

CRUISE REPORT AND PRELIMINARY RESULTS
CSS HUDSON 87- 033

SEPTEMBER 18 - OCTOBER 7, 1987

Compiled by

G. Vilks and C. Powell

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Sailing instructions and scientific staff

CRUISE NO: 87-033

MASTER: Capt. L. Strum

SENIOR SCIENTIST: G. Vilks

SCHEDULE: September 18, 1987 - Clyde River NWT to October 7, 1987
- St. John's, Nfld.

AGENCY: Atlantic Geoscience Centre, Memorial University

OPERATIONAL AREAS: Baffin Bay, Davis Strait, Hudson Strait,
Labrador Sea and Northeast Newfoundland
Shelf

PURPOSE: To establish sedimentary history on Baffin Island Shelf
and to extend Quaternary stratigraphy in the other areas.

EQUIPMENT INVOLVED: Huntec DTS - 540 Joule, 4000 Volts, AGC
Number 2 Deep Tow. Firing Rate 3/4 sec., 1/4
sec. sweep, displayed on EPC 4100. External
and internal hydrophones. Waverly thermal
line scan recorder.
Air gun - 40 cu. inch with 100 ft, 25 ft and
NSRF towed streamers.
Sounders - 3.5 and 12 kHz
Bottom samplers - Long Coring Facility and
Van Veen.

SCIENTIFIC STAFF LIST AND AFFILIATION

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The LCF coring program

G. Vilks

The purpose of the LCF coring on this cruise was to return to sites that have been previously cored with the conventional piston corers and reach deeper targets with the longer coring facility. The scientific objectives were to study sedimentary processes and chronostratigraphy in Baffin Bay (Memorial University and AGC), Davis Strait and Northeastern Labrador Sea (University of Quebec, Montreal), Resolution Basin (INSTAAR), Hudson Strait, Labrador Shelf (AGC), NE Newfoundland Shelf and Bonavista Bay (Memorial University). The sedimentary features to be cored were identified on Huntec DTS records of previous site surveys. Each selected site was resurveyed and cored when the feature was identified.

LCF cores were retrieved at 18 localities from 20 attempted. Sediments were not collected at station 1 in Baffin Bay due to loss of all core pipes. At station 10 in Resolution Basin the corer was empty despite favorable sea floor conditions showing on the site survey seismic records. One planned locality in outer Hudson Strait was abandoned when seismic site survey showed insufficient thickness of sediments. Another site on the continental slope of southeastern Labrador Shelf was abandoned because of high winds.

The coring was carried out with 9, 12 or 15 m barrels, depending on the thickness of sediments overlying the target. 65 per cent was the average core recovery; it was poor in Davis Strait, but highest in Hudson Strait, Cartwright Saddle on

Labrador Shelf, a small basin on the northeastern Newfoundland Shelf and in Bonavista Bay. Poor recovery was attributed to partial penetration of the corer in coarse and compacted sediments and to loss of sandy sediments.

Because of the loss of 30 metres of core barrel at Station 1 and insufficient number of spare barrels on board, we were not able to utilize the LCF to its full potential. In Davis Strait and other localities where the recovery was poor with the shorter barrel, this loss did not effect the coring results. However, at eight coring sites where the recovery was better than 90%, (Table 11) longer core barrel would have given us the desired extended core lengths.

The recovery data in Table 11 also gives some indication of the potential of the LCF. Despite careful selection of coring sites on the basis of detailed high resolution seismic surveys, only eight coring attempts from 19 were fully successful. Apart from mechanical problems at station 1, the sea floor conditions seem to play a major part in successful coring. Although the seismic data show sufficient thicknesses of soft sediments, a thin gravel layer at the sediment water interface may play a major role in slowing down the corer or preventing penetration. This may be the major reason for zero recovery at station 10. The LCF corer has no free fall through the water column and therefore can not punch its way through a hard surface layer. Longest cores were recovered in basins that consist of silty clays and show no evidence for the presence of gravel.

Table 11

Core recovery summary

| NO | LATITUDE N | LONGITUDE W | DEPTH M | BARREL M | TRIGGER CM | PISTON M | %REC. |
|----|------------|-------------|---------|----------|------------|----------|-------|
| 01 | 71 39.94 | 65 50.64 | 2255 | 30.5 | 69 | 0 | 0 |
| 02 | 70 19.62 | 64 18.41 | 2056 | 9.8 | 138 | 5.5 | 56 |
| 03 | 70 20.77 | 64 22.28 | 2056 | 9.8 | 52 | 6.4 | 65 |
| 04 | 69 17.00 | 69 15.49 | 124 | 15.5 | 5 | 6.6 | 44 |
| 05 | 69 17.25 | 69 13.00 | 139 | 9.8 | 27 | 6.1 | 62 |
| 06 | 64 59.23 | 58 24.43 | 1088 | 15.2 | 0 | 2.5 | 16 |
| 07 | 64 24.01 | 57 25.20 | 823 | 12.2 | 74 | 3.0 | 25 |
| 08 | 62 38.91 | 53 53.07 | 2424 | 12.2 | 221 | 11.6 | 95 |
| 09 | 62 30.99 | 59 26.82 | 1437 | 12.2 | 133 | 11.2 | 92 |
| 10 | 61 47.45 | 63 53.77 | 574 | 15.2 | 0 | 0 | 0 |
| 11 | 60 55.93 | 65 24.68 | 896 | 15.2 | 90 | 12.44 | 82 |
| 12 | 61 03.45 | 66 26.04 | 772 | 15.2 | 122 | 15.2 | 100 |
| 13 | 60 57.49 | 66 27.75 | 786 | 15.2 | 135 | 14.6 | 96 |
| 15 | 50 45.83 | 62 15.39 | 188 | 15.2 | 177 | 10.5 | 69 |
| 16 | 56 04.99 | 58 48.63 | 420 | 15.2 | 65 | 5.2 | 34 |
| 17 | 54 36.99 | 56 10.60 | 514 | 15.2 | 135 | 13.8 | 91 |
| 18 | 54 44.71 | 56 03.05 | 460 | 15.2 | 114 | 14.7 | 96 |
| 19 | 50 54.51 | 53 15.63 | 453 | 15.2 | 125 | 15.1 | 99 |
| 20 | 48 33.40 | 58 39.40 | 305 | 15.2 | 114 | 13.8 | 91 |

The Memorial University Program

A. Aksu and R. Hiscott

The main objectives for the Memorial University Program on Cruise 87033 were (1) to study in detail the sedimentary processes on undisturbed glaciated continental slopes using seismic techniques and accurately positioned cores, (ii) to correlate seismic stratigraphy of ODP Site 645 with stages of slope evolution (iii) to resolve the chronostratigraphy of Baffin Bay and Davis Strait basinal sediments through detailed studies of microfossils and stable isotopes and (iv) to determine the glacial history of Bonavista Bay, northeast Newfoundland.

To reach the above objectives the following activity was proposed: (i) carry out ca 1000 kilometres of seismic survey along the Baffin Island margin between water depths of 200 and 2300 metres, (ii) collect three ca 30 metre long piston cores in central Baffin Bay, Davis Strait and NW Labrador Sea and (iii) collect ca 100 line kilometres of seismic data and one long piston core from Bonavista Bay, NE Newfoundland.

The program began with an unsuccessful attempt to take a 30 m core when the barrel departed immediately below the core head due to coupling failure. The activity (ii) was only partly completed with a shorter core barrel.

From day 262/0400 until 266/ 0700 ca 1,300 line-kilometres of seismic data were collected in the area bounded by the following Latitude/Longitude coordinates: 71 05'N/ 68 25'W, 71 30'N/66 10'W, 69 50'N/65 30'W, and 70 20'N/63 40W. The instruments used in data collection were (i) a 40 cubic inch air

gun with 100' and 25' NSRF streamers; (ii) 3.5 kHz system and (iii) about 24 hours total use of HUNTEC DTS. Excessive water depths and interference between seismic systems precluded effective use of HUNTEC in this survey.

Ten slope-perpendicular and two slope-parallel lines in water depths of ca 200 to 2300 m showed that the lower slope contains significant quantities of lenticular, acoustically transparent units interpreted as debris flow or debris slide deposits, which were apparently derived from large erosional scars or escarpments on the upper slope. The apparent maximum thickness of section removed from the upper slope region is about 500 m.

The acoustically transparent lenses range in thickness from a few metres to approximately 100 m as interpreted from airgun profiles, and also 3.5 kHz profiles with penetration as deep as 15 m. The presence of several clear examples of this type of unit in the upper 10 m (3.5 kHz) allowed us to select two coring sites near the distal end of a thin debrite immediately downslope from the ODP Site 645. Core 87033002 LCF penetrated the debrite lens from a depth of 223 cm to the bottom of the core at 546 cm; 87033003 LCF penetrated only the feather edge of the same debrite at subbottom depths between 299 to 350 cm, verifying the geometry of the unit as deduced from the seismic data. The debrite consists of cohesive silty mud to muddy sand (5Y4/1) with scattered granules and pebbles to maximum size of 6 cm.

Two Davis Strait cores 87033006 and 87033007 were shorter than Benthos piston cores at corresponding localities. Core 87033006 was taken with a 15 metre barrel and was only 2.5 m

long. A ca 9 m core 77027017 was recovered from the same locality with the Benthos piston corer. A 12 m barrel was used for Core 87033007 and only 3m of sediment was recovered. The failure of the LCF to recover longer piston cores was attributed to the coarse nature of the sediments. For this reason one of Memorial coring sites in the NW Labrador Sea was omitted.

Approximately 150 line-kilometres of high resolution seismic data and a 14 m long piston core were collected from Bonavista Bay.

Magnetic susceptibility

F. Hall

Whole core magnetic susceptibility was measured at 3 cm intervals on 18 trigger weight and piston cores. A Barrington Instruments magnetic susceptibility sensor and meter, linked to a Data General DG-1 computer, was used. Results are plotted in uncorrected c.g.s. units (Figure 2) and downcore depths may vary slightly from true core depths. Magnetic susceptibility is used as an estimate of the relative concentration of magnetic minerals, differences in grain size and sediment porosity.

Magnetic susceptibility for cores 87033-8 and 9 was determined C. Guilmette, the remainder by F. Hall.

Shipboard physical properties program

Janice Marsters

After removal from the barrel, the cores were cut into 1.3 m sections and the ends were capped and taped. The cores that were not to be processed immediately were sealed with beeswax and stored upright in the refrigerated locker, others were stored upright on deck before processing.

Cores 02, 03, 09, 11, 12, 13, 15, 17, and 18 were split onboard, with a full suite of physical property tests performed, along with the standard description and photography. The core liners were split using the AGC mounted router. Meter tape was placed along both halves of the cores to assist identifying downcore depth for subsampling and description. The sediment was then split using the electric knife setup or piano wire, depending on the type of material.

After splitting, the working half of the core was immediately covered with plastic film to prevent moisture loss. The archive half was photographed and described, and physical properties testing was performed on the working half. Dalhousie University's Digital Sound Velocimeter was used to measure vertical and horizontal velocities at intervals of approximately 20 cm. Vane shear measurements were performed in the areas between velocimeter sample sites, also at an interval of approximately 20 cm, using AGC's motorized shear vane apparatus. The velocity and strength data will be analysed at Dalhousie University and the results summarized in a report as provided by the existing contract.

Once the "undisturbed" tests were completed, the working half of the core was subsampled for analysis to be performed at a later date. Bulk density samples (approximately 10 cc) were extracted from the working half of the core at the velocimeter test sites. The pore water will be extracted from a portion of these bulk density samples for a salinity measurement. These samples will be analyzed in AGC's geotechnical lab., and the results included in the report supplied by Dalhousie University.

Consolidation and triaxial samples were also taken from three cores (11, 15 and 18) in the form of whole round 35 cm samples. These will be analysed at a later date by Harold Christian of AGC and /or by Les Shepard of SANDIA. The trimmings and the final dried samples will be available for other studies. Samples were not taken on board for Atterberg limits or ASTM grain size testing. These samples will be taken later where the need is indicated by the initial geotechnical analysis.

SAMPLE INVENTORY 87-033

| <u>STATION NUMBER</u> | <u>SAMPLE TYPE</u> | <u>DAY/TIME (GMT)</u> | <u>LATITUDE</u> | <u>LONGITUDE</u> | <u>DEPTH (METRES)</u> | <u>GEOGRAPHIC LOCATION</u> |
|---------------------------|------------------------|---------------------------|-----------------|------------------|---------------------------|--------------------------------|
| 001 | LCF CORE | 2620224 | 71 39.94N | 65 50.64W | 2255 | BAFFIN BAY |
| 002 | LCF CORE | 2661333 | 70 19.62N | 64 18.42W | 2056 | BAFFIN BAY |
| 003 | LCF CORE | 2661856 | 70 20.77N | 64 22.28W | 2056 | BAFFIN BAY |
| 004 | LCF CORE | 2671352 | 69 17.00N | 69 15.49W | 124 | ITIRBILUNG FIORD |
| 005 | LCF CORE | 2671920 | 69 17.25N | 69 13.00W | 139 | ITIRBILUNG FIORD |
| 006 | LCF CORE | 2682323 | 66 59.23N | 58 24.43W | 1088 | DAVIS STRAIT |
| 007 | VAN VEEN | 2692115 | 64 24.89N | 57 21.90W | 823 | DAVIS STRAIT |
| 007 | LCF CORE | 2692215 | 64 24.01N | 57 25.20W | 823 | DAVIS STRAIT |
| 008 | LCF CORE | 2701942 | 62 38.91N | 53 53.07W | 2424 | DAVIS STRAIT |
| 009 | LCF CORE | 2711754 | 62 30.99N | 59 26.82W | 1437 | DAVIS STRAIT |
| 010 | LCF CORE | 2721046 | 61 47.45N | 63 53.77W | 574 | RESOLUTION BASIN |
| 011 | LCF CORE | 2721809 | 60 55.93N | 65 24.68W | 896 | HUDSON STRAIT |
| 012 | LCF CORE | 2731042 | 61 03.45N | 66 26.04W | 772 | HUDSON STRAIT |
| 013 | LCF CORE | 2731459 | 60 57.49N | 66 26.75W | 786 | HUDSON STRAIT |
| 014 | N/A | N/A | N/A | N/A | N/A | CANCELLED |
| 015 | LCF CORE | 2741332 | 58 45.83N | 62 15.39W | 188 | SAGLEK |
| 016 | LCF CORE | 2750858 | 56 04.95N | 58 48.63W | 420 | HOPEDALE SADDLE |
| 017 | LCF CORE | 2761523 | 54 36.99N | 56 10.60W | 514 | CARTWRIGHT SADDLE |
| 018 | LCF CORE | 2770727 | 54 44.71N | 56 03.05W | 460 | CARTWRIGHT SADDLE |
| 019 | LCF CORE | 2790514 | 50 54.51N | 53 15.63W | 453 | NFLD SHELF |
| 020 | LCF CORE | 2790748 | 48 33.40N | 58 39.40W | 305 | BONAVISTA BAY |

TABLE 2

CORE SAMPLES 87-033

| SAMPLE NUMBER | SAMPLE TYPE | JULIAN DAY/TIME | LATITUDE LONGITUDE | DEPTH (MTRS) | CORER LENGTH (CM) | APP. PENN (CM) | CORE LENGTH (CM) | NO OF SECT | SEISMIC TIME | GEOGRAPHIC LOCATION | NOTES |
|---------------|-------------|-----------------|------------------------|--------------|-------------------|----------------|------------------|------------|--------------|---------------------|---|
| 001 | LCF CORER | 2620224 | 71 39.94N 65 50.64W | 2255 | 3000 | N/A | N/A | 0 | | BAFFIN BAY | LCF CAME UP WITH NO CORE BARRELS ATTACHED. COUPLING FAILURE. |
| 002 | LCF CORER | 2661333 | 70 19.62N 64 18.42W | 2056 | 912 | 700 | 552 | 4 | | BAFFIN BAY | 1. WIRE STRAIN-DOWN 12-14, SERBED 14.5, PULL OUT 22. 2. WATER DEPTH CHANGED TO 2052 M. 3. SUBSAMPLES: CUTTER WAS EXTRUDED KEEPING TOP AND CORE LIKE SHAPE INTACT. THIS WAS STORED IN A BAG LABELLED CUTTER WITH AN ARROW INDICATING TOP. 40CM LONG. ANOTHER PIECE EXTRUDED FROM C-C APPROX. 12CM LONG. BOTTOM OF C EXTRUDED OUT AND IS STORED IN A CAP-THIS IS STORED IN A CAP + AN EXTRA PIECE OF CORE LINER. NO DAMAGE TO CORER OR LINERS. |
| 003 | LCF CORER | 2661856 | 70 20.77N 64 22.28W | 2056 | 912 | 638 | 636 | 5 | | BAFFIN BAY | 1. WIRE STRAIN DOWN 12-14, PULL OUT 21. 2. SUBSAMPLES: CUTTER WAS EXTRUDED AND PLACED IN A BAG WITH TOP INDICATED 33CM LONG. A RATHER LONG SECTION EXTRUDED OUT BETWEEN C-C 2 BAGS WERE FILLED ONE PIECE IS 34CM, THE OTHER 6CM THESE ARE APPROX. PIECES WERE COMPRESSED SLIGHTLY GETTING THEM IN BAGS. 3. THE TOP SECTION E-F GOT TOTALLY LIQUAFIED DURING PROCESSING ON DECK. IT WAS VERY FULL OF WATER. NO DAMAGE TO CORER OR LINERS. |
| 004 | LCF CORER | 2671352 | 69 17.00N 69 15.49W | 124 | 1520 | 608 | 662 | 6 | 2671218 | ITIRBILUNG FIOR | CORE WAS TAKEN OFF CENTRE IN THE FIOR. MORE TOWARDS THE SIDE ENTRY GLACIER. CREW INDICATED THE CORER HIT BOTTOM AT 110M INSTEAD OF 124M. URI PEOPLE BELIEVE THAT THE CORER FELL OVER ON IT'S SIDE AND SUCKED IN A LOT OF SURFACE SEDIMENT. SECTION A-C WAS HAMMERED OUT OF THE BARREL AND CONSIDERABLE CORE FLOWED OUT OF THE C-END. APPROX 30-50CM, ALSO A PIECE FELL OUT AT B-BOTTOM. SEDIMENT SO LIQUIFIED THAT IT WAS HARD TO CONTAIN BEFORE CAPPING, THUS ACCOUNTING FOR GAPS IN EACH SECTION. NO DAMAGE TO CORER. |

TABLE 2

CORE SAMPLES 87-033

| SAMPLE NUMBER | SAMPLE TYPE | JULIAN DAY/TIME | LATITUDE LONGITUDE | DEPTH (MTRS) | CORER LENGTH (CM) | APP. PENN (CM) | CORE LENGTH (CM) | NO OF SECT | SEISMIC TIME | GEOGRAPHIC LOCATION | NOTES |
|---------------|-------------|-----------------|------------------------|--------------|-------------------|----------------|------------------|------------|--------------|---------------------|--|
| 005 | LCF CORER | 2671920 | 69 17.25N 69 13.00W | 139 | 1520 | 608 | 608 | 4 | 2671219 | ITIRBILUNG FJORD | CUTTER WAS FULL OF HOMOGENEOUS GREY SAND (MED WELL SORTED) WITH LOTS OF HEAVY MINERALS. STORED IN A BAG IN THE COOLER. C-C A SAMPLE FELL OUT DURING HANDLING ON DECK, IT WAS PUT IN A BAG. E-E A SAMPLE AT THE SURFACE FELL OUT OF THE BARREL. E-G THIS WAS IT FOR SEDIMENT FOR THAT BARREL. IT WAS PUT IN A BAG. ALL CORE PARTS ARE STORED IN A BUCKET LABELLED 87-033 SCHAFFER IN THE COOLER. NO DAMAGE TO CORER OR LINERS. |
| 006 | LCF CORER | 2682323 | 66 59.23N 58 24.43W | 1089 | 1520 | 608 | 246 | 2 | | DAVIS STRAIT | CATCHER DAMAGED. A CONSIDERABLE LENGTH OF CORE FELL OUT WHILE CORER WAS BEING RAISED OUT OF THE WATER, 1-2M POSSIBLE LOSS. SECTION A-C LINER WAS JAMMED IN THE BARREL. INSERTED METAL PUSHER IN THE C-END AND HAMMERED WITH A SLEDGEHAMMER, TRIED THE SAME THING WITH AT A-END. REMOVED BY PUSHING A CORE LINER IN C-END. CORE CATCHER SEVERLY BENT AND BROKEN. THE CORE CUTTER SAMPLE WAS EXTRUDED IN ONE PIECE WITH THE TOP INTACT, IT WAS PLACED IN A 1/2 LINER AND WRAPPED AND LABELLED CUTTER 87-033-006. |
| 007 | LCF CORER | 2692215 | 64 24.01N 57 25.20W | 823 | 1216 | 608 | 304 | 2 | 2691900 | DAVIS STRAIT | A SAMPLE WAS PRESERVED FROM EXTRUDED THE SEDIMENT OUT OF CORE CUTTER IN 2 BAGS (25CM). PIECES FELL OUT WHILE LINER WAS BEING REMOVED, AT THE C-END (24CM). TO GET THE LINER OUT OF THE BARREL THE LINER WAS HIT SEVERAL TIMES. SEDIMENT IN THE CORE WAS GRITTY WITH SEVERAL LARGE CLASTS VISIBLE AT EACH END. TEMPERATURE 3.8 DEG. CORE WAS TAKEN FOR ANNE DEVERNAL-UNIVERSITI DE QUEBEC. NO DAMAGE TO CORER OR LINERS. |
| 008 | LCF CORER | 2701942 | 62 38.91N 53 53.07W | 2424 | 1216 | 1216 | 1162 | 8 | 2701400 | DAVIS STRAIT | CUTTER WAS EXTRUDED AND PUT IN A CORE LINER IN A BAG. SMALL PIECE FELL OUT AT E, IN A BAG. SMALL PIECE FELL OUT AT G, IN A BAG. THER WAS NO DAMAGE, NO BANGING TO GET THE LINERS OUT. TEMPERATURE 4.8 DEG. CORE IS FOR ANNE DEVERNAL. |

TABLE 2

CORE SAMPLES 87-033

| SAMPLE NUMBER | SAMPLE TYPE | JULIAN DAY/TIME | LATITUDE LONGITUDE | DEPTH (MTRS) | CORER LENGTH (CM) | APP. PENN LENGTH (CM) | CORE LENGTH (CM) | NO OF SECT | SEISMIC TIME | GEOGRAPHIC LOCATION | NOTES |
|---------------|-------------|-----------------|------------------------|--------------|-------------------|-----------------------|------------------|------------|--------------|---------------------|---|
| 009 | LCF CORER | 2711754 | 62 30.99N 59 26.82W | 1437 | 1218 | 1248 | 1122 | 8 | 2711625 | DAVIS STRAIT | CUTTER SAMPLE EXTRUDED. CATCHER SAMPLE IN A VIAL. NO BANGING OR HITTING TO GET THE LINERS OUT. TEMPERATURE 5.3DEG. 20 KIPS PULL-OUT. |
| 010 | LCF CORER | 2721046 | 61 47.45N 63 53.77W | 574 | | 0 | 0 | 0 | 2720702 | RESOLUTION BASIN | LONG CORER CAME UP WITH 4 PEBBLES-NOTHING ELSE. NO DAMAGE. PULLOUT 11 KIPS. |
| 011 | LCF CORER | 2721809 | 60 55.93N 65 24.68W | 896 | 1520 | 1300 | 1244 | 9 | 2721700 | HUDSON STRAIT | CUTTER 38CM LONG, PLUS BAGGED SAMPLE OF OUTSIDE OF CORE. E-E 15CM PIECE (EXPANSION). TEMPERATURE 1.1 DEG. PULLOUT 15 KIPS. |
| 012 | LCF CORER | 2731042 | 61 03.45N 66 26.04W | 772 | 1520 | 1600 | 1519 | 11 | 2730237 | HUDSON STRAIT | 16 KIPS PULLOUT. TEMPERATURE 1.3DEG CUTTER-23CM. CATCHER SAMPLE. NO EXTRUDED PIECES. NO BANGING ON CORE DURING CORE BREAKING. NOTE THE SECTION 2ND FROM TOP IS 12' NOT 10'-THER IS AN EXTRA 2' SECTION IN THE BARREL-THIS IS DUE TO AN EXTRA COUPLING ON THE BARREL.NO DAMAGE TO THE CORE. |
| 013 | LCF CORER | 2731459 | 60 57.49N 66 26.75W | 786 | 1520 | 1580 | 1460 | 10 | 2731406 | HUDSON STRAIT | 19 KIPS PULLOUT. CUTTER-40CM. TOP LINER WAS BENT-SIGNS OF A POTENTIAL IMPLOSION IN J-K. LINER BENT IN-BUT DID NO BREAK. NO DAMAGE TO CORE. |
| 015 | LCF CORER | 2741332 | 58 45.83N 62 15.39W | 188 | 1520 | 1050 | 1050 | 7 | 2741230 | SAGLEK | 18 KIPS PULLOUT. A SECTION EXTRUDED OUT OF THE BOTTOM OF D-E WHEN CORE WAS BEING HANDLED ON DECK. IT WAS 35CM LONG AND IS BAGGED. THE CORE CUTTER WAS VERY DIFFICULT TO EXTRUDE, DUE TO THE NATURE OF THE SEDIMENT-DARK GREY STIFF SANDY SILTY MUD, VERY COHESIVE, WITH GRAVEL, COBBLES AND BROKEN SHELLS AND SHINY FORAMS. ONLY 1/2 OF THE CUTTER BELOW THE FLAPPER VALVE WAS EXTRUDABLE-ITS IN A CORE TUBE APPROX. 17CM LONG. 2 VIALS WERE SUBSAMPLED FOR FUTURE ANALYSIS. CATCHER WAS FULL OF SAME SEDIMENT. |

TABLE 2

CORE SAMPLES 87-033

| SAMPLE NUMBER | SAMPLE TYPE | JULIAN DAY/TIME | LATITUDE LONGITUDE | DEPTH (MTRS) | CORER LENGTH (CM) | APP. PENN (CM) | CORE LENGTH (CM) | NO OF SECT | SEISMIC TIME | GEOGRAPHIC LOCATION | NOTES |
|---------------|-------------|-----------------|------------------------|--------------|-------------------|----------------|------------------|------------|--------------|---------------------|---|
| 016 | LCF CORER | 2750858 | 56 04.95N 58 48.63W | 420 | 1520 | 604 | 523 | 4 | 2750600 | HOPEDALE SADDLE | 20 KIPS PULLOUT. TEMPERATURE 3.0DEG TWO PIECES FELLOUT AT C WHILE CORE WAS BEING PROCESSED ON DECK, IN BAGS. TOP PIECE E-F WAS PUT IN A LINER AFTER IT FELL OUT INTO THE BARREL. |
| 017 | LCF CORER | 2761523 | 54 36.99N 56 10.60W | 514 | 1512 | 1600 | 1381 | 10 | 2761353 | CARTWRIGHT SADDLE | 19 KIPS PULLOUT. TEMPERATURE 2.6DEG AT A. DARK GREY CLAY-IN CATCHER AND CUTTER (VERY COHESIVE). CUTTER SAMPLE-WRAPPED IN A LINER WITH TOP INDICATED. NO PIECES EXTRUDED. NO DAMAGE TO CORE. |
| 018 | LCF CORER | 2770727 | 54 44.71N 56 03.05W | 460 | 1520 | 1266 | 1465 | 6 | 2770005 | CARTWRIGHT SADDLE | 12 KIPS PULLOUT. TEMPERATURE 2.1DEG A SECTION FELL OUT (INTO THE OCEAN) AT E-APPROX. LENGTH 15-20CM. A CUTTER AND CATCHER SAMPLE WERE TAKEN. |
| 019 | LCF CORER | 2780514 | 50 54.51N 53 15.63W | 453 | 1512 | 1900 | 1506 | 11 | 2780420 | NFLD SHELF | TEMPERATURE 5.1DEG. FINE CLAY-2" STICKING OUT END OF THE CUTTER. ON THE LCF THE 4TH 10' BARREL IS REALLY 12' LONG THUS THE J-I SAMPLE J-I WAS DROPPED (ACCIDENTLY) ON THE DECK. CUTTER SAMPLE IS IN A 1/2 CORE LINER WRAPPED IN A BAG-40CM LONG WITH TOP INDICATED. |
| 020 | LCF CORER | 2790748 | 48 33.40N 58 39.40W | 305 | 1520 | 1600 | 1376 | 10 | 2790015 | BONAUISTA BAY | THERE IS AN EXTRA SECTION-2' IN THE 4TH BARREL BECAUSE IT IS 12' LONG DUE TO AN EXTRA COUPLING. CUTTER WAS EXTRUDED INTO A CORE HALF-BAGGED AND LABELLED WITH AN UP ARROW. 30-40CM LONG. CATCHER WAS SUB-SAMPLED IN A BAG BY AKSU. NO DAMAGE. |

TABLE 3

CORE SAMPLES 87-033

| SAMPLE NUMBER | SAMPLE TYPE | JULIAN DAY/TIME | LATITUDE LONGITUDE | DEPTH (MTRS) | CORER LENGTH (CM) | APP. PENN (CM) | CORE LENGTH (CM) | NO OF SECT | SEISMIC TIME | GEOGRAPHIC LOCATION | NOTES |
|---------------|--------------|-----------------|------------------------|--------------|-------------------|----------------|------------------|------------|--------------|---------------------|---|
| 001 | TRIGGER CORE | 2620224 | 71 39.94N 65 50.64W | 2255 | 250 | 180 | 69 | 1 | | BAFFIN BAY | ONE SUBSAMPLE-CUTTER-IN A VIAL. |
| 002 | TRIGGER CORE | 2661333 | 70 19.62N 64 18.42W | 2056 | 250 | 180 | 138 | 1 | | BAFFIN BAY | CUTTER SUBSAMPLE IN A VIAL. |
| 003 | TRIGGER CORE | 2661856 | 70 20.77N 64 22.28W | 2056 | 250 | 180 | 52 | 1 | | BAFFIN BAY | NO SUBSAMPLES FROM CORE. |
| 004 | TRIGGER CORE | 2671352 | 69 17.00N 69 15.49W | 124 | 250 | 0 | 5 | 1 | 2671218 | ITIRBILUNG FIORD | SMALL (95CM) TWC PRESERVED. OLIVE GREY MUD. SMALL % OF SILT. CATCHER SAMPLE STORED IN A VIAL. BOTH STORED IN HUDSON'S COOLER. |
| 005 | TRIGGER CORE | 2671920 | 69 17.25N 69 13.00W | 139 | 250 | 180 | 27 | 1 | 2671218 | ITIRBILUNG FIORD | NO SUBSAMPLES TAKEN |
| 006 | TRIGGER CORE | 2682323 | 66 59.23N 58 24.43W | 1088 | 250 | 180 | 0 | 0 | | DAVIS STRAIT | CUTTER AND CATCHER CLEAN. NO SAMPLE. |
| 007 | TRIGGER CORE | 2692215 | 64 24.01N 57 25.20W | 823 | 250 | 180 | 74 | 1 | 2691900 | DAVIS STRAIT | CORE CATCHER CLEAN-NO CUTTER SAMPLE. |
| 008 | TRIGGER CORE | 2701942 | 62 38.91N 53 53.07W | 2424 | 250 | 230 | 221 | 2 | 2701400 | DAVIS STRAIT | CUTTER AND CATCHER CLEAN. |
| 009 | TRIGGER CORE | 2711754 | 62 30.99N 59 26.82W | 1437 | 250 | 250 | 133 | 1 | 2711625 | DAVIS STRAIT | CUTTER AND CATCHER CLEAN. NO SUB-SAMPLES. |
| 010 | TRIGGER CORE | 2721046 | 61 47.45N 63 53.77W | 574 | 250 | 0 | 0 | 0 | 2720702 | RESOLUTION BASIN | CORE CAME UP EMPTY. |
| 011 | TRIGGER CORE | 2721809 | 60 55.93N 65 24.68W | 896 | 250 | 150 | 90 | 1 | 2721700 | HUDSON STRAIT | CATCHER AND CUTTER EMPTY. |
| 012 | TRIGGER CORE | 2731042 | 61 03.45N 66 26.04W | 772 | 250 | 180 | 122 | 1 | 2730237 | HUDSON STRAIT | CUTTER, CATCHER CLEAN NO SUBSAMPLES |
| 013 | TRIGGER CORE | 2731459 | 60 57.49N 66 26.75W | 786 | 250 | 180 | 135 | 1 | 2731406 | HUDSON STRAIT | CUTTER, CATCHER CLEAN NO SUBSAMPLES |
| 015 | TRIGGER CORE | 2741332 | 58 45.83N 62 15.39W | 188 | 250 | 180 | 132 | 1 | 2741230 | SAGLEK | CATCHER AND CUTTER CLEAN. NO SUBSAMPLES. |
| 016 | TRIGGER CORE | 2750858 | 56 04.95N 58 48.63W | 420 | 250 | 170 | 65 | 1 | 2750600 | HOPEDALE SADDLE | NO CUTTER, CATCHER SUBSAMPLES. |

TABLE 3

CORE SAMPLES 87-033

| SAMPLE NUMBER | SAMPLE TYPE | JULIAN DAY/TIME | LATITUDE LONGITUDE | DEPTH (MTRS) | CORER LENGTH (CM) | APP. PENN (CM) | CORE LENGTH (CM) | NO OF SECT | SEISMIC TIME | GEOGRAPHIC LOCATION | NOTES |
|---------------|--------------|-----------------|------------------------|--------------|-------------------|----------------|------------------|------------|--------------|---------------------|--|
| 017 | TRIGGER CORE | 2761523 | 54 36.99N 56 10.60W | 514 | 250 | 180 | 135 | 1 | 2761353 | CARTWRIGHT SADDLE | NO CUTTER, CATCHER SUBSAMPLES. |
| 018 | TRIGGER CORE | 2770727 | 54 44.71N 56 03.05W | 460 | 250 | 170 | 114 | 1 | 2770005 | CARTWRIGHT SADDLE | NO CUTTER OR CATCHER SAMPLES. |
| 019 | TRIGGER CORE | 2780514 | 50 54.51N 53 15.63W | 453 | 250 | 230 | 125 | 1 | 2780420 | NFLD SHELF | |
| 020 | TRIGGER CORE | 2790748 | 48 33.40N 58 39.40W | 305 | 250 | 250 | 114 | 1 | 2790015 | BONAVISTA BAY | MUD WAS UP OVER TOP WEIGHT. NO CATCHER-CUTTER SUBSAMPLE. |

86-040 GRABS

| SAMPLE NUMBER | SAMPLE TYPE | JULIAN DAY/TIME | LATITUDE | LONGITUDE | DEPTH (MTRS) | NO OF ATTEMPTS | NO OF SUBSAMPLES | GEOGRAPHIC LOCATION | NOTES |
|------------------|----------------|--------------------|-----------|-----------|-----------------|----------------------|------------------------|------------------------|--|
| 007 | VANVEEN | 2692115 | 64 24.89N | 57 21.90W | 823 | 2 | 4 | DAVIS STRAIT | FIRST ATTEMPT WAS WITH A SHIPEK, CLOSED BUT ONLY A FEW SAND GRAINS. SECOND -VANVEEN FULL, SURFACE WAS WATERY AND SOUPY, OLIVE (GREENISH) SANDY, SILTY MUD. SUB-SURFACE A MORE COHESIVE GREYER UNIT, HIGH IN SAND AND SILT. MACROFAUNA PRESENT. |

TABLE 5

3.5 ACOUSTIC PROFILER RECORDS 87-033

| <u>ROLL NUMBERS</u> | <u>START DAY/TIME</u> | <u>STOP DAY/TIME</u> | <u>LINE NUMBER</u> | <u>GEOGRAPHIC LOCATION</u> | <u>RECORDER</u> | <u>NOTES</u> |
|---------------------|-----------------------|----------------------|--------------------|----------------------------|-----------------|--------------|
| 001 | 2611950 | 2620430 | | BAFFIN BAY | EPC | |
| 002 | 2620435 | 2630340 | | BAFFIN BAY | EPC | |
| 003 | 2630340 | 2640135 | | BAFFIN BAY | EPC | |
| 004 | 2640135 | 2642115 | | BAFFIN BAY | EPC | |
| 005 | 2642115 | 2642215 | | BAFFIN BAY | EPC | |
| 006 | 2642220 | 2650110 | | BAFFIN BAY | EPC | |
| 007 | 2650130 | 2651335 | | BAFFIN BAY | EPC | |
| 008 | 2651545 | 2661045 | | BAFFIN BAY | EPC | |
| 009 | 2661050 | 2662340 | | BAFFIN BAY | EPC | |
| 010 | 2682200 | 2701810 | | DAVIS STRAIT | EPC | |
| 011 | 2711135 | 2721810 | | DAVIS STRAIT | EPC | |

TABLE 6

12 KHZ BATHYMETRY RECORDS 87-033

| <u>ROLL NUMBERS</u> | <u>START DAY/TIME</u> | <u>STOP DAY/TIME</u> | <u>LINE NUMBER</u> | <u>GEOGRAPHIC LOCATION</u> | <u>RECORDER</u> | <u>NOTES</u> |
|---------------------|-----------------------|----------------------|--------------------|----------------------------|-----------------|--------------|
| 001 | 2611950 | 2621105 | | BAFFIN BAY | L.S.R. | |
| 002 | 2621114 | 2632200 | | BAFFIN BAY | L.S.R. | |
| 003 | 2632205 | 2651345 | | BAFFIN BAY | L.S.R. | |
| 004 | 2651535 | 2662350 | | BAFFIN BAY | L.S.R. | |
| 005 | 2671125 | 2671325 | | IIIRBILUNG FIORD | L.S.R. | |
| 006 | 2682145 | 2701850 | | DAVIS STRAIT | L.S.R. | |
| 007 | 2711120 | 2721955 | | DAVIS STRAIT | L.S.R. | |
| 008 | 2722005 | 2780420 | | LABRADOR SEA | L.S.R. | |
| 009 | 2781630 | 2780600 | | BONAVISTA BAY | L.S.R. | |
| 010 | 2790640 | 2790745 | | BONAVISTA BAY | L.S.R. | |

TABLE 7

AIRGUN SEISMIC RECORDS 87-033

| <u>ROLL NUMBERS</u> | <u>START DAY/TIME</u> | <u>STOP DAY/TIME</u> | <u>LINE NUMBER</u> | <u>GEOGRAPHIC LOCATION</u> | <u>RECORDER</u> | <u>HYDROPHONE</u> | <u>NOTES</u> |
|---------------------|-----------------------|----------------------|--------------------|----------------------------|-----------------|-------------------|------------------------------|
| 001 | 2612219 | 2641400 | | BAFFIN BAY | L.S.R. | 100' | CHANGE TO 100' AT 2641106 |
| 002 | 2641410 | 2651335 | | BAFFIN BAY | L.S.R. | 100' | |
| 003 | 2651550 | 2662345 | | BAFFIN BAY | L.S.R. | 100' | |
| 004 | 2682150 | 2701805 | | DAVIS STRAIT | L.S.R. | 100' | |
| 005 | 2711130 | 2711640 | | DAVIS STRAIT | L.S.R. | 100' | |
| 006 | 2720525 | 2730920 | | RESOLUTION BASIN | L.S.R. | 100' | |
| 007 | 2732315 | 2770610 | | LABRADOR SEA | L.S.R. | 100' | |
| 008 | 2781635 | 2790600 | | BONAVISTA BAY | L.S.R. | 100' | |
| 001 | 2612020 | 2641415 | | BAFFIN BAY | L.S.R. | S.E. 25' | |
| 002 | 2641425 | 2651335 | | BAFFIN BAY | L.S.R. | S.E. 25' | |
| 003 | 2651550 | 2662345 | | BAFFIN BAY | L.S.R. | S.E. 25' | |
| 004 | 2682150 | 2691050 | | DAVIS STRAIT | L.S.R. | S.E. 25' | |
| 005 | 2691310 | 2701805 | | DAVIS STRAIT | L.S.R. | S.E. 25' | |
| 006 | 2711130 | 2711650 | | DAVIS STRAIT | L.S.R. | S.E. 25' | |
| 007 | 2720525 | 2730920 | | RESOLUTION BASIN | L.S.R. | S.E. 25' | |
| 008 | 2732315 | 2770610 | | LABRADOR SEA | L.S.R. | S.E. 25' | |
| 009 | 2781635 | 2790600 | | BONAVISTA BAY | L.S.R. | S.E. 25' | |

TABLE 8

AIRGUN SEISMIC TAPES 87-033

| TAPE NUMBERS | START DAY/TIME | STOP DAY/TIME | LINE NUMBER | GEOGRAPHIC LOCATION | CHANNELS | NOTES |
|--------------|----------------|---------------|-------------|---------------------|--|-------|
| 001 | 2620345 | 2621628 | | BAFFIN BAY | FM-100'SE RAW FM- 25'SE RAW DR-NSRF RAW FM-SHOT | |
| 002 | 2621629 | 2630516 | | BAFFIN BAY | FM-100'SE RAW FM- 25'SE RAW DR-NSRF RAW FM-SHOT | |
| 003 | 2630517 | 2631705 | | BAFFIN BAY | FM-100'SE RAW FM- 25'SE RAW DR-NSRF RAW FM-SHOT | |
| 004 | 2631805 | 2640655 | | BAFFIN BAY | FM-100'SE RAW FM- 25'SE RAW DR-NSRF RAW FM-SHOT | |
| 005 | 2640700 | 2642000 | | BAFFIN BAY | FM-100'SE RAW FM- 25'SE RAW DR-NSRF RAW FM-SHOT | |
| 006 | 2642004 | 2650850 | | BAFFIN BAY | FM-100'SE RAW FM- 25'SE RAW DR-NSRF RAW FM-SHOT | |
| 007 | 2650852 | 2652340 | | BAFFIN BAY | FM-100'SE RAW FM- 25'SE RAW DR-NSRF RAW FM-SHOT | |
| 008 | 2652341 | 265 | | BAFFIN BAY | FM-100'SE RAW FM- 25'SE RAW DR-NSRF RAW FM-SHOT | |
| 009 | 2682148 | 2711544 | | DAVIS STRAIT | FM-100'SE RAW FM- 25'SE RAW DR-NSRF RAW FM-SHOT | |
| 010 | 2711544 | 2730100 | | DAVIS STRAIT | FM-100'SE RAW FM- 25'SE RAW DR-NSRF RAW FM-SHOT | |
| 011 | 2730102 | 2750736 | | LABRADOR SEA | FM-100'SE RAW FM- 25'SE RAW DR-NSRF RAW FM-SHOT | |

TABLE 8

AIRGUN SEISMIC TAPES 87-033

| TAPE NUMBERS | START DAY/TIME | STOP DAY/TIME | LINE NUMBER | GEOGRAPHIC LOCATION | CHANNELS | NOTES |
|--------------|----------------|---------------|-------------|---------------------|--|-------|
| 012 | 2750737 | 2770335 | | LABRADOR SEA | FM-100' SE RAW FM- 25' SE RAW DR-NSRF RAW FM-SHOT | |
| 013 | 2770335 | 2790510 | | LABRADOR SEA | FM-100' SE RAW FM- 25' SE RAW DR-NSRF RAW FM-SHOT | |
| 014 | 2770514 | 2790600 | | BONAVISTA BAY | FM-100' SE RAW FM-25' SE RAW DR-NSRF FM-SHOT | |

TABLE 9

HUNTEC D.T.S. RECORDS 87-033

| <u>ROLL NUMBERS</u> | <u>START DAY/TIME</u> | <u>STOP DAY/TIME</u> | <u>LINE NUMBER</u> | <u>GEOGRAPHIC LOCATION</u> | <u>RECORDER</u> | <u>HYDROPHONE</u> | <u>NOTES</u> |
|---------------------|-----------------------|----------------------|--------------------|----------------------------|-----------------|-------------------|--------------|
| 001 | 2621310 | 2621818 | | BAFFIN BAY | EPC | EXTERNAL | |
| 002 | 2621850 | 2631855 | | BAFFIN BAY | EPC | EXTERNAL | |
| 003 | 2661115 | 2662345 | | BAFFIN BAY | EPC | EXTERNAL | |
| 004 | 2671140 | 2671225 | | ITIRBILUNG FJORD | EPC | EXTERNAL | |
| 005 | 2690910 | 2721710 | | DAVIS STRAIT | EPC | EXTERNAL | |
| 006 | 2721905 | 2730935 | | HUDSON STRAIT | EPC | EXTERNAL | |
| 007 | 2731350 | 2731405 | | HUDSON STRAIT | EPC | EXTERNAL | |
| 008 | | | | | EPC | EXTERNAL | |
| 009 | 2750535 | 2750755 | | LABRADOR SEA | EPC | EXTERNAL | |
| 010 | 2761301 | 2770220 | | LABRADOR SEA | EPC | EXTERNAL | |
| 011 | 2770225 | 2770600 | | LABRADOR SEA | EPC | EXTERNAL | |
| 012 | 2780345 | 2780420 | | N.E. NFLD SHELF | EPC | EXTERNAL | |
| 013 | 2781635 | 2790600 | | BONAUVISTA BAY | EPC | EXTERNAL | |
| 001 | 2621255 | 2621420 | | BAFFIN BAY | EPC | INTERNAL | |
| 002 | 2621425 | 2662345 | | BAFFIN BAY | EPC | INTERNAL | |
| 003 | 2671135 | 2671225 | | ITIRBILUNG FJORD | EPC | INTERNAL | |
| 004 | 2690910 | 2720915 | | DAVIS STRAIT | EPC | INTERNAL | |
| 005 | 2721550 | 2730200 | | HUDSON STRAIT | EPC | INTERNAL | |
| 006 | 2761315 | 2761750 | | LABRADOR SEA | EPC | INTERNAL | |
| 007 | 2761800 | 2770603 | | LABRADOR SEA | EPC | INTERNAL | |
| 008 | 2780345 | 2780420 | | N.E. NFLD SHELF | EPC | INTERNAL | |
| 009 | 2781635 | 2790600 | | BONAUVISTA BAY | EPC | INTERNAL | |
| 05A | 2720005 | 2720940 | | HUDSON STRAIT | EPC | INTERNAL | |
| 09A | 2781635 | 2790600 | | BONAUVISTA BAY | EPC | INTERNAL | |

TABLE 10

HUNTEC D.T.S. TAPES 87-033

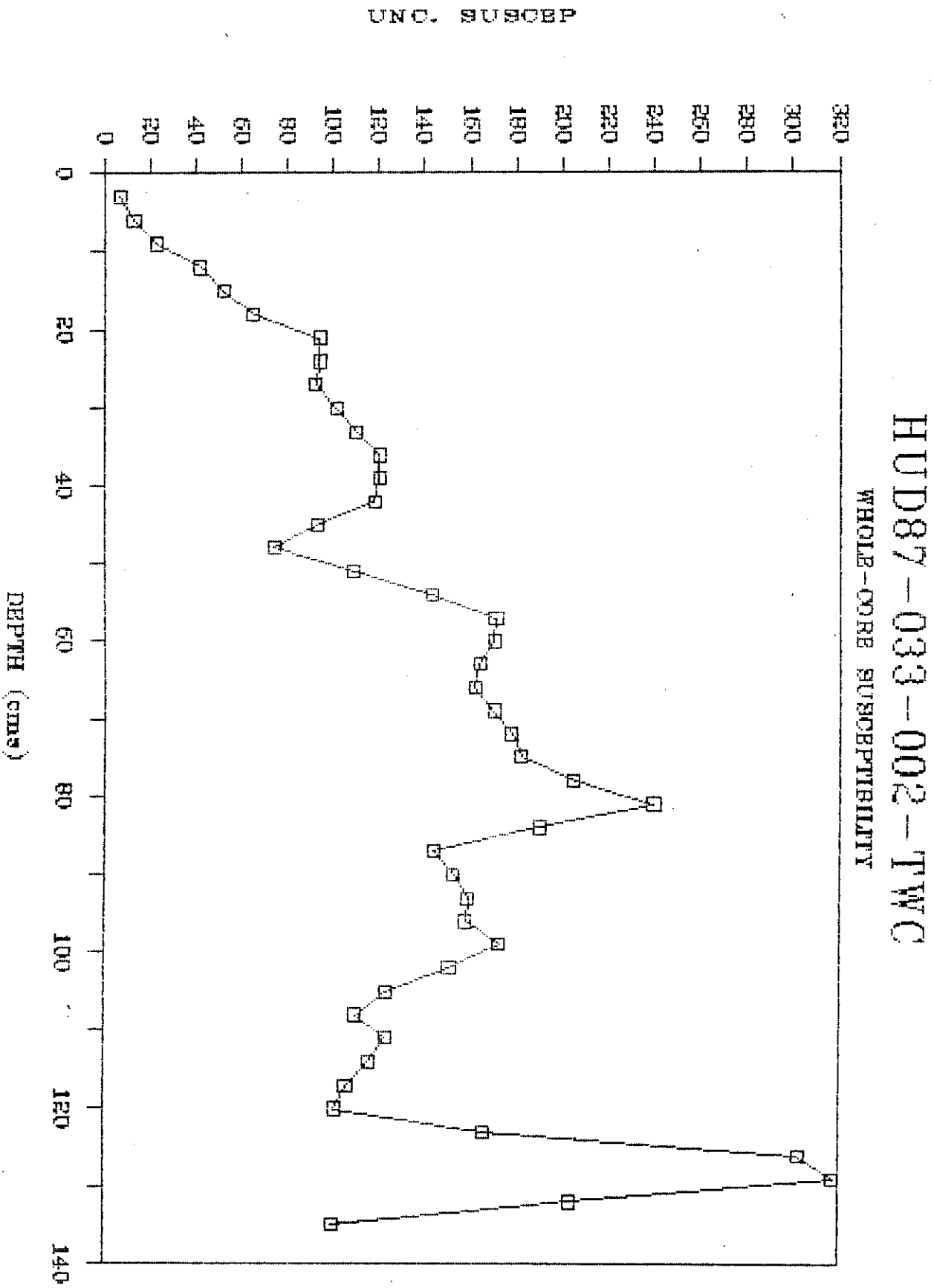
| TAPE NUMBERS | START DAY/TIME | STOP DAY/TIME | LINE NUMBER | GEOGRAPHIC LOCATION | CHANNELS | NOTES |
|--------------|----------------|---------------|-------------|---------------------|---|-------------|
| 001 | 2621322 | 2621621 | | BAFFIN BAY | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |
| 002 | 2621622 | 2622014 | | BAFFIN BAY | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |
| 003 | 2622016 | 2662115 | | BAFFIN BAY | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |
| 004 | 2662116 | 2671221 | | BAFFIN BAY | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |
| 005 | 2671221 | 2720717 | | DAVIS STRAIT | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |
| 006 | 2720718 | | | DAVIS STRAIT | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |
| 007 | 2721902 | 2722219 | | HUDSON STRAIT | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |
| 008 | 2722220 | 2730134 | | HUDSON STRAIT | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |
| 009 | 2730136 | 2730430 | | HUDSON STRAIT | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |
| 010 | 2730451 | 2730805 | | HUDSON STRAIT | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |
| 011 | 2741136 | 2750736 | | LABRADOR SEA | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |

TABLE 10

HUNTEC D.T.S. TAPES 87-033

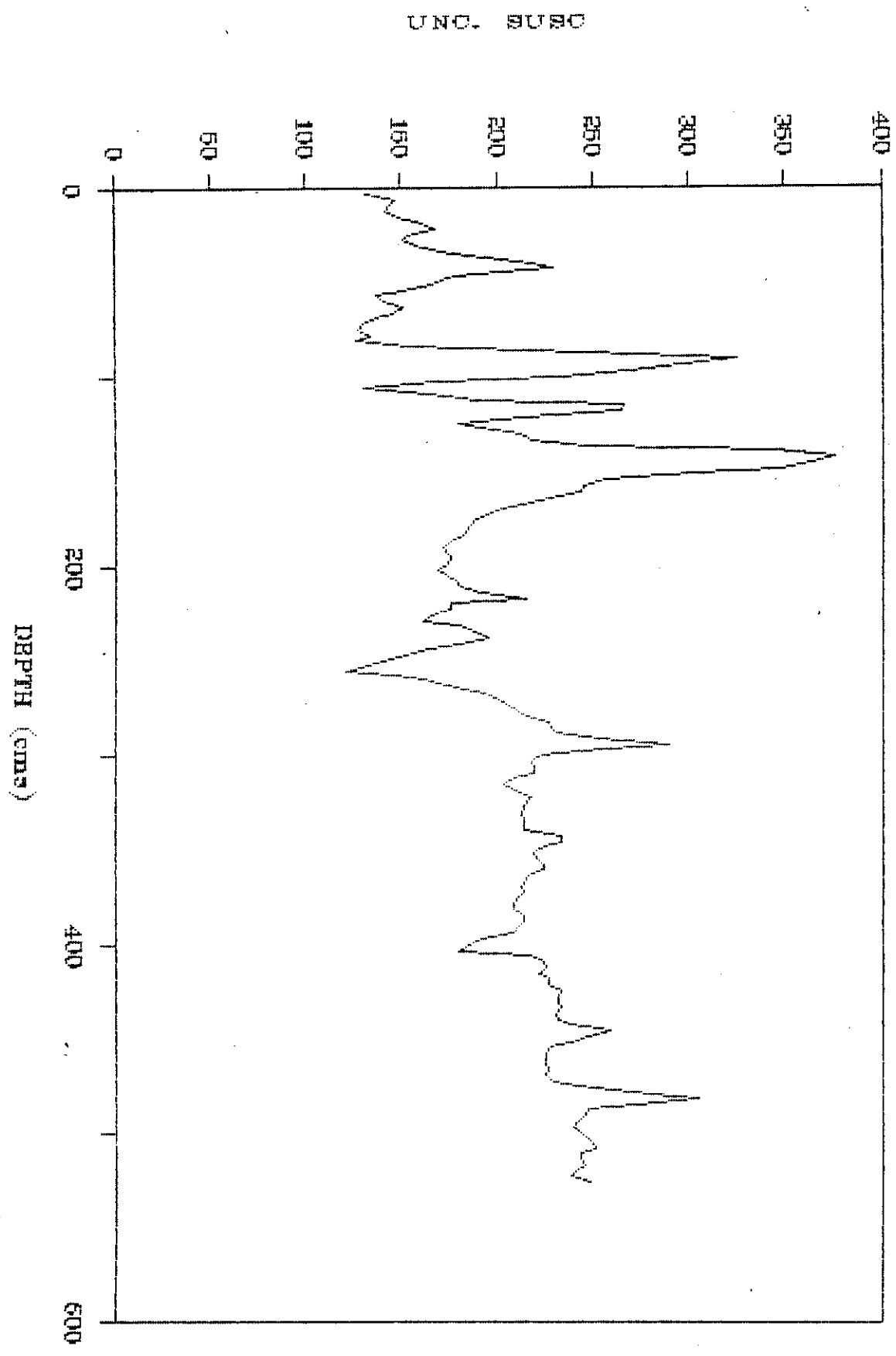
| TAPE NUMBERS | START DAY/TIME | STOP DAY/TIME | LINE NUMBER | GEOGRAPHIC LOCATION | CHANNELS | NOTES |
|--------------|----------------|---------------|-------------|---------------------|---|-------------|
| 012 | 2741136 | 2750736 | | LABRADOR SEA | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |
| 013 | 2750737 | 2761824 | | LABRADOR SEA | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |
| 014 | 2761825 | 2762139 | | LABRADOR SEA | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |
| 015 | 2762140 | 2770050 | | LABRADOR SEA | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |
| 016 | 2770055 | 2770409 | | LABRADOR SEA | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |
| 017 | 2770410 | 2781724 | | LABRADOR SEA | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |
| 018 | 2781725 | 2782039 | | BONAVISTA BAY | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |
| 019 | 2782040 | 2782353 | | BONAVISTA BAY | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |
| 020 | 2790000 | 2790600 | | BONAVISTA BAY | INTERNAL TRIGGER EXTERNAL TIME FIX | BOOMER MODE |

Figure 2. Magnetic susceptibilities for cores 2 to 19



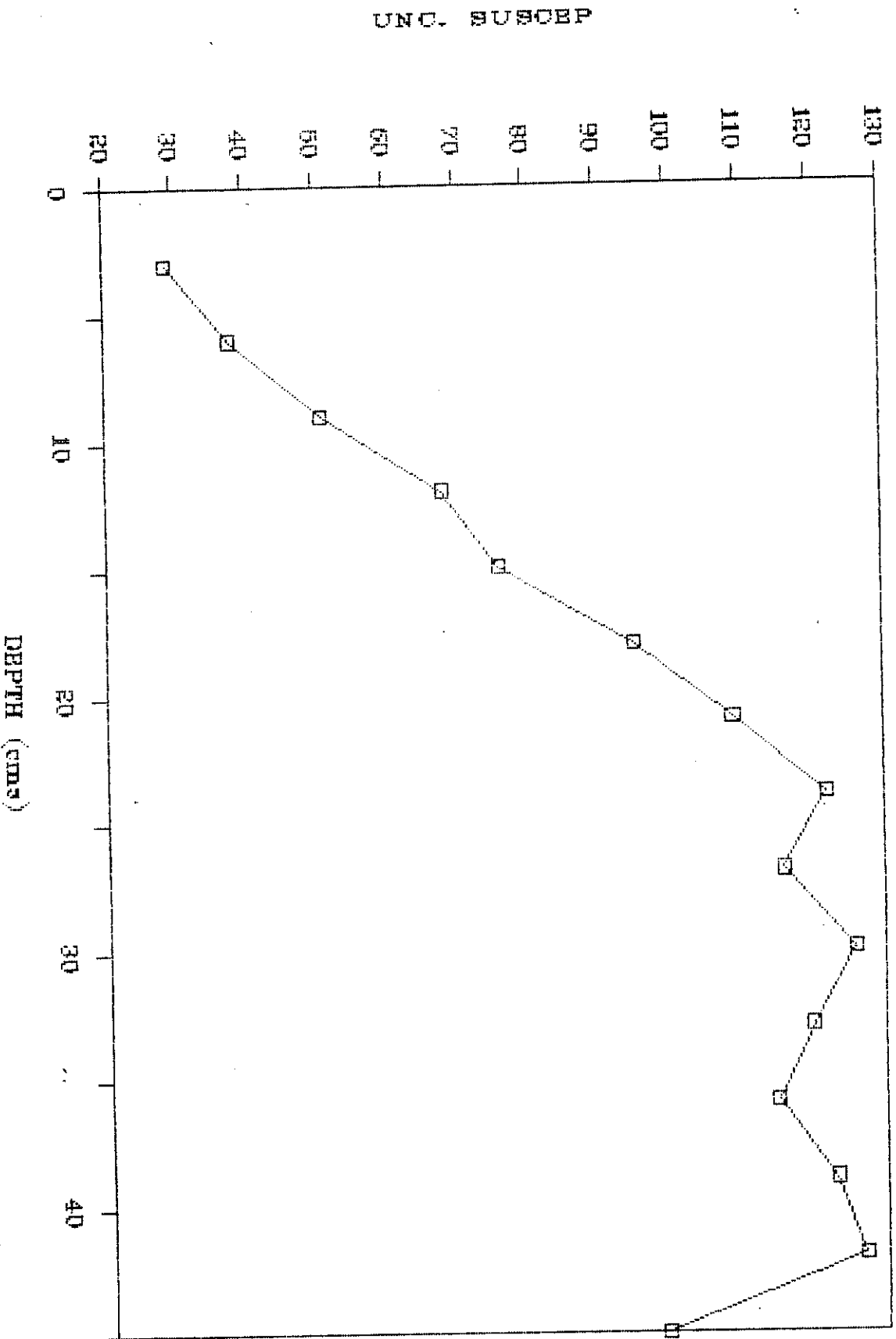
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WGSW



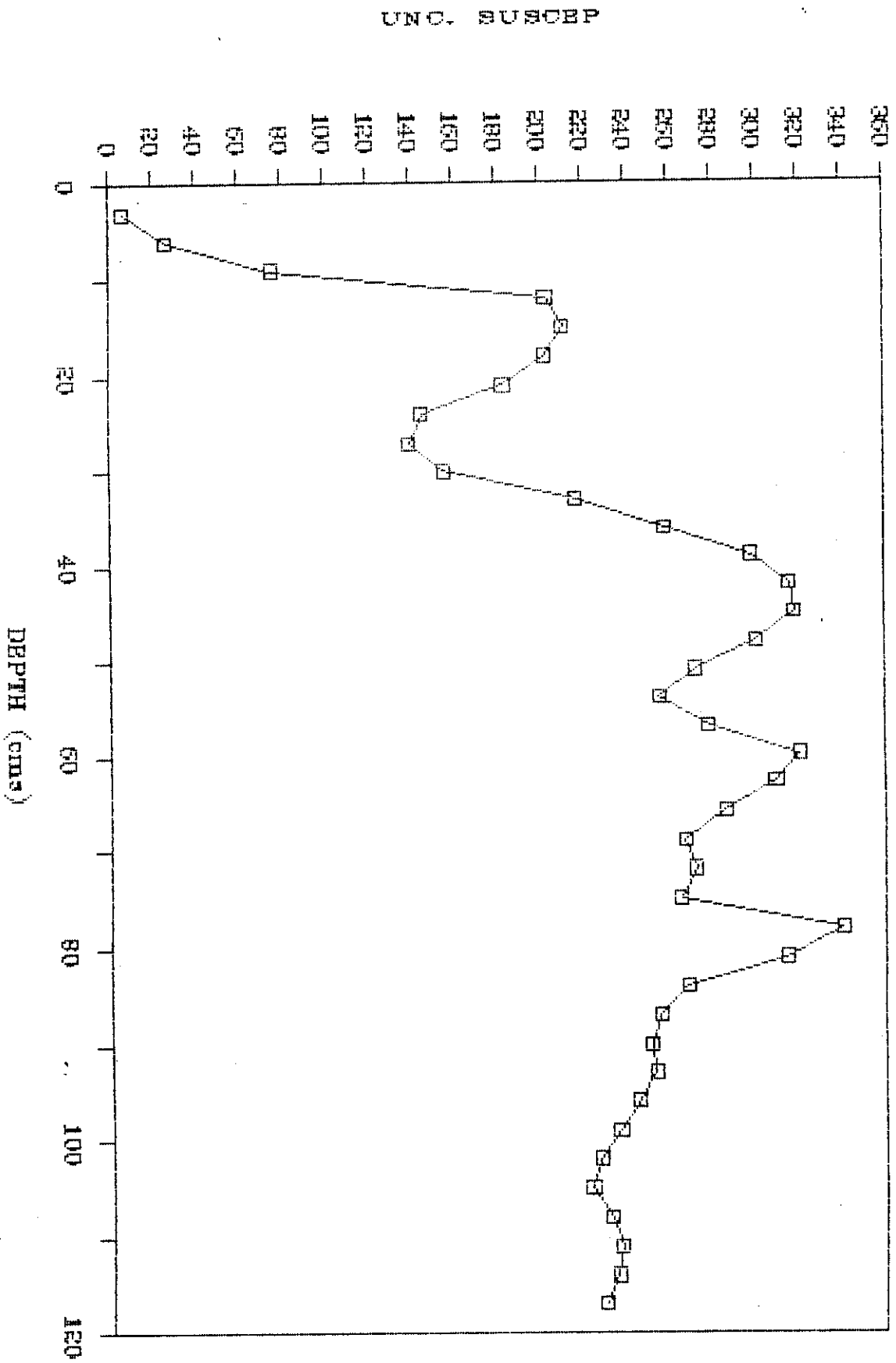
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WCS



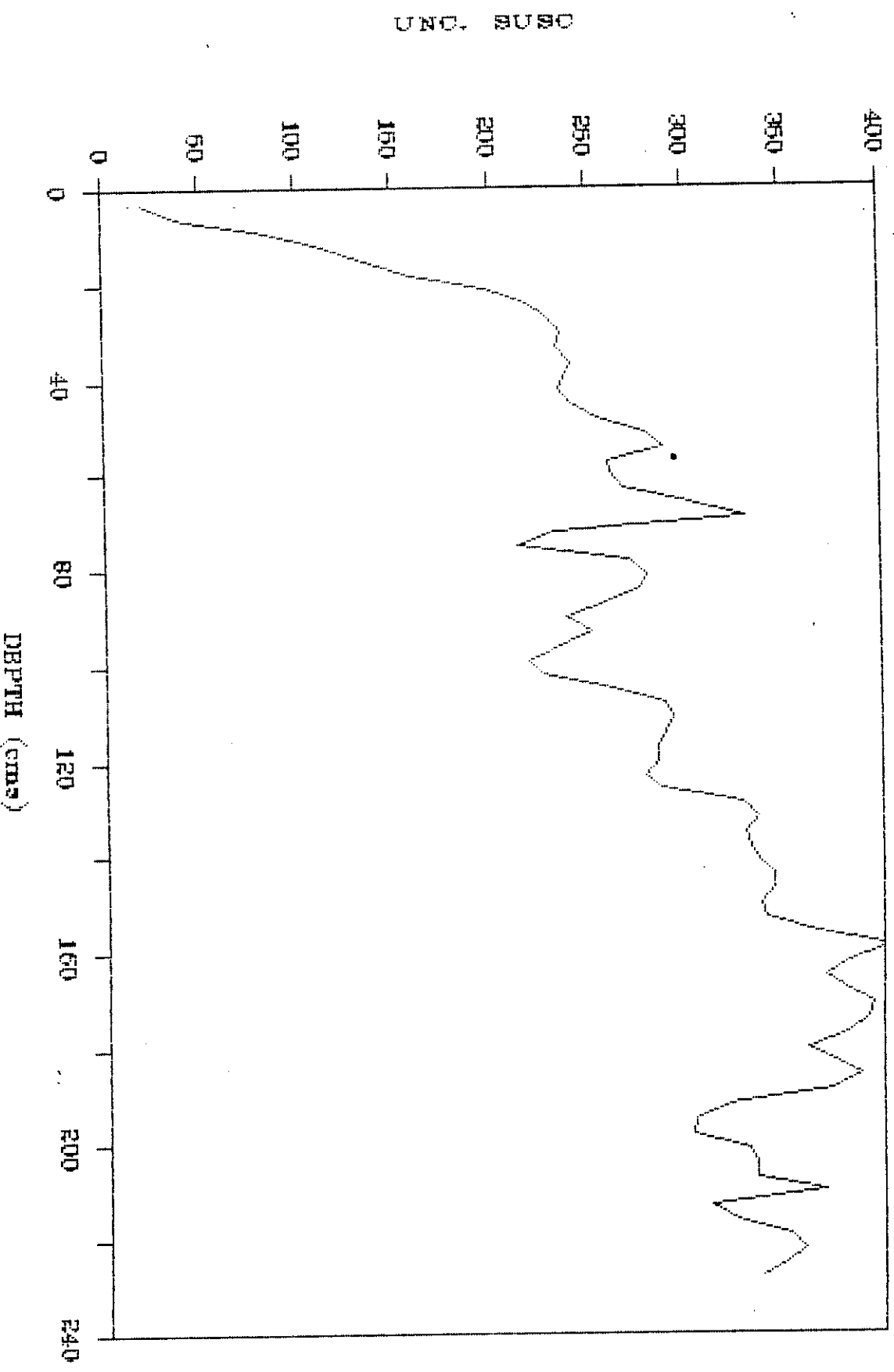
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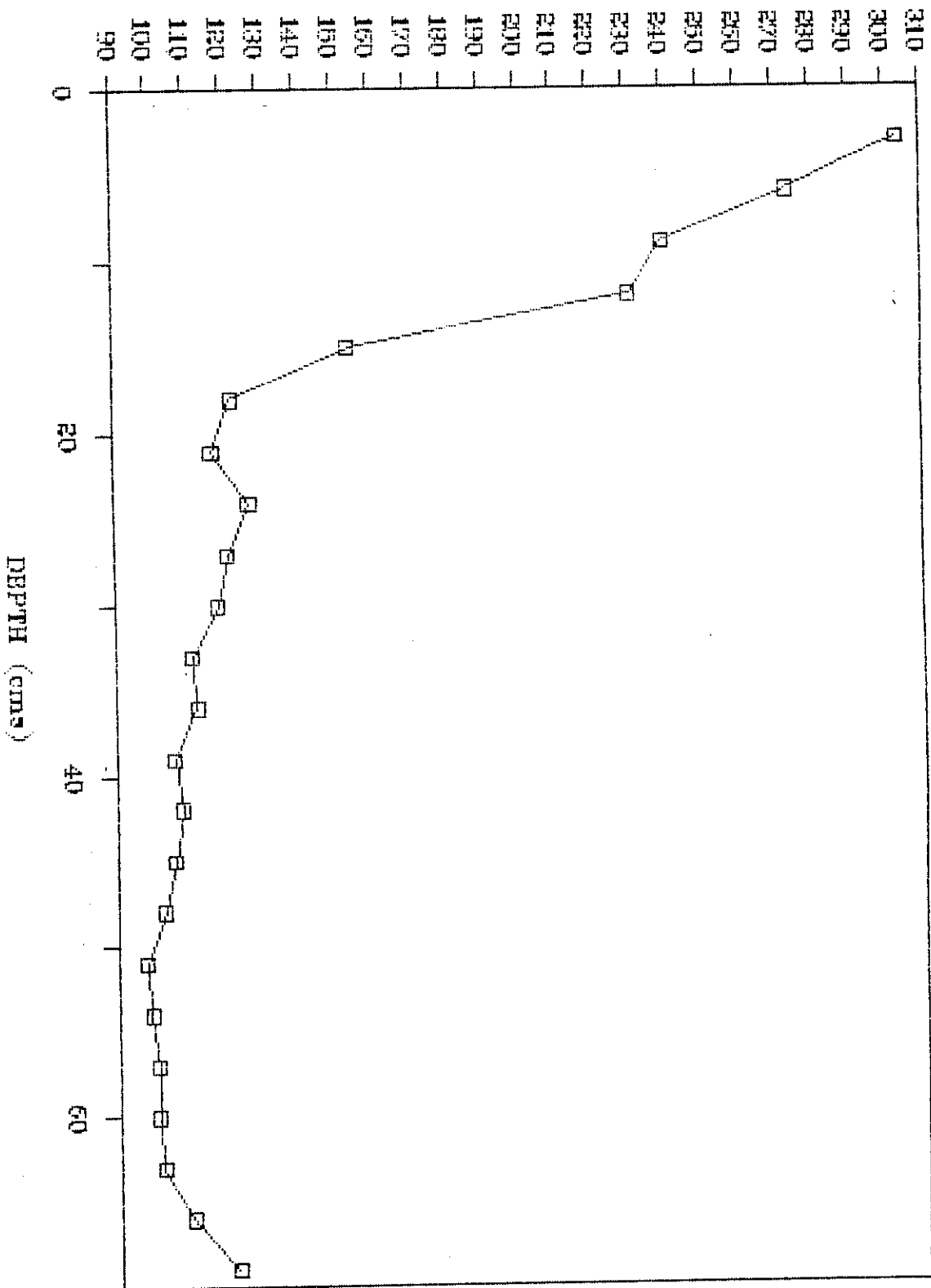
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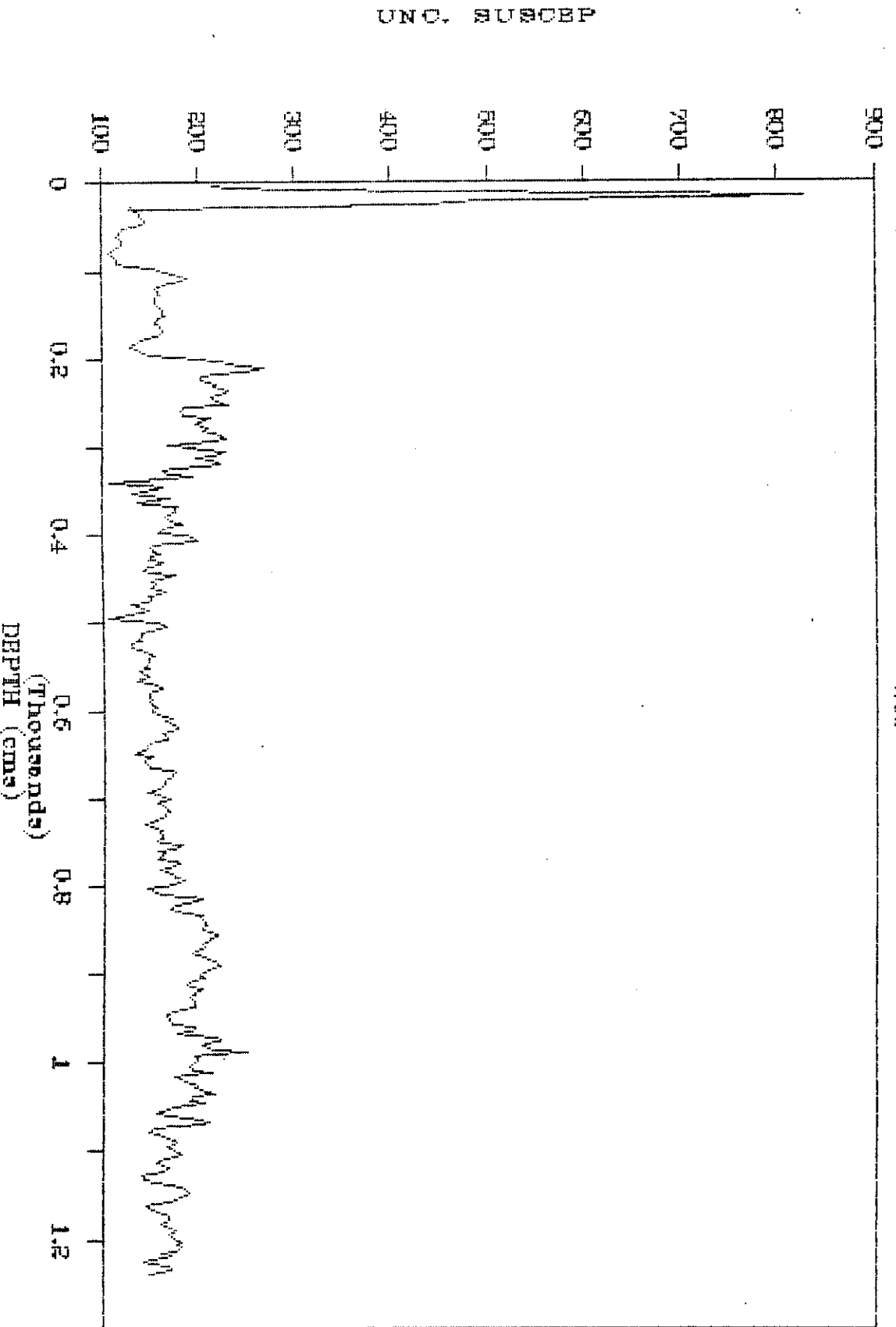
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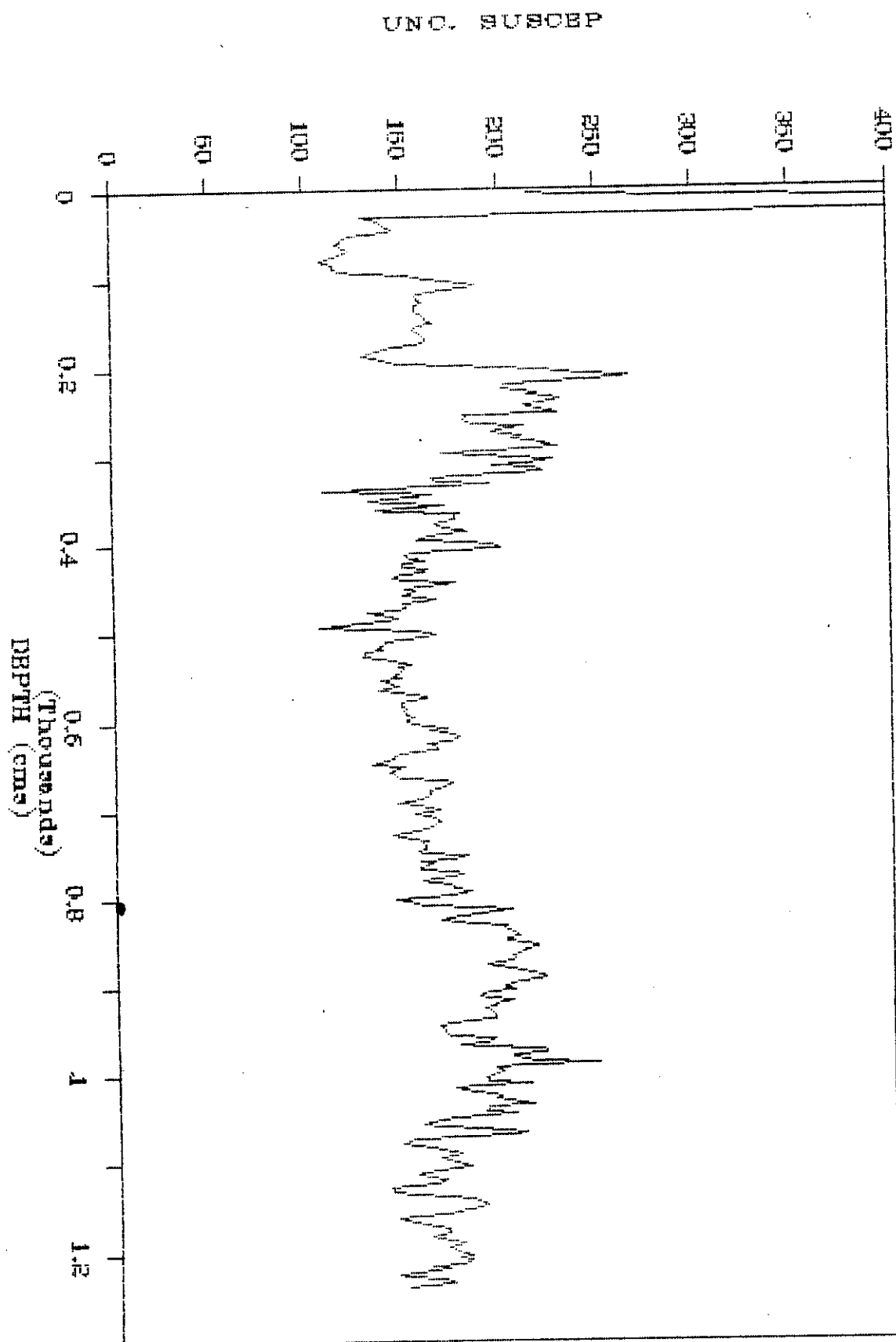
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HUD87-033-011-LCF

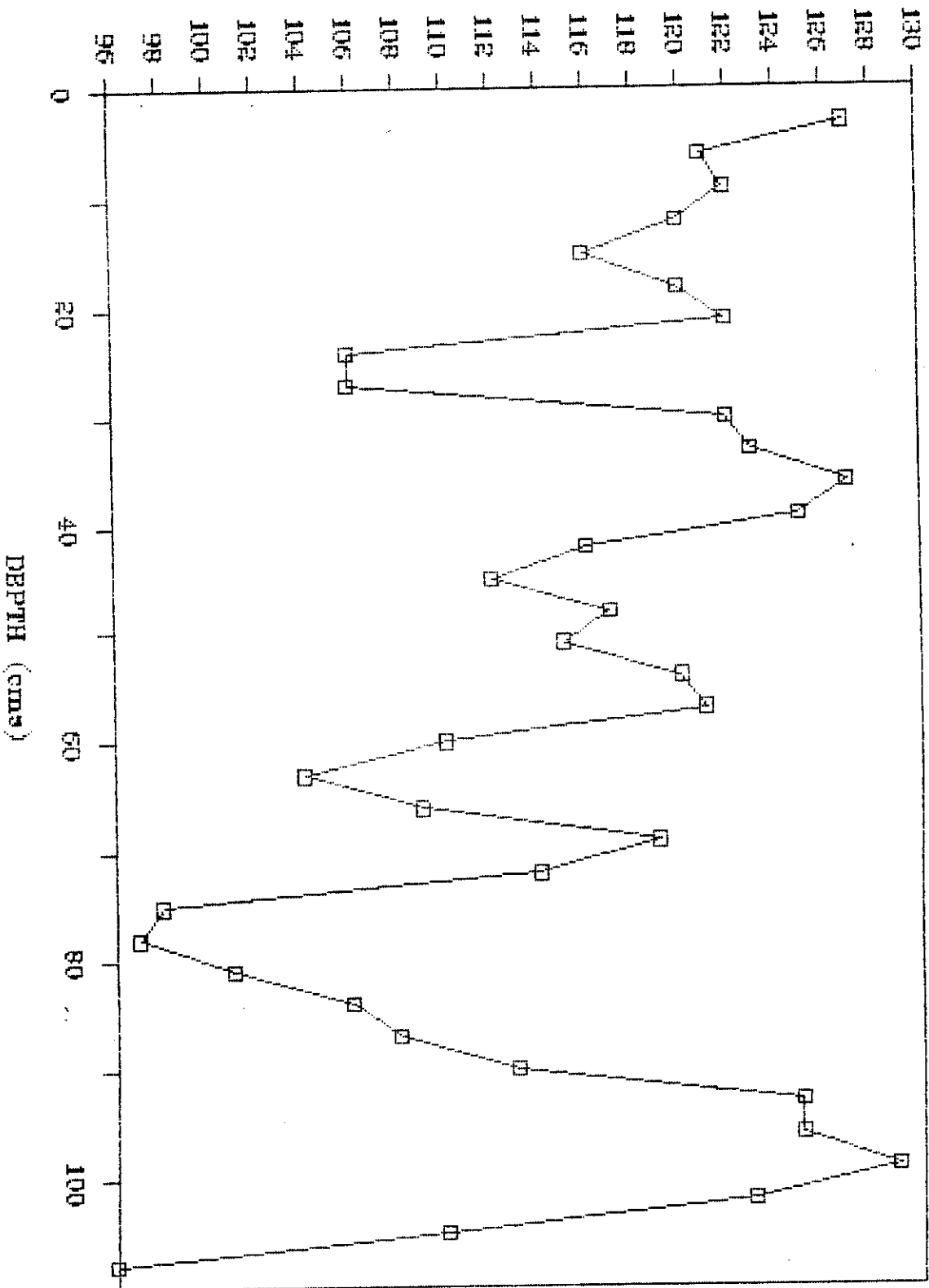
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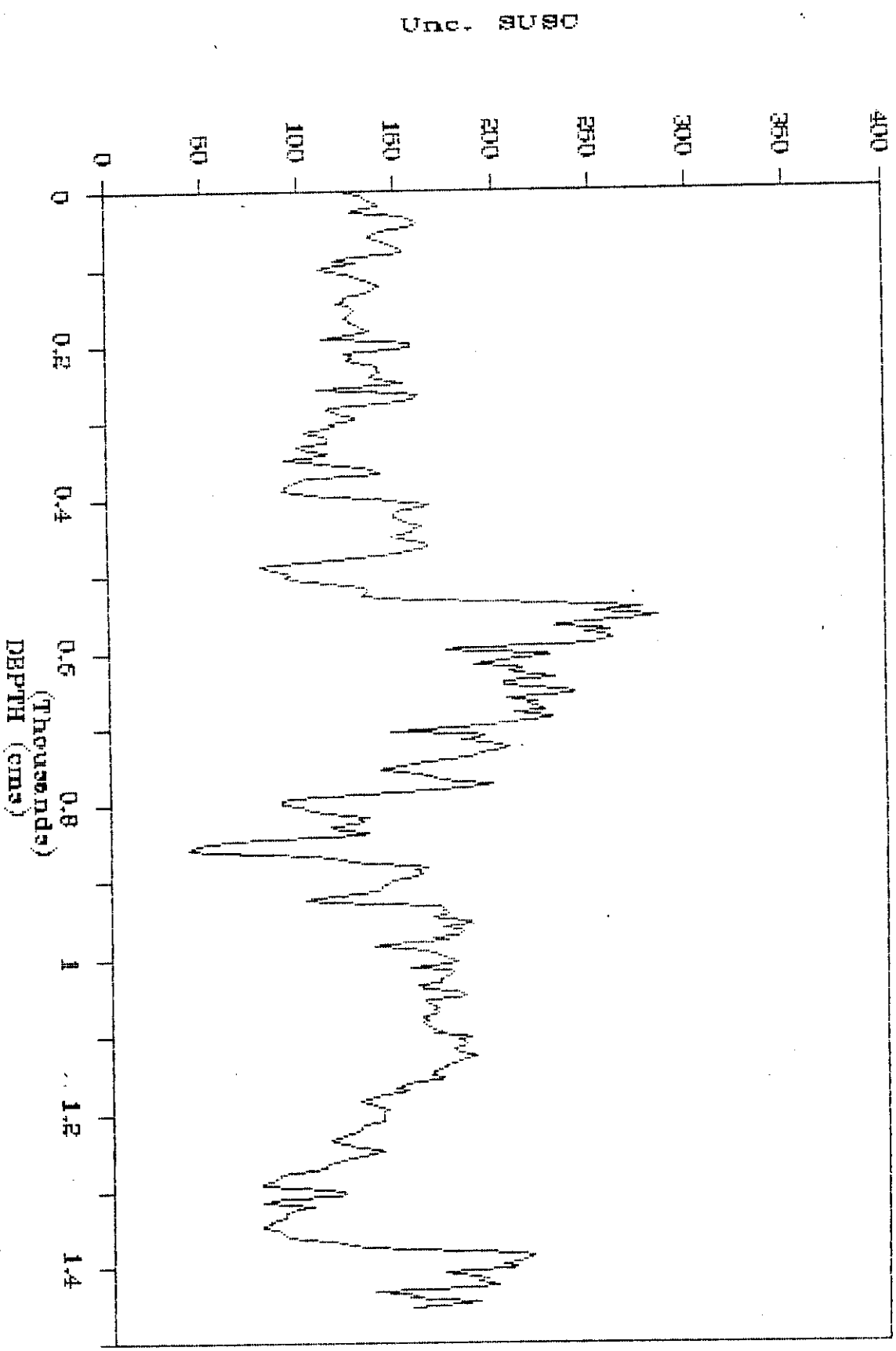
UNC. SUSCEP

HUD87-033-012-TWC

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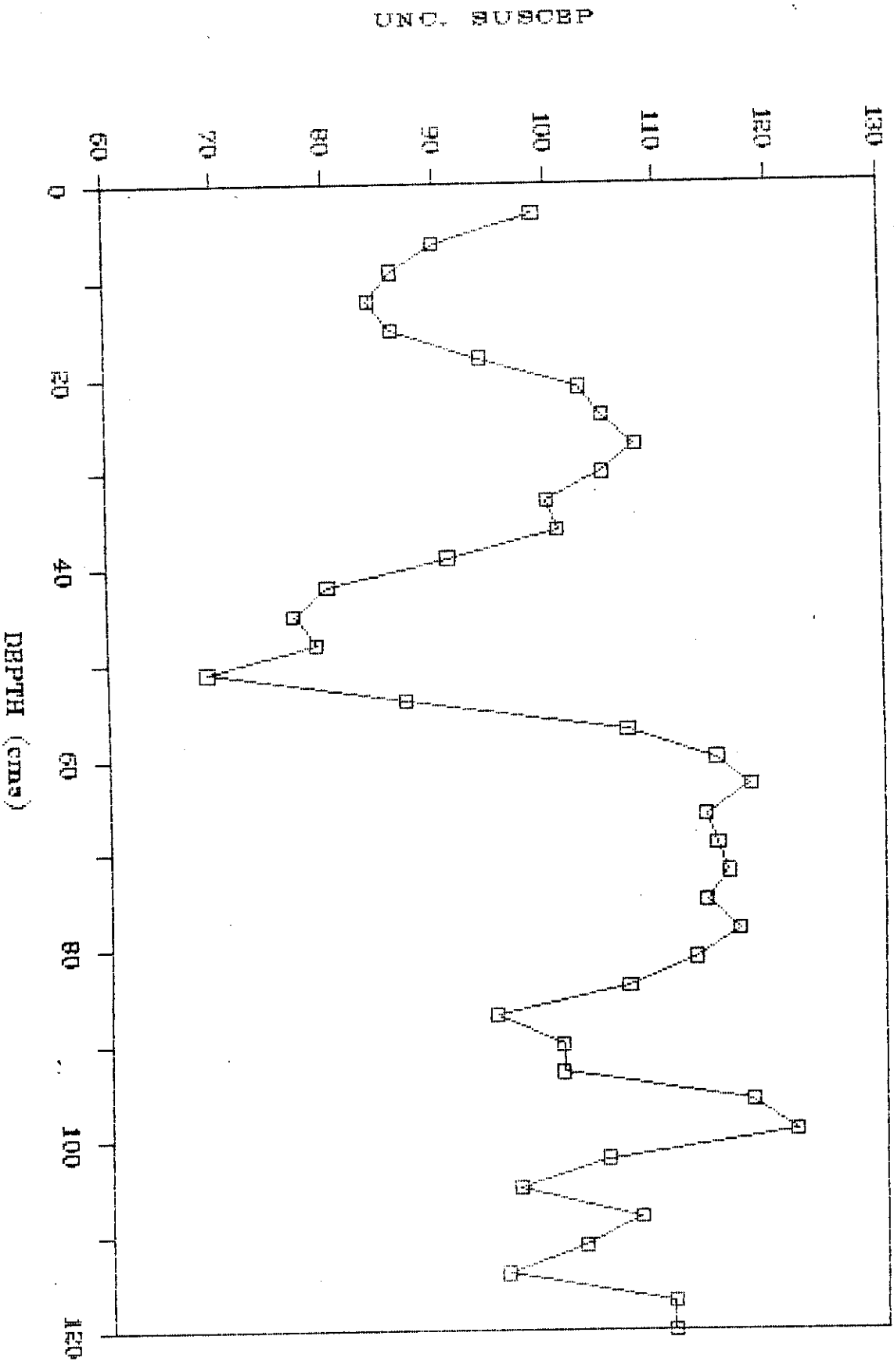


HUD87-033-012
WHOLE CORE SUSCEPTIBILITY



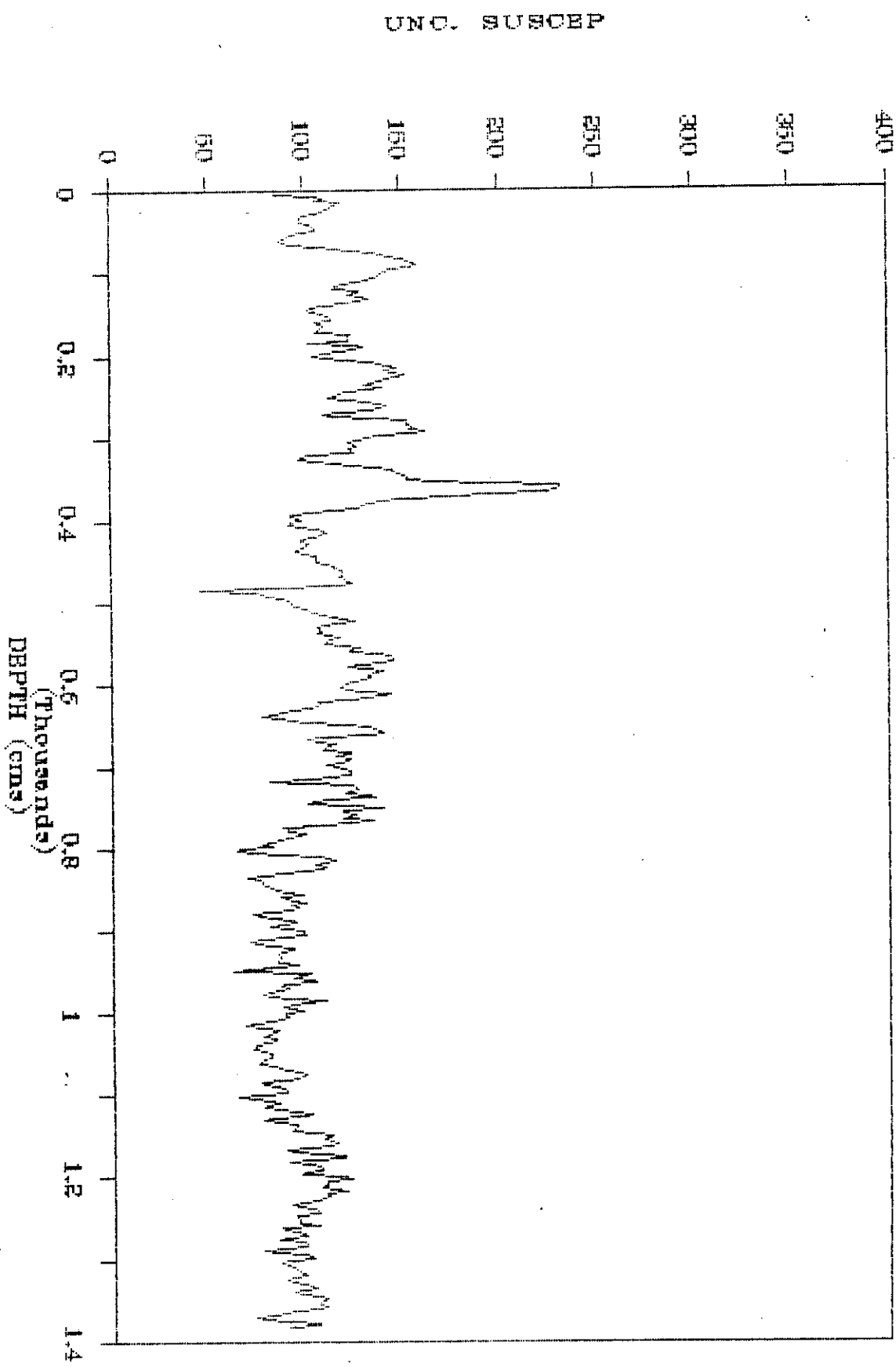
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W039



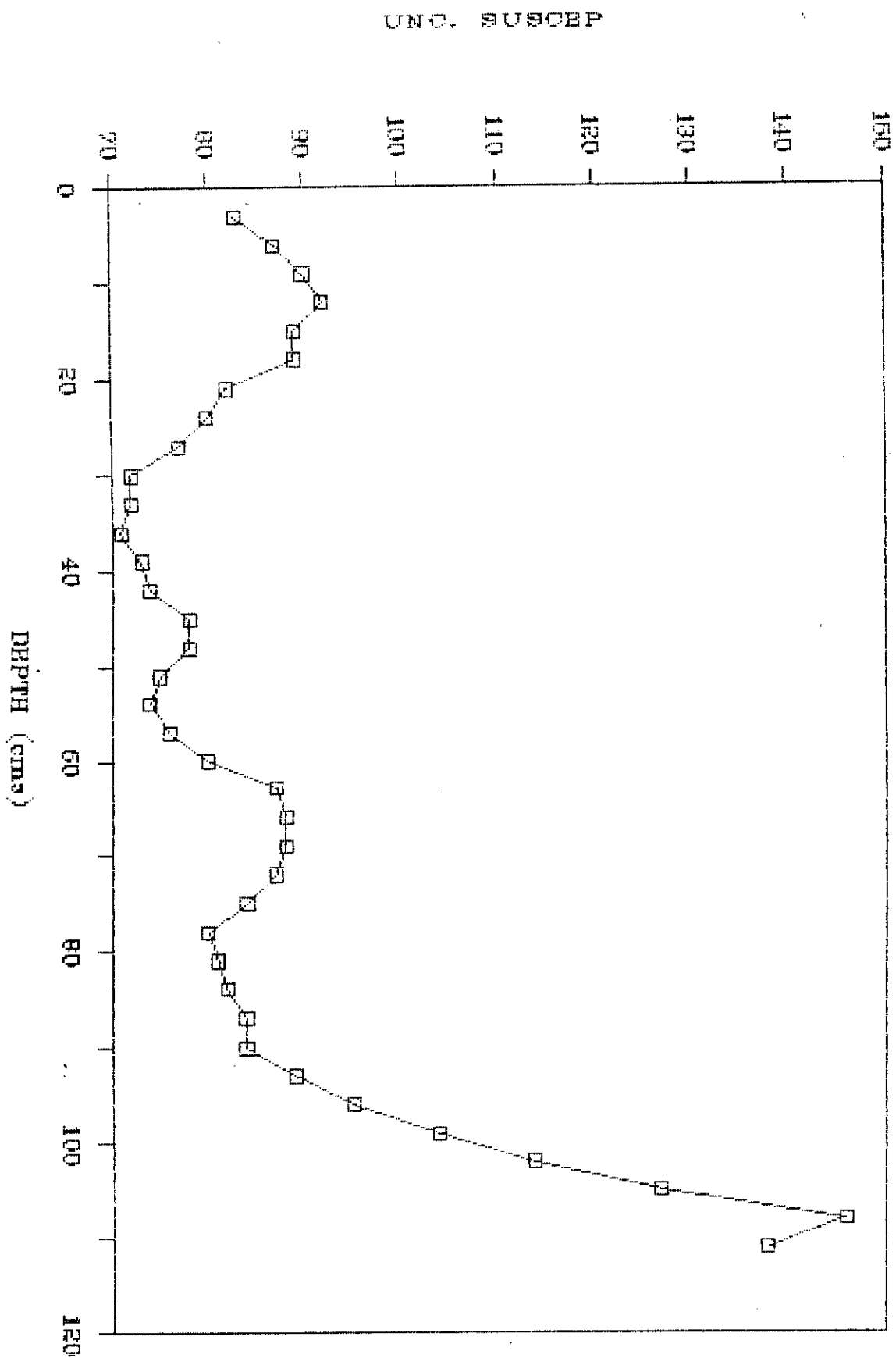
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MOB



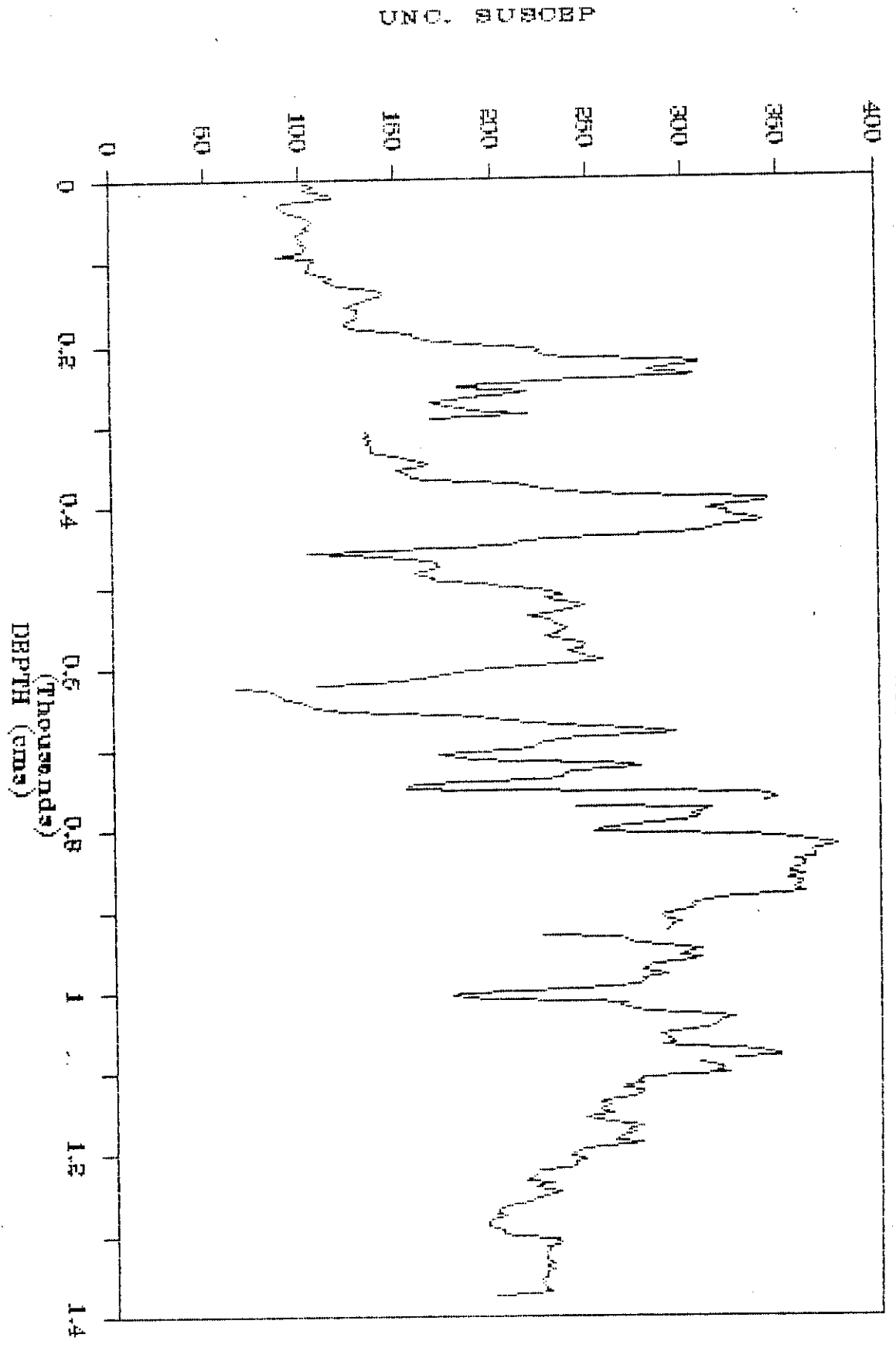
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WCSB



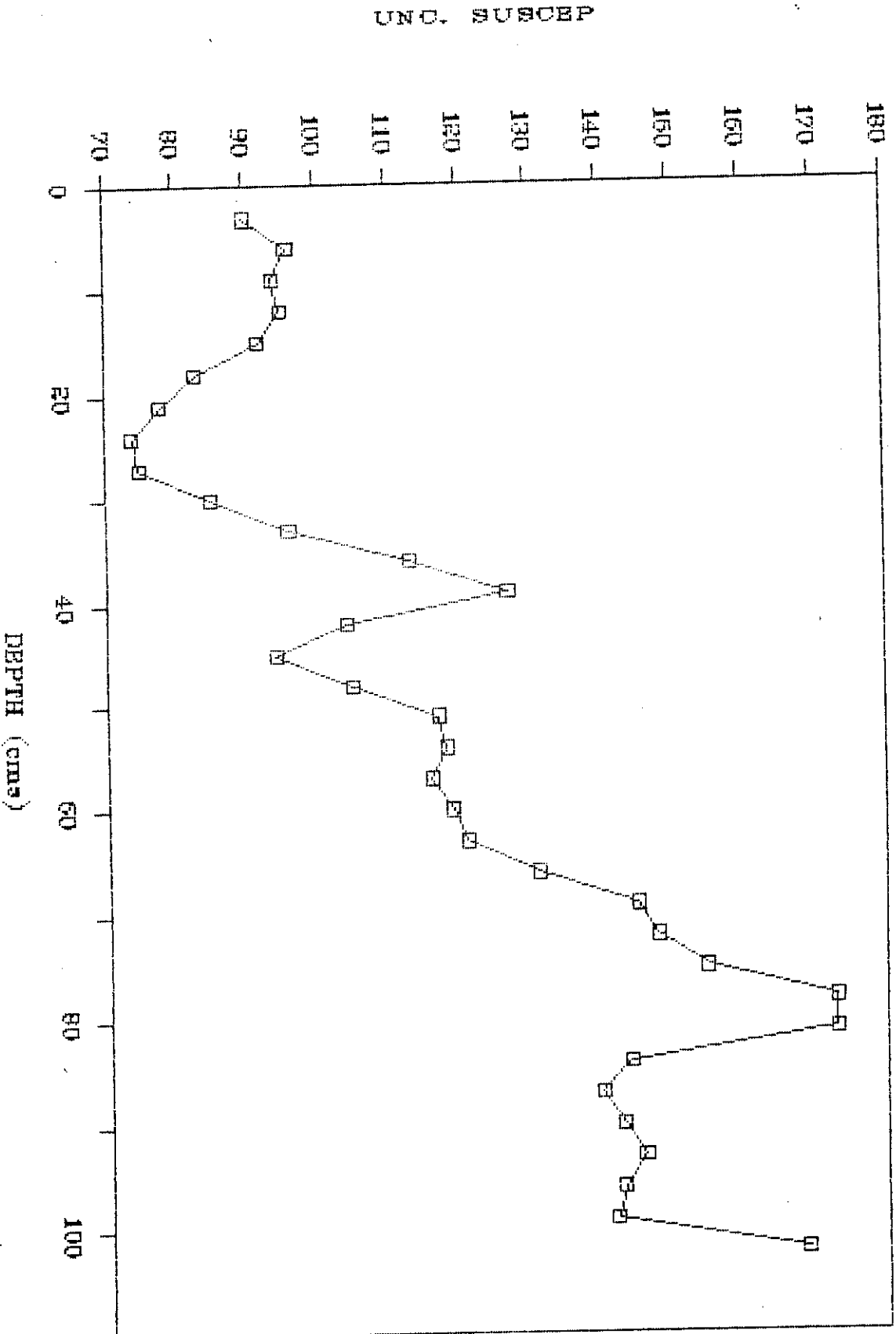
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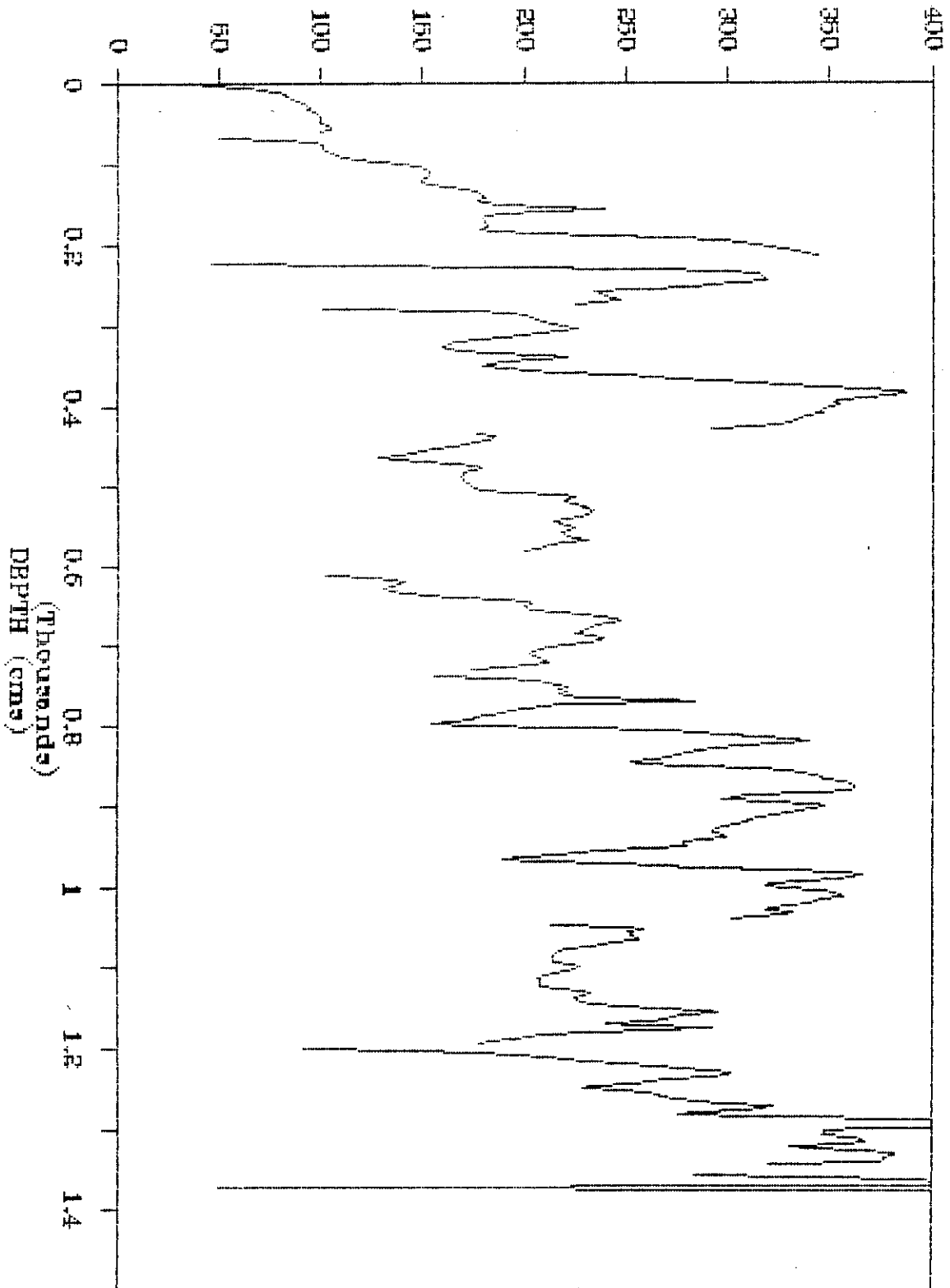


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WCB



UNC. SUSCP

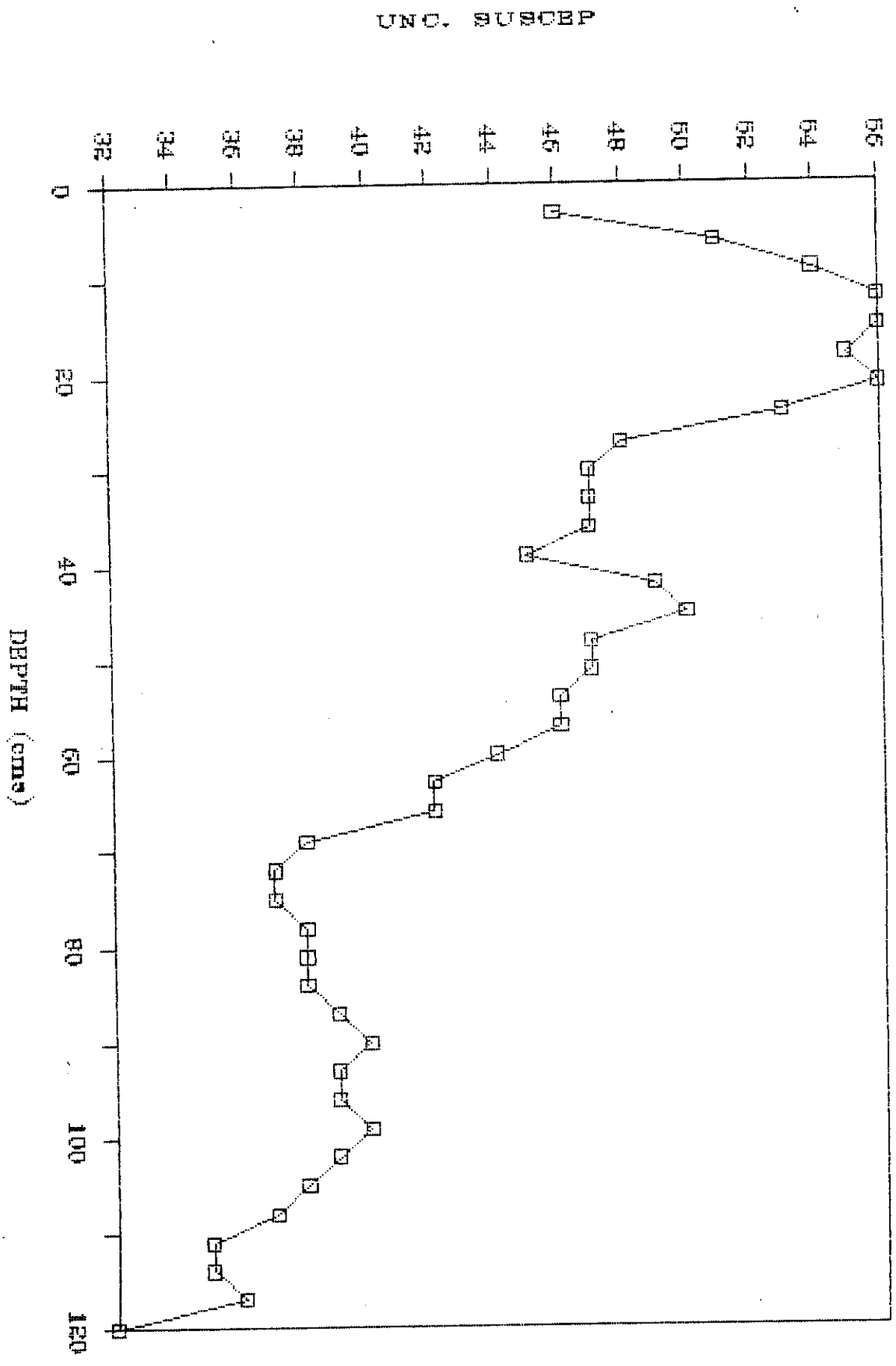


HUD87-033-018

WCS

HUD87-033-019-TWC

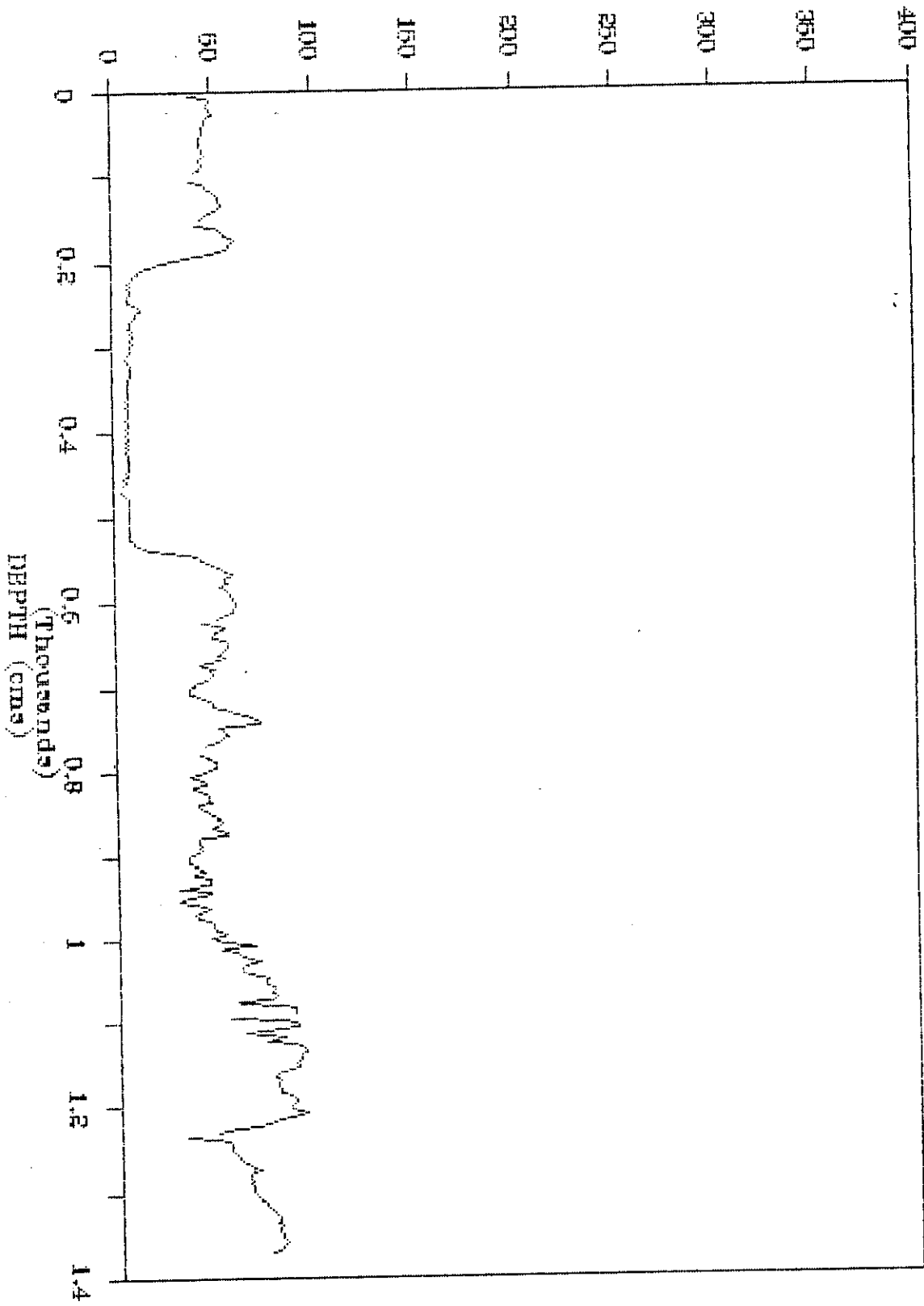
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UNC. SUSCP

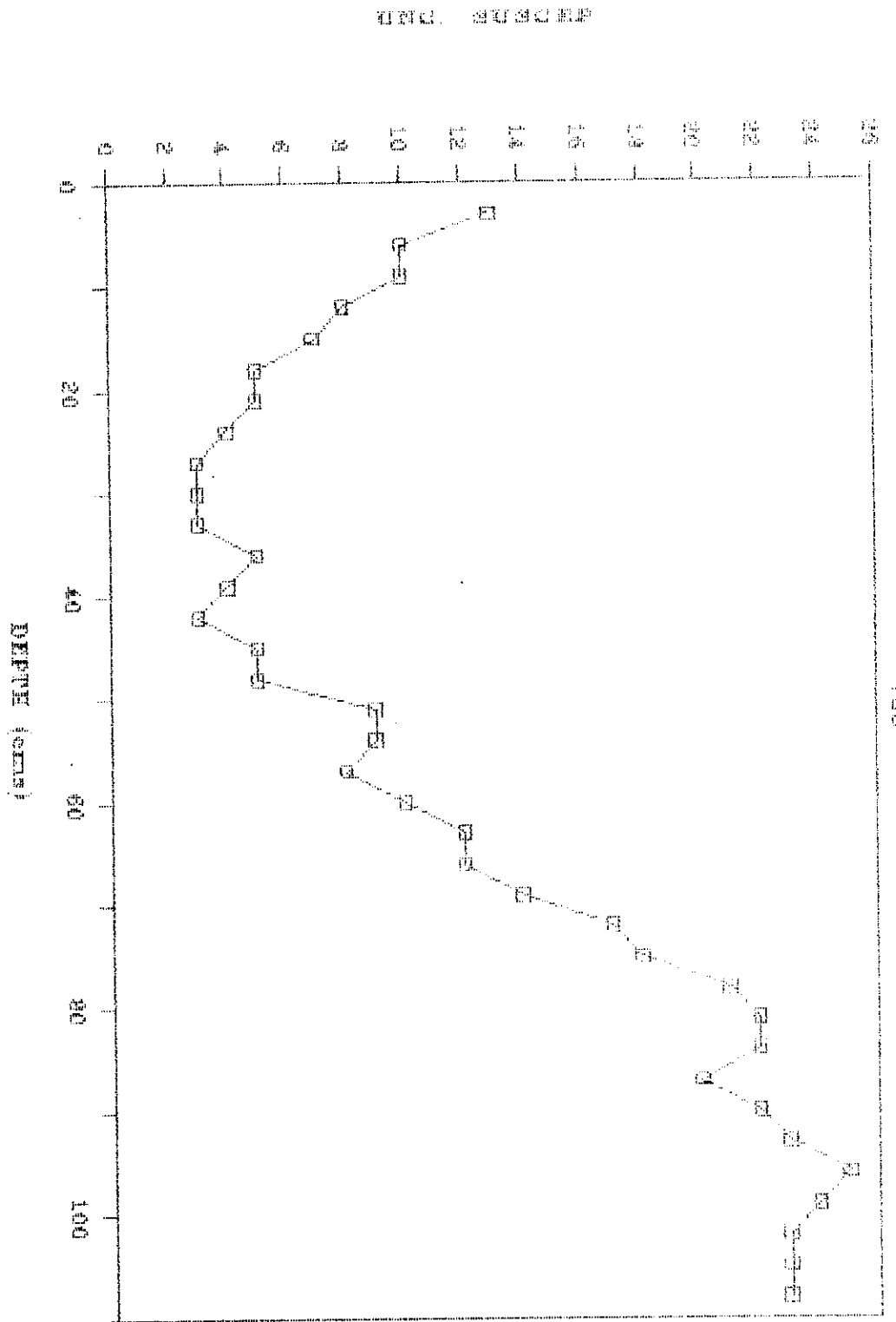
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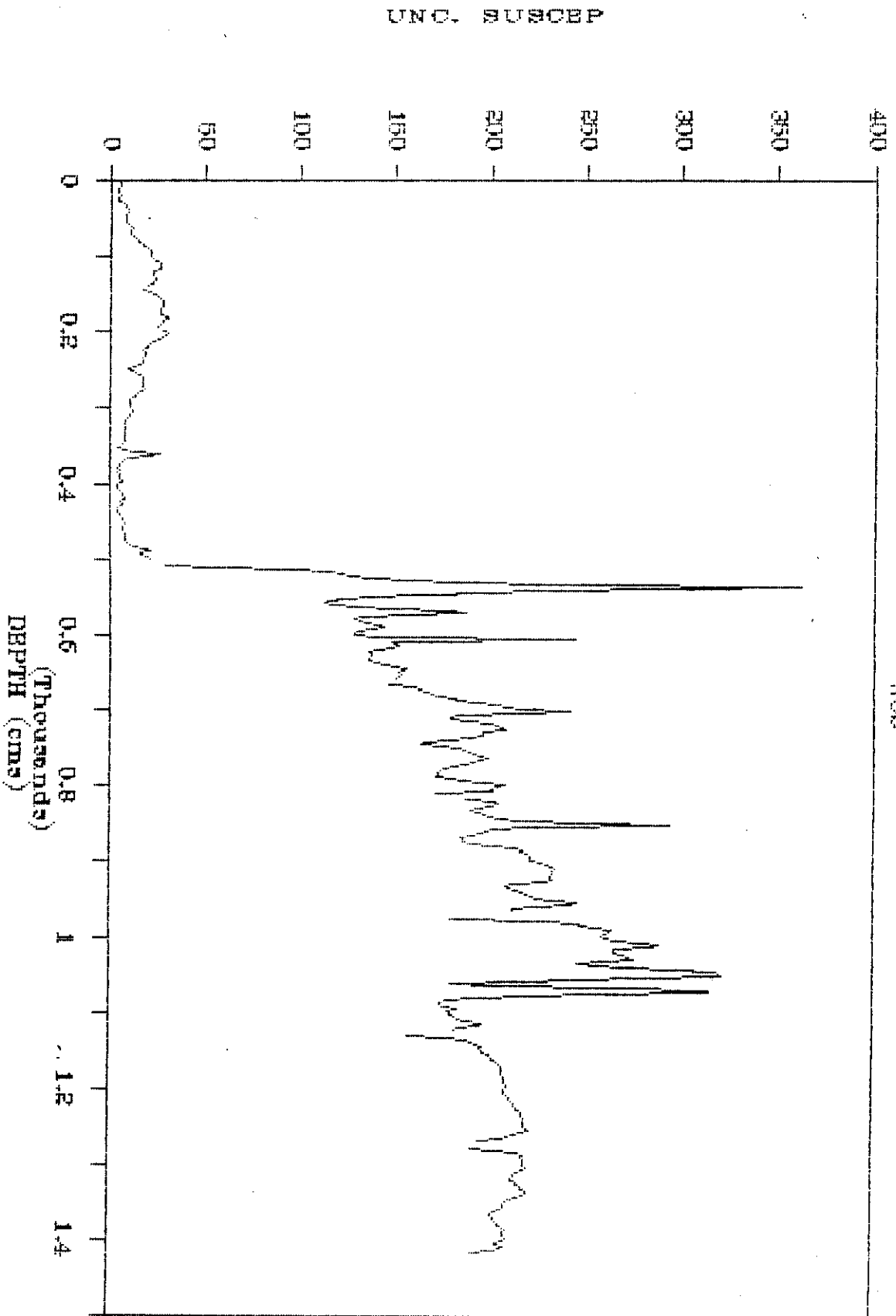
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W23

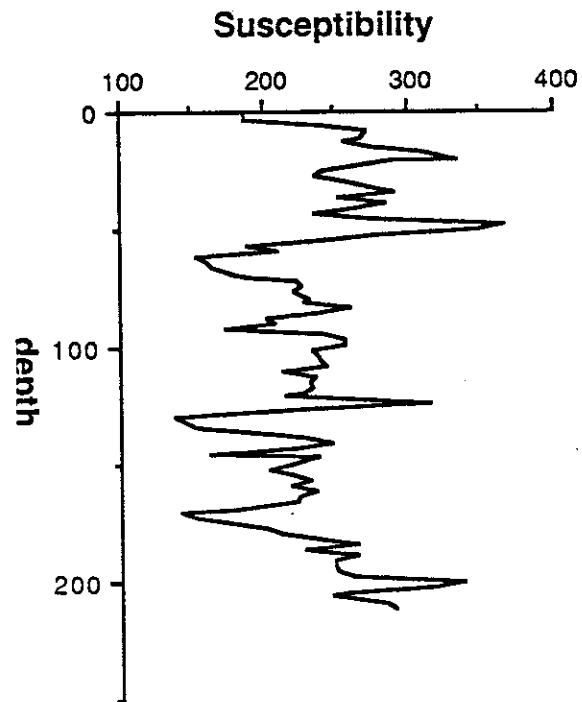


HUD87-033-020

WCS

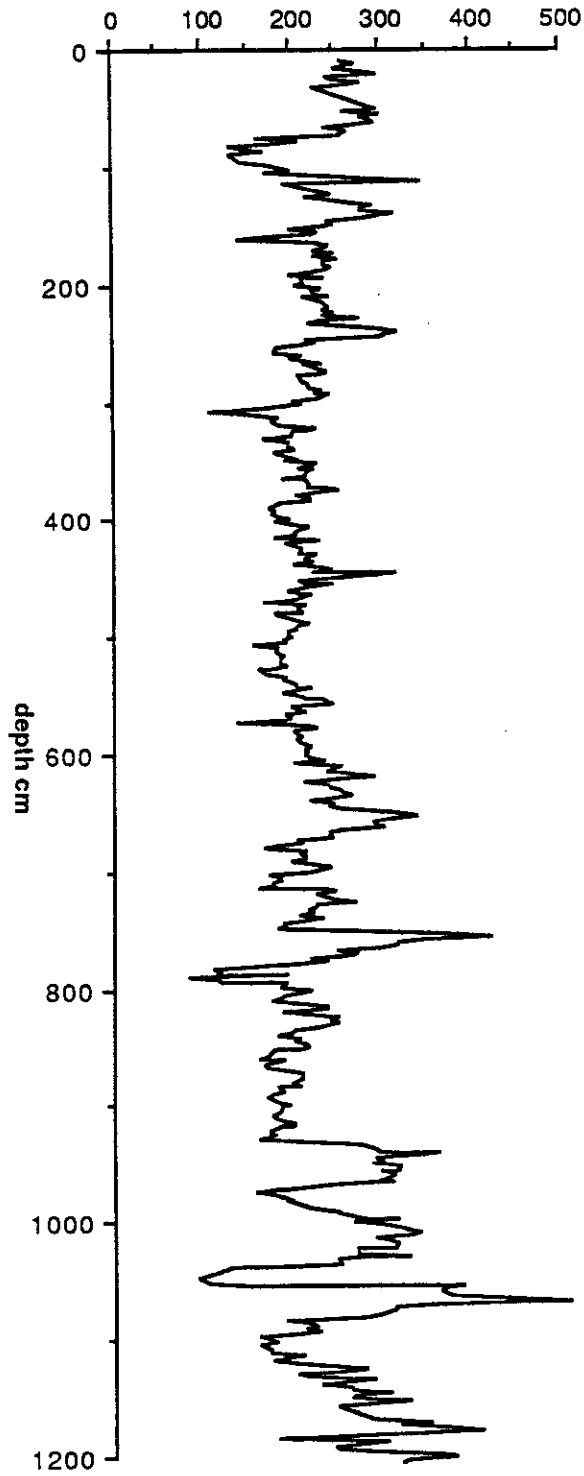


87033008 TW

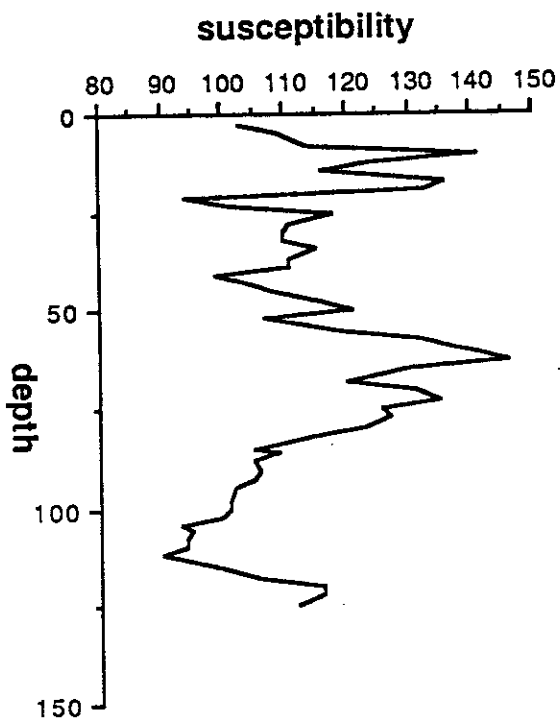


87033008 LCF

susceptibility si units

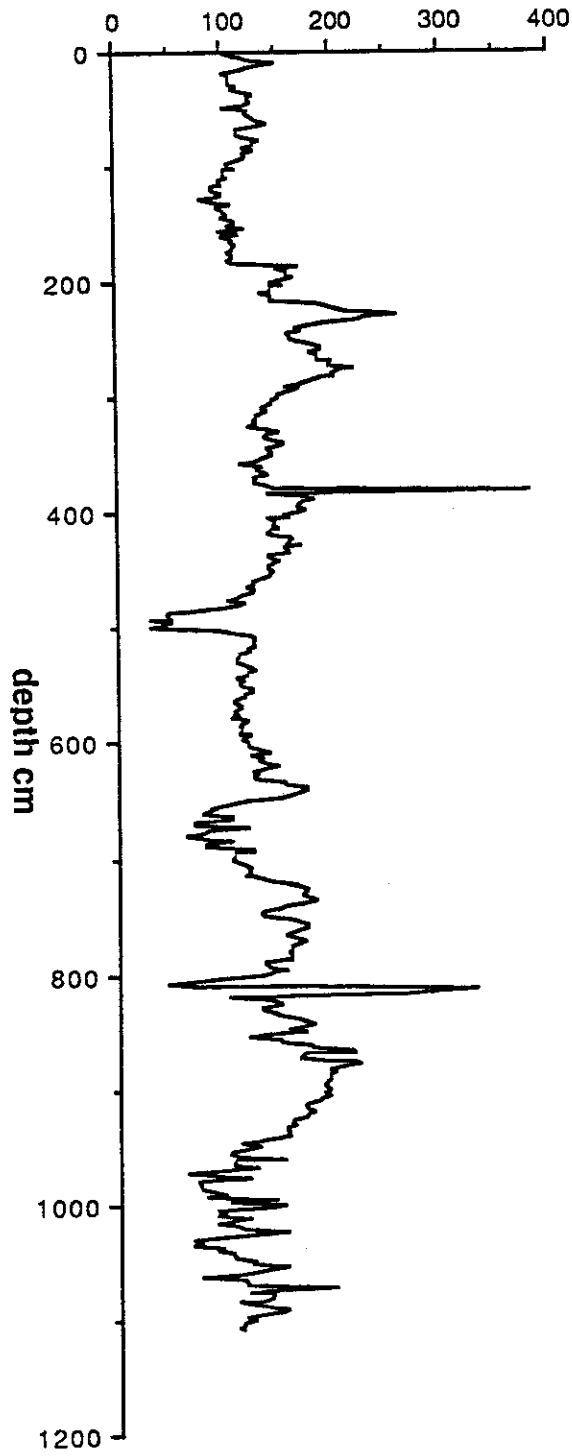


87033009 TW



87033009 LCF

susceptibility si units



EQUIPMENT LOSS REPORT

HUDSON 87-033

18 SEPTEMBER, 1987

Position: Lat. 71 39.95 Long. 65 50.64

Water Depth: 2255 M

1.0 Situation Description:

During the first station of this cruise at station number 87-033-001 a 100 foot section of core barrel was lost shortly after pullout from the bottom. Sea conditions were approximately state 4 with a 15 - 20 knot wind. Ship was operating stern to the wind as was the usual procedure and was not involved in any unusual maneuvering at the time. Deployment and lowering of the core was routine and triggering of the core occurred without incident. Pullout was measured at 23,000 lbs which is within the accepted range for this water depth and core length. Tension readings immediately prior to the trigger point at 2000m was 17,000 lbs, at trigger tension dropped to 8,000 lbs. After pullout was achieved it was observed that the tension was only 13,000 lbs.

Initially this differential was attributed to a problem in the tension readout as the tension meter had been reported as inoperable and was repaired at sea. (T. Atkinson). During recovery the winch operator, (G. Whalen), observed that the winch suddenly increased speed at 300 m from the surface which could have been the point at which the barrel string fell away from the core head. Upon recovery it was observed that there were drag marks on the core head barrel stud which were in line with the blind holes. However no damage to the blind holes was observed in the 8 blind hole locations present, but drag marks were present at four locations.

It appears that the mechanism of failure was the improper installation of the set screws in the top most 3/4 to 1 inch transition coupling. The set screws, due to the depth of the metal in the transition coupling, were not observed carefully after initial alignment and at some point the barrel, with the coupling attached, moved forward unobserved. The screws were tightened and it was assumed that they were properly installed. However, due to the depth of the thread it was impossible to make an accurate visual determination. The hold of the screws was sufficiently strong enough to prevent rotation or further slippage of the coupling during the rest of the barrel installation process. Had this occurred it would have been obvious that a problem existed and it could have been corrected at that point. Since none of these indicators were present the

fault went undetected by both the deck crew and the core supervisor.

2.0 LIST OF EQUIPMENT LOST:

The equipment which was lost in this accident includes the following:

- (2) 1" wall core barrels
- (4) 3/4" wall core barrels
- (4) 1/2" wall core barrels
- (2) 3/4 to 1" transition couplings
- (1) 1" straight coupling
- (3) 3/4" straight couplings
- (1) 3/4 to 1/2" transition coupling
- (3) 1/2" straight couplings
- (1) Cutter/catcher assembly
- (2) Lifting collars
- (1) Finger catcher
- (100) Feet of core liner
- (2) Recovery pennants
- Misc. hardware.

Estimated value of the equipment lost at present replacement costs is \$xxxxxx in U.S. funds.

3.0 CORRECTIVE MEASURES TAKEN:

In order to preclude a repeat of this accident the importance of proper seating and alignment of the set screws with the blind holes in the core barrel was reinforced with the assembly crew. Careful visual inspection of the seating of the first screw, including a down hole inspection with a flashlight is now required on all assemblies. The failure of the screws to seat properly was not a failure of the assembly crew as an alignment judgement had been made after proper inspection and the unobserved slippage of the coupling could not have been detected for the reasons stated in section 1.0. None of the indicators of improper set screw placement were present either during the remainder of the assembly or at core launch. The loss of the barrel string is considered to be accidental and under the circumstances unpreventable at that time. New inspection procedures which have been instituted will serve to prevent a recurrence.

Loss Report Compiled by:



Alan H. Driscoll
Onboard C.S.S. HUDSON
September 19, 1987

C.S.S. HUDSON

CRUISE 87-033

EVALUATION OF LINE TENSION MONITOR ABOARD C.S.S. HUDSON
AND LONG CORING TENSION RECORDS

By

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Long Core Development Project
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October 1987

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1.0 INTRODUCTION:

A strain gauge tension monitor located in the overboarding block aboard HUDSON is used to monitor the line tension during coring operations. An early evaluation of the accuracy of this sensor against the relatively well known weights of the LCF showed a fairly large discrepancy between the two values. This differential appears to be a linear 4000 lb error at all depths. The following is a comparison of the known weights for the coring system at various depths as they compare to the load values which were supplied by the winch operator during operations.

Several interesting observations were made during this evaluation and included the fact that the winch operators analog dial tension indicator consistently reads 4000 lbs higher than the print out of the chart recorder. It appears that the recorder shows the correct tension as it closely matched the calculated values for the system. Secondly, by analysing the chart record it is possible to assign a value for the drag of the coring system at the end of the wire as the ship pitches in different sea states. This information may be of value when dealing with heavy weights in rough sea conditions. Thirdly, a lag time exists between the observation of the triggering of the core by the winch operator and the response of the chart recorder when an event occurred. Consistently during the 20 core stations occupied during this cruise a trip was observed by the winch operator and responded to before the chart registered the event.

2.0 METHODS OF CALCULATION:

In order to assess the accuracy of the tension monitoring system it was necessary to ascertain the weights (in air) of the various components of the coring system and weights for the various length cores which were deployed. Secondly a weight for the 3/4" 3 X 19 wire rope in water was established. The resulting values were as follows:

| CORE LENGTH | WEIGHT |
|--------------|----------|
| 100' (30.5m) | 8585 lbs |
| 50" (15.2m) | 6373 lbs |
| 40' (12.2m) | 5573 lbs |
| 30' (9.8m) | 4325 lbs |

WIRE WEIGHT

Per ft. in water = .764 lbs

Per M in water = 2.506 lbs

Two values were calculated for this evaluation (1) the weight of the coring system and wire in water for any given depth [A] and (2) the actual force required to pull the corer from the bottom [B]. These values were derived in the following manner:

[A]

$$T = C + W1$$

Where

T = Tension

C = Total core weight for a given length

W1 = Weight in water of wire at different depths

[B]

$$PF = PL - (C - W2)$$

Where

PF = Actual pullout force

PL = Recorded total pullout force

C = Total core weight for a given length

W2 = Weight in water of wire at maximum station length

Lacking any accurate means of establishing the actual weight in water of a particular coring system with less than a 200 lb error factor it has been assumed that the weights shown for any 0 meter weight are accurate for the purposes of this evaluation. Secondly, the loads determined from the chart recording are subject to some interpretation error due to the small scale involved, but are felt to be reasonably accurate to within 200 lbs.

The accuracy of this evaluation is adequate to make an assesment of the existing variances seen when using the current tension monitoring system aboard HUDSON. It should be remembered that the dial indicator at the winch control for the Pengo is located slightly behind and to the left of the operator and is subject to read errors, especially when in the middle of an over the side operation. As a built in safety factor should probably not be changed.

3.0 CORE STATION DATA

The terms which are used in this section refer to the CHART record obtained as part of this study and the values it produced which are equal to the calculated values for the various length coring systems. In addition, OBSERVED values are listed which were derived from the winch operator at various times during the station and are included in order to show the differential which exists in the system.

| | |
|-----------------------------|----------------------|
| Core 87-033-001 | |
| Core Length: 100' (30.5m) | Water Depth: 2255m |
| Core Weight: 8585 lbs | Max. Wire Out: 2253m |
| NO TENSION RECORD AVAILABLE | Penetration: ? |

| | |
|--------------------------------|--------------------|
| Core 87-033-002 | |
| Core Length: 30' (9.8m) | Water Depth: 2056m |
| Core Weight: 4325 lbs | Max. Wire Out: ? |
| Actual Pullout Force: 6988 lbs | Penetration: 7m |

| CHART | OBSERVED |
|-------------------|------------|
| 0m = 4000 lbs | |
| 500m = 5400 lbs | 8,000 lbs |
| 1000m = 6500 lbs | 10,000 lbs |
| 1500m = 7760 lbs | 12,000 lbs |
| 2000m = 9012 lbs | |
| HIT = 3000 lbs | |
| Pull = 16,000 lbs | 22,000 lbs |

| | |
|--------------------------------|----------------------|
| Core 87-033-003 | |
| Core Length: 30' (9.8m) | Water Depth: 2056m |
| Core Weight: 4325 lbs | Max. Wire Out: 2026m |
| Actual Pullout Force: 7250 lbs | Penetration: 6.38m |

| CHART | OBSERVED |
|-------------------|------------|
| 0m = 4000 lbs | |
| 500m = 5400 lbs | 9,000 lbs |
| 1000m = 6500 lbs | 11,000 lbs |
| 1500m = 7760 lbs | 14,000 lbs |
| 2026m = 9000 lbs | 13,000 lbs |
| HIT = 3000 | |
| Pull = 16,250 lbs | 21,000 lbs |

Core 87-033-004
Core Length: 50' (15.2m)
Core Weight: 6373 lbs
Actual Pullout Force: 5300 lbs

Water Depth: 128m
Max. Wire Out: 89m
Penetration: 6.08m

CHART

OBSERVED

0m = 6000 lbs
89m = 6200 lbs
HIT = 2000 lbs
Pull = 11,500 lbs

NO OBSERVATIONS

Core 87-033-005
Core Length: 30' (9.8m)
Core Weight: 4325 lbs

NO TENSION RECORD TAKEN ON THIS STATION

Core 87-033-006
Core Length: 50' (15.2m)
Core Weight: 6373 lbs
Actual Pullout Force: 5050 lbs

Water Depth: 1080m
Max. Wire Out: 1066m
Penetration: 6.08m

CHART

OBSERVED

0m = 6000 lbs
500m = 7000 lbs
1066m = 8700 lbs
HIT = 2500 lbs
Pull = 13,750 lbs

11,000 lbs
13,000 lbs
18,000 lbs

Core 87-033-007
Core Length: 40' (12.2m)
Core Weight: 5573 lbs
Actual Pullout Force: 4300 lbs

Water Depth: 820m
Max. Wire Out: 817m
Penetration: 7.3m

CHART

OBSERVED

0m = 5200 lbs
500m = 6450 lbs
817m = 7200 lbs
HIT = 1000 lbs
PULL = 11,500 lbs

10,000 lbs
16,000 lbs

Core 87-033-008
Core Length: 40' (12.2m)
Core Weight: 5573 lbs
Actual Pullout Force: 4700 lbs

Water Depth: 2397m
Max. Wire Out: 2424m
Penetration: 12.2m

| CHART | | OBSERVED |
|-------|--------------|------------|
| 0m | = 5200 lbs | |
| 500m | = 6450 lbs | 11,000 lbs |
| 1000m | = 7700 lbs | 13,000 lbs |
| 1500m | = 9000 lbs | 15,000 lbs |
| 2000m | = 10,000 lbs | 16,000 lbs |
| 2424m | = 11,300 lbs | |
| HIT | = 4500 lbs | |
| Pull | = 16,000 lbs | 20,000 lbs |

Core 87-033-009
Core Length: 40' (12.2m)
Core Weight: 5573 lbs
Actual Pullout Force: 6300 lbs

Water Depth: 1437m
Max. Wire Out: 1447m
Penetration: 12.48m

| CHART | | OBSERVED |
|-------|--------------|------------|
| 0m | = 5200 lbs | |
| 500m | = 6400 lbs | 10,000 lbs |
| 1000m | = 7700 lbs | 12000 lbs |
| 1447m | = 8800 lbs | |
| HIT | = 2000 lbs | |
| Pull | = 15,100 lbs | 20,000 lbs |

Core 87-033-010
Core Length: 50' (15.2m)
Core Weight: 6373 lbs
Actual Pullout Force: 2100 lbs

Water Depth: 574m
Max. Wire Out: 560m
Penetration: 3m

| CHART | | OBSERVED |
|-------|------------|------------|
| 0m | = 6000 lbs | |
| 500m | = 7253 lbs | 10,000 lbs |
| 560m | = 7400 lbs | |
| HIT | = 1000 lbs | |
| PULL | = 9500 lbs | 11,000 lbs |

Core 87-033-011
Core Length: 50' (15.2m)
Core Weight: 6373 lbs
Actual Pullout Force: 3300 lbs

Water Depth: 896m
Max. Wire Out: 867m
Penetration: 14.6m

CHART

OBSERVED

| | | | |
|------|---|------------|------------|
| 0m | = | 6000 lbs | |
| 500m | = | 7253 lbs | 10,000 lbs |
| 867m | = | 8200 lbs | 12,000 lbs |
| HIT | = | 900 lbs | |
| PULL | = | 11,500 lbs | 15,000 lbs |

Core 87-033-012
Core Length: 50' (15.2m)
Core Weight: 6373 lbs
Actual Pullout Force: 4100 lbs

Water Depth: 770m
Max. Wire Out: 752m
Penetration: 16m

CHART

OBSERVED

| | | | |
|------|---|------------|------------|
| 0m | = | 6000 lbs | |
| 500m | = | 7200 lbs | 11,000 lbs |
| 752m | = | 7900 lbs | |
| HIT | = | 1200 lbs | |
| PULL | = | 12,000 lbs | 16,000 lbs |

Core 87-033-013
Core Length: 50' (15.2m)
Core Weight: 6373 lbs
Actual Pullout Force: 5500 lbs

Water Depth: 786m
Max. Wire Out: 780m
Penetration: 15.8m

CHART

OBSERVED

| | | | |
|------|---|------------|------------|
| 0m | = | 6000 lbs | |
| 500m | = | 7200 lbs | 11,000 lbs |
| 780m | = | 8000 lbs | 12,000 lbs |
| HIT | = | 1000 lbs | |
| PULL | = | 13,500 lbs | 19,000 lbs |

Core 87-033-014

NO CORE THIS STATION - BOTTOM TOO HARD

Core 87-033-015
Core Length: 50' (15.2m)
Core Weight: 6373 lbs
Actual Pullout Force: 7300 lbs

Water Depth: 177m
Max. Wire Out: 161m
Penetration: 11.3m

| CHART | OBSERVED |
|-------------------|------------|
| 0m = 6000 m | |
| 161m = 6400 lbs | 10,000 lbs |
| HIT = 1000 lbs | |
| PULL = 13,700 lbs | 18,000 lbs |

Core 87-033-016
Core Length: 50' (15.2m)
Core Weight: 6373 lbs
Actual Pullout Force: 9000 lbs

Water Depth: 420m
Max. Wire Out: 398m
Penetration: 6.04m

| CHART | OBSERVED |
|-------------------|------------|
| 0m = 6000 lbs | |
| 398m = 7000 lbs | |
| HIT = 1000 lbs | |
| PULL = 16,000 lbs | 20,000 lbs |

Core 87-033-017
Core Length: 50' (15.2m)
Core Weight: 6373 lbs
Actual Pullout Force: 7900 lbs

Water Depth: 514m
Max. Wire Out: 504m
Penetration: 16.2m

| CHART | OBSERVED |
|-------------------|-------------------|
| 0m = 6000 lbs | 10,000 lbs @ 100m |
| 504m = 7300 lbs | 12,000 lbs @ 400m |
| HIT = 1500 lbs | |
| PULL = 15,200 lbs | 19,000 lbs |

Core 87-033-018
Core Length: 50' (15.2m)
Core Weight: 6373 lbs
Actual Pullout Force: 4700 lbs

Water Depth: 460m
Max. Wire Out: 430m
Penetration: 12.2m

| CHART | OBSERVED |
|-------------------|-------------------|
| 0m = 6000 lbs | 9,000 lbs @ 200m |
| 430m = 7000 lbs | 11,000 lbs @ 400m |
| HIT = 800 lbs | |
| PULL = 11,700 lbs | 16,000 lbs |

Core 87-033-019
Core Length: 50' (15.2m)
Core Weight: 6373 lbs
Actual Pullout Force: 5100 lbs

Water Depth: 450m
Max. Wire Out: 443m
Penetration: 17m

| CHART | | OBSERVED |
|-------|--------------|-------------------|
| 0m | = 6000 lbs | 10,000 lbs @ 200m |
| 443m | = 7100 lbs | 11,000 lbs @ 350m |
| HIT | = 1000 lbs | |
| PULL | = 12,200 lbs | 18,000 lbs |

Core 87-033-020
Core Length: 50' (15.2m)
Core Weight: 6373 lbs
Actual Pullout Force: 4276 lbs

Water Depth: 305m
Max. Wire Out: 289m
Penetration: 15.5m

| CHART | | OBSERVED |
|-------|--------------|------------|
| 0m | = 6000 lbs | |
| 289m | = 10,000 lbs | |
| HIT | = 1000 lbs | |
| PULL | = 11,000 lbs | 11,000 lbs |

Figure 1. Cruise track and station locations

