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 streemers.
Sounders - 3.5 and 12 kHz
Bottom samplers - Long Coring Facility and Van Veen.

SCIENTIFIC STAFF LIST AND AFFILIATION

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J. Marsters	Dalhousie University

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 sccsessful. Apart from mechanical problems at station 1, the sea floor conditions seem to play a major part in succsessful 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 preventig 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 teckniques 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 ommitted.

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 uppright in the refrigerated locker, others were stored uppright 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 imdicated by the initial geotechnical analysis.

TABLE 1

SAMPLE INVENTORY 87-033

STATION NUMBER	SAMPLE TYPE	DAY/TIME (GMT)	LATITUDE	LONGITUDE	DEPTH (METRES)	GEOGRAPHIC LOCATION
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	2780514	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,SEABED 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 FIORD	CORE WAS TAKEN OFF CENTRE IN THE FIORD. 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	2671218	ITIRBILUNG FIORD	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 SCHAFER IN THE COOLER. NO DAMAGE TO CORER OR LINERS.
006	LCF CORER	2682323	66 59.23N 58 24.43W	1088	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 EXTRUDING 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 (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	BONAVISTA 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.

TABLE 4

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 ATTEMT WAS WITH A SHIPEK, CLOSED BUT ONLY A FEW SAND GRAINS. SECOND -VANVEEN FULL, SURFACE WAS WATERY AND SOUPY, OLIVE (GRRENISH) 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

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	LINE NUMBER	GEOGRAPHIC LOCATION	RECORDER	NOTES
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	2661845		BAFFIN BAY	EPC	
009	2661850	2662340		BAFFIN BAY	EPC	
010	2682200	2701810		DAVIS STRAIT	EPC	
011	2711135	2721810		DAVIS STRAIT	EPC	

TABLE 6

12 KHZ BATHYMETRY RECORDS 87-033

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	LINE NUMBER	GEOGRAPHIC LOCATION	RECORDER	NOTES
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		ITIRBILUNG 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

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	LINE NUMBER	GEOGRAPHIC LOCATION	RECORDER	HYDROPHONE	NOTES
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 RAWF 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

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	LINE NUMBER	GEOGRAPHIC LOCATION	RECORDER	HYDROPHONE	NOTES
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 FIORD	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		BONAVASTA BAY	EPC	EXTERNAL	
001	2621255	2621420		BAFFIN BAY	EPC	INTERNAL	
002	2621425	2662345		BAFFIN BAY	EPC	INTERNAL	
003	2671135	2671225		ITIRBILUNG FIORD	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		BONAVISTA BAY	EPC	INTERNAL	
05A	2720005	2720940		HUDSON STRAIT	EPC	INTERNAL	
09A	2781635	2790600		BONAVISTA BAY	EPC	INTERNAL	

TABLE 10

HUNTEC D.T.S. TAPES 87-033

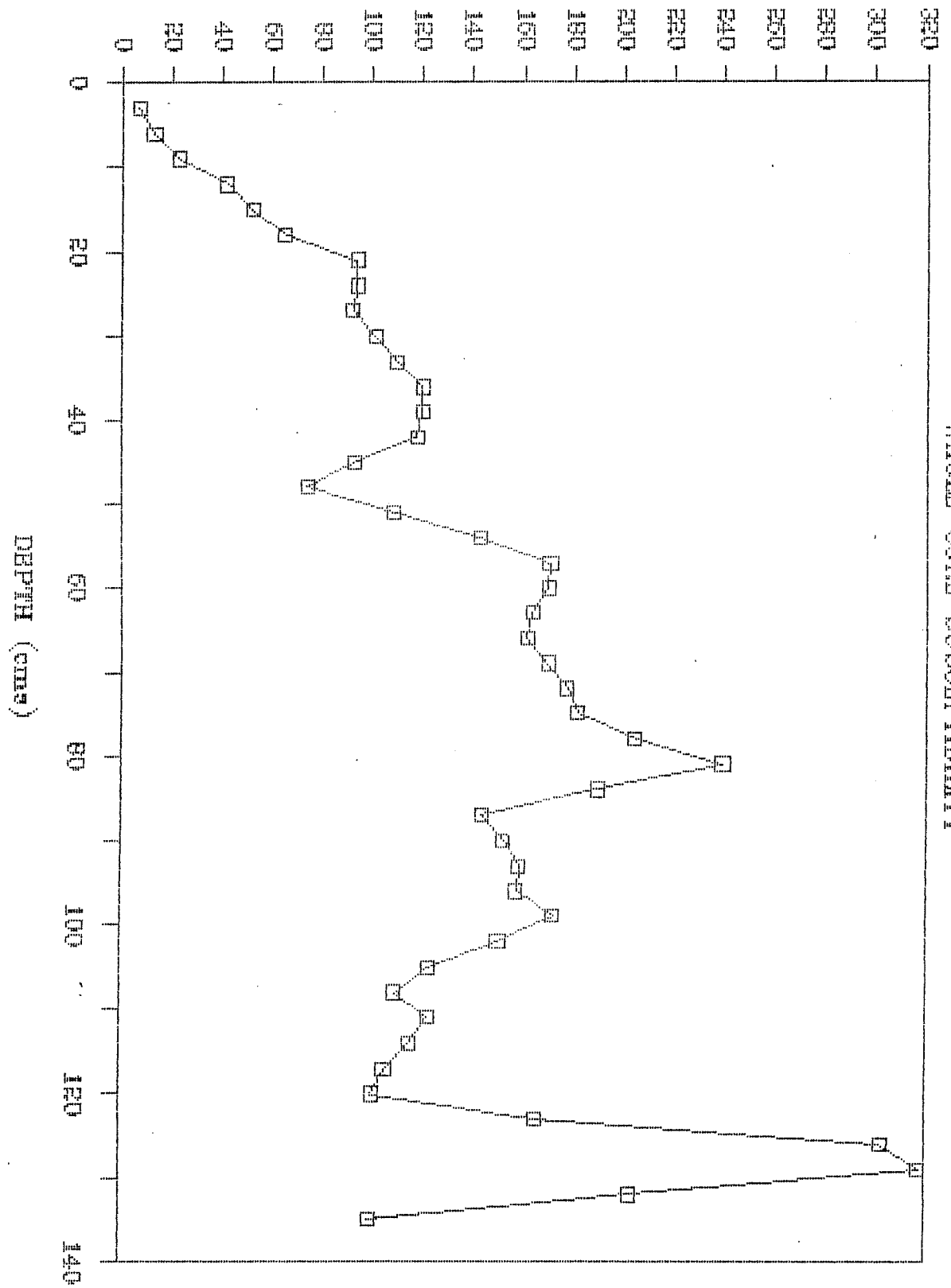
TAPE NUMBERS	START DAY/TIME	STOP DAY/TIME	LINE NUMBER	GEOGRAPHIC LOCATION	CHANNELS	NOTES
001	2621322	2621621		BAFFIN BAY	INTERNAL TRIGGER EXTERNAL TIME FIX	BOOMER MODE
002	2621622	2622014		BAFFIN BAY	INTERNAL TRIGGER EXTERNAL TIME FIX	BOOMER MODE
003	2622016	2662115		BAFFIN BAY	INTERNAL TRIGGER EXTERNAL 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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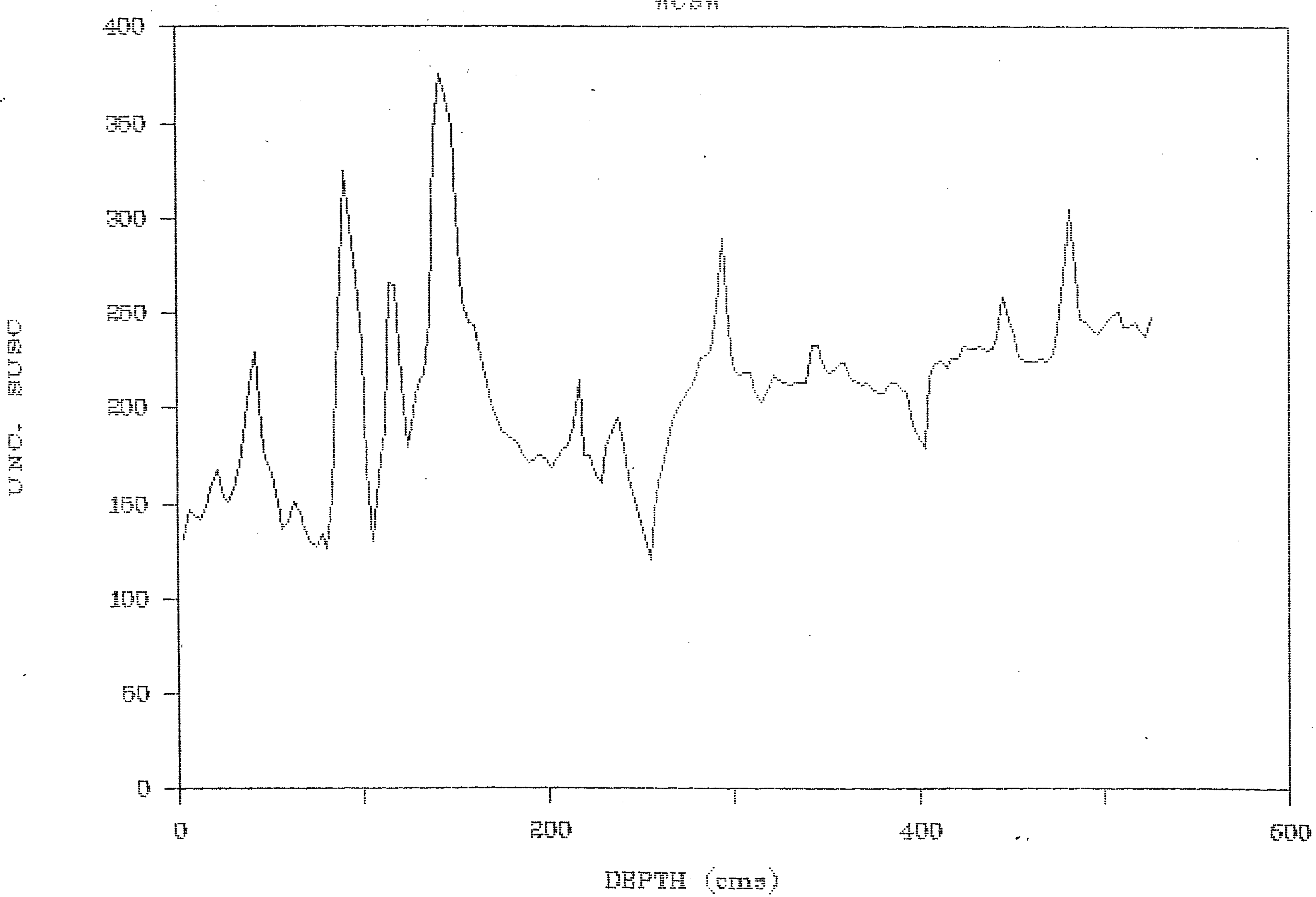

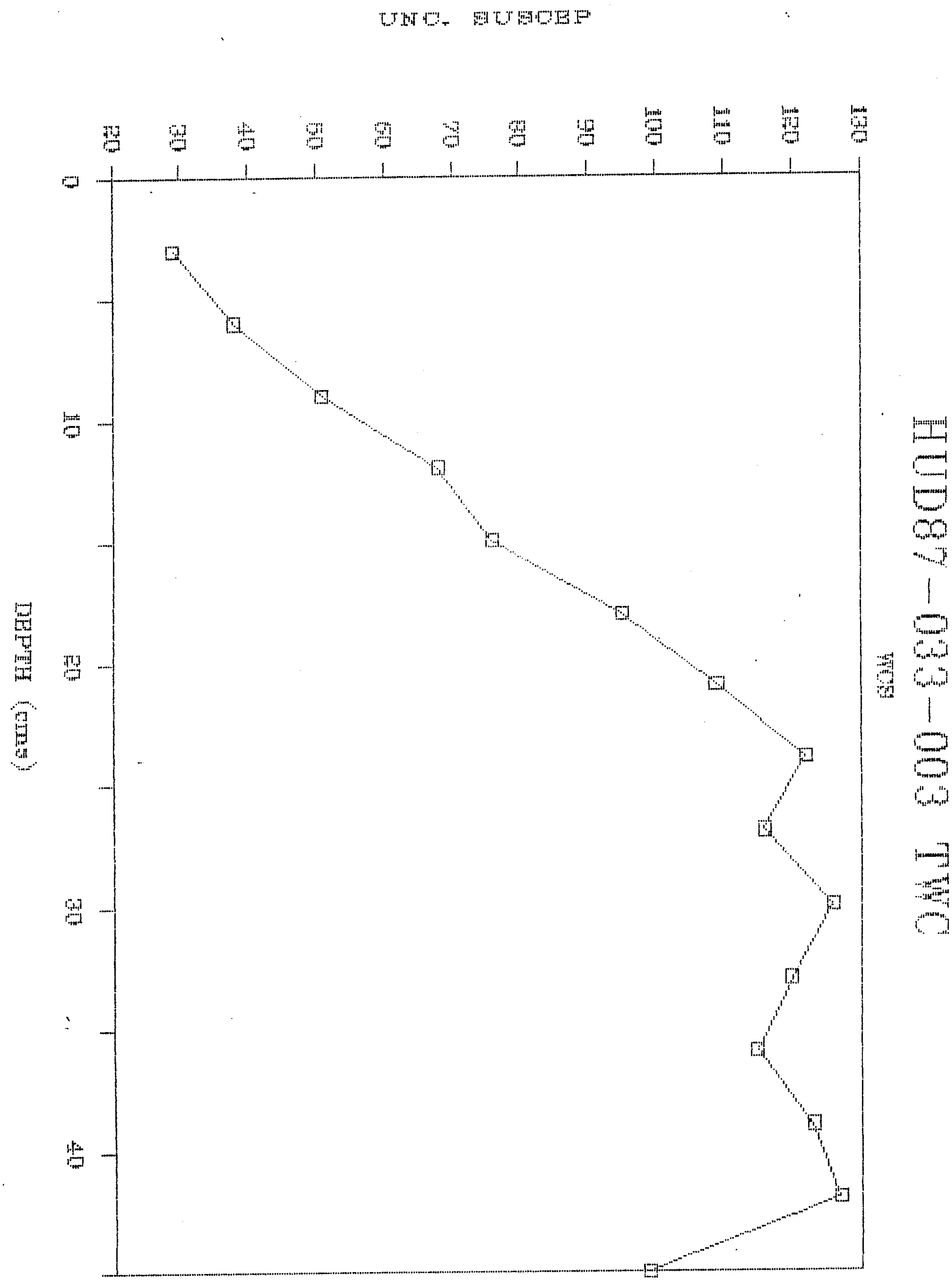
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50
60
70
80
90
100
110
120
130
0
10
20
30
40

UNC. SUSCEP

HUD87 — 0313 — 0005 — TWC
MCB
DEPTH (cms)
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20
40
60
80
100
120
0
20
40
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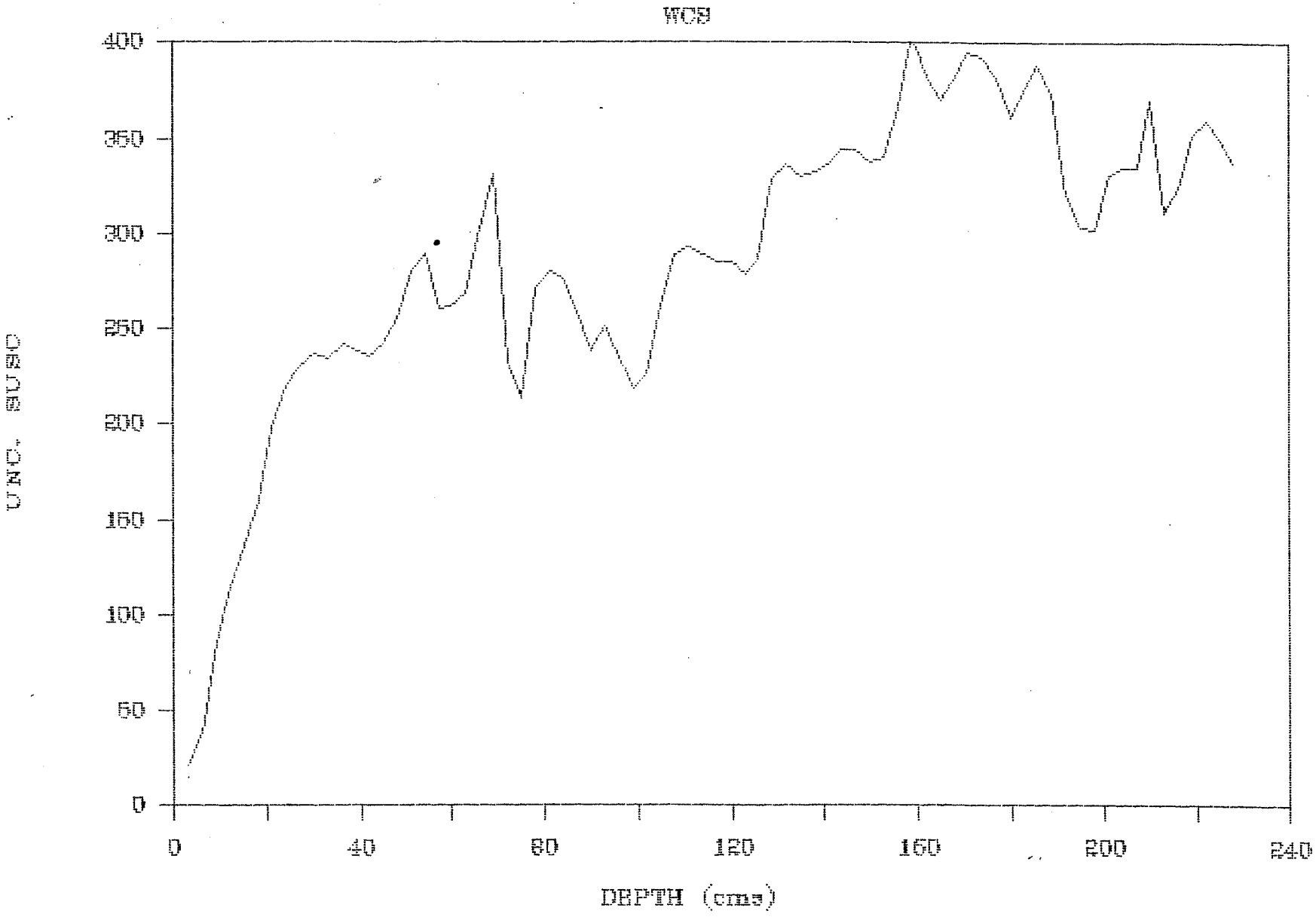
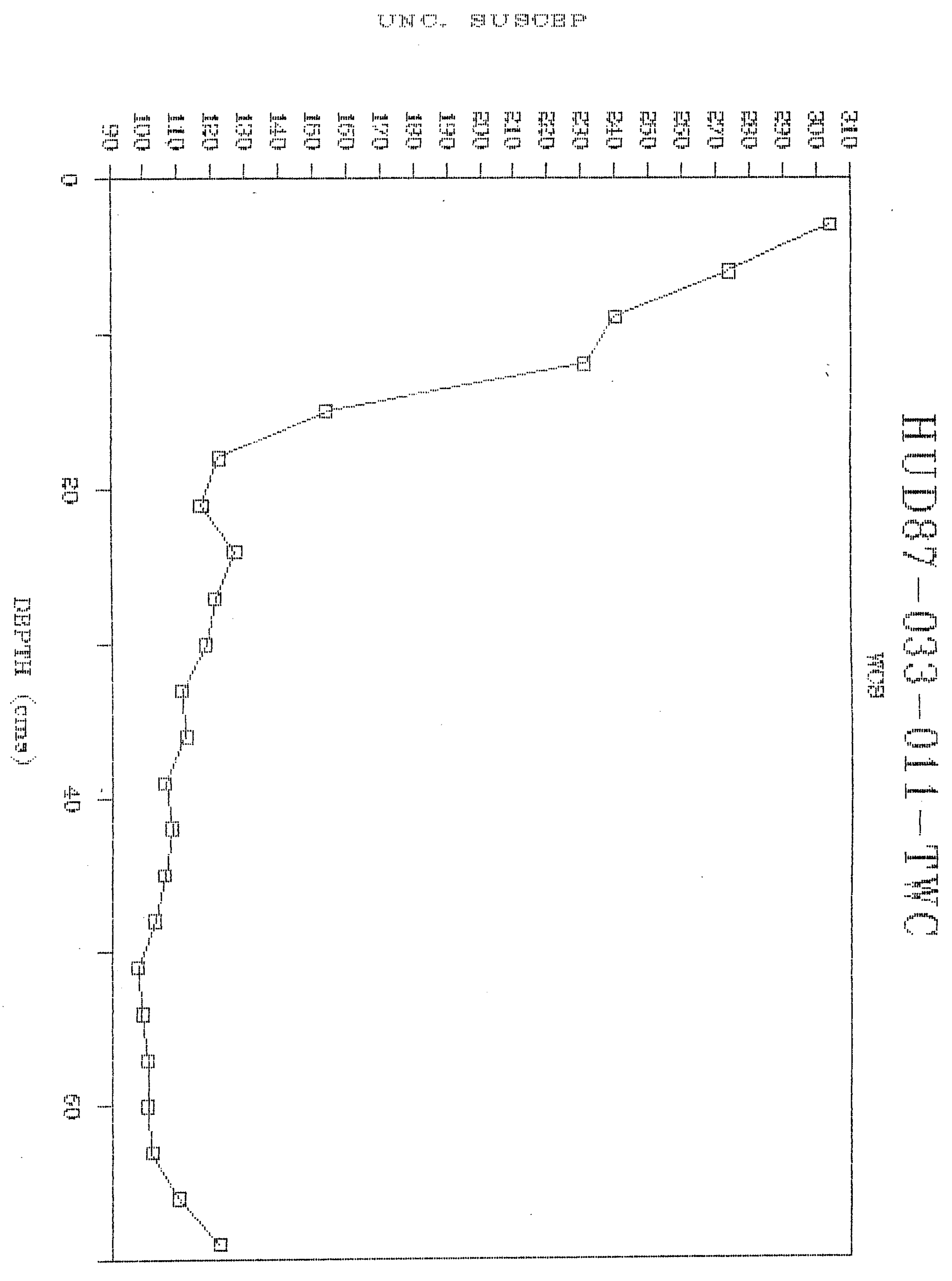
200
220
240
260
280
300
320
340
360

HUD87-033-006

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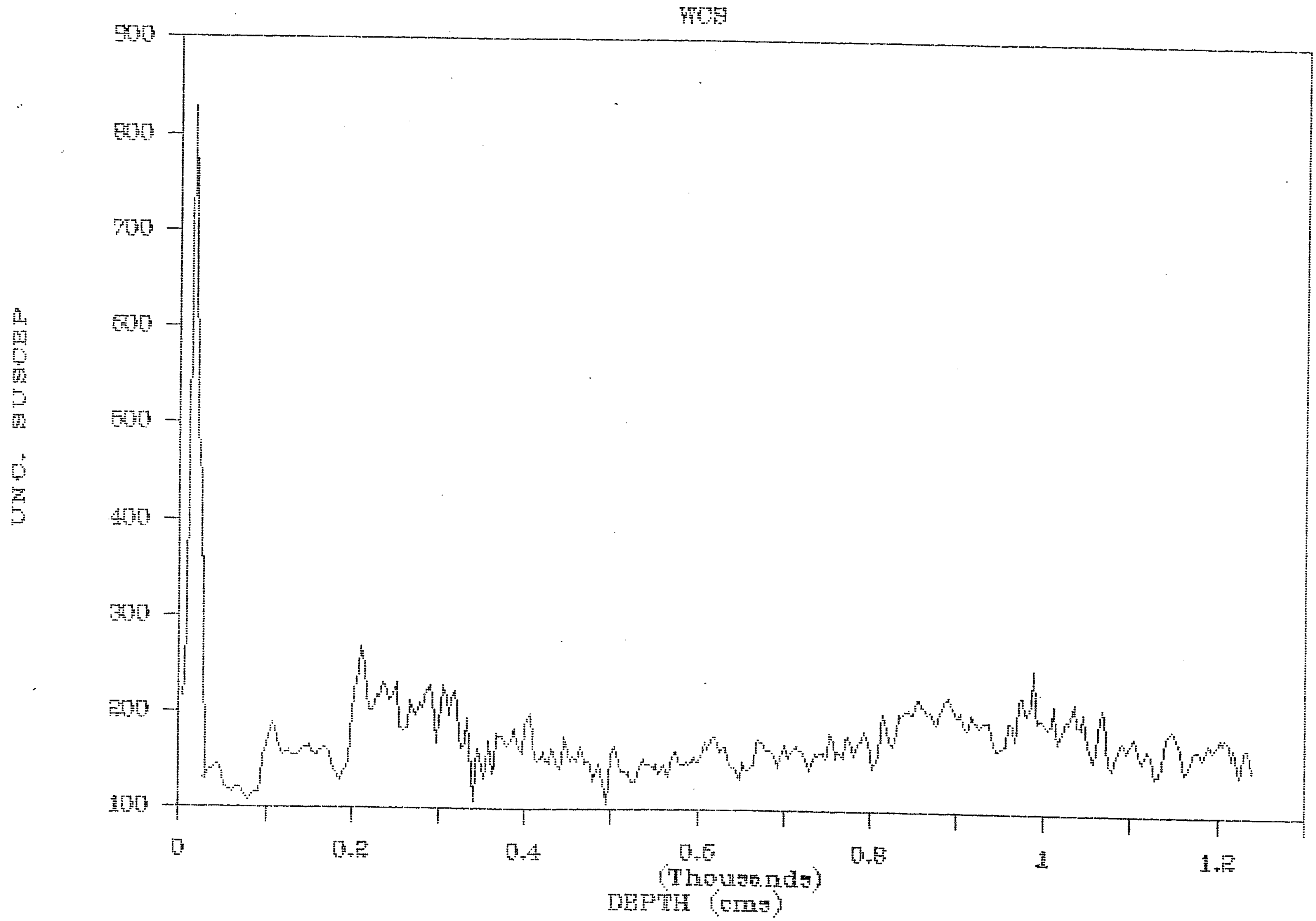
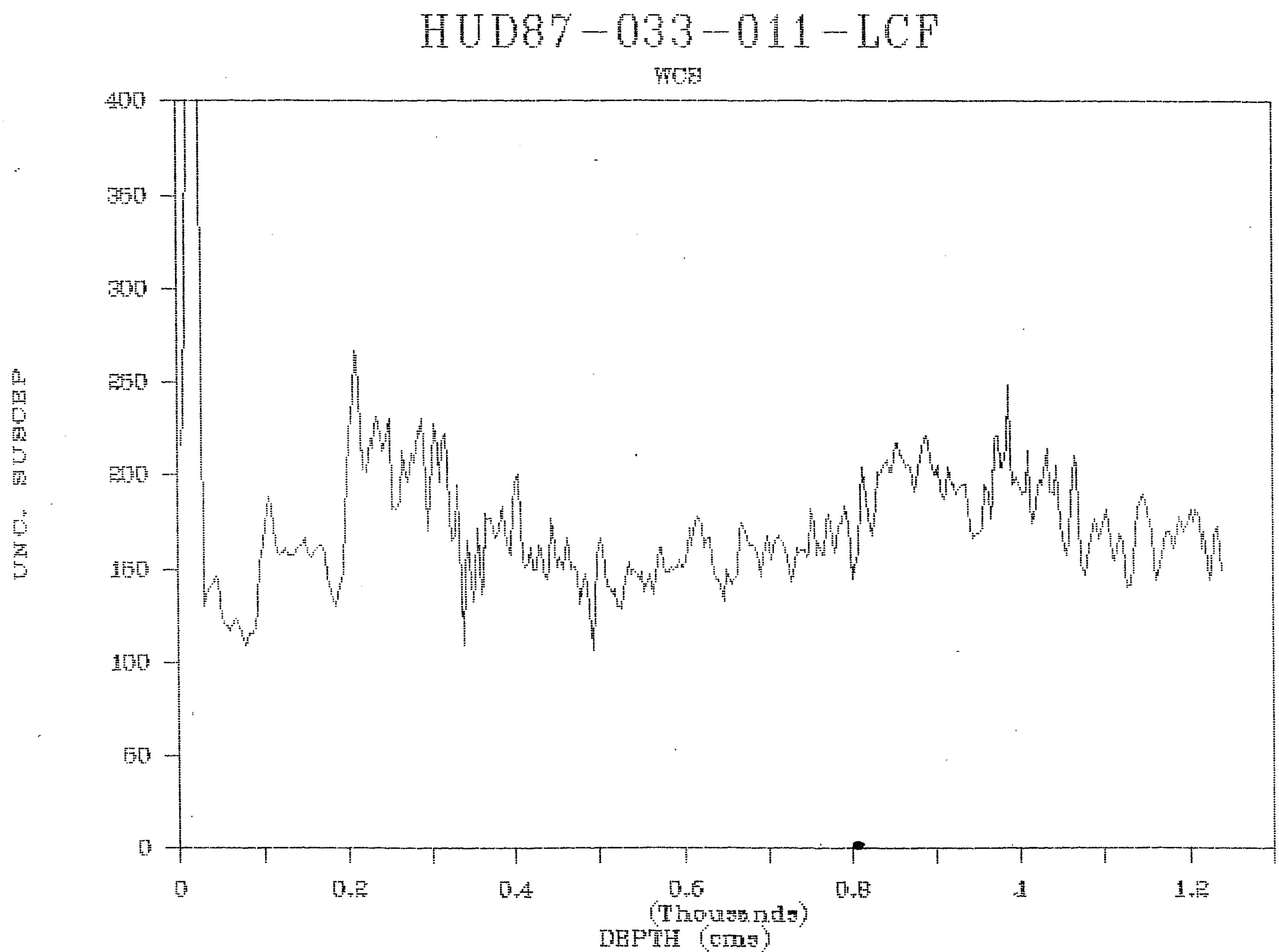
310

HUD87-033-011-LCF

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WCS
UNC. SUSCEP
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300
250
200
150
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0.6
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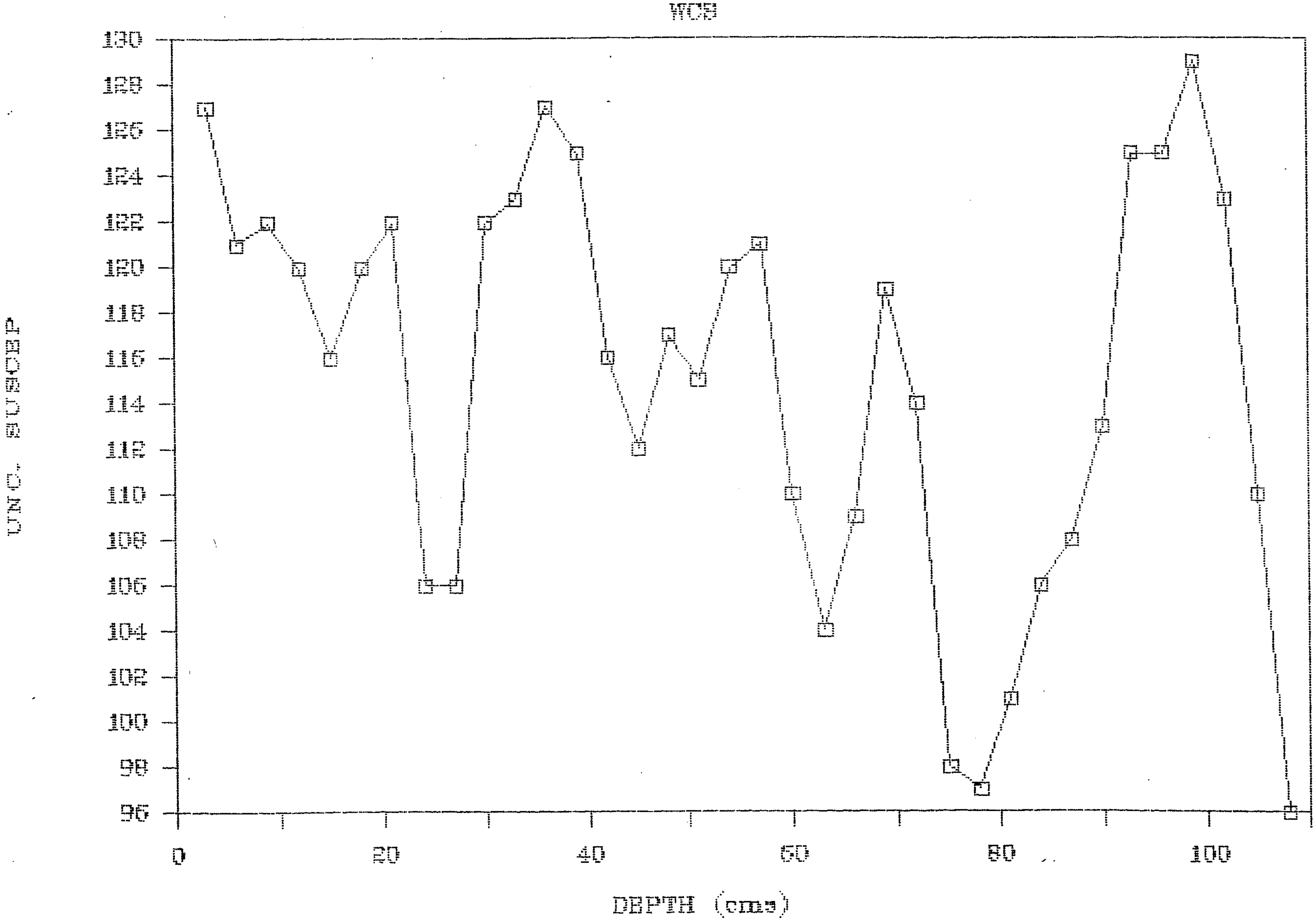
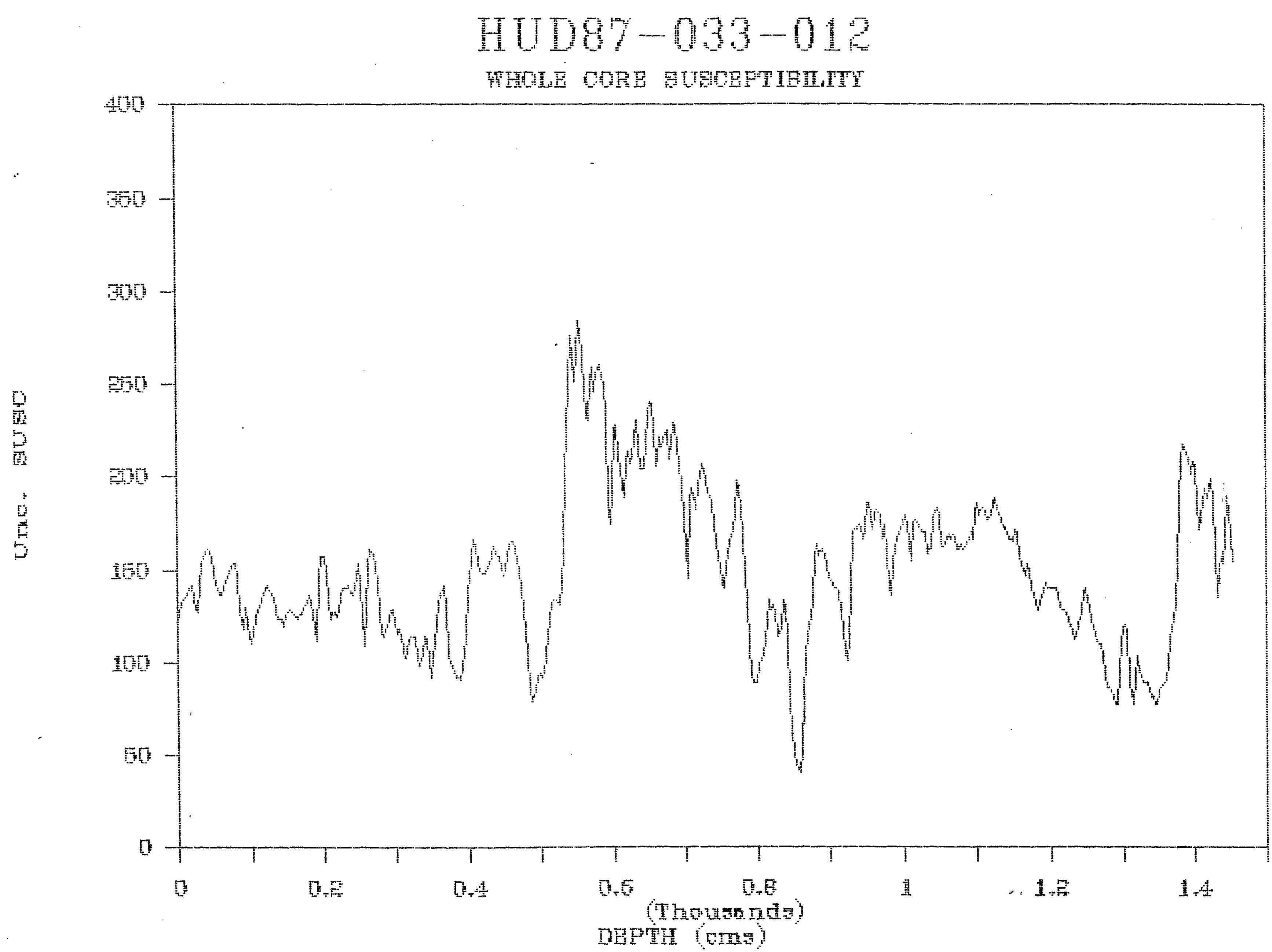
1.2
(Thousands)
DEPTH (cms)

HUD87-033-012-TWC

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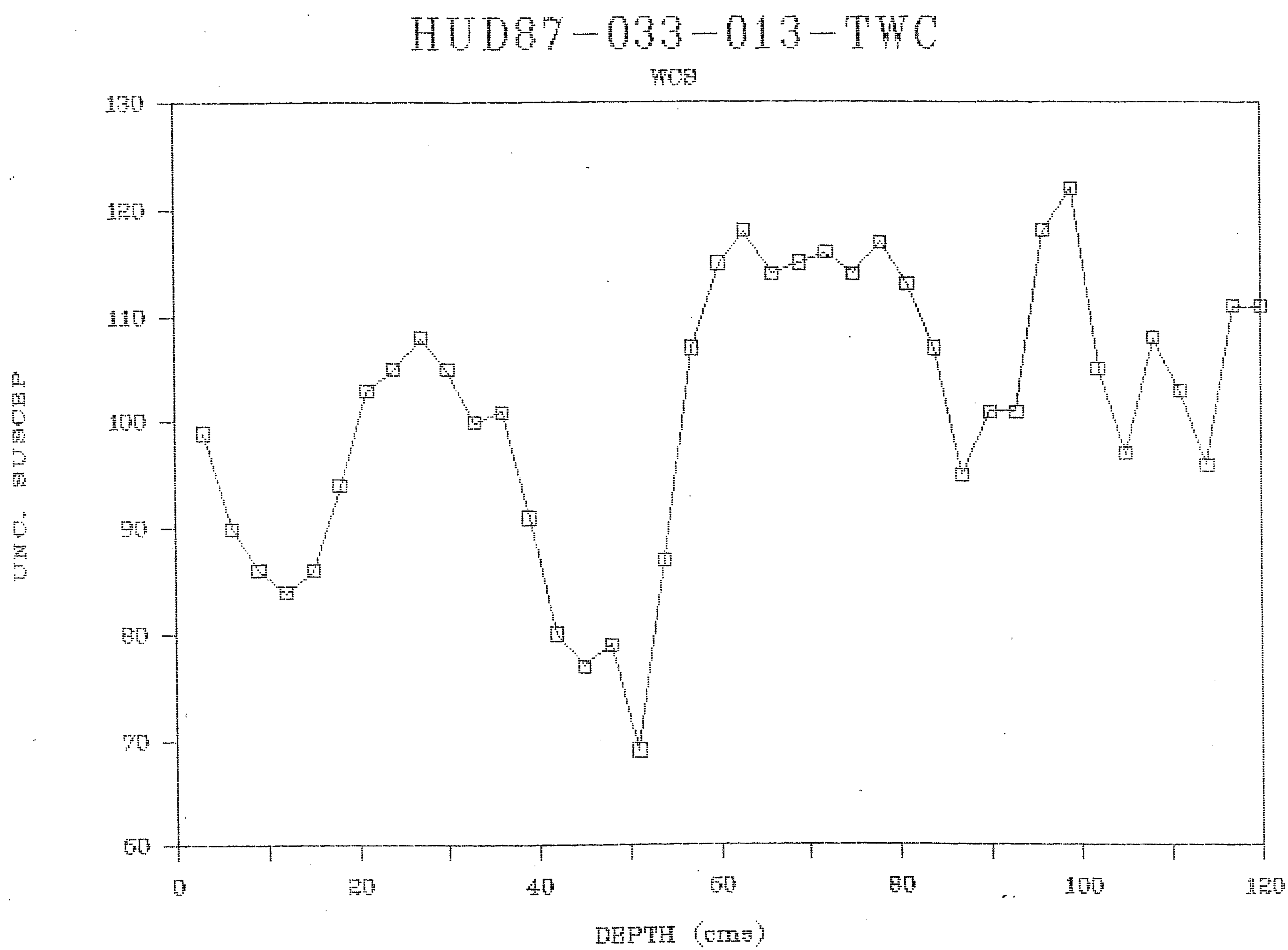
WHOLE CORE SUSCEPTIBILITY
Unc. SUSC
0
50
100
150
200
250
300
350
400
0
0.2
0.4
0.6
0.8
1
1.2
1.4
(Thousands)
DEPTH (cms)



HUD87-033-013-TWC
WCS
UNC. SUSCEP
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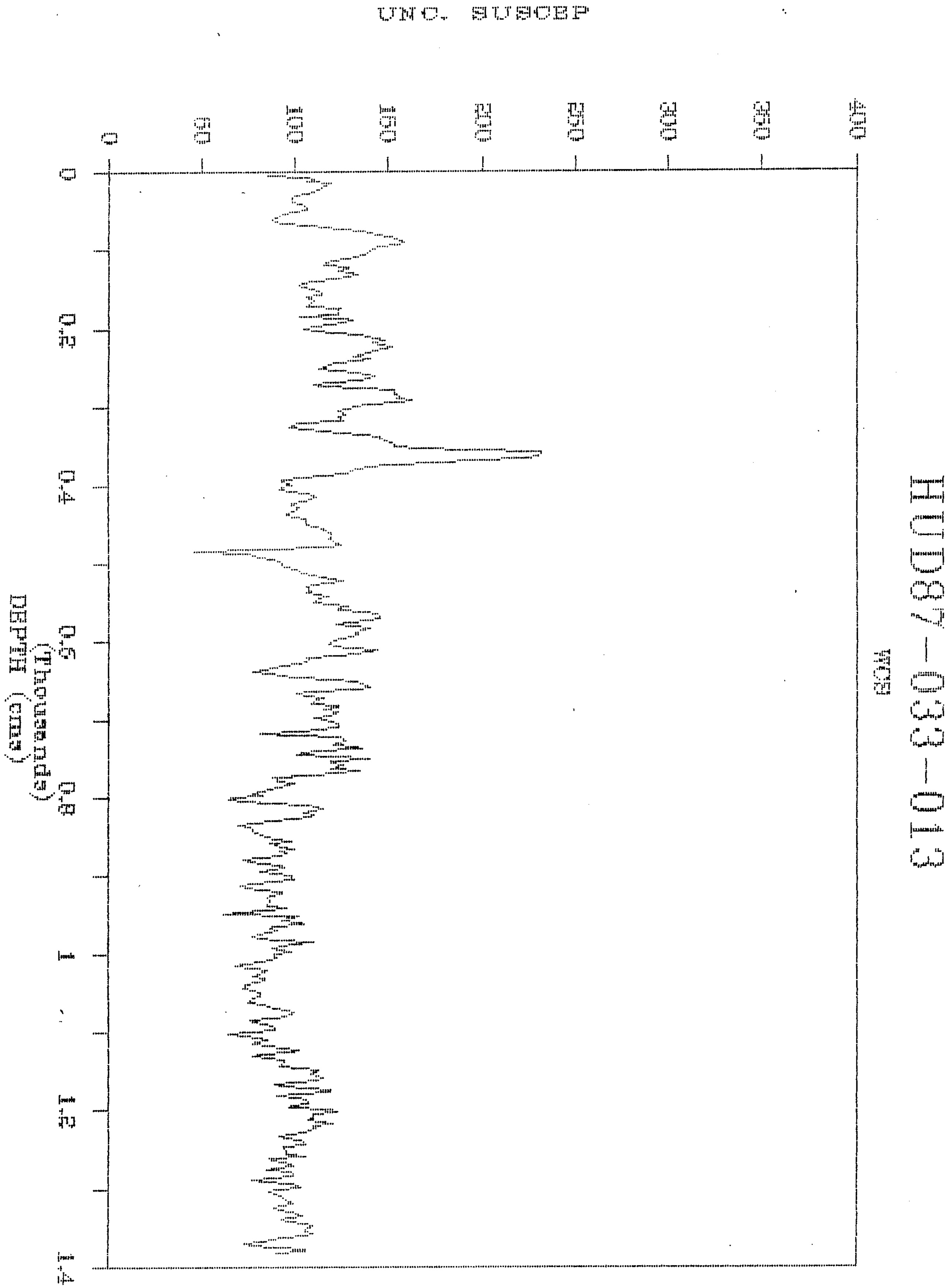
120
110
100
90
80
70
60
0
20
40
60
80
100
120
DEPTH (cms)


UNC. SUSCEP
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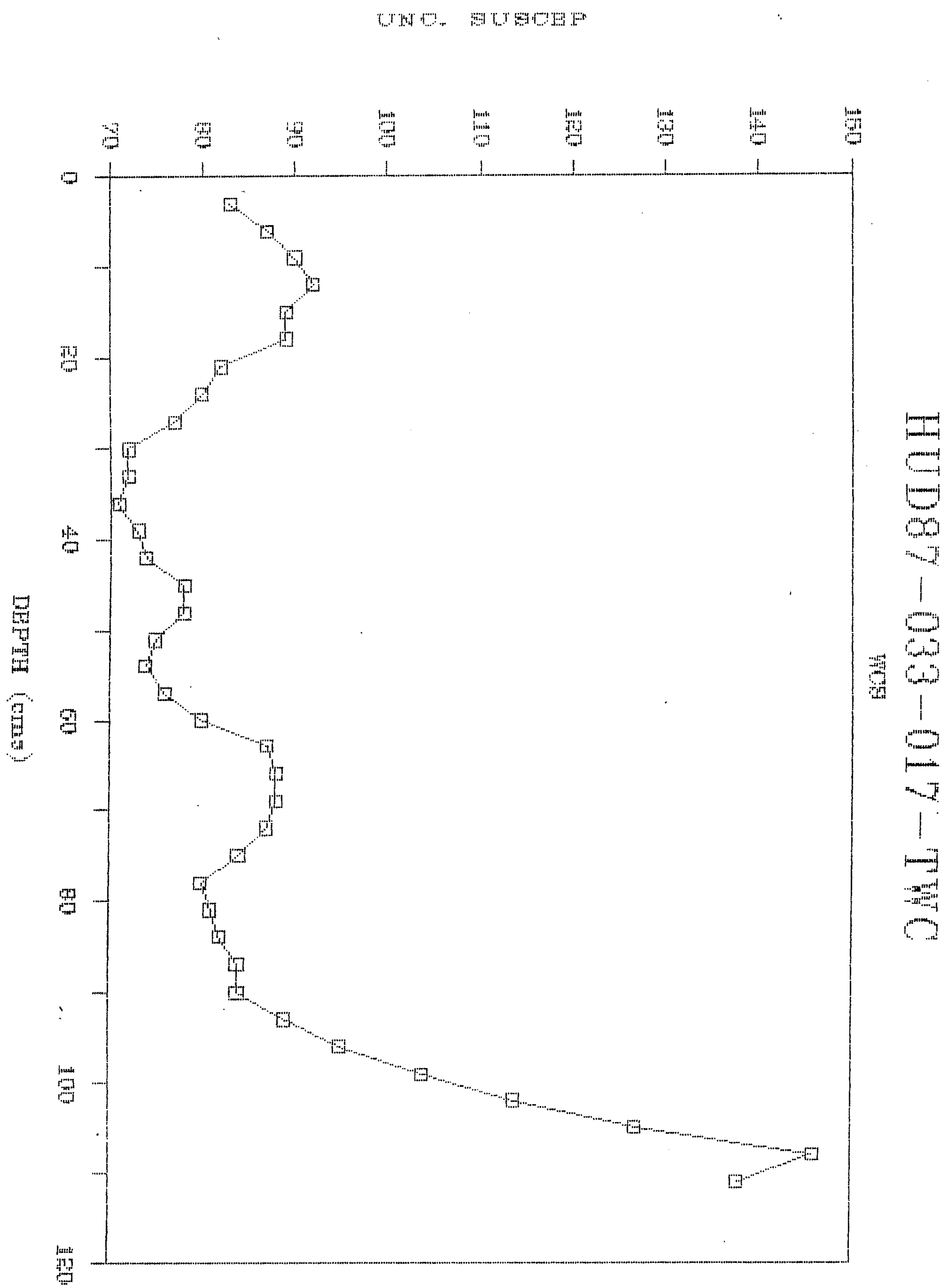
50
100
150
200
250
300
350
400
0
0.2
0.4
0.6
0.8
1
1.2
1.4
DEPTH (Thousands) (cms)
HUD87 — 033 — 013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HUD87—033—017 TWC
MCS
DEPTH (cms)
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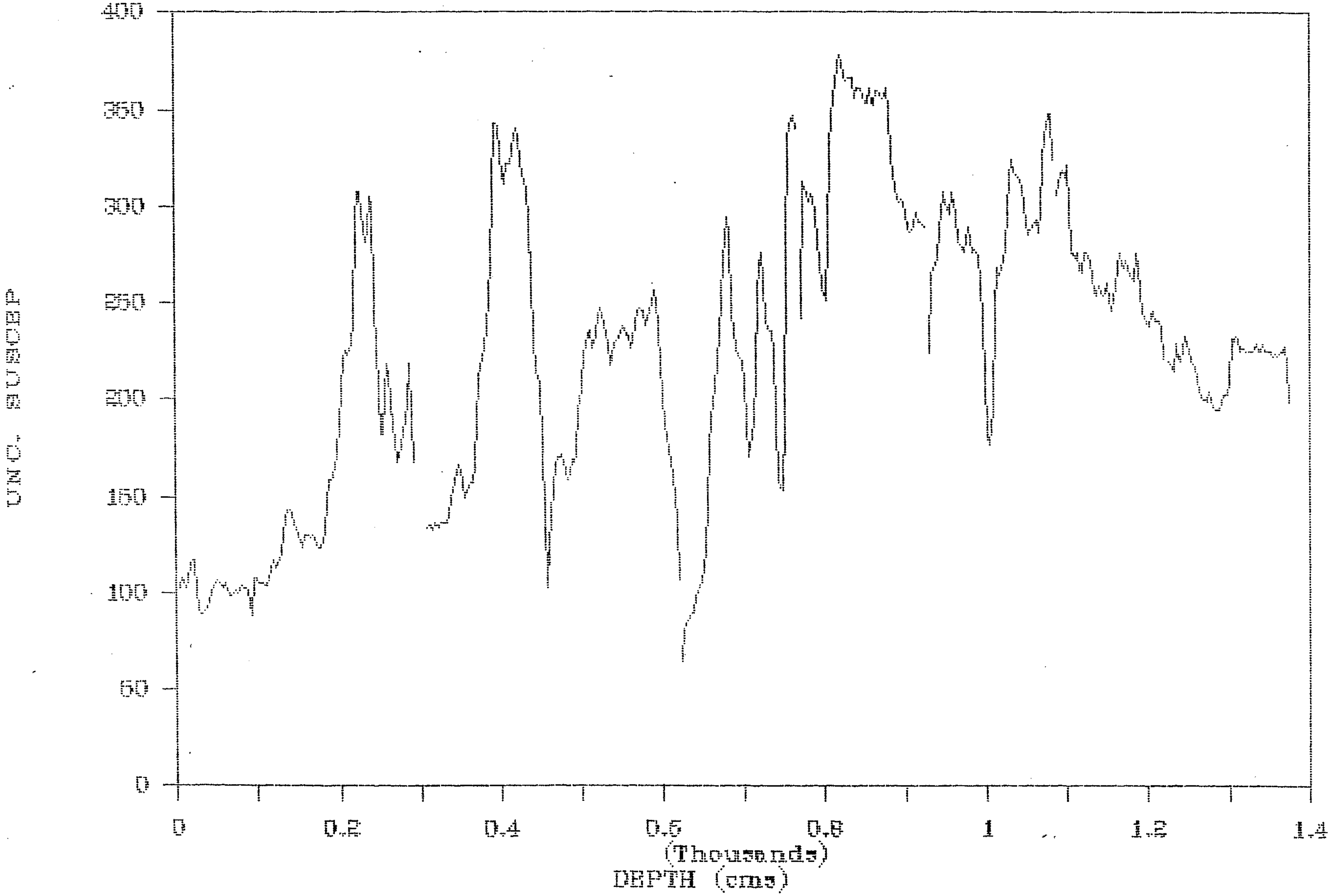
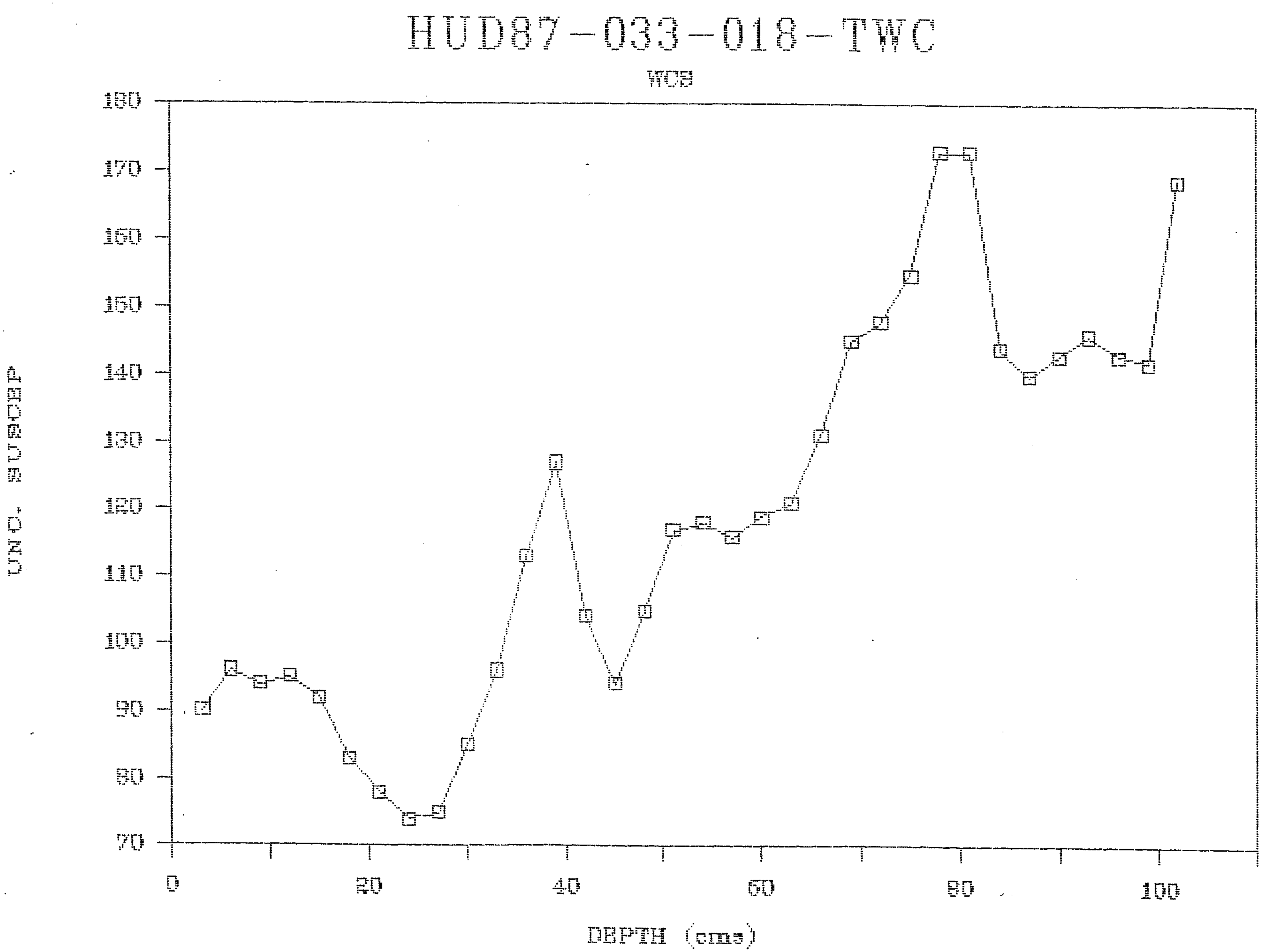
20
40
60
80
100
120

HUD87-033-017

WCB




HUD87-033-018-TWC
WCS
UNC. SUSCEP
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170
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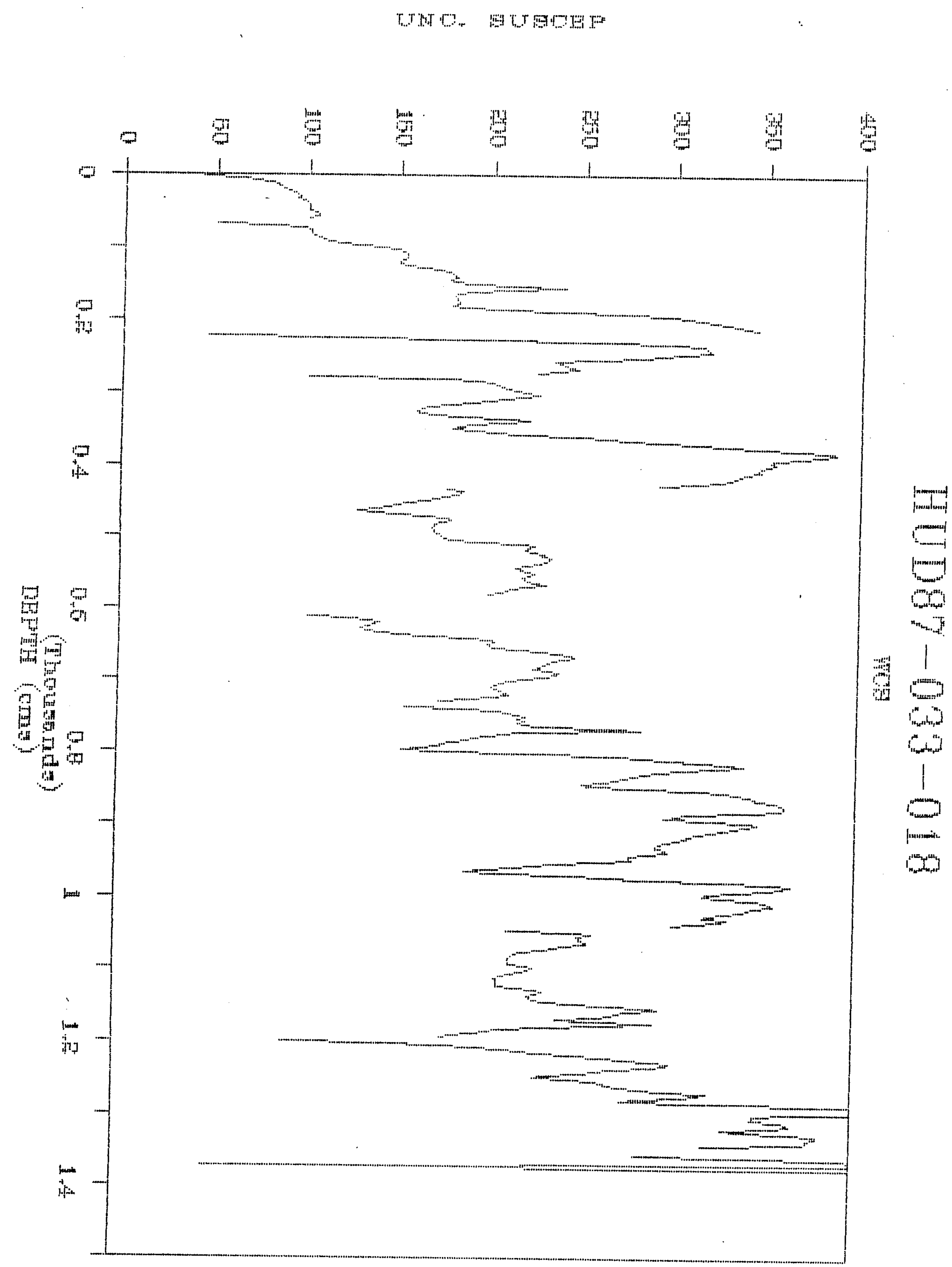
140
130
120
110
100
90
80
70
0
20
40
60
80
100
DEPTH (cms)


UNC. SUSCEP
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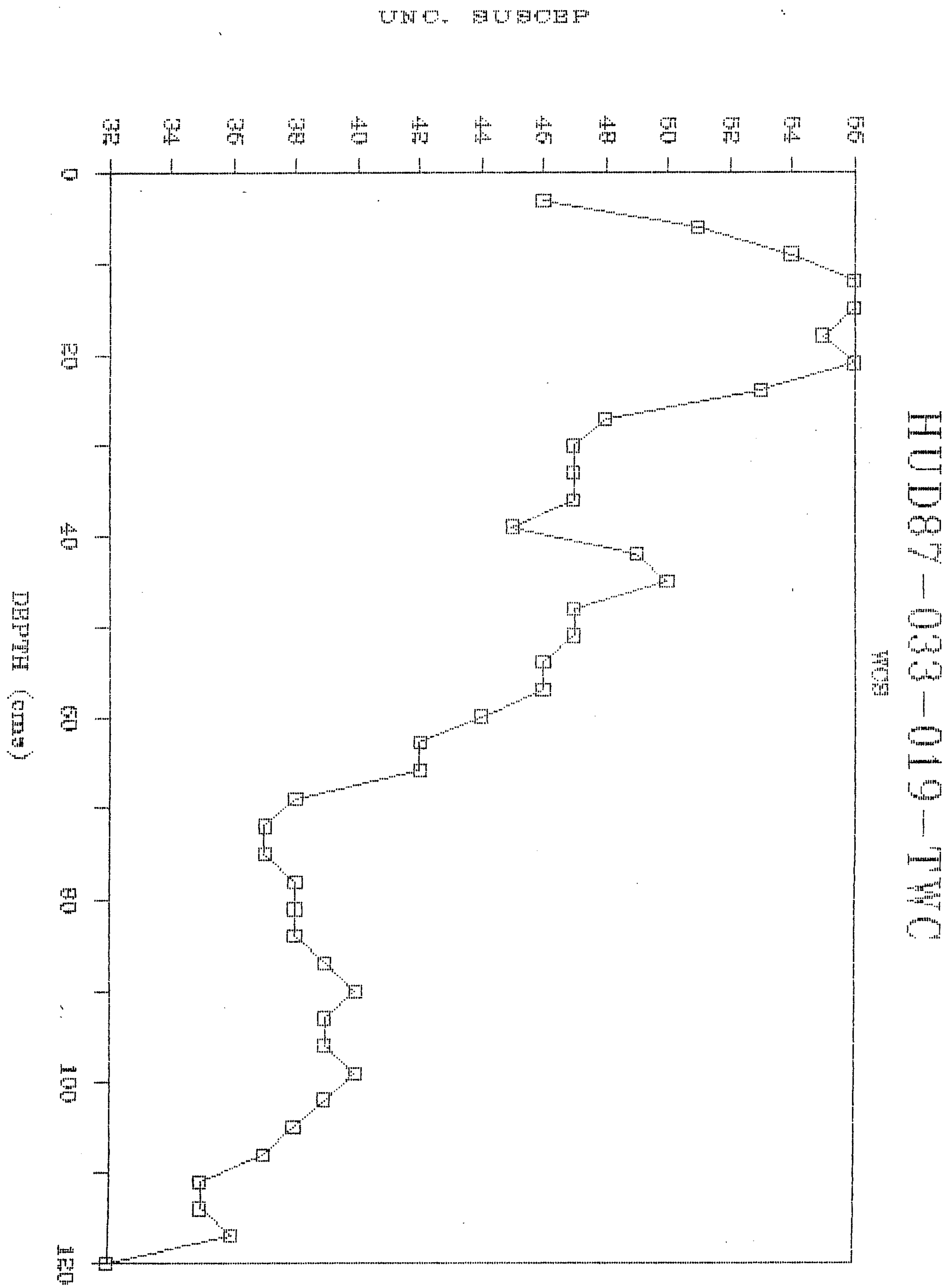
50
100
150
200
250
300
350
400
0
0.2
0.4
0.6
0.8
1
1.2
1.4
DEPTH (cms)
(Thousands)
SCM
HUD87—033—018



UNC. SUSCEP
32
34
36
38
40
42
44
46
48
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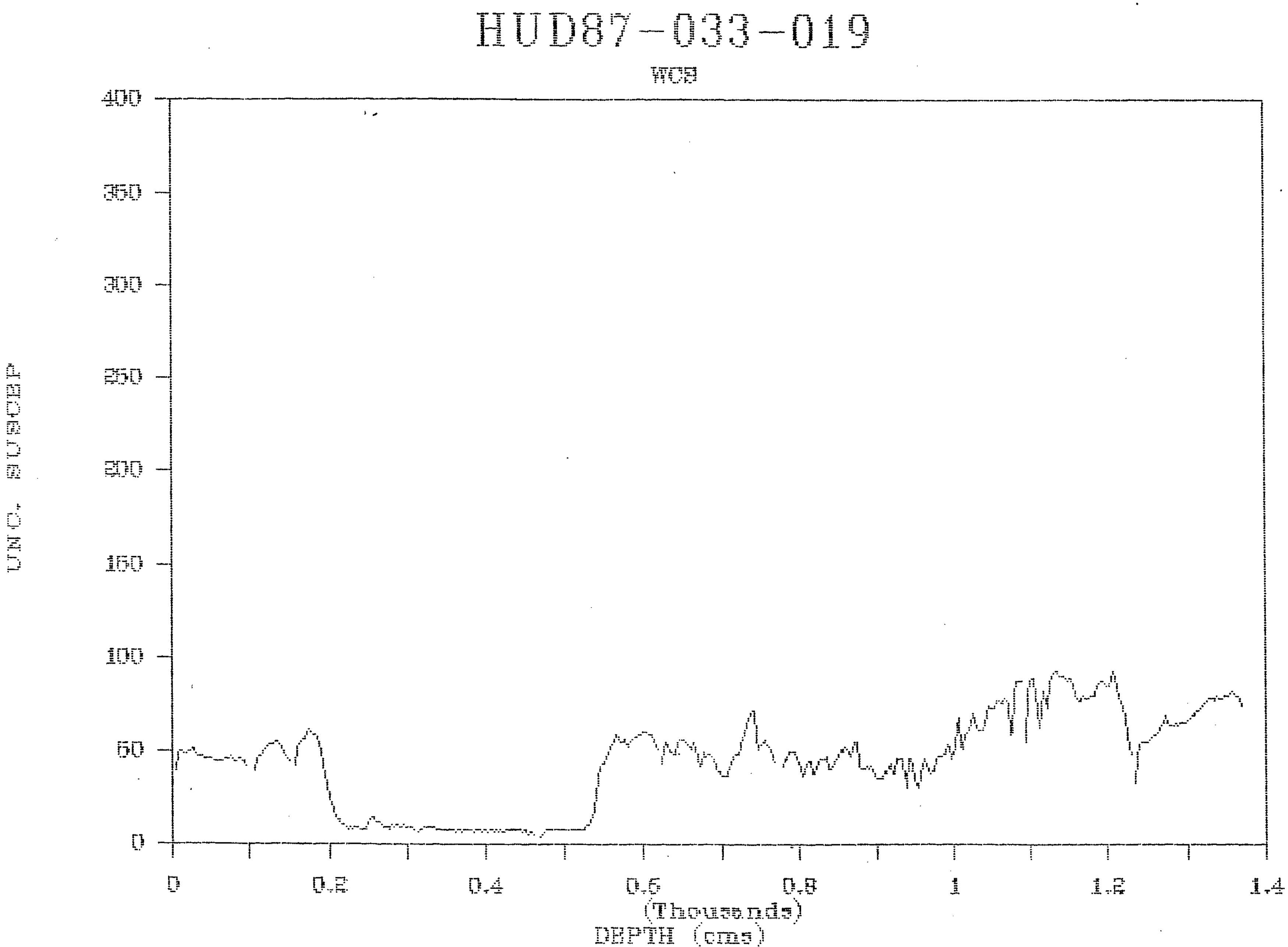
52
54
56
0
20
40
60
80
100
120
DEPTH (cms)
HUD87 — 033 — 019 — TWC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WCB
UNC. SUSCEP
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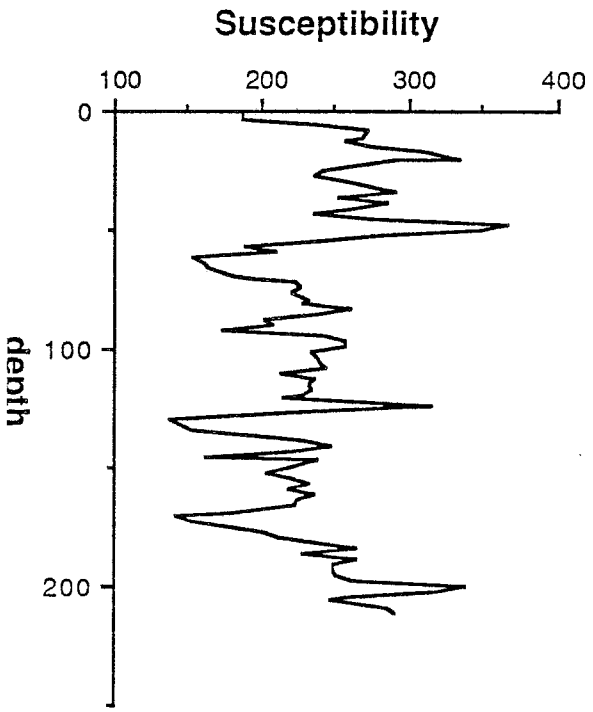
100
150
200
250
300
350
400
0
0.2
0.4
0.6
0.8
1
1.2
1.4
(Thousands)
DEPTH (cms)

0
2
4
6
8
10
12
14
16
18
20
22
24
100
80
60
40
20
0

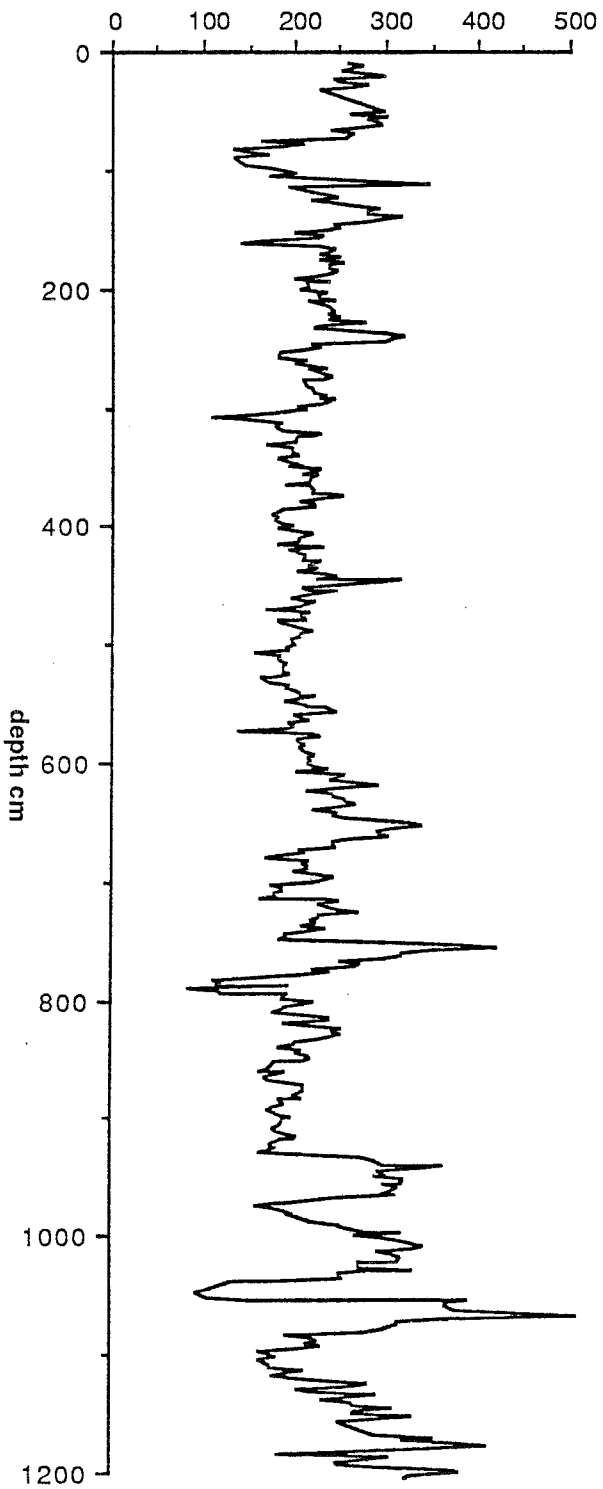
UNC. SUBCBP
0
50
100
150
200
250
300
350
400
0
0.5
1
1.5
2
2.5
DEPTH (thousands)
(cms)
HUB87-03-020

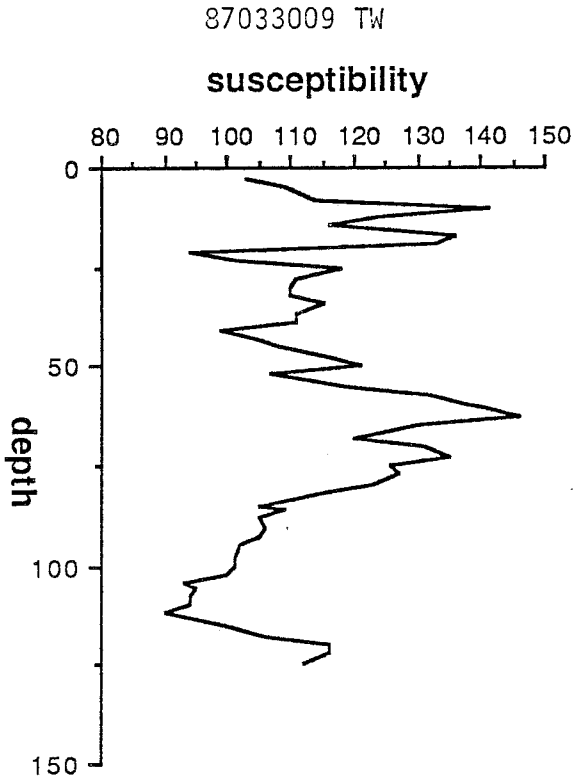
87033008 TW



87033008 LCF

susceptibility si units

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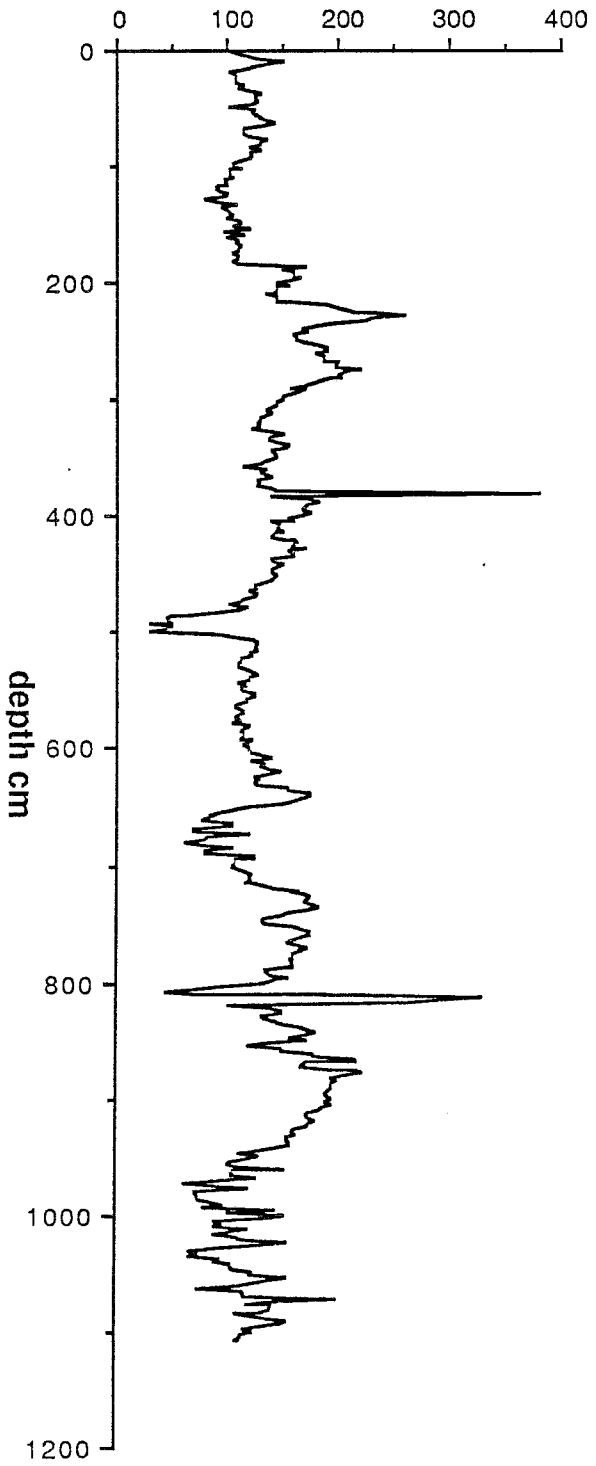
0
50
100
150
depth

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 shortley 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 occured 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 acheived it was observed that the tension was only 13,000 lbs.

Initialy 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 instalation 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 visiual determination. The hold of the screws was sufficiently strong enough to prevent rotation or furthur slippage of the coupling during the rest of the barrel intsallation process. Had this occured 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 assembley
(2)	Lifting collars
(1)	Finger catcher
(100)	Feet of core liner
(2)	Recovery pennents
	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 asembley 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 assembley 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 assembley 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 reoccurance.

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

Alan H. Driscoll, Director
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 appeares 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 consistantly 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 occured. Consistantly 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, especialy 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)
Core Weight: 8585 lbs
NO TENSION RECORD AVAILABLE

Water Depth: 2255m
Max. Wire Out: 2253m
Penetration: ?

Core 87-033-002
Core Length: 30' (9.8m)
Core Weight: 4325 lbs
Actual Pullout Force: 6988 lbs

Water Depth: 2056m
Max. Wire Out: ?
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)
Core Weight: 4325 lbs
Actual Pullout Force: 7250 lbs

Water Depth: 2056m
Max. Wire Out: 2026m
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	NO OBSERVATIONS
HIT	=	2000 lbs	
Pull	=	11,500 lbs	

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	11,000 lbs
1066m	=	8700 lbs	13,000 lbs
HIT	=	2500 lbs	
Pull	=	13,750 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	10,000 lbs
817m	=	7200 lbs	
HIT	=	1000 lbs	
PULL	=	11,500 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) Water Depth: 896m
Core Weight: 6373 lbs Max. Wire Out: 867m
Actual Pullout Force: 3300 lbs 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) Water Depth: 770m
Core Weight: 6373 lbs Max. Wire Out: 752m
Actual Pullout Force: 4100 lbs 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) Water Depth: 786m
Core Weight: 6373 lbs Max. Wire Out: 780m
Actual Pullout Force: 5500 lbs 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) Water Depth: 177m
Core Weight: 6373 lbs Max. Wire Out: 161m
Actual Pullout Force: 7300 lbs 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) Water Depth: 420m
Core Weight: 6373 lbs Max. Wire Out: 398m
Actual Pullout Force: 9000 lbs 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) Water Depth: 514m
Core Weight: 6373 lbs Max. Wire Out: 504m
Actual Pullout Force: 7900 lbs 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) Water Depth: 460m
Core Weight: 6373 lbs Max. Wire Out: 430m
Actual Pullout Force: 4700 lbs 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