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INTERIM RESULTS COLUMN EXPERIMENTS WAGENINGEN-BANJARBARU

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RESEARCH ON ACID SULPHATE SOILS IN THE HUMID TROPICS

INTERIM RESULTS COLUMN EXPERIMENTS WAGENINGEN–BANJARBARU
modeling component

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SUPPORTING MINISTRIES

Ministry of Agriculture, Indonesia
Ministry of Agriculture and Fisheries, The Netherlands
Directorate General for International Cooperation, DGIS, The Netherlands

COOPERATING INSTITUTES

Indonesia:

AARD	Agency for Agricultural Research and Development
CSR	Centre for Soil Research
BARIF	Banjarbaru Research Institute for Foodcrops

The Netherlands:

LAWOO	Land and Water Group
ILRI	International Institute for Land Reclamation and Improvement
ICW	Institute for Land and Water Management Research
STIBOKA	Netherlands Soil Survey Institute
EUROCONSULT	Arnhem

Wageningen November 1988

CONTENTS

1. INTRODUCTION

To study the effect of water management on physical and chemical processes in acid sufate soils, a column experiment was planned. Both in Banjarbaru and Wageningen 7 undisturbed soil cores of 1 m length and 25 cm diameter were sampled in the field, brought into the laboratory, and subjected to various water management strategies. For the experiments two different soil types were selected:

1. a sulfidic clay. Pyrite in the upper part of the profile.
   Under field circumstances almost saturated completely throughout the whole year. (columns 1, 2, 3, 4);
2. a ripe acid sulfate clay (with raw subsoil). Pyrite from about 40 downwards. pH around 4 or lower in the upper 40 cm.
   Under field circumstances groundwaterlevel not below 40 cm for bigger part of the year. (columns 5, 6, 7).

A complete profile description of the chosen soil types is given in Chapters 2.1 and 3.1 of this report. The selected soils differ somewhat from the proposed in the original experimental set-up. (See: Proposal for column experiments to study physical and chemical processes in acid sulfate soils.) The reasons for this are:

- the soils from Pulau Petak, used for the column experiments have a high organic matter content, like the majority of soils in Pulau Petak;
- the potential acid sulfate soils in the columns in Banjarbaru have a low pH. pH in potential acid sulfate soils in Pulau Petak is generally 5 or lower because of supply of acidity from surrounding areas or oxidation of pyrite in top layers and subsequent downward transport of acidity;
- a potential acid sulfate soil with pyrite in the upper 10 cm does not occur in the field. To resemble such a soil, both in South Kalimantan and the Netherlands soil columns were taken from the subsoil after removing the upper 40-50 cm.

All seven columns were exposed to different water management strategies. The imposed water management strategies are:

1. groundwater level constant at -80 cm, leaching with fresh water (columns 1, 5);
2. groundwater level constant at -80 cm, leaching with brackish water (columns 2, 6);
3. groundwater level alternating between +5 and -80 cm (column 3);
4. groundwater level ranging from +5 to -10 cm (columns 4, 7).

The actual execution of the column experiments in Banjarbaru and Wageningen differed somewhat. In Banjarbaru, the four water management strategies described above were followed exactly. This means for instance that every time the groundwater level dropped below -80 cm, irrigation water was supplied. In Wageningen the water management strategies were adjusted during the experiment. The period of drying of the columns 1, 2, 5 and 6 was prolonged to several months, during which the groundwater level dropped below 2 meters (as indicated by the lower tensiometer). The difference in water management between Banjarbaru and Wageningen results in interesting differences in physical and chemical measurements. For instance the chemical composition of the soil solution of the drying Wageningen columns shows a trend in a certain direction. In the Banjarbaru columns, due to the intermittent drying-wetting cycles, soil solution concentrations increased and decreased alternatingly. In the collected graphs in this interim report, these differences are clearly visible.

At the start of the experiments, all columns were sampled in order to determine the initial properties. This includes physical properties, like moisture characteristics and (un)saturated hydraulic conductivity, and chemical properties like CEC, initial composition of the soil solution and mineral content of the soil (FeS2, CaCO3, other iron minerals). Part of these determinations are completed and presented in this report (Chapter 2.1 and 3.1) The actual water management strategies and the resulting physical and chemical changes in the soil columns are presented in respectively the Chapters 2.2 and 3.2, 2.3 and 3.3 and 2.4 and 3.4.

In this interim report, all experimental results with respect to the column experiments obtained during the period May 1988-November 1988 are collected. Because the column experiments have only been going on for about six months now, and the total duration will be more than two years, all conclusions at this moment are very tentative. Therefore in this report the interim results are presented without comment or conclusions.

The aim of this report is to make the numerous data from the column experiments in Wageningen and Banjarbaru easily accessible. In the next months, this report will be used to discuss, evaluate and, where neccessary, adapt the column experiments. Furthermore, this interim report is essential in selecting the parameters and processes to be incorporated in the simulation model.

2. WAGENINGEN, THE NETHERLANDS

Wageningen, the Netherlands

2.1. INITIAL PROPERTIES OF SOILS FOR COLUMN EXPERIMENTS

Wageningen, the Netherlands

2.1.1. Profile description

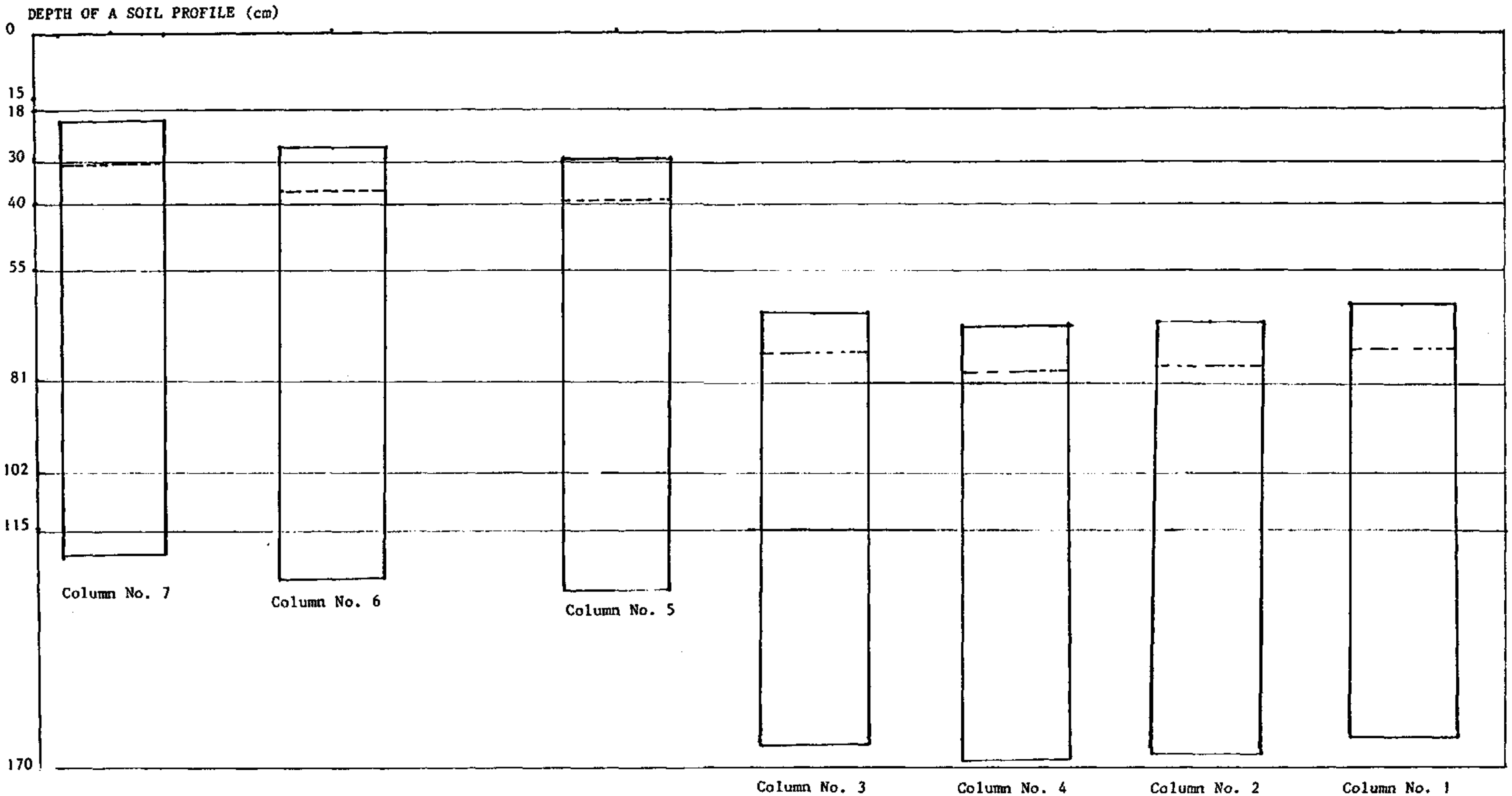
SOIL PROFILE DESCRIPTION

Profile Number.	: 1
Soil Name	: Nieuwkoop Polder Acid Sulphate Soil
Soil Classification	:
-Soil Taxonomy (USDA,1975).	: Typic Sulfaquepts
-FAO(1974).	: Thionic Fluvisols
-Dutch soil mapping unit	: Swampy soil (moerigegronden)
-Indonesian.	: Kambisol Sulfik
Date of examination.	: 22nd June 1988
Author of decriptions.	: Nugroho
Location.	: Farmland of Gebr. Vermijn Noordeseweg 29 Nieuwkoop Netherlands 8 meter from farm house, 30 meter from the dyke, 15 meter from drainage stream. No. topographical map. 31 B 114700 w/o 463945z/n (y): 52o9'13"N;4o32'13"E
Elevations	: -5.6 to -5.3 meter ordnatum level.
Landforms	:
-site physiographic position	: Flat low land behind the dyke, polder land
-landform of surrounding	: Flat low land
-microtopography	: None
Slope	: Flat (0-1%) to the stream channel direction
Vegetation and Land use	: Orchards (apple) with grass covers
Climate	: Cf climate (Koppen) Humid temperate
Reference	: Soil Sample description by W.C. Markus (Stiboka, sample no. 3 - 5 November 1963). Point Code No. k 4 cl. Code area Wol, in soil map scale of 1 : 50000.
Parent Material	: Subrecent deposits
Drainage	: Moderately-somewhat poor in upper layers, and poorly drained in lower layers.
Moisture condition	: Moist in the upper layers, and wet in the lower layers less than 80 cm
Depth of ground water level	: -65 cm.
Human influence	: Cultivated more than 150 years
Presence of surface stones or rock outcrop	: None
Presence of alkali or salt	: Not obvious, but might occur

PROFILE DESCRIPTION

Ap 0-15/18 cm.	Very dark grayish brown (10YR3/2)moist, loam; -riped; moderately fine to medium subangular blocky; non-sticky, slightly plastic, friable and slightly hard when dry; many fine to medium intertitial pores, few centimeter of very dense grass rooting system, abundant fine and few medium roots; rich humus layers; clear smooth boundary; pH 6.5 (H2O) and 6.43 after oxidized.
B1 15/18-29/30 cm	Very dark gray(10YR3/1) to very dark grayish brown (10YR 3/2) with many, medium, clear, spot and firelike dark brown (7.5YR3/2) mottles along the root channel and broken face, clay; riped; moderately fine to medium subangular blocky; sticky and plastic (wet), -firm (moist);many fine roots; clear smooth boundary; pH 6.54 to 5.9 after oxidated.
B21 29/30-39/40 cm	Gray (2.5Y 5/0) with many, large clear brown (7.5YR4/4) mottles along the root channel and broken face, with many pilar shape of white to pale yellow(2.5Y8/1-8/2) jarosite, clay; moderate fine to medium subangular blocky; sticky and plastic (wet), firm (moist); many fine roots; clear smooth boundary; pH 6.39 become 3.96 after oxidized.
B22 39/40-55 cm.	Dark gray (2.5Y 4/0) clay; moderate, fine to medium subangular blocky; sticky and plastic (wet), firm (moist); many fine roots; crack of 2 cm width, 10 cm long horisontal and 35 cm long vertical, iron coated face brown (7.5 YR 4/4) ; clear smooth boundary; pH 6.39 become 3.94 after oxidation.
B23 55-81 cm.	Dark gray (2.5 Y4/0) with few fine clear brown (7.5 YR 4/4)mottles along the root channel and broken face structure, clay; half riped, weak, coarse to medium subangular blocky; sticky and plastic (wet), firm (moist) many fine roots; clear smooth boundary;
B24 81-102 cm.	Dark gray (5 Y 4/1) clay; half riped, weak, medium to coarse medium subangular blocky; sticky and plastic (wet), firm (moist); many fine roots; clear smooth boundary; not clear evidence of calcareous material (HCl test).
C1 102-115 cm.	Dark gray (5 Y 4/1) to very dark gray (5Y3/1) clay; massive; unriped; sticky and plastic; few fine roots,few rotten straw (pale yellow) clear smooth boundary; not clear evidence of calcareous material (HCl test) with few fine shell fragment.
C2 115 + cm.	Very dark gray (5Y3/1) clay; massive; unriped; sticky and plastic; few rotten straw (pale yellow); few fine roots; calcareous fragment of shell in few spot.

Columns Sampling



Location : 52°9'13" N 4°32'13" E; Nieuwkoop-Netherlands

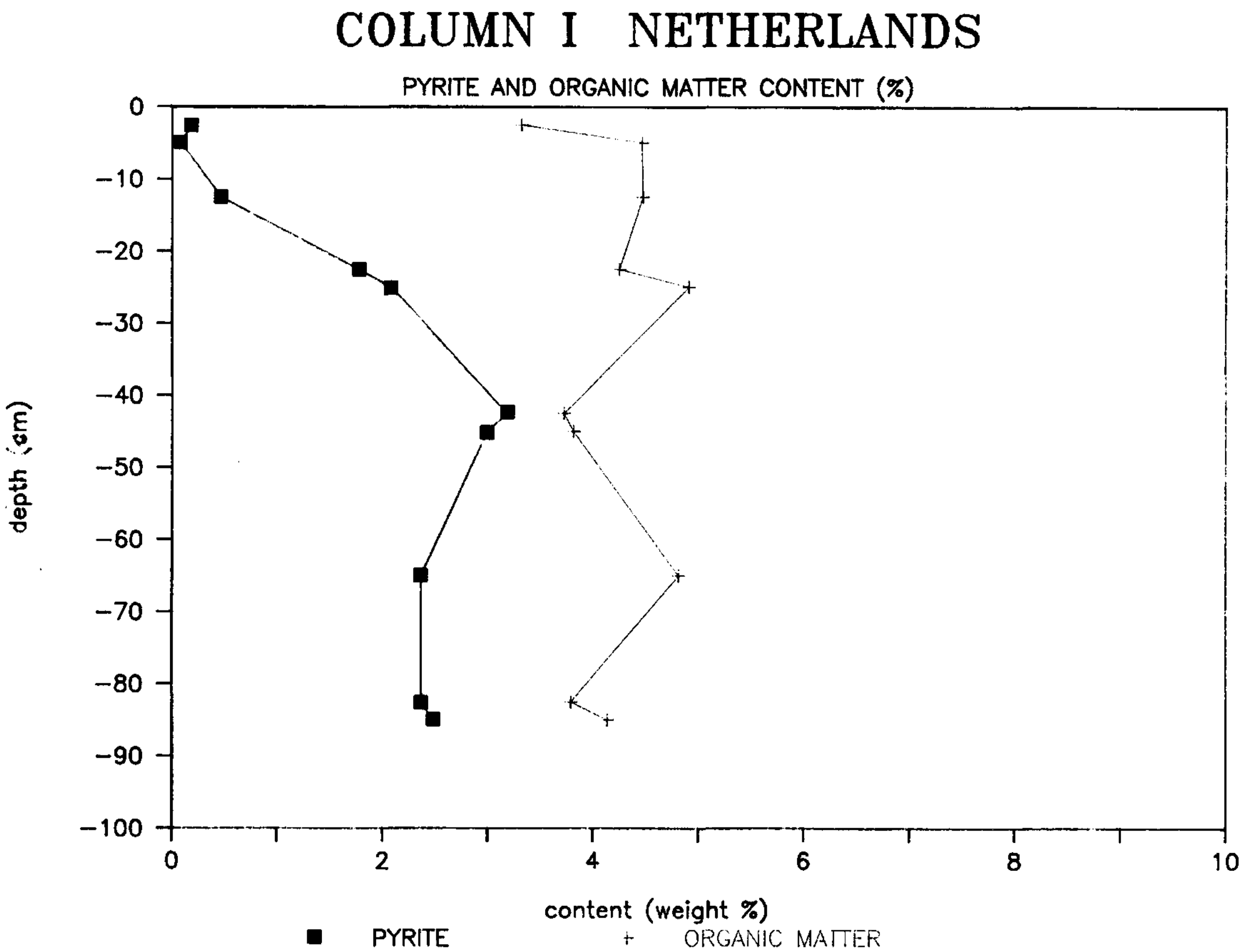
2.1.2. Mineralogical composition
(texture, pyrite, org. matter)

PARTICLE SIZE ANALYSIS

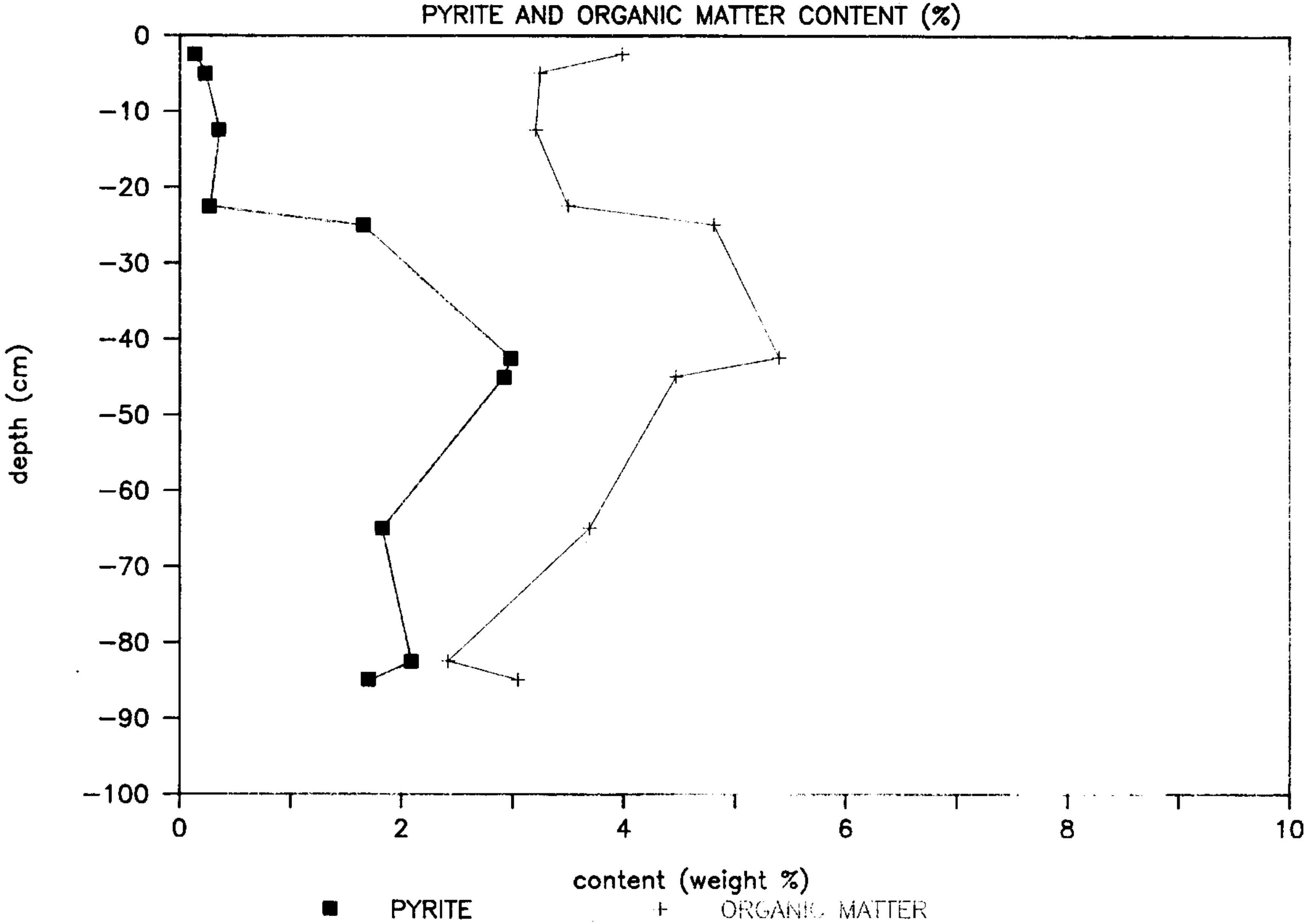
These are the results of the particle size analysis of the Nieuwkoop -Acid Sulphate Profile. Soil columns were taken of this soil profile on the 22 th. of June. Depth is depth below soil surface.

Depth (cm.)	Clay (%)	Silt (%)	Sand (%)	Org. matter (%) *)
30 - 40	48.6	49.7	1.7	10.0
30 - 40	44.8	52.3	2.2	11.0
45 - 55	51.2	47.0	1.8	3.3
45 - 55	42.9	54.8	2.4	3.8
75 - 85	46.3	53.1	0.6	3.5
75 - 85	47.7	51.5	0.8	3.2
110 - 120	28.9	68.9	2.2	3.4
110 - 120	31.6	66.5	1.9	2.3
140 - 150	13.8	84.1	2.1	2.7
140 - 150	30.3	67.8	1.8	2.6

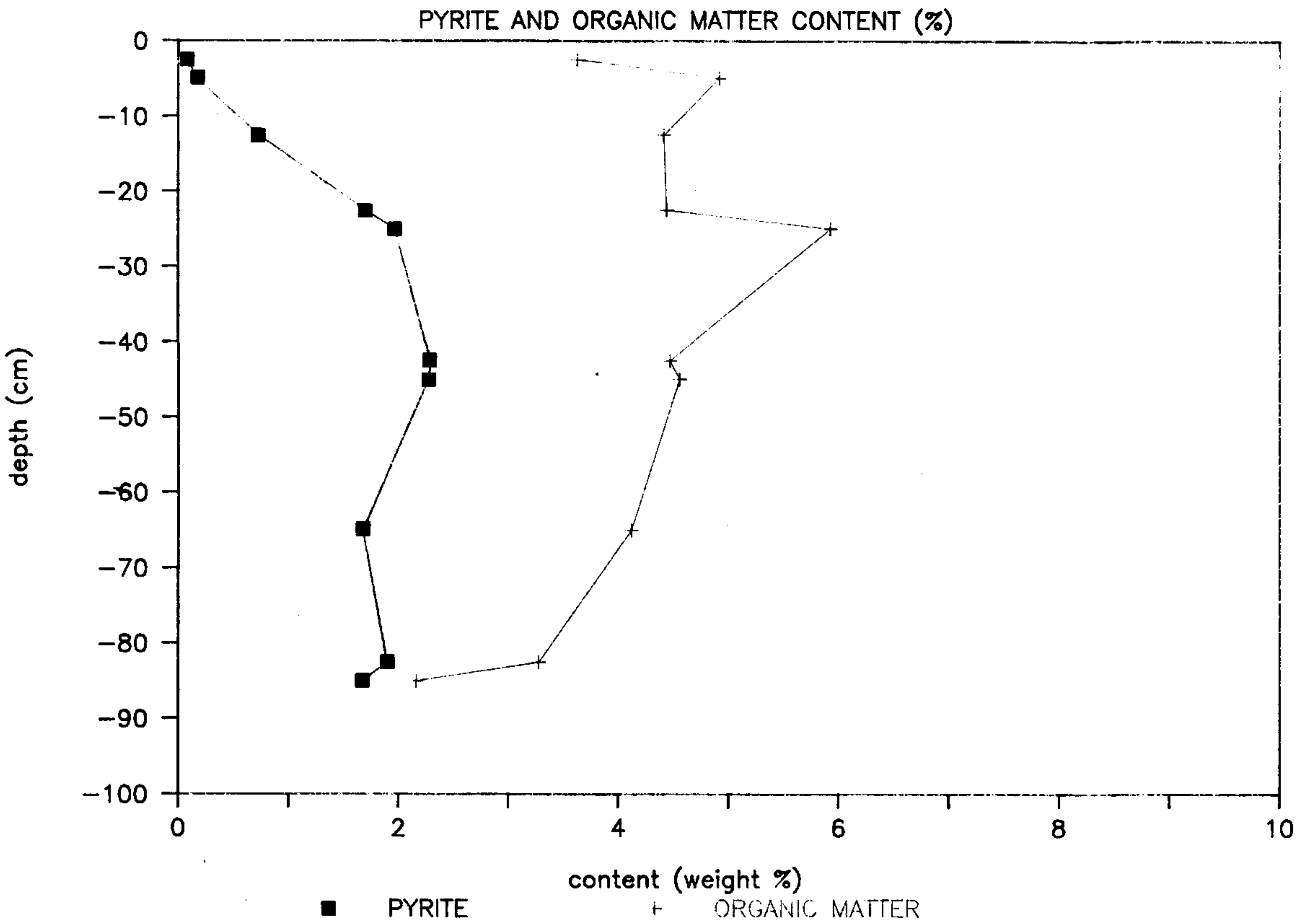
*) - Percentage of total solid matter. Others are percentages of mineral parts.


COLUMN I NETHERLANDS
PYRITE AND ORGANIC MATTER CONTENT (%)
depth (cm)
0
−10
−20
−30
−40
−50
−60
−70
−80
−90
−100
0
2
4
6
8
10
content (weight %)
PYRITE
ORGANIC MATTER

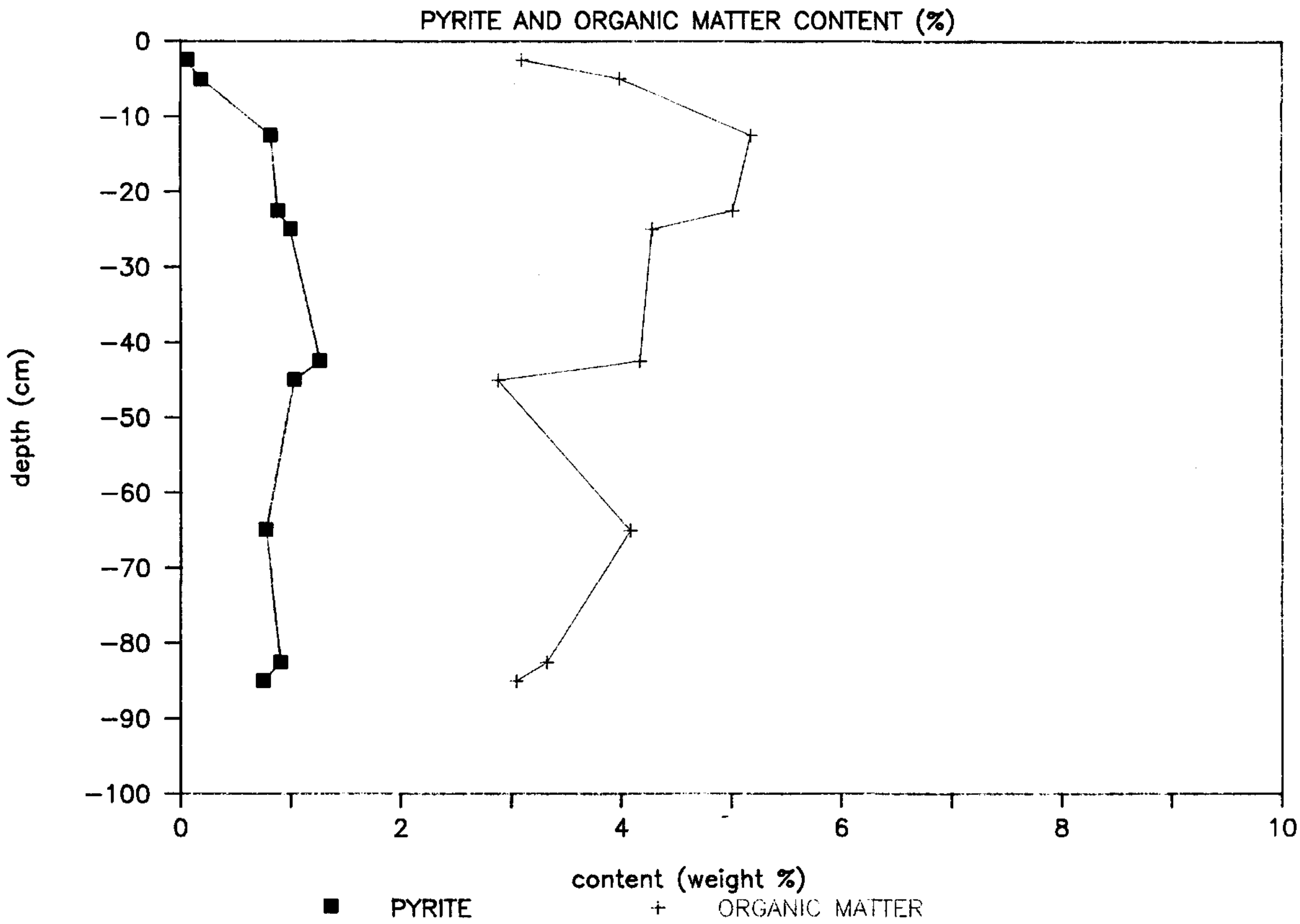
COLUMN II NETHERLANDS

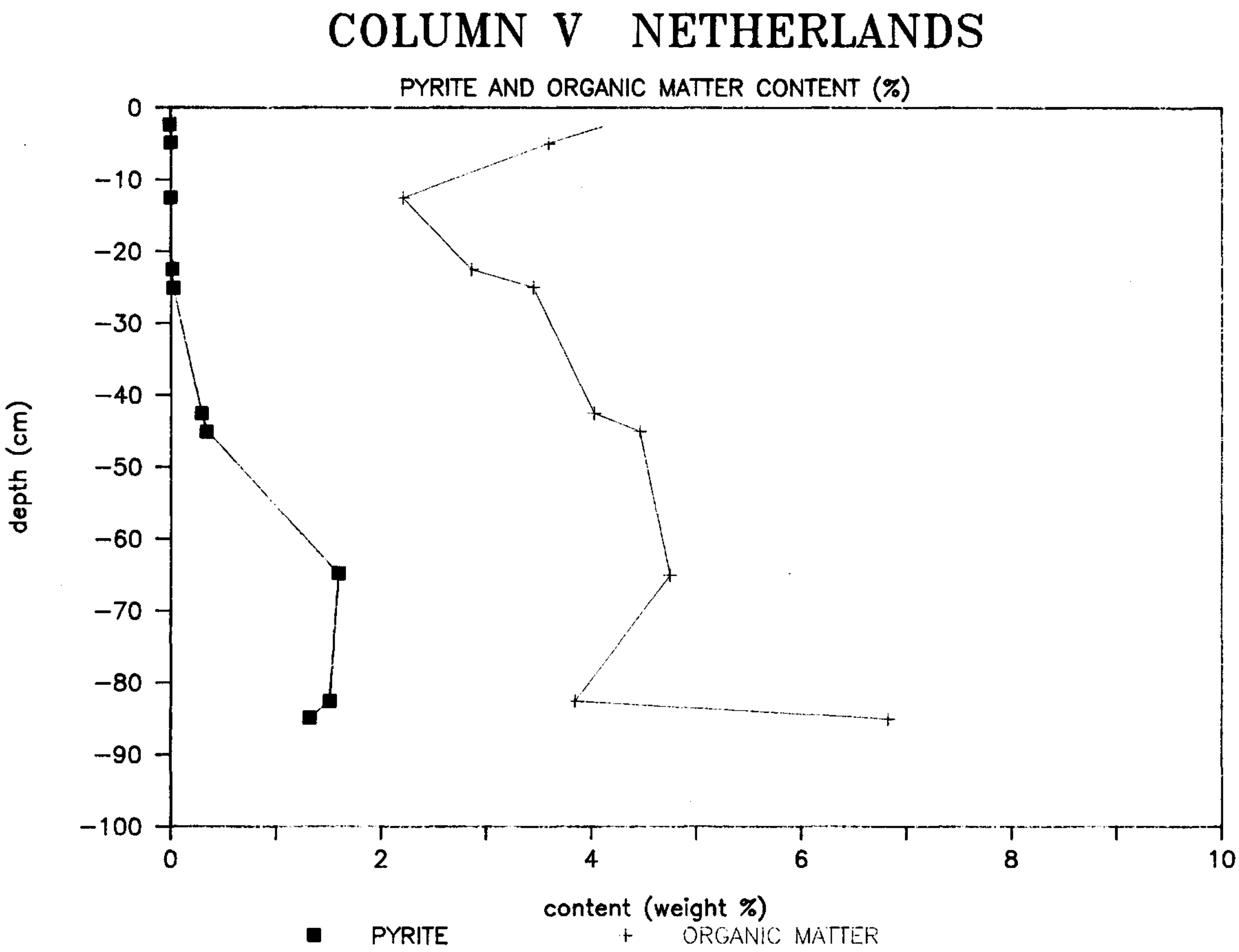


COLUMN III NETHERLANDS



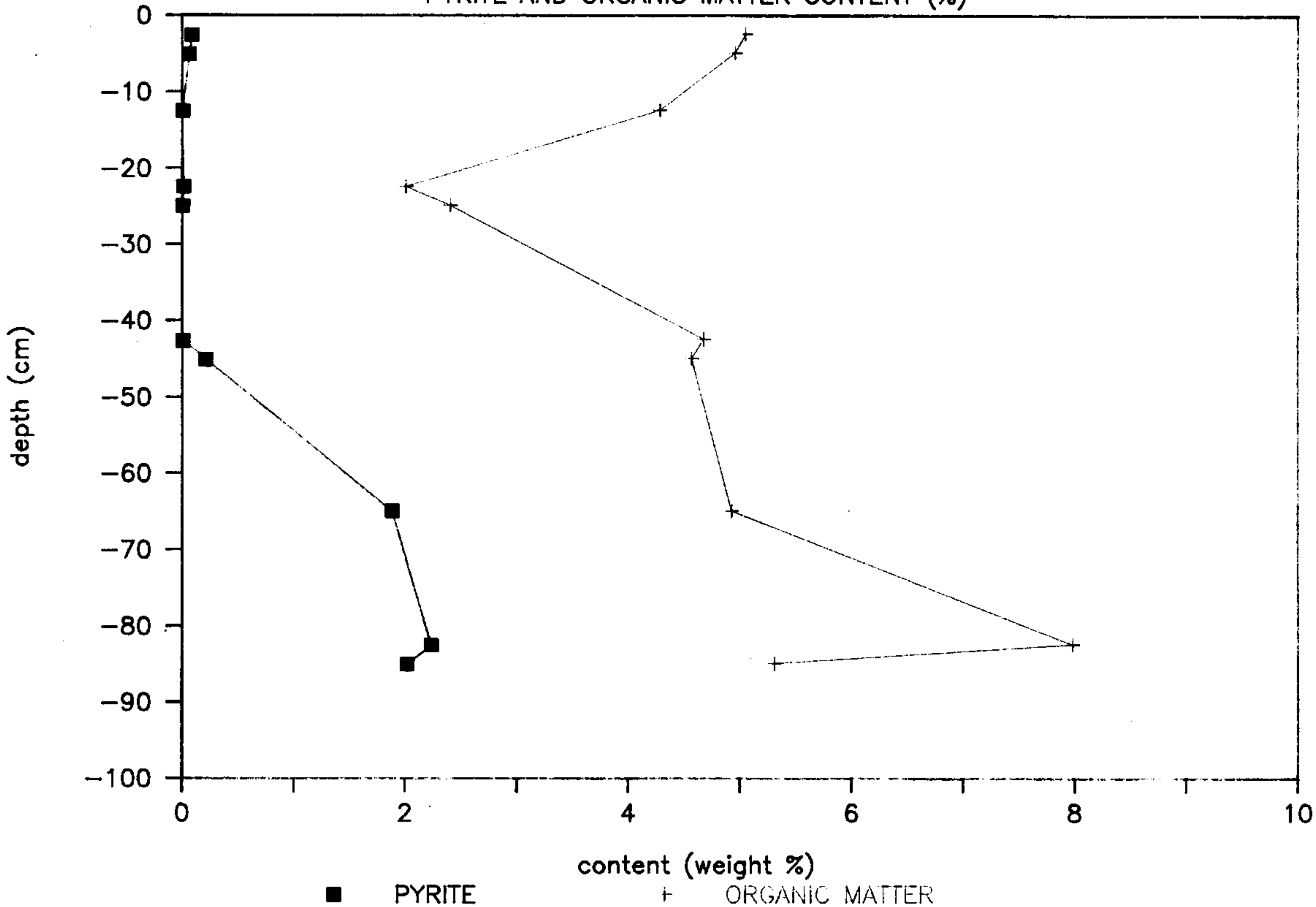
COLUMN IV NETHERLANDS



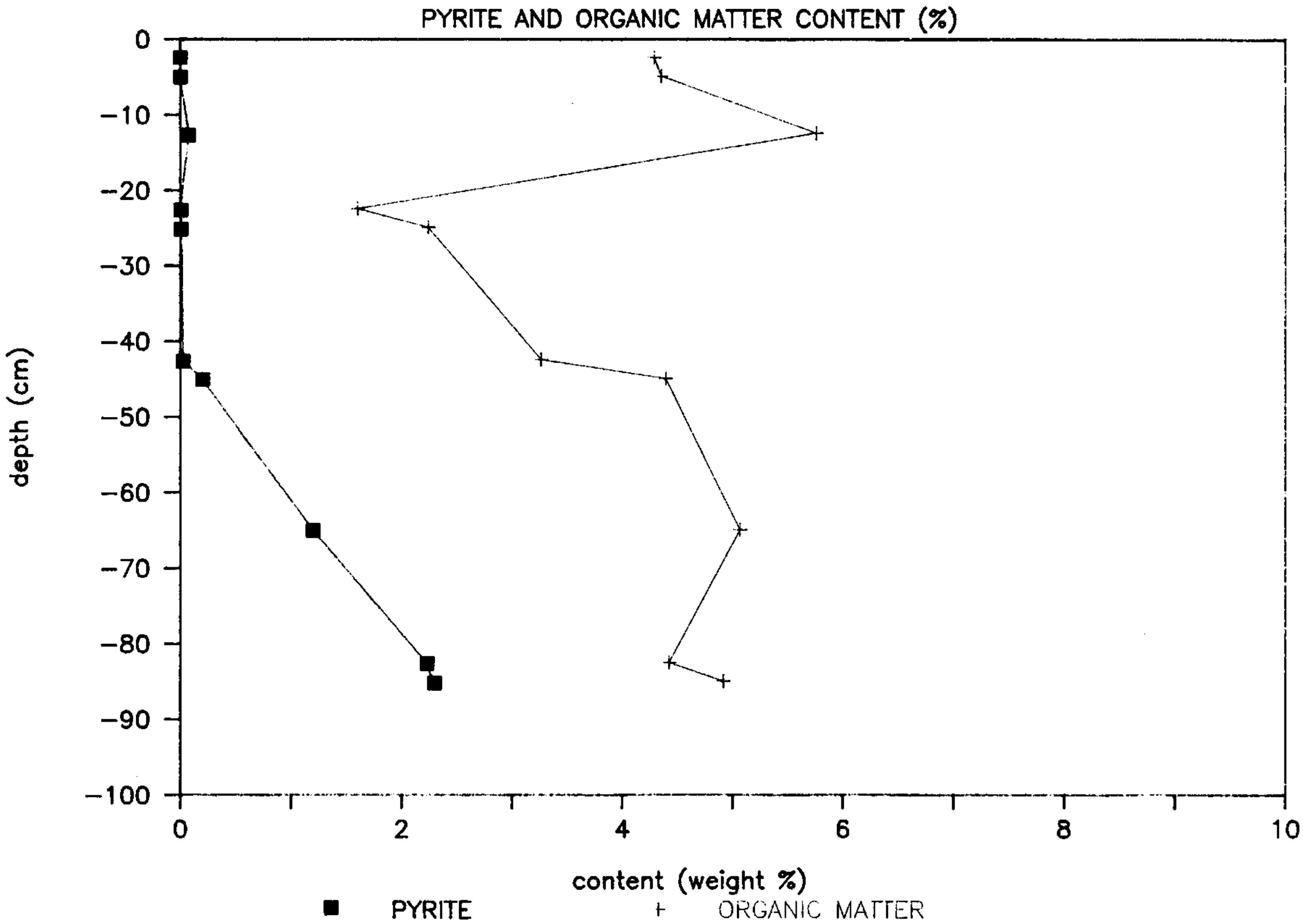

COLUMN V NETHERLANDS
PYRITE AND ORGANIC MATTER CONTENT (%)
depth (cm)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
0
2
4
6
8
10
content (weight %)
PYRITE
ORGANIC MATTER

COLUMN VI NETHERLANDS

PYRITE AND ORGANIC MATTER CONTENT (%)



COLUMN VII NETHERLANDS

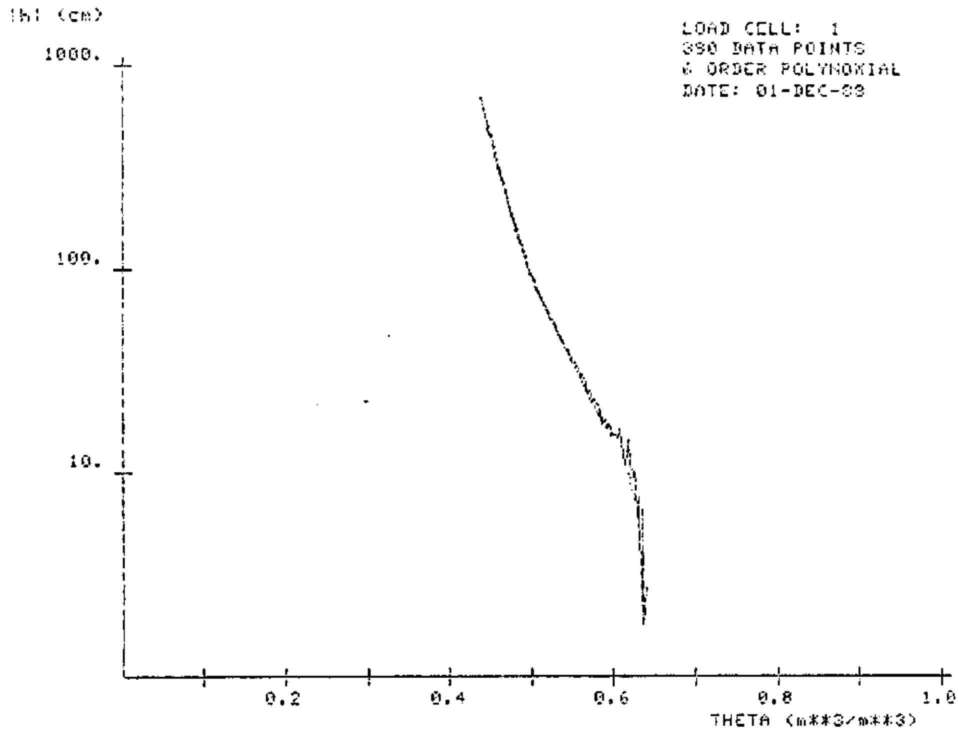


WEIGHT PERCENTAGES CALCITE + DOLOMITE

DEPTH (cm)	COLUMN 1	COLUMN 5
2.5	0.3	0.0
5.0	1.2	0.0
12.5	1.5	2.3
22.5	1.5	0.2
25.0	2.6	0.0
42.5	13.5	1.4
45.0	nm*	1.9
65.0	14.3	5.0
82.5	nm*	13.8
85.0	15.1	15.6

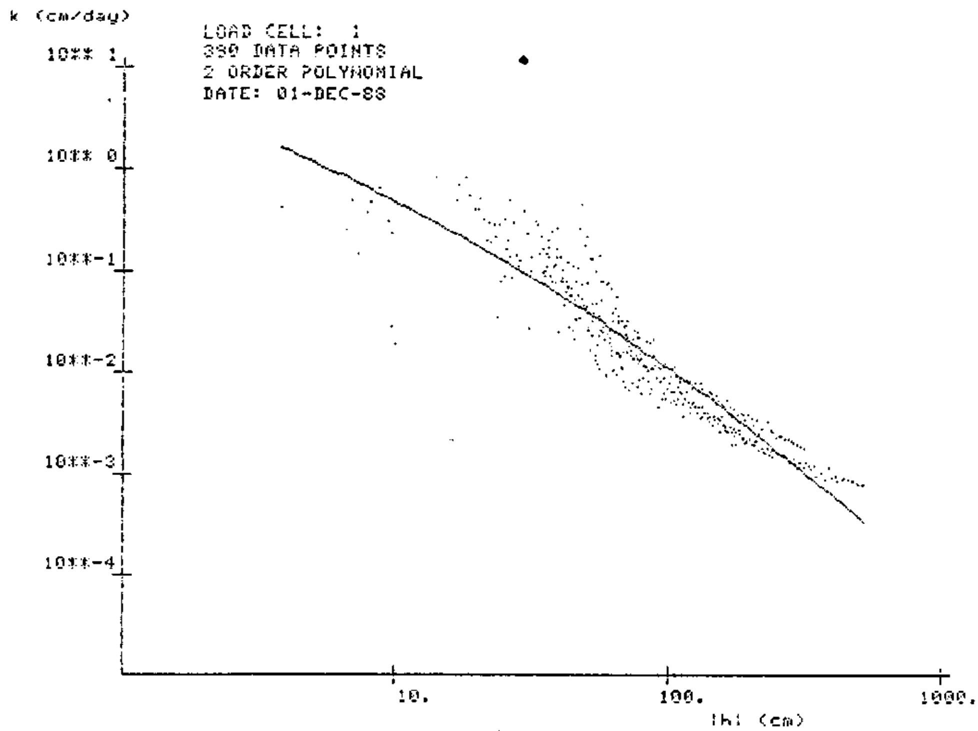
*** - not measured**

2.1.3. Moisture retention curve, K(h) relation



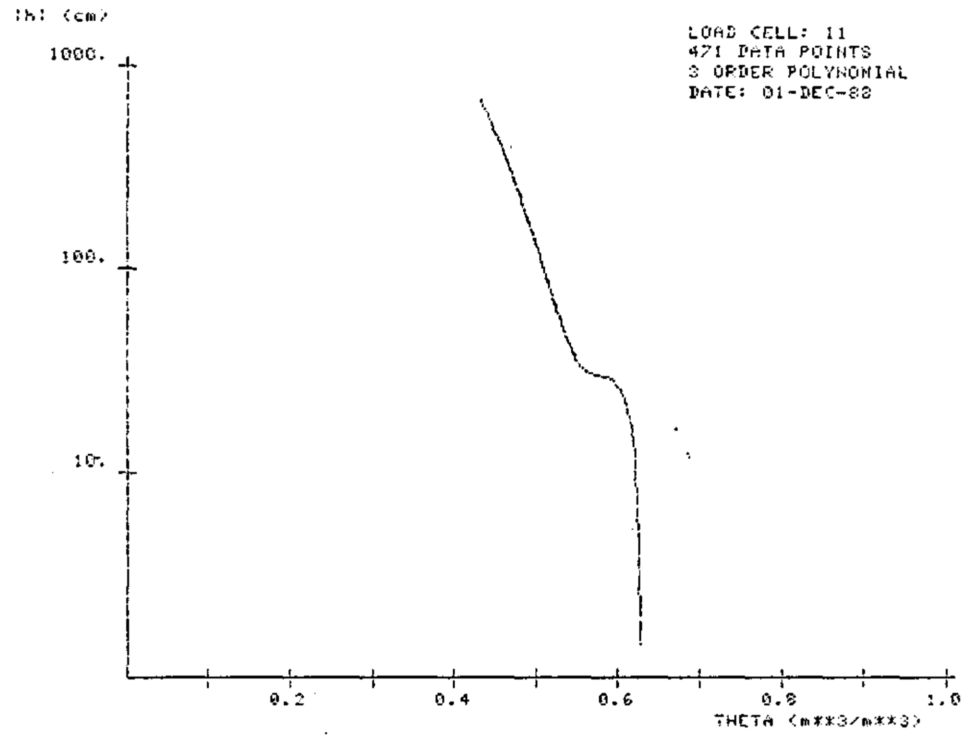
The water retention (h-THETA) curve was fitted with:
|h|=a0 + a1*THETA + ... + aN*THETA**N
(h in cm and THETA in m**3/m**3)
Permitted THETA range from 0.437 to 0.640
a0 = 0.2287021E+07
a1 = -0.2335184E+08
a2 = 0.9918963E+08
a3 = -0.2242630E+09
a4 = 0.2845668E+09
a5 = -0.1920881E+09
a6 = 0.5387403E+08

EXPERIMENT: 74
KATTEKLEI NIEUWKOOP
LAYER 30 - 40 CM.
REPLICATION 1



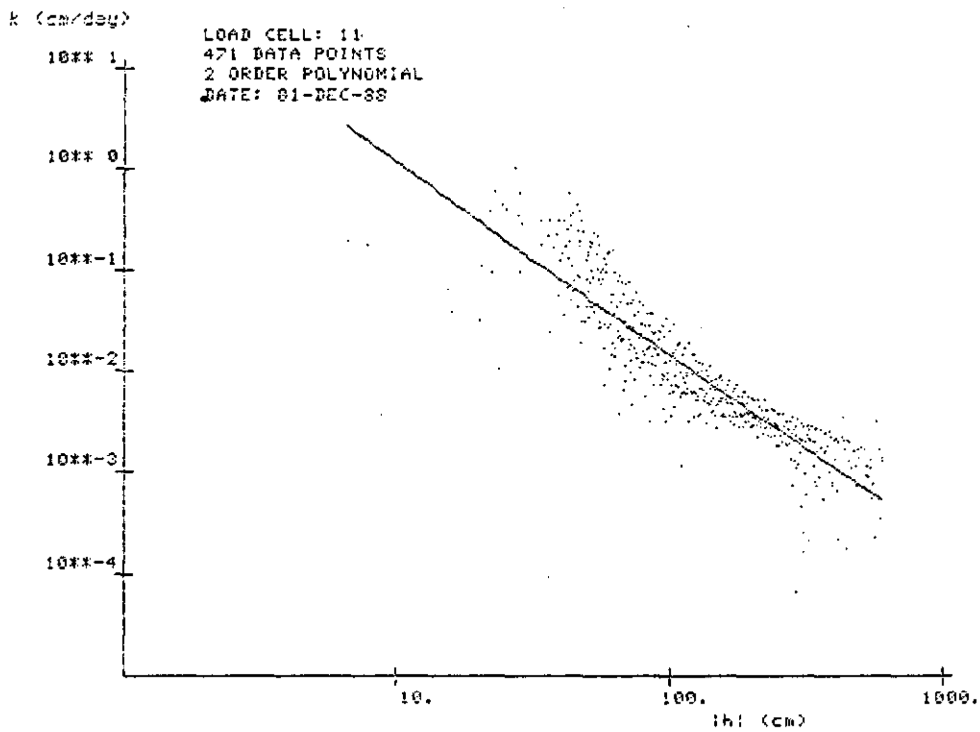
The k-h relation was fitted with:
log(k) = b0 + b1*log(|h|) + ... + bN*[log(|h|)]**N
(k in cm/day and h in cm)
Permitted |h| range from 4. to 523.
b0 = 0.7859313E+00
b1 = -0.8372547E+00
b2 = -0.2679043E+00

EXPERIMENT: 74
KATTEKLEI NIEUWKOOP
LAYER 30 - 40 CM.
REPLICATION 1



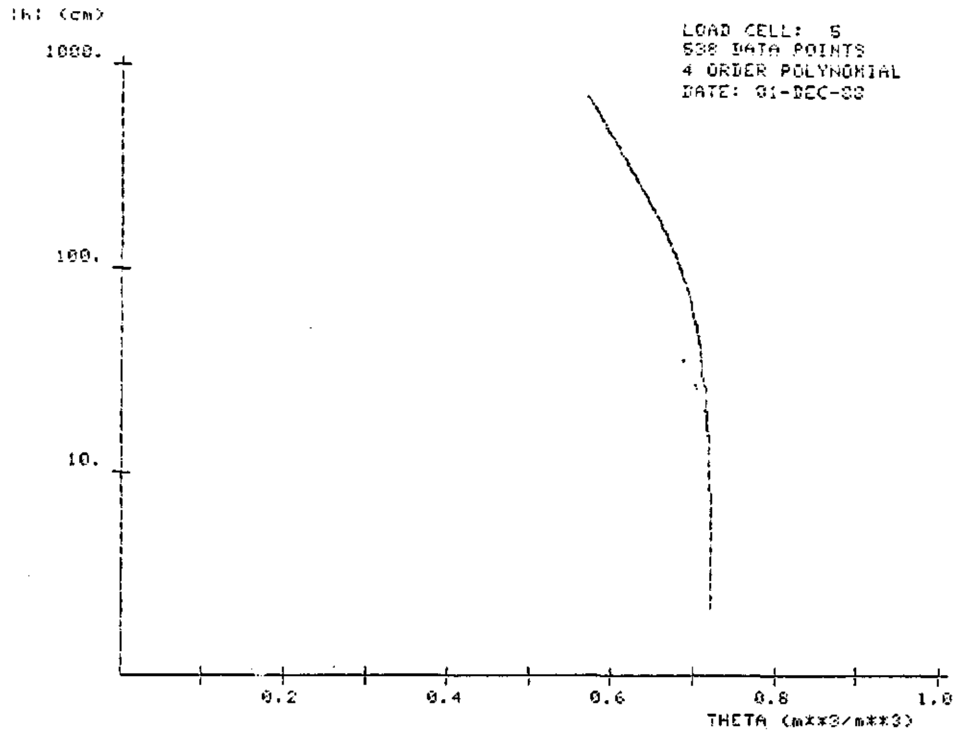
The water retention (h-THETA) curve was fitted with:
|h|=a0 + a1*THETA + ... + aN*THETA**N
(h in cm and THETA in m**3/m**3)
Permitted THETA range from 0.430 to 0.627
a0 = 0.3975900E+05
a1 = -0.2065282E+06
a2 = 0.3579497E+06
a3 = -0.2068425E+06

EXPERIMENT: 74
KATTEKLEI NIEUWKOOP
LAYER 30 - 40 CM.
REPLICATION 2



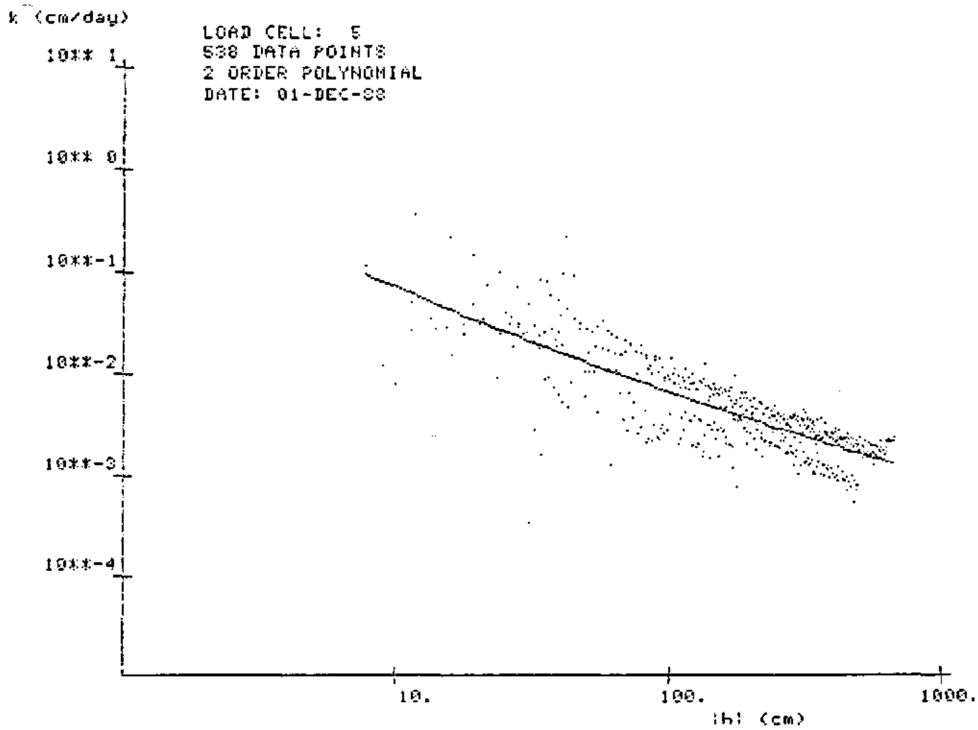
The k-h relation was fitted with:
log(k) = b0 + b1*log(|h|) + ... + bN*[log(|h|)]**N
(k in cm/day and h in cm)
Permitted |h| range from 7. to 599.
b0 = 0.2113445E+01
b1 = -0.2107306E+01
b2 = 0.6081619E-01

EXPERIMENT: 74
KATTEKLEI NIEUWKOOP
LAYER 30 - 40 CM.
REPLICATION 2



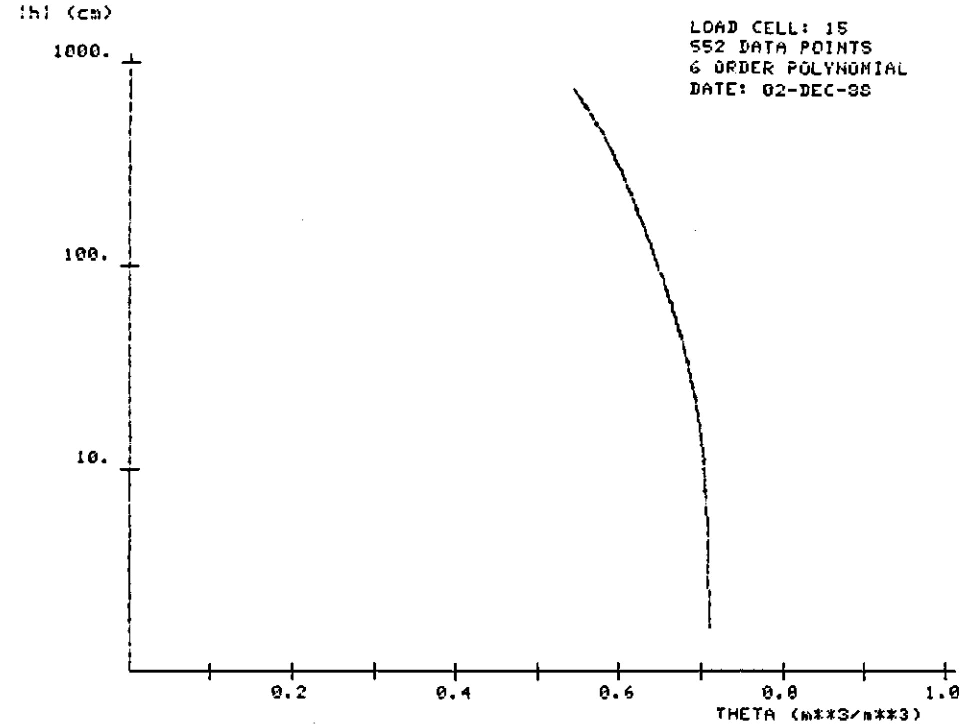
The water retention (h-THETA) curve was fitted with:
|h|=a0 + a1*THETA + ... + aN*THETA**N
(h in cm and THETA in m**3/m**3)
Permitted THETA range from 0.571 to 0.722
a0 = 0.1085975E+06
a1 = -0.5528591E+06
a2 = 0.1049529E+07
a3 = -0.8745483E+06
a4 = 0.2672342E+06

EXPERIMENT: 74
KATTEKLEI NIEUWKOOP
LAYER 45 - 55 CM.
REPLICATION 1



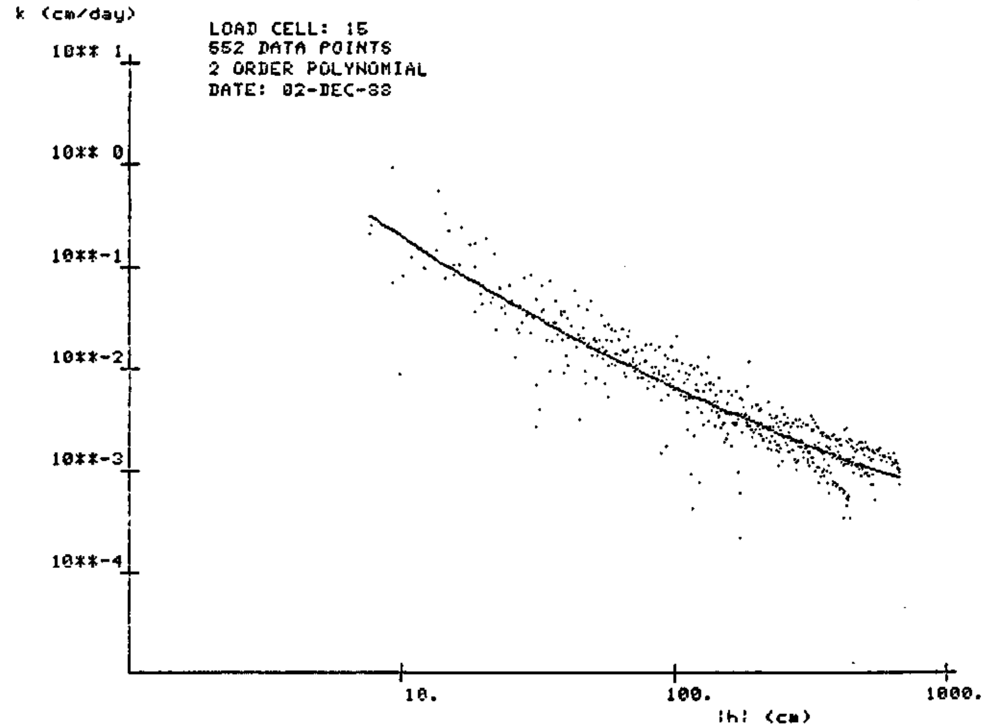
The k-h relation was fitted with:
log(k) = b0 + b1*log(|h|) + ... + bN*[log(|h|)]**N
(k in cm/day and h in cm)
Permitted |h| range from 8. to 654.
b0 = 0.8958802E-01
b1 = -0.1338324E+01
b2 = 0.1028735E+00

EXPERIMENT: 74
KATTEKLEI NIEUWKOOP
LAYER 45 - 55 CM.
REPLICATION 1



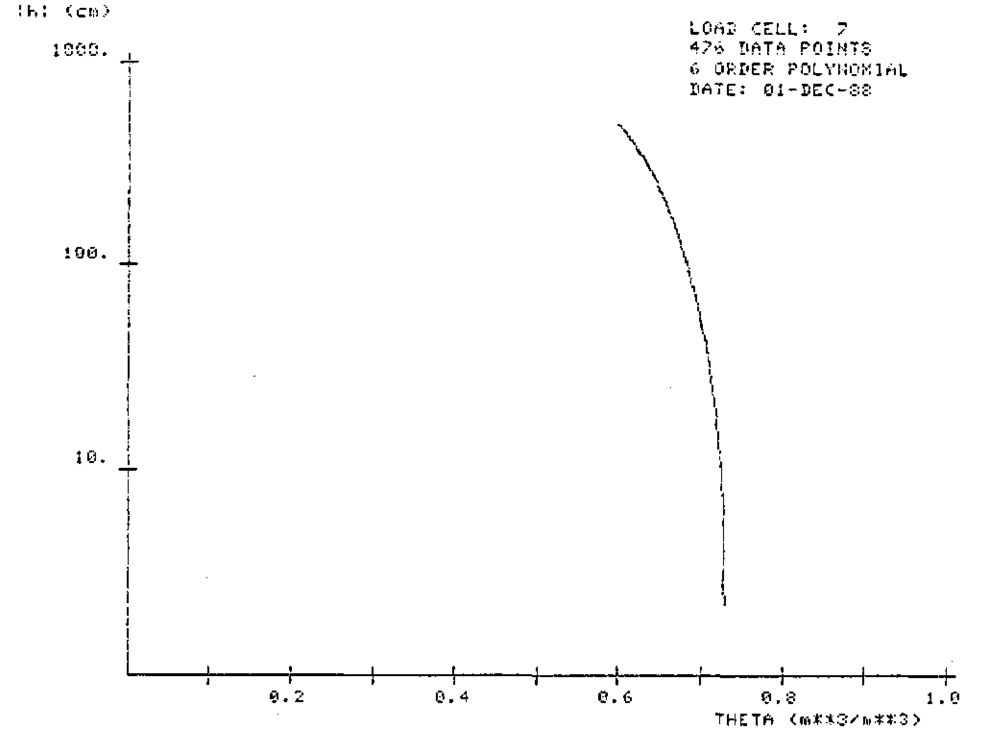
The water retention (h-THETA) curve was fitted with:
|h|=a0 + a1*THETA + ... + aN*THETA**N
(h in cm and THETA in m**3/m**3)
Permitted THETA range from 0.542 to 0.711
a0 = -0.1452910E+07
a1 = 0.1231991E+08
a2 = -0.4270201E+08
a3 = 0.7740683E+08
a4 = -0.7724968E+08
a5 = 0.4009188E+08
a6 = -0.8399270E+07

EXPERIMENT: 74
KATTEKLEI NIEUWKOOP
LAYER 45 55 CM.
REPLICATION 2



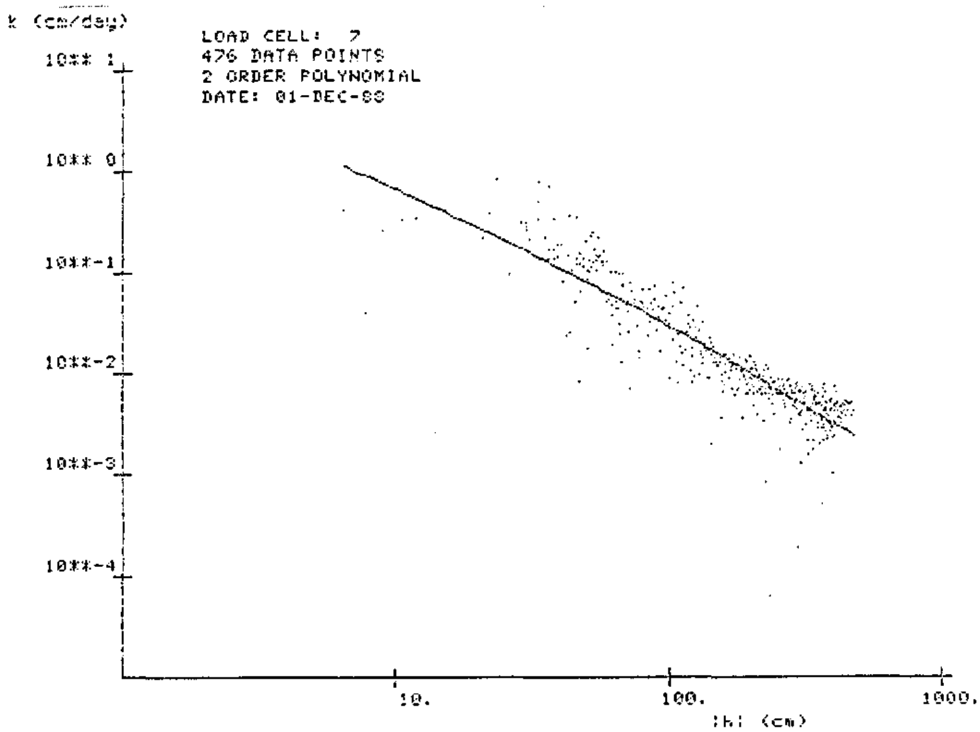
The k-h relation was fitted with:
log(k) = b0 + b1*log(|h|) + ... + bN*[log(|h|)]**N
(k in cm/day and h in cm)
Permitted |h| range from 8. to 672.
b0 = 0.1223701E+01
b1 = -0.2155596E+01
b2 = 0.2264108E+00

EXPERIMENT: 74
KATTEKLEI NIEUWKOOP
LAYER 45 55 CM.
REPLICATION 2



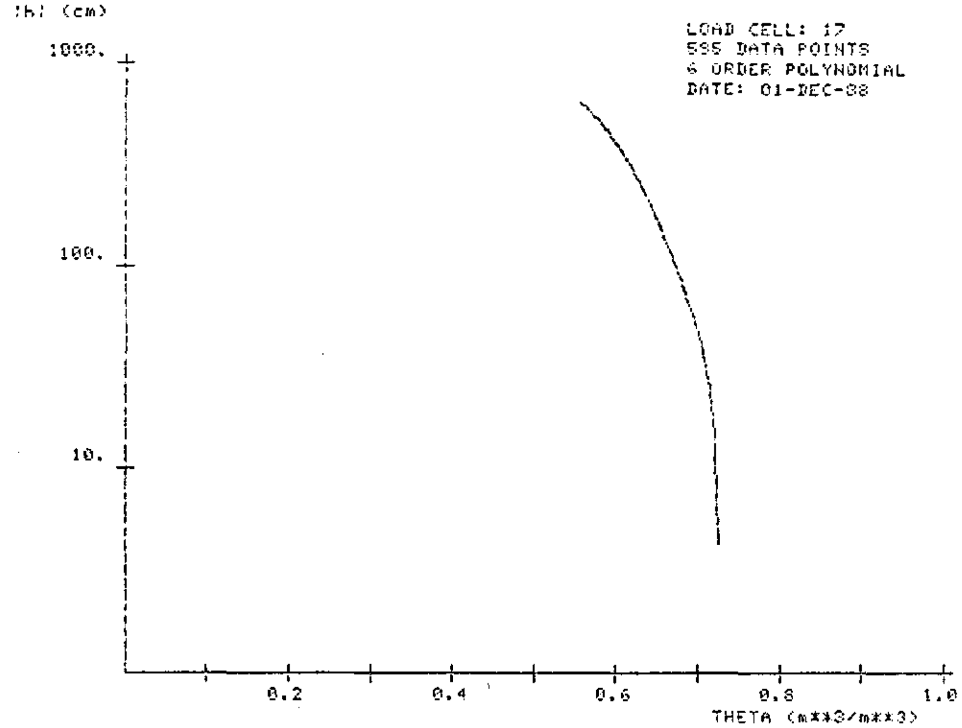
The water retention (h-THETA) curve was fitted with:
|h|=a0 + a1*THETA + ... + aN*THETA**N
(h in cm and THETA in m**3/m**3)
Permitted THETA range from 0.598 to 0.730
a0 =   0.1182196E+07
a1 = -0.4311425E+07
a2 = -0.8130819E+07
a3 =   0.6598354E+08
a4 = -0.1312900E+09
a5 =   0.1135443E+09
a6 = -0.3717042E+08

EXPERIMENT: 74
KATTEKLEI NIEUWKOOP
LAYER 75 - 85 CM.
REPLICATION 1



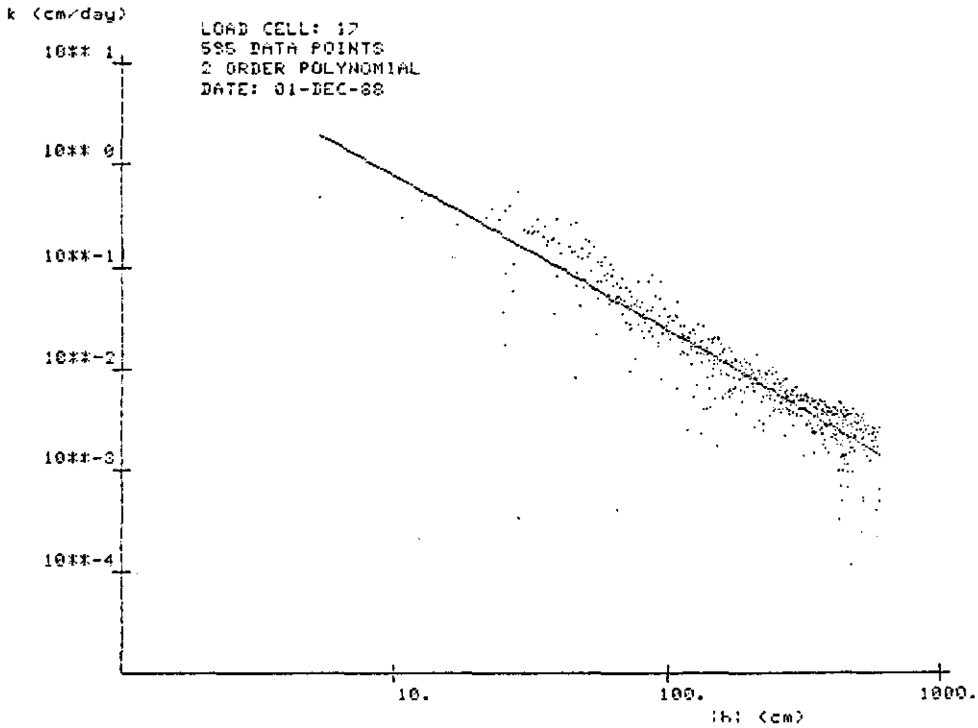
The k-h relation was fitted with:
log(k) = b0 + b1*log(|h|) + ... + bN*[log(|h|)]**N
(k in cm/day and h in cm)
Permitted |h| range from 6. to 473.
b0 =   0.9230776E+00
b1 = -0.9530730E+00
b2 = -0.1389415E+00

EXPERIMENT: 74
KATTEKLEI NIEUWKOOP
LAYER 75 - 85 CM.
REPLICATION 1



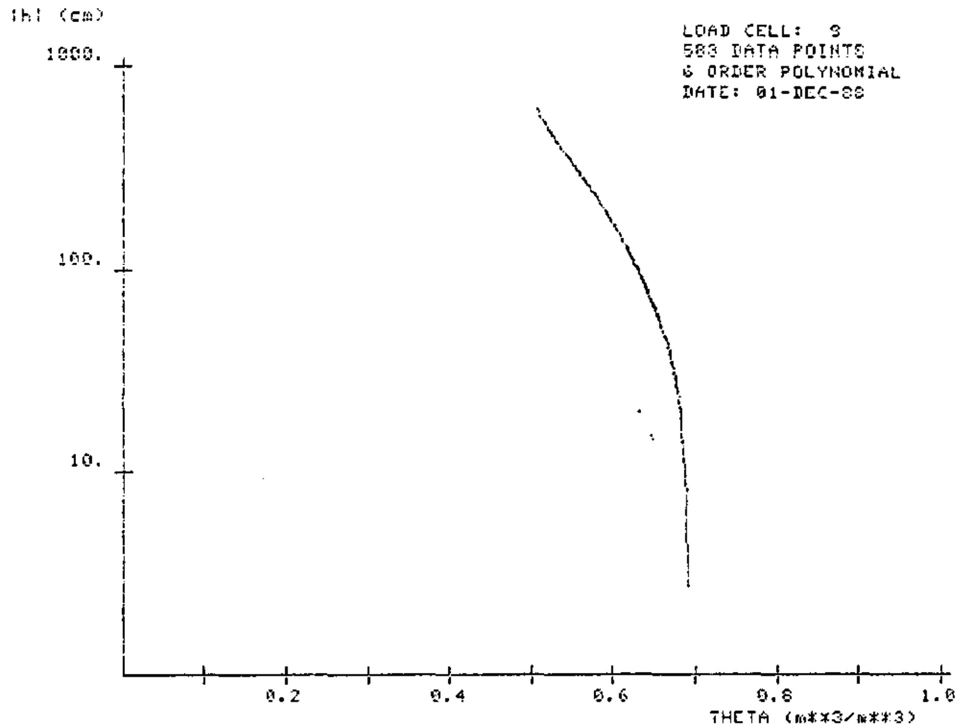
The water retention (h-THETA) curve was fitted with:
|h|=a0 + a1*THETA + ... + aN*THETA**N
(h in cm and THETA in m**3/m**3)
Permitted THETA range from 0.555 to 0.727
a0 = 0.1164711E+06
a1 = -0.8099603E+06
a2 = 0.1739049E+07
a3 = 0.2060734E+06
a4 = -0.5803657E+07
a5 = 0.7757065E+07
a6 = -0.3251550E+07

EXPERIMENT: 74
KATTEKLEI NIEUWKOOP
LAYER 75 - 85 CM.



The k-h relation was fitted with:
log(k) = b0 + b1*log(|h|) + ... + bN*[log(|h|)]**N
(k in cm/day and h in cm)
Permitted |h| range from 5. to 595.
b0 = 0.1288737E+01
b1 = -0.1349384E+01
b2 = -0.5032363E-01

EXPERIMENT: 74
KATTEKLEI NIEUWKOOP
LAYER 75 - 85 CM.
REPLICATION 2

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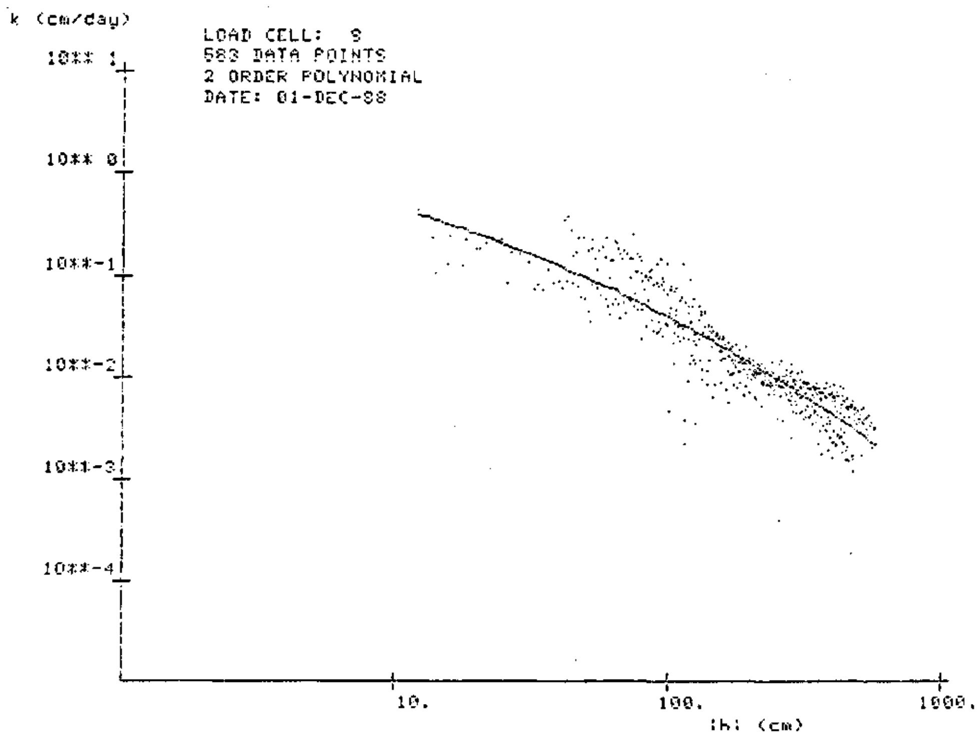
The water retention (h-THETA) curve was fitted with:
|h|=a0 + a1*THETA + ..... + aN*THETA**N
(h in cm and THETA in m**3/m**3)
Permitted THETA range from 0.506 to 0.691
a0 =    0.2374841E+07
a1 =   -0.2209052E+08
a2 =    0.8522520E+08
a3 =   -0.1743176E+09
a4 =    0.1991249E+09
a5 =   -0.1202994E+09
a6 =    0.2998697E+08
```

EXPERIMENT: 74
KATTEKLEI NIEUWKOOP
LAYER 110 -120 CM.
REPLICATION 1

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The k-h relation was fitted with:
log(k) = b0 + b1*log(|h|) + .... + bN*[log(|h|)]**N
(k in cm/day and h in cm)
Permitted |h| range from   12. to  574.
b0 =    0.1105087E+00
b1 =   -0.1370828E+00
b2 =   -0.3111499E+00
```
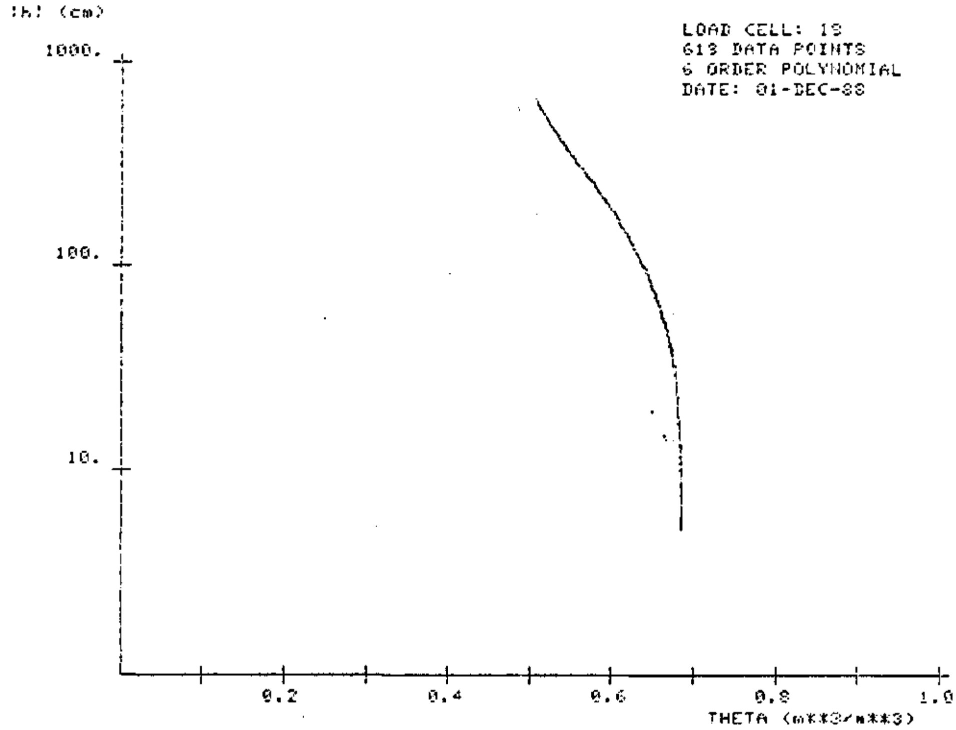
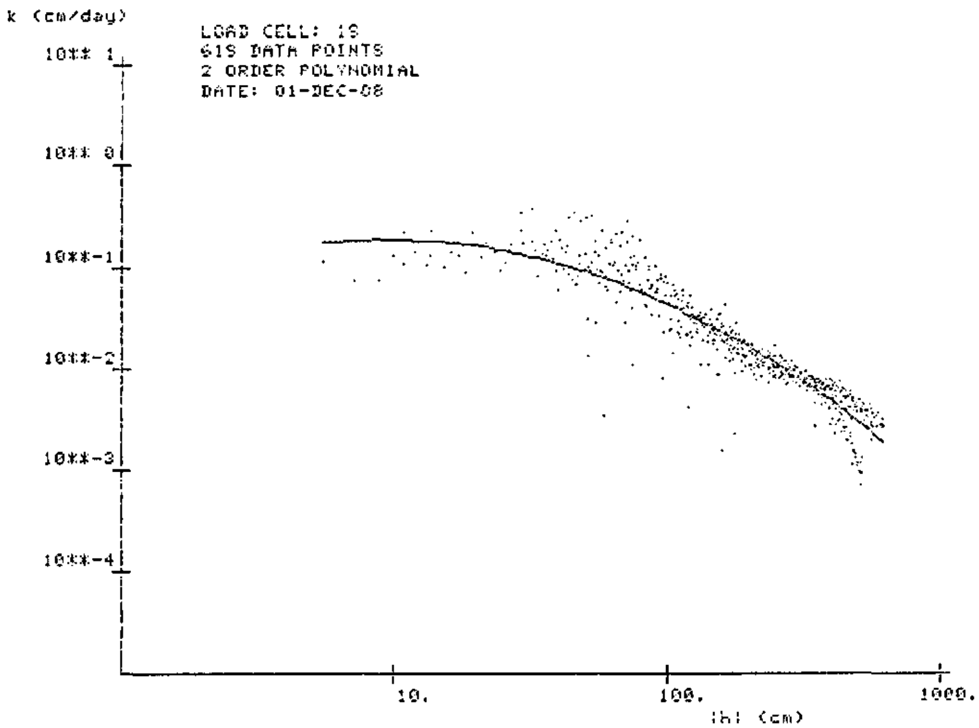

EXPERIMENT: 74
KATTEKLEI NIEUWKOOP
LAYER 110 -120 CM.
REPLICATION 1



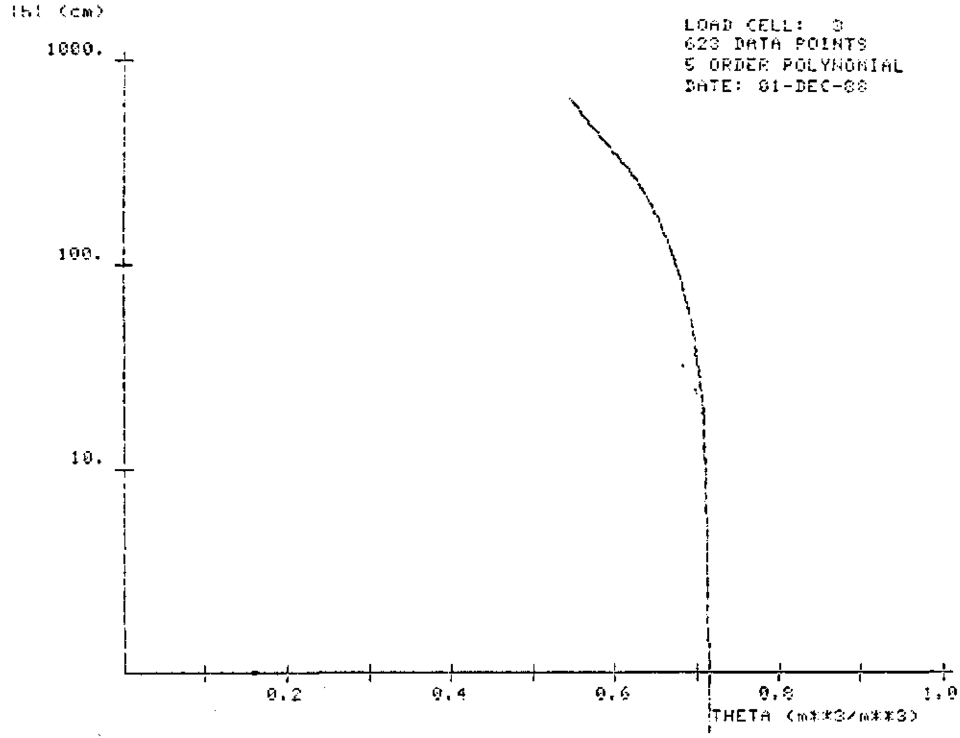
The water retention (h-THETA) curve was fitted with:
|h|=a0 + a1*THETA + ... + aN*THETA**N
(h in cm and THETA in m**3/m**3)
Permitted THETA range from 0.506 to 0.686
a0 = -0.1235984E+07
a1 = 0.1468632E+08
a2 = -0.7034547E+08
a3 = 0.1756042E+09
a4 = -0.2423604E+09
a5 = 0.1759950E+09
a6 = -0.5266700E+08

EXPERIMENT: 74
KATTEKLEI NIEUWKOOP
LAYER 110 - 120 CM.
REPLICATION 2



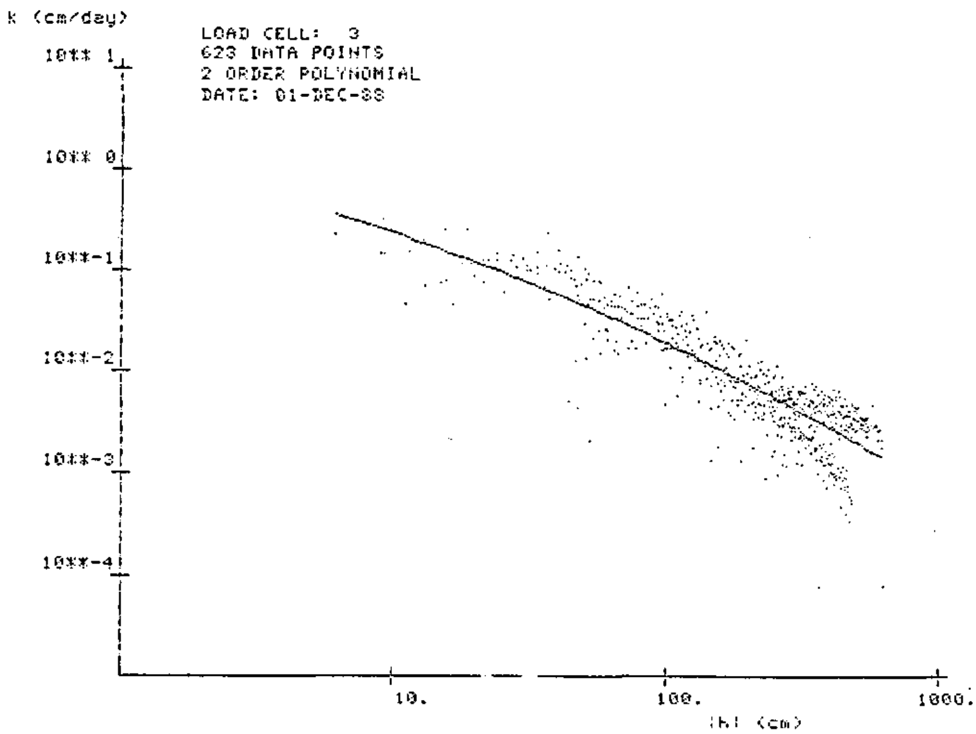
The k-h relation was fitted with:
log(k) = b0 + b1*log(|h|) + ... + bN*[log(|h|)]**N
(k in cm/day and h in cm)
Permitted |h| range from 6. to 625.
b0 = -0.1326024E+01
b1 = 0.1223527E+01
b2 = -0.6163837E+00

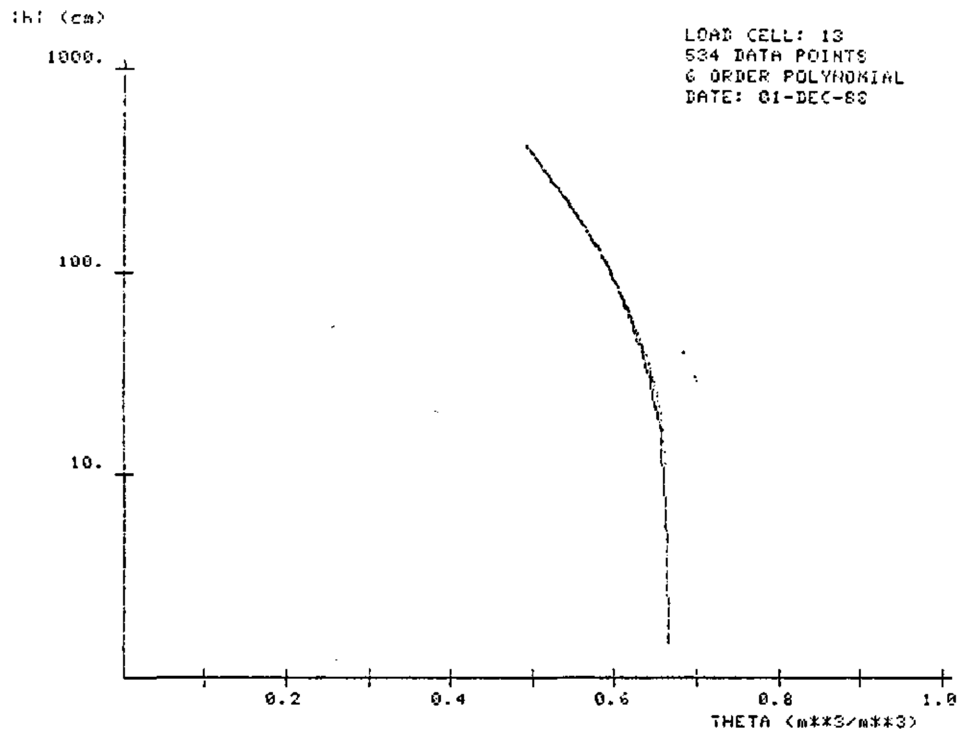
EXPERIMENT: 74
KATTEKLEI NIEUWKOOP
LAYER 110 - 120 CM.
REPLICATION 2



The water retention (h-THETA) curve was fitted with:
|h|=a0 + a1*THETA + ... + aN*THETA**N
(h in cm and THETA in m**3/m**3)
Permitted THETA range from 0.546 to 0.714
a0 = 0.1593929E+07
a1 = -0.1236417E+08
a2 = 0.3835732E+08
a3 = -0.5943839E+08
a4 = 0.4598645E+08
a5 = -0.1420861E+08

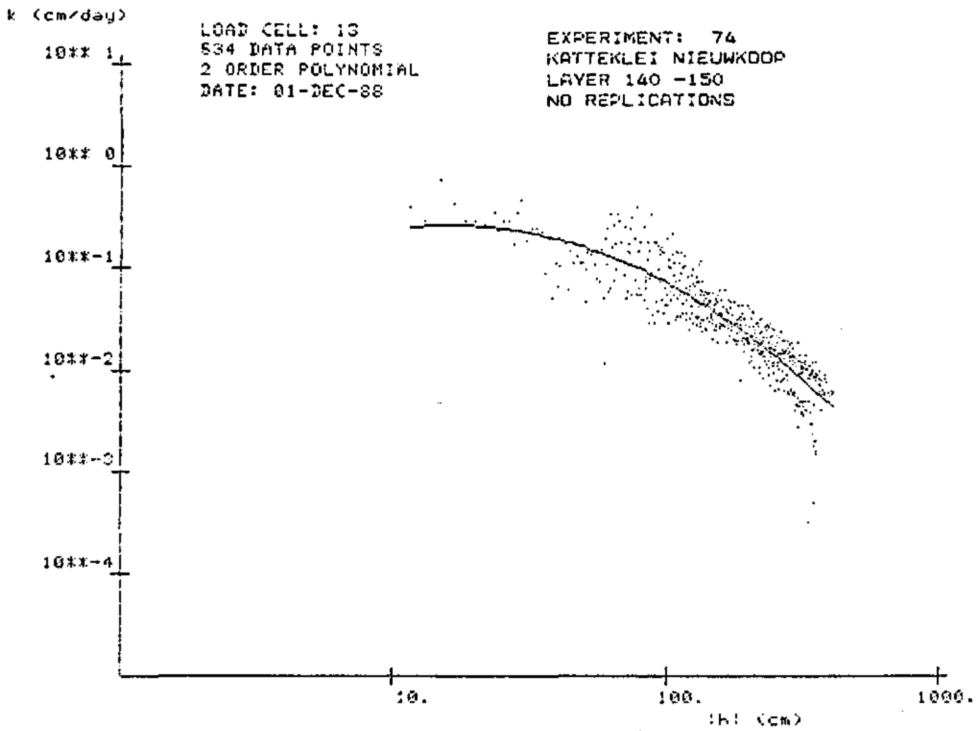
EXPERIMENT: 74
KATTEKLEI NIEUWKOOP
LAYER 110 -120 CM.
REPLICATION 3





The water retention (h-THETA) curve was fitted with:
|h|=a0 + a1*THETA + ... + aN*THETA**N
(h in cm and THETA in m**3/m**3)
Permitted THETA range from 0.490 to 0.668
a0 = -0.2706063E+07
a1 = 0.2903208E+08
a2 = -0.1292019E+09
a3 = 0.3055286E+09
a4 = -0.4050753E+09
a5 = 0.2855636E+09
a6 = -0.8363918E+08

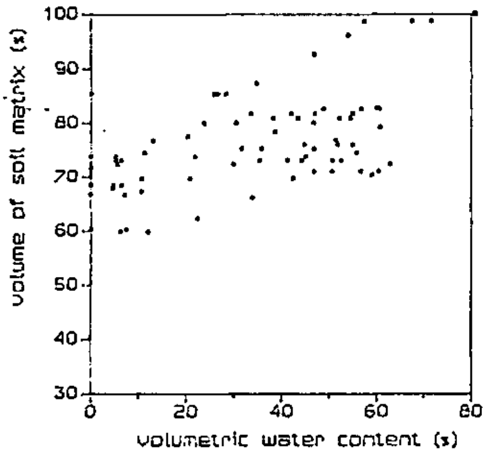
EXPERIMENT: 74
KATTEKLEI NIEUWKOOP
LAYER 140 -150
NO REPLICATIONS



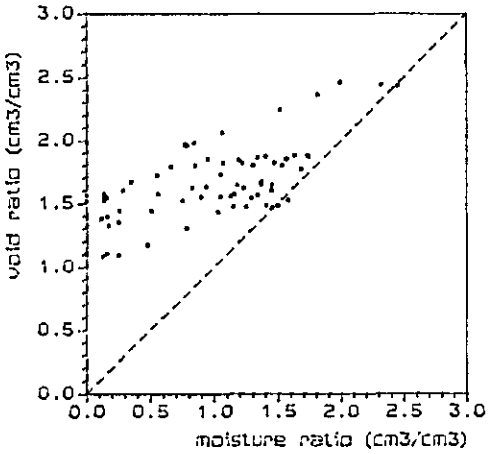
The k-h relation was fitted with:
log(k) = b0 + b1*log(|h|) + ... + bN*[log(|h|)]**N
(k in cm/day and h in cm)
Permitted |h| range from 11. to 410.
b0 = -0.1857152E+01
b1 = 0.2136864E+01
b2 = -0.8907073E+00

Wageningen, The Netherlands

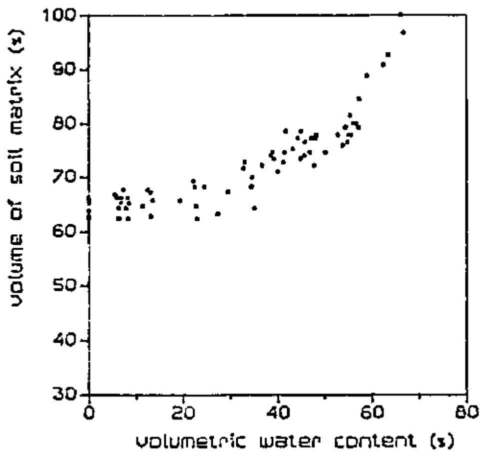
2.1.4. Shrinkage characteristics



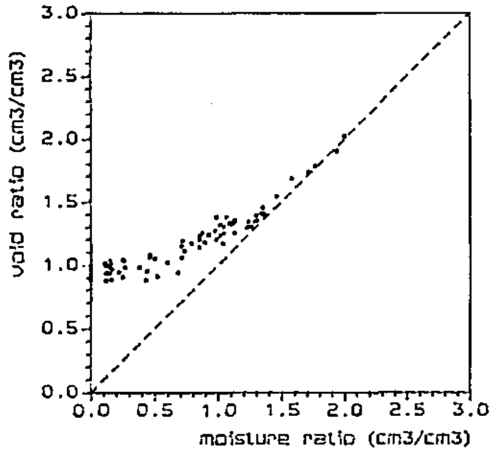
Katteklei Nieuwkoop 30 cm



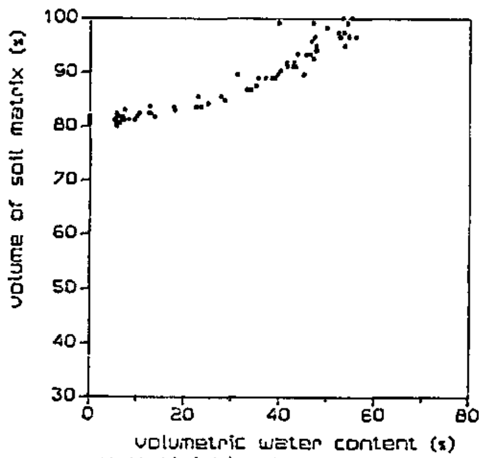
Katteklei Nieuwkoop 30 cm



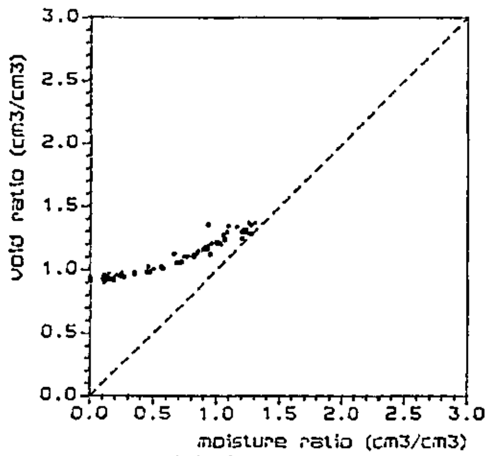
Katteklei Nieuwkoop 45 cm



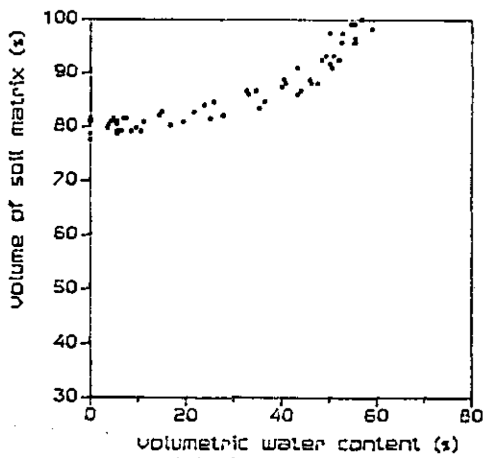
Katteklei Nieuwkoop 45 cm



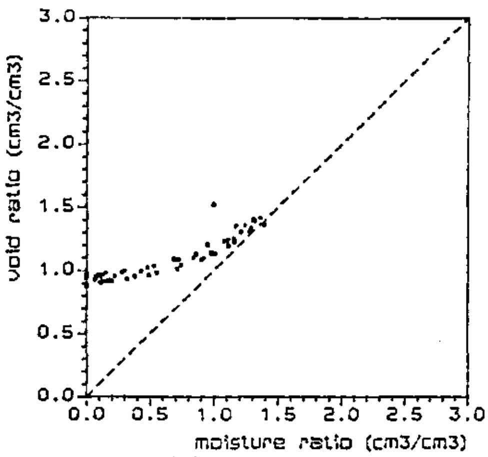
Katteklei Nieuwkoop 75 cm



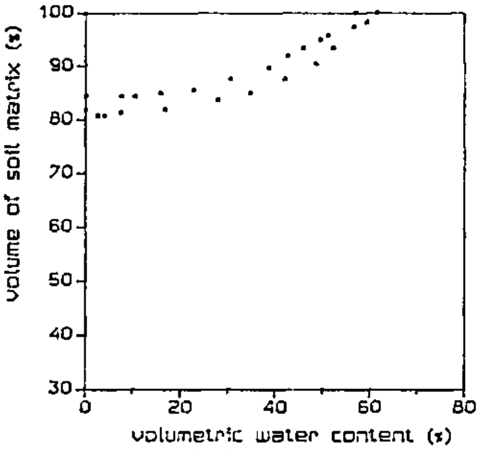
Katteklei Nieuwkoop 75 cm



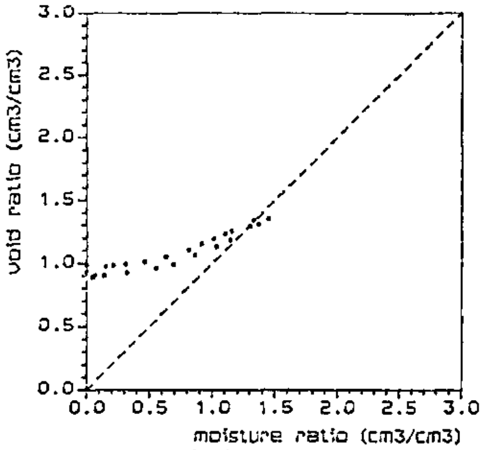
Katteklei Nieuwkoop 110 cm



Katteklei Nieuwkoop 110 cm



Katteklei Nieuwkoop 140 cm



Katteklei Nieuwkoop 140 cm

Katteklei Nieuwkoop

Nr of measurements per sample : 78

Nr of samples : 1

Density solid phase: Sample 1: 2.45 g/cm3

Properties SARAN-resin:
Specific mass : 1.50 g/cm3
Weightloss upon ovendrying : 0.10 g/g

Weight SARAN-coating: Sample 1: 1 - 2 g

Time of measurements: 31-10 31-10 01-11 01-11 02-11 03-11 04-11 07-11 11-11
16-11 20-11 24-11 25-11

Explanation of used symbols :
Depth : Sampling depth in soil profile (cm)
Thetag : Gravimetric water content (gram water/100 gram dry soil)
Thetav : Volumetric water content (cm3 water/100 cm3 soil)
Poros : Porosity (cm3 pores/100 cm3 soil)
Moistr : Moisture ratio (cm3 water/cm3 solid matter)
Voidr : Void ratio (cm3 pores/cm3 solid matter)
Volmas : Dry bulkdensity (gram dry soil/cm3 soil)
Volclod: Volume clod (cm3)

Results shrinkage measurements :
****

Depth	Thetag	Thetav	Poros	Moistr	Voidr	Volmas	Volclod
30	105.8	80.6	71.3	2.80	2.48	0.76	4.19
	106.1	81.0	71.2	2.81	2.47	0.76	4.17
	92.6	71.6	70.8	2.45	2.43	0.77	4.12
	87.6	67.5	70.9	2.32	2.44	0.77	4.14
	75.0	57.4	71.1	1.99	2.46	0.77	4.17
	68.4	54.0	70.3	1.81	2.36	0.79	4.04
	57.2	46.8	69.1	1.51	2.24	0.82	3.89
	39.9	34.5	67.3	1.06	2.06	0.87	3.68
	31.7	28.2	66.4	0.84	1.98	0.89	3.58
	29.9	26.7	66.2	0.79	1.96	0.89	3.56
	28.9	25.8	66.3	0.77	1.97	0.89	3.57
	28.9	25.9	66.3	0.77	1.96	0.89	3.57
	0.0	0.0	66.5	0.00	1.98	0.89	3.59
	65.6	60.5	65.2	1.74	1.87	0.92	5.41
	65.2	59.9	65.3	1.73	1.88	0.92	5.43
	61.6	56.7	65.2	1.63	1.88	0.92	5.42
	59.2	55.0	64.9	1.57	1.85	0.93	5.37
	52.8	48.7	65.2	1.40	1.87	0.92	5.41
	50.6	46.9	65.0	1.34	1.86	0.93	5.38
	44.9	41.9	64.8	1.19	1.84	0.93	5.36
	35.9	33.4	64.9	0.95	1.85	0.93	5.37
	24.9	23.7	64.2	0.66	1.79	0.95	5.26
	13.1	13.0	62.6	0.35	1.67	0.99	5.03
	5.1	5.3	61.1	0.14	1.57	1.03	4.84
	5.1	5.3	60.8	0.14	1.55	1.04	4.81
	0.0	0.0	61.0	0.00	1.56	1.03	4.83
	56.6	60.4	59.7	1.50	1.48	1.07	4.79
	59.7	62.8	60.3	1.58	1.52	1.05	4.86
	54.8	59.0	59.4	1.45	1.46	1.08	4.74
	53.0	56.7	59.6	1.41	1.48	1.07	4.78

47.2	50.6	59.5	1.25	1.47	1.07	4.77
43.4	46.7	59.4	1.15	1.47	1.07	4.76
38.7	42.3	58.8	1.03	1.43	1.09	4.68
29.4	33.8	56.5	0.78	1.30	1.15	4.43
18.2	22.3	53.8	0.48	1.17	1.22	4.18
9.4	11.9	52.2	0.25	1.09	1.27	4.04
5.9	7.4	52.3	0.16	1.10	1.26	4.04
4.9	6.2	52.0	0.13	1.08	1.27	4.02
0.0	0.0	52.4	0.00	1.10	1.26	4.05
63.4	60.7	63.9	1.68	1.77	0.96	5.20
59.0	54.8	65.0	1.56	1.85	0.93	5.36
57.6	54.4	64.3	1.53	1.80	0.94	5.26
55.6	52.2	64.6	1.47	1.82	0.94	5.30
49.2	46.6	64.2	1.30	1.80	0.95	5.25
46.0	43.3	64.5	1.22	1.82	0.94	5.29
40.5	38.1	64.5	1.07	1.82	0.94	5.28
32.1	30.4	64.3	0.85	1.80	0.95	5.25
20.8	20.3	63.2	0.55	1.72	0.98	5.10
11.0	11.2	61.5	0.29	1.60	1.02	4.88
6.2	6.4	60.6	0.16	1.54	1.04	4.76
5.3	5.6	60.3	0.14	1.52	1.05	4.73
0.0	0.0	60.1	0.00	1.51	1.06	4.70
54.7	54.9	62.1	1.45	1.64	1.00	3.78
54.7	55.8	61.5	1.45	1.60	1.02	3.72
50.7	52.5	60.9	1.34	1.56	1.04	3.67
48.6	50.7	60.6	1.29	1.54	1.04	3.64
43.6	45.0	61.1	1.16	1.57	1.03	3.68
42.6	44.2	60.8	1.13	1.55	1.04	3.66
39.7	41.2	60.8	1.05	1.55	1.04	3.66
33.9	35.3	60.7	0.90	1.55	1.04	3.65
28.4	29.8	60.3	0.75	1.52	1.05	3.61
19.1	20.8	59.0	0.51	1.44	1.09	3.50
9.4	10.6	57.4	0.25	1.35	1.13	3.37
6.3	7.2	56.8	0.17	1.32	1.14	3.32
0.0	0.0	56.8	0.00	1.32	1.14	3.32
51.8	51.8	62.3	1.37	1.65	1.00	8.59
51.7	51.4	62.5	1.37	1.67	0.99	8.65
46.2	46.7	61.9	1.23	1.62	1.01	8.51
44.6	44.7	62.2	1.18	1.64	1.00	8.57
39.6	38.5	63.4	1.05	1.73	0.97	8.85
35.4	35.7	61.9	0.94	1.63	1.01	8.52
31.2	31.6	61.9	0.83	1.62	1.01	8.51
21.1	21.8	61.1	0.56	1.57	1.03	8.33
9.8	10.7	59.0	0.26	1.44	1.09	7.90
5.9	6.5	58.1	0.16	1.39	1.11	7.74
4.4	4.9	58.0	0.12	1.38	1.11	7.72
4.1	4.6	57.8	0.11	1.37	1.12	7.68
0.0	0.0	58.0	0.00	1.38	1.11	7.71

Katteklei Nieuwkoop

Nr of measurements per sample : 78

Nr of samples : 1

Density solid phase: Sample 1: 2.65 g/cm3

Properties SARAN-resin:
Specific mass : 1.50 g/cm3
Weightloss upon ovendrying : 0.10 g/g

Weight SARAN-coating: Sample 1: 1 - 2 gr.

Time of measurements: 31-10 31-10 01-11 01-11 02-11 03-11 04-11 7-11 11-11 16-11 20-11 24-11 25-11

Explanation of used symbols :
Depth : Sampling depth in soil profile (cm)
Thetag : Gravimetric water content (gram water/100 gram dry soil)
Thetav : Volumetric water content (cm3 water/100 cm3 soil)
Poros : Porosity (cm3 pores/100 cm3 soil)
Moistr : Moisture ratio (cm3 water/cm3 solid matter)
Voidr : Void ratio (cm3 pores/cm3 solid matter)
Volmas : Dry bulkdensity (gram dry soil/cm3 soil)
Volclod: Volume clod (cm3)

Results shrinkage measurements :
****

Depth	Thetag	Thetav	Poros	Moistr	Voidr	Volmas	Volclod
45	75.5	66.2	66.9	2.00	2.02	0.88	11.69
	73.0	66.7	65.5	1.94	1.90	0.91	11.23
	66.5	63.5	64.0	1.76	1.78	0.95	10.75
	64.5	62.5	63.4	1.71	1.73	0.97	10.59
	59.6	59.0	62.6	1.58	1.68	0.99	10.36
	55.0	57.3	60.7	1.46	1.54	1.04	9.85
	51.1	55.3	59.2	1.35	1.45	1.08	9.49
	42.6	50.1	55.6	1.13	1.25	1.18	8.72
	33.9	41.1	54.2	0.90	1.18	1.21	8.46
	25.6	35.0	48.4	0.68	0.94	1.37	7.51
	19.7	27.3	47.5	0.52	0.91	1.39	7.38
	16.3	23.0	46.9	0.43	0.88	1.41	7.30
	0.0	0.0	47.3	0.00	0.90	1.40	7.35
	47.5	54.8	56.5	1.26	1.30	1.15	22.00
	46.4	53.8	56.2	1.23	1.29	1.16	21.89
	39.1	47.7	53.9	1.04	1.17	1.22	20.79
	39.6	46.7	55.5	1.05	1.25	1.18	21.51
	37.3	44.8	54.6	0.99	1.20	1.20	21.12
	32.2	40.0	53.2	0.85	1.14	1.24	20.49
	26.7	34.4	51.4	0.71	1.06	1.29	19.69
	16.7	22.8	48.6	0.44	0.95	1.36	18.64
	9.4	13.1	47.3	0.25	0.90	1.40	18.19
	5.9	8.3	46.9	0.16	0.88	1.41	18.03
	4.6	6.5	46.7	0.12	0.88	1.41	17.99
	4.4	6.2	46.6	0.12	0.87	1.41	17.95
	0.0	0.0	46.9	0.00	0.88	1.41	18.03
	50.7	56.0	58.4	1.34	1.40	1.10	32.71
	49.2	54.5	58.2	1.30	1.39	1.11	32.56
	42.0	48.0	56.9	1.11	1.32	1.14	31.58
	42.7	48.3	57.3	1.13	1.34	1.13	31.93

38.4	45.6	55.2	1.02	1.23	1.19	30.41
35.1	41.4	55.4	0.93	1.24	1.18	30.53
30.0	36.6	54.0	0.79	1.17	1.22	29.61
18.9	24.5	51.2	0.50	1.05	1.29	27.91
10.1	13.5	49.5	0.27	0.98	1.34	26.96
6.3	8.5	48.9	0.17	0.96	1.35	26.65
5.1	6.9	49.2	0.14	0.97	1.35	26.80
5.2	7.0	49.7	0.14	0.99	1.33	27.06
0.0	0.0	48.9	0.00	0.96	1.35	26.66
48.5	55.0	57.2	1.29	1.34	1.13	20.30
46.7	52.8	57.3	1.24	1.34	1.13	20.34
39.7	45.7	56.5	1.05	1.30	1.15	19.98
36.8	43.1	55.9	0.98	1.27	1.17	19.69
32.6	39.2	54.6	0.86	1.20	1.20	19.14
27.5	34.5	52.6	0.73	1.11	1.26	18.33
22.5	29.5	50.6	0.60	1.02	1.31	17.57
14.5	19.4	49.4	0.38	0.98	1.34	17.16
8.4	11.4	48.6	0.22	0.94	1.36	16.89
5.8	7.9	48.2	0.15	0.93	1.37	16.78
4.7	6.5	48.2	0.13	0.93	1.37	16.76
4.6	6.3	48.2	0.12	0.93	1.37	16.77
0.0	0.0	48.0	0.00	0.92	1.38	16.72
51.6	57.2	58.2	1.37	1.39	1.11	36.28
49.3	55.5	57.5	1.31	1.35	1.13	35.68
42.5	47.9	57.5	1.13	1.35	1.13	35.65
40.3	44.9	57.9	1.07	1.38	1.12	36.02
38.6	44.2	56.8	1.02	1.32	1.14	35.13
33.1	38.9	55.6	0.88	1.25	1.18	34.18
27.2	32.9	54.4	0.72	1.19	1.21	33.22
17.5	22.2	51.9	0.46	1.08	1.27	31.54
9.6	12.5	51.0	0.25	1.04	1.30	30.92
5.6	7.3	50.8	0.15	1.03	1.30	30.84
4.3	5.6	50.3	0.11	1.01	1.32	30.48
4.2	5.6	50.1	0.11	1.00	1.32	30.38
0.0	0.0	49.8	0.00	0.99	1.33	30.18
51.3	56.7	58.3	1.36	1.40	1.10	31.84
49.1	54.3	58.2	1.30	1.39	1.11	31.77
42.1	47.8	57.2	1.12	1.33	1.14	30.96
41.2	47.0	57.0	1.09	1.33	1.14	30.87
37.4	41.7	57.9	0.99	1.38	1.12	31.52
32.3	38.5	55.1	0.86	1.23	1.19	29.54
26.6	32.7	53.6	0.71	1.15	1.23	28.57
17.5	22.5	51.4	0.46	1.06	1.29	27.30
10.0	13.1	50.6	0.26	1.03	1.31	26.88
6.2	8.2	49.9	0.16	1.00	1.33	26.49
4.8	6.3	49.8	0.13	0.99	1.33	26.42
4.5	6.0	49.7	0.12	0.99	1.33	26.35
0.0	0.0	49.6	0.00	0.98	1.34	26.31

Katteklei Nieuwkoop

Nr of measurements per sample : 78

Nr of samples : 1

Density solid phase: Sample 1: 2.65 g/cm3

Properties SARAN-resin:
Specific mass : 1.50 g/cm3
Weightloss upon ovendrying : 0.10 g/g

Weight SARAN-coating: Sample 1: 1 - 2 gr.

Time of measurements: 31-10 31-10 01-11 01-11 02-11 03-11 04-11 7-11 11-11
16-11 20-11 24-11 25-11

Explanation of used symbols :
Depth : Sampling depth in soil profile (cm)
Thetag : Gravimetric water content (gram water/100 gram dry soil)
Thetav : Volumetric water content (cm3 water/100 cm3 soil)
Poros : Porosity (cm3 pores/100 cm3 soil)
Moistr : Moisture ratio (cm3 water/cm3 solid matter)
Voidr : Void ratio (cm3 pores/cm3 solid matter)
Volmas : Dry bulkdensity (gram dry soil/cm3 soil)
Volclod: Volume clod (cm3)

Results shrinkage measurements :
****

Depth	Thetag	Thetav	Poros	Moistr	Voidr	Volmas	Volclod
75	48.9	54.9	57.7	1.30	1.36	1.12	24.52
	47.3	53.2	57.6	1.25	1.36	1.12	24.49
	41.3	46.8	57.3	1.09	1.34	1.13	24.30
	39.8	46.5	55.9	1.05	1.27	1.17	23.56
	35.1	39.6	57.4	0.93	1.35	1.13	24.36
	33.9	41.4	54.0	0.90	1.17	1.22	22.57
	28.0	35.4	52.3	0.74	1.10	1.26	21.79
	17.5	22.9	50.5	0.46	1.02	1.31	20.99
	9.4	12.7	49.3	0.25	0.97	1.34	20.46
	5.5	7.4	49.0	0.15	0.96	1.35	20.37
	4.2	5.7	48.7	0.11	0.95	1.36	20.25
	4.1	5.7	47.3	0.11	0.90	1.40	19.70
	0.0	0.0	47.7	0.00	0.91	1.39	19.85
	46.3	53.3	56.6	1.23	1.31	1.15	34.59
	45.4	52.5	56.4	1.20	1.29	1.16	34.38
	40.8	47.2	56.3	1.08	1.29	1.16	34.33
	40.2	47.6	55.3	1.06	1.24	1.19	33.53
	36.2	43.6	54.6	0.96	1.20	1.20	33.02
	33.6	41.5	53.5	0.89	1.15	1.23	32.24
	29.2	36.9	52.3	0.77	1.10	1.26	31.45
	21.1	27.7	50.6	0.56	1.02	1.31	30.35
	13.3	17.8	49.4	0.35	0.97	1.34	29.62
	7.8	10.5	48.6	0.21	0.95	1.36	29.21
	5.2	7.1	48.3	0.14	0.93	1.37	29.00
	4.6	6.3	48.1	0.12	0.93	1.37	28.92
	0.0	0.0	47.6	0.00	0.91	1.39	28.65
	47.0	54.5	56.2	1.24	1.28	1.16	35.33
	45.5	52.7	56.3	1.21	1.29	1.16	35.43
	40.1	47.5	55.3	1.06	1.24	1.18	34.64
	38.7	46.3	54.8	1.02	1.21	1.20	34.26

35.2	42.8	54.1	0.93	1.18	1.22	33.69
30.5	38.3	52.6	0.81	1.11	1.26	32.67
25.6	33.1	51.3	0.68	1.05	1.29	31.77
16.8	22.5	49.4	0.45	0.98	1.34	30.61
9.4	12.8	48.6	0.25	0.94	1.36	30.09
5.9	8.2	47.9	0.16	0.92	1.38	29.71
4.6	6.4	47.7	0.12	0.91	1.39	29.57
4.5	6.2	47.7	0.12	0.91	1.39	29.58
0.0	0.0	47.9	0.00	0.92	1.38	29.72
48.1	55.9	56.2	1.27	1.28	1.16	18.67
45.5	52.2	56.7	1.21	1.31	1.15	18.88
37.8	45.4	54.8	1.00	1.21	1.20	18.09
35.2	43.2	53.6	0.93	1.16	1.23	17.65
31.6	39.5	52.8	0.84	1.12	1.25	17.34
24.8	31.1	52.8	0.66	1.12	1.25	17.33
18.9	25.0	49.9	0.50	1.00	1.33	16.34
9.2	12.6	48.6	0.24	0.95	1.36	15.93
5.0	7.0	47.9	0.13	0.92	1.38	15.70
4.4	6.0	48.2	0.12	0.93	1.37	15.80
3.8	5.3	47.9	0.10	0.92	1.38	15.70
3.9	5.4	48.0	0.10	0.92	1.38	15.75
0.0	0.0	48.3	0.00	0.93	1.37	15.83
45.4	53.6	55.4	1.20	1.24	1.18	18.75
43.7	49.7	57.1	1.16	1.33	1.14	19.46
37.8	45.4	54.7	1.00	1.21	1.20	18.43
36.0	44.9	52.9	0.95	1.12	1.25	17.73
32.2	40.0	53.2	0.85	1.14	1.24	17.85
27.2	34.9	51.6	0.72	1.06	1.28	17.25
21.7	28.5	50.3	0.57	1.01	1.32	16.80
13.3	18.0	48.9	0.35	0.96	1.35	16.35
7.3	10.0	48.2	0.19	0.93	1.37	16.13
5.1	7.1	47.8	0.14	0.92	1.38	16.02
4.1	5.7	47.7	0.11	0.91	1.39	15.97
4.0	5.5	48.0	0.11	0.92	1.38	16.06
0.0	0.0	47.7	0.00	0.91	1.39	15.98
47.9	54.1	57.3	1.27	1.34	1.13	17.42
46.4	53.3	56.6	1.23	1.31	1.15	17.16
39.9	47.5	55.1	1.06	1.23	1.19	16.56
38.9	46.9	54.5	1.03	1.20	1.21	16.34
34.8	42.6	53.8	0.92	1.16	1.23	16.09
30.9	38.9	52.5	0.82	1.10	1.26	15.65
26.2	33.9	51.2	0.70	1.05	1.29	15.25
17.7	23.6	49.5	0.47	0.98	1.34	14.73
10.1	13.7	48.5	0.27	0.94	1.37	14.43
6.8	9.4	47.7	0.18	0.91	1.38	14.23
5.2	7.2	47.9	0.14	0.92	1.38	14.28
5.1	7.0	48.0	0.13	0.92	1.38	14.31
0.0	0.0	47.7	0.00	0.91	1.38	14.23

Katteklei Nieuwkoop

Nr of measurements per sample : 65

Nr of samples : 1

Density solid phase: Sample 1: 2.65 g/cm3

Properties SARAN-resin:
Specific mass : 1.50 g/cm3
Weightloss upon ovendrying : 0.10 g/g

Weight SARAN-coating: Sample 1: 1 - 2 gr.

Time of measurements: 31-10 31-10 01-11 01-11 02-11 03-11 04-11 07-11 11-11 16-11 20-11 24-11 25-11

Explanation of used symbols :
Depth : Sampling depth in soil profile (cm)
Thetag : Gravimetric water content (gram water/100 gram dry soil)
Thetav : Volumetric water content (cm3 water/100 cm3 soil)
Poros : Porosity (cm3 pores/100 cm3 soil)
Moistr : Moisture ratio (cm3 water/cm3 solid matter)
Voidr : Void ratio (cm3 pores/cm3 solid matter)
Volmas : Dry bulkdensity (gram dry soil/cm3 soil)
Volclod: Volume clod (cm3)

Results shrinkage measurements :
****

Depth	Thetag	Thetav	Poros	Moistr	Voidr	Volmas	Volclod
110	51.5	56.7	58.5	1.36	1.41	1.10	23.82
	49.2	54.6	58.1	1.30	1.39	1.11	23.64
	40.8	48.4	55.2	1.08	1.23	1.19	22.10
	35.8	43.2	54.4	0.95	1.20	1.21	21.72
	32.5	40.4	53.0	0.86	1.13	1.24	21.07
	25.7	32.6	52.1	0.68	1.09	1.27	20.66
	19.8	25.8	50.9	0.53	1.03	1.30	20.14
	11.2	14.9	49.7	0.30	0.99	1.33	19.69
	5.6	7.5	49.2	0.15	0.97	1.35	19.48
	4.2	5.7	48.8	0.11	0.95	1.36	19.31
	3.6	4.9	48.9	0.10	0.96	1.36	19.35
	3.6	4.9	48.9	0.10	0.96	1.35	19.37
	0.0	0.0	48.8	0.00	0.95	1.36	19.32
	49.4	54.6	58.3	1.31	1.40	1.11	27.78
	48.3	55.5	56.6	1.28	1.30	1.15	26.70
	43.6	51.9	55.2	1.16	1.23	1.19	25.84
	44.3	50.1	57.4	1.17	1.35	1.13	27.17
	41.8	50.2	54.7	1.11	1.21	1.20	25.58
	38.1	47.4	53.0	1.01	1.13	1.25	24.65
	34.6	43.9	52.1	0.92	1.09	1.27	24.18
	26.8	35.3	50.3	0.71	1.01	1.32	23.33
	18.6	25.1	49.0	0.49	0.96	1.35	22.74
	12.1	16.6	48.1	0.32	0.93	1.37	22.34
	7.6	10.6	47.7	0.20	0.91	1.39	22.17
	6.2	8.6	47.6	0.16	0.91	1.39	22.10
	0.0	0.0	47.1	0.00	0.89	1.40	21.90
	48.1	55.2	56.7	1.28	1.31	1.15	26.11
	45.6	52.6	56.5	1.21	1.30	1.15	25.98
	37.1	46.2	53.0	0.98	1.13	1.25	24.03
	34.0	43.3	51.8	0.90	1.08	1.28	23.45

27.9	36.4	50.9	0.74	1.04	1.30	22.99
20.7	27.7	49.6	0.55	0.98	1.34	22.39
14.2	19.4	48.7	0.38	0.95	1.36	22.02
7.0	9.6	47.8	0.18	0.92	1.38	21.63
4.8	6.6	47.6	0.13	0.91	1.39	21.54
4.5	6.2	47.5	0.12	0.91	1.39	21.52
4.0	5.6	47.4	0.11	0.90	1.39	21.47
4.1	5.7	47.3	0.11	0.90	1.40	21.43
0.0	0.0	46.6	0.00	0.87	1.42	21.15
52.4	58.9	57.6	1.39	1.36	1.12	29.00
46.7	52.7	57.4	1.24	1.35	1.13	28.88
43.7	52.0	55.0	1.16	1.22	1.19	27.34
41.8	50.5	54.4	1.11	1.19	1.21	26.96
36.9	45.8	53.2	0.98	1.14	1.24	26.27
31.6	39.9	52.4	0.84	1.10	1.26	25.84
25.9	33.0	51.8	0.69	1.08	1.28	25.54
16.3	21.7	49.8	0.43	0.99	1.33	24.51
8.2	11.1	48.8	0.22	0.95	1.36	24.02
4.1	5.6	48.3	0.11	0.94	1.37	23.80
2.8	3.8	48.4	0.07	0.94	1.37	23.85
2.7	3.7	48.0	0.07	0.92	1.38	23.65
0.0	0.0	48.6	0.00	0.94	1.36	23.91
49.9	55.3	58.2	1.32	1.39	1.11	30.21
48.8	55.4	57.1	1.29	1.33	1.14	29.48
43.3	50.9	55.6	1.15	1.25	1.18	28.48
41.8	49.4	55.4	1.11	1.24	1.18	28.33
37.7	39.6	60.4	1.00	1.52	1.05	31.89
32.6	40.7	52.9	0.86	1.12	1.25	26.83
27.2	34.5	52.0	0.72	1.08	1.27	26.35
18.2	23.9	50.4	0.48	1.02	1.31	25.50
10.7	14.4	49.4	0.28	0.98	1.34	24.99
5.1	6.9	48.9	0.13	0.96	1.35	24.73
3.4	4.6	48.8	0.09	0.95	1.36	24.69
3.1	4.3	48.7	0.08	0.95	1.36	24.66
0.0	0.0	49.1	0.00	0.97	1.35	24.84

Katteklei Nieuwkoop

Nr of measurements per sample : 26

Nr of samples : 1

Density solid phase: Sample 1: 2.65 g/cm3

Properties SARAN-resin:
Specific mass : 1.50 g/cm3
Weightloss upon ovendrying : 0.10 g/g

Weight SARAN-coating: Sample 1: 1 - 2 gr.

Time of measurements: 31-10 31-10 01-11 01-11 02-11 03-11 04-11 07-11 11-11
16-11 20-11 24-11 25-11

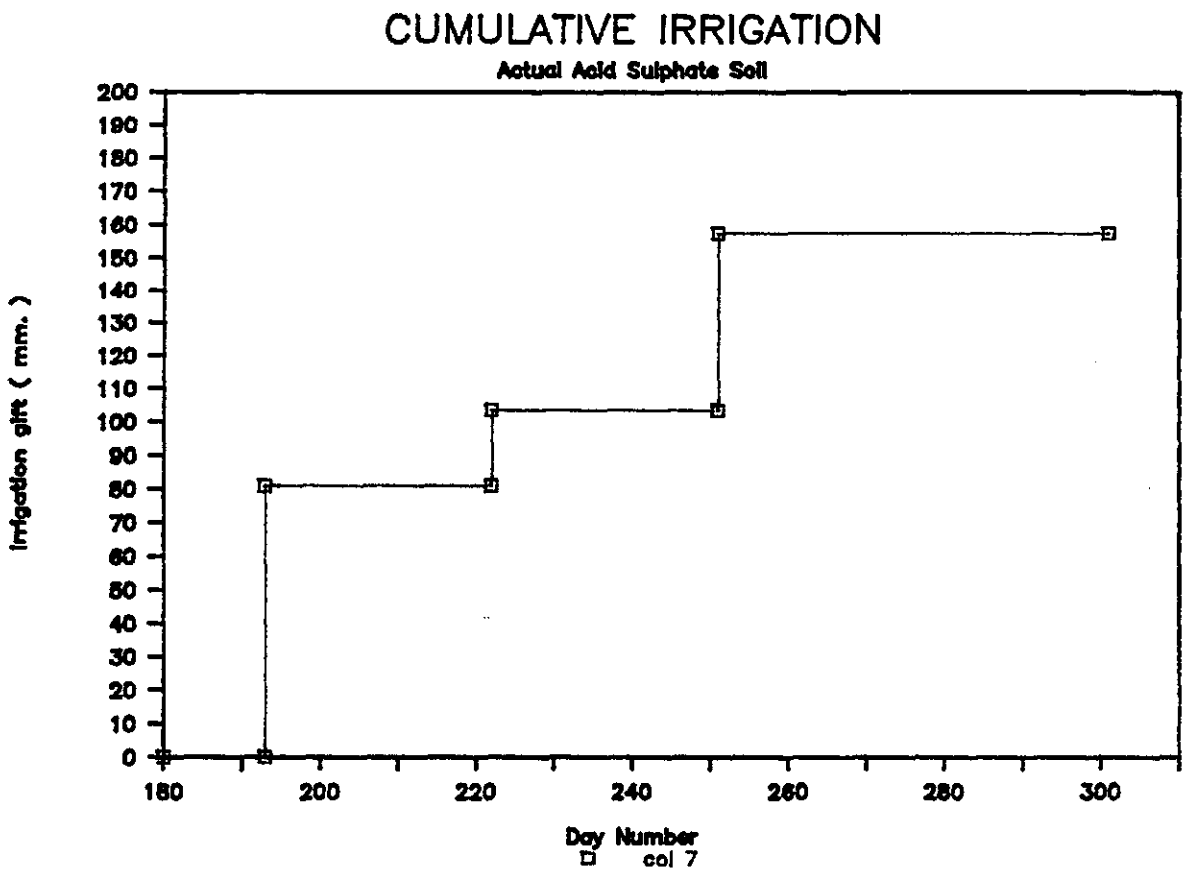
Explanation of used symbols :
Depth : Sampling depth in soil profile (cm)
Thetag : Gravimetric water content (gram water/100 gram dry soil)
Thetav : Volumetric water content (cm3 water/100 cm3 soil)
Poros : Porosity (cm3 pores/100 cm3 soil)
Moistr : Moisture ratio (cm3 water/cm3 solid matter)
Voidr : Void ratio (cm3 pores/cm3 solid matter)
Volmas : Dry bulkdensity (gram dry soil/cm3 soil)
Volclod: Volume clod (cm3)

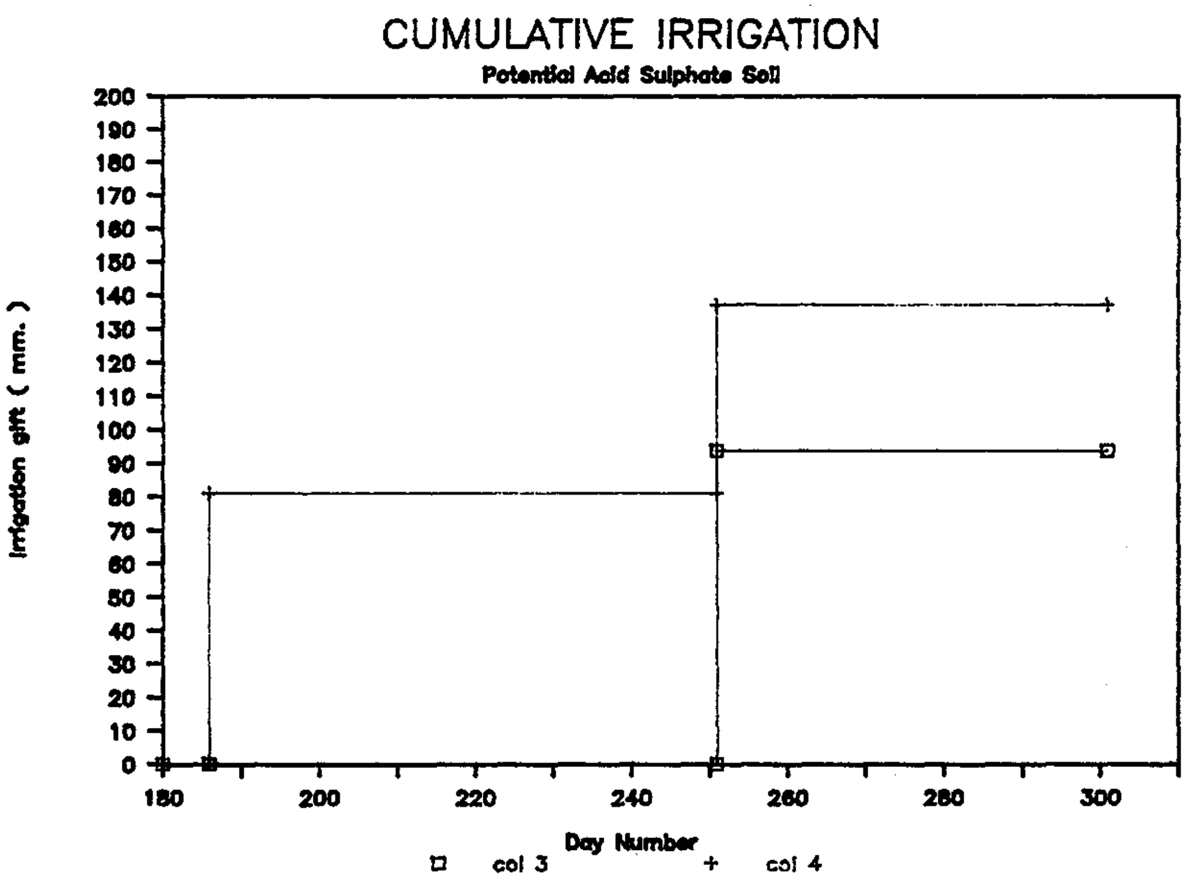
Results shrinkage measurements :
****

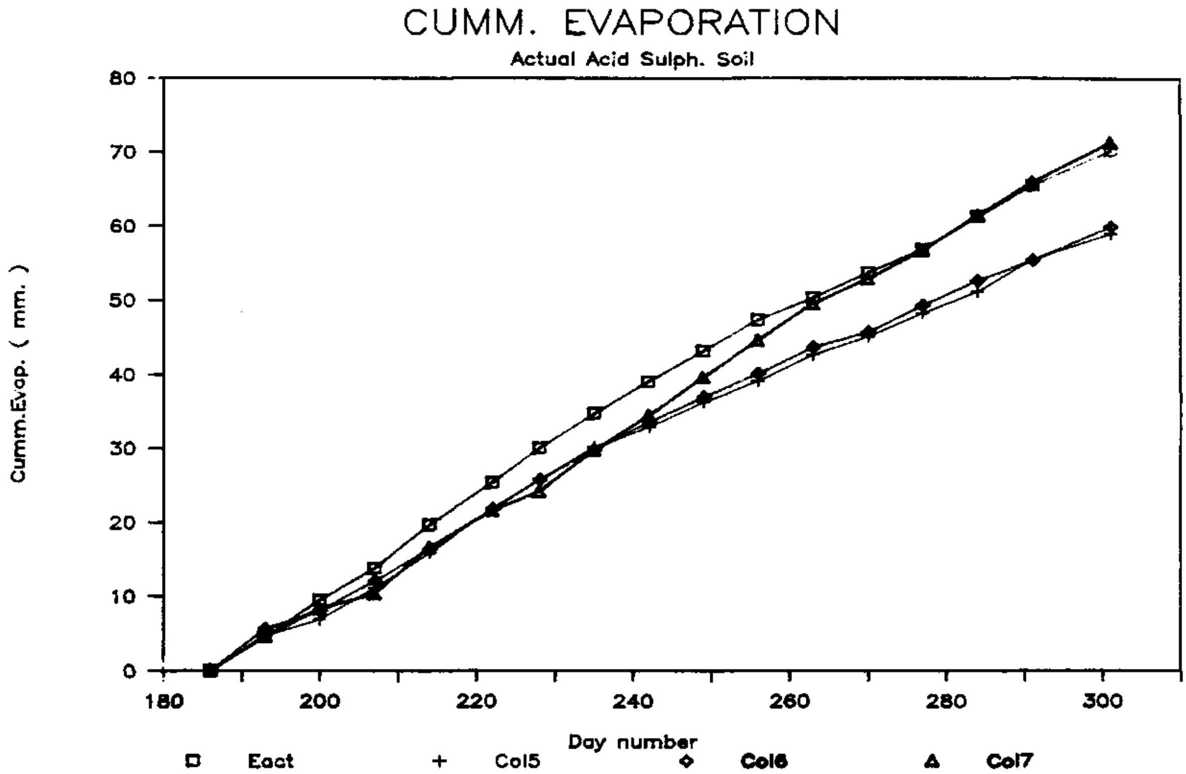
Depth	Thetag	Thetav	Poros	Moistr	Voidr	Volmas	Volclod
140	50.3	57.0	57.2	1.33	1.34	1.13	18.52
	49.0	56.6	56.4	1.30	1.29	1.16	18.15
	43.5	51.1	55.6	1.15	1.25	1.18	17.85
	41.7	49.5	55.2	1.10	1.23	1.19	17.66
	38.0	45.9	54.4	1.01	1.19	1.21	17.36
	34.5	42.6	53.4	0.91	1.15	1.23	17.00
	30.6	38.6	52.4	0.81	1.10	1.26	16.64
	23.7	30.5	51.3	0.63	1.05	1.29	16.25
	17.2	22.7	50.2	0.46	1.01	1.32	15.91
	11.8	15.8	49.7	0.31	0.99	1.33	15.75
	7.7	10.4	49.4	0.21	0.98	1.34	15.65
	5.6	7.6	49.3	0.15	0.97	1.34	15.63
	0.0	0.0	49.4	0.00	0.98	1.34	15.66
	54.5	61.5	57.4	1.45	1.35	1.13	13.05
	51.8	59.4	56.7	1.37	1.31	1.15	12.84
	43.0	52.2	54.2	1.14	1.18	1.21	12.13
	38.9	48.5	53.0	1.03	1.13	1.25	11.81
	32.6	41.9	51.5	0.86	1.06	1.29	11.45
	26.1	34.7	49.9	0.69	0.99	1.33	11.08
	20.6	27.9	48.9	0.55	0.96	1.35	10.88
	12.2	16.8	48.0	0.32	0.92	1.38	10.69
	5.3	7.4	47.4	0.14	0.90	1.39	10.56
	2.8	3.9	47.3	0.07	0.90	1.40	10.53
	1.9	2.7	47.1	0.05	0.89	1.40	10.51
	1.8	2.5	47.1	0.05	0.89	1.40	10.49
	0.0	0.0	48.1	0.00	0.93	1.38	10.70

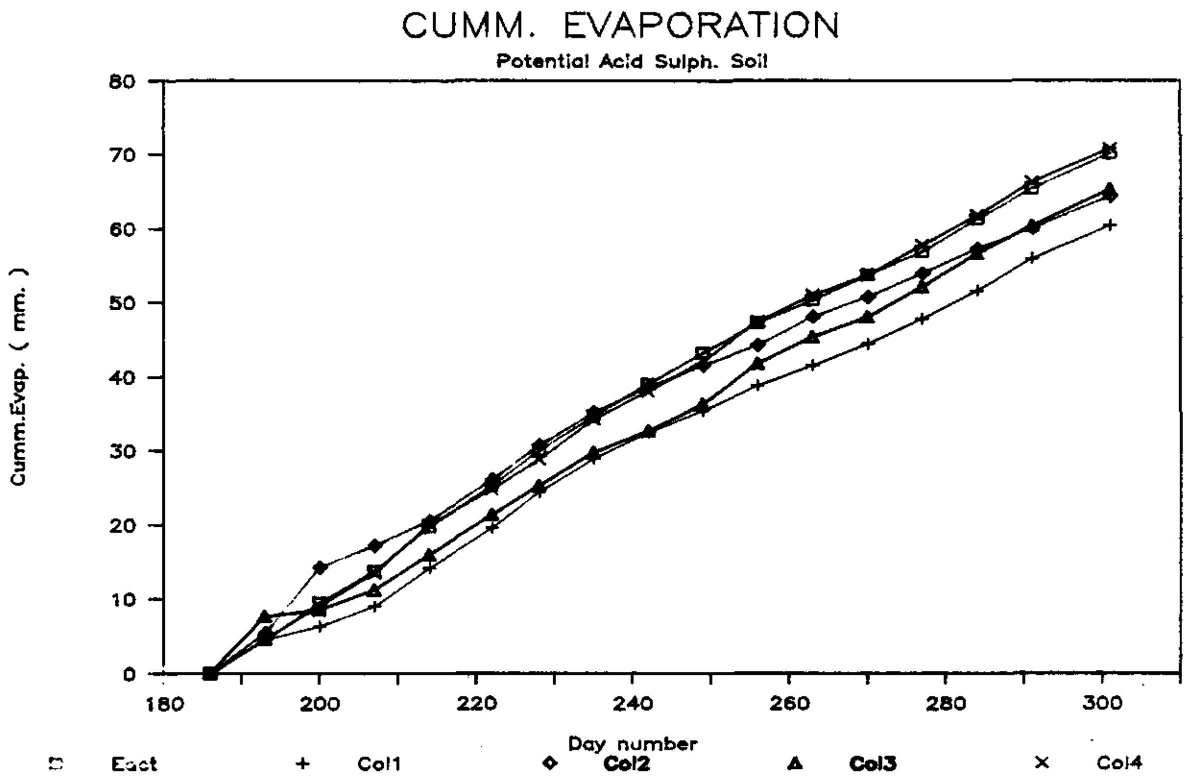
Wageningen, The Netherlands

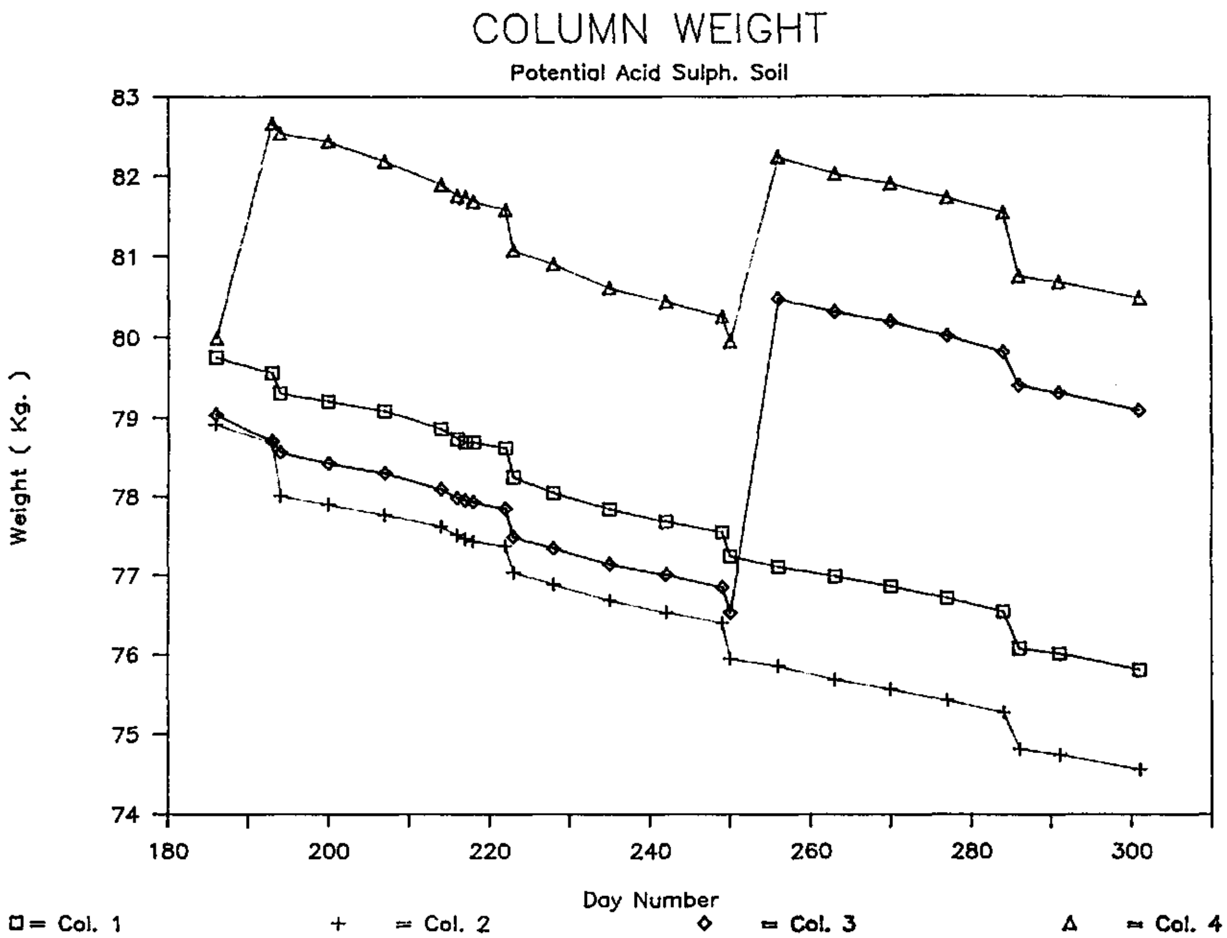
2.2. WATER MANAGEMENT AND WATER BALANCE OF SOIL COLUMNS


CUMULATIVE IRRIGATION
Actual Acid Sulphate Soil
Irrigation gift (mm.)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
180
200
220
240
260
280
300
Day Number
col 7

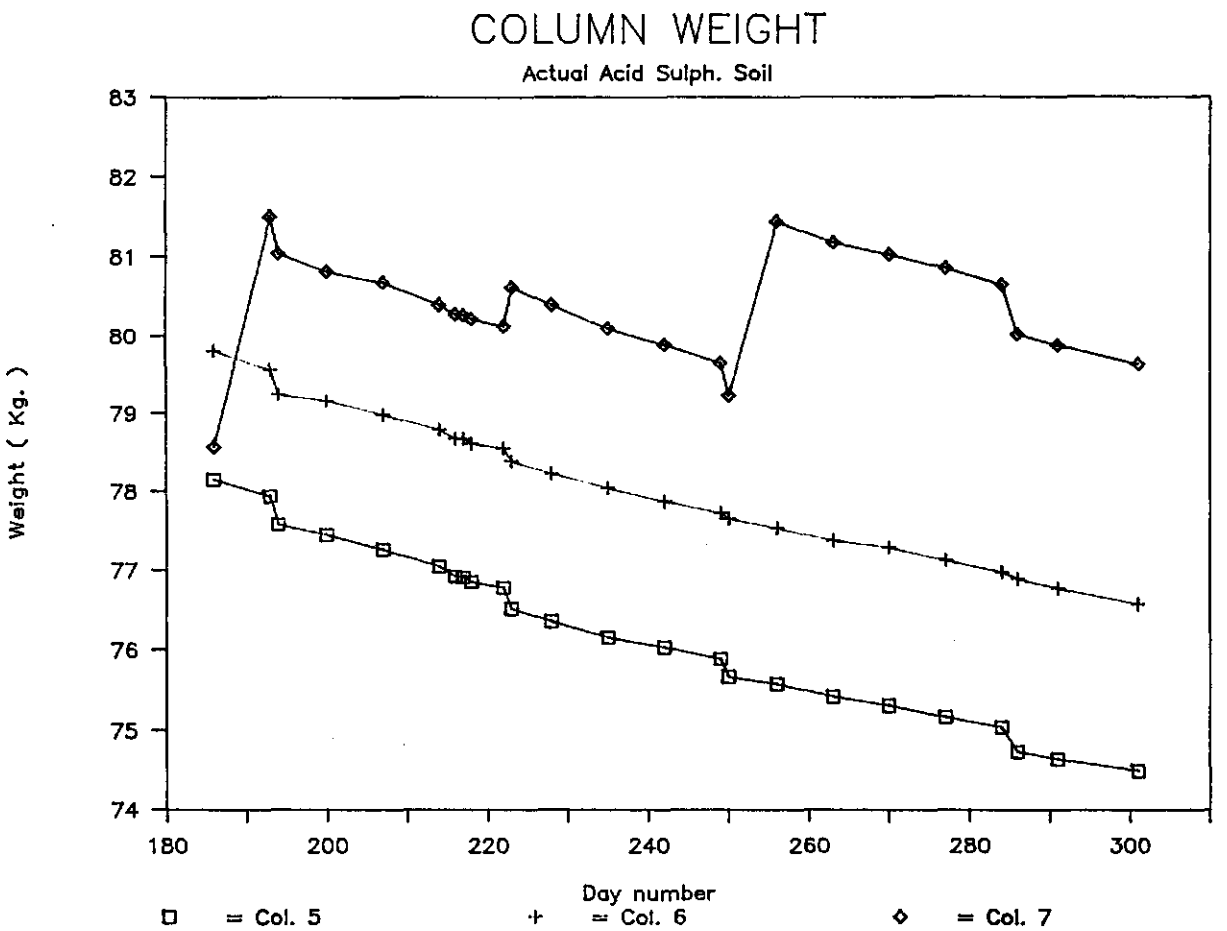

CUMULATIVE IRRIGATION
Potential Acid Sulphate Soil
Irrigation gift (mm.)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
180
200
220
240
260
280
300
Day Number
col 3
col 4


CUMM. EVAPORATION
Actual Acid Sulph. Soil
Cumm.Evap. (mm.)
Day number
Eact
Col5
Col6
Col7

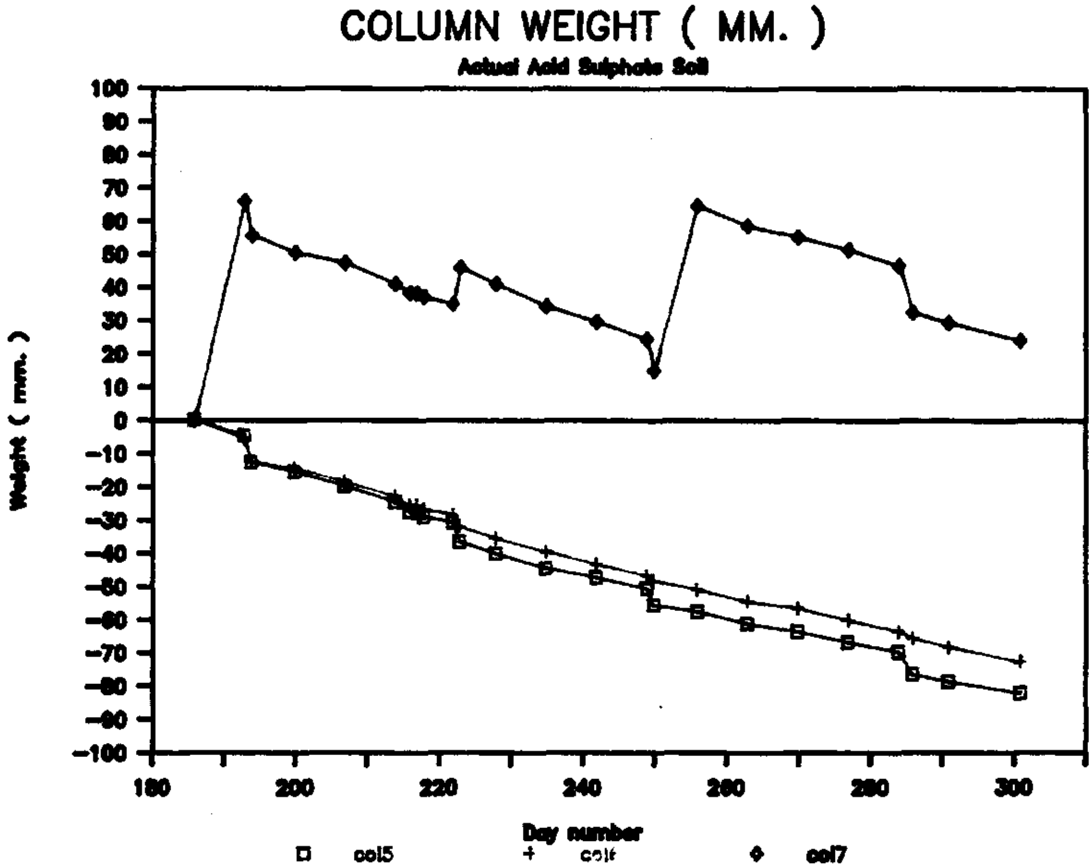

CUMM. EVAPORATION
Potential Acid Sulph. Soil
Cumm.Evap. (mm.)
Day number
Eact
Col1
Col2
Col3
Col4

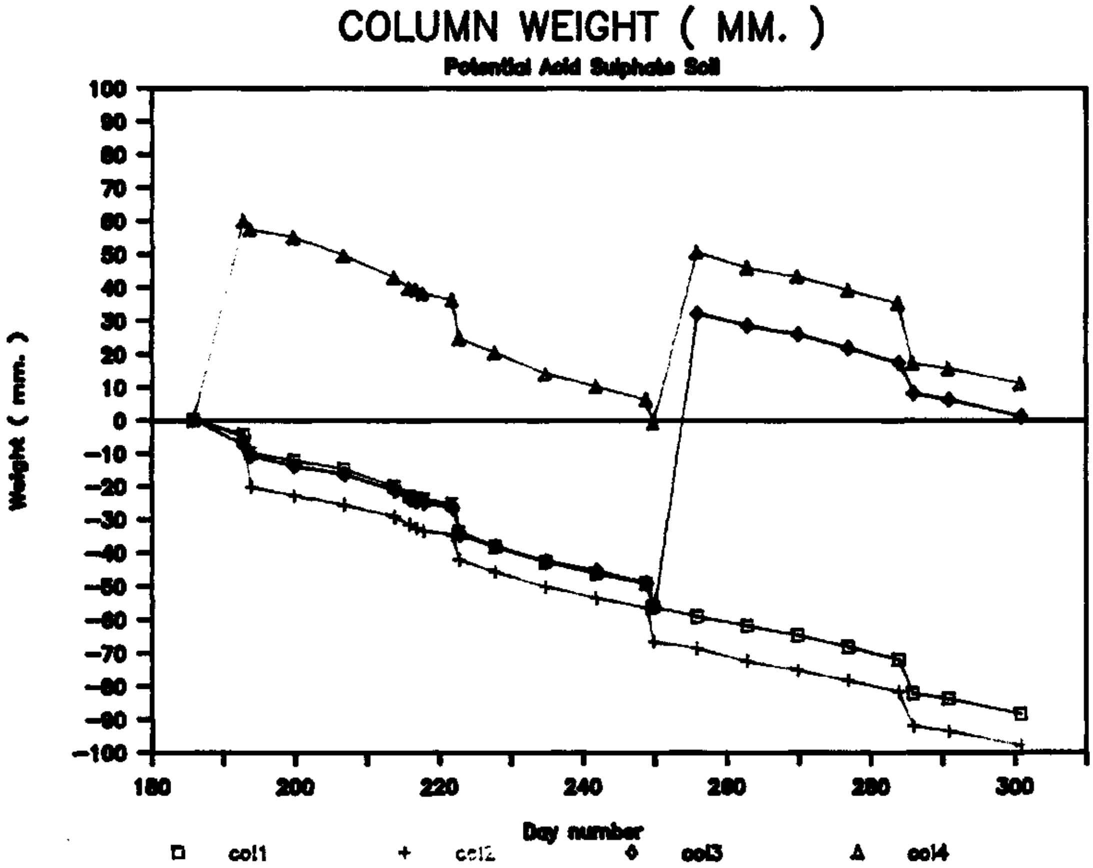


COLUMN WEIGHT
Potential Acid Sulph. Soil
Weight (Kg.)
83
82
81
80
79
78
77
76
75
74
180
200
220
240
260
280
300
Day Number
□= Col. 1
+ = Col. 2
◇ = Col. 3
Δ = Col. 4



COLUMN WEIGHT
Actual Acid Sulph. Soil
Weight (Kg.)
83
82
81
80
79
78
77
76
75
74
180
200
220
240
260
280
300
Day number
□ = Col. 5
+ = Col. 6
◇ = Col. 7

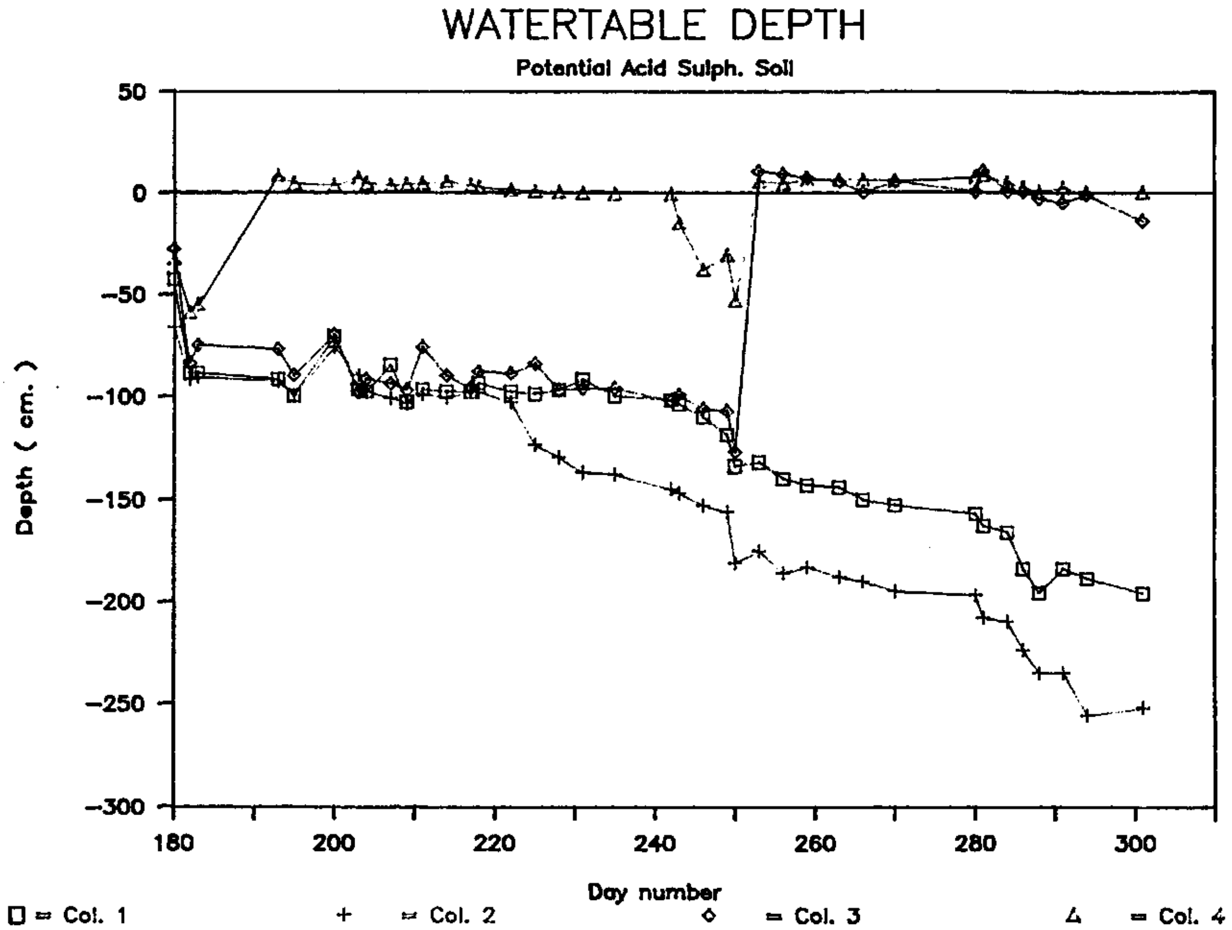

COLUMN WEIGHT (MM.)
Actual Acid Sulphate Soil
Weight (mm.)
100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
180
200
220
240
260
280
300
Day number
col5
col6
col7


COLUMN WEIGHT (MM.)
Potential Acid Sulphate Soil
Weight (mm.)
100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
180
200
220
240
260
280
300
Day number
col1
col2
col3
col4

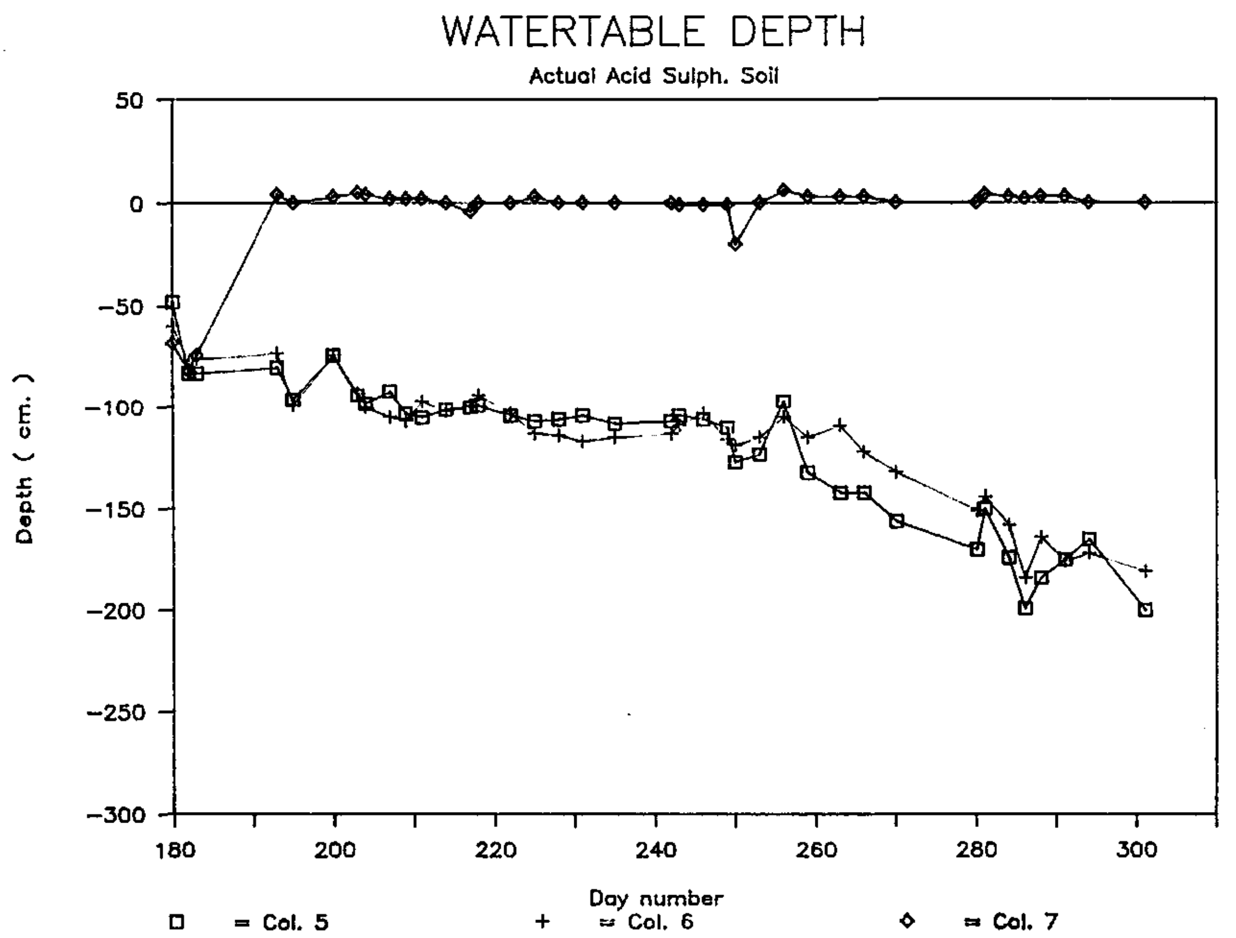
Wageningen, The Netherlands

2.3. PHYSICAL MEASUREMENTS IN COLUMNS

2.3.1. Groundwater levels



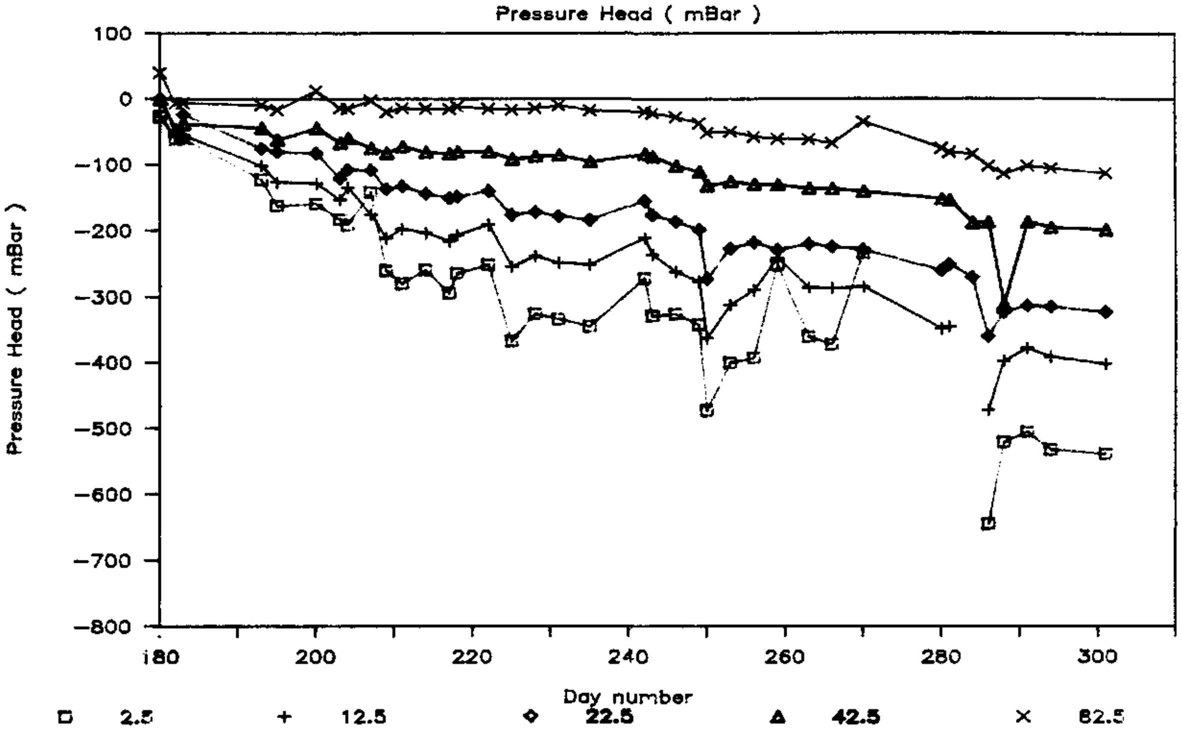
WATERTABLE DEPTH
Potential Acid Sulph. Soil
Depth (cm.)
Day number
50
0
-50
-100
-150
-200
-250
-300
180
200
220
240
260
280
300
□ = Col. 1
+ = Col. 2
◇ = Col. 3
△ = Col. 4



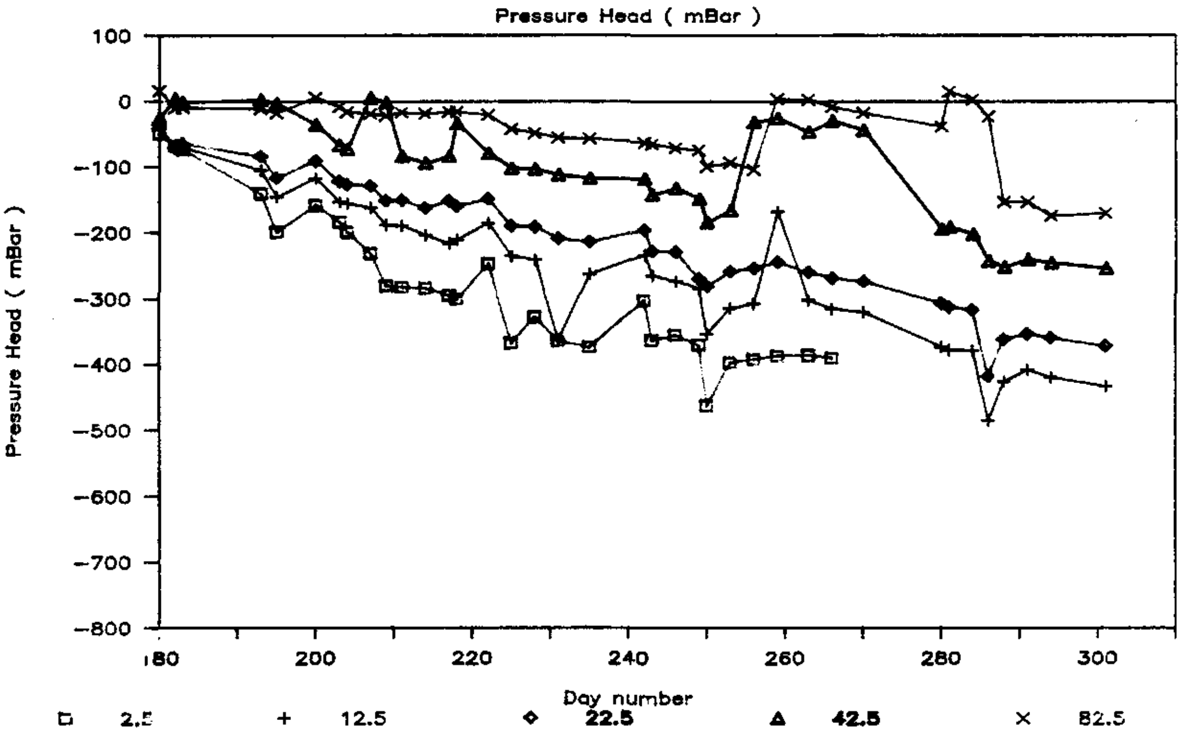
WATERTABLE DEPTH
Actual Acid Sulph. Soil
Depth (cm.)
Day number
50
0
-50
-100
-150
-200
-250
-300
180
200
220
240
260
280
300
□ = Col. 5
+ = Col. 6
◇ = Col. 7

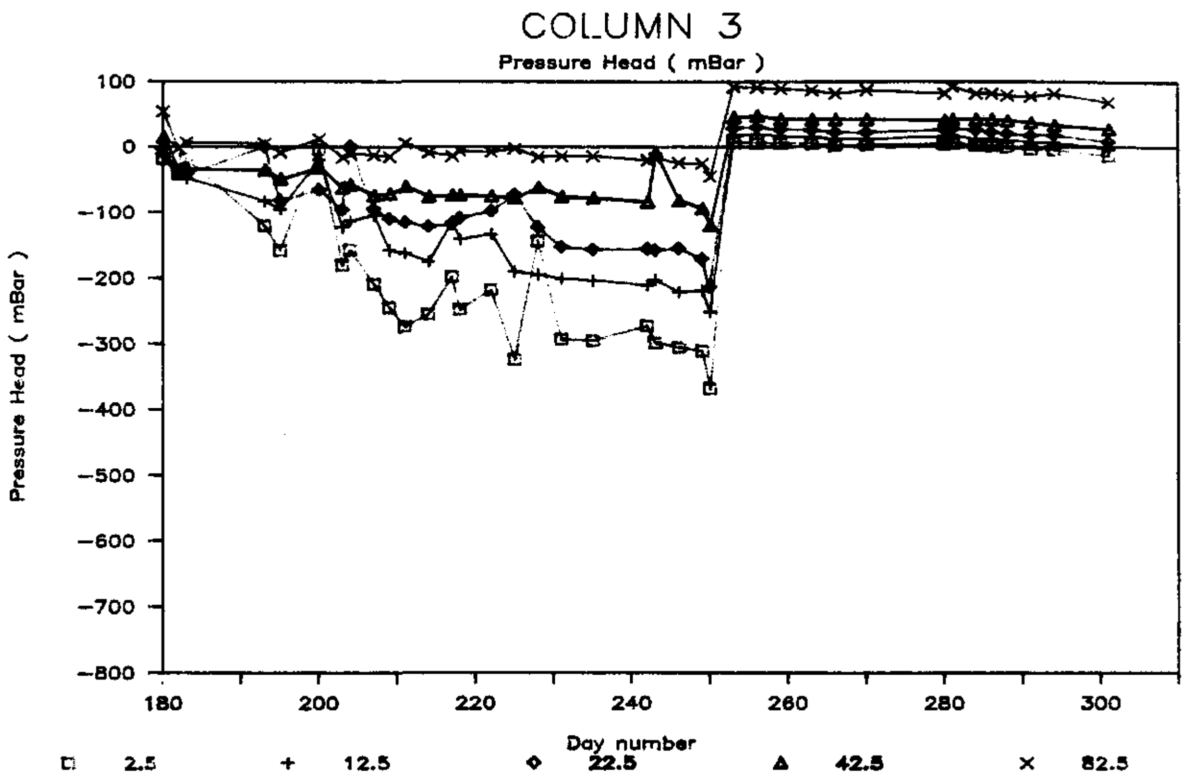
2.3.2. Pressure heads

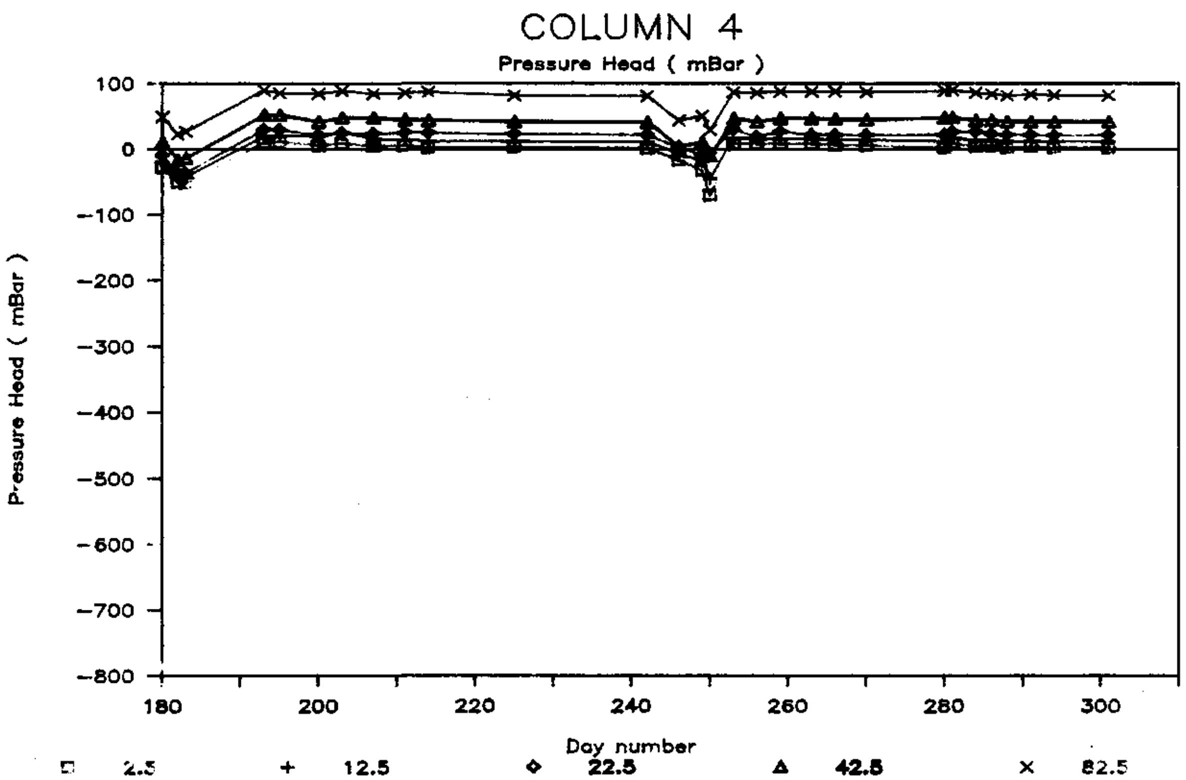
COLUMN 1

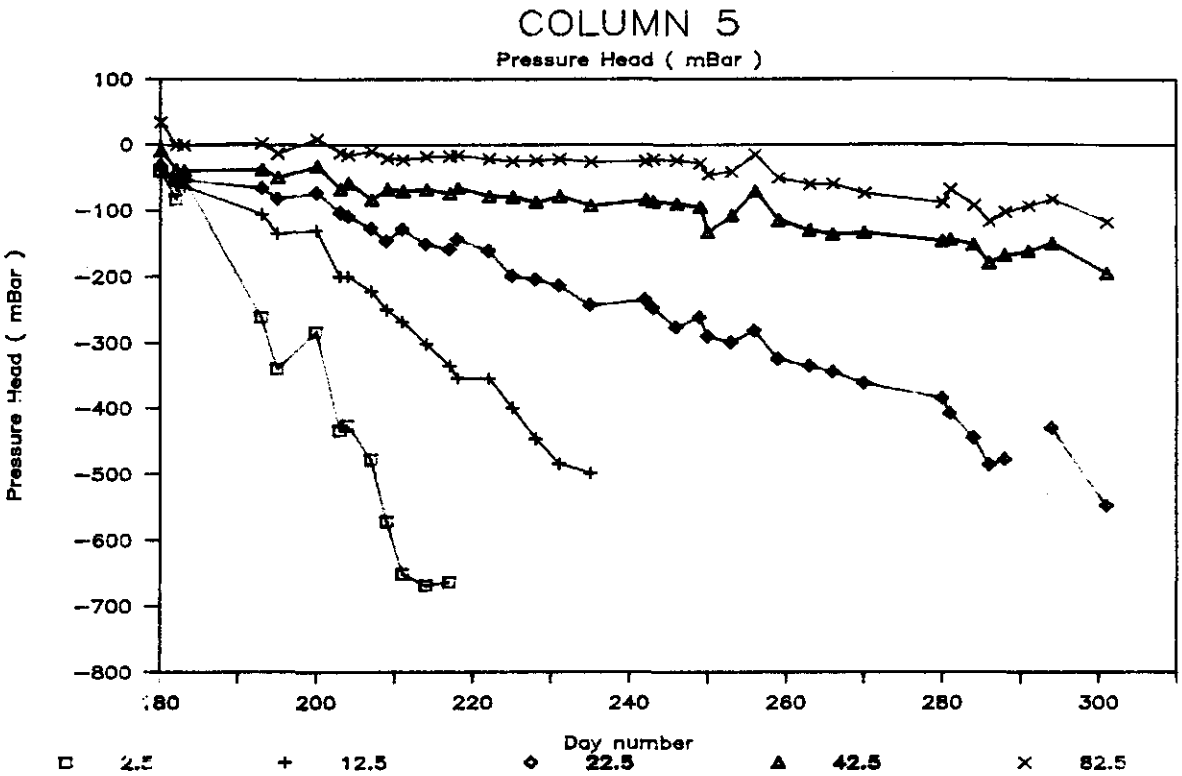


COLUMN 2

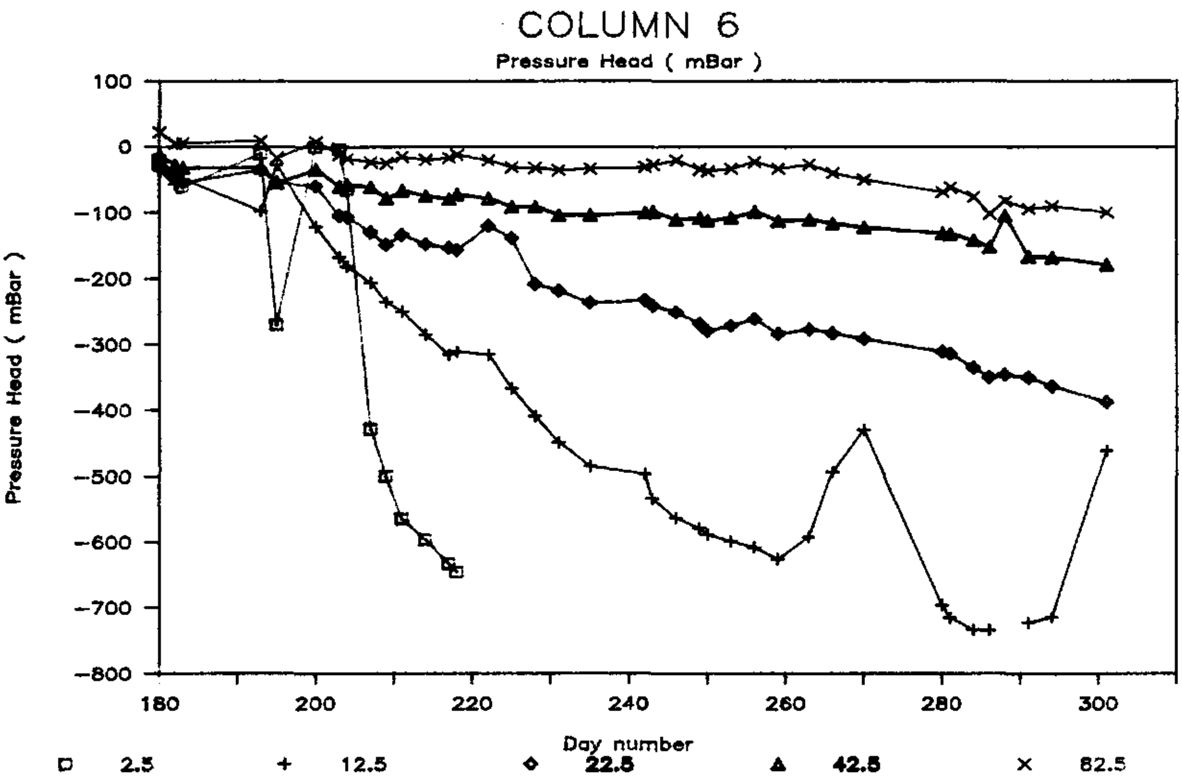



COLUMN 3
Pressure Head (mBar)
Pressure Head (mBar)
100
0
-100
-200
-300
-400
-500
-600
-700
-800
180
200
220
240
260
280
300
Day number
2.5
12.5
22.5
42.5
82.5

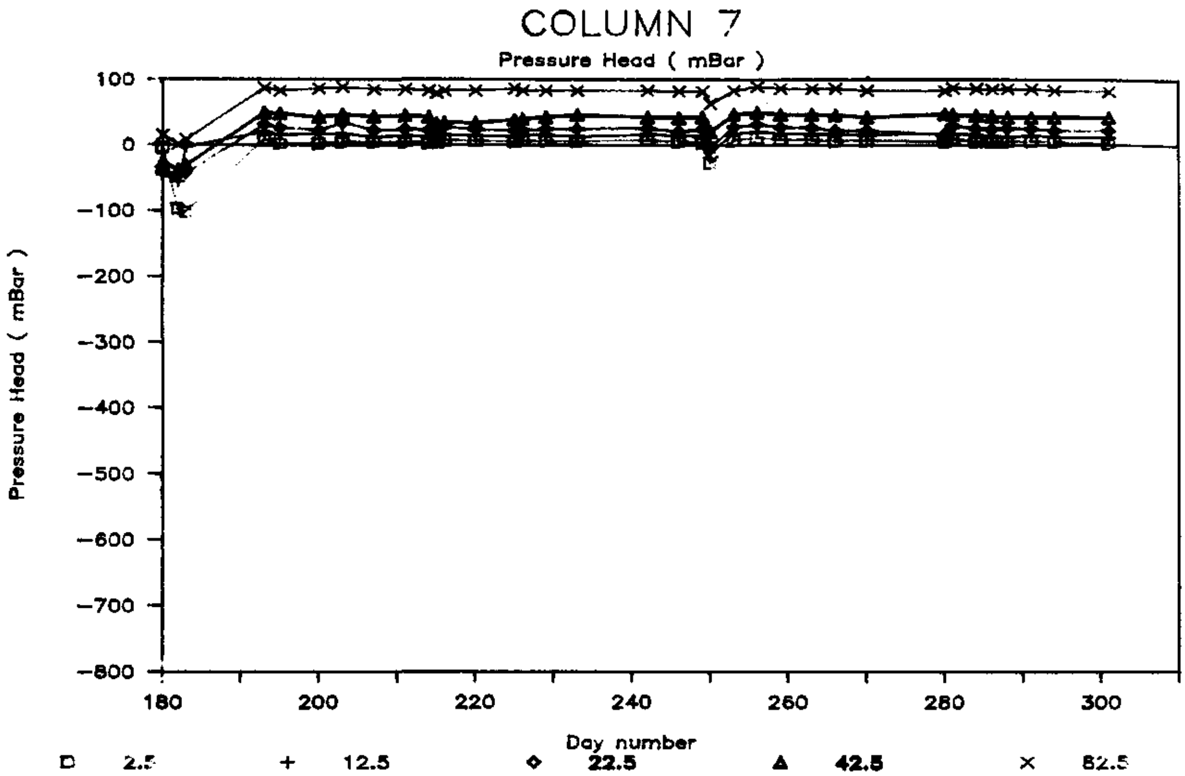

COLUMN 4
Pressure Head (mBar)
Pressure Head (mBar)
100
0
-100
-200
-300
-400
-500
-600
-700
-800
180
200
220
240
260
280
300
Day number
2.5
12.5
22.5
42.5
82.5



COLUMN 5
Pressure Head (mBar)
100
0
−100
−200
−300
−400
−500
−600
−700
−800
Pressure Head (mBar)
180
200
220
240
260
280
300
Day number
2.5
12.5
22.5
42.5
82.5

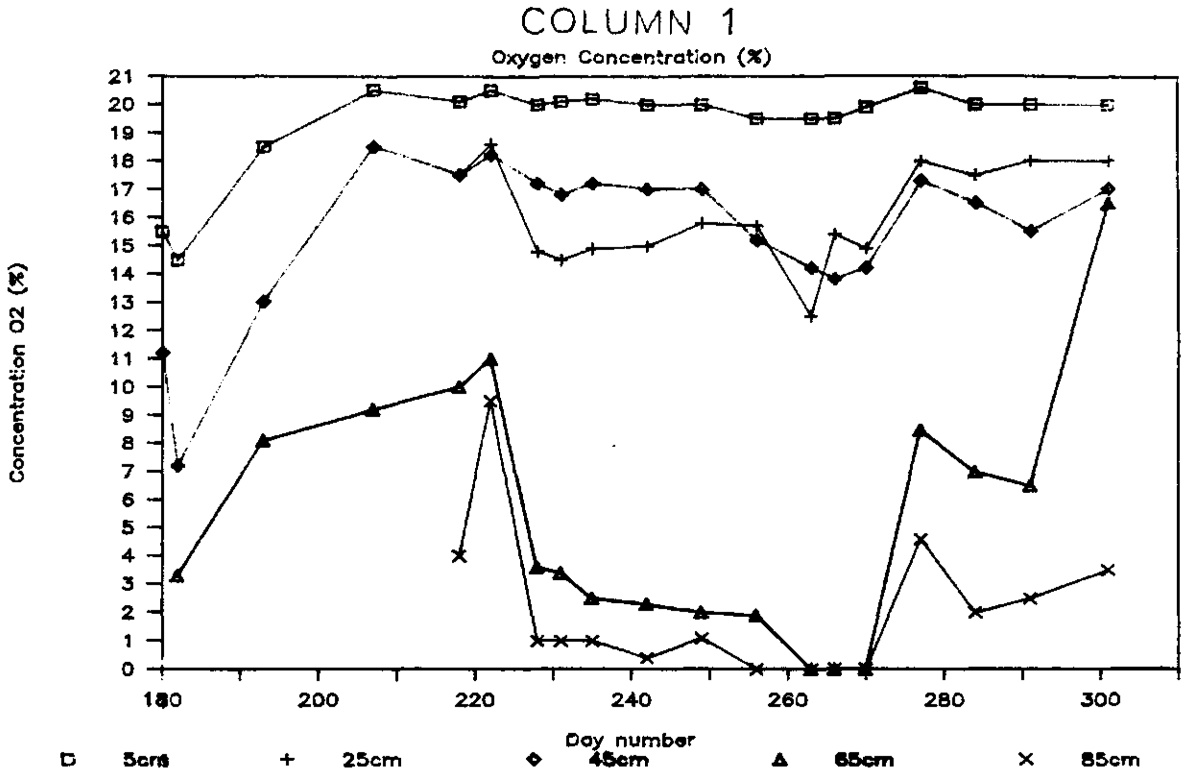


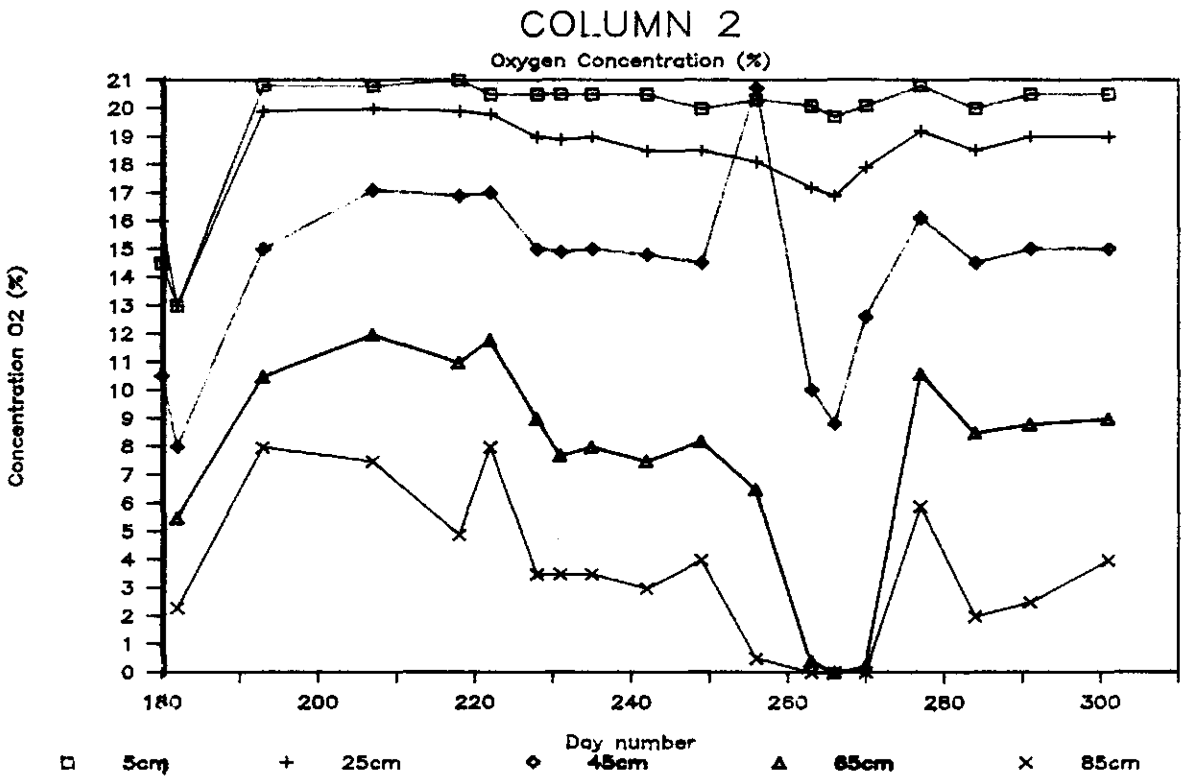
COLUMN 6
Pressure Head (mBar)
100
0
−100
−200
−300
−400
−500
−600
−700
−800
Pressure Head (mBar)
180
200
220
240
260
280
300
Day number
2.5
12.5
22.5
42.5
82.5

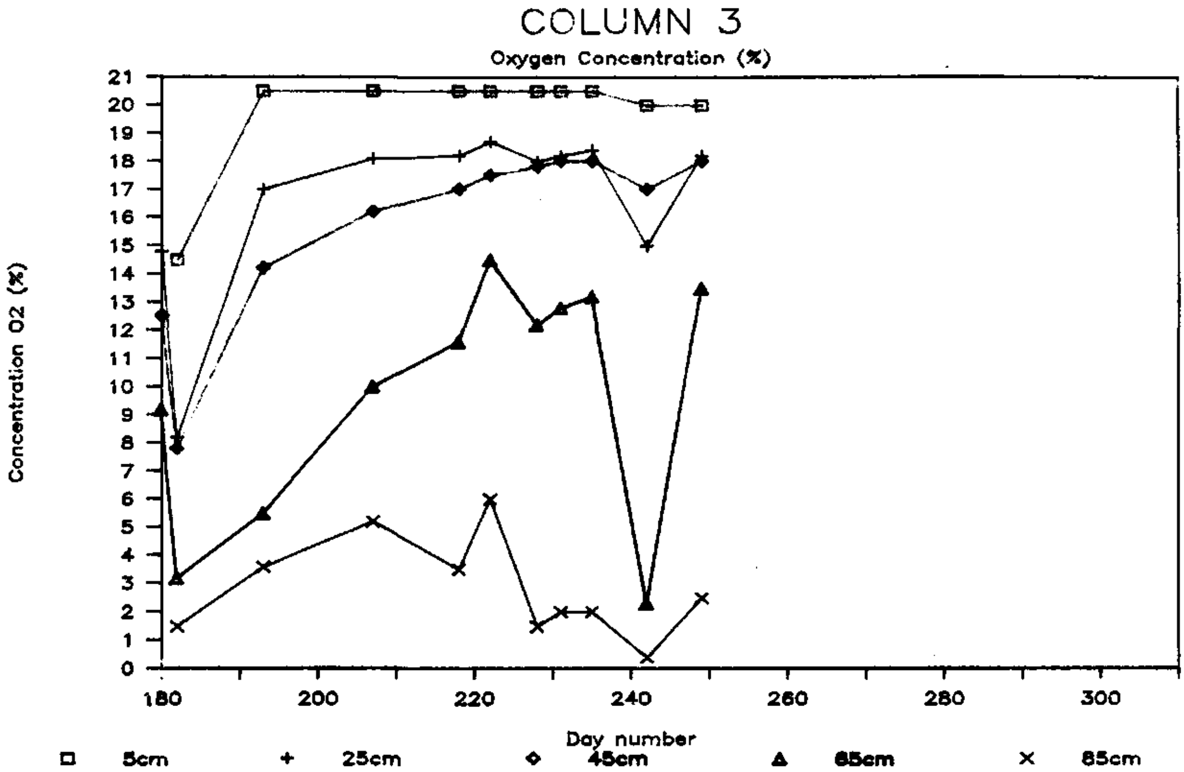


COLUMN 7
Pressure Head (mBar)
Pressure Head (mBar)
100
0
−100
−200
−300
−400
−500
−600
−700
−800
180
200
220
240
260
280
300
Day number
2.5
12.5
22.5
42.5
82.5

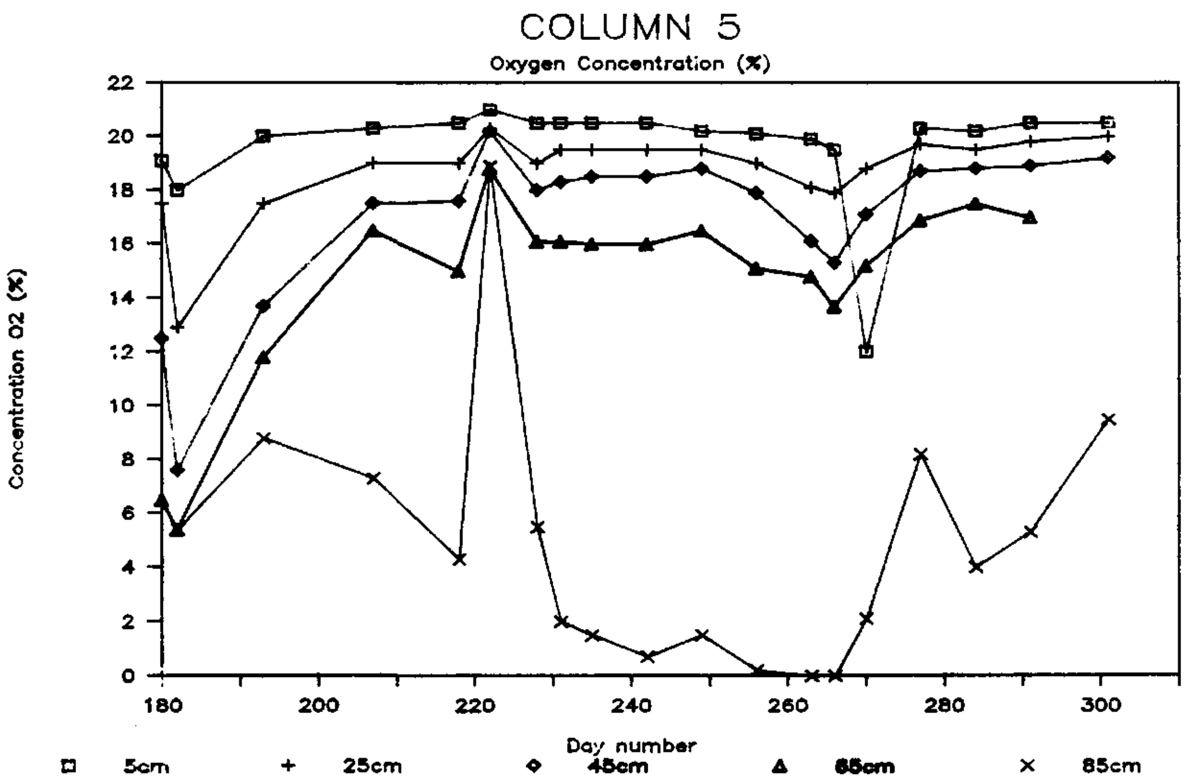
2.3.3. Oxygen concentration in soil air


COLUMN 1
Oxygen Concentration (%)
Concentration O2 (%)
Day number
5cm
25cm
45cm
65cm
85cm

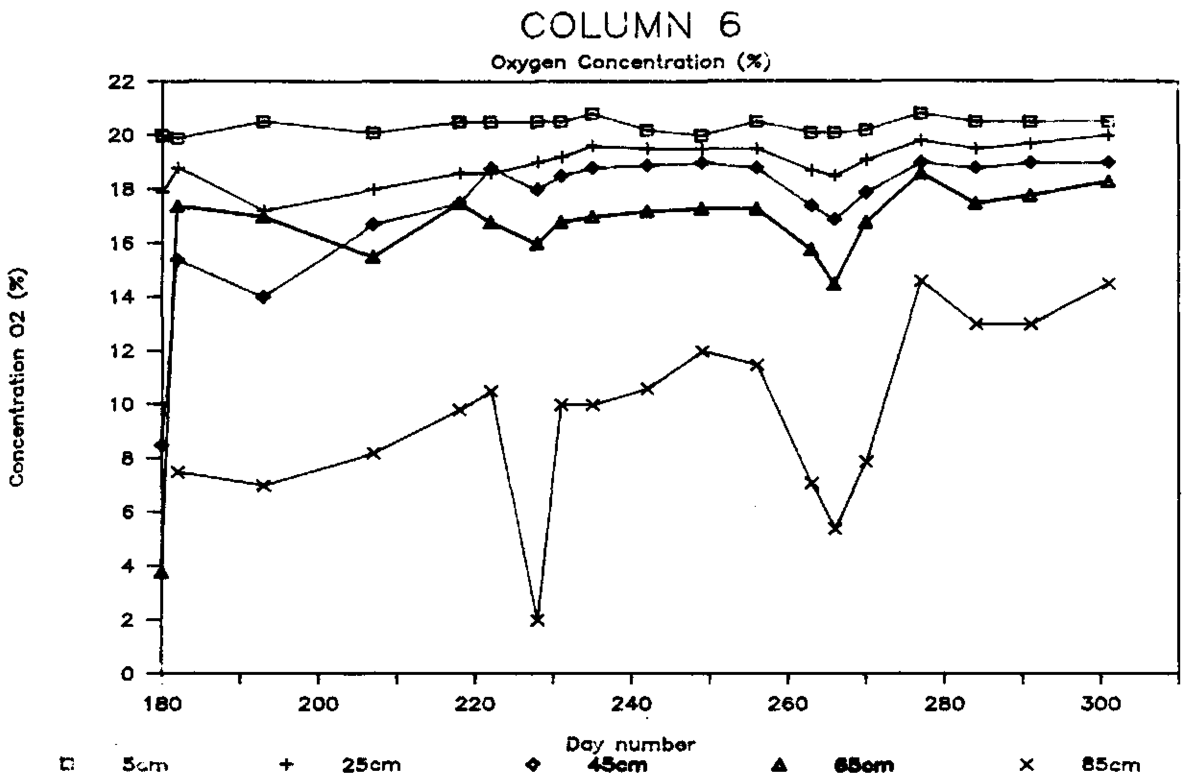

COLUMN 2
Oxygen Concentration (%)
Concentration O2 (%)
Day number
5cm
25cm
45cm
65cm
85cm

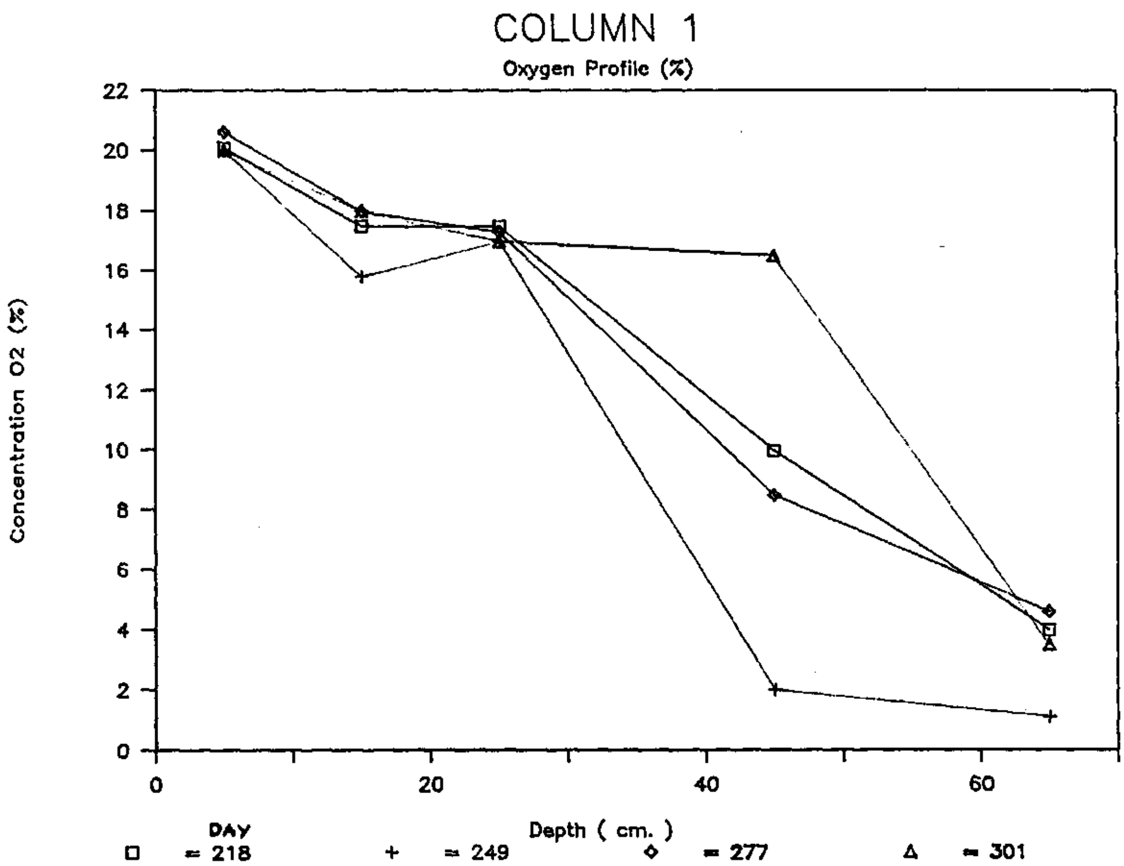


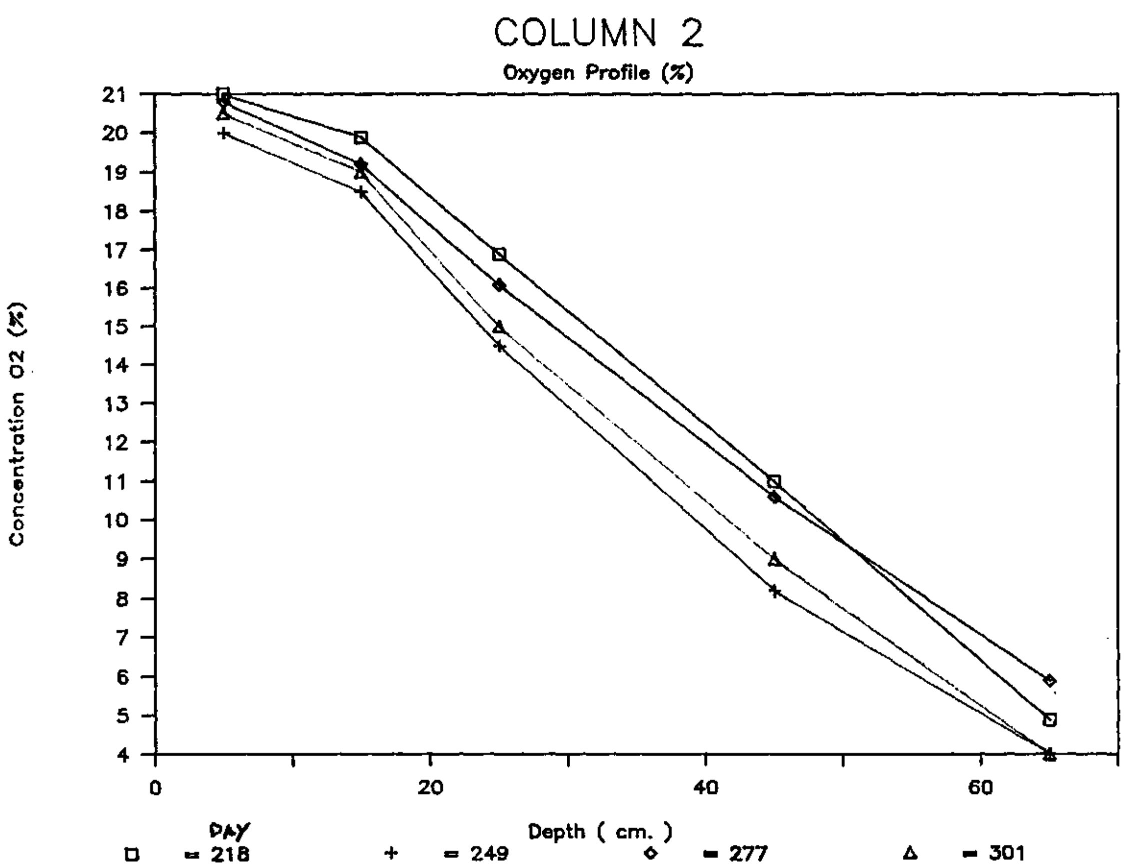
COLUMN 3
Oxygen Concentration (%)
Concentration O2 (%)
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

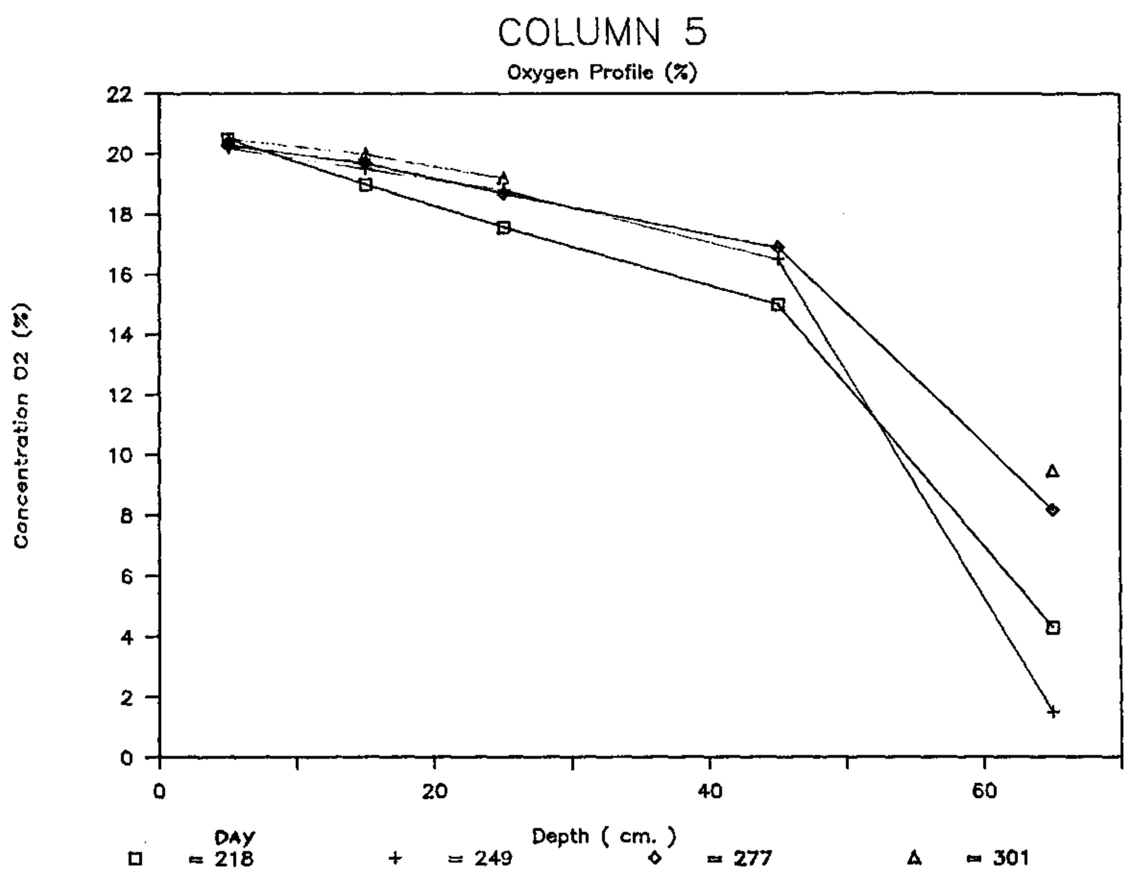


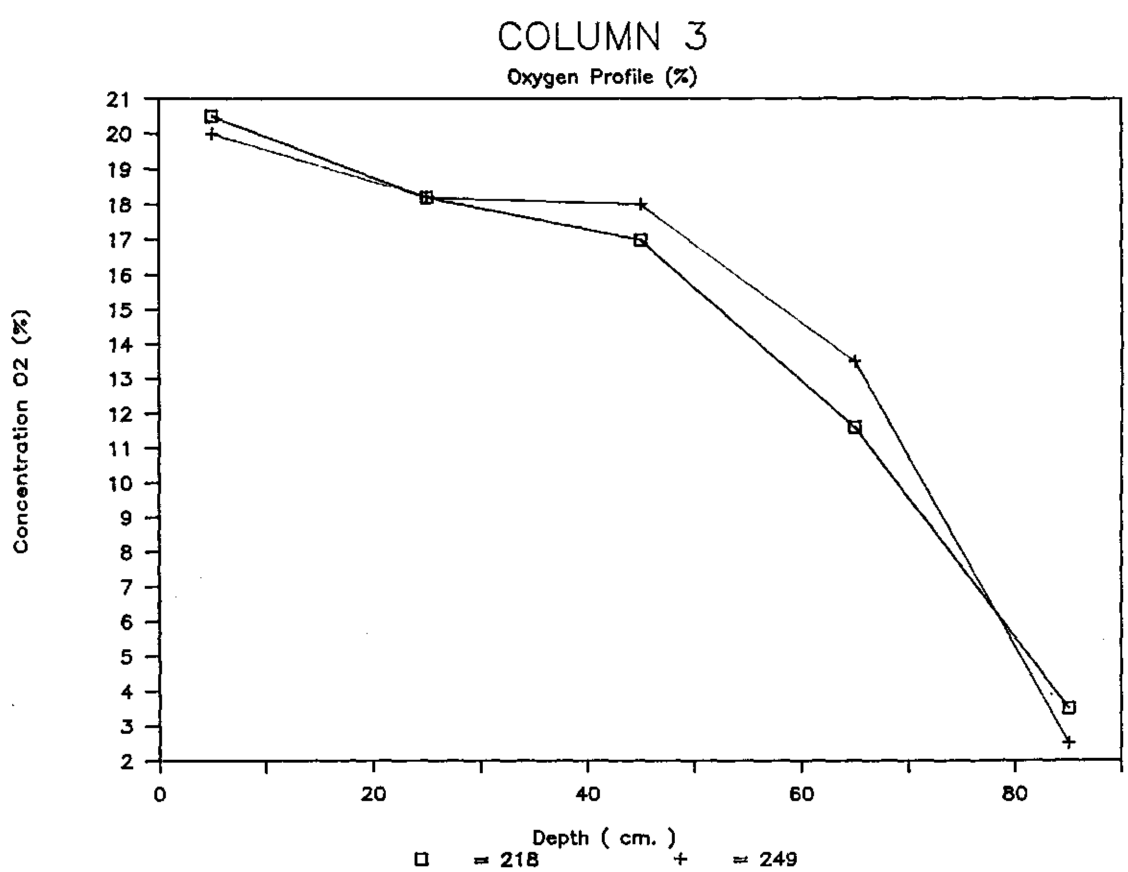
COLUMN 5
Oxygen Concentration (%)
Concentration O2 (%)
22
20
18
16
14
12
10
8
6
4
2
0
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

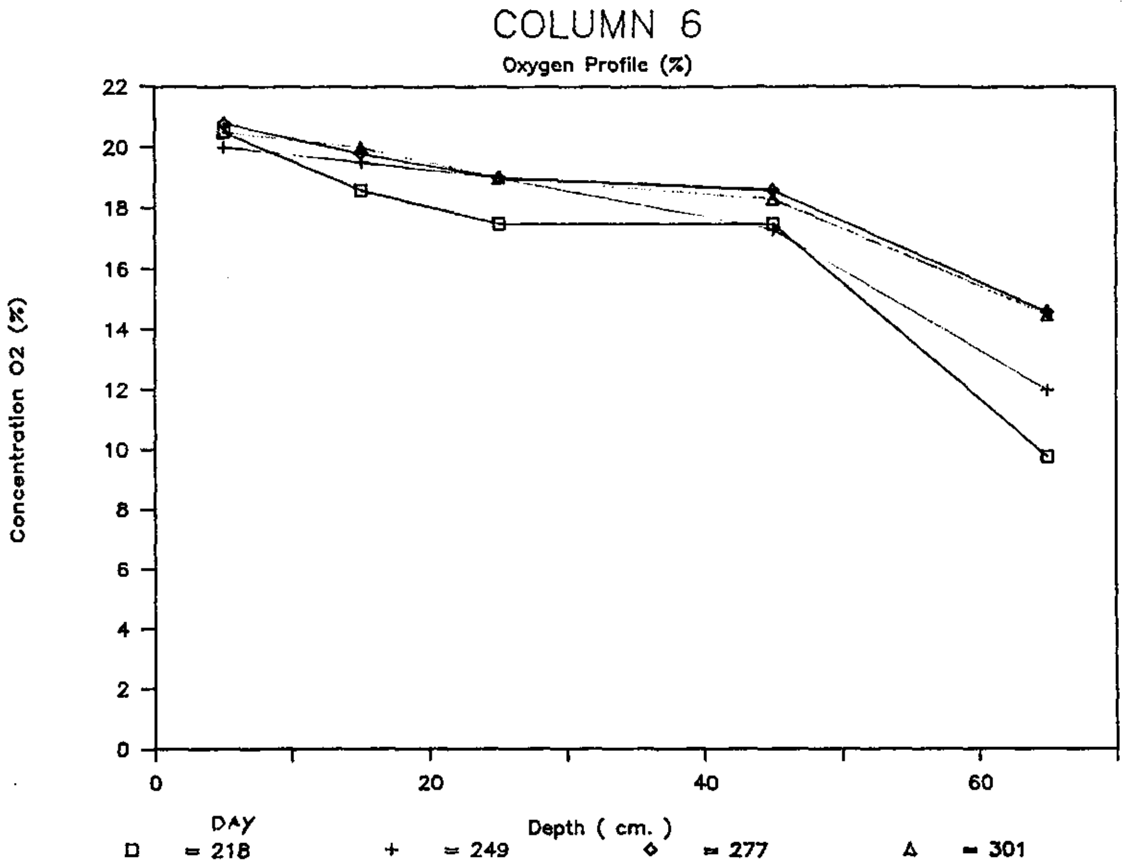

COLUMN 6
Oxygen Concentration (%)
Concentration O2 (%)
22
20
18
16
14
12
10
8
6
4
2
0
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm


COLUMN 1
Oxygen Profile (%)
Concentration O2 (%)
Depth (cm.)
DAY
□ = 218
+ = 249
◇ = 277
Δ = 301

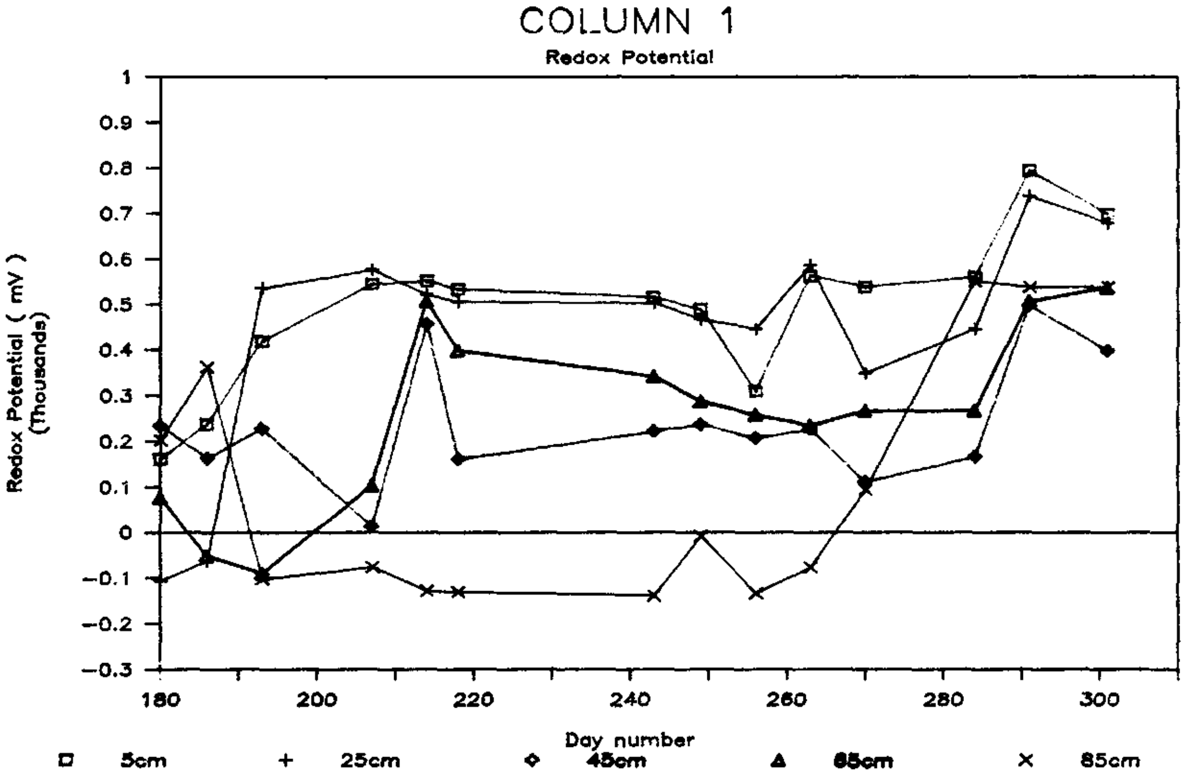

COLUMN 2
Oxygen Profile (%)
Concentration O2 (%)
Depth (cm.)
DAY
□ = 218
+ = 249
◇ = 277
Δ = 301


COLUMN 5
Oxygen Profile (%)
Concentration O2 (%)
Depth (cm.)
DAY
□ = 218
+ = 249
◇ = 277
Δ = 301

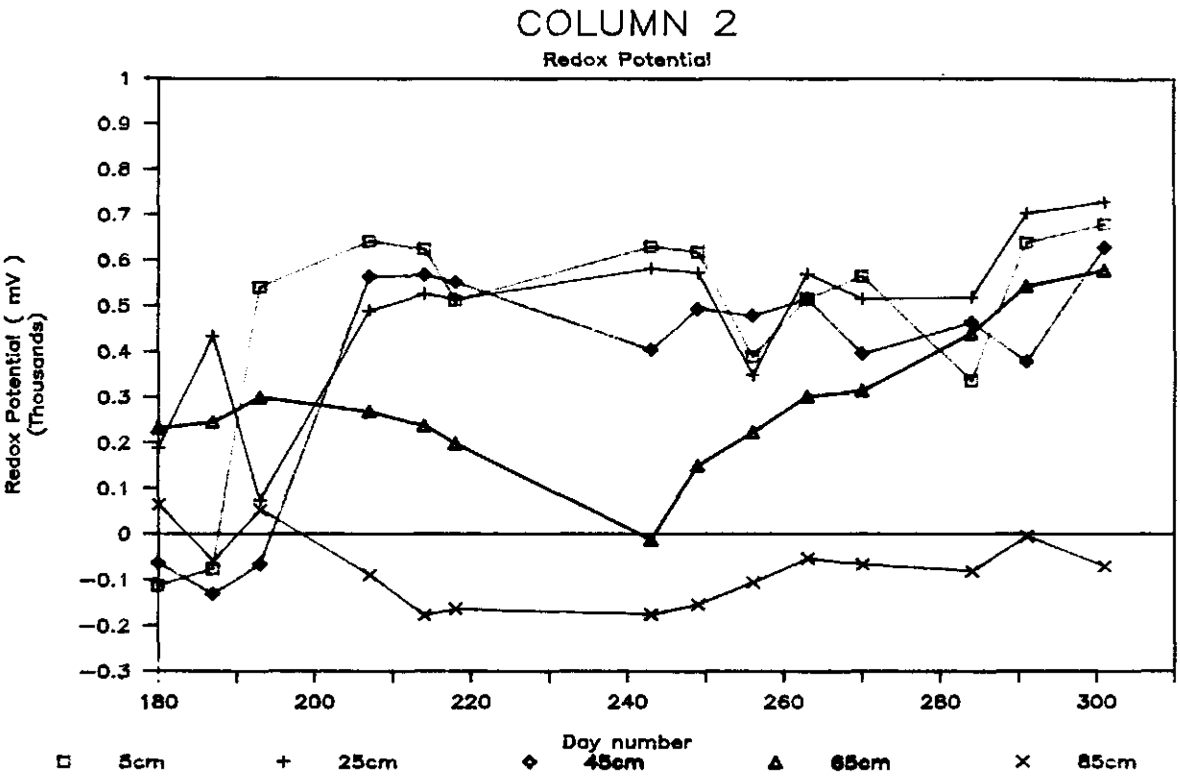

COLUMN 3
Oxygen Profile (%)
Concentration O2 (%)
Depth (cm.)
□ = 218
+ = 249

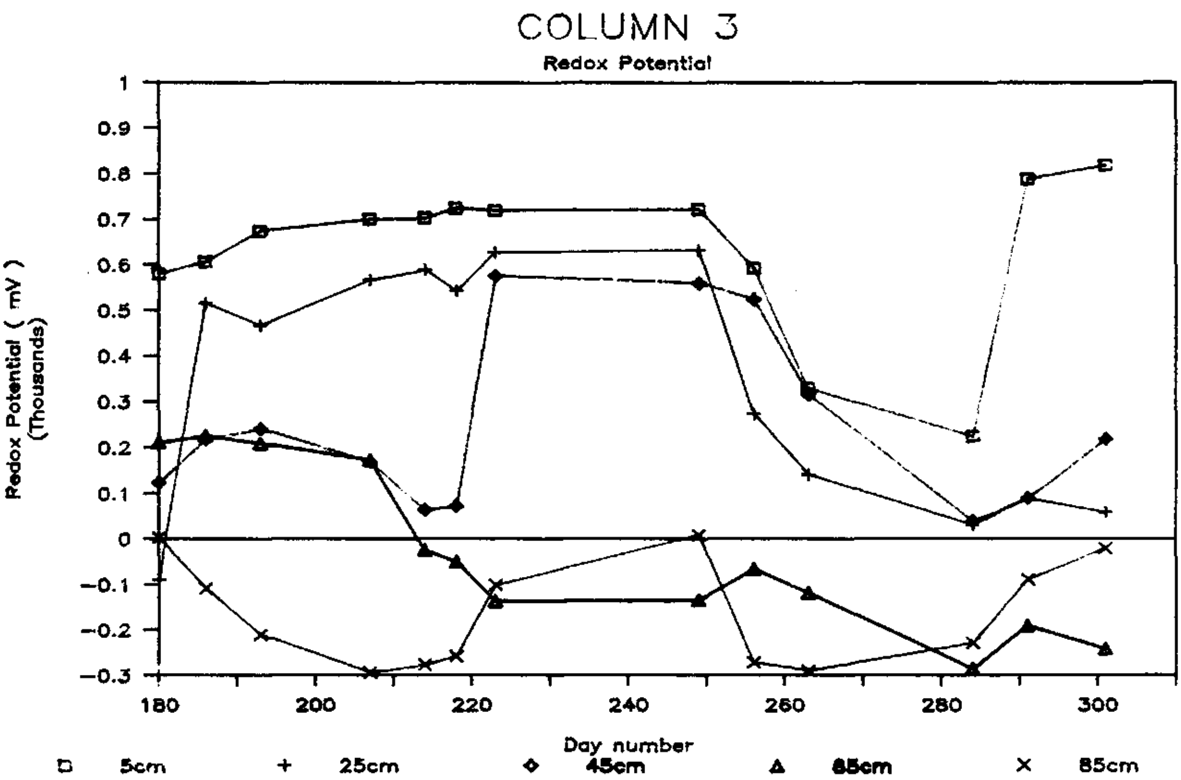

COLUMN 6
Oxygen Profile (%)
Concentration O2 (%)
22
20
18
16
14
12
10
8
6
4
2
0
0
20
40
60
Depth (cm.)
DAY
□ = 218
+ = 249
◇ = 277
Δ = 301

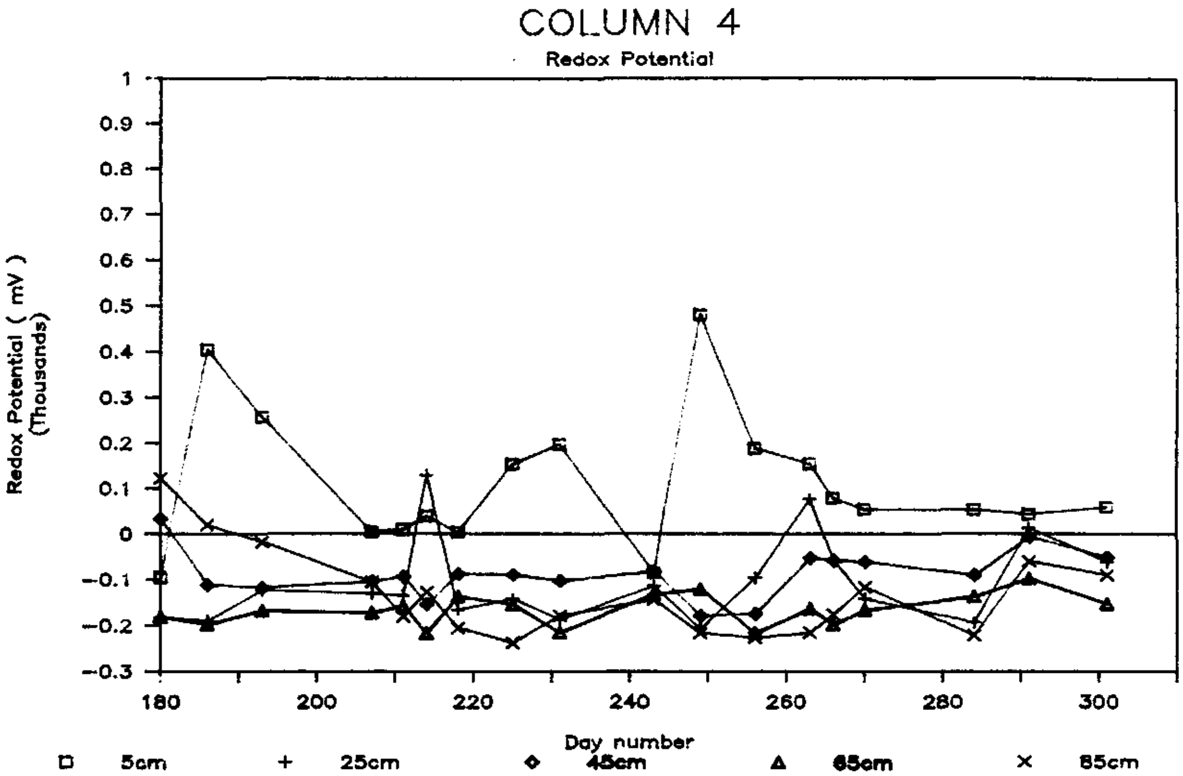
2.3.4. Redox potentials

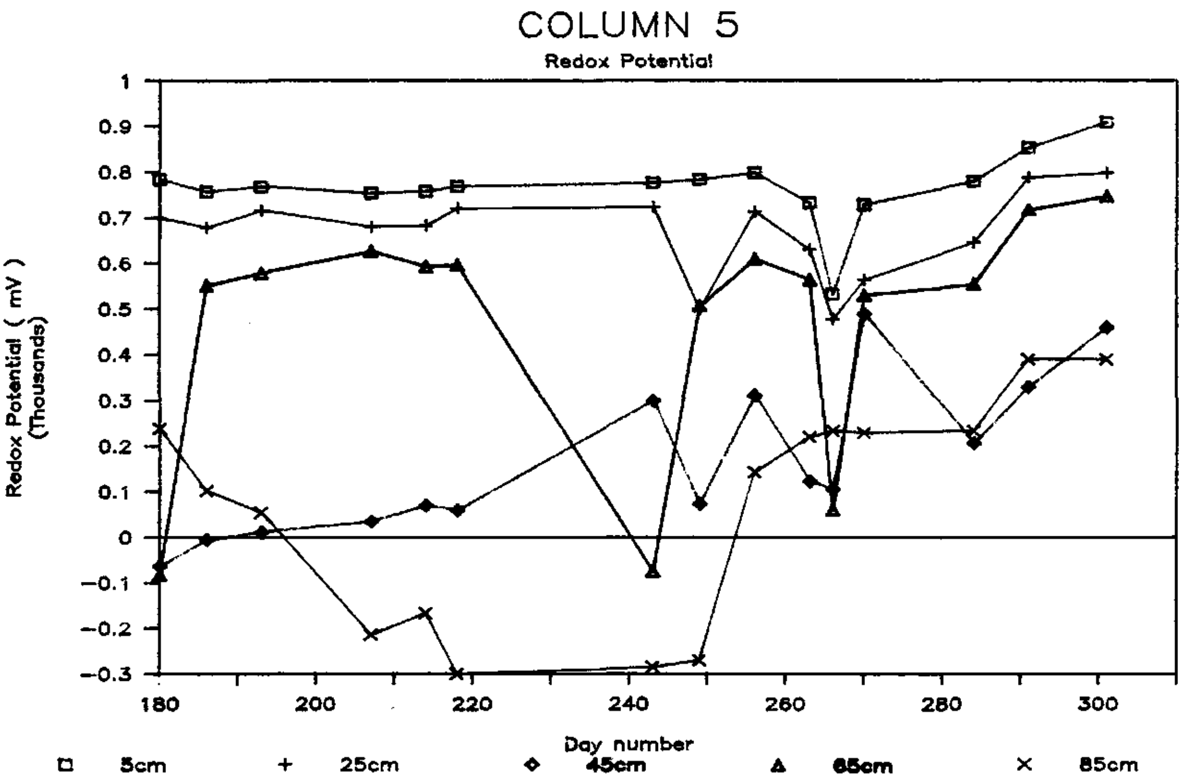


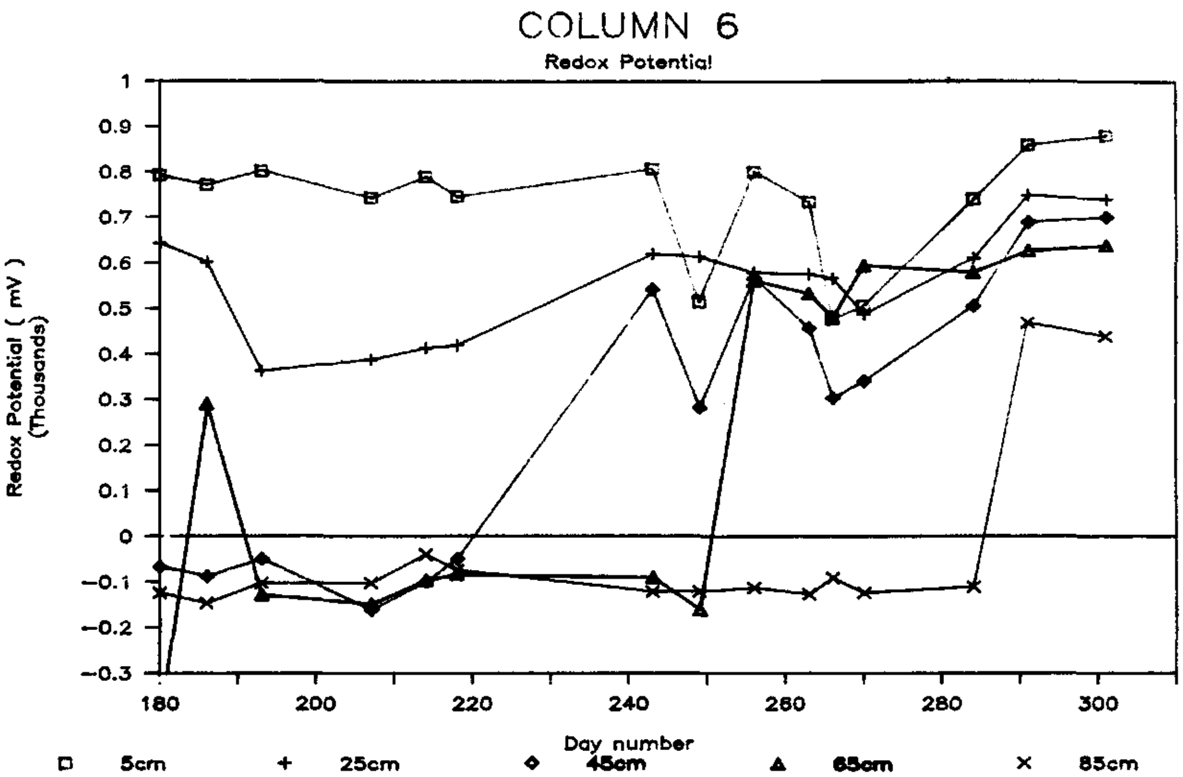
COLUMN 1
Redox Potential
Redox Potential (mV)
(Thousands)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
−0.1
−0.2
−0.3
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm


COLUMN 2
Redox Potential
Redox Potential (mV)
(Thousands)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
−0.1
−0.2
−0.3
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

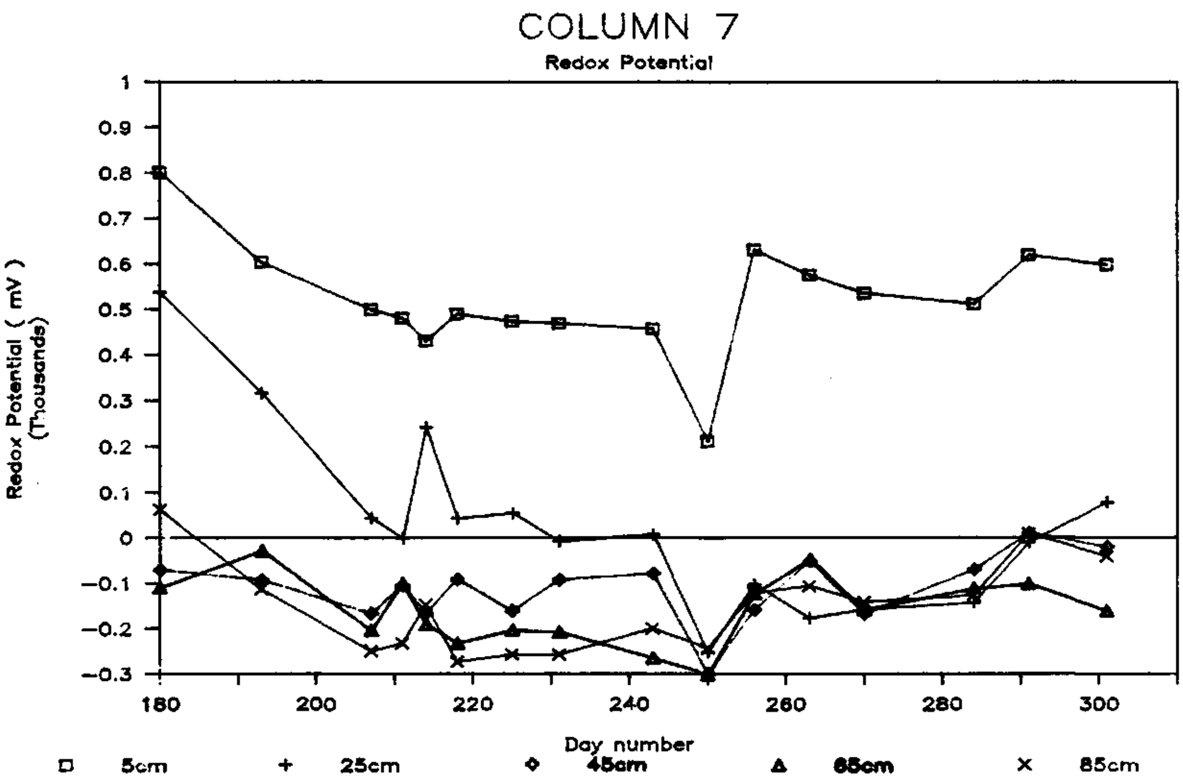

COLUMN 3
Redox Potential
Redox Potential (mV)
(Thousands)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
−0.1
−0.2
−0.3
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm


COLUMN 4
Redox Potential
Redox Potential (mV)
(Thousands)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm


COLUMN 5
Redox Potential
Redox Potential (mV)
(Thousands)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



COLUMN 6
Redox Potential
Redox Potential (mV)
(Thousands)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



COLUMN 7
Redox Potential
Redox Potential (mV)
(Thousands)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

Wageningen, The Netherlands

2.4. CHEMICAL MEASUREMENTS IN COLUMNS

Wageningen, The Netherlands

2.4.1. Chemical composition of ponding water

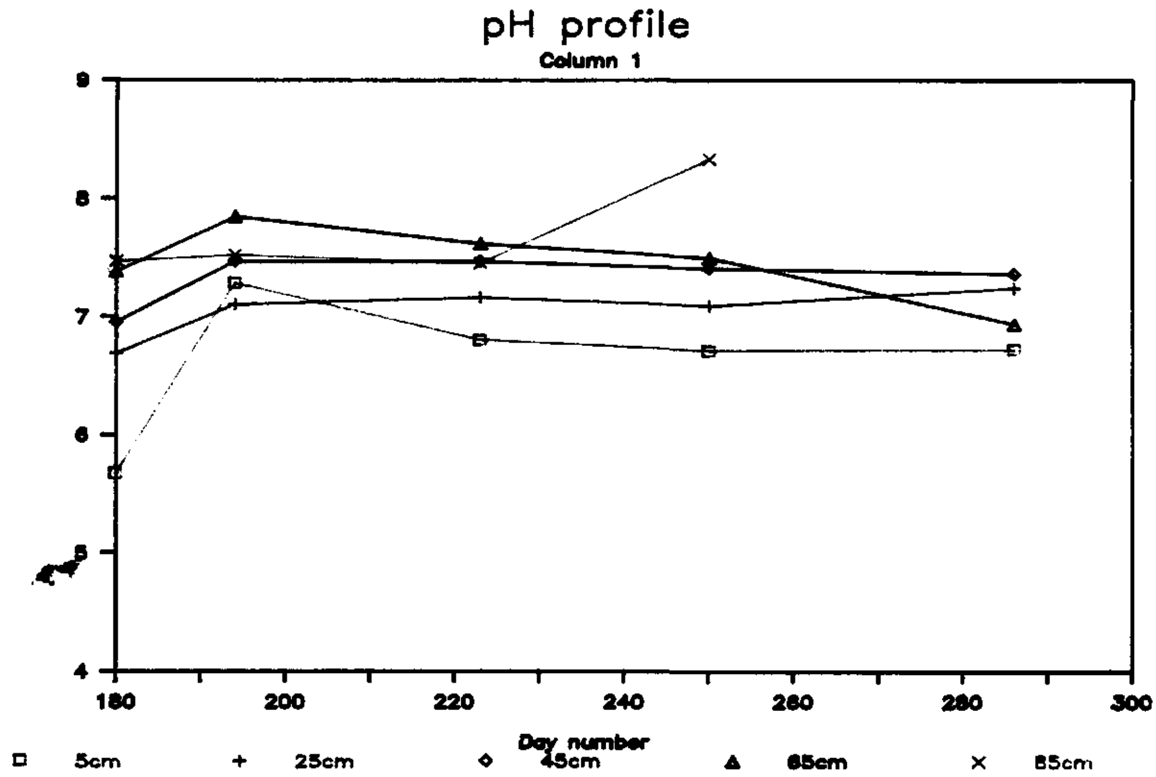
COLUMN 4
QUALITY PONDING WATER

DATE	pH	EC	TOC	Cl-	NO3-	IC	SO4(2-)	Na	K	Ca	Mg	Fe	Al	Mn+
187	6.93	16	0.82	12.58	0.00	12.95	13.65	9.28	8.12	23.44	2.19	0.11	0.00	0.06
189	7.85	16	0.53	13.85	0.00	12.01	13.22	12.75	6.78	20.42	2.37	0.37	0.02	0.07
193	7.60	19	0.12	16.77	2.84	10.97	18.36	15.07	8.34	19.74	2.71	1.52	0.05	0.02
200	7.87	21	6.54	17.45	1.98	14.09	18.76	21.38	7.67	21.76	3.57	3.99	0.07	0.03
223	6.90	22	10.87	20.04	4.05	10.79	21.23	34.16	9.65	36.27	7.11	11.36	0.22	0.01
232	7.68	41	28.55	59.43	2.30	9.58	96.87	32.58	17.8	43.13	7.40	9.33	0.18	0.16

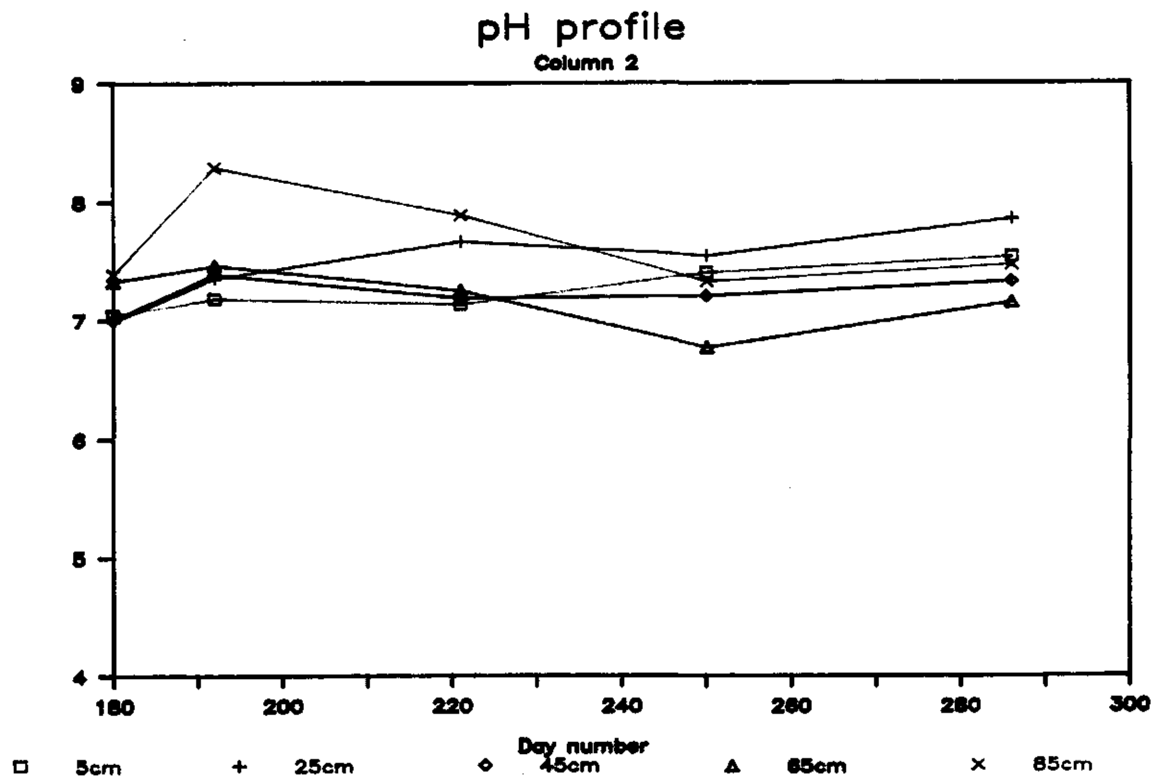
COLUMN 7
QUALITY PONDING WATER

DATE	pH	EC	TOC	Cl-	NO3-	IC	SO4(2-)	Na	K	Ca	Mg	Fe	Al	Mn+
187	6.81	10	3.99	10.23	0.94	12.95	11.42	4.51	6.75	13.01	1.69	1.85	0.03	0.04
189	6.07	6	2.71	7.92	0	12.01	13.61	4.38	7.21	7.46	2.67	7.5	0.04	0.08
193	5.00	7	12.3	10.39	0	10.97	19.36	4.7	7.78	8.17	2.93	7.95	0.05	0.14
200	4.91	10	18.66	11.56	0.76	14.09	20.34	6.51	7.56	10.78	3.45	8.49	0.06	0.19
232	4.46	16.4	17	33.05	3.1	0.9	26.75	6.28	6.6	15.66	2.77	1.8	0.03	0.32

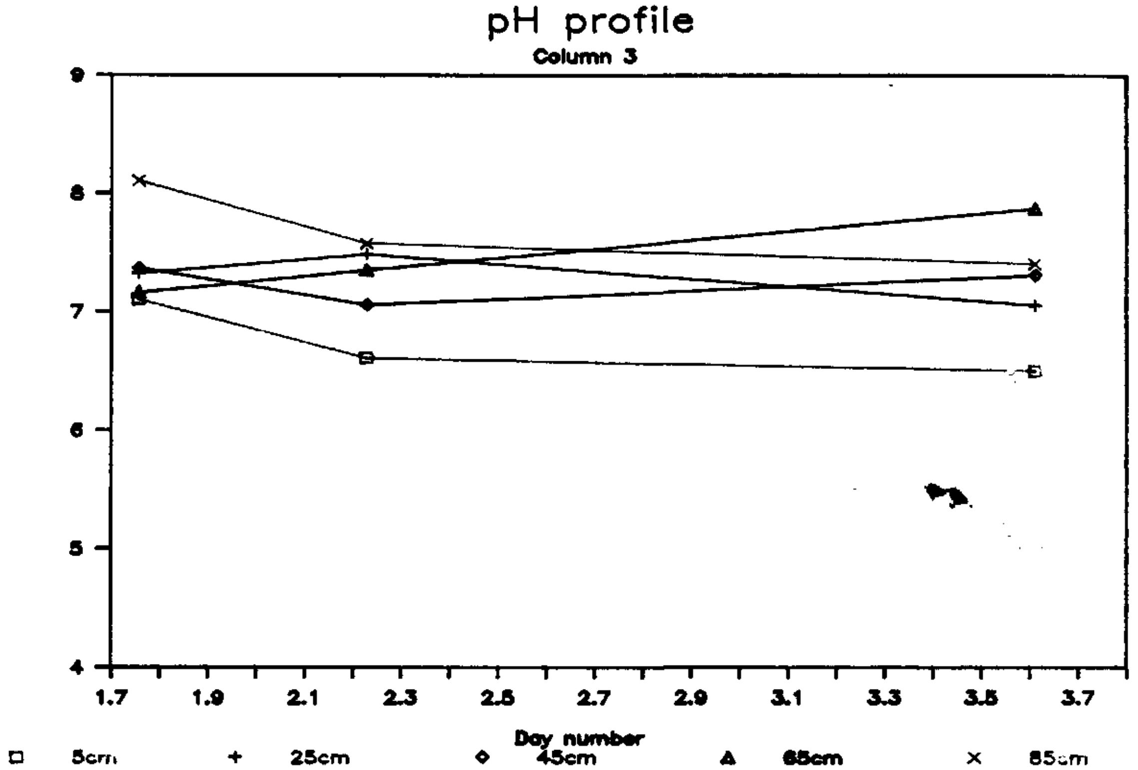
2.4.2. Chemical composition of soil solution



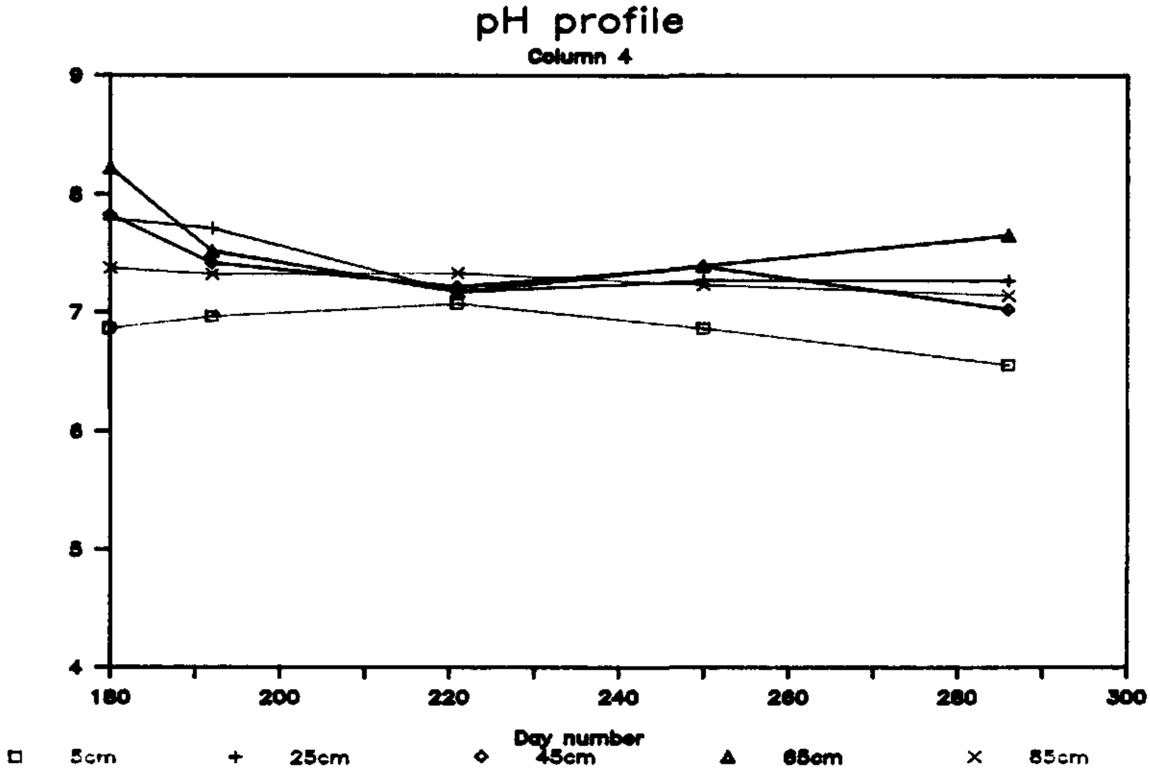
pH profile
Column 1
9
8
7
6
5
4
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



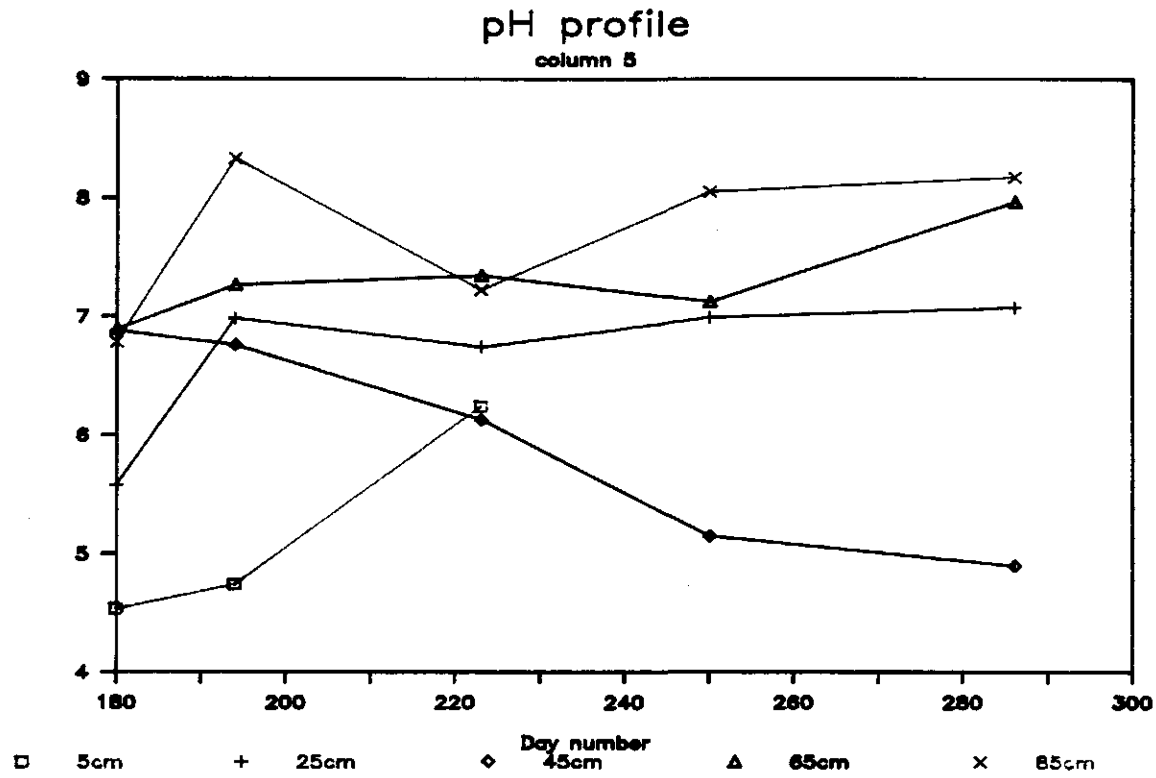
pH profile
Column 2
9
8
7
6
5
4
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

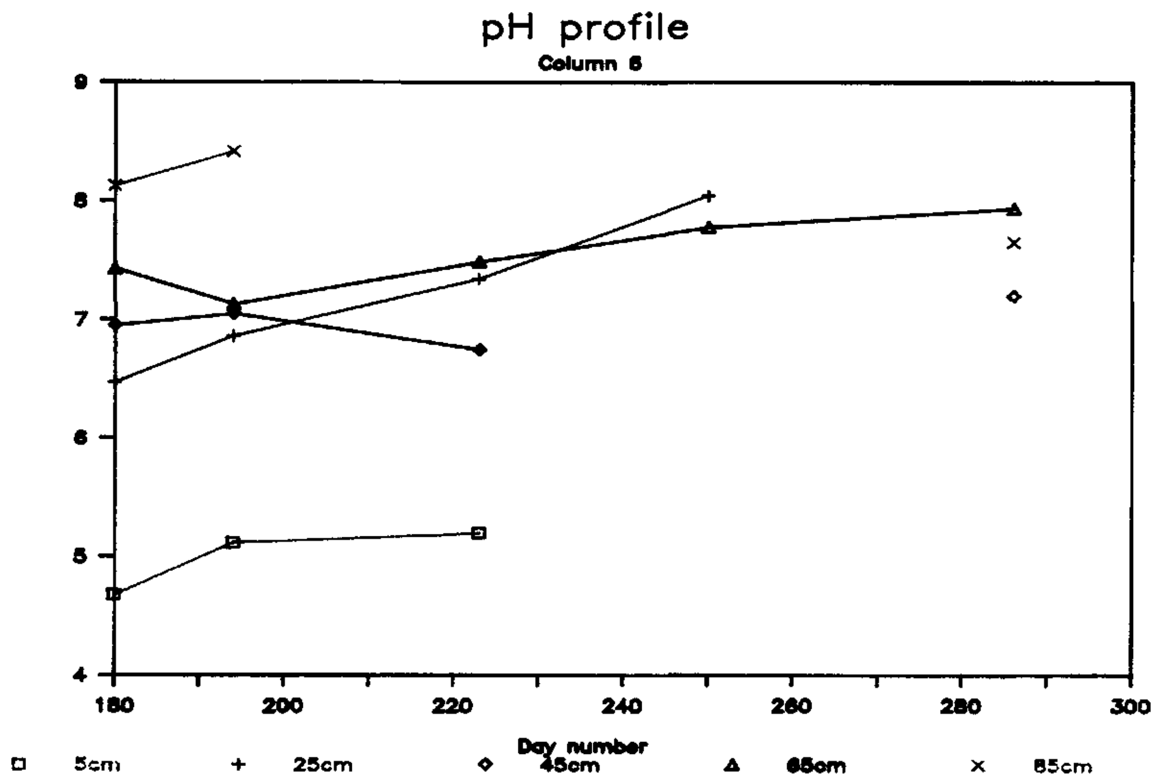


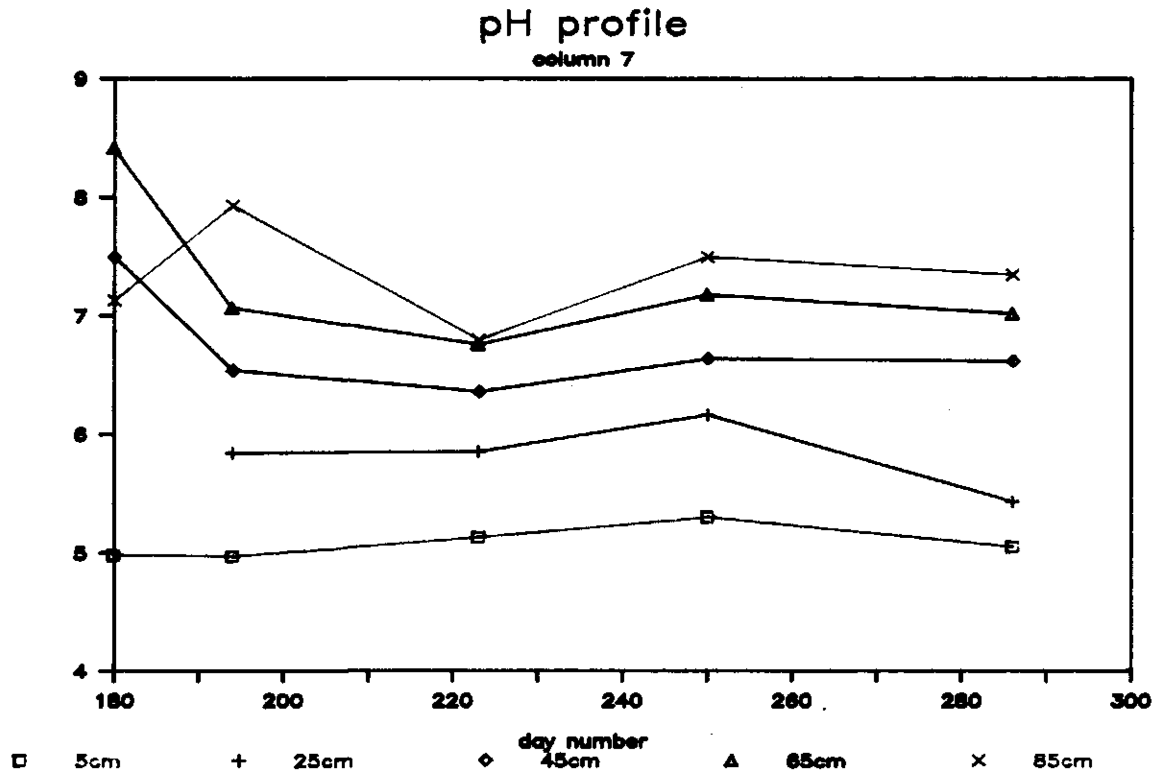
pH profile
Column 3
9
8
7
6
5
4
1.7
1.9
2.1
2.3
2.5
2.7
2.9
3.1
3.3
3.5
3.7
Day number
5cm
25cm
45cm
65cm
85cm

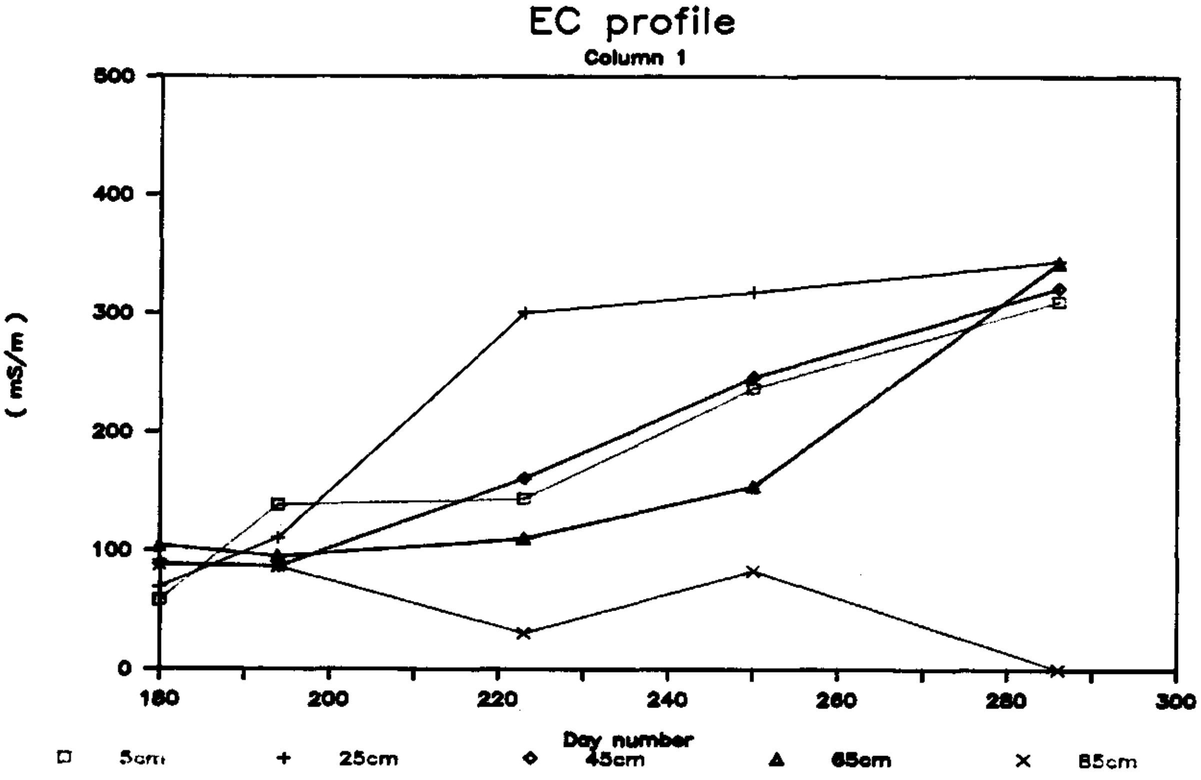


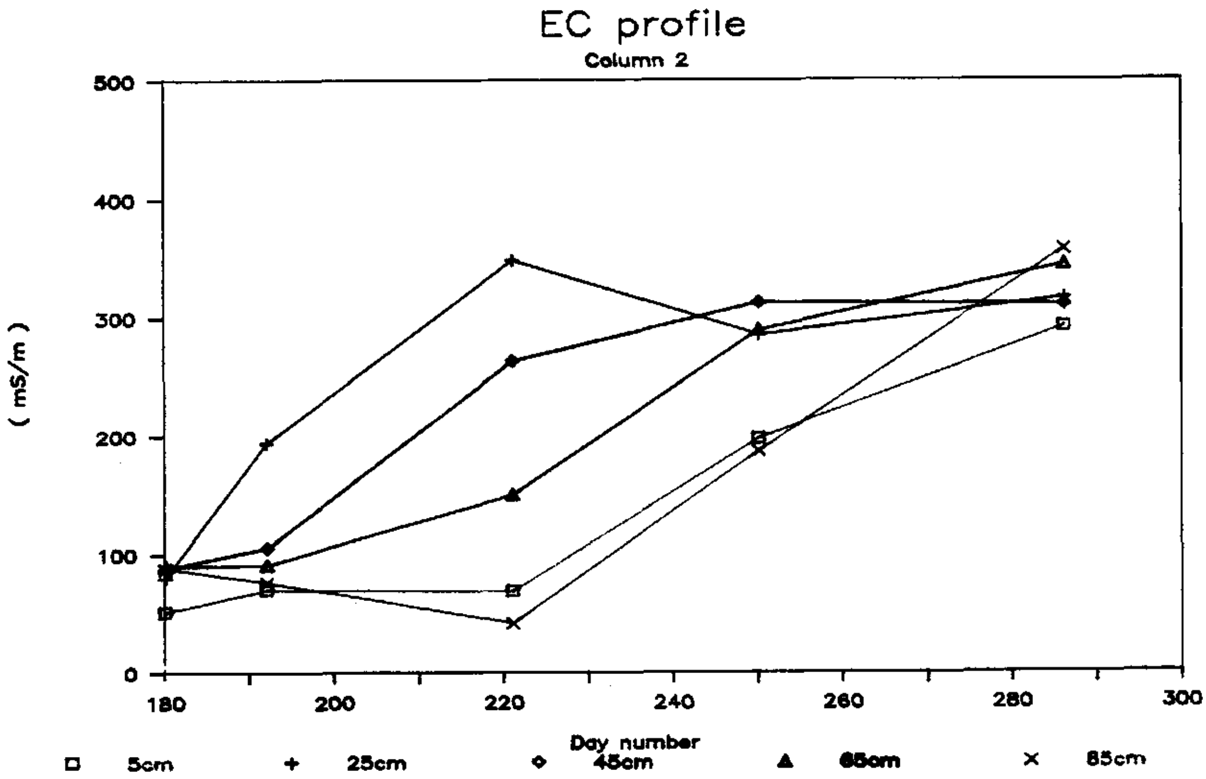
pH profile
Column 4
9
8
7
6
5
4
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

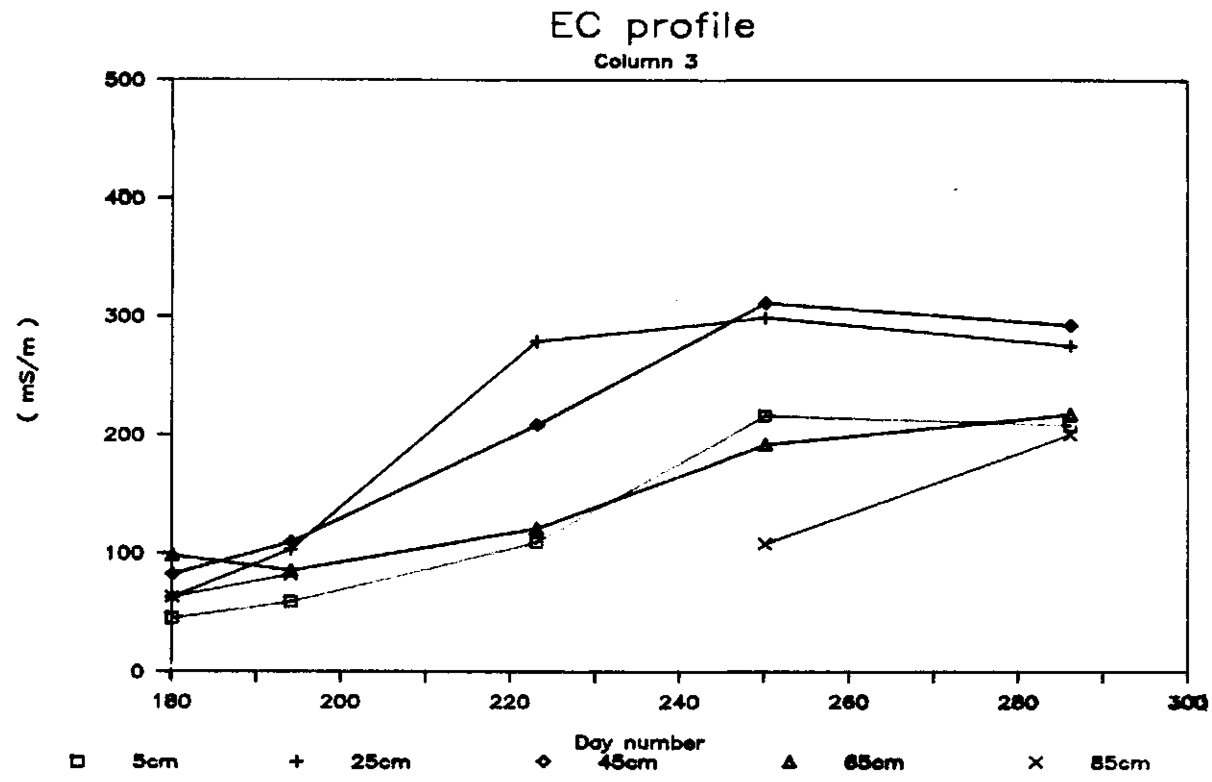

pH profile
column 5
9
8
7
6
5
4
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm


pH profile
Column 6
9
8
7
6
5
4
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

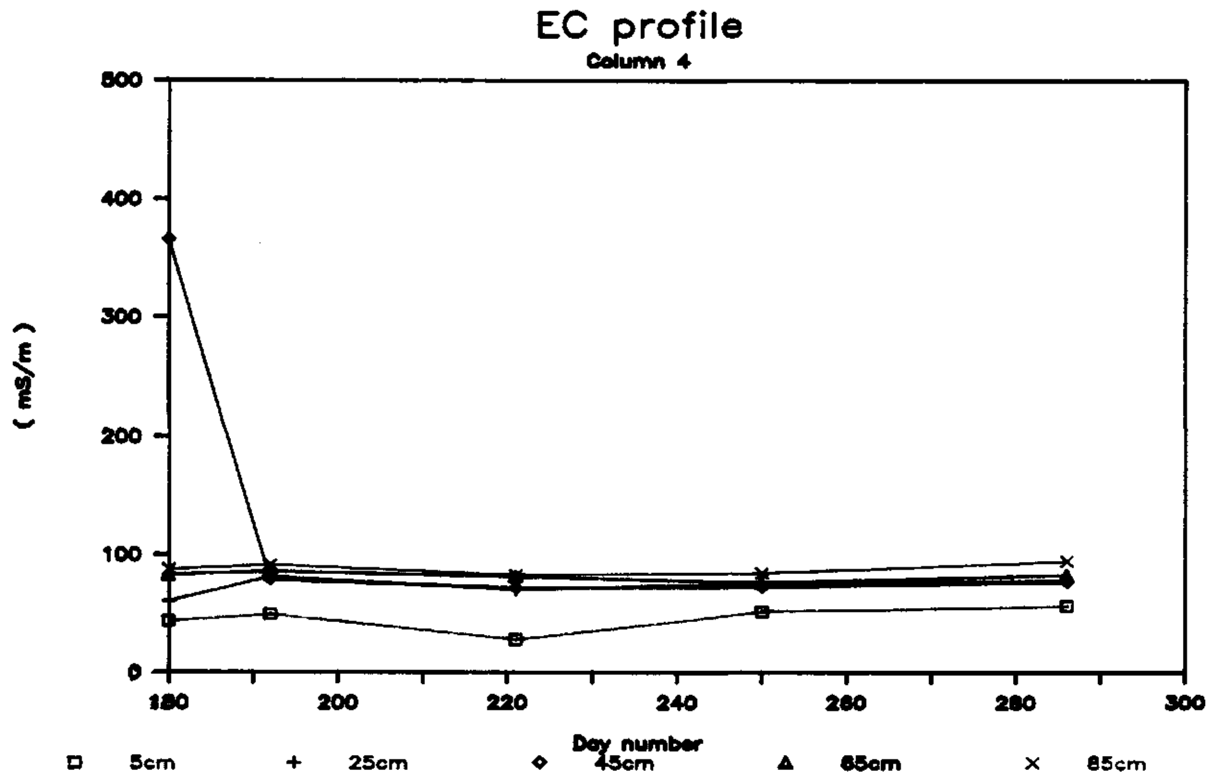

pH profile
column 7
9
8
7
6
5
4
180
200
220
240
260
280
300
day number
5cm
25cm
45cm
65cm
85cm


EC profile
Column 1
500
400
300
200
100
0
(mS/m)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

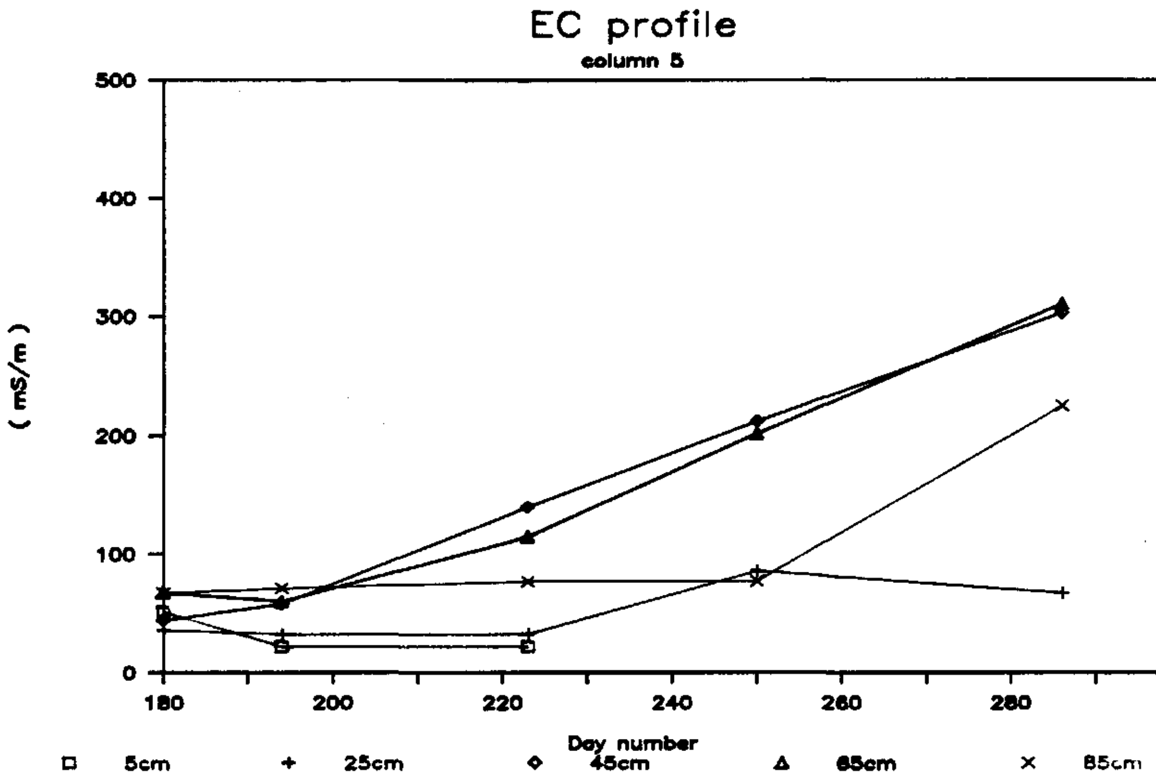

EC profile
Column 2
500
400
300
200
100
0
(mS/m)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

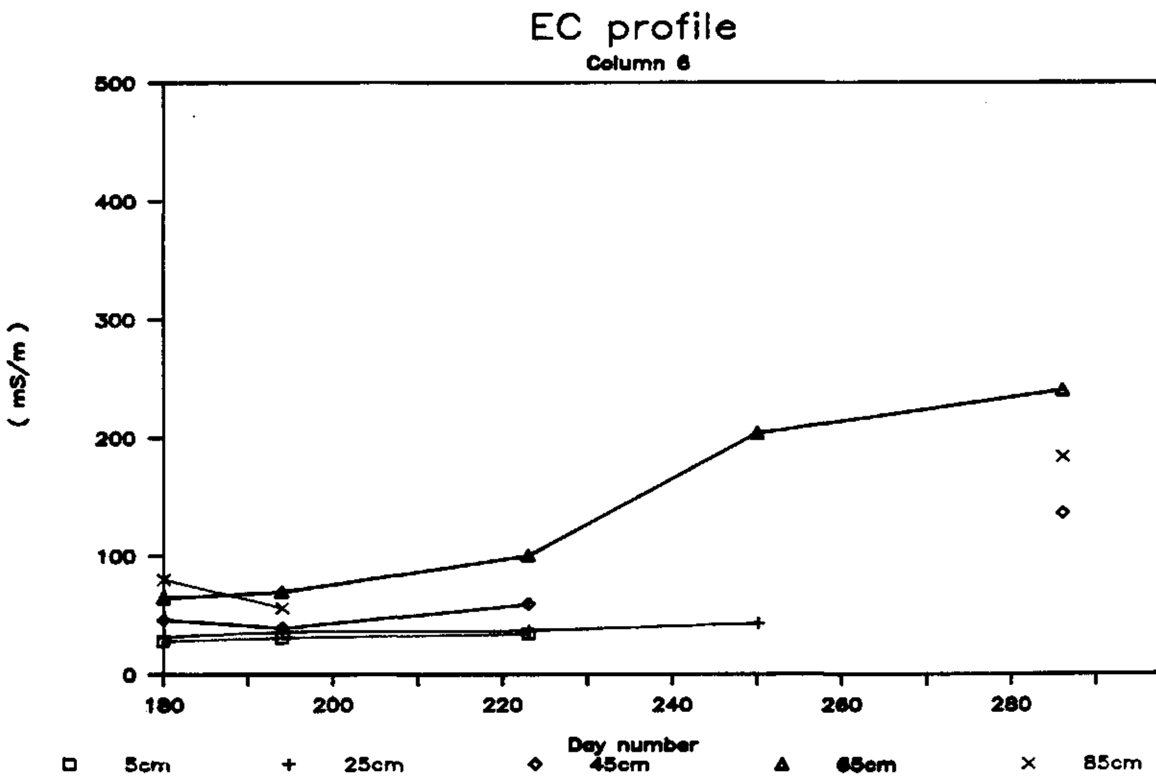


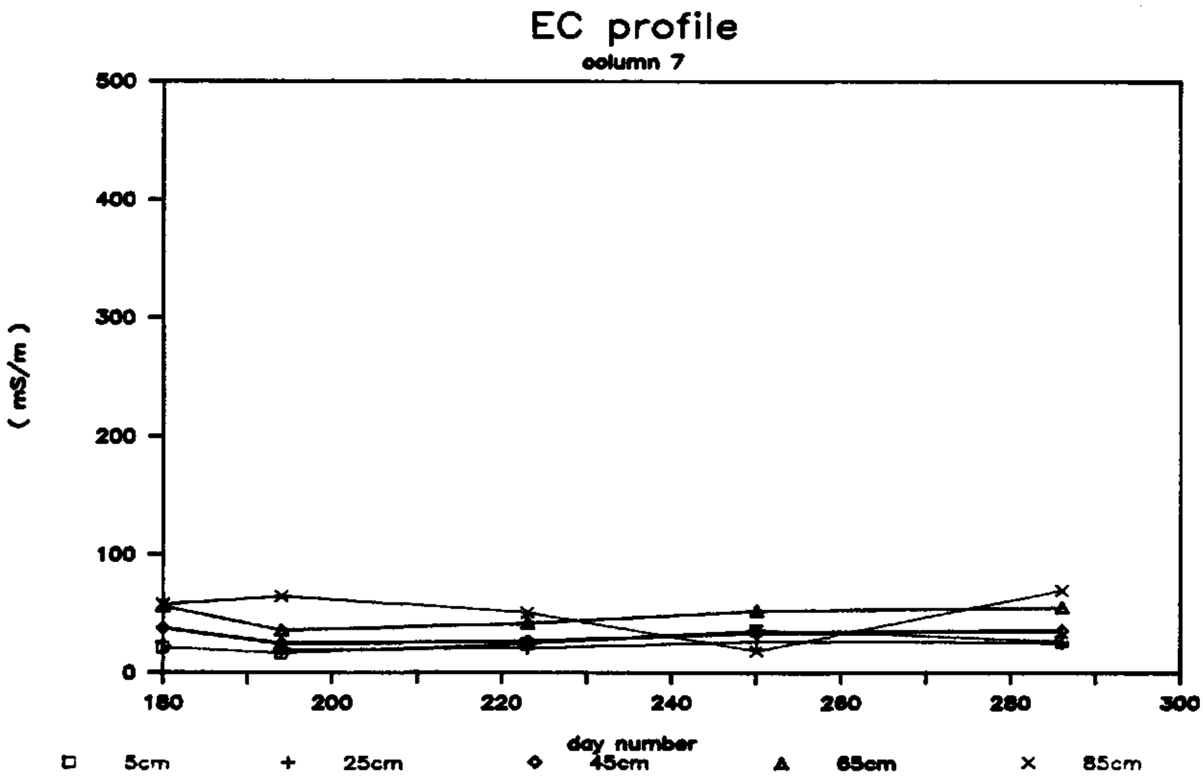
EC profile
Column 3
500
400
300
200
100
0
(mS/m)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

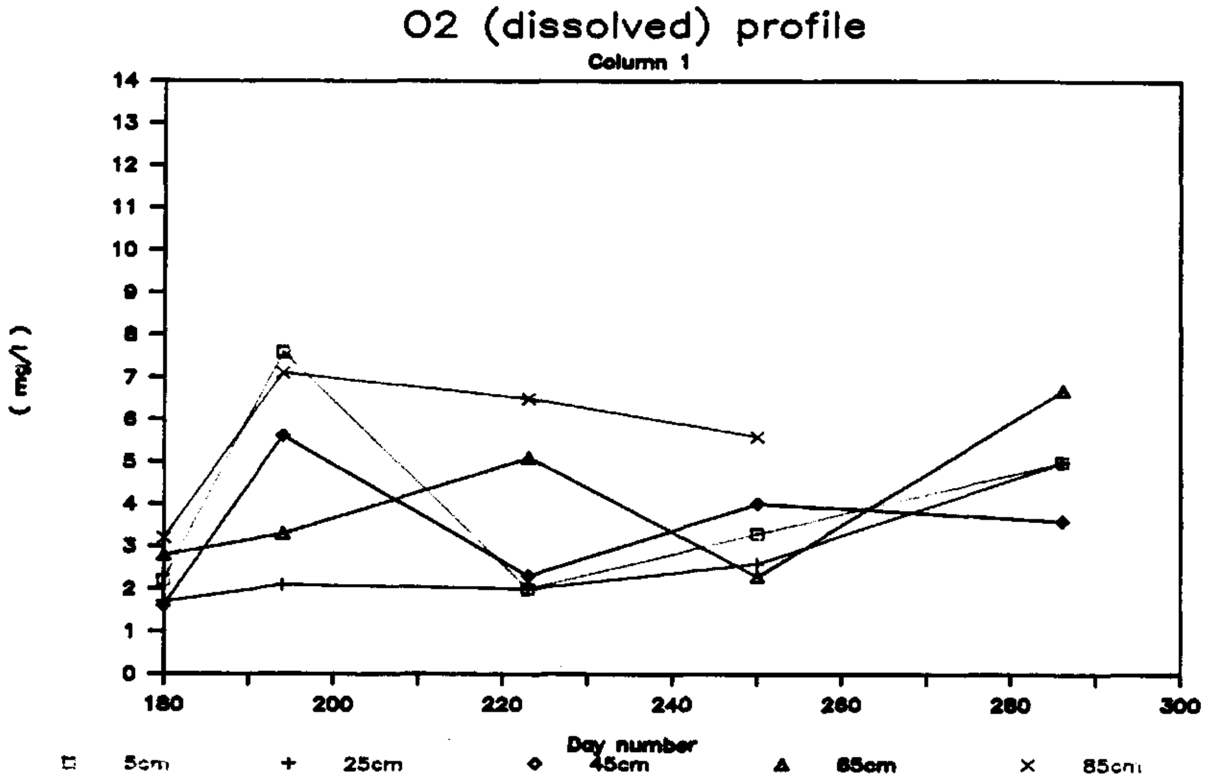


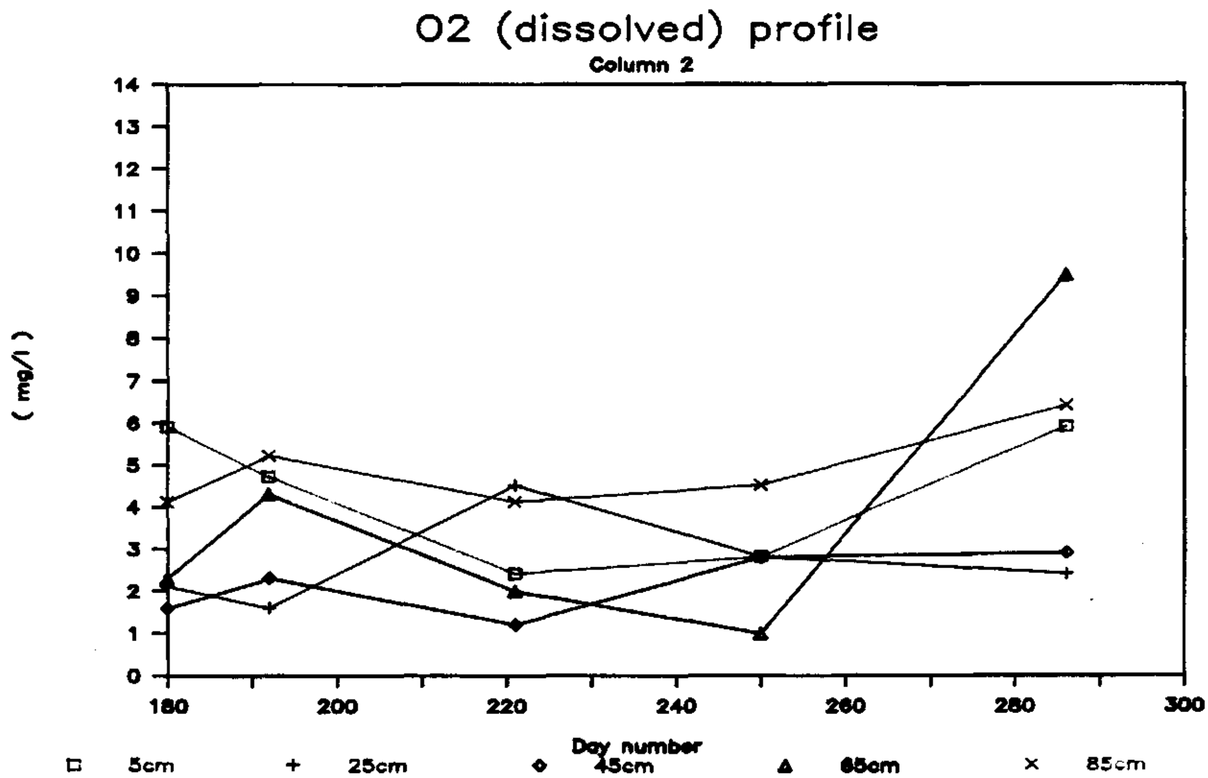
EC profile
Column 4
500
400
300
200
100
0
(mS/m)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

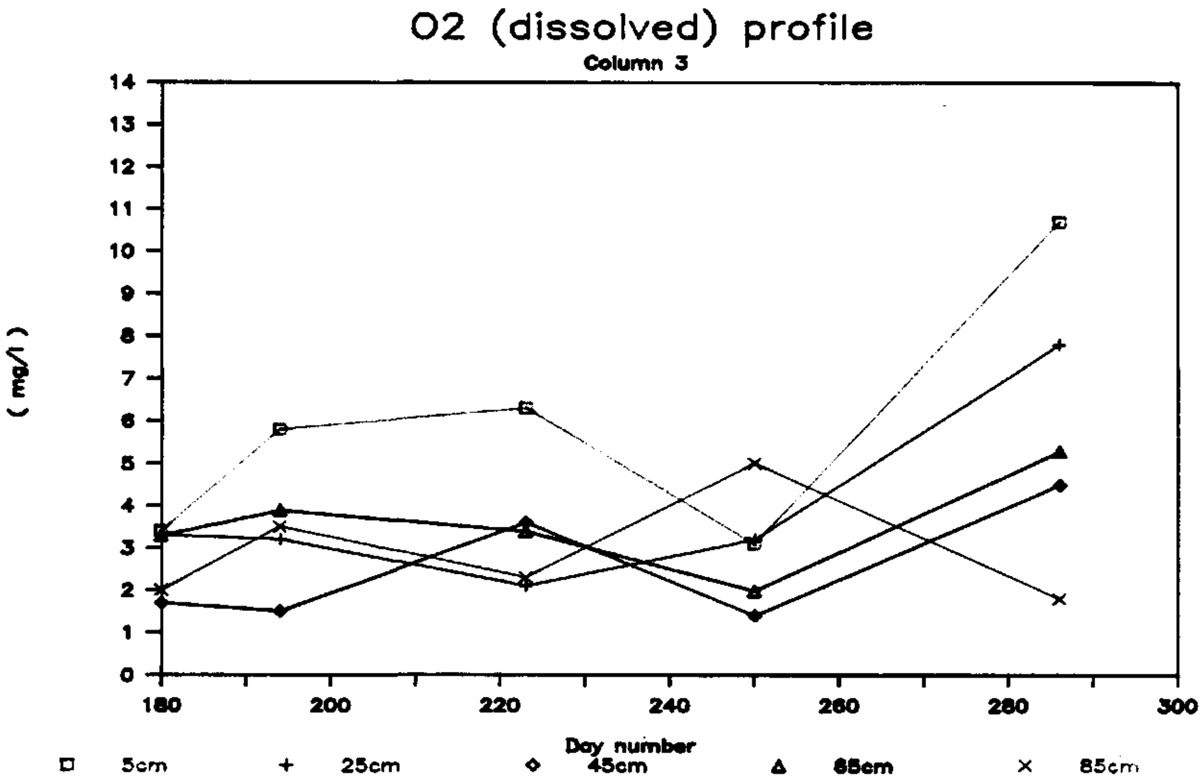

EC profile
column 5
500
400
300
200
100
0
(mS/m)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

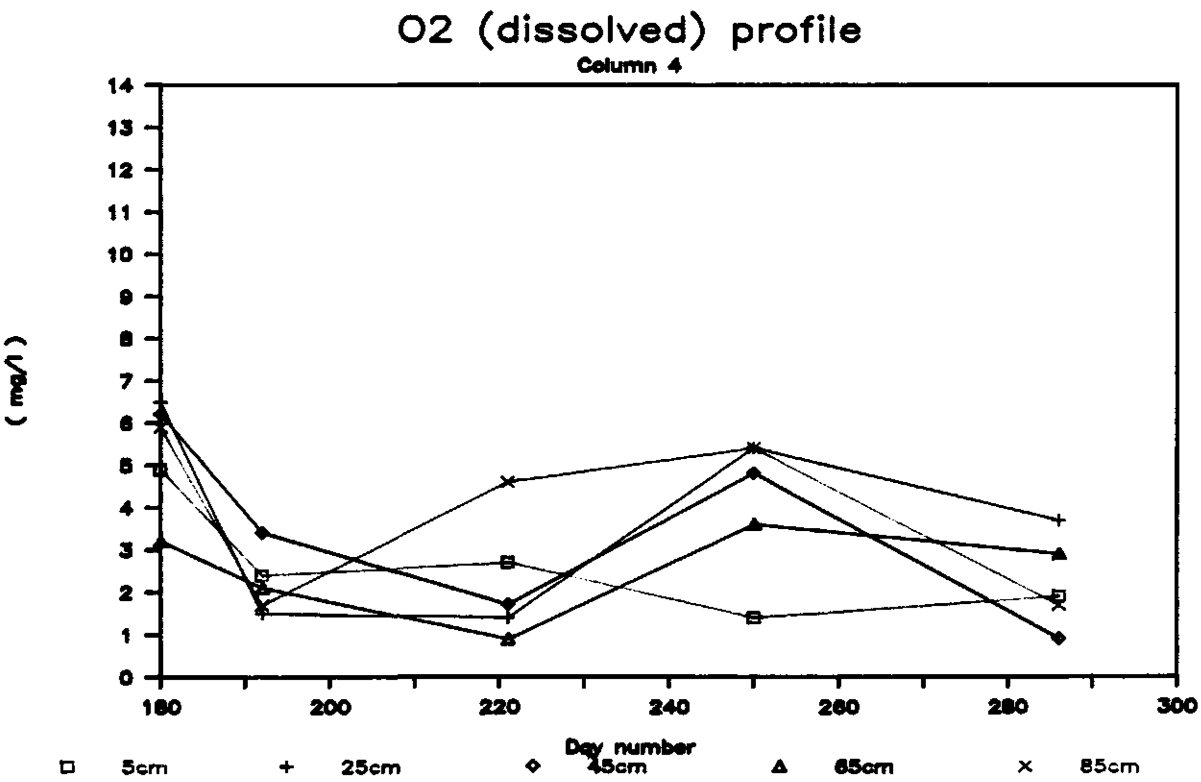

EC profile
Column 6
500
400
300
200
100
0
(mS/m)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

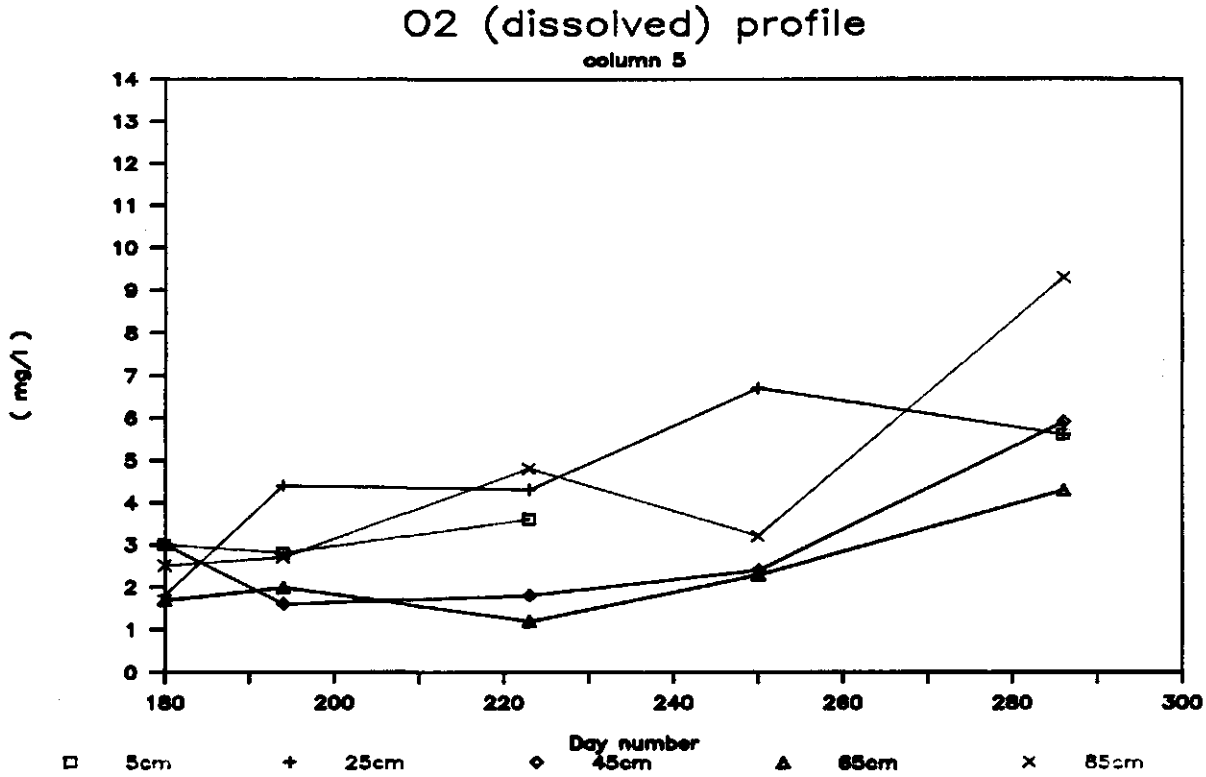

EC profile
column 7
500
400
300
200
100
0
(mS/m)
180
200
220
240
260
280
300
day number
5cm
25cm
45cm
65cm
85cm

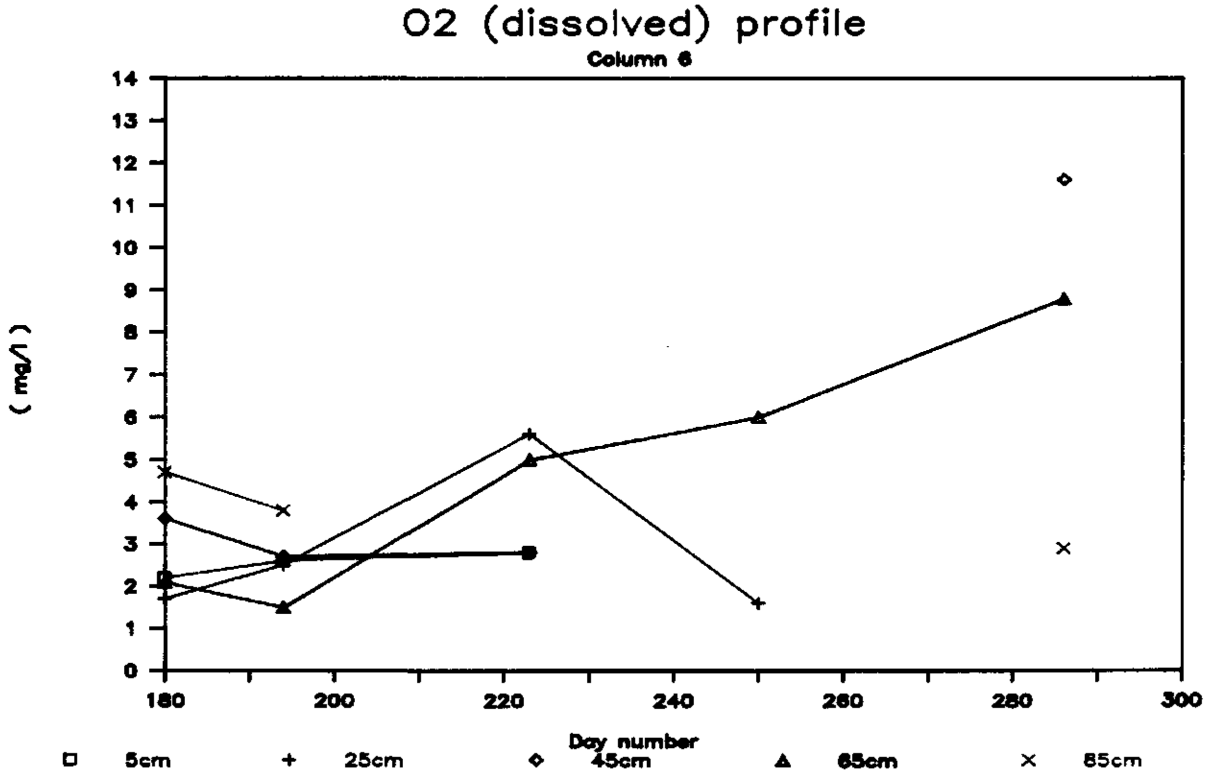

O2 (dissolved) profile
Column 1
(mg/l)
Day number
5cm
25cm
45cm
65cm
85cm

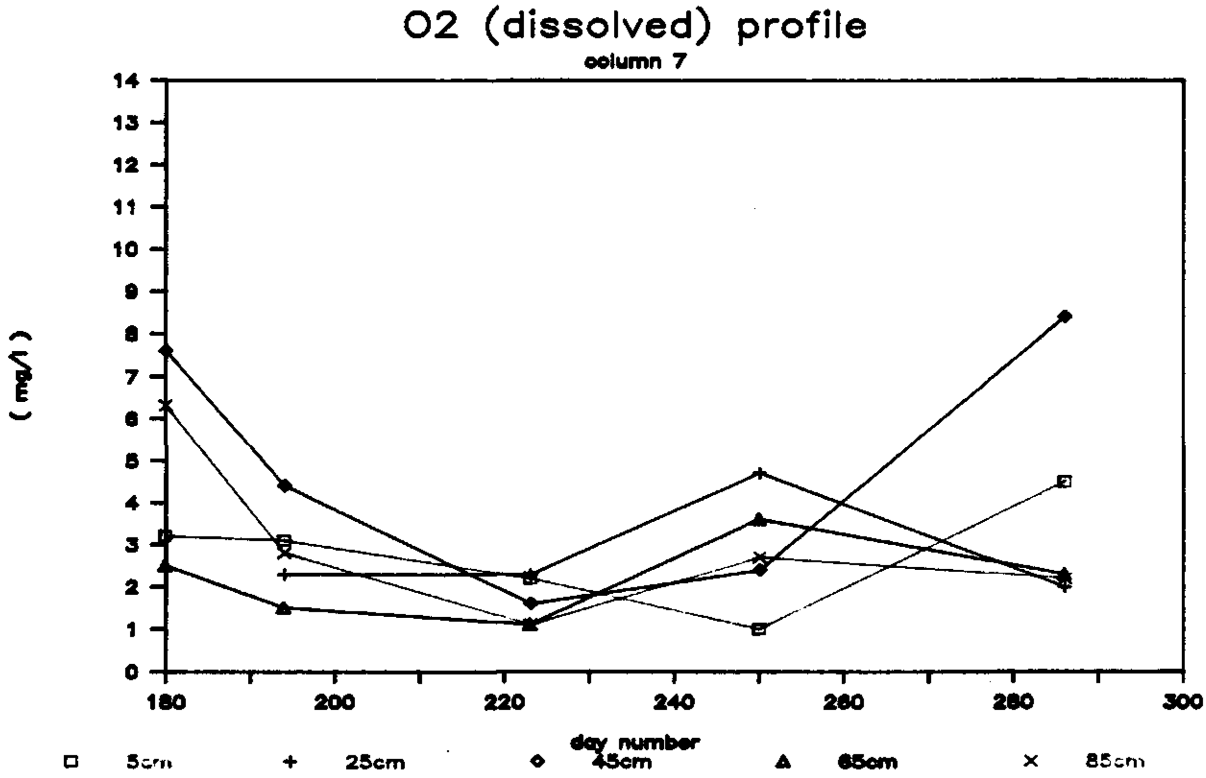

O2 (dissolved) profile
Column 2
(mg/l)
Day number
5cm
25cm
45cm
65cm
85cm

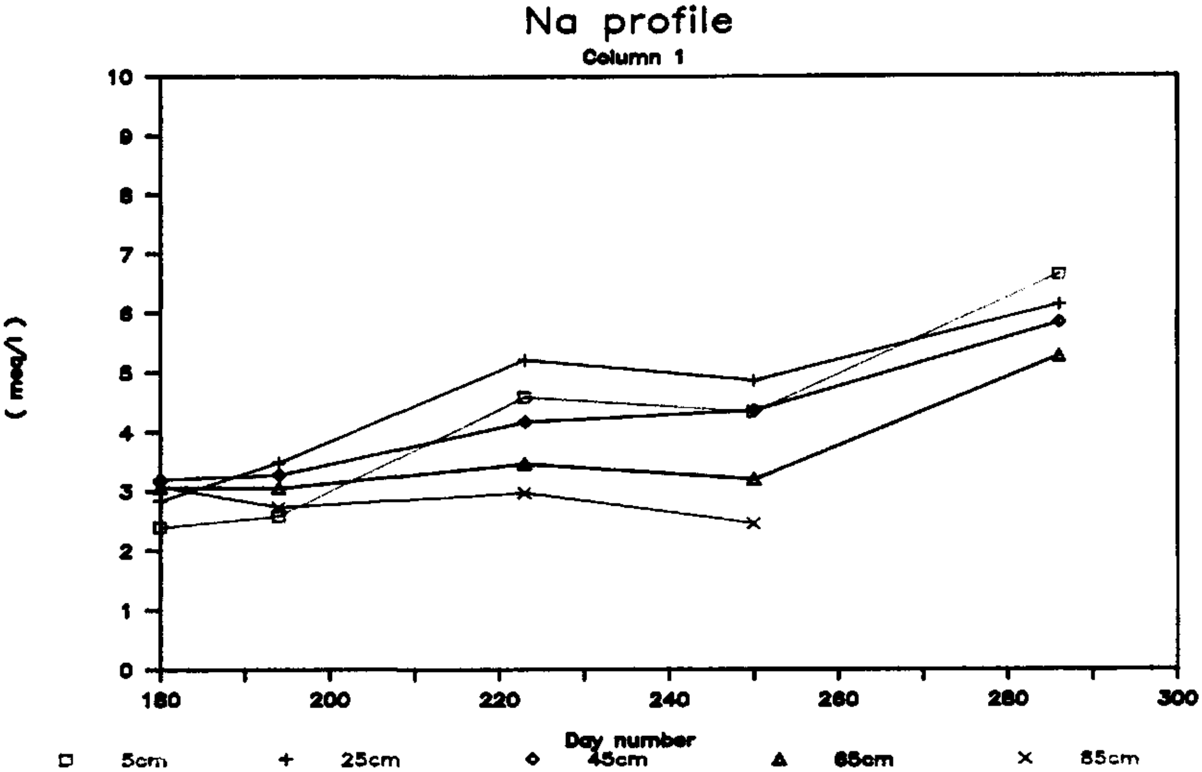

O2 (dissolved) profile
Column 3
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
(mg/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm


O2 (dissolved) profile
Column 4
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
(mg/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

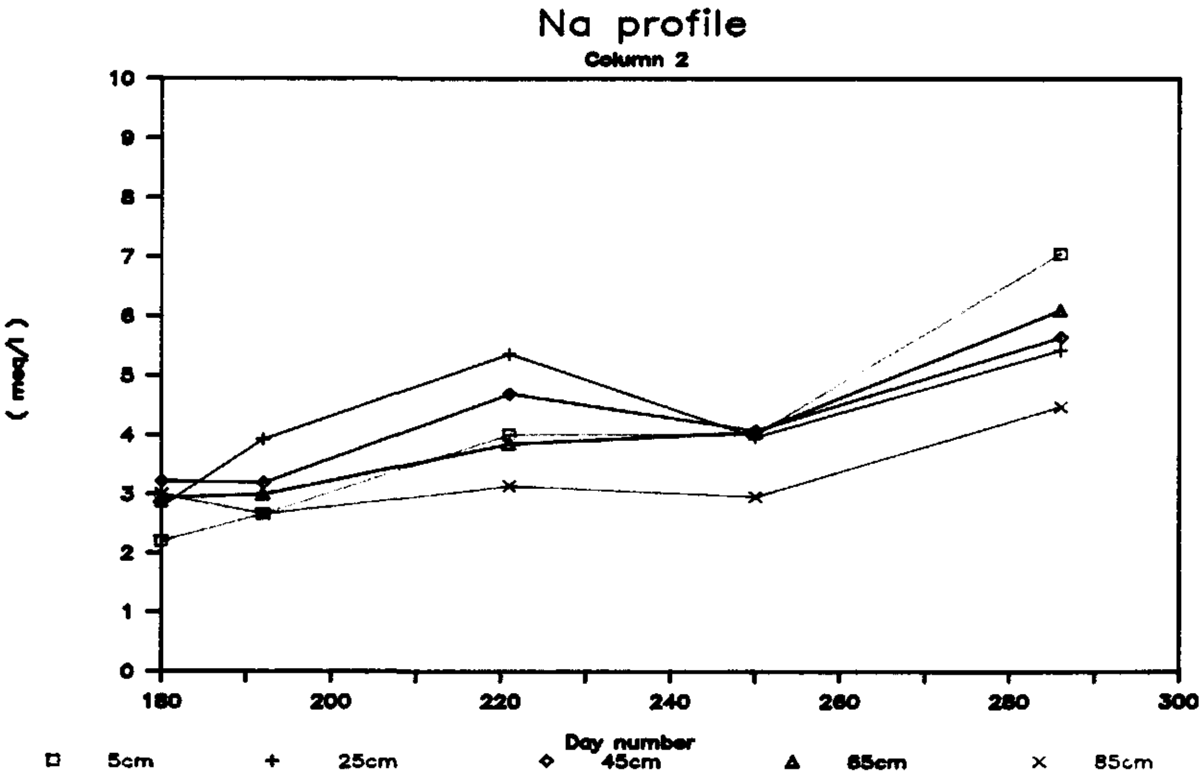

O2 (dissolved) profile
column 5
(mg/l)
Day number
5cm
25cm
45cm
65cm
85cm


O2 (dissolved) profile
Column 6
(mg/l)
Day number
5cm
25cm
45cm
65cm
85cm

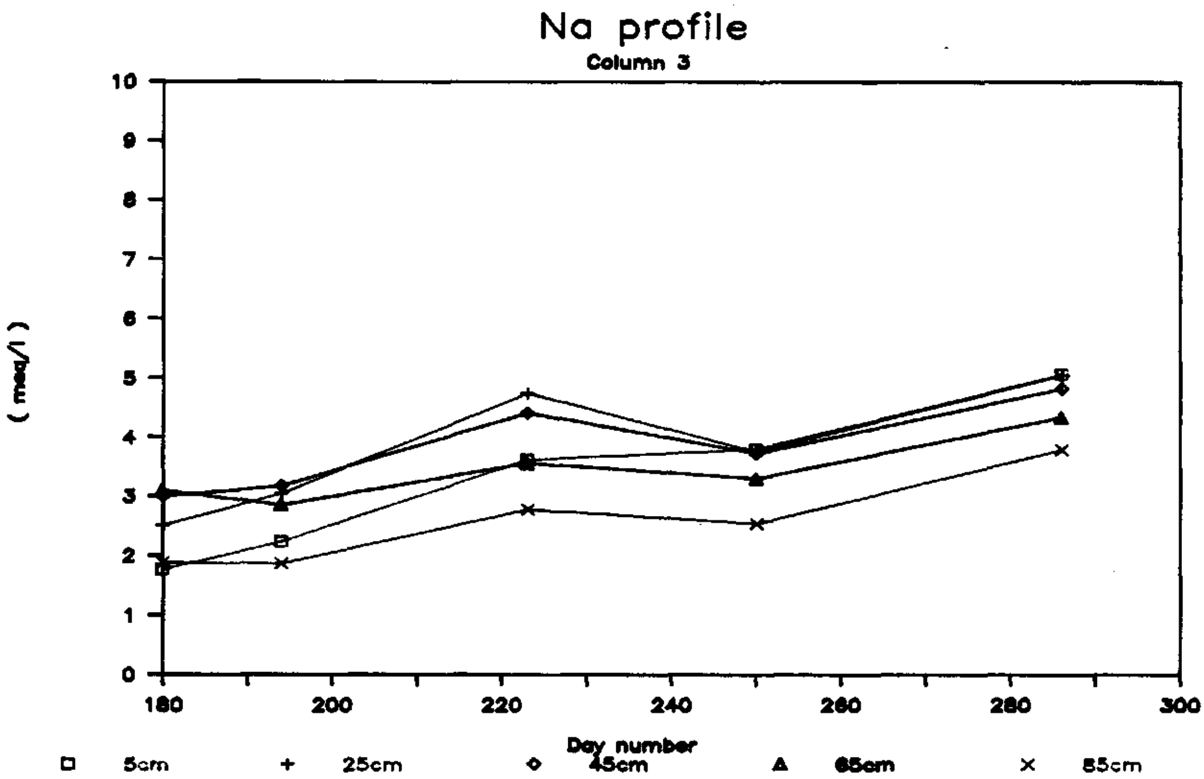

O2 (dissolved) profile
column 7
(mg/l)
day number
5cm
25cm
45cm
65cm
85cm



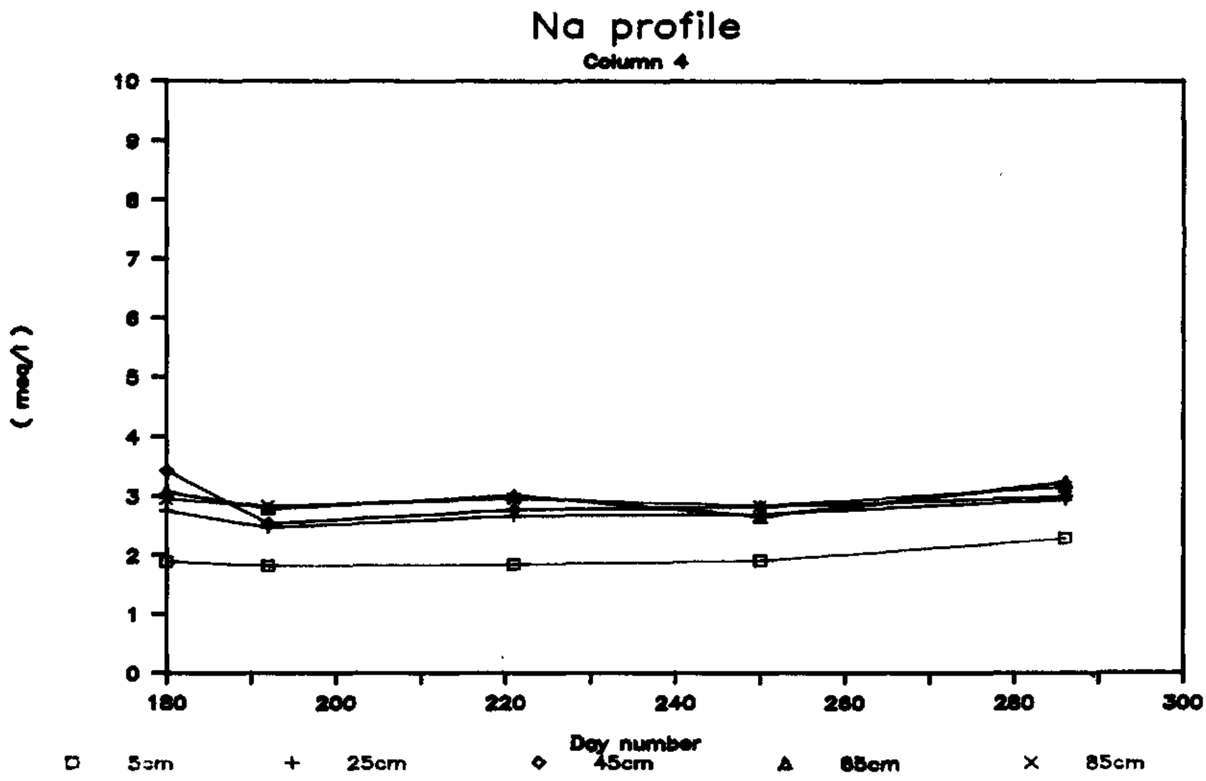
Na profile
Column 1
10
9
8
7
6
5
4
3
2
1
0
(meq/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



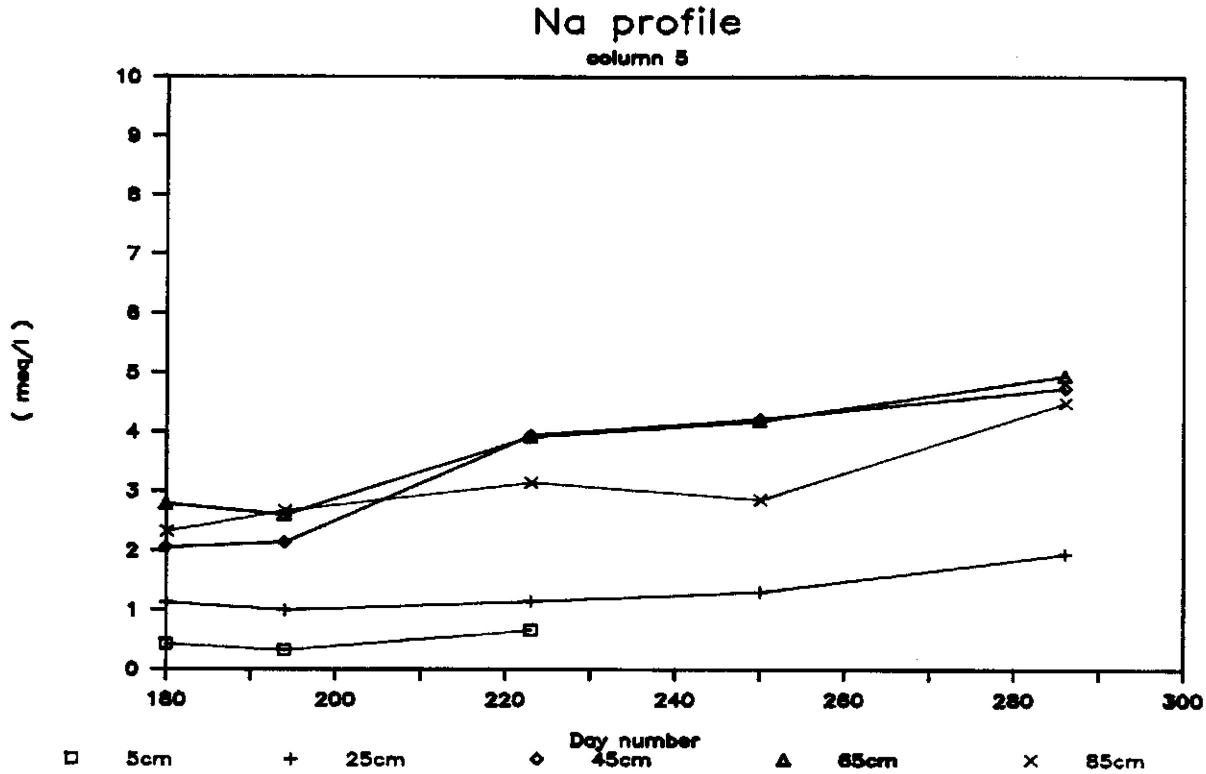
Na profile
Column 2
10
9
8
7
6
5
4
3
2
1
0
(meq/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



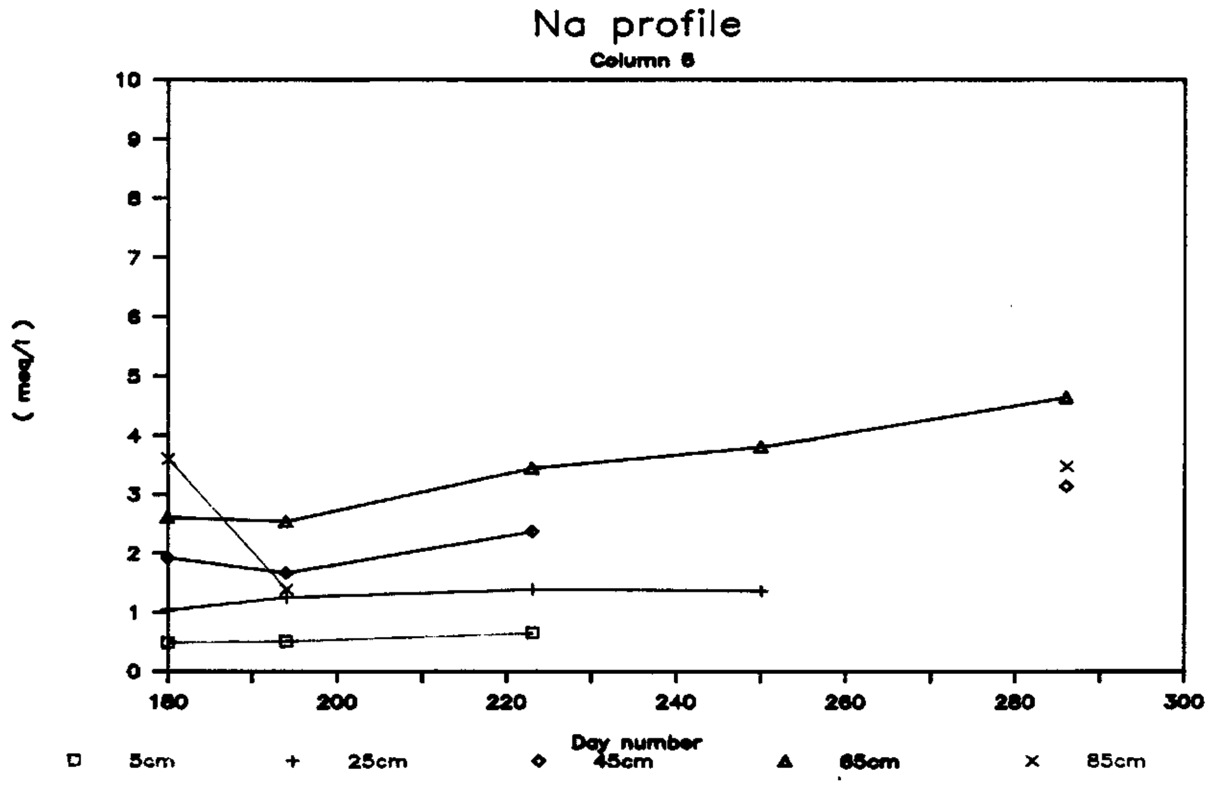
Na profile
Column 3
(meq/l)
10
9
8
7
6
5
4
3
2
1
0
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



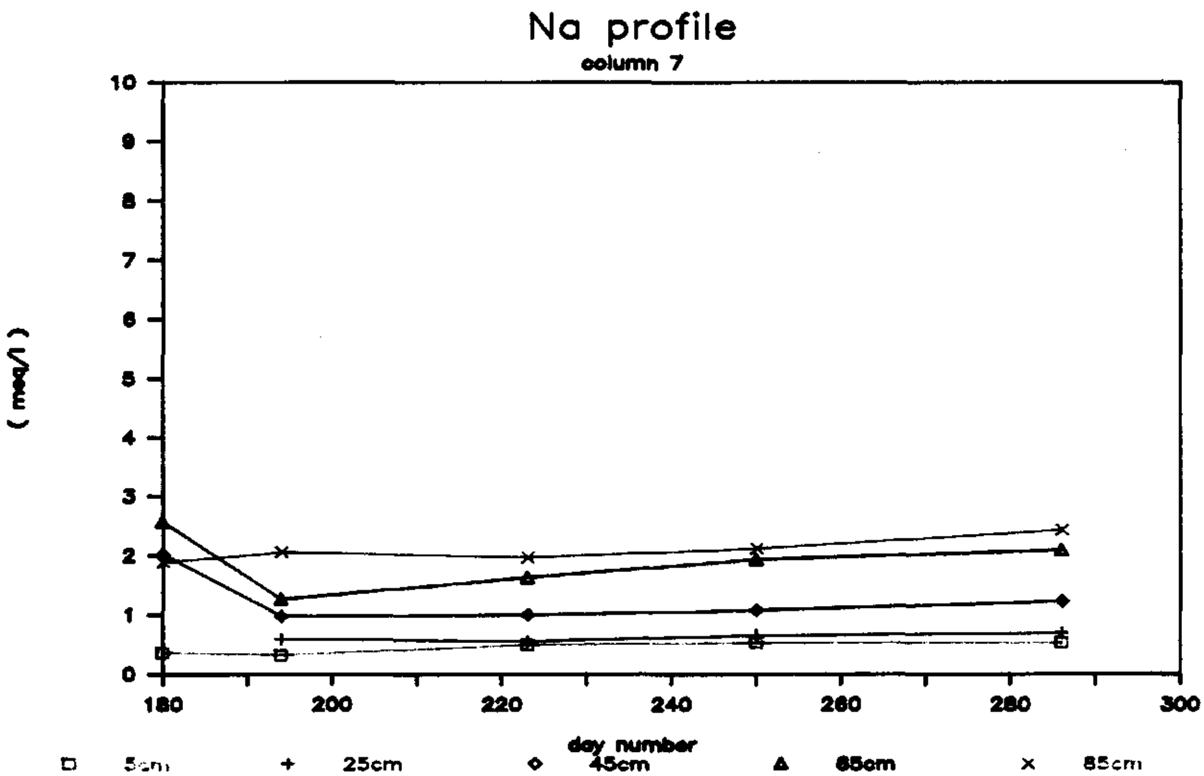
Na profile
Column 4
(meq/l)
10
9
8
7
6
5
4
3
2
1
0
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



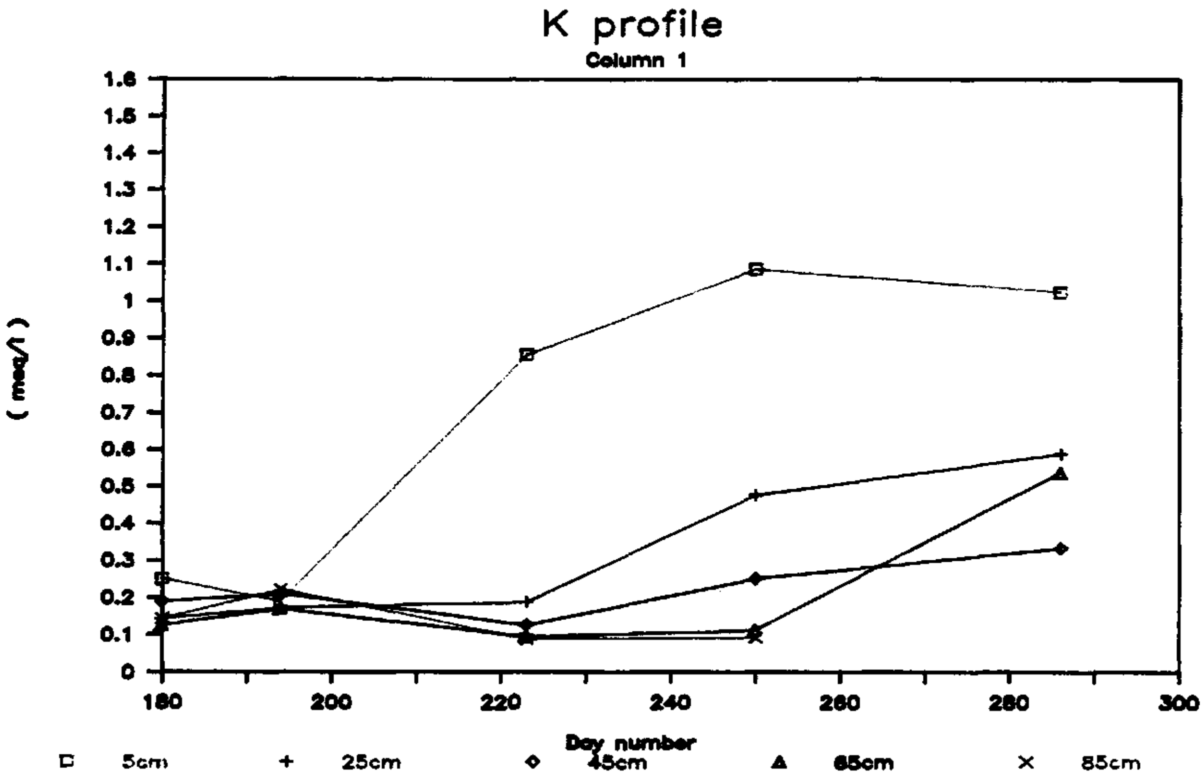
Na profile
column 5
10
9
8
7
6
5
4
3
2
1
0
(meq/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



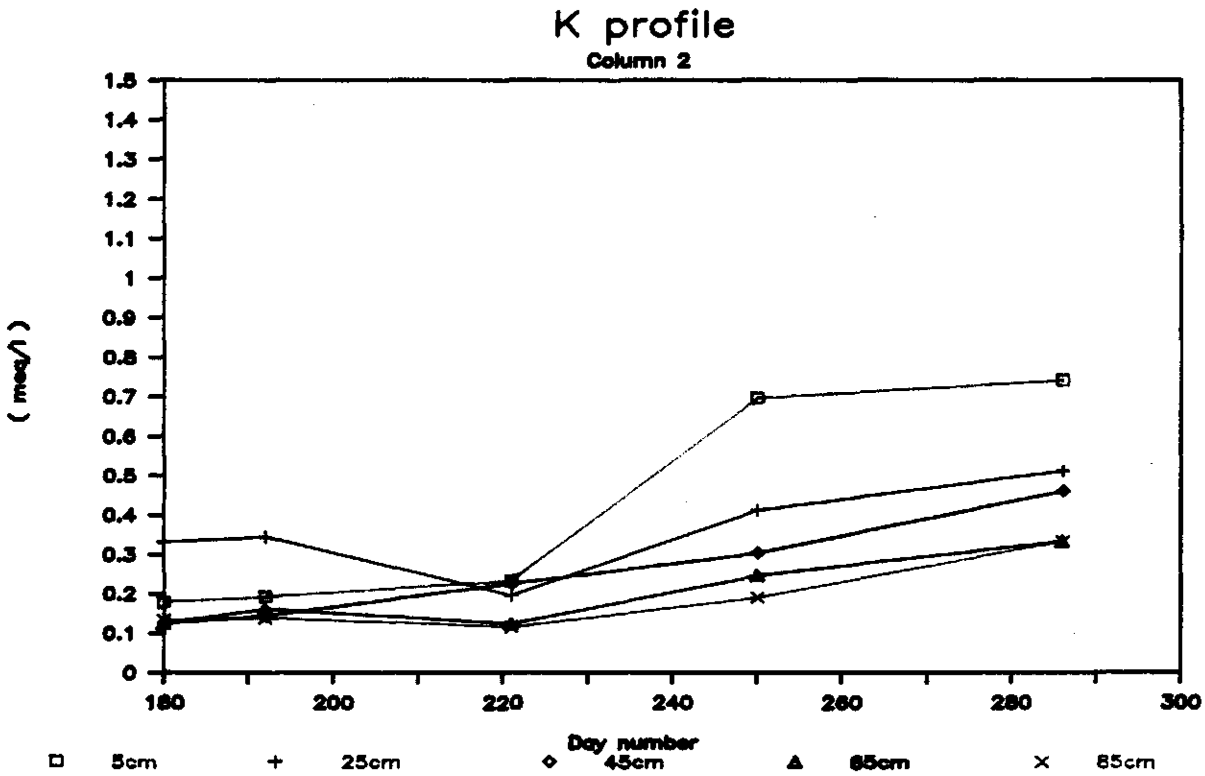
Na profile
Column 6
10
9
8
7
6
5
4
3
2
1
0
(meq/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



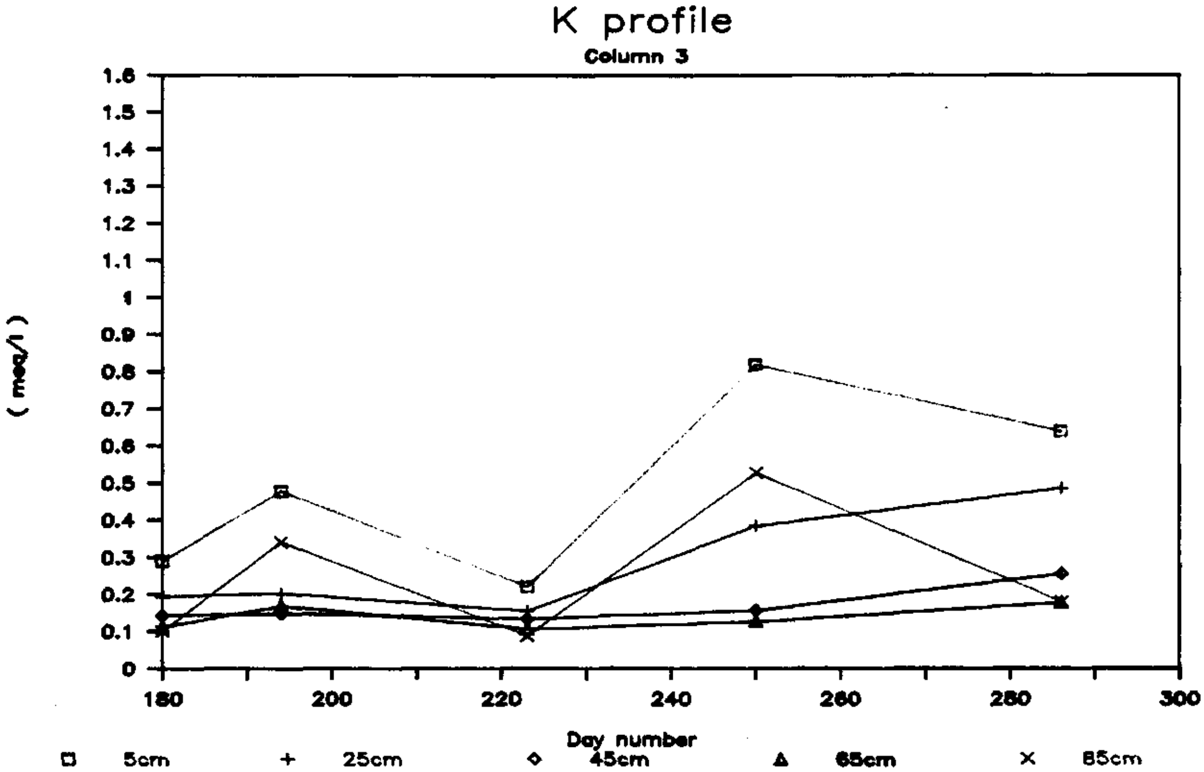
Na profile
column 7
(meq/l)
day number
5cm
25cm
45cm
65cm
85cm

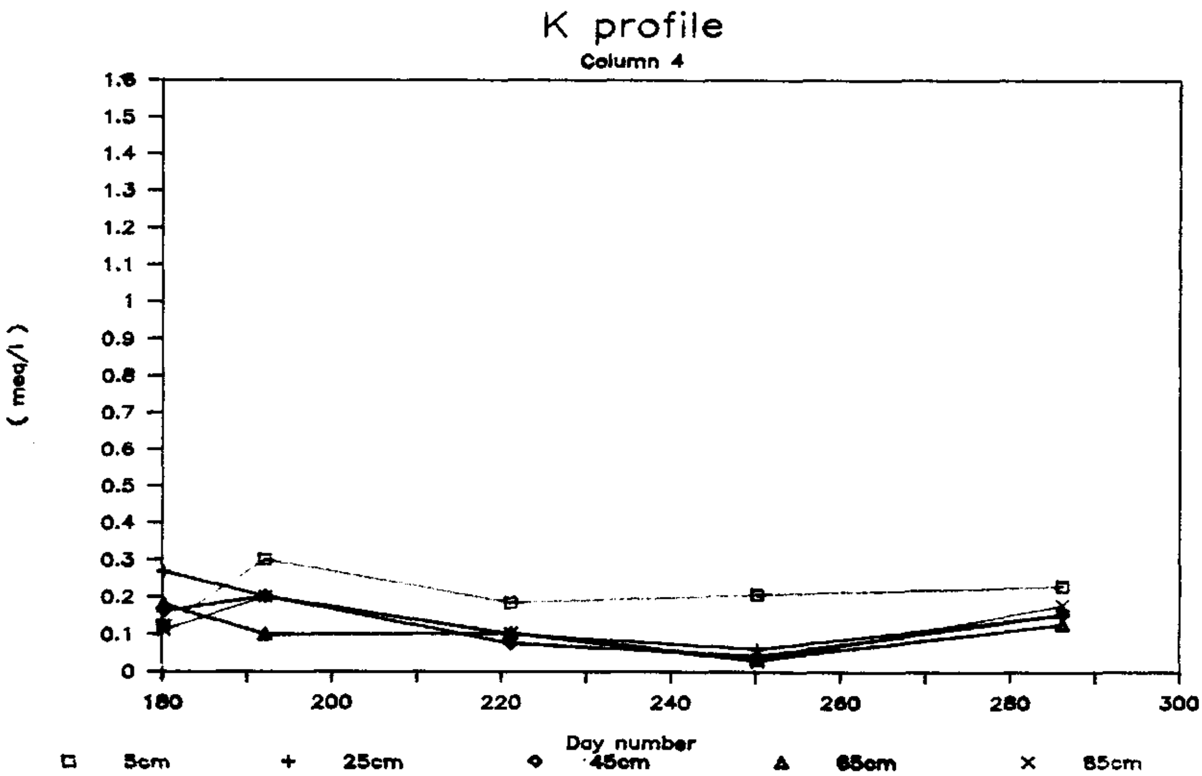


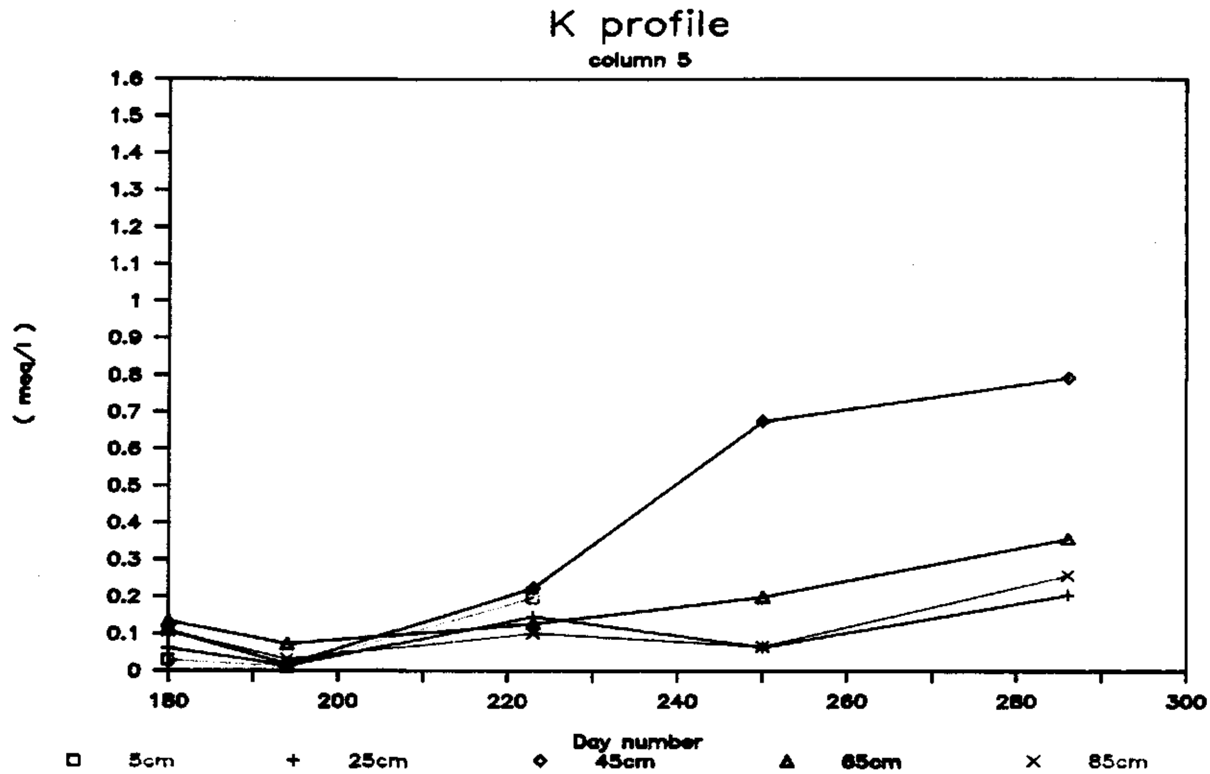
K profile
Column 1
(meq/l)
Day number
5cm
25cm
45cm
65cm
85cm



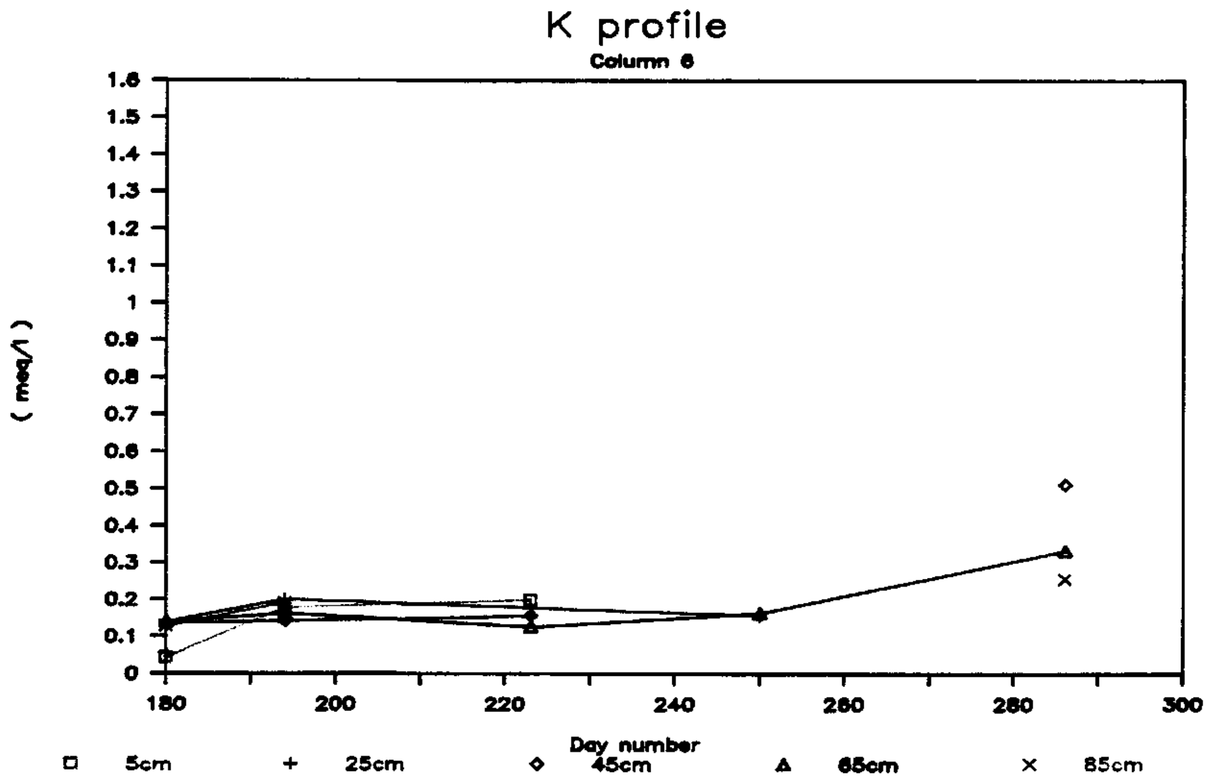
K profile
Column 2
(meq/l)
Day number
5cm
25cm
45cm
65cm
85cm


K profile
Column 3
(meq/l)
Day number
5cm
25cm
45cm
65cm
85cm


K profile
Column 4
(meq/l)
Day number
5cm
25cm
45cm
65cm
85cm

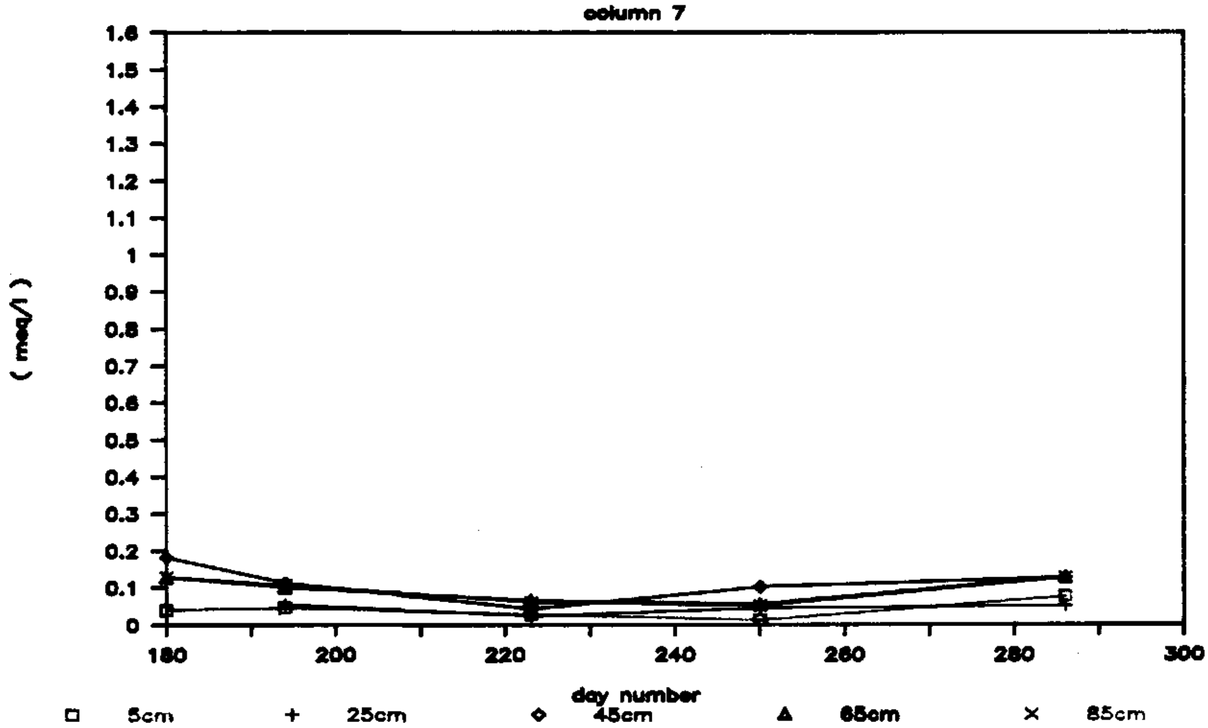


K profile
column 5
(meq/l)
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

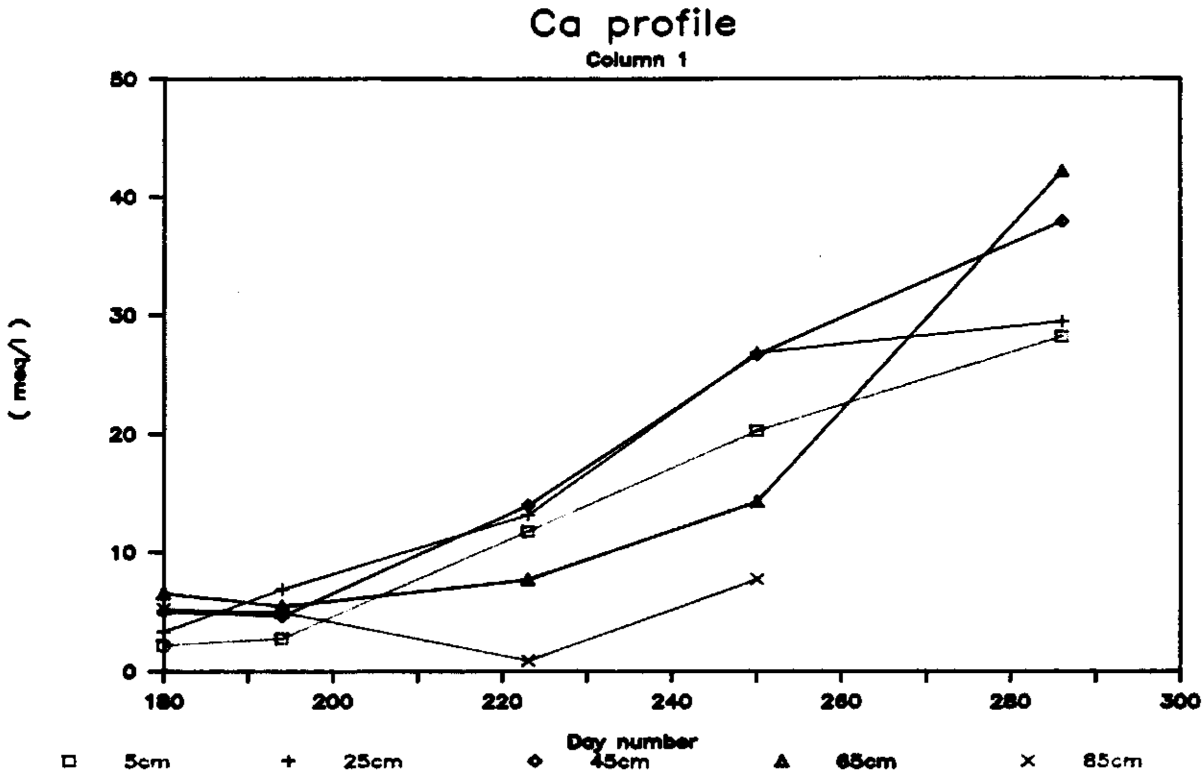


K profile
Column 6
(meq/l)
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

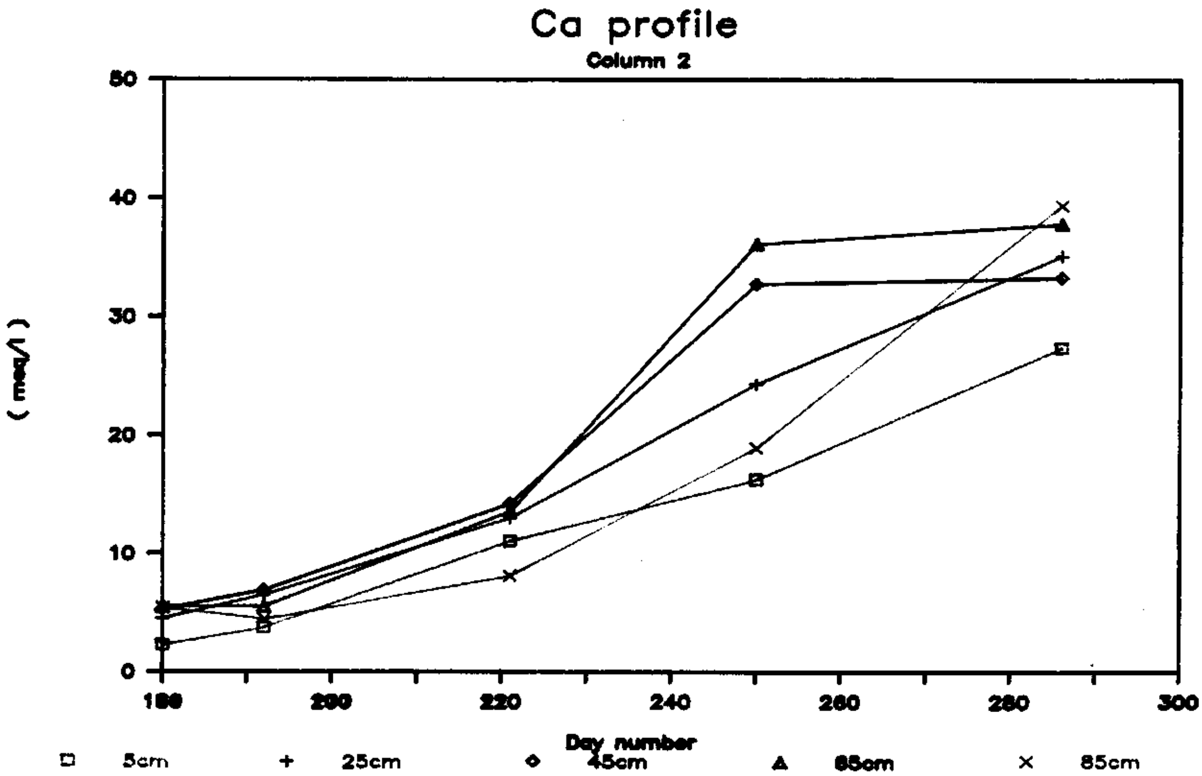
K profile



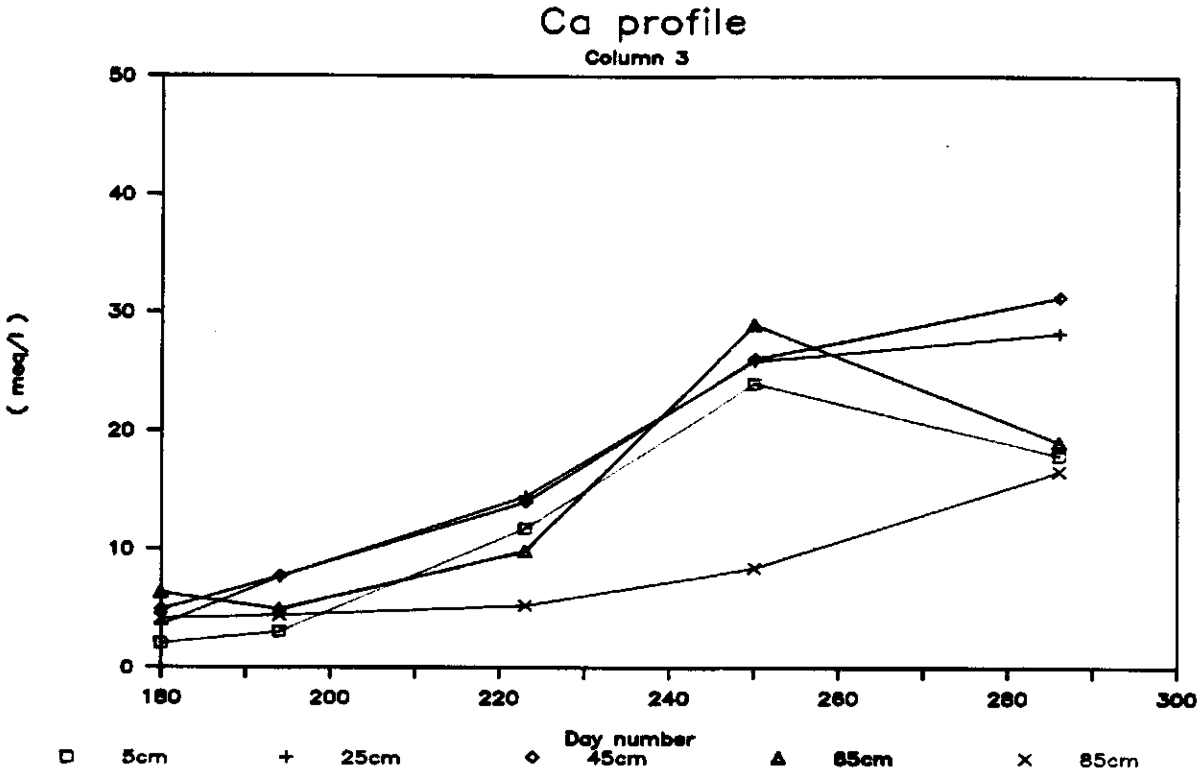
column 7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
(meq/l)
180
200
220
240
260
280
300
day number
5cm
25cm
45cm
65cm
85cm

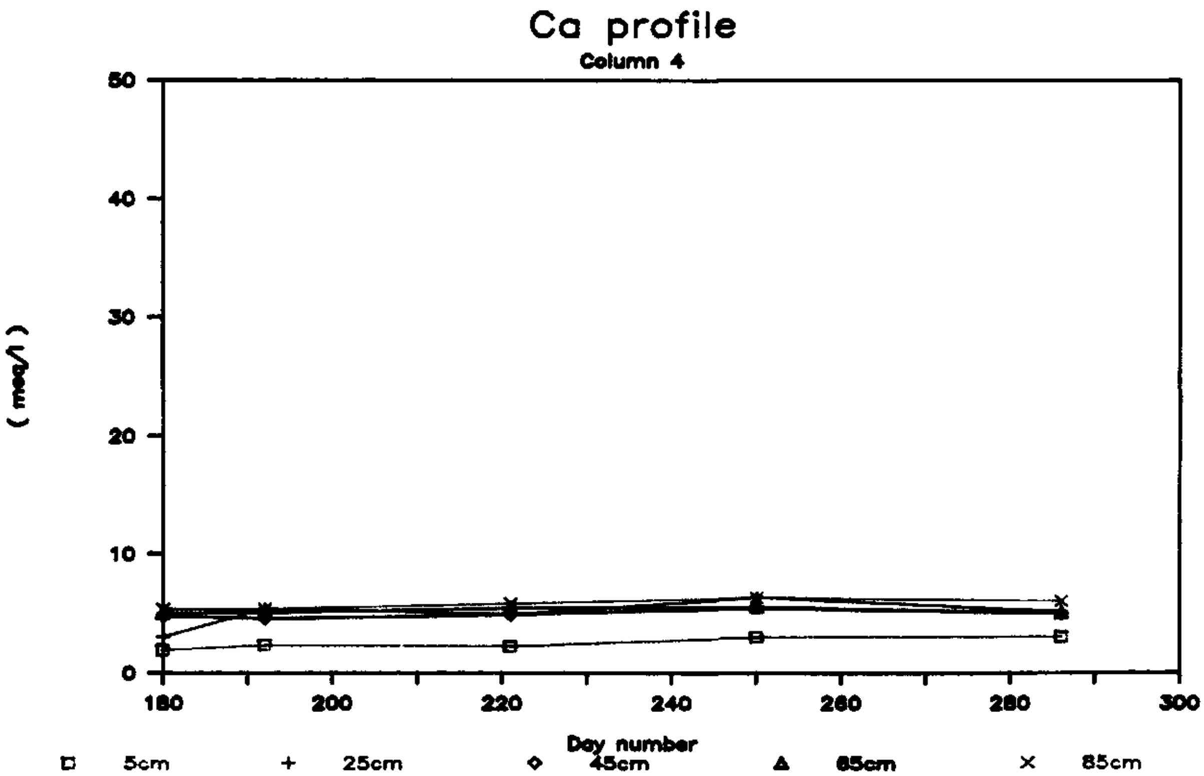


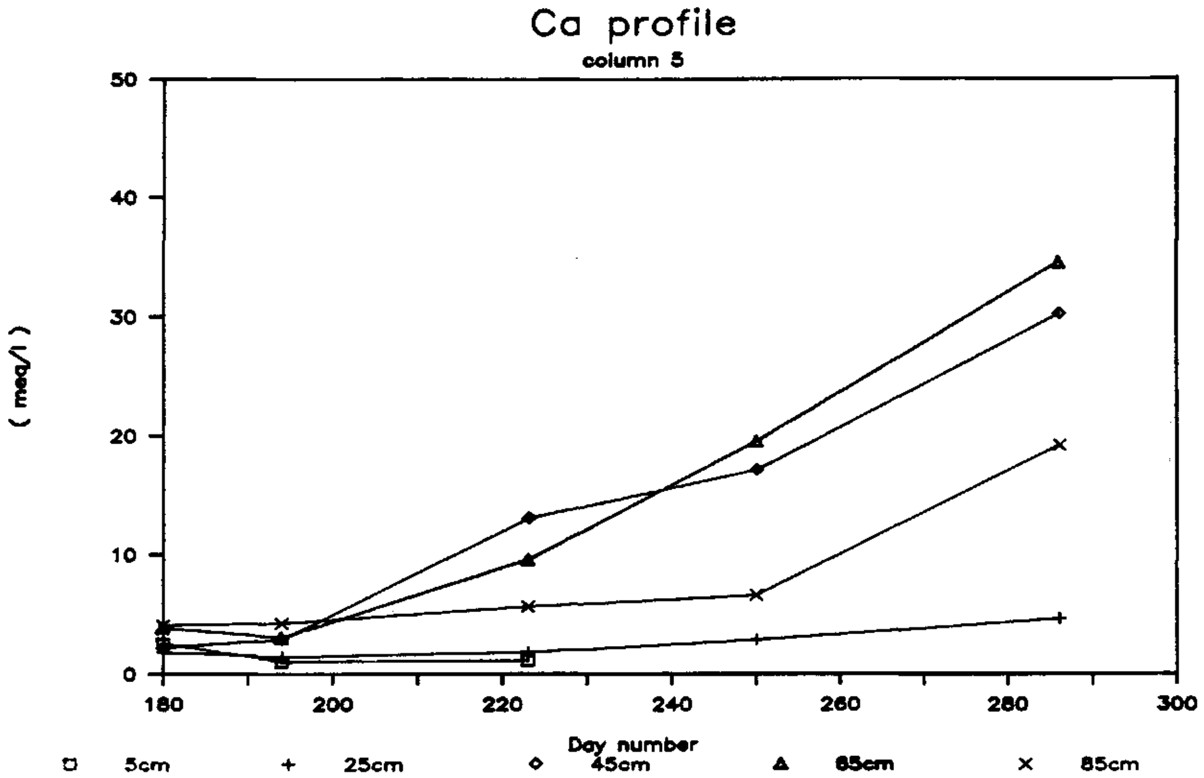
Ca profile
Column 1
50
40
30
20
10
0
(meq/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



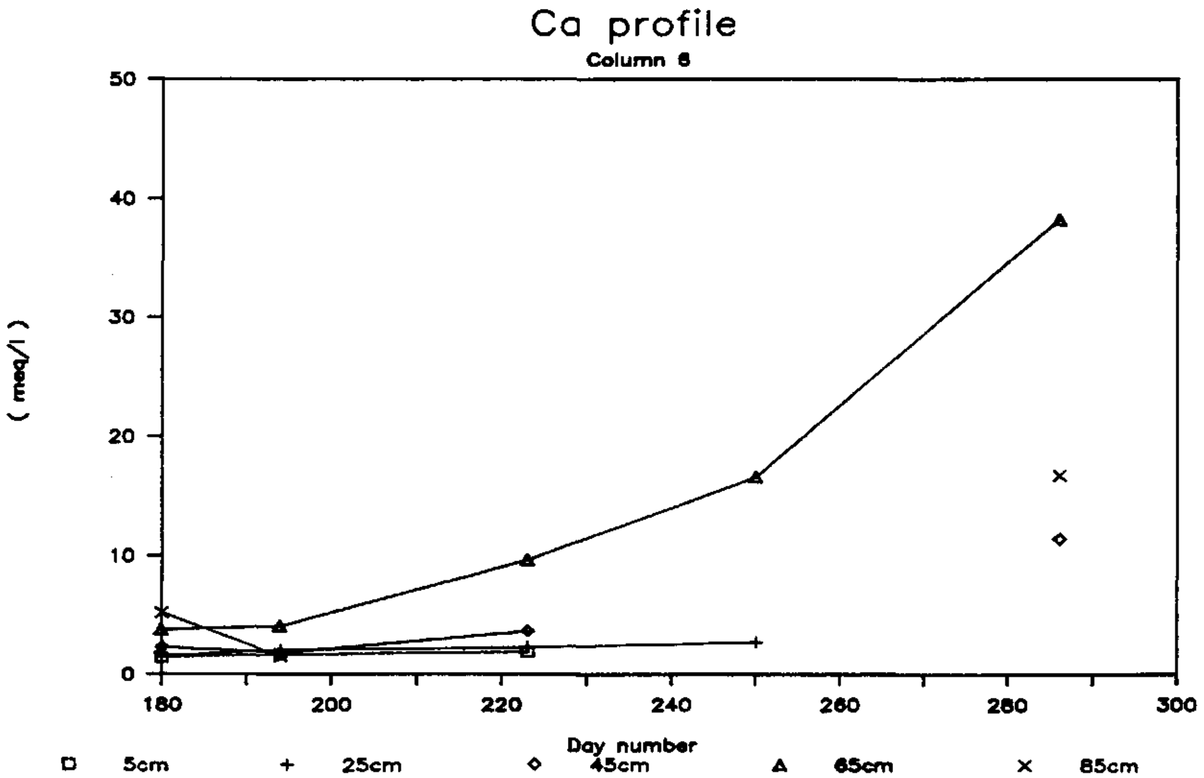
Ca profile
Column 2
50
40
30
20
10
0
(meq/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm


Ca profile
Column 3
50
40
30
20
10
0
(meq/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

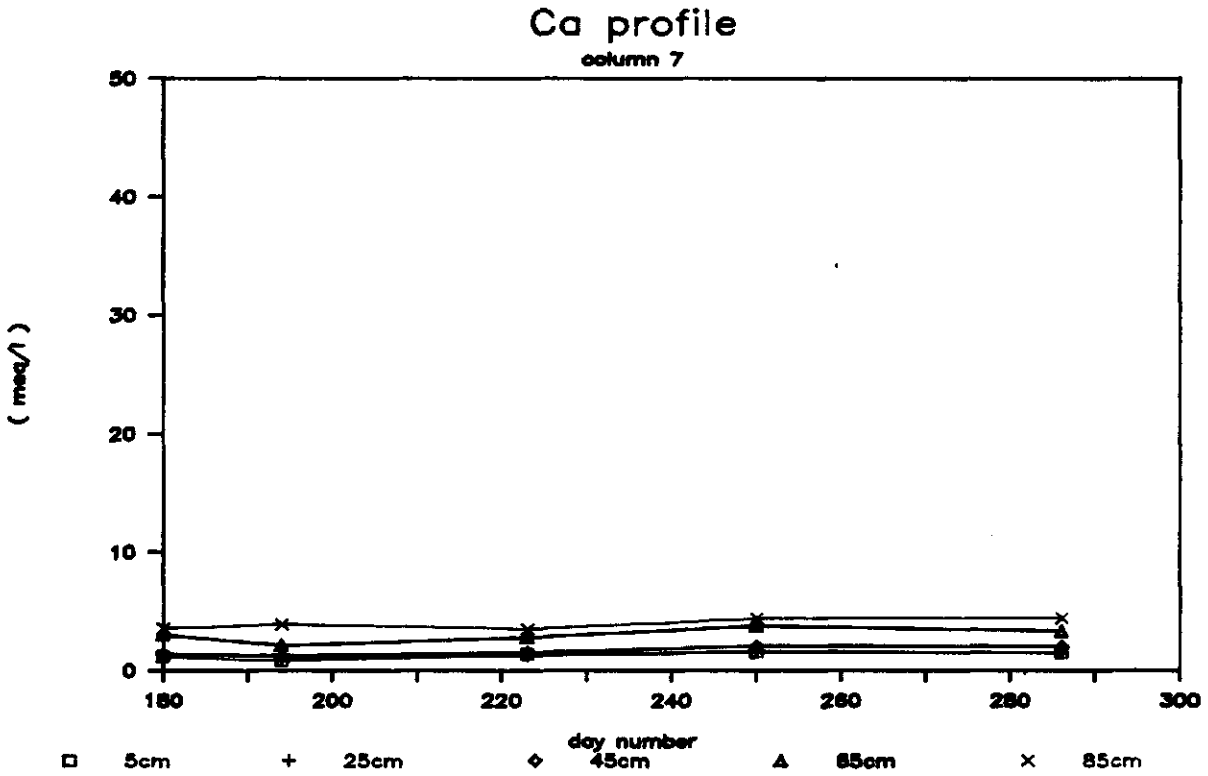

Ca profile
Column 4
50
40
30
20
10
0
(meq/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



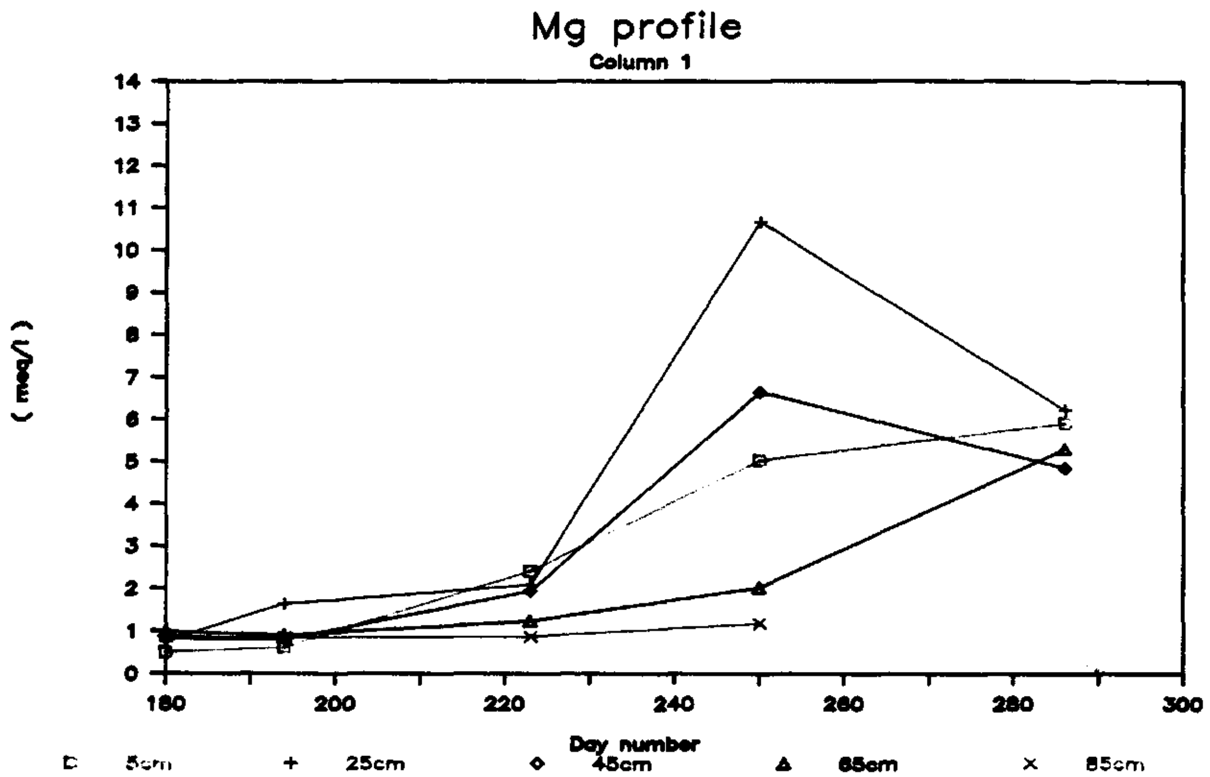
Ca profile
column 5
50
40
30
20
10
0
(meq/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



Ca profile
Column 6
50
40
30
20
10
0
(meq/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



Ca profile
column 7
50
40
30
20
10
0
(meq/l)
180
200
220
240
260
280
300
day number
5cm
25cm
45cm
65cm
85cm


Mg profile
Column 1
(meq/l)
14
13
12
11
10
9
8
7
6
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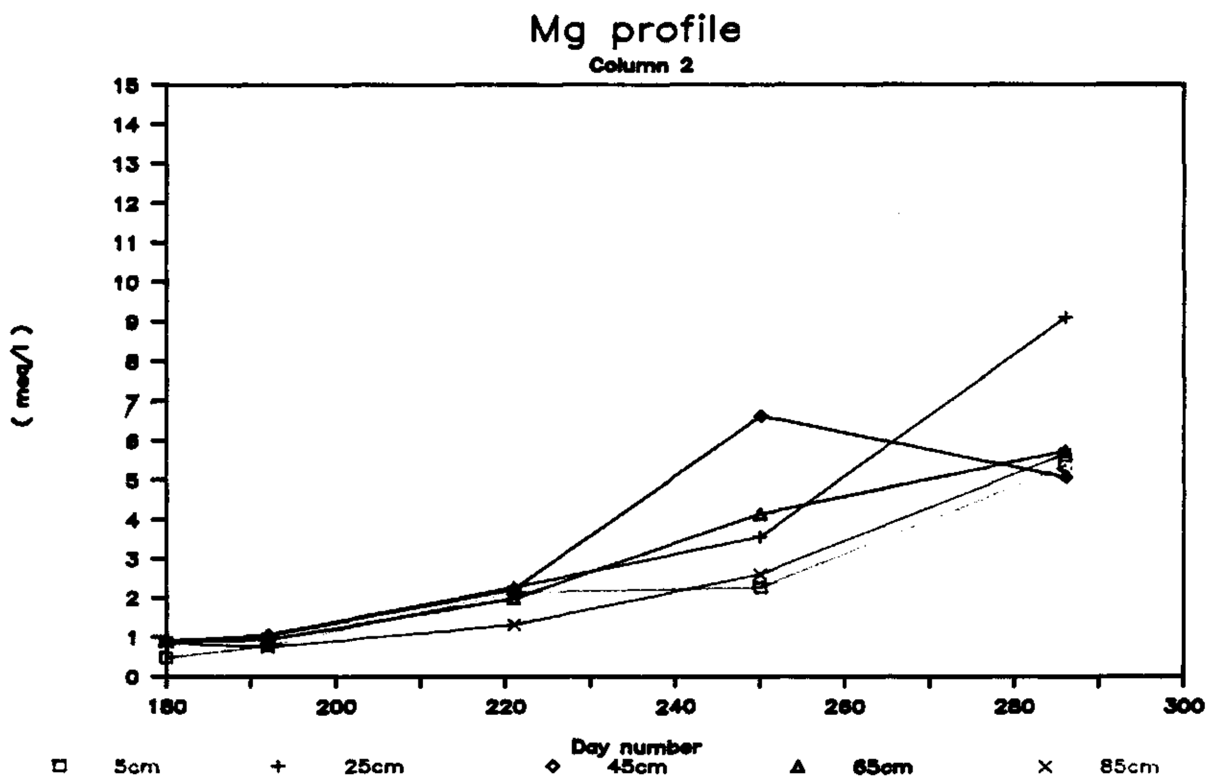
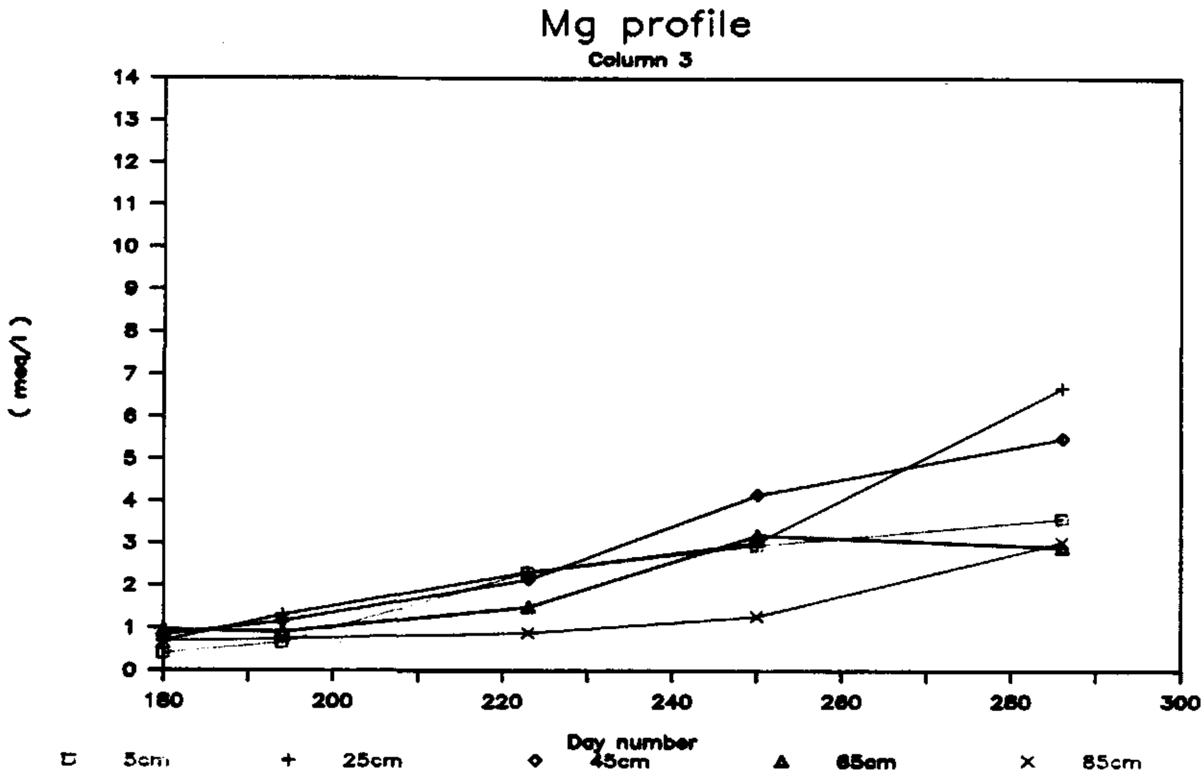
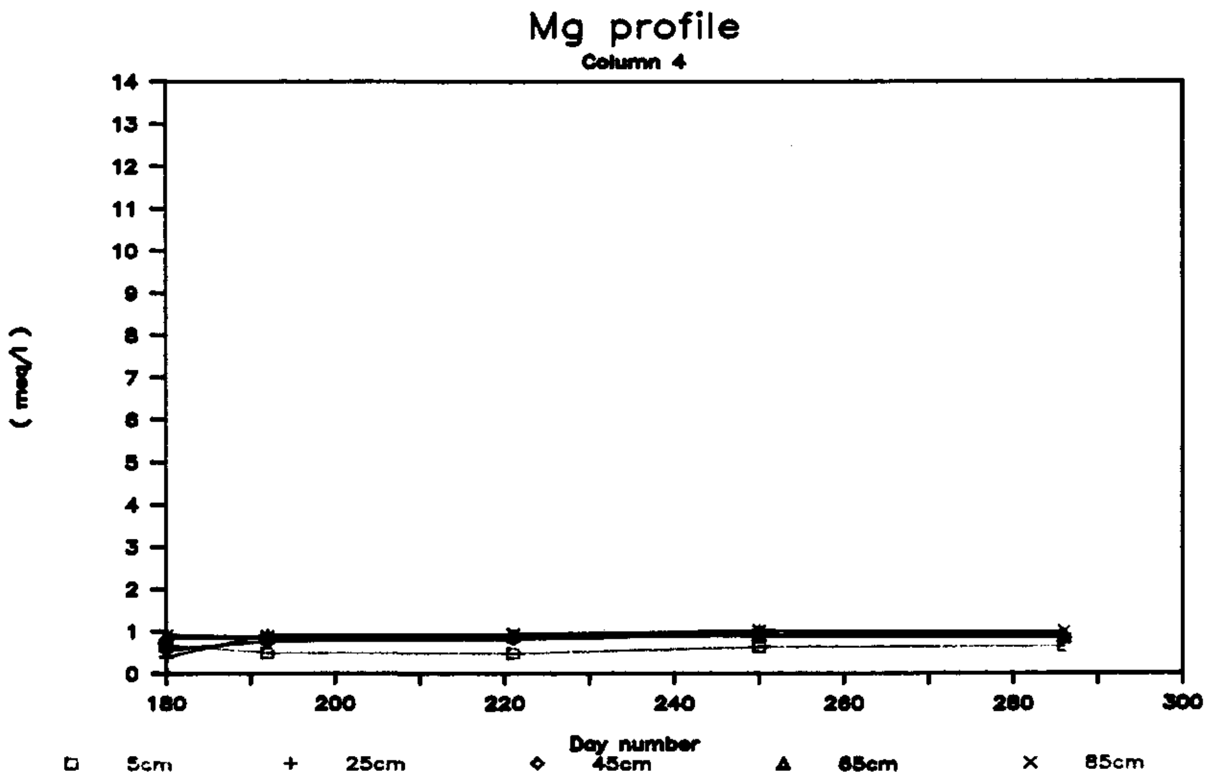
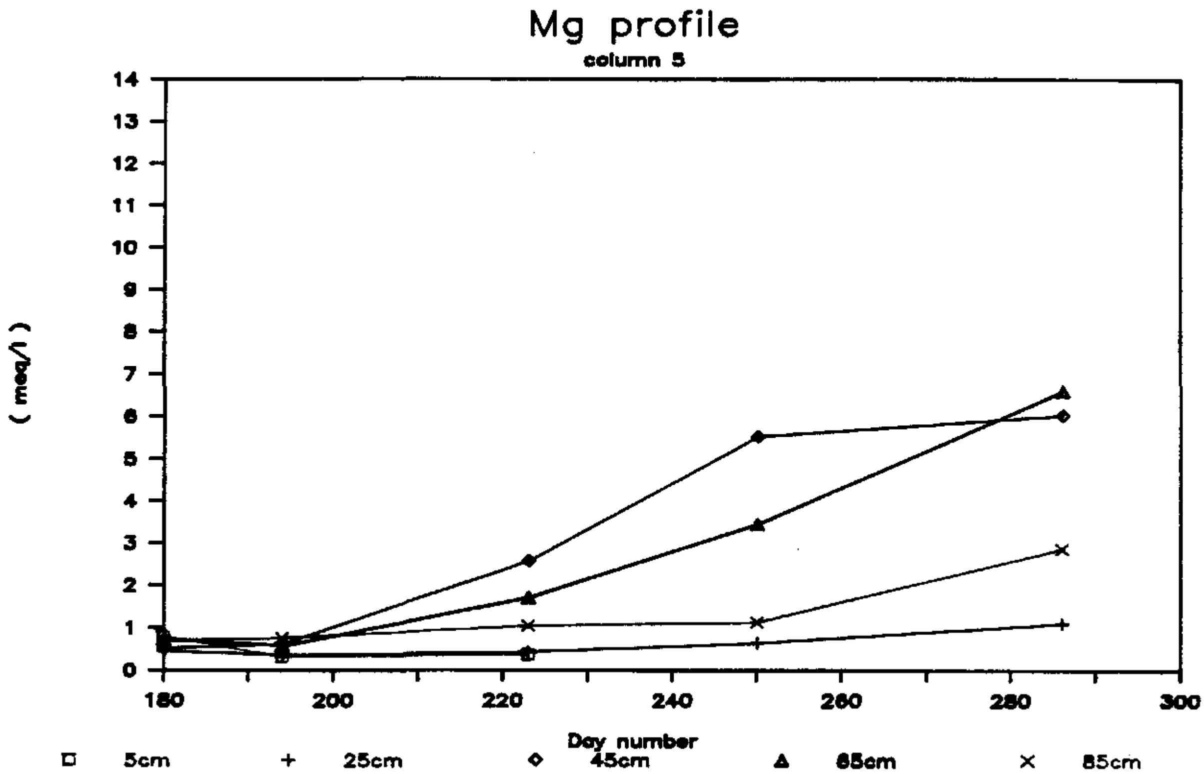
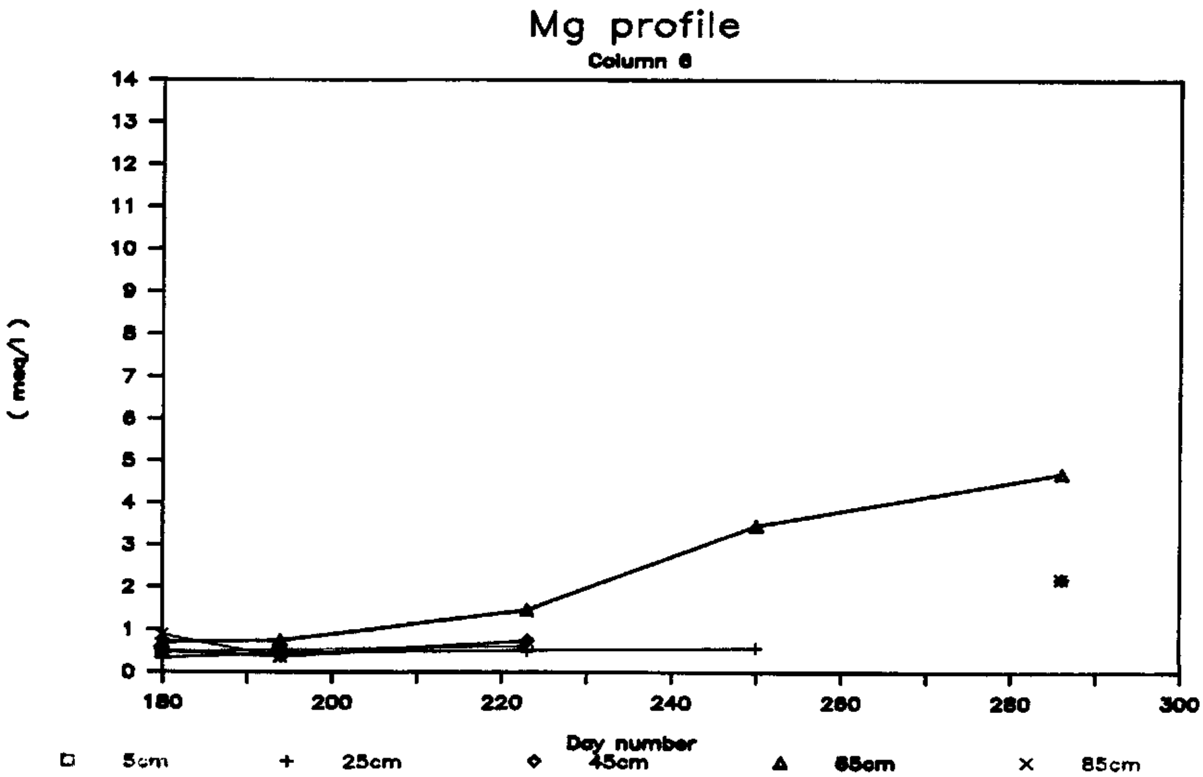
4
3
2
1
0
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

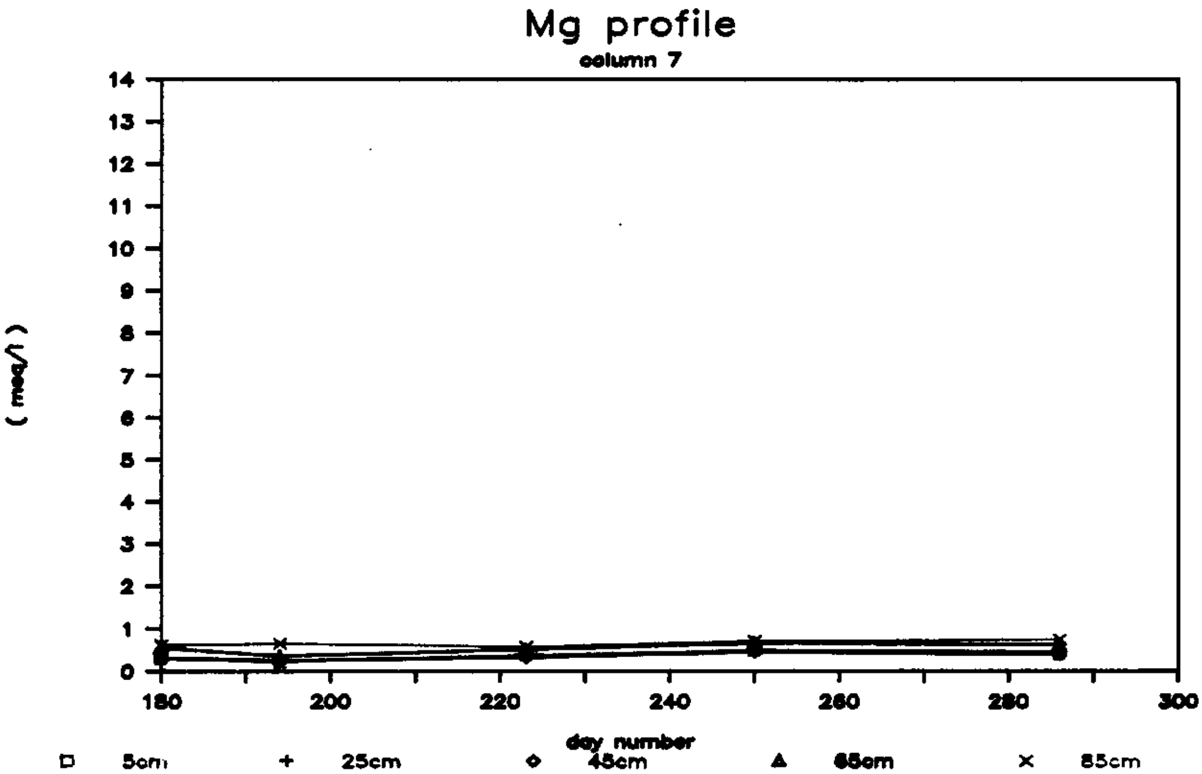

Mg profile
Column 2
(meq/l)
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

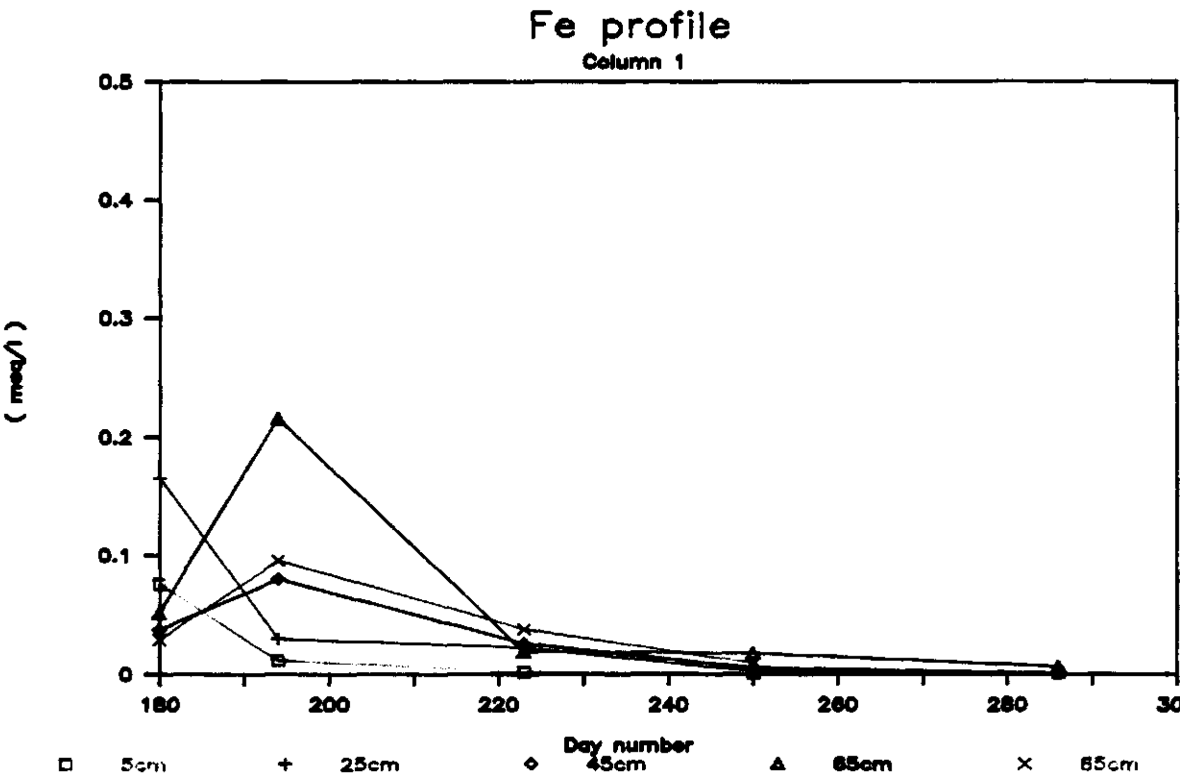

Mg profile
Column 3
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
(meq/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm


Mg profile
Column 4
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
(meq/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

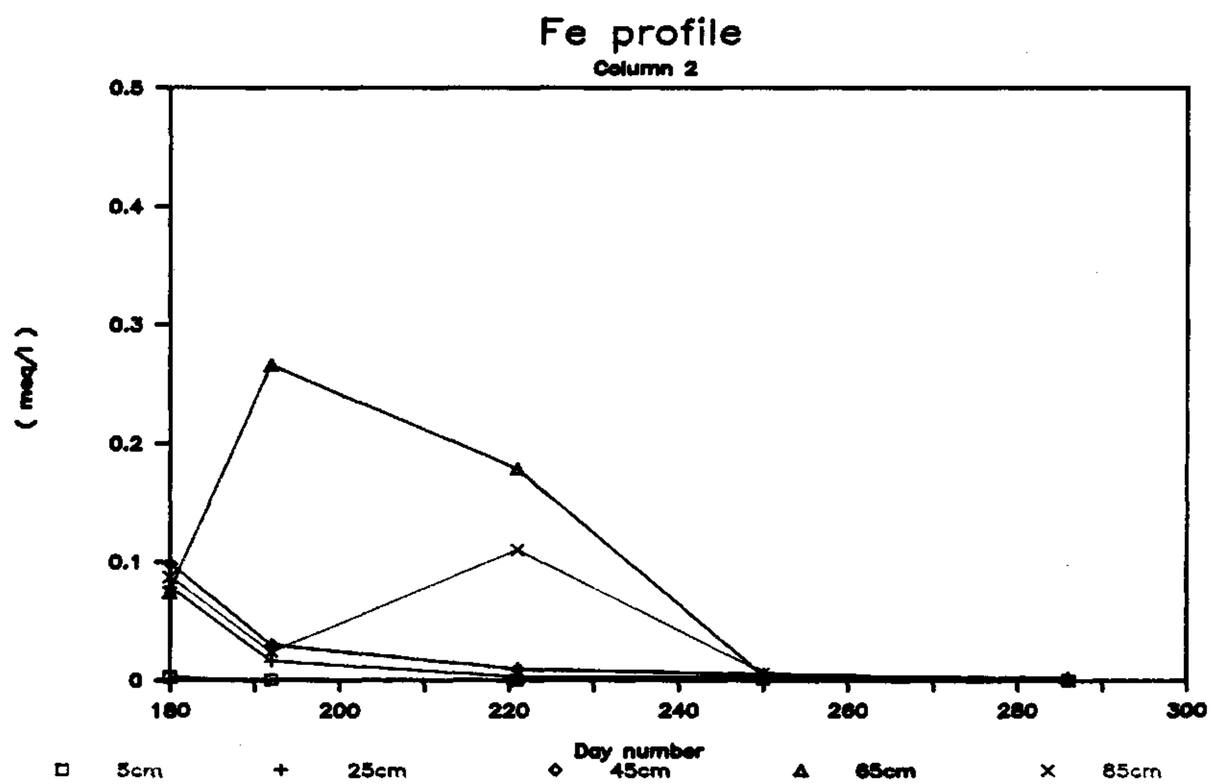

Mg profile
column 5
(meq/l)
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm


Mg profile
Column 6
(meq/l)
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

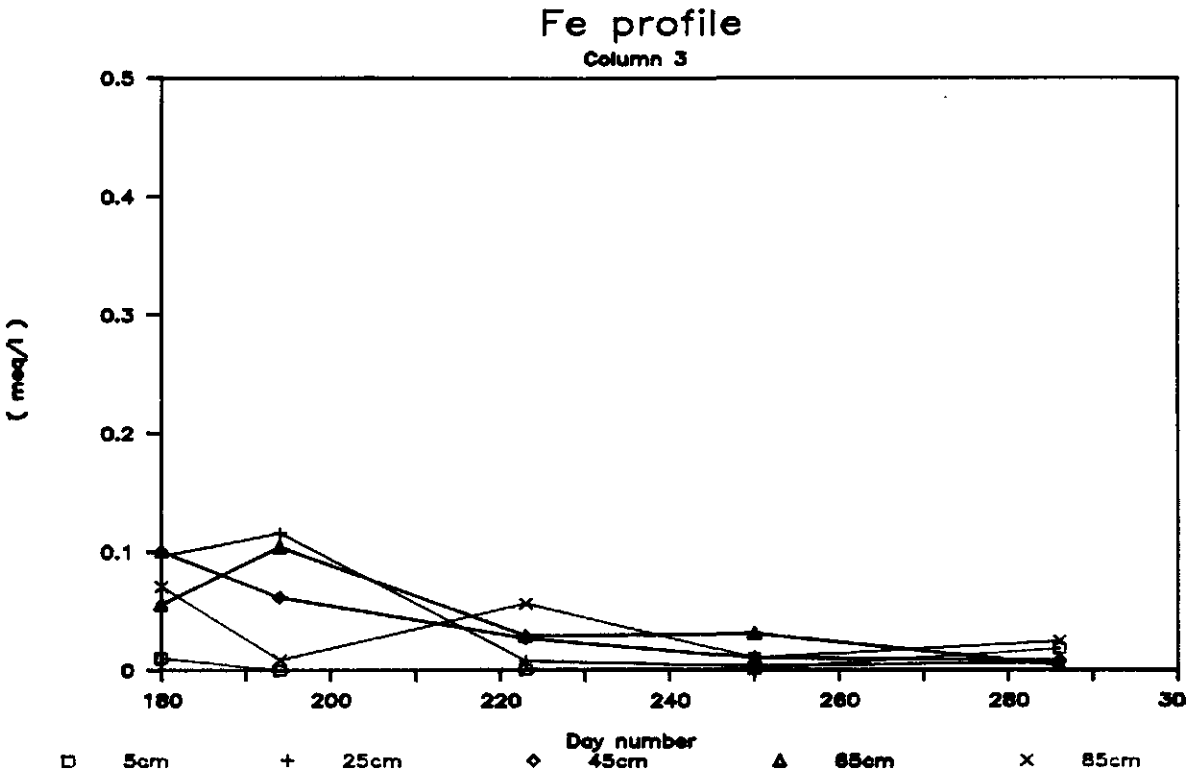

Mg profile
column 7
(meq/l)
day number
5cm
25cm
45cm
65cm
85cm



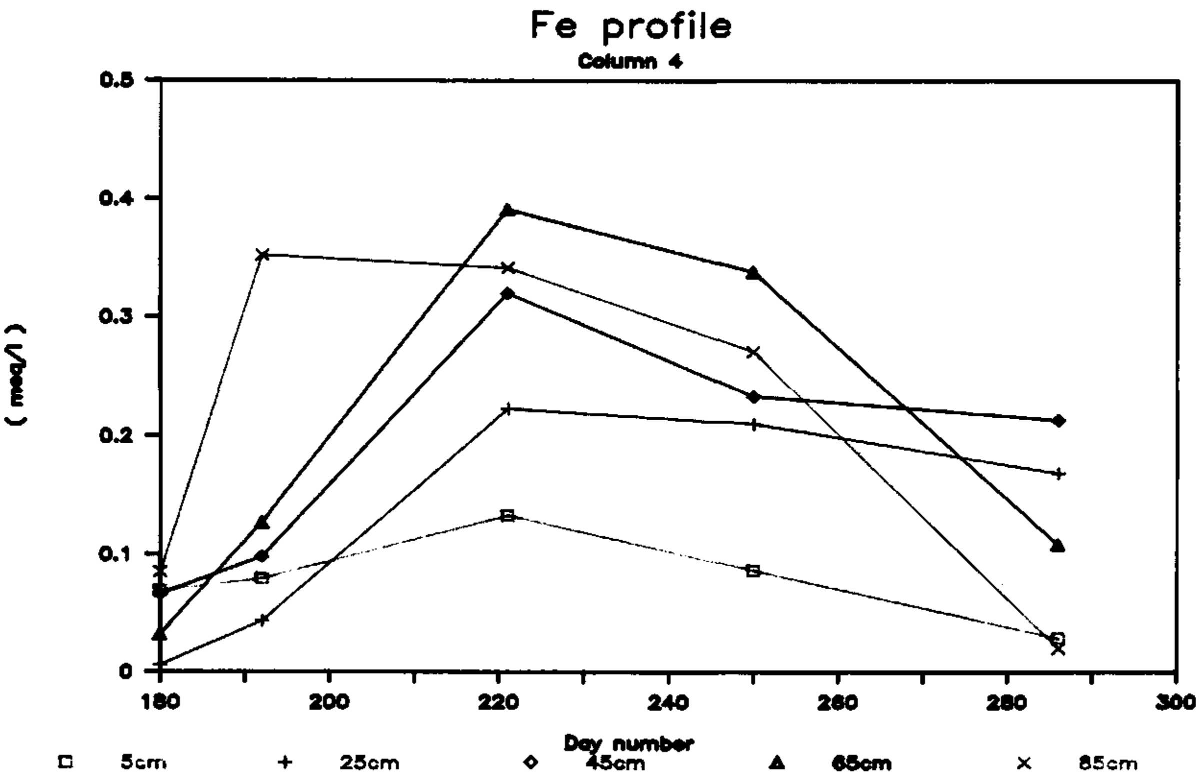
Fe profile
Column 1
0.5
0.4
0.3
0.2
0.1
0
(meq/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



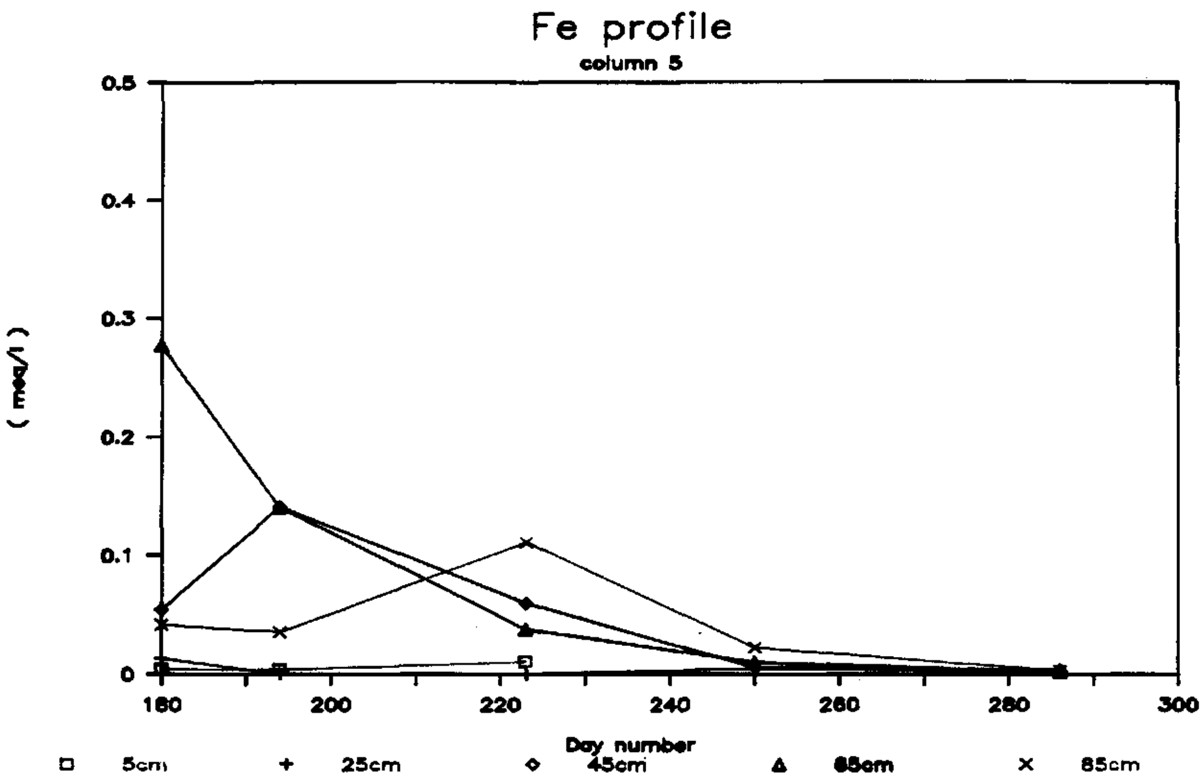
Fe profile
Column 2
0.5
0.4
0.3
0.2
0.1
0
(meq/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



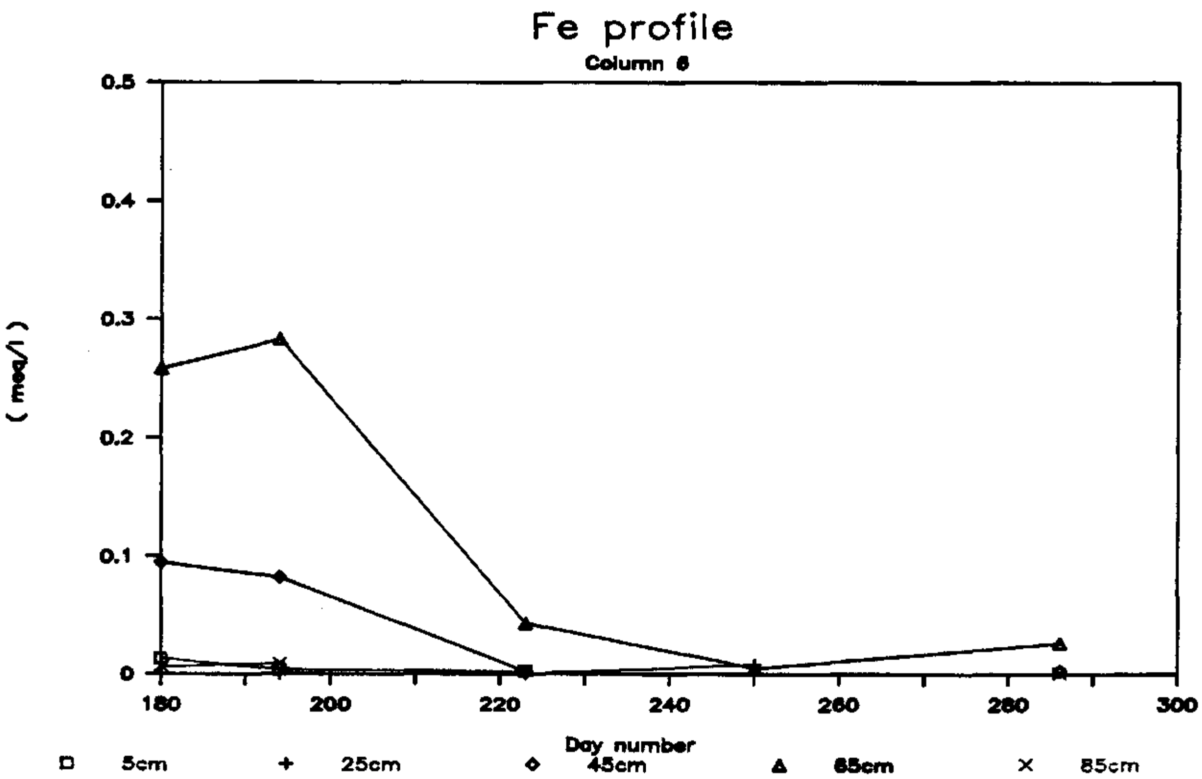
Fe profile
Column 3
0.5
0.4
0.3
0.2
0.1
0
(meq/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



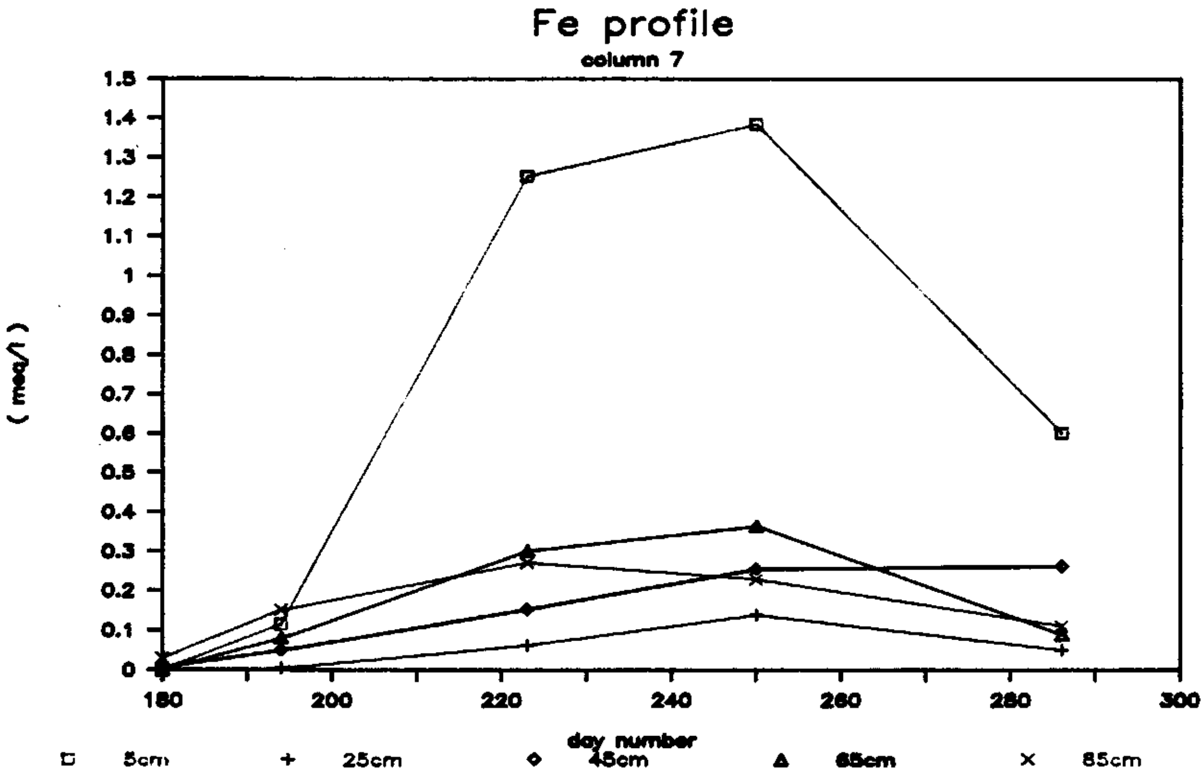
Fe profile
Column 4
0.5
0.4
0.3
0.2
0.1
0
(meq/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



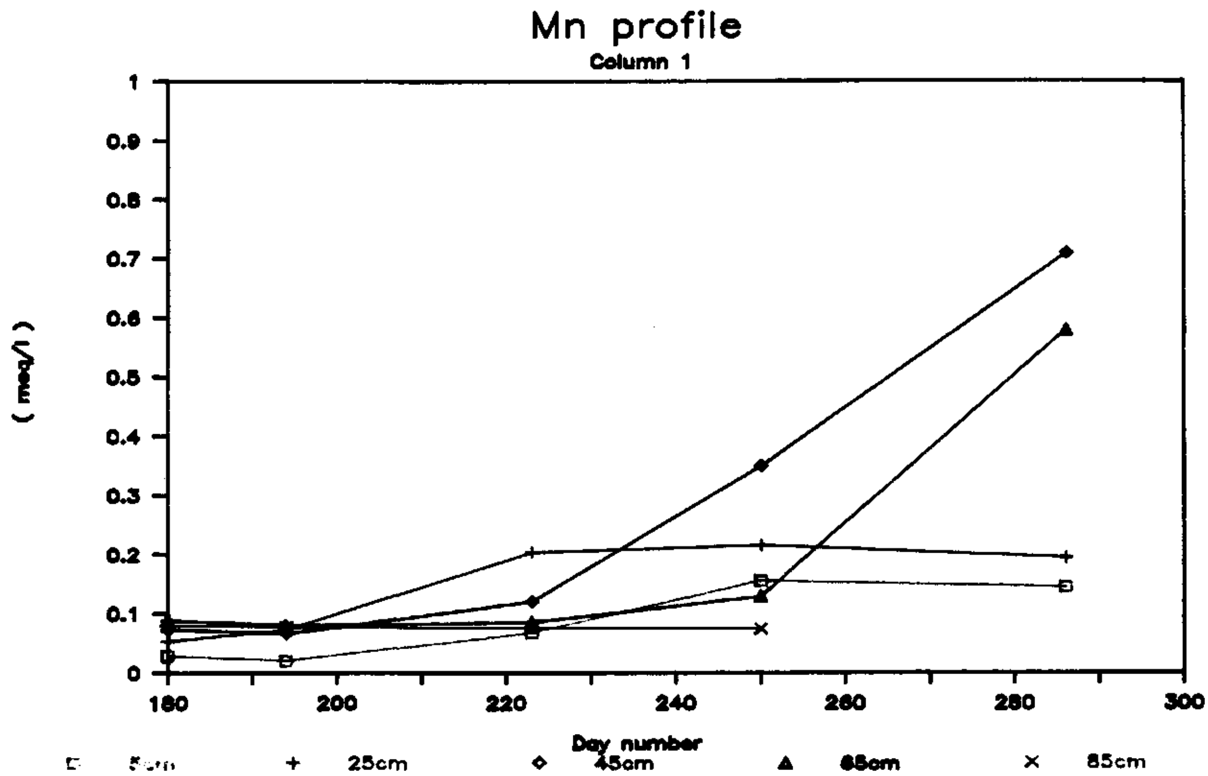
Fe profile
column 5
0.5
0.4
0.3
0.2
0.1
0
(meq/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



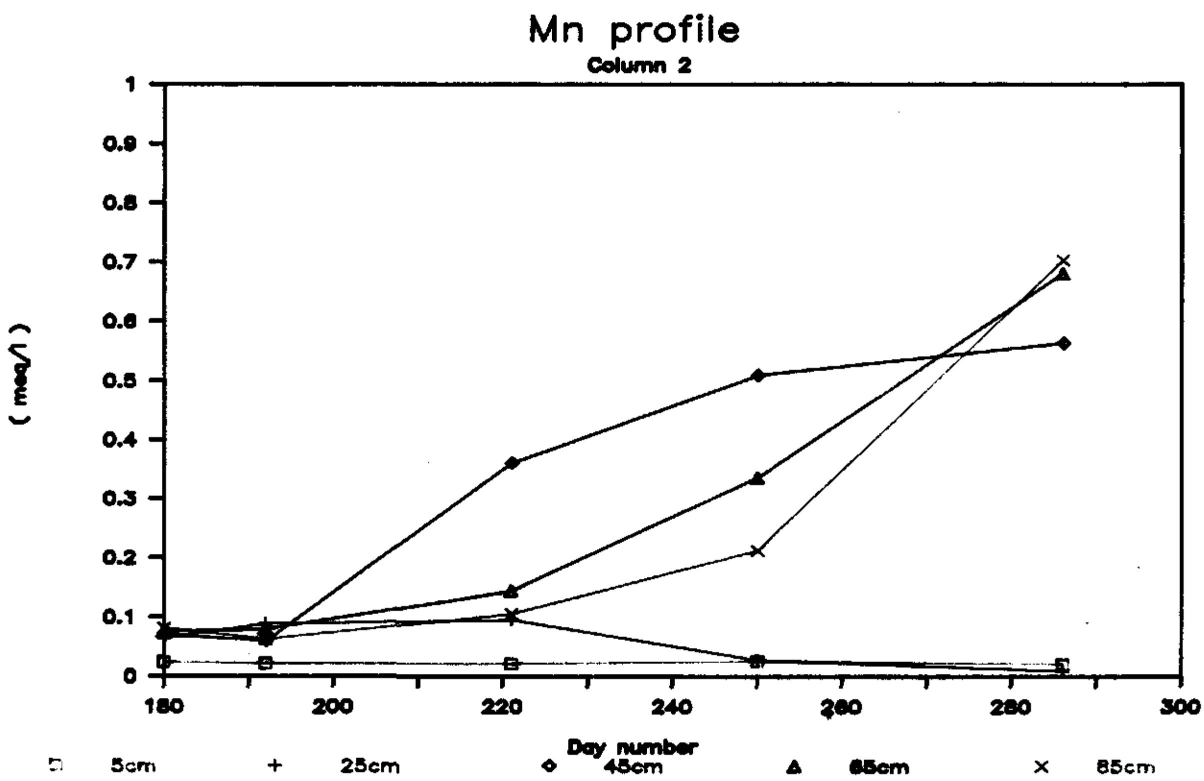
Fe profile
Column 6
0.5
0.4
0.3
0.2
0.1
0
(meq/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



Fe profile
column 7
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
(meq/l)
180
200
220
240
260
280
300
day number
5cm
25cm
45cm
65cm
85cm



Mn profile
Column 1
(meq/l)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



Mn profile
Column 2
(meq/l)
1
0.9
0.8
0.7
0.6
0.5
0.4
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0
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200
220
240
260
280
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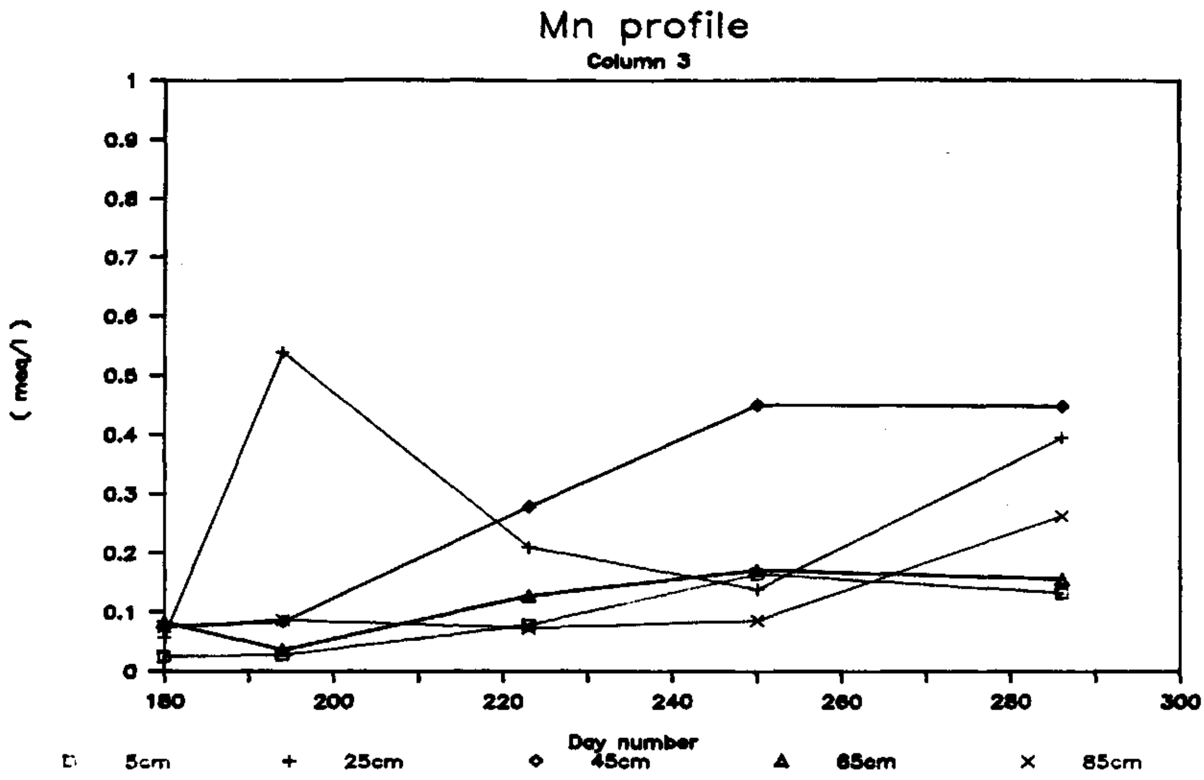
Day number
5cm
25cm
45cm
65cm
85cm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(meq/l)
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0.6
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0.4
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240
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Day number
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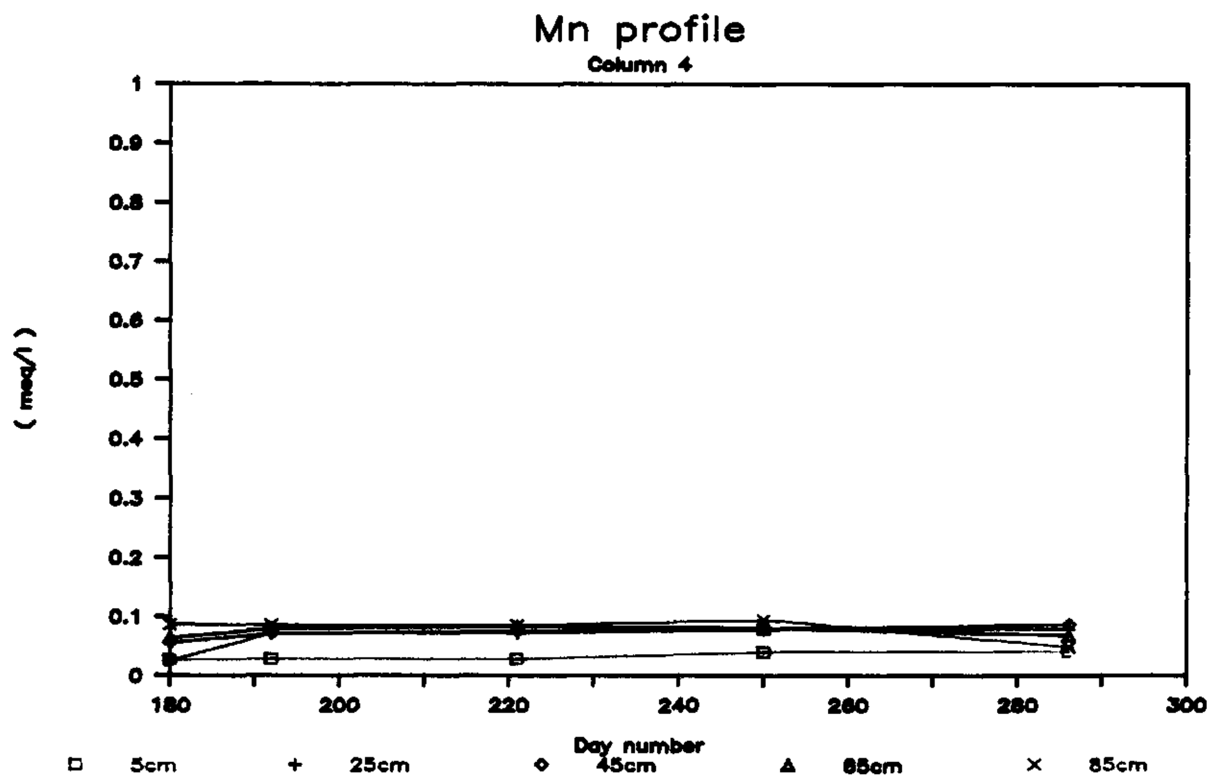
45cm
65cm
85cm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240
260
280
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Day number
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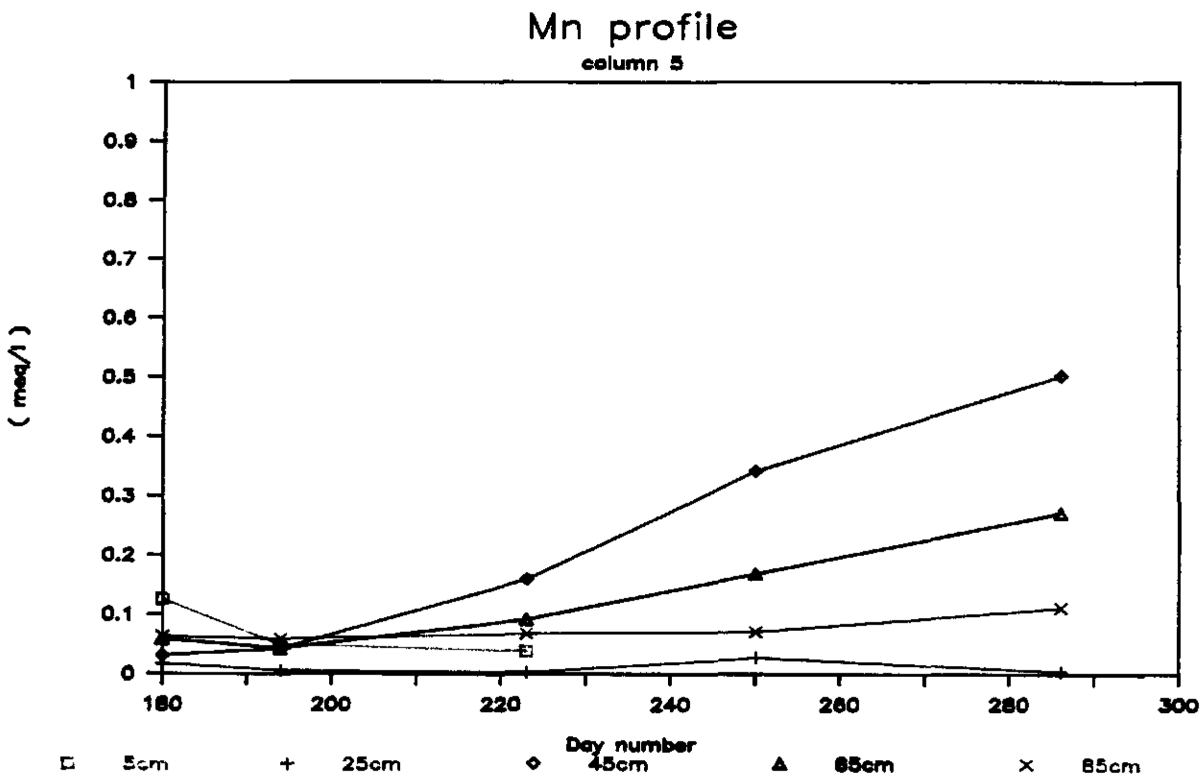
85cm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Day number
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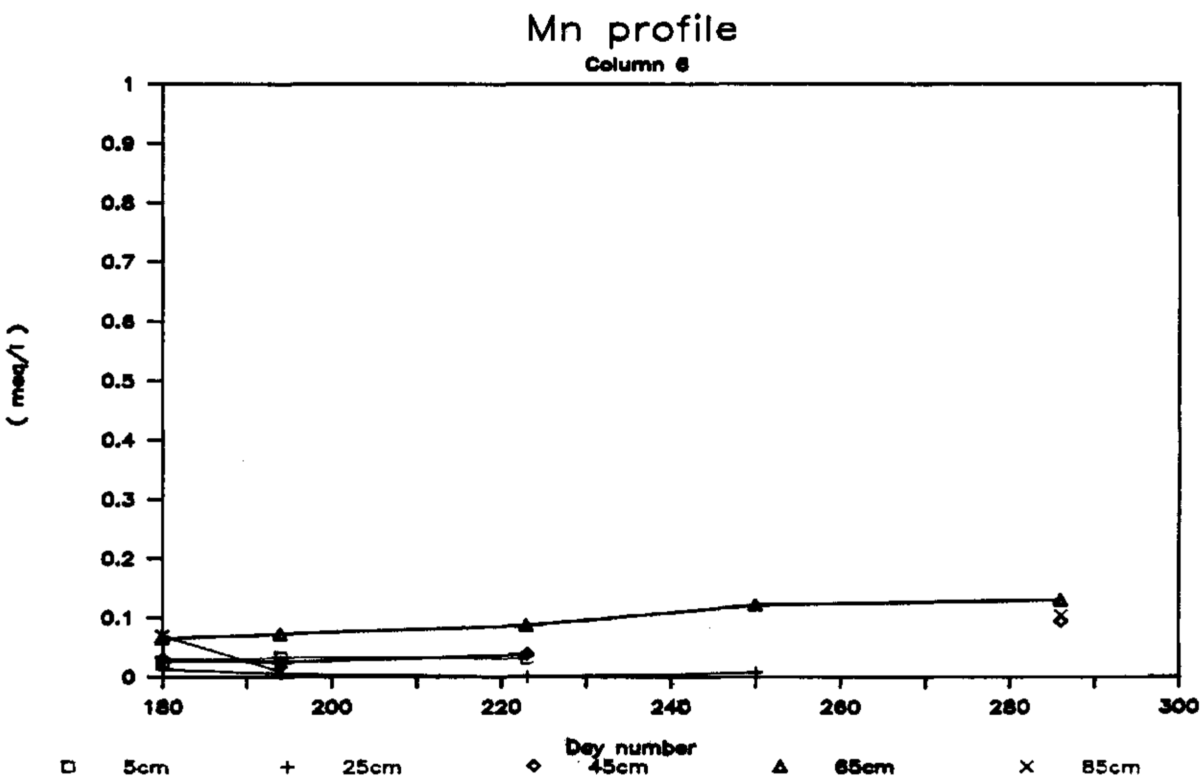
85cm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Day number
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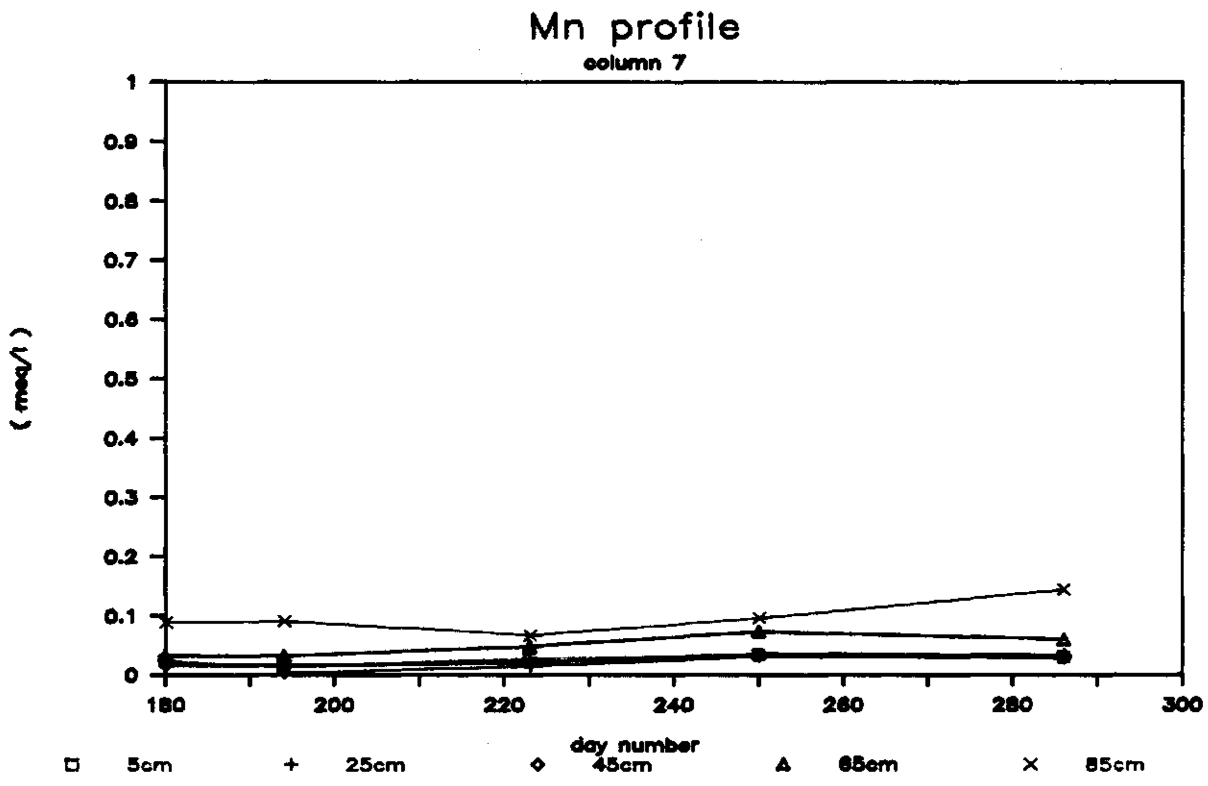
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0.2
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0
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200
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240
260
280
300
day number
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45cm
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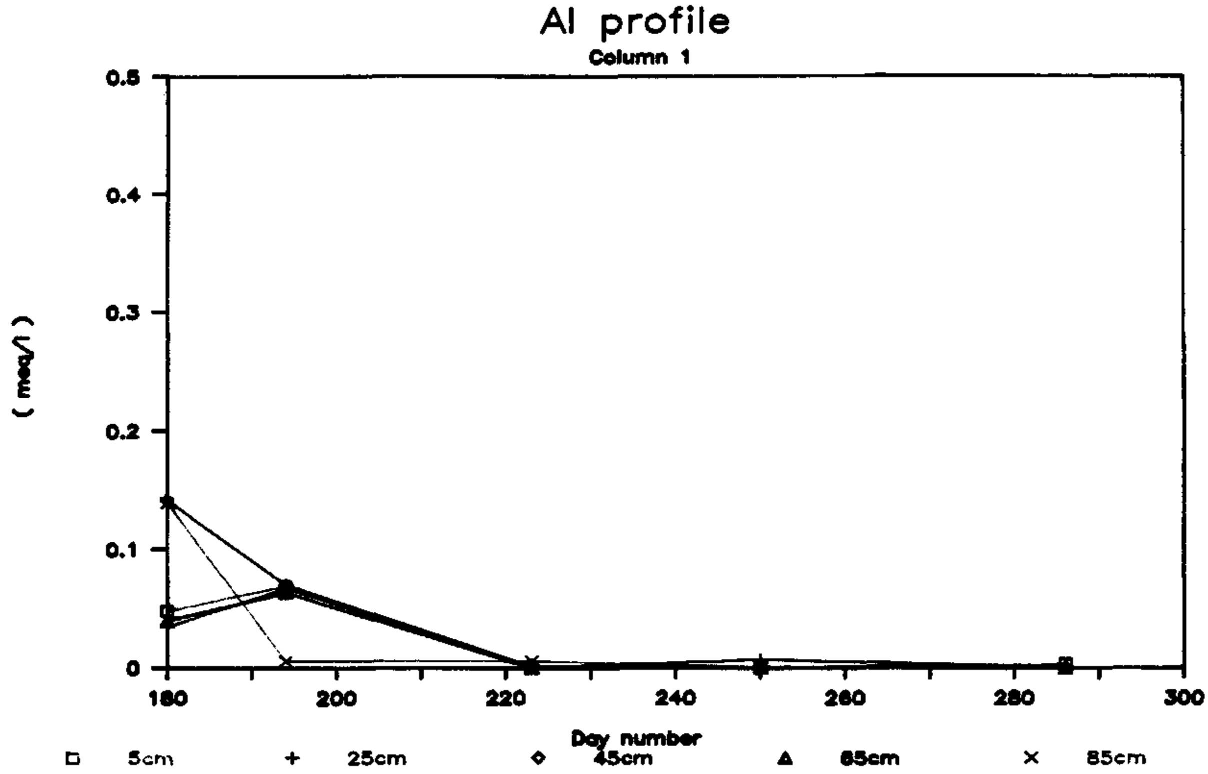

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Day number
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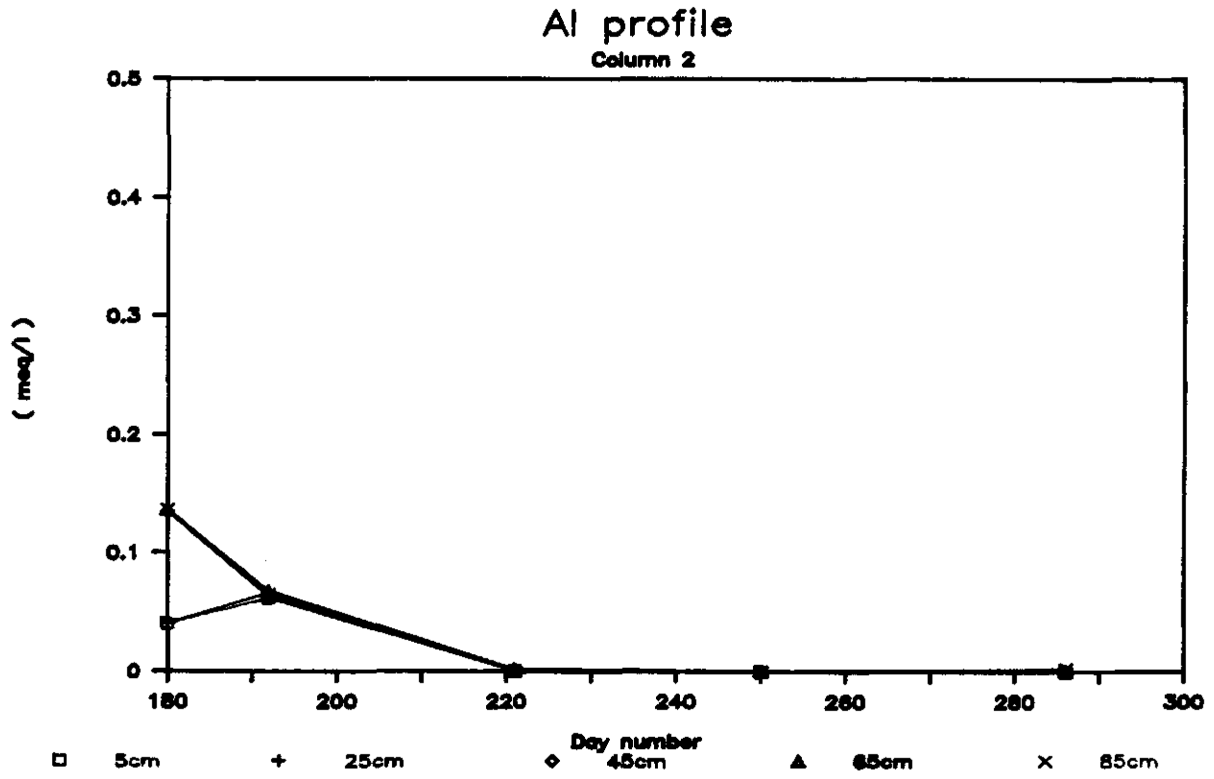

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Day number
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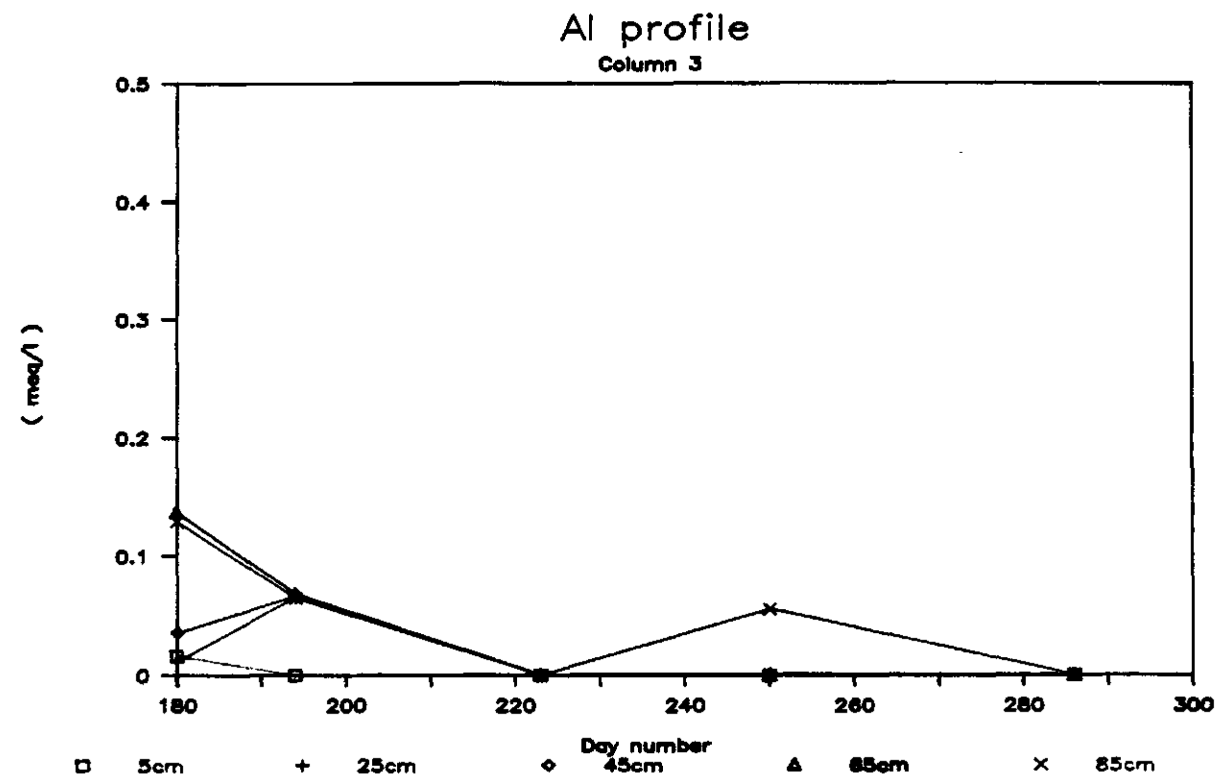
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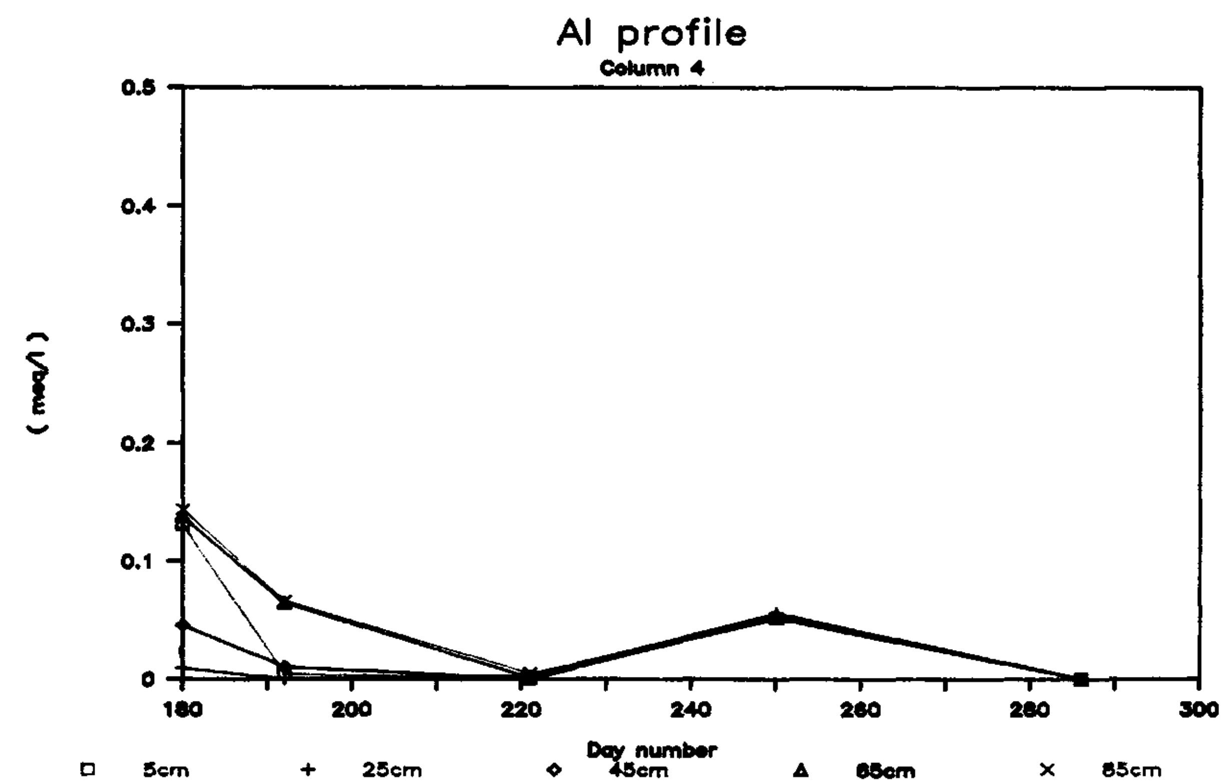
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Day number
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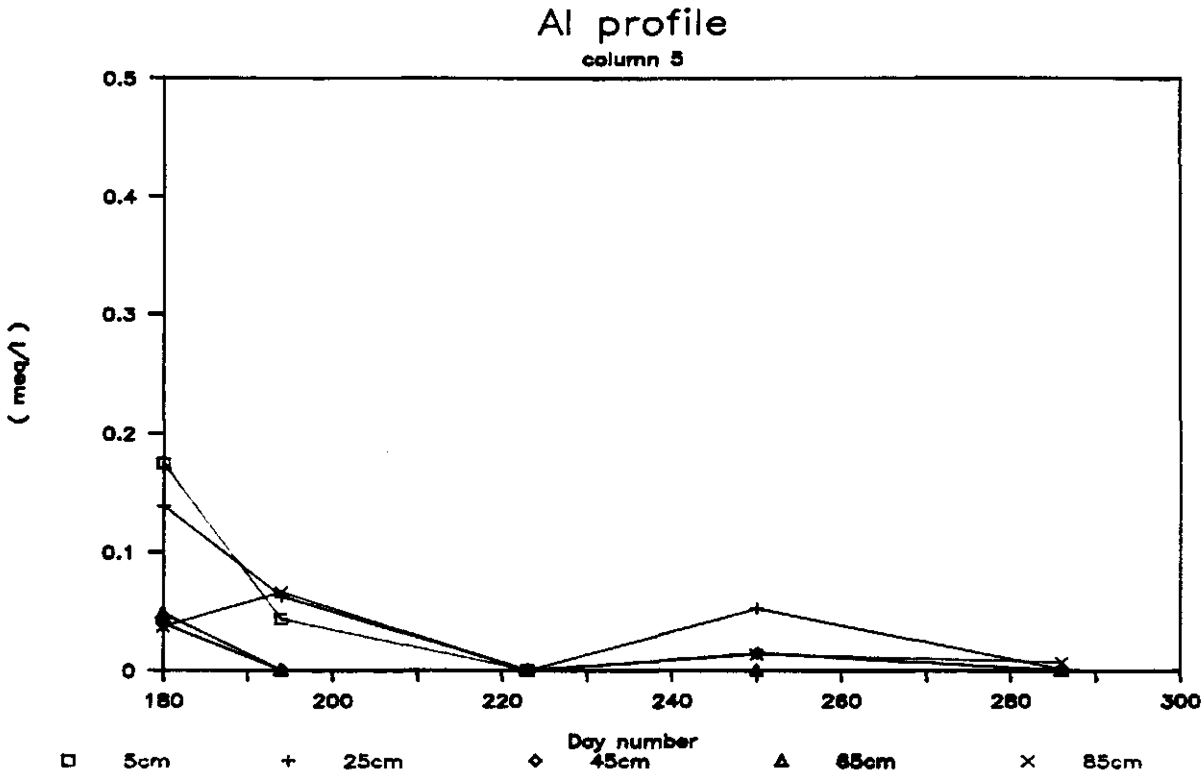
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Day number
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45cm
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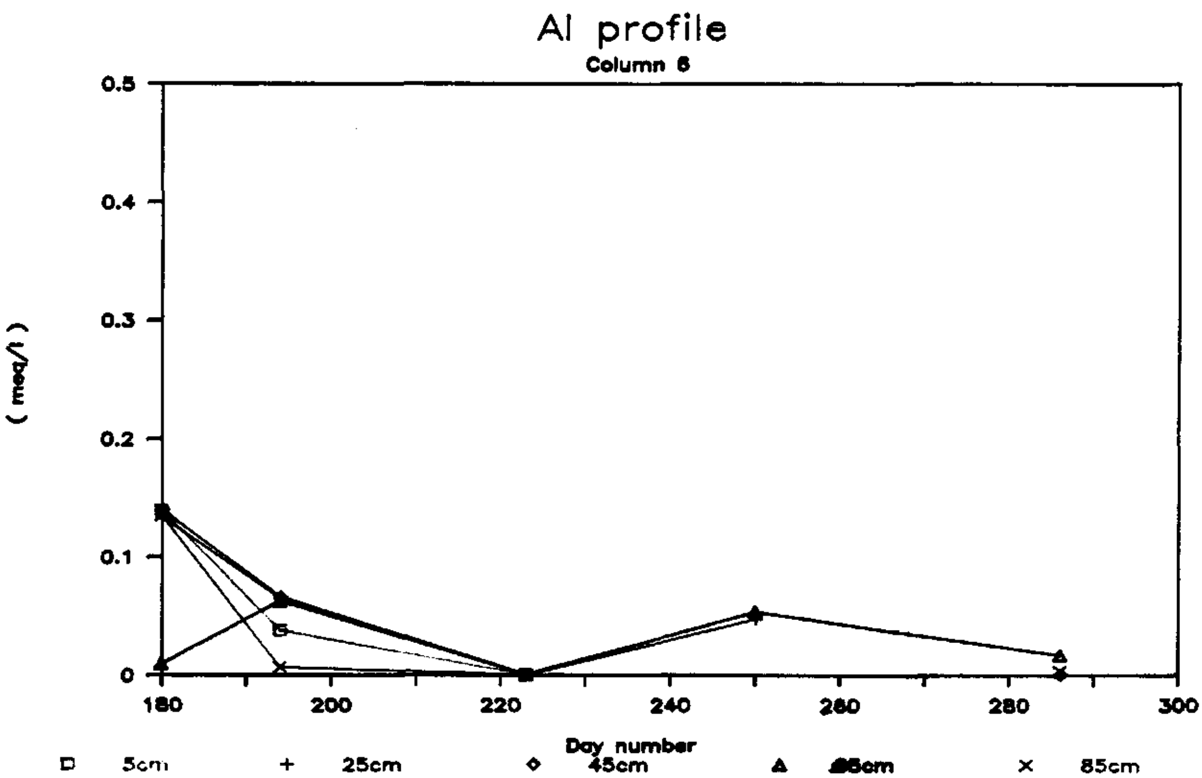
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Day number
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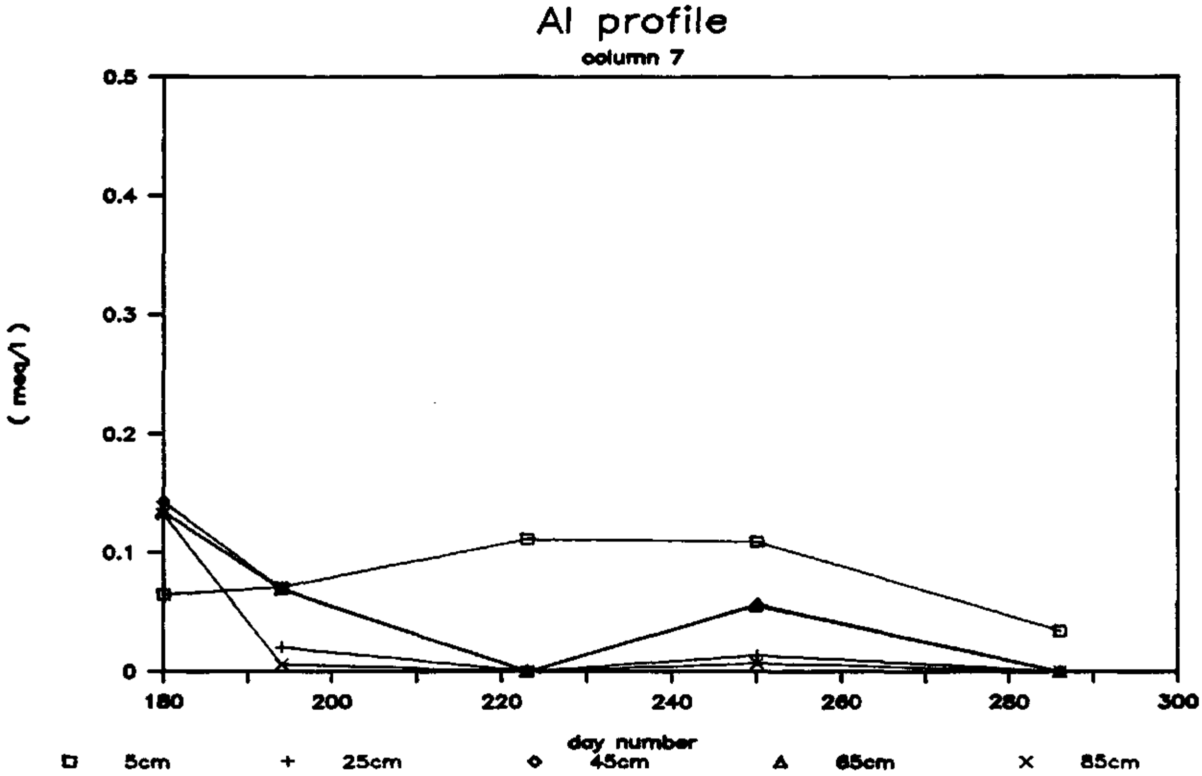

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0.4
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0.2
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(meq/l)
180
200
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280
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day number
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45cm
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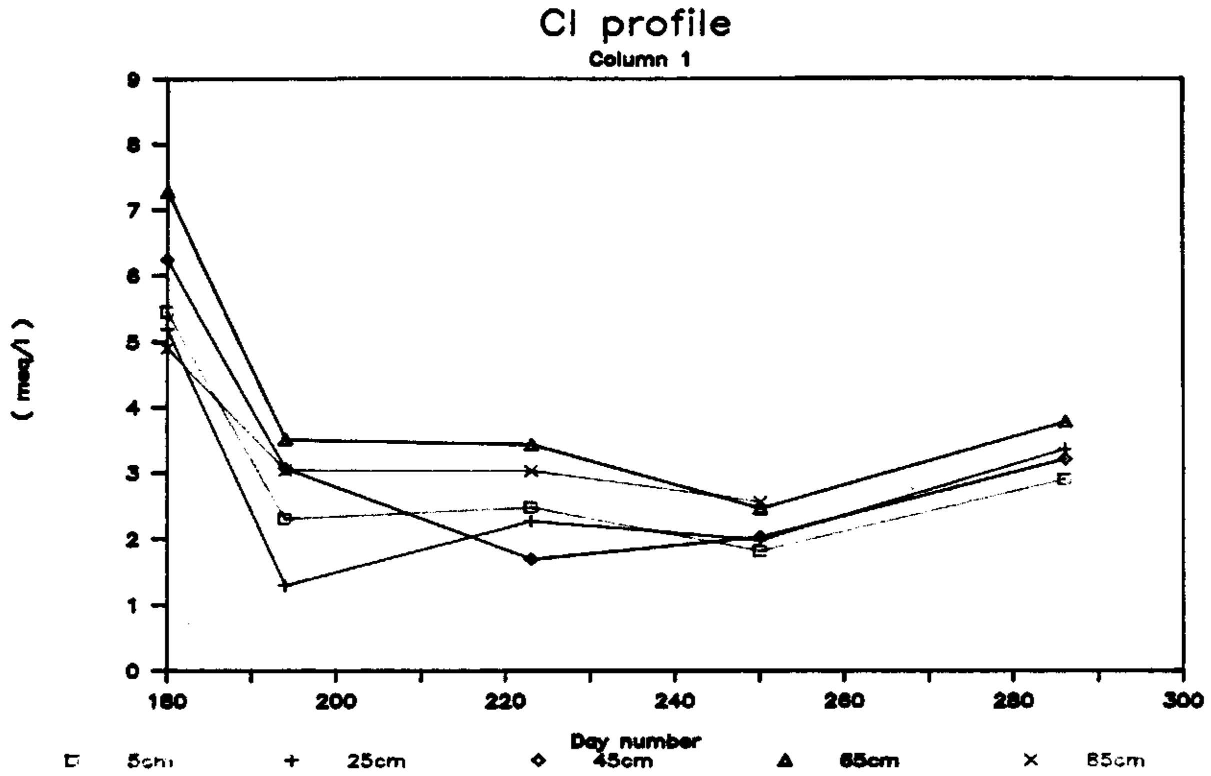
85cm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(meq/l)
Day number
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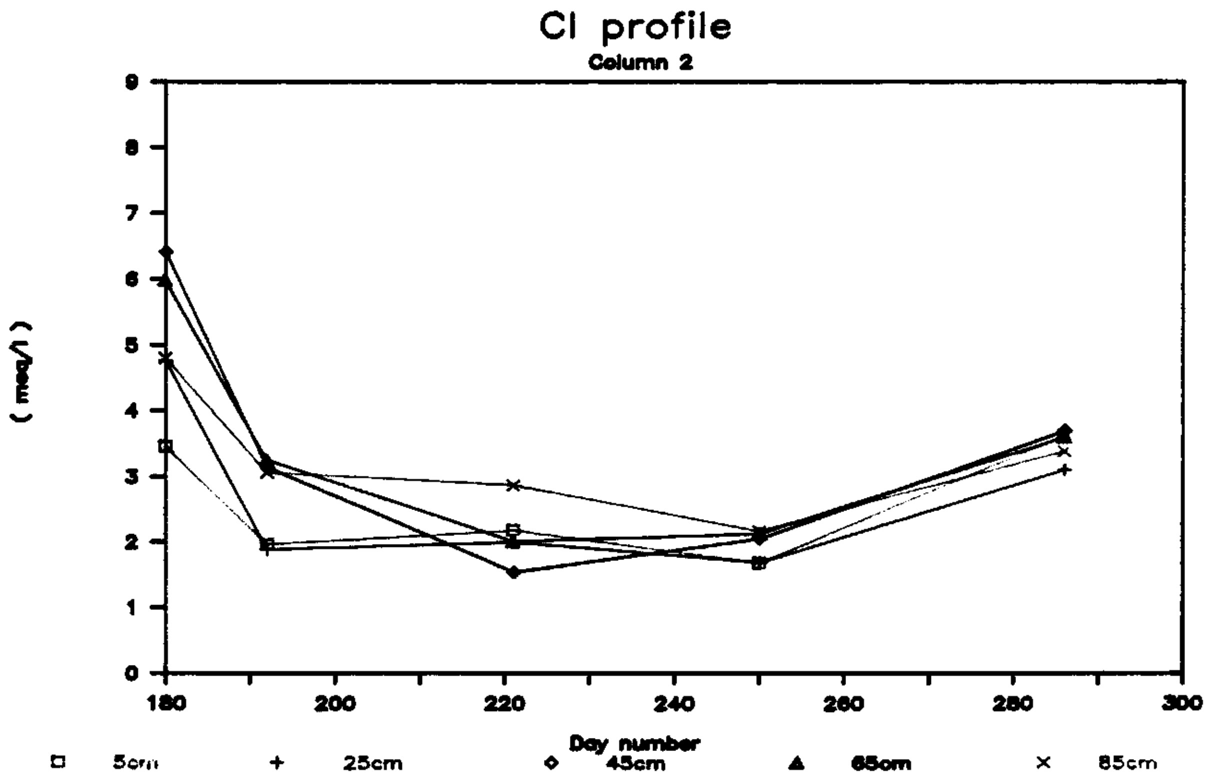
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(meq/l)
Day number
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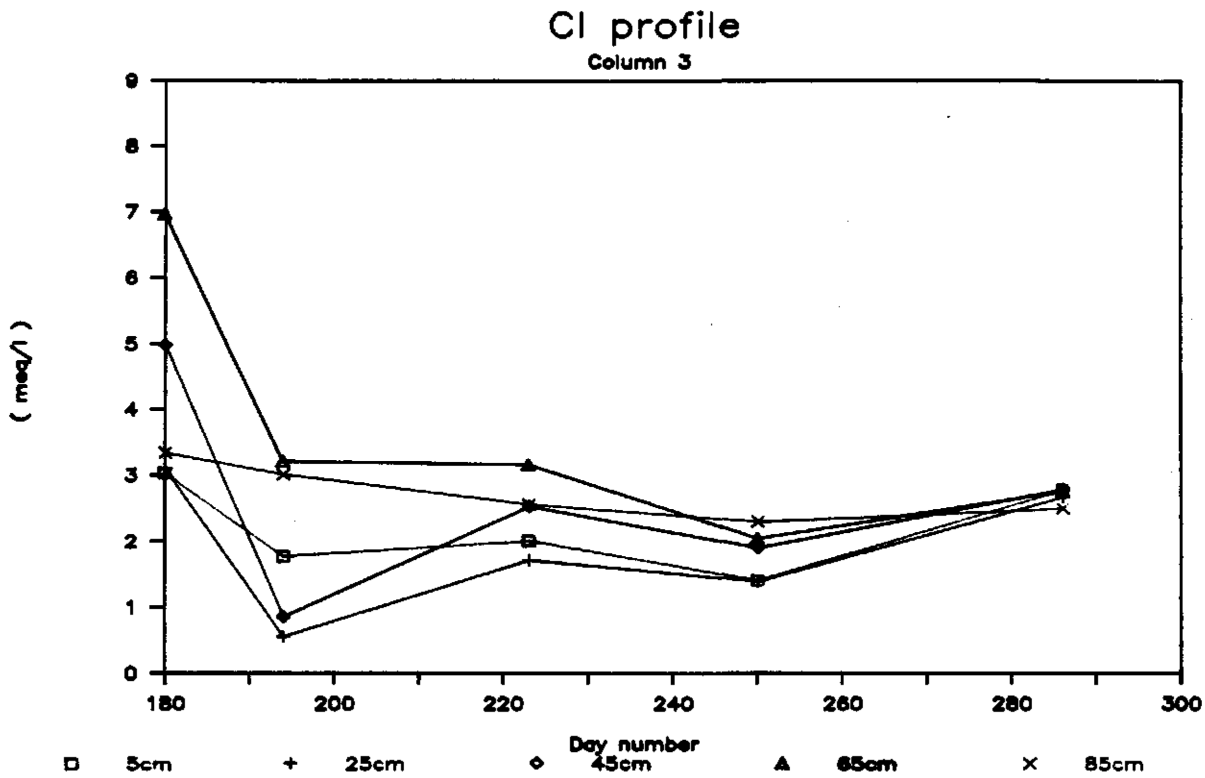
Cl profile
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(meq/l)
0
1
2
3
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200
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300
Day number
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45cm
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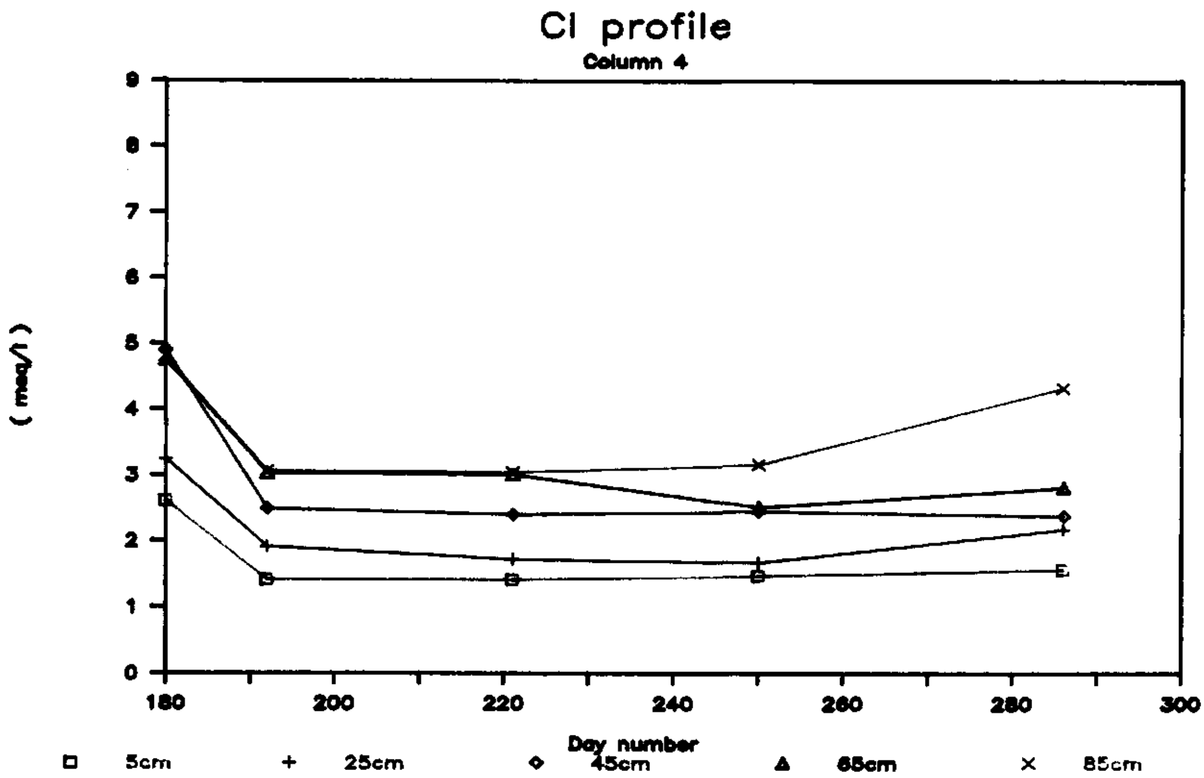
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(meq/l)
0
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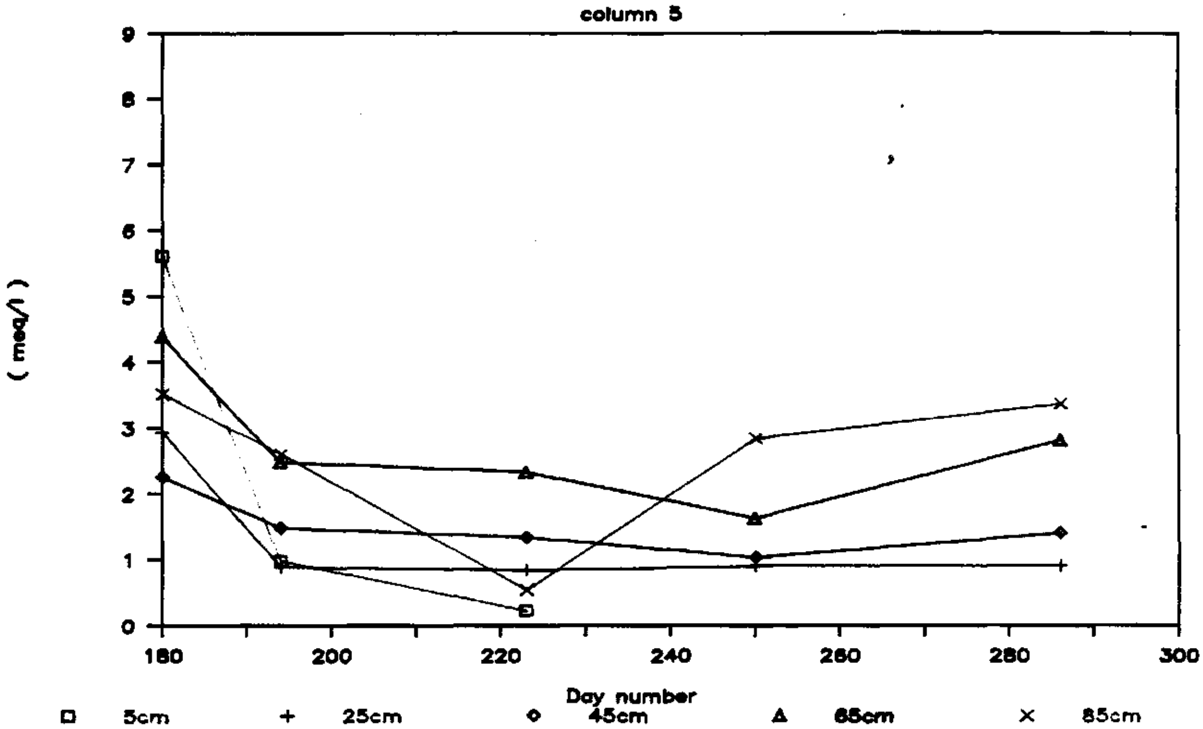
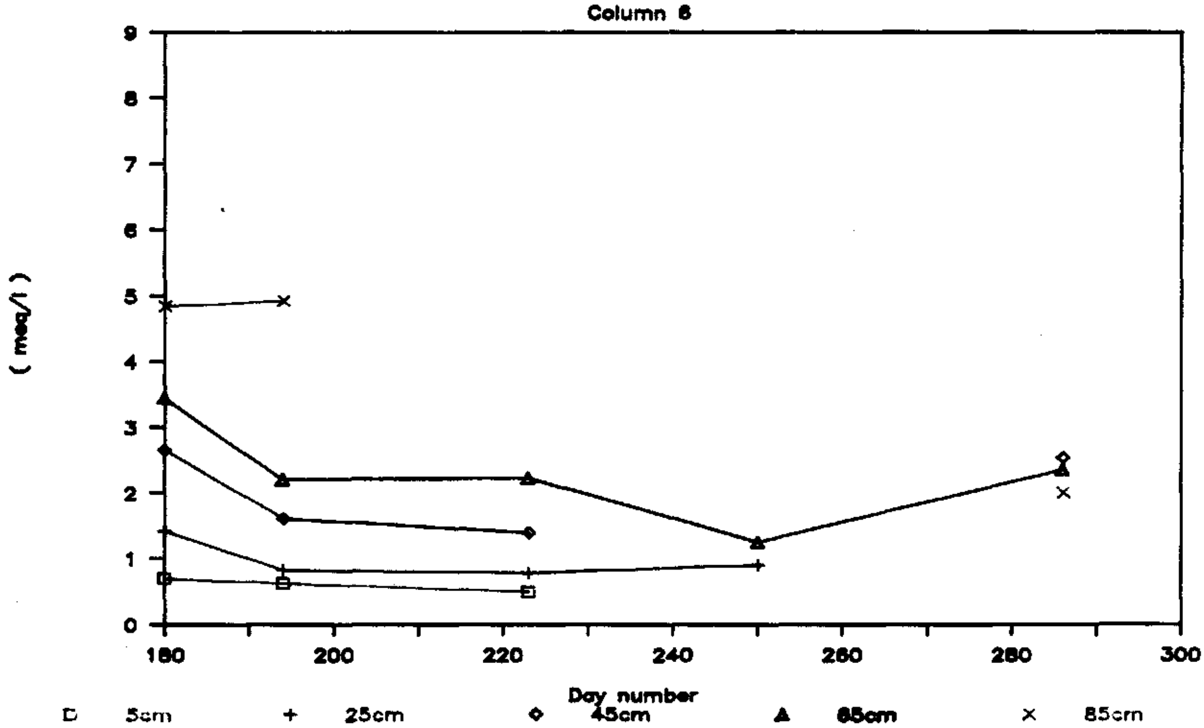
Cl profile

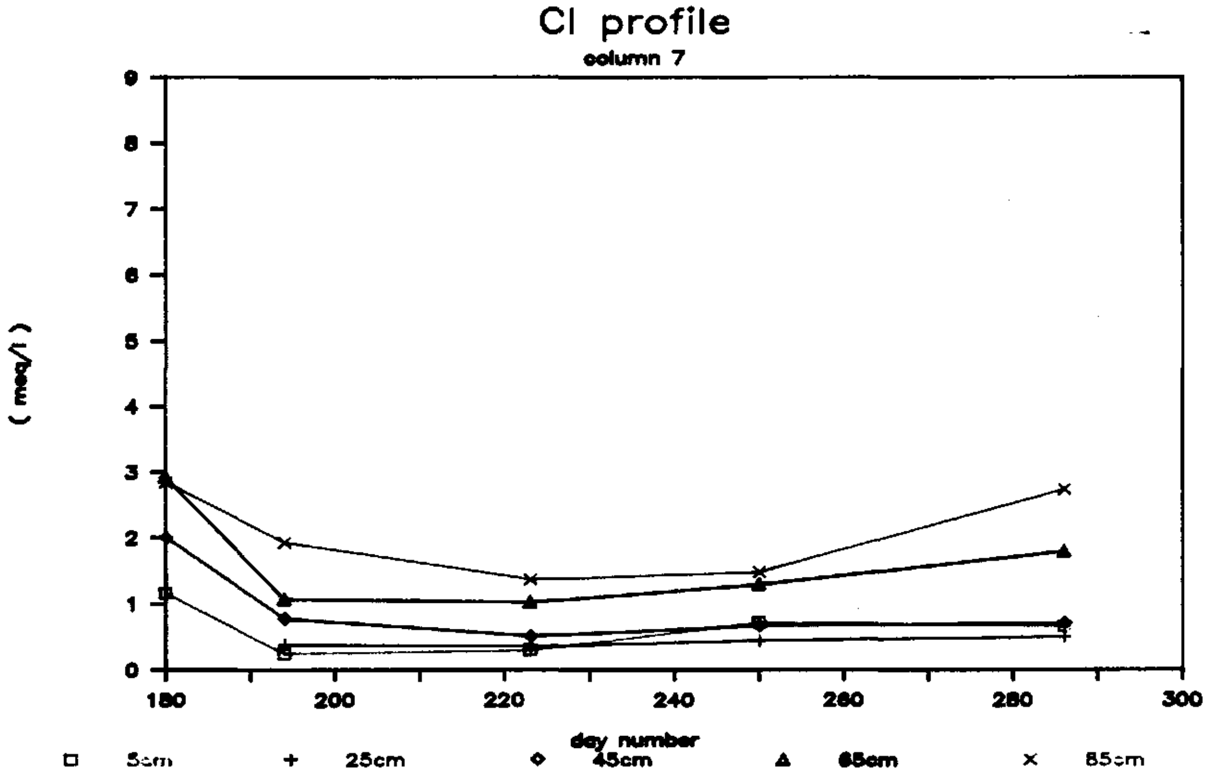
column 5



Cl profile

Column 6





Cl profile
column 7
(meq/l)
0
1
2
3
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5
6
7
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9
180
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260
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day number
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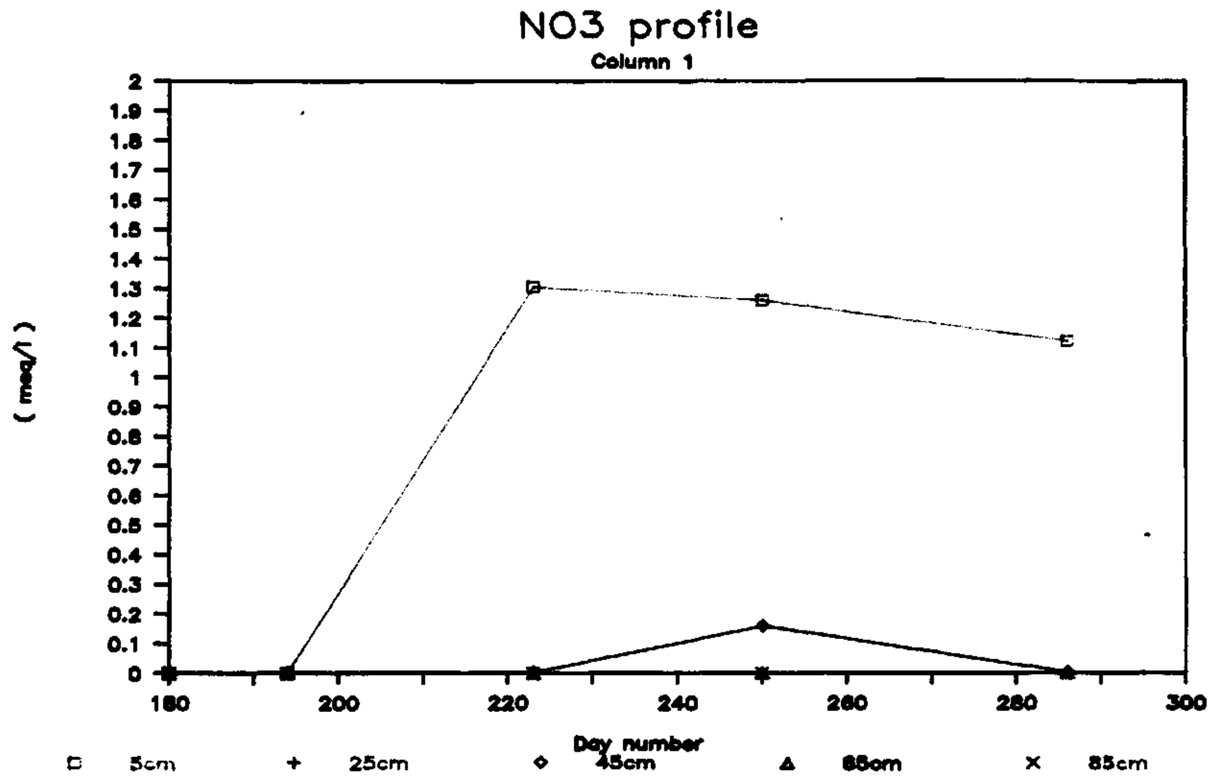
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1.5
1.4
1.3
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1.1
1
0.9
0.8
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0.6
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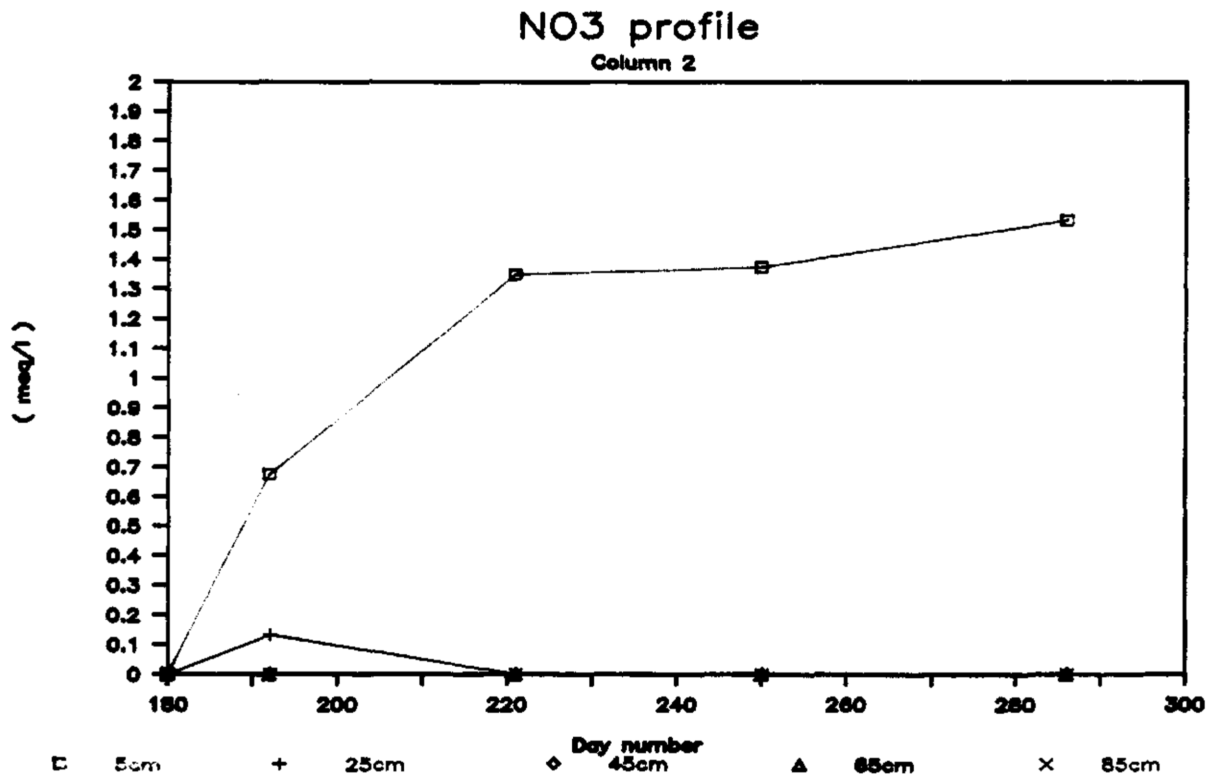
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1.4
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1
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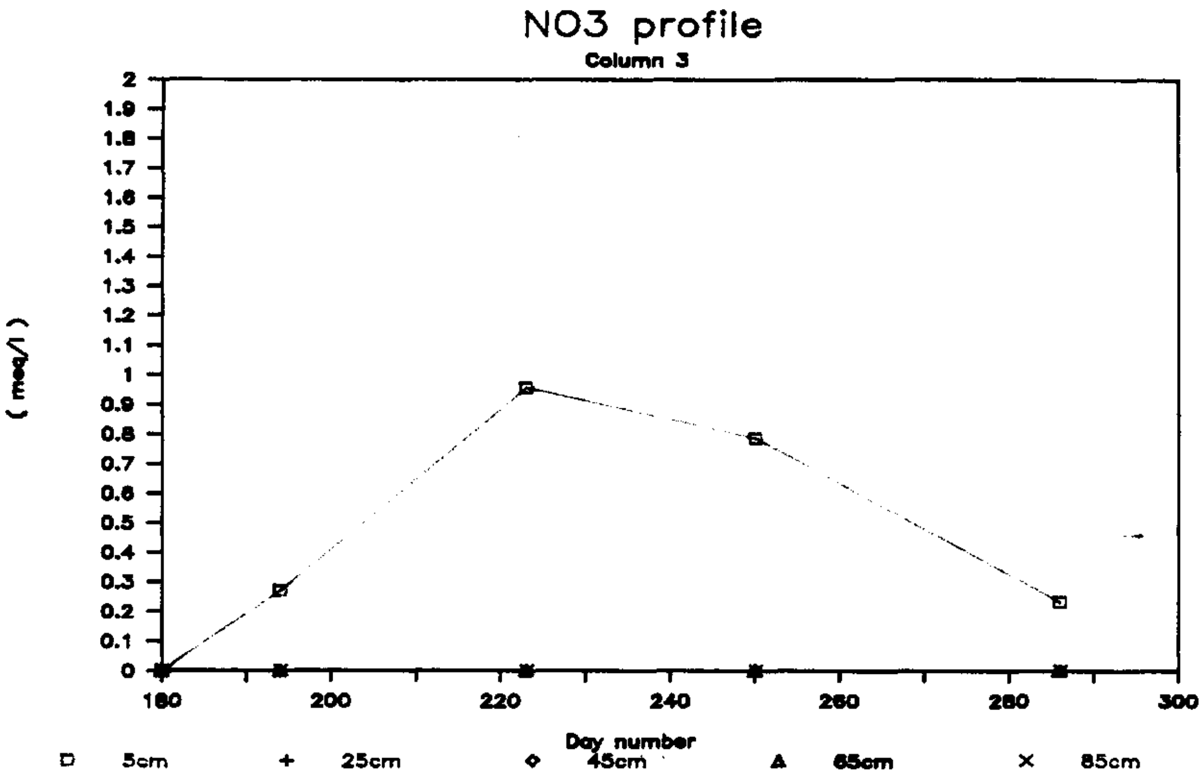
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1.4
1.3
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1.1
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0.8
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0.6
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Day number
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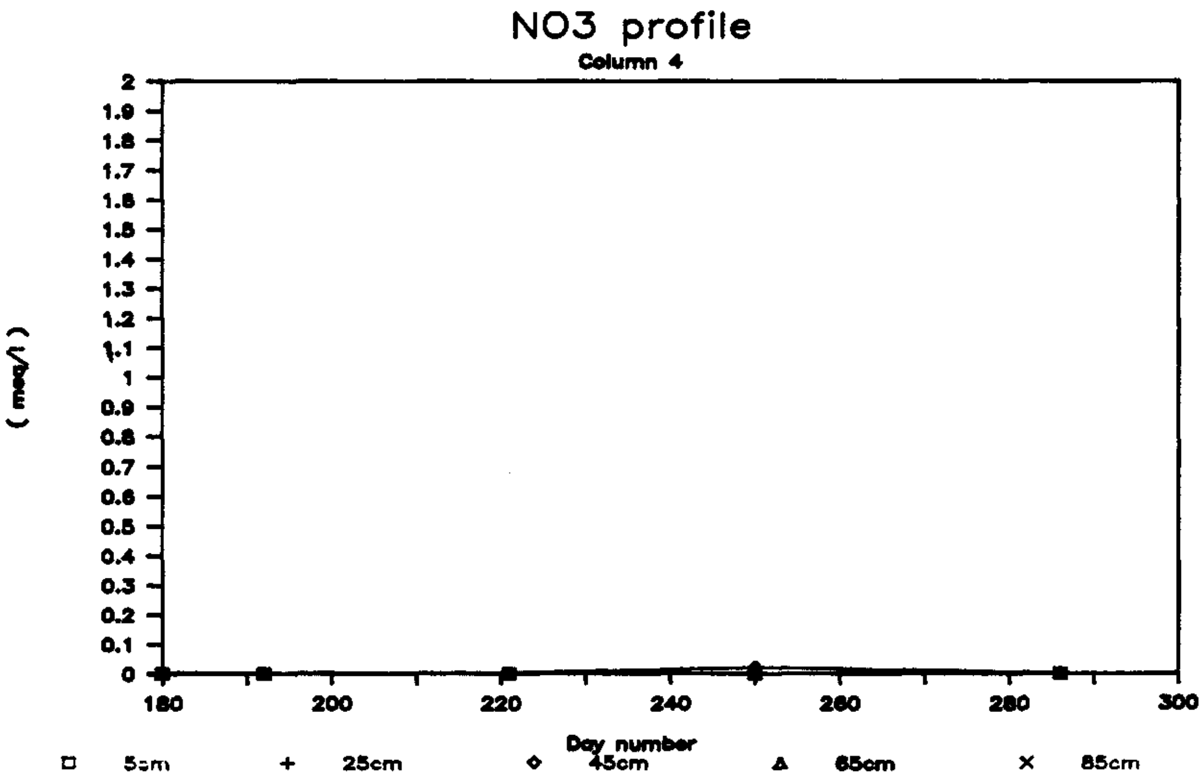
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(meq/l)
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0.8
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0.6
0.5
0.4
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Day number
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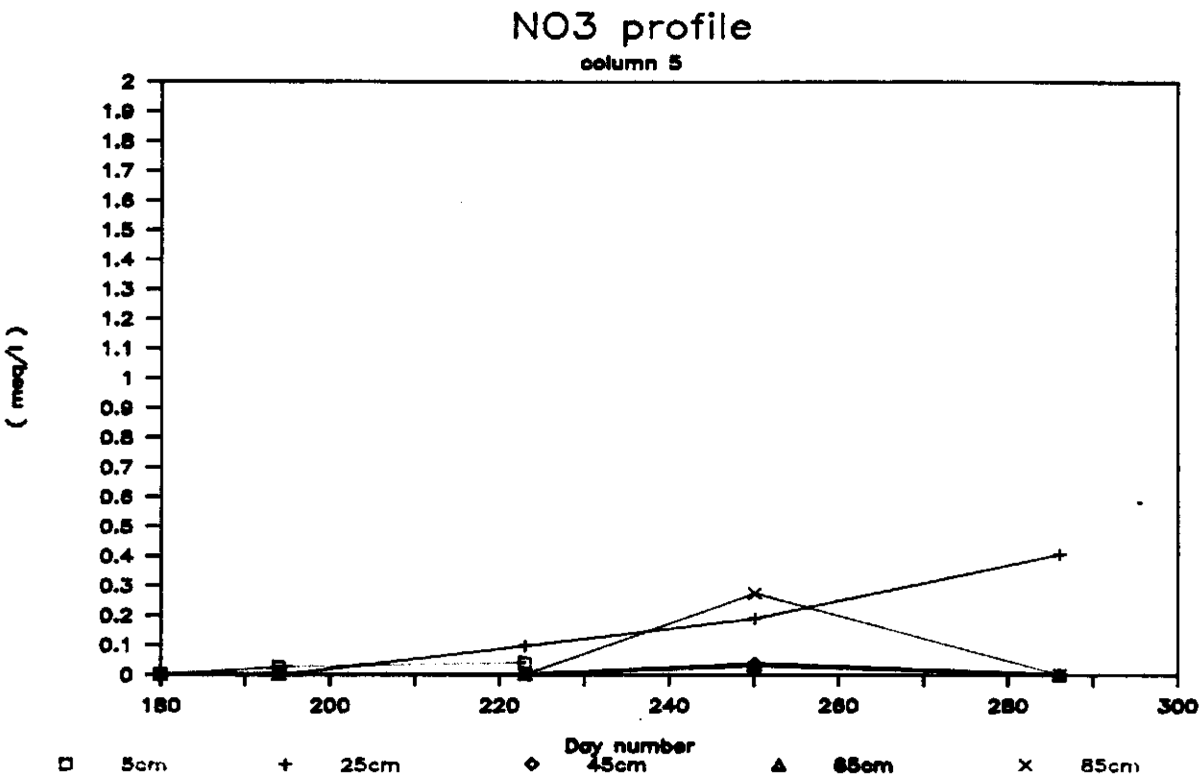

NO3 profile
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(meq/l)
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1.1
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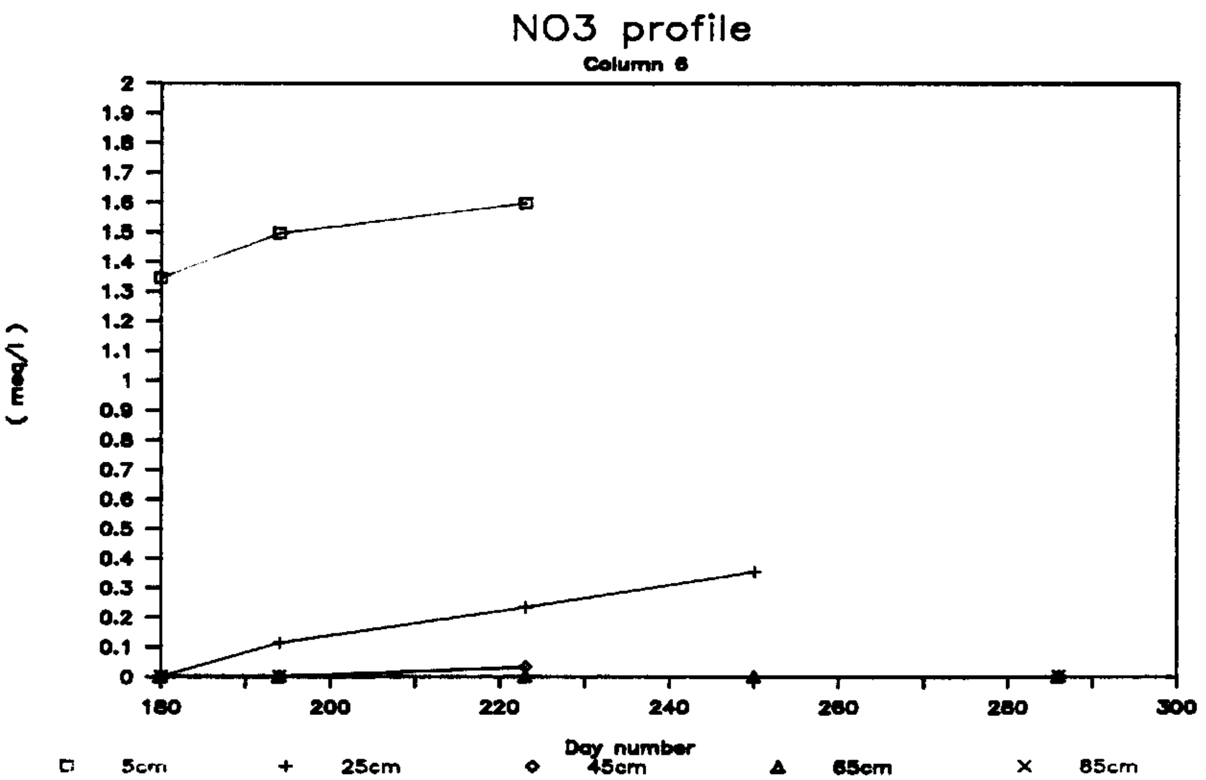

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1.1
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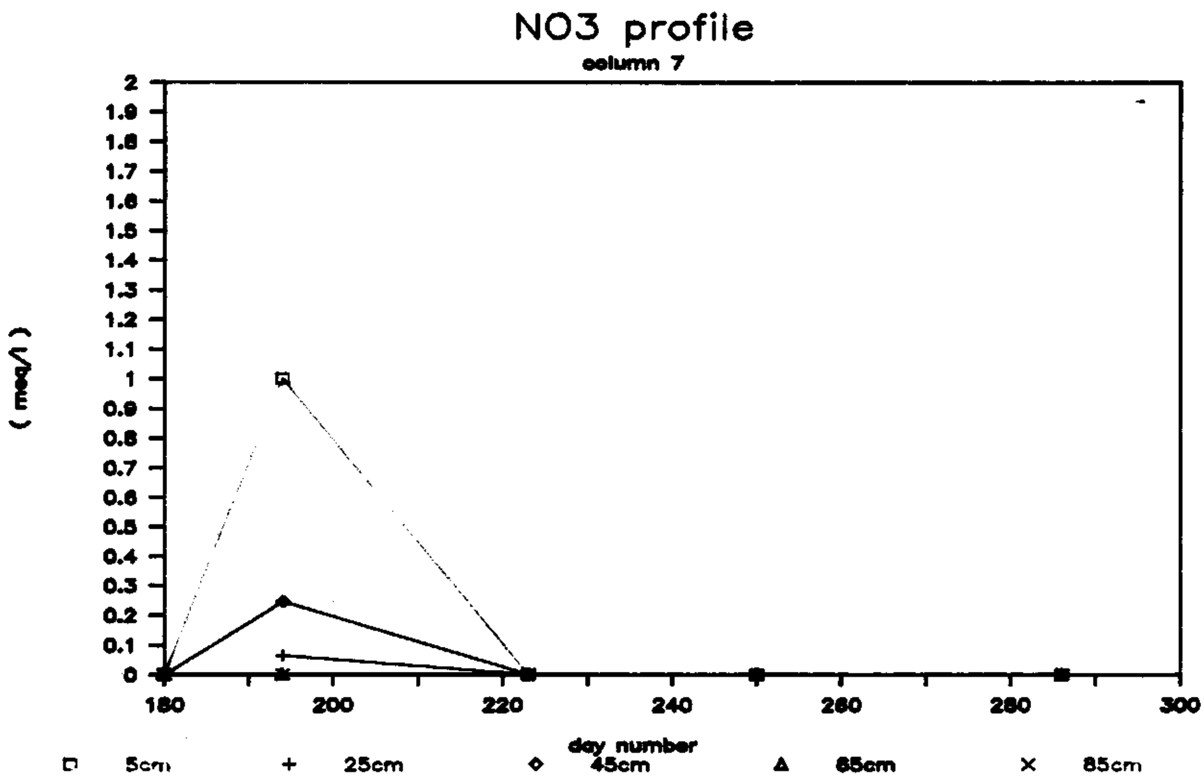

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(meq/l)
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1.4
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1.2
1.1
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0.6
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0.4
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day number
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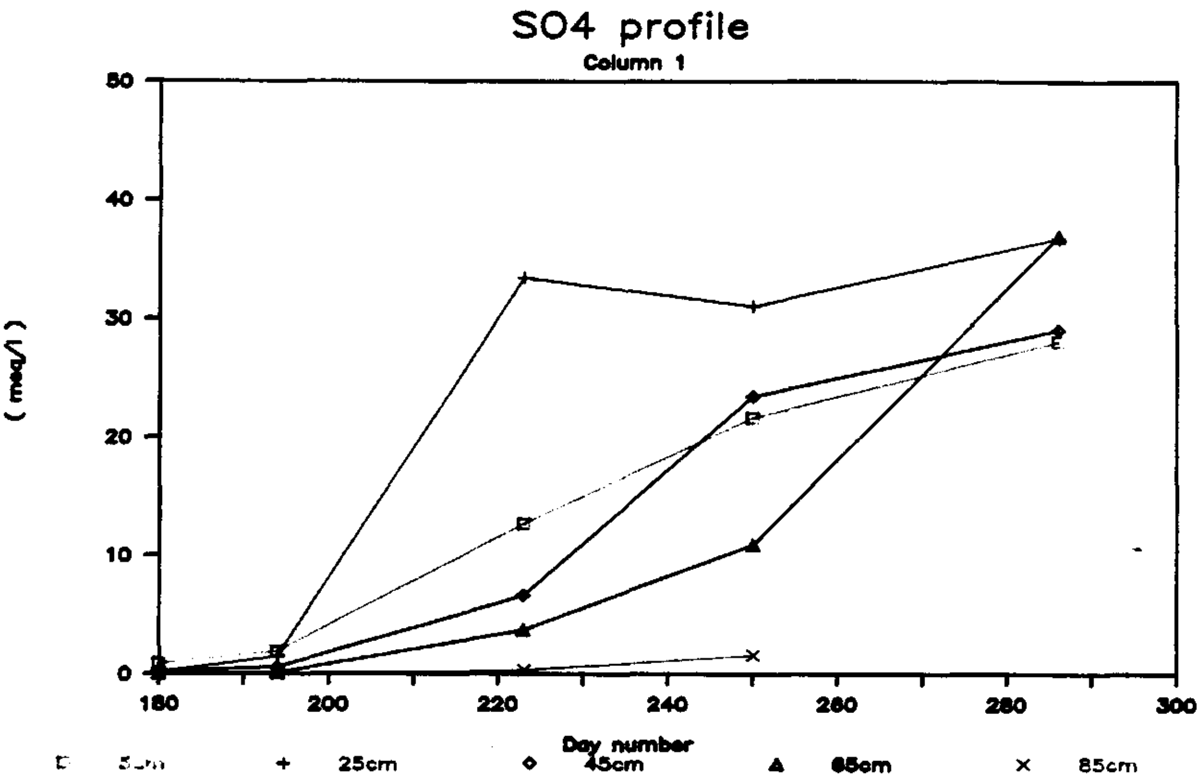

SO4 profile
Column 1
(meq/l)
Day number
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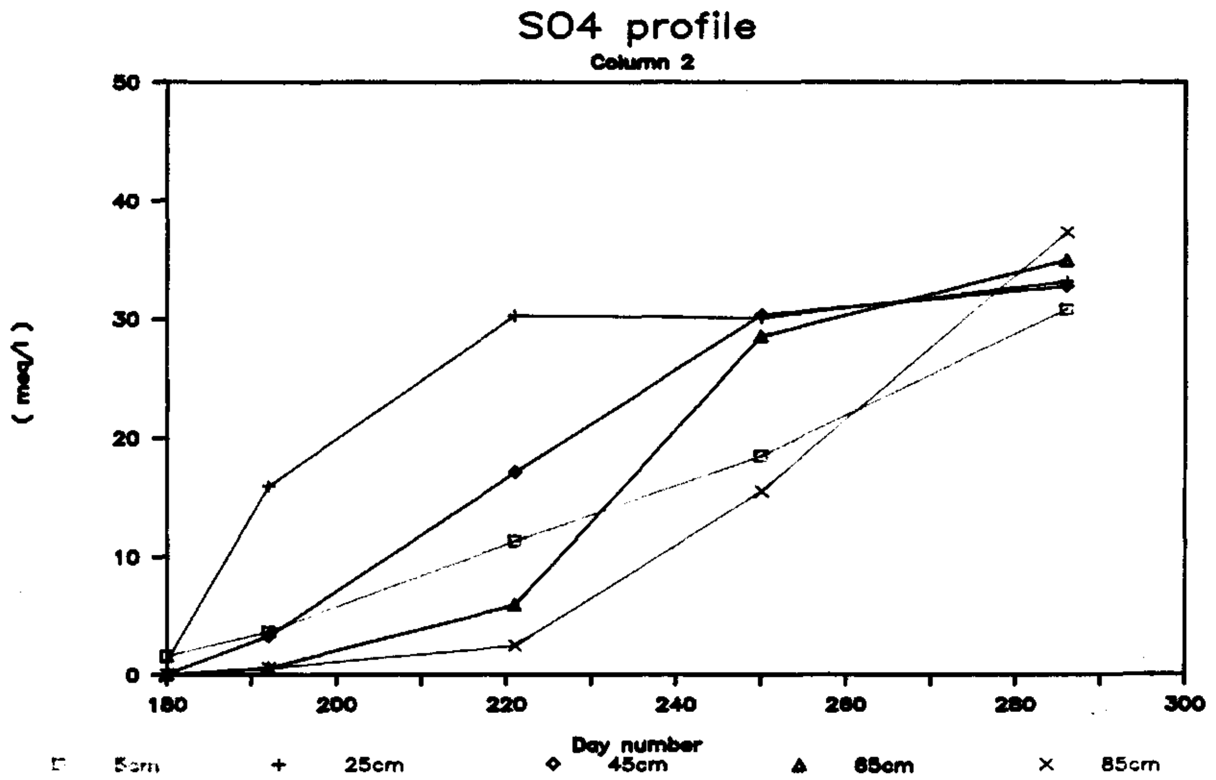
85cm



SO4 profile
Column 2
(meq/l)
Day number
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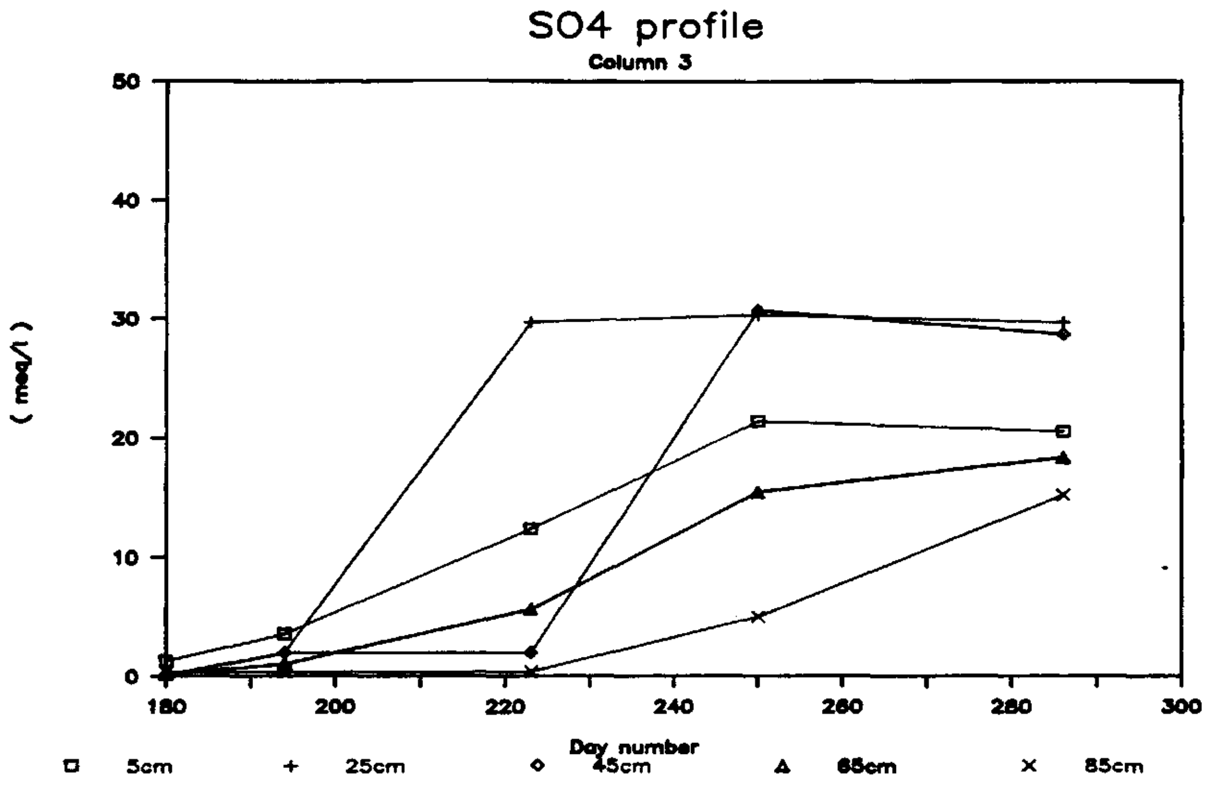
85cm


SO4 profile
Column 3
(meq/l)
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240
260
280
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Day number
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45cm
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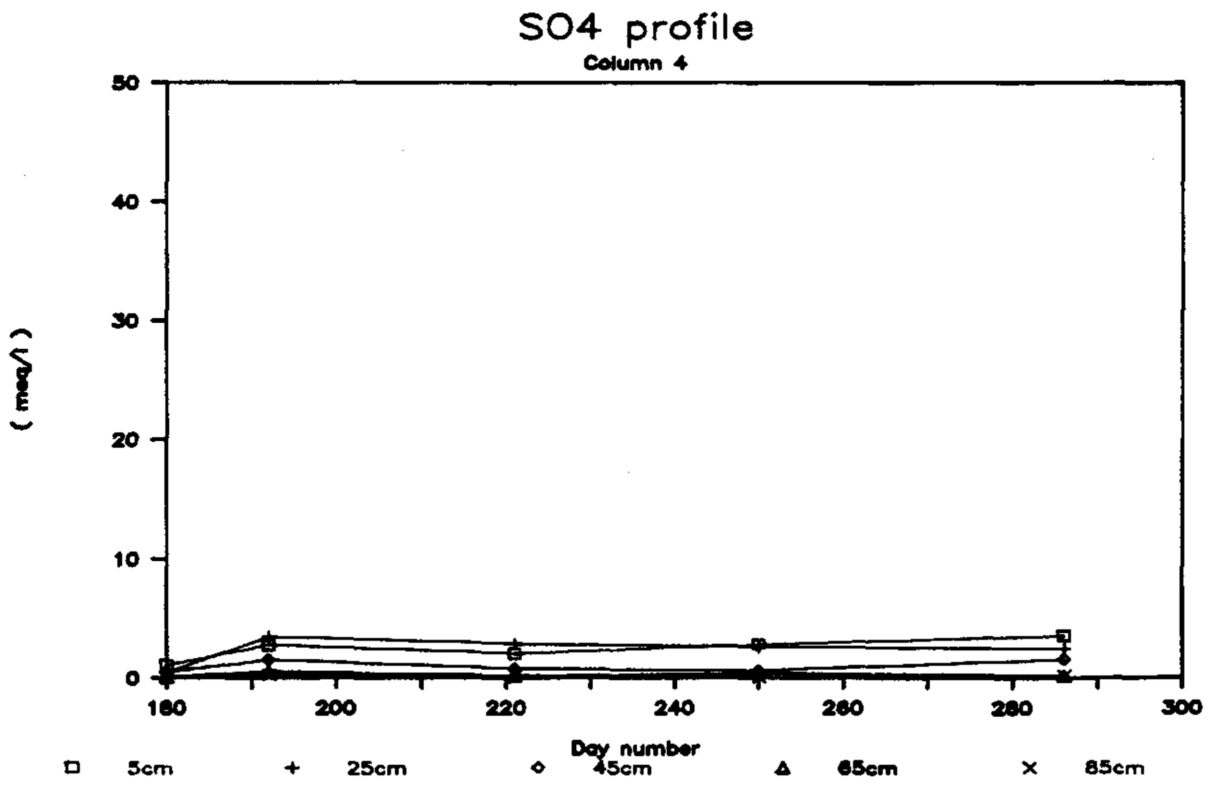
85cm


SO4 profile
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(meq/l)
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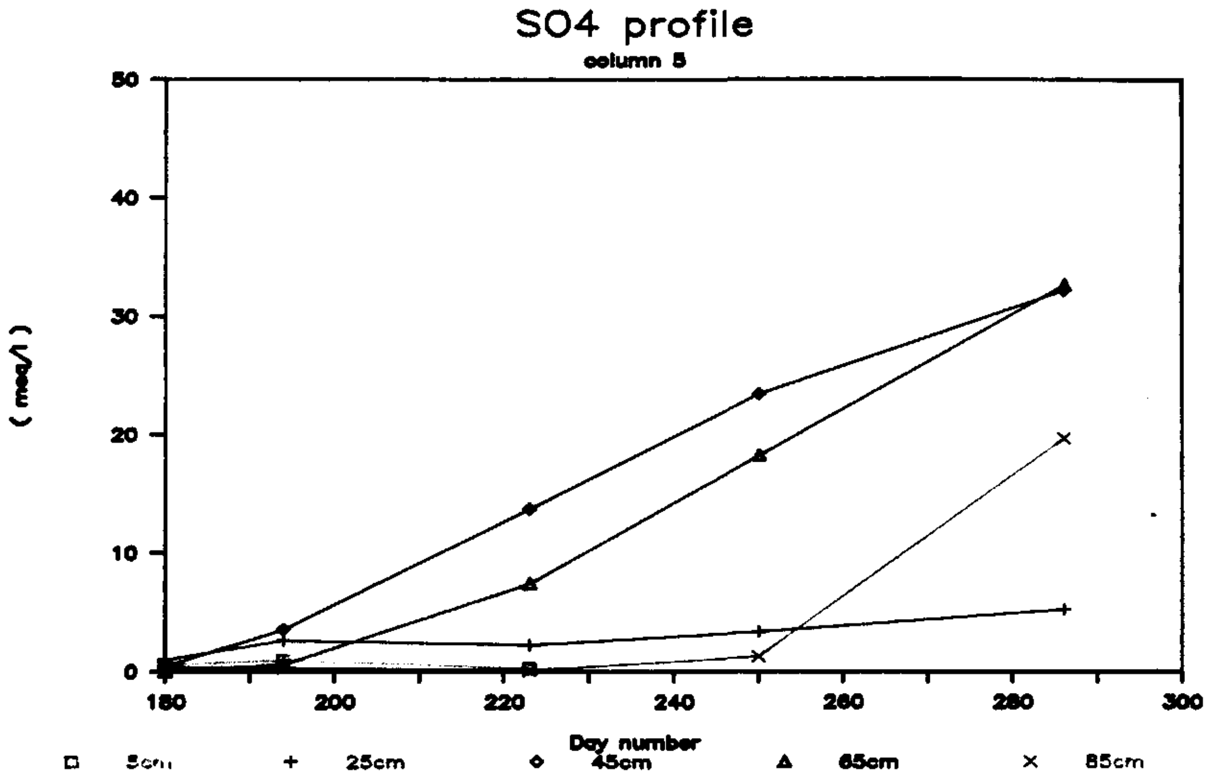
SO4 profile
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(meq/l)
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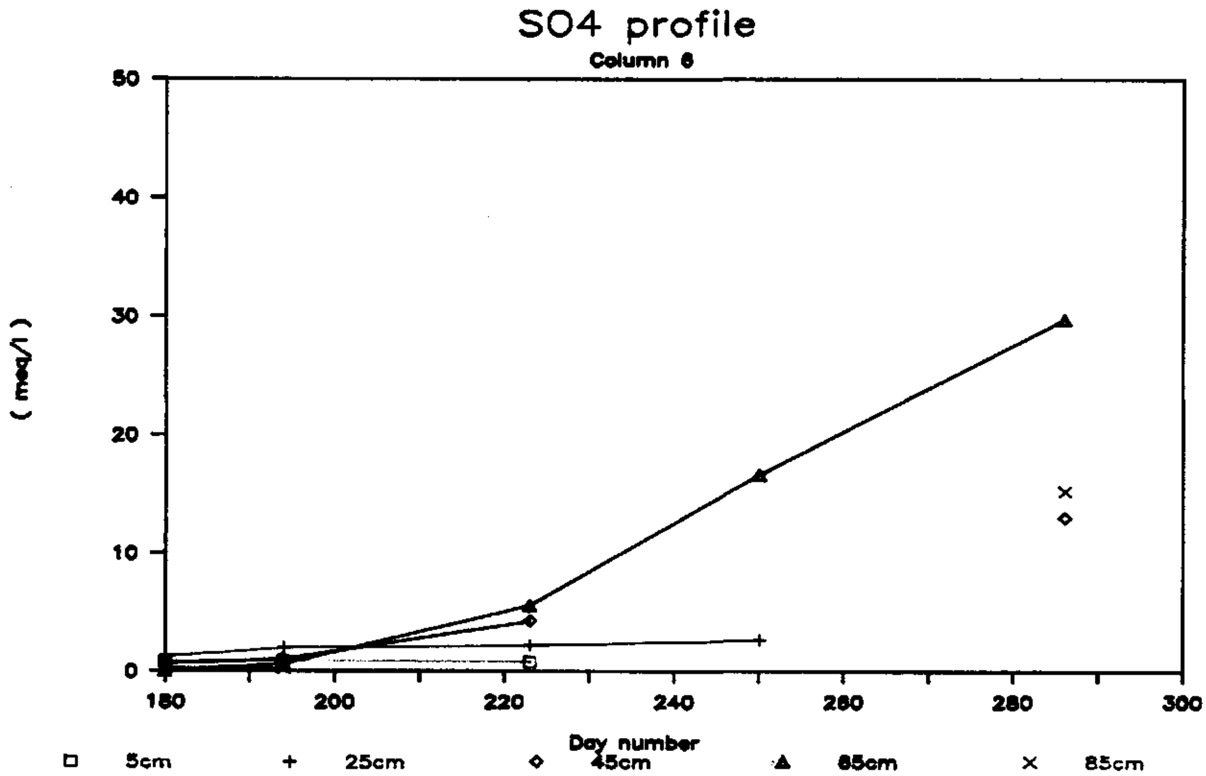
SO4 profile
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(meq/l)
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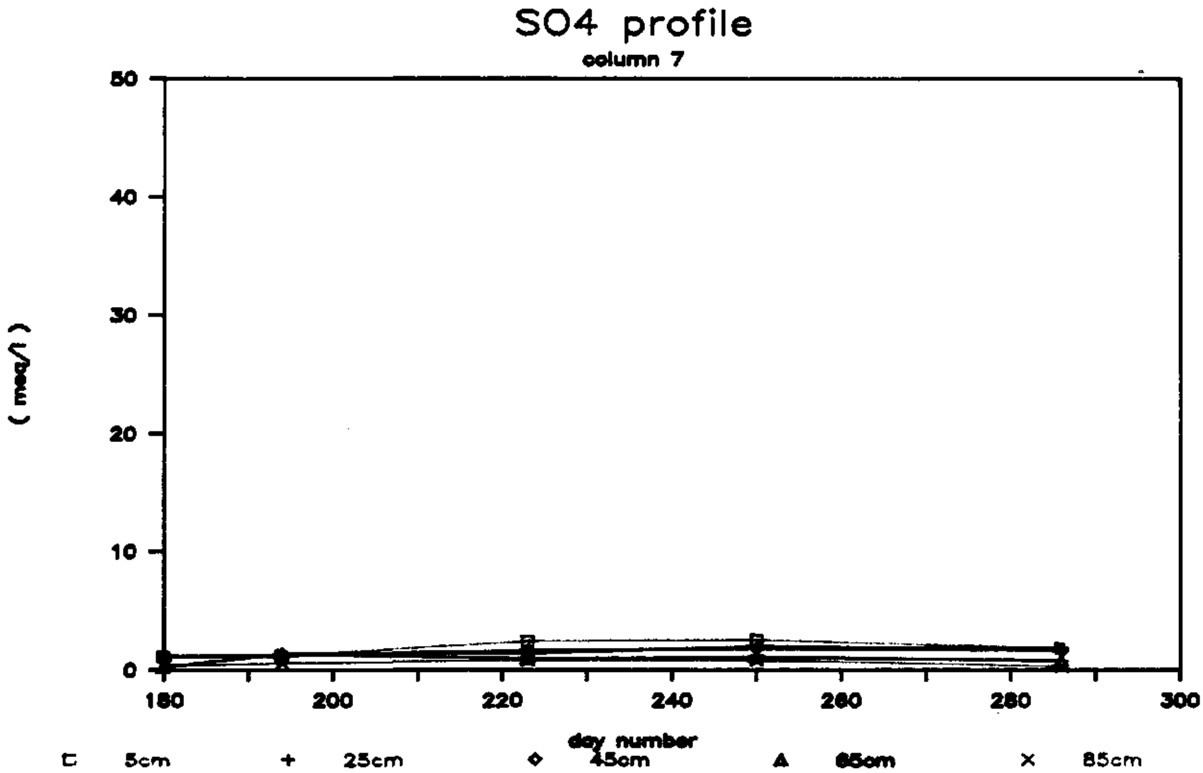
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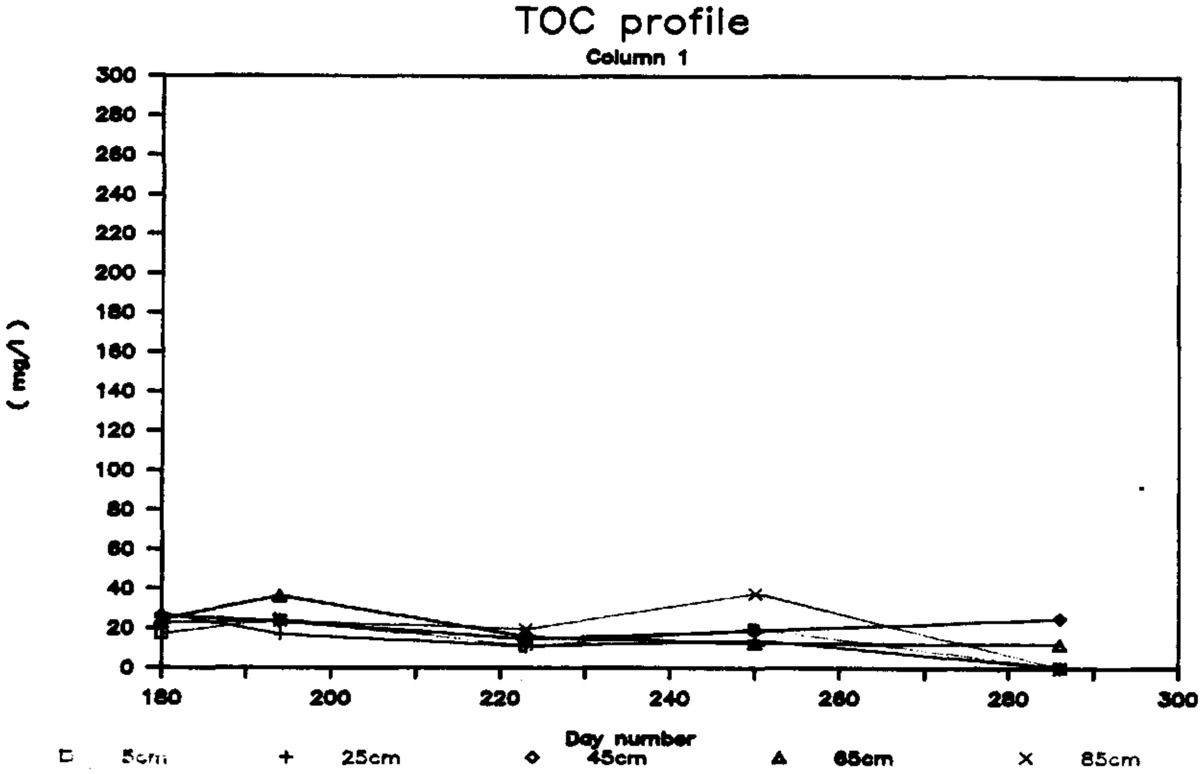
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Day number
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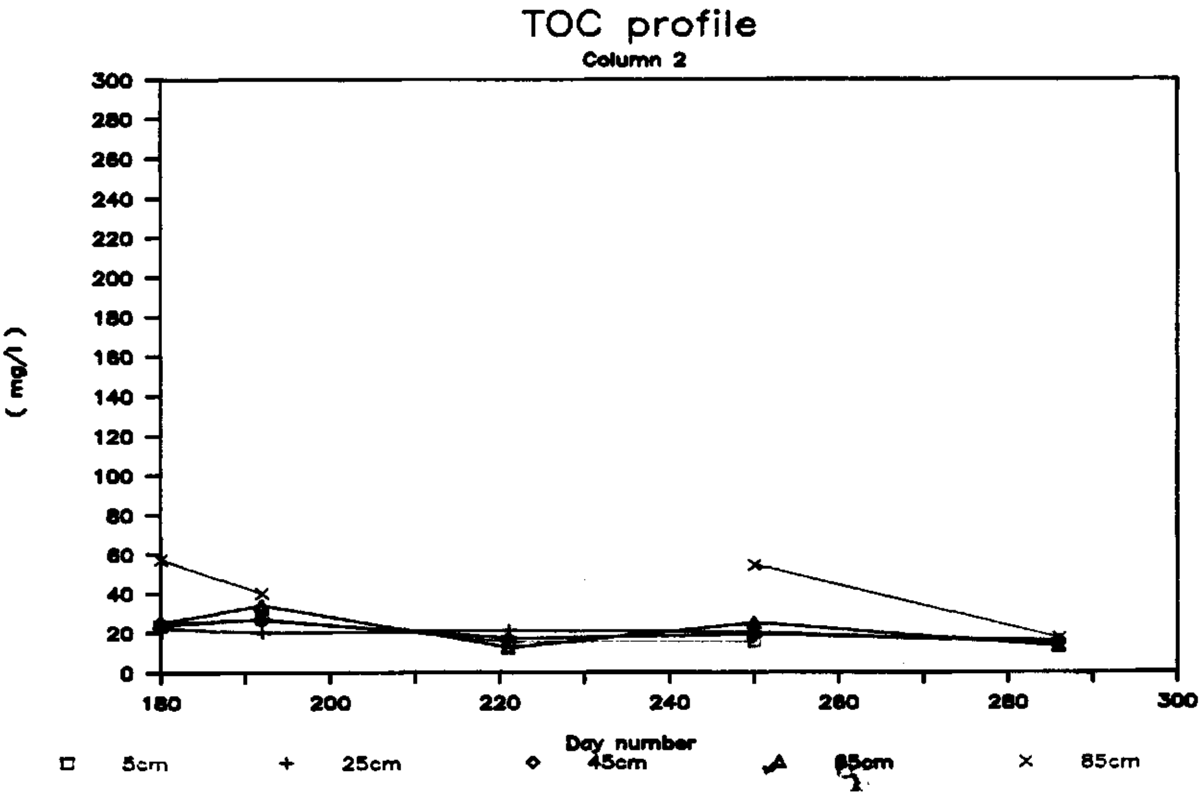
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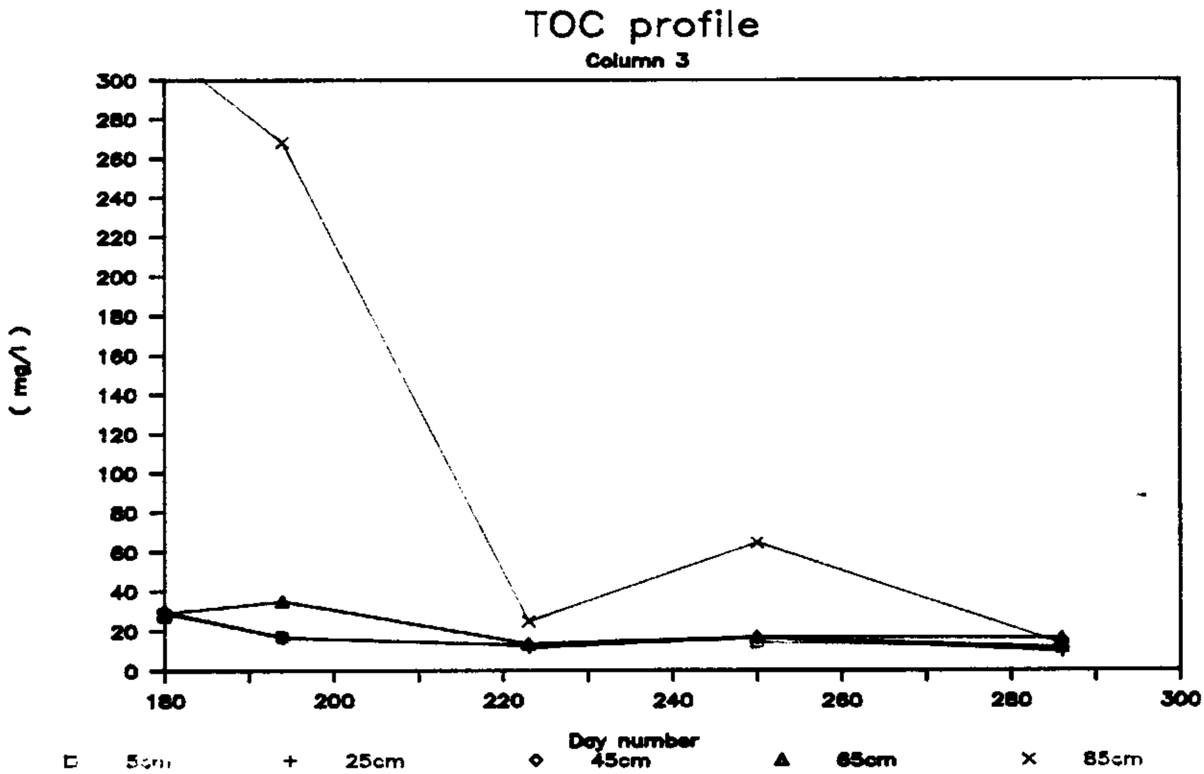
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(mg/l)
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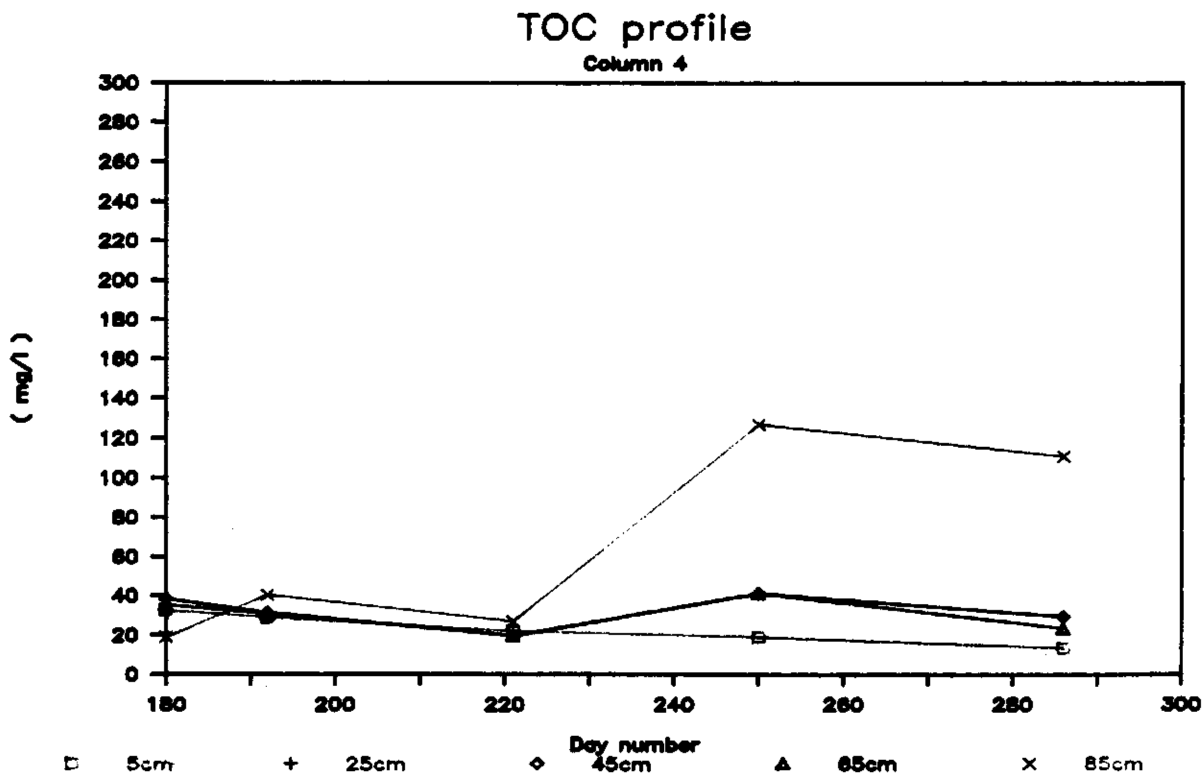
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(mg/l)
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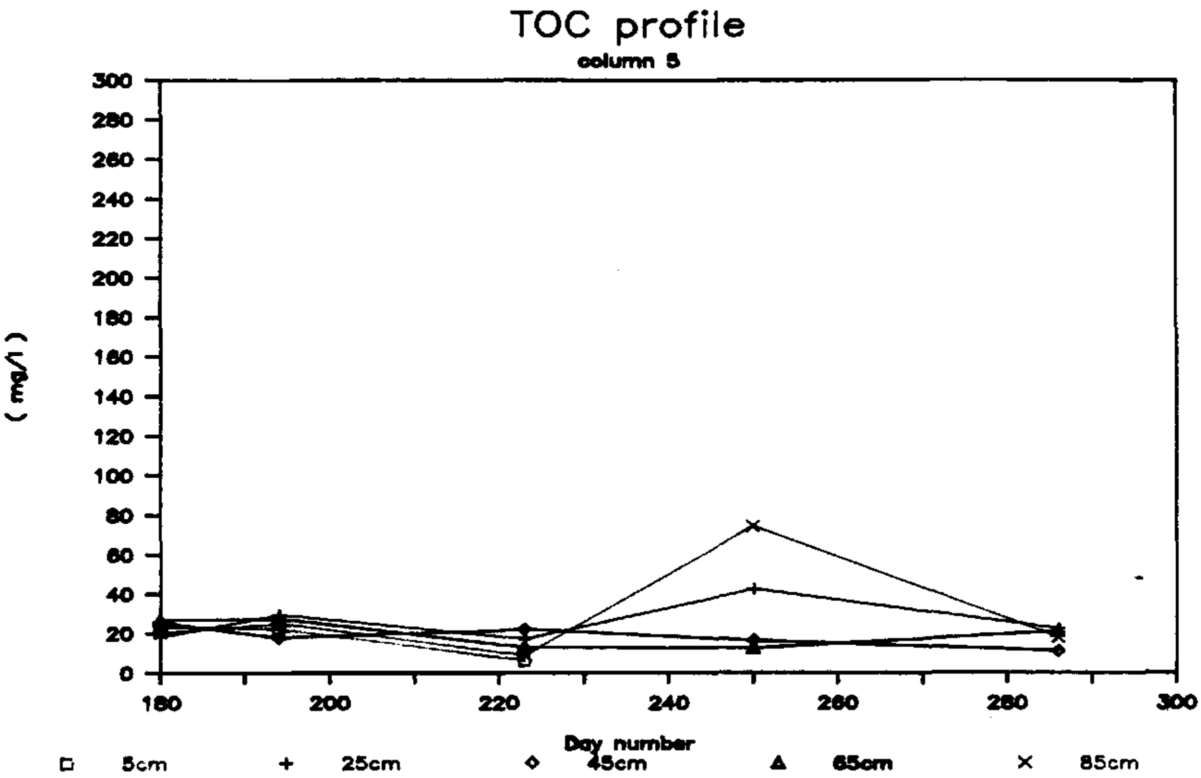
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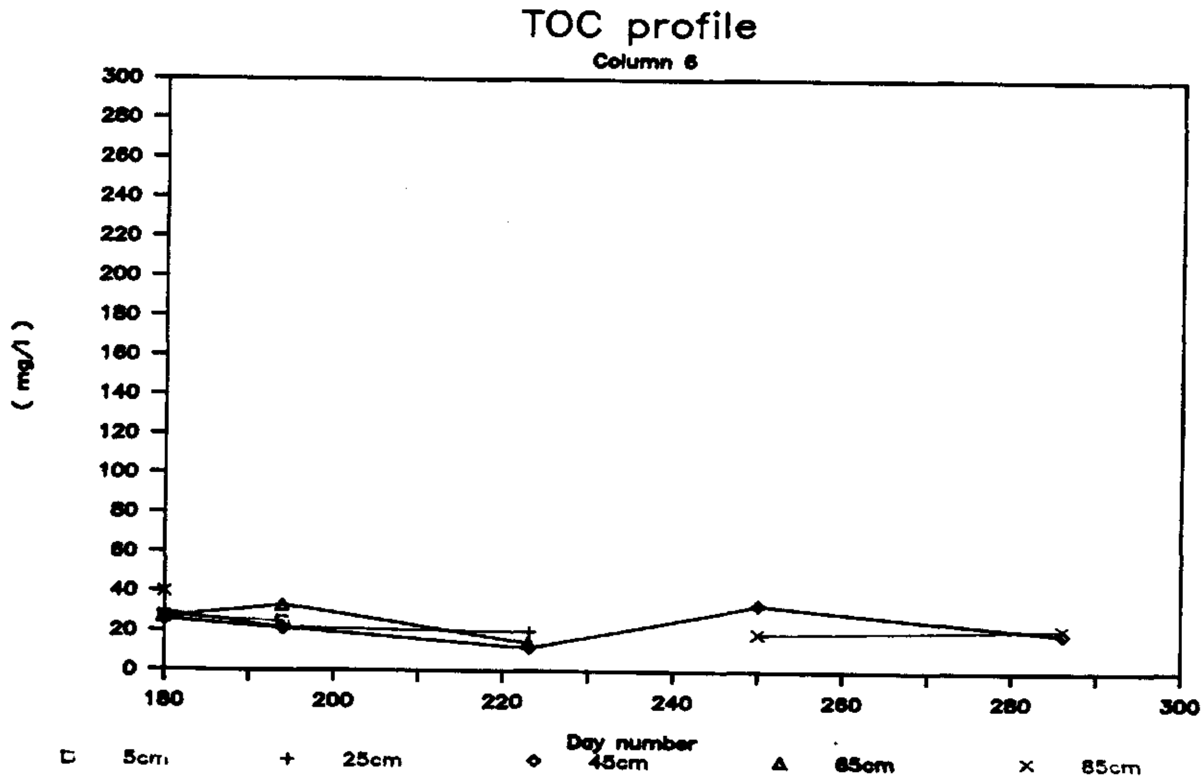
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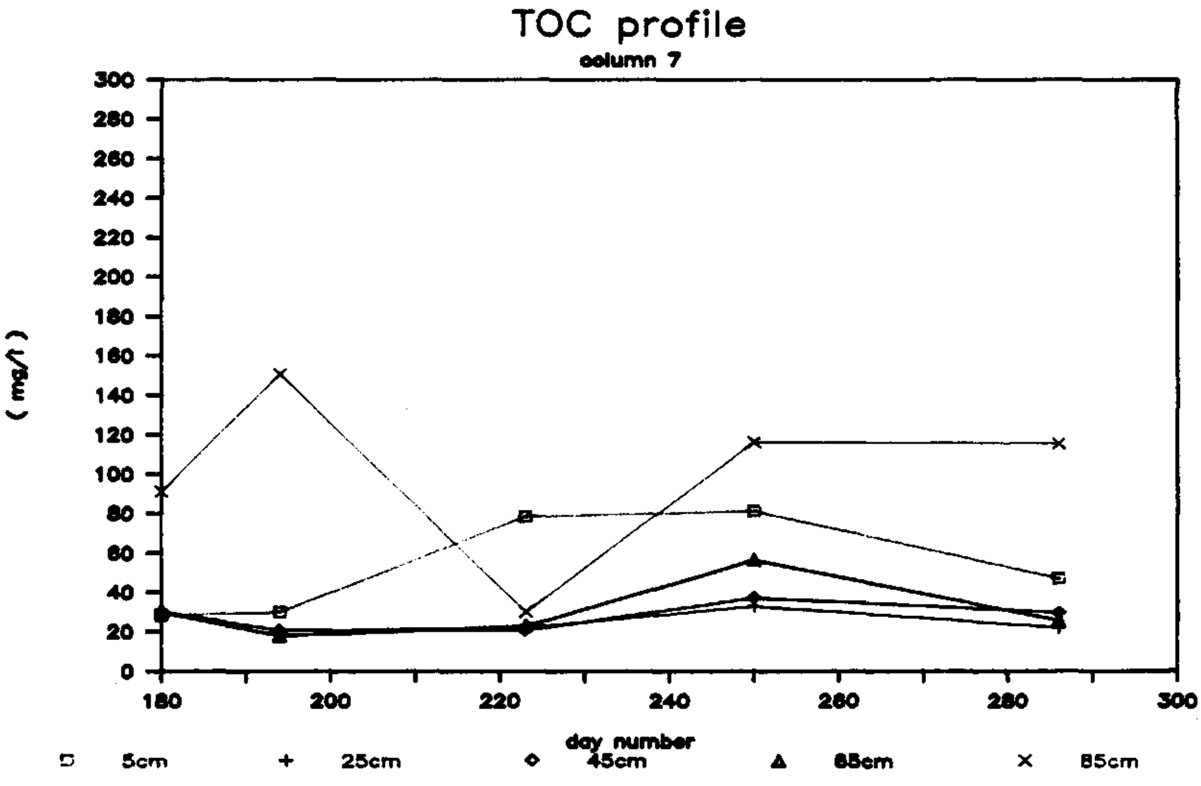
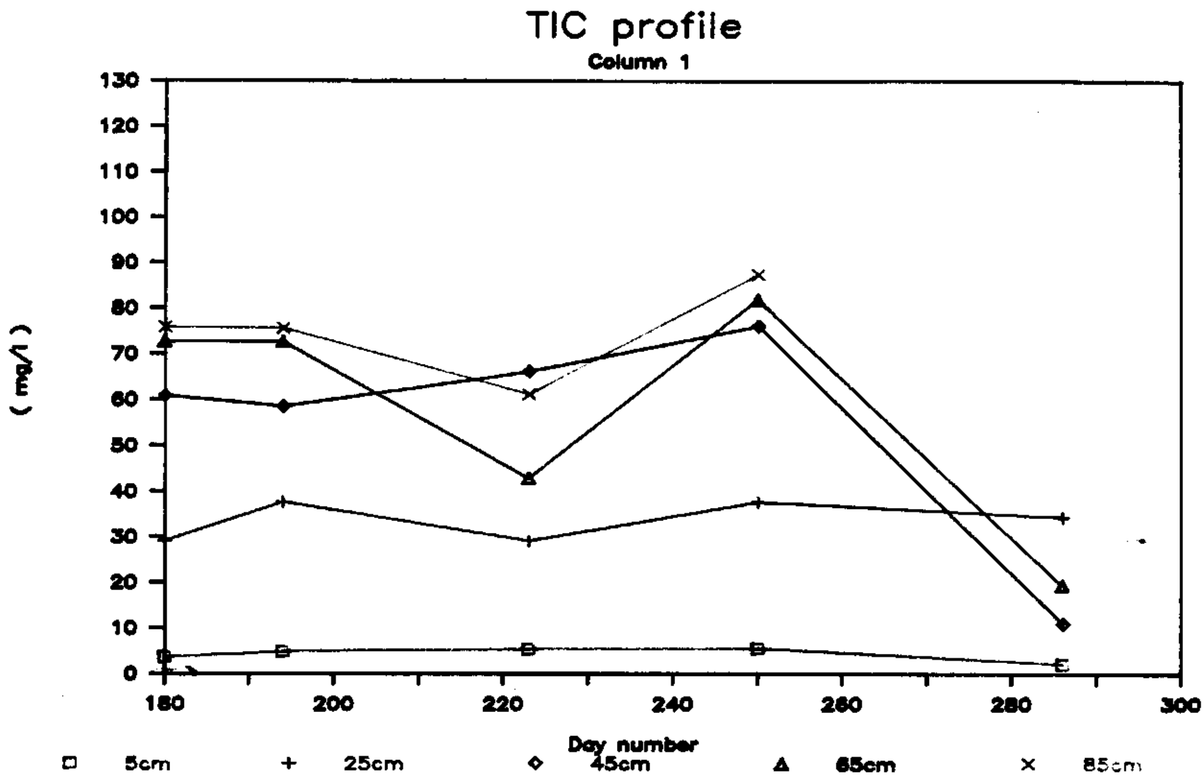
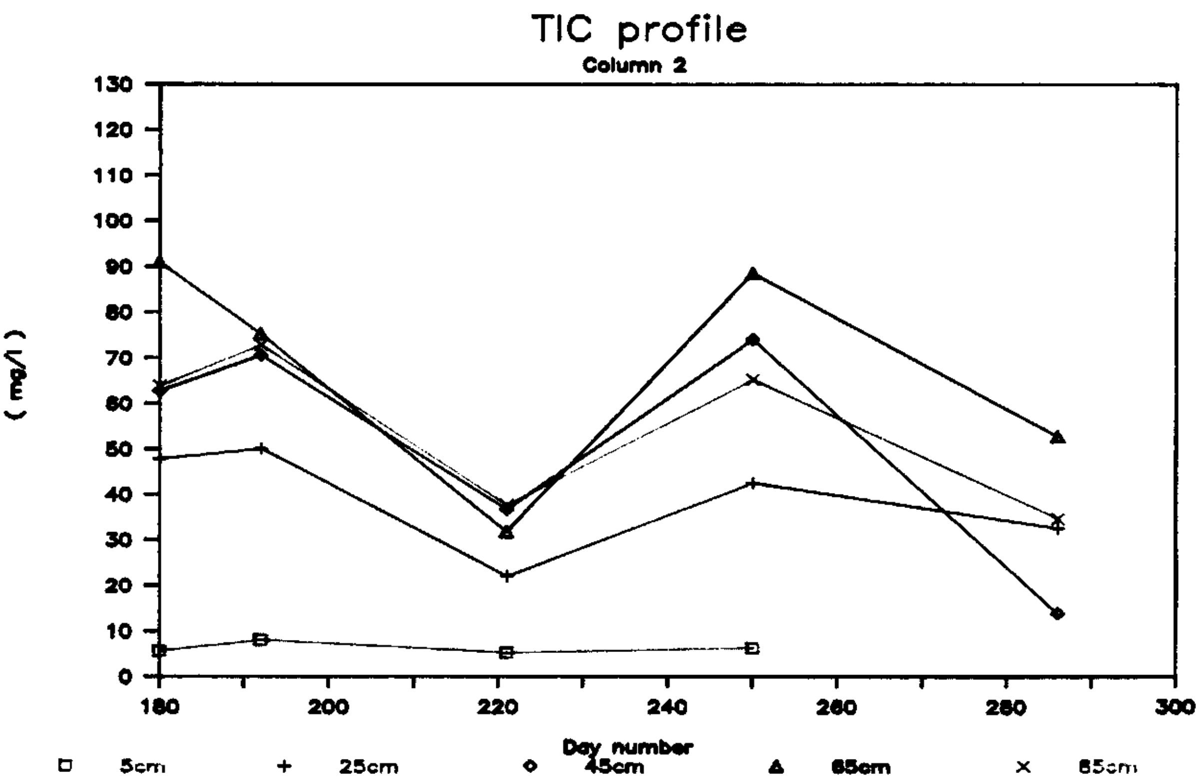

TOC profile
column 7
(mg/l)
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
180
200
220
240
260
280
300
day number
5cm
25cm
45cm
65cm
85cm


TIC profile
Column 1
(mg/l)
Day number
5cm
25cm
45cm
65cm
85cm


TIC profile
Column 2
(mg/l)
Day number
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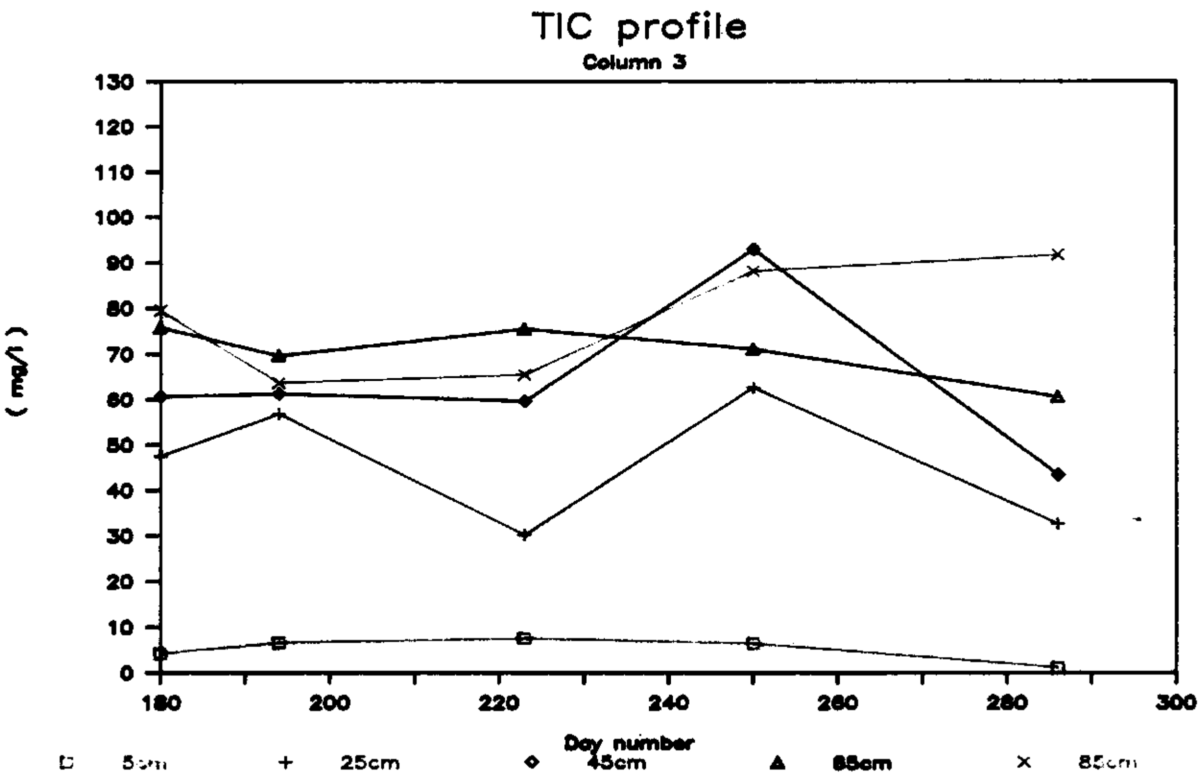

TIC profile
Column 3
(mg/l)
Day number
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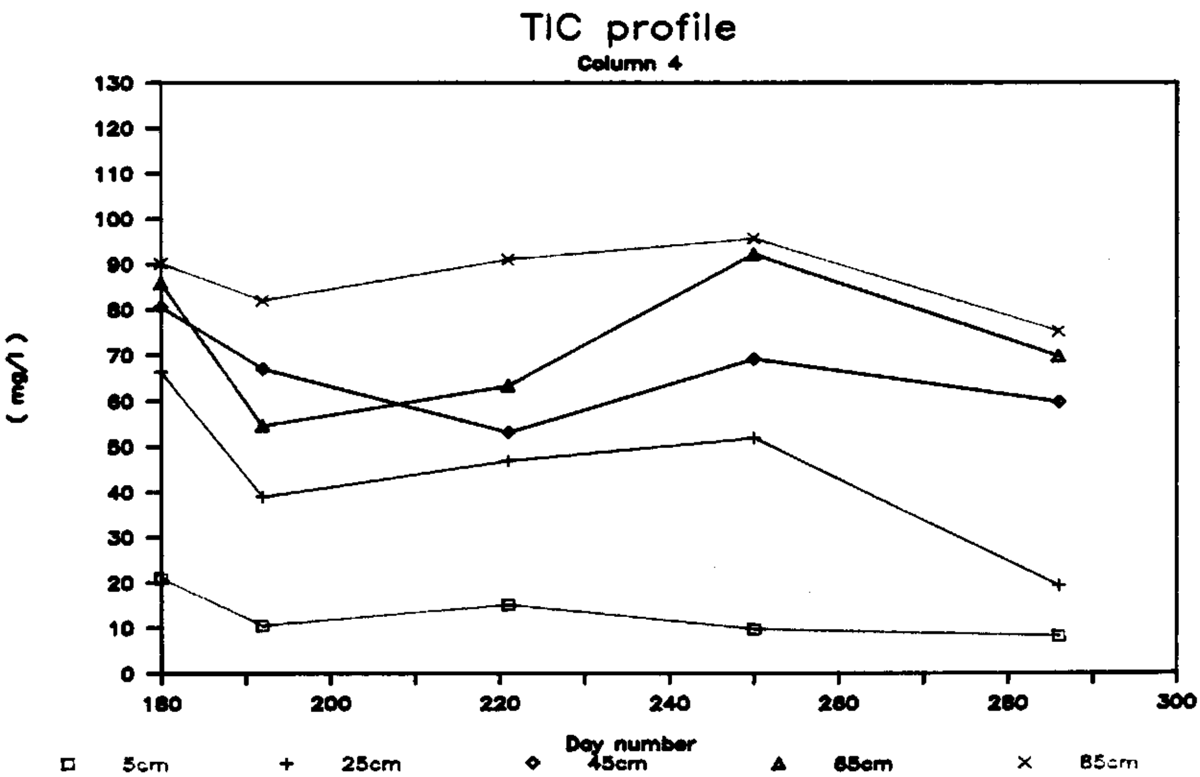
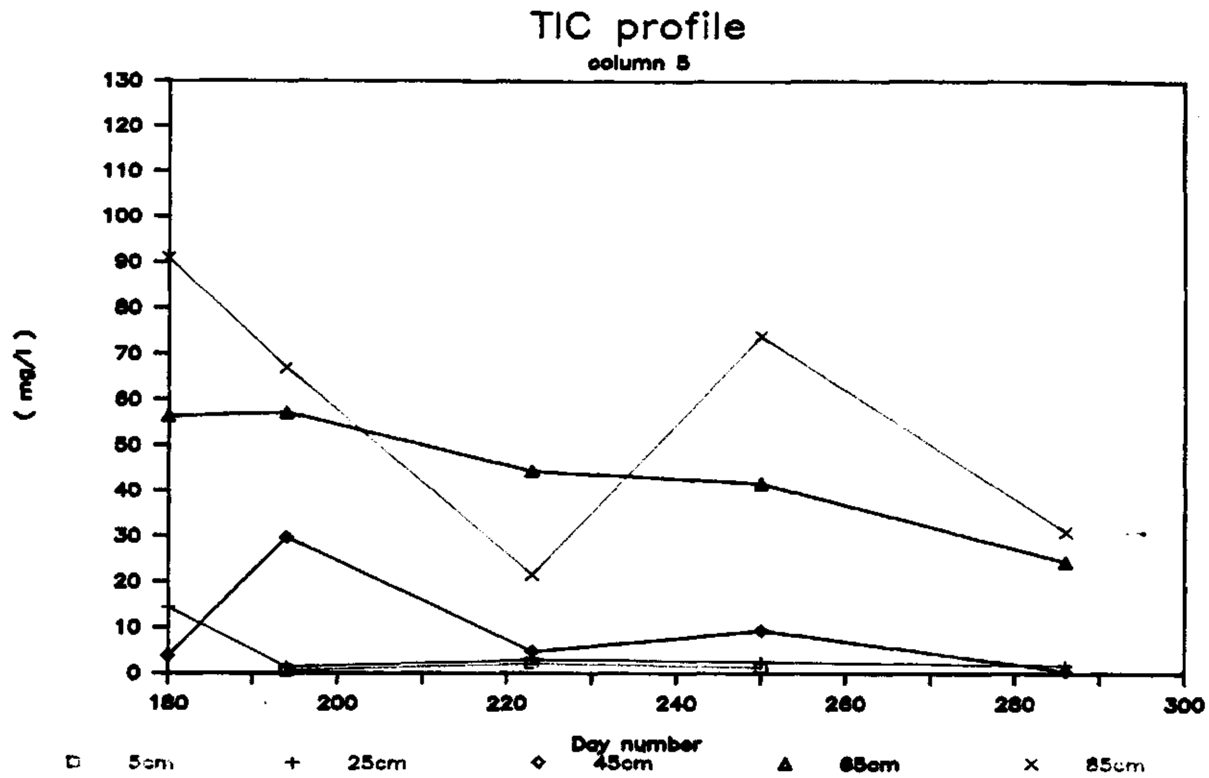
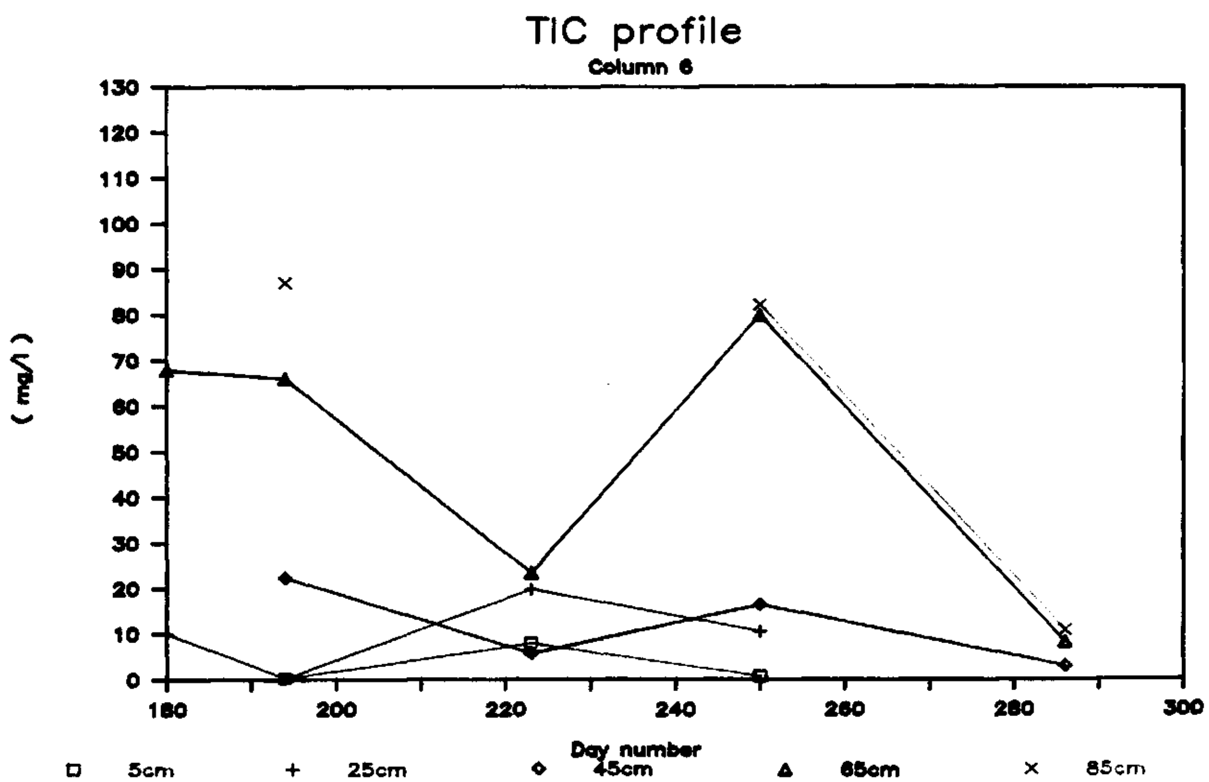
45cm
65cm
85cm



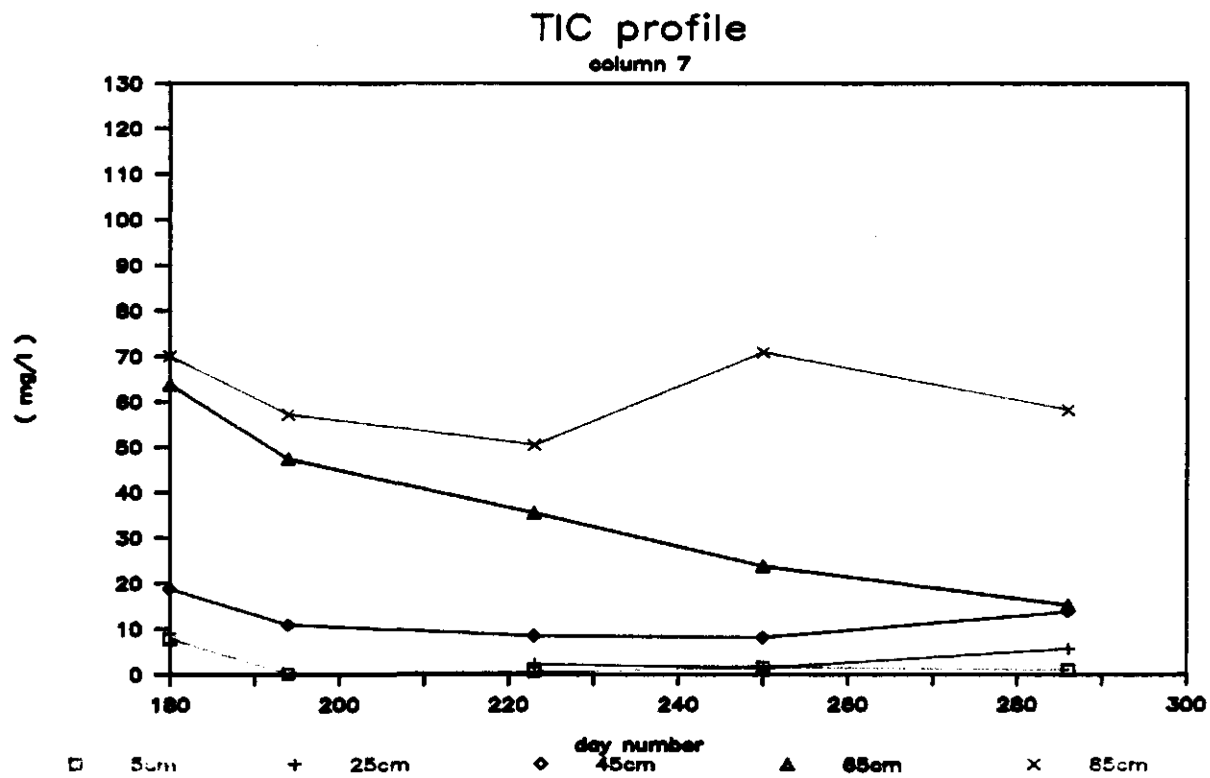
TIC profile
Column 4
(mg/l)
Day number
5cm
25cm
45cm
65cm
85cm



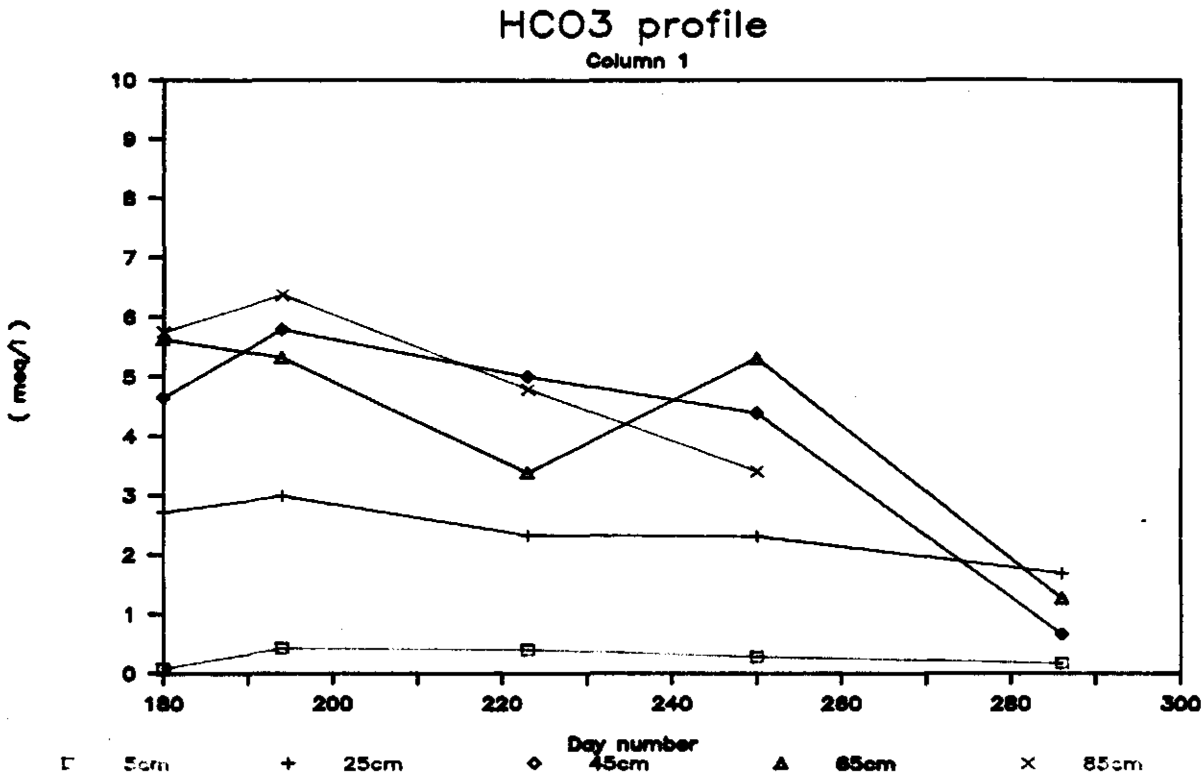
TIC profile
column 5
130
120
110
100
90
80
70
60
50
40
30
20
10
0
(mg/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

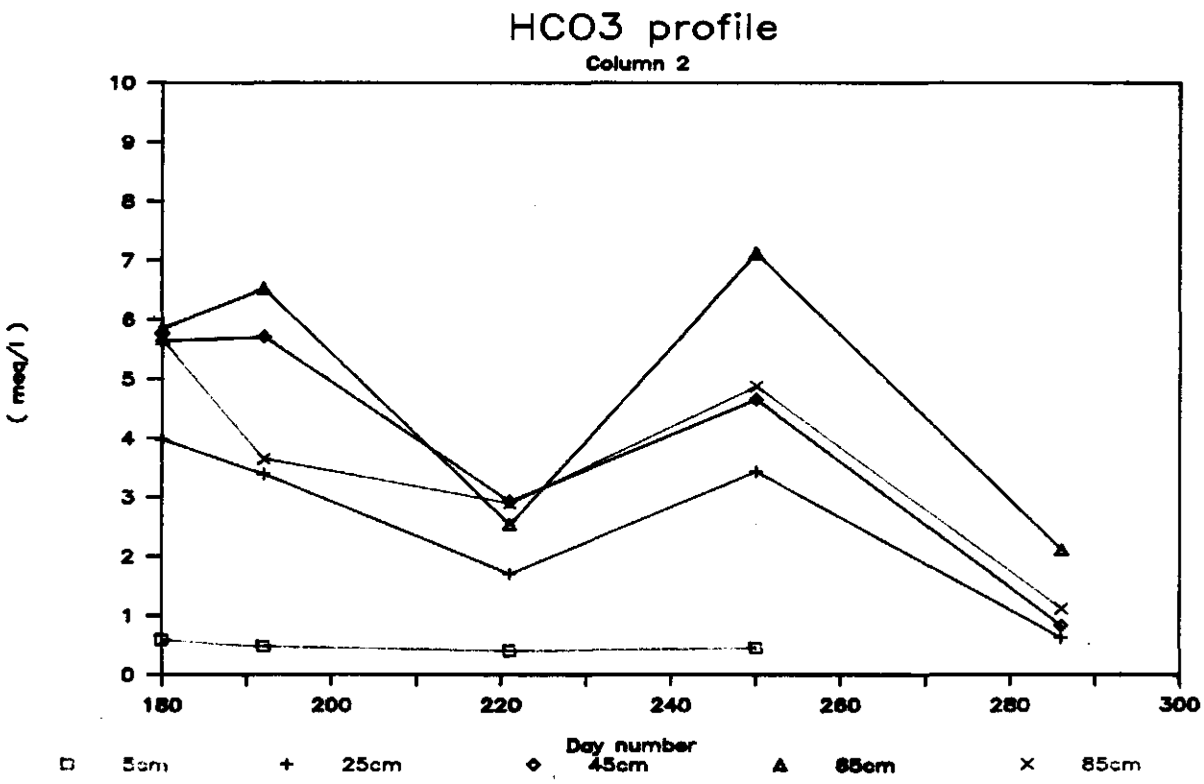


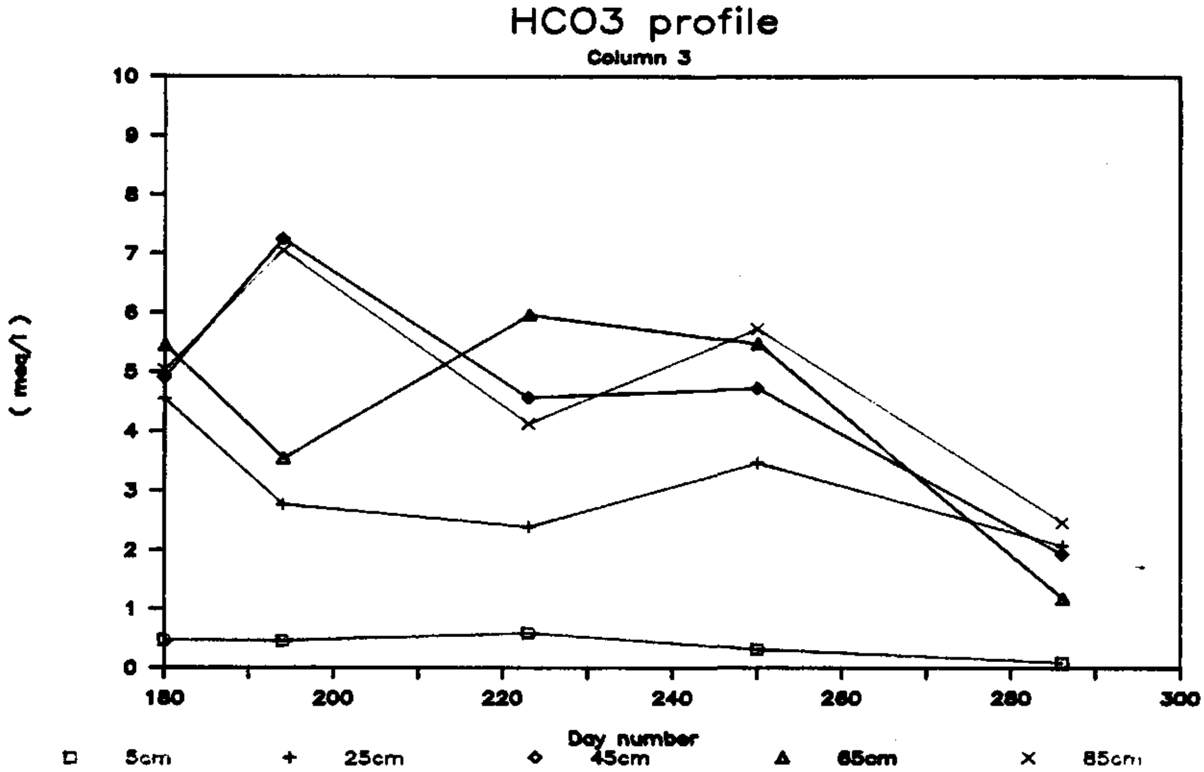
TIC profile
Column 6
130
120
110
100
90
80
70
60
50
40
30
20
10
0
(mg/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



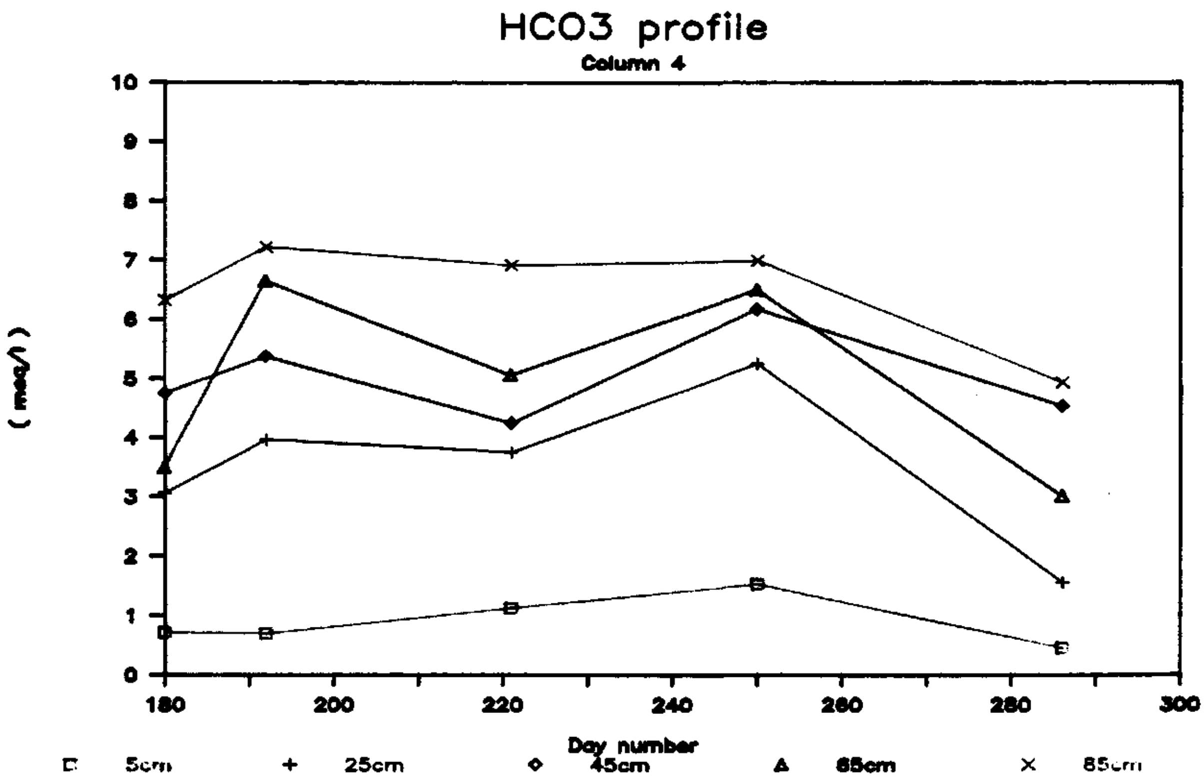
TIC profile
column 7
(mg/l)
130
120
110
100
90
80
70
60
50
40
30
20
10
0
180
200
220
240
260
280
300
day number
5cm
25cm
45cm
65cm
85cm


HCO3 profile
Column 1
(meq/l)
Day number
0
1
2
3
4
5
6
7
8
9
10
180
200
220
240
260
280
300
5cm
25cm
45cm
65cm
85cm

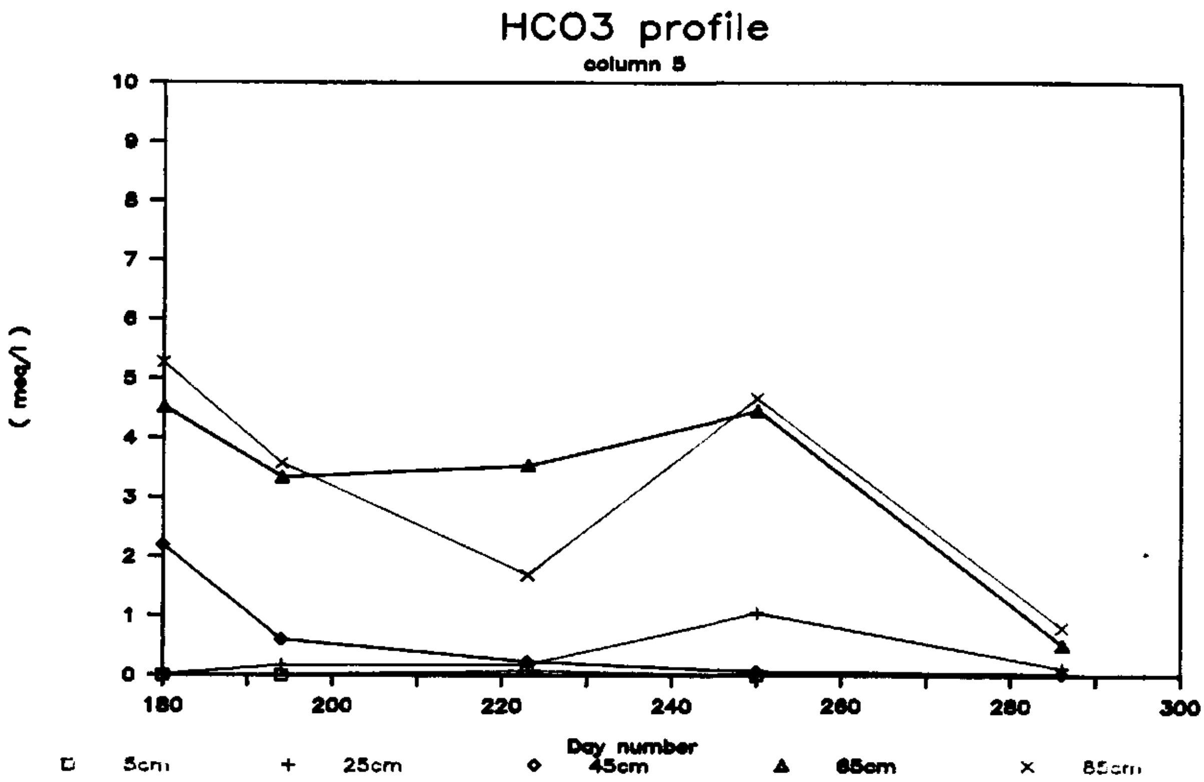

HCO3 profile
Column 2
(meq/l)
Day number
0
1
2
3
4
5
6
7
8
9
10
180
200
220
240
260
280
300
5cm
25cm
45cm
65cm
85cm

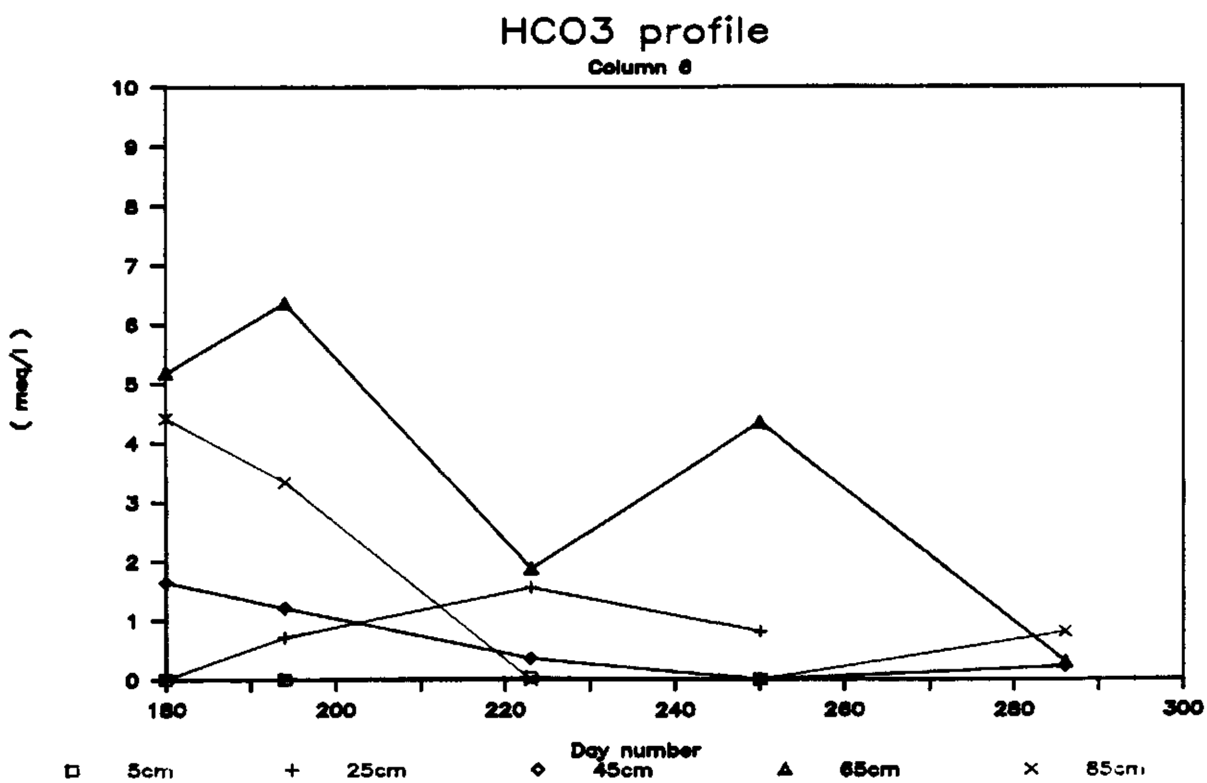


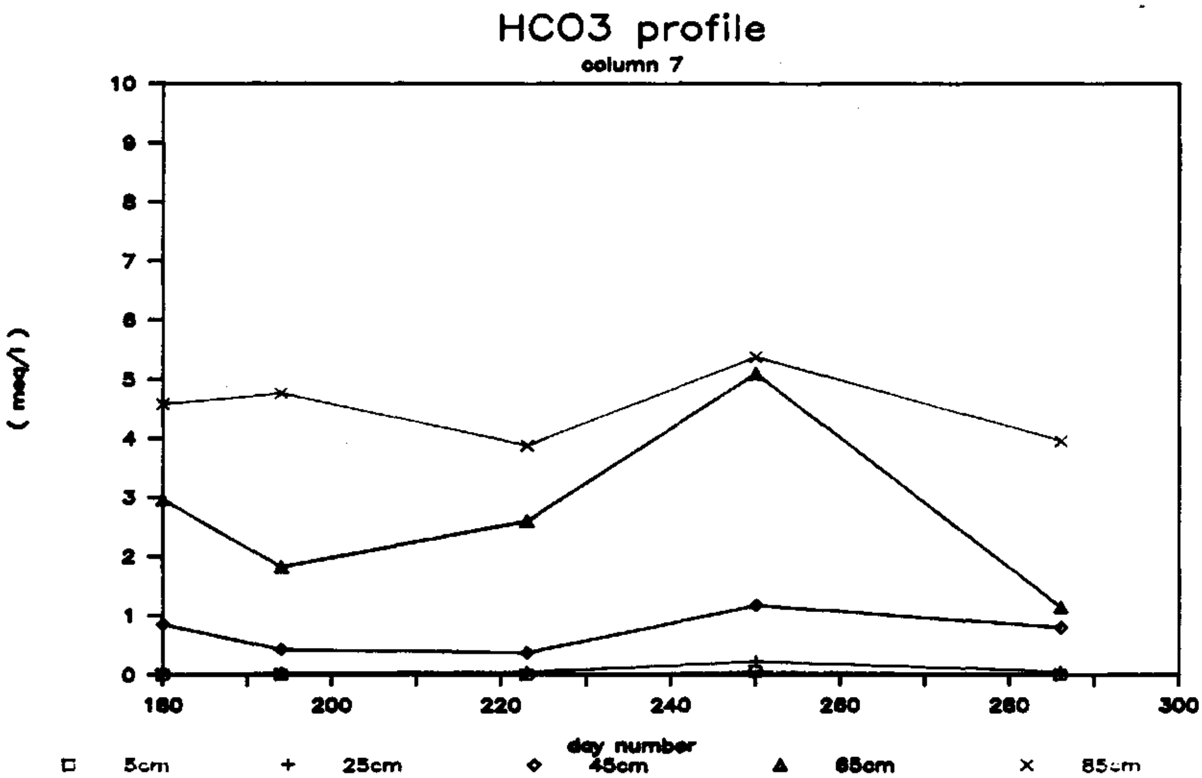
HCO3 profile
Column 3
(meq/l)
0
1
2
3
4
5
6
7
8
9
10
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



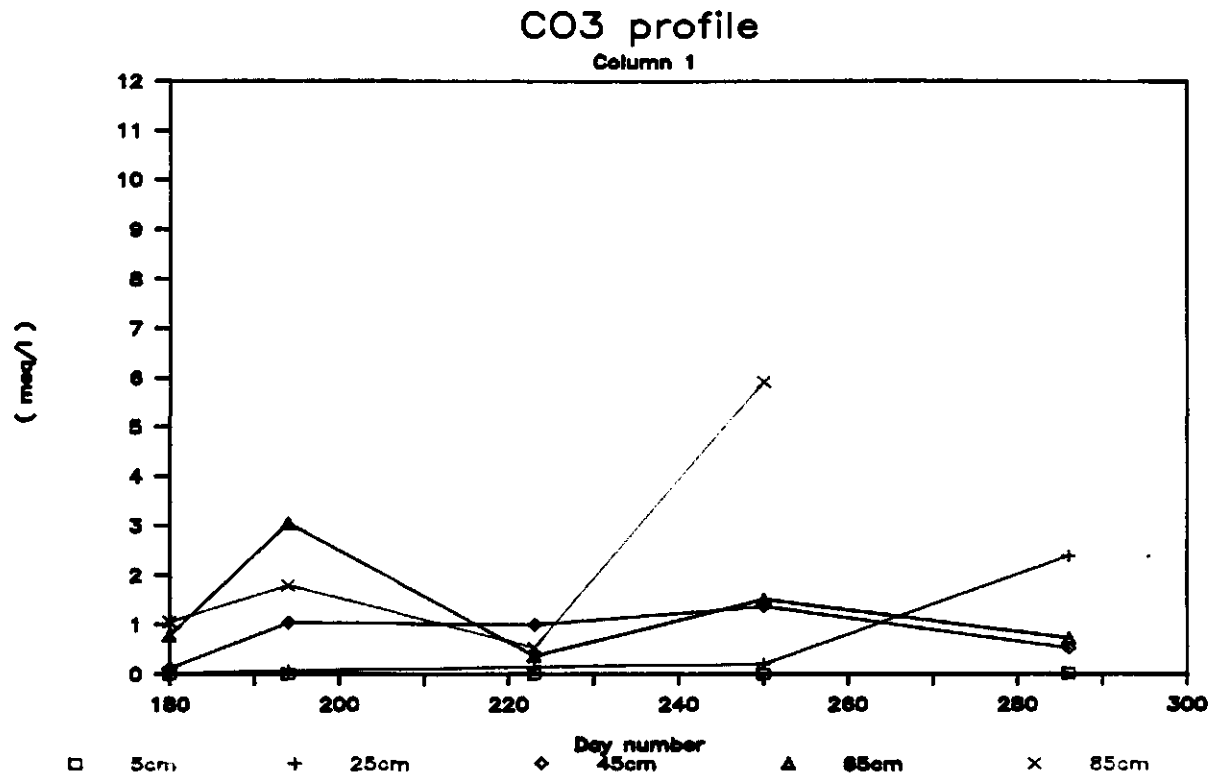
HCO3 profile
Column 4
(meq/l)
0
1
2
3
4
5
6
7
8
9
10
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm


HCO3 profile
column 5
(meq/l)
Day number
5cm
25cm
45cm
65cm
85cm

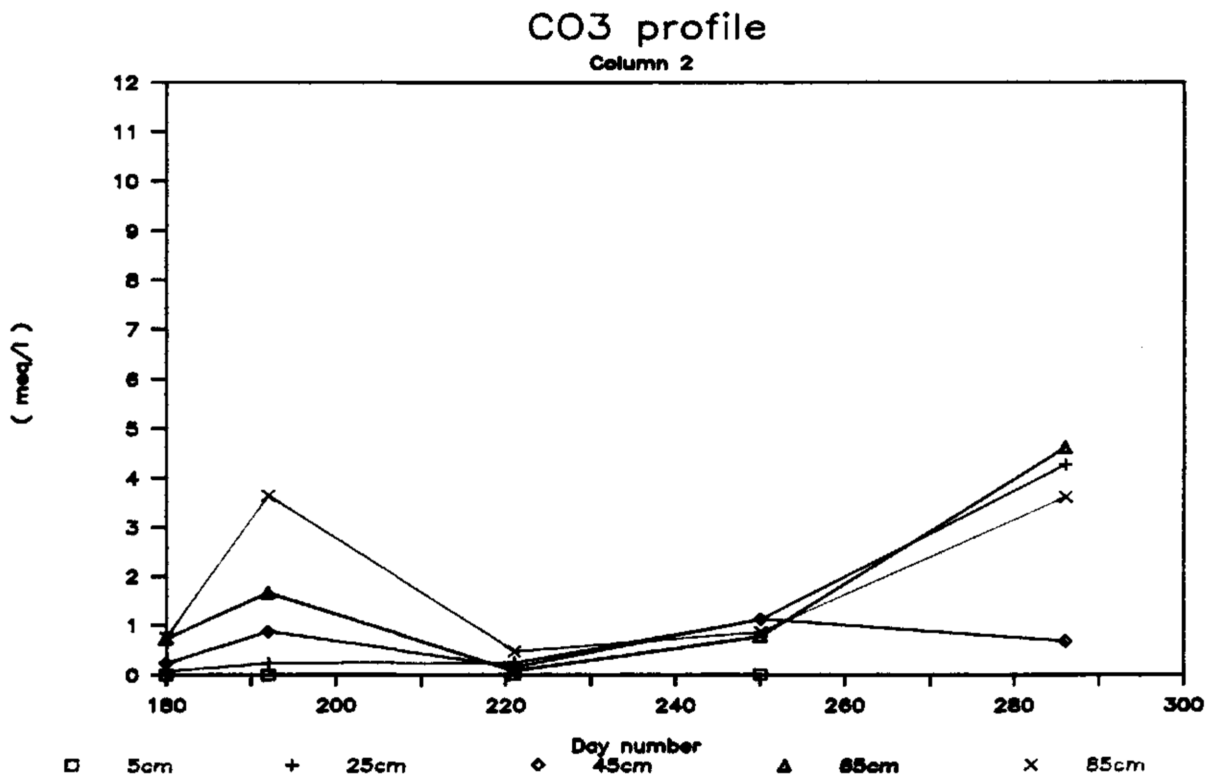

HCO3 profile
Column 6
(meq/l)
Day number
5cm
25cm
45cm
65cm
85cm



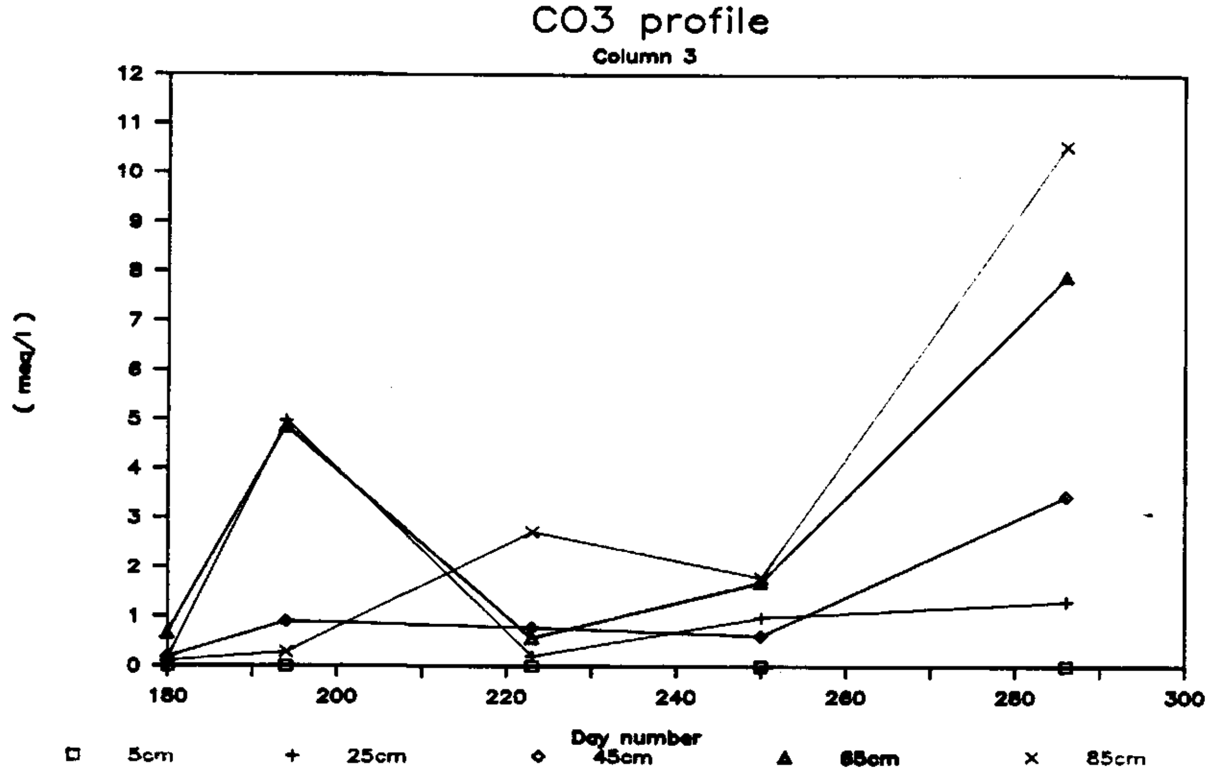
HCO3 profile
column 7
10
9
8
7
6
5
4
3
2
1
0
(meq/l)
180
200
220
240
260
280
300
day number
5cm
25cm
45cm
65cm
85cm



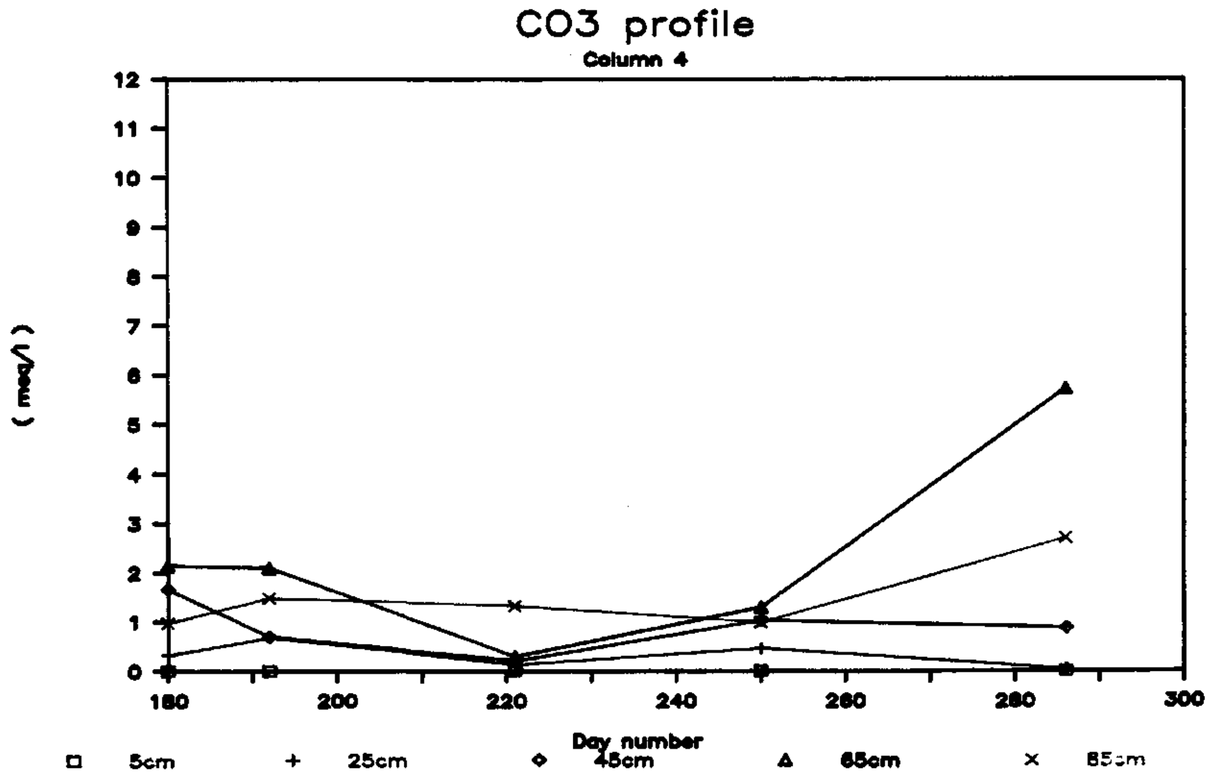
CO3 profile
Column 1
(meq/l)
Day number
5cm
25cm
45cm
65cm
85cm



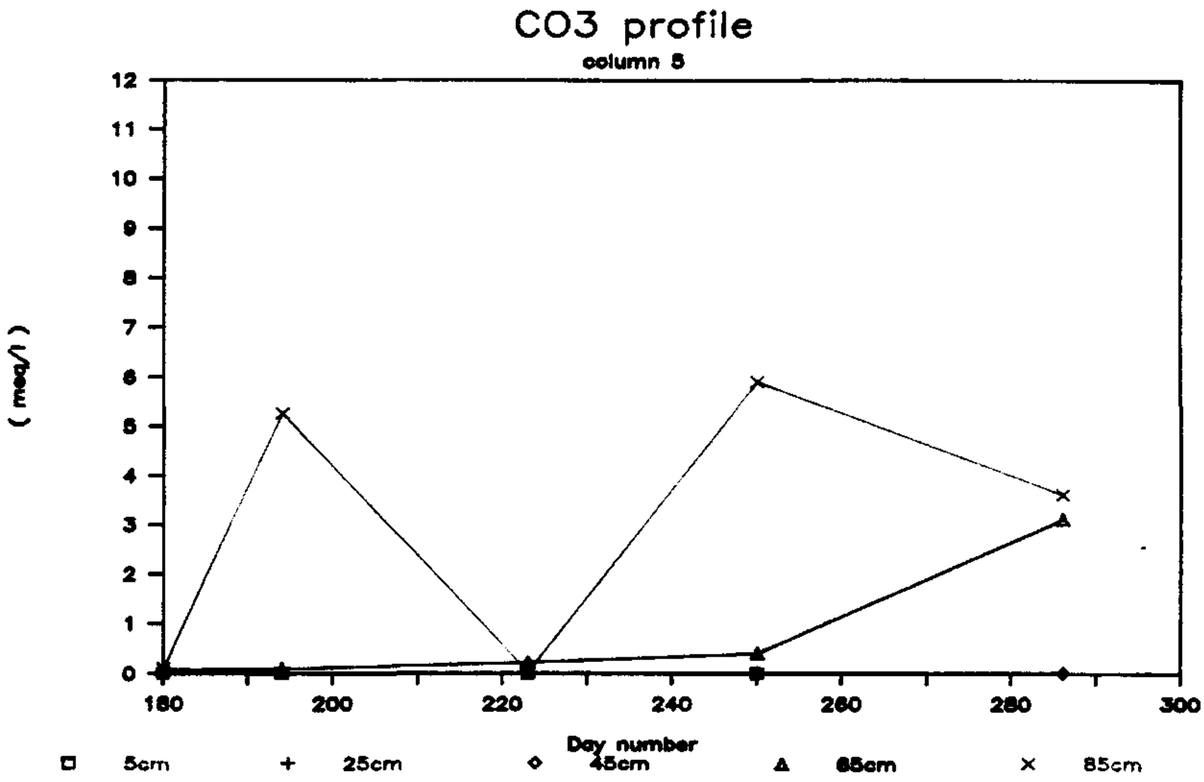
CO3 profile
Column 2
(meq/l)
Day number
5cm
25cm
45cm
65cm
85cm

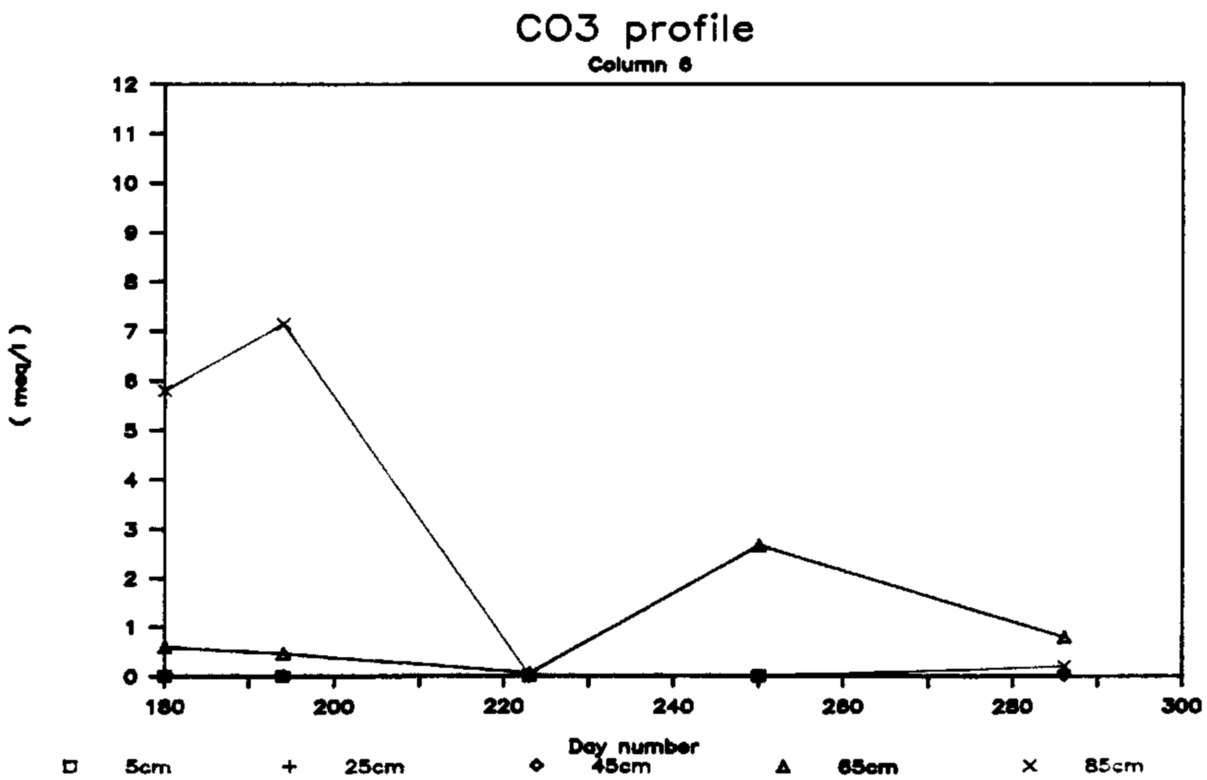


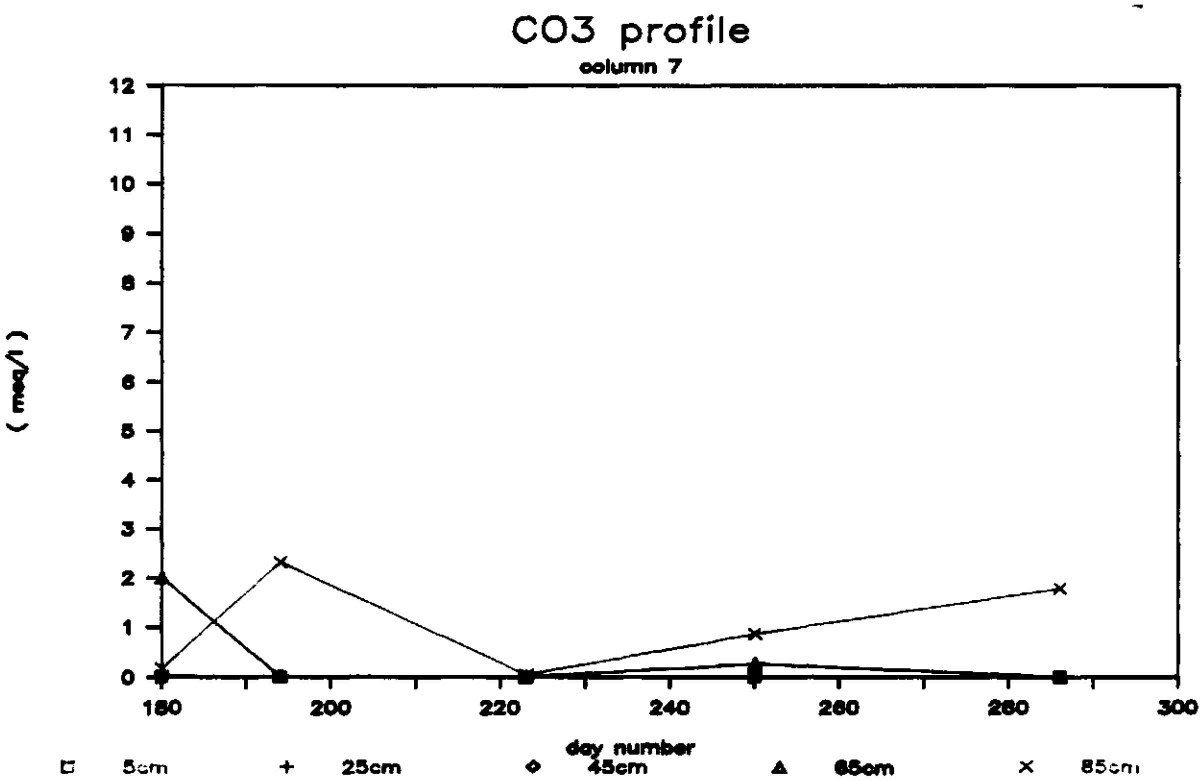
CO3 profile
Column 3
(meq/l)
12
11
10
9
8
7
6
5
4
3
2
1
0
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm



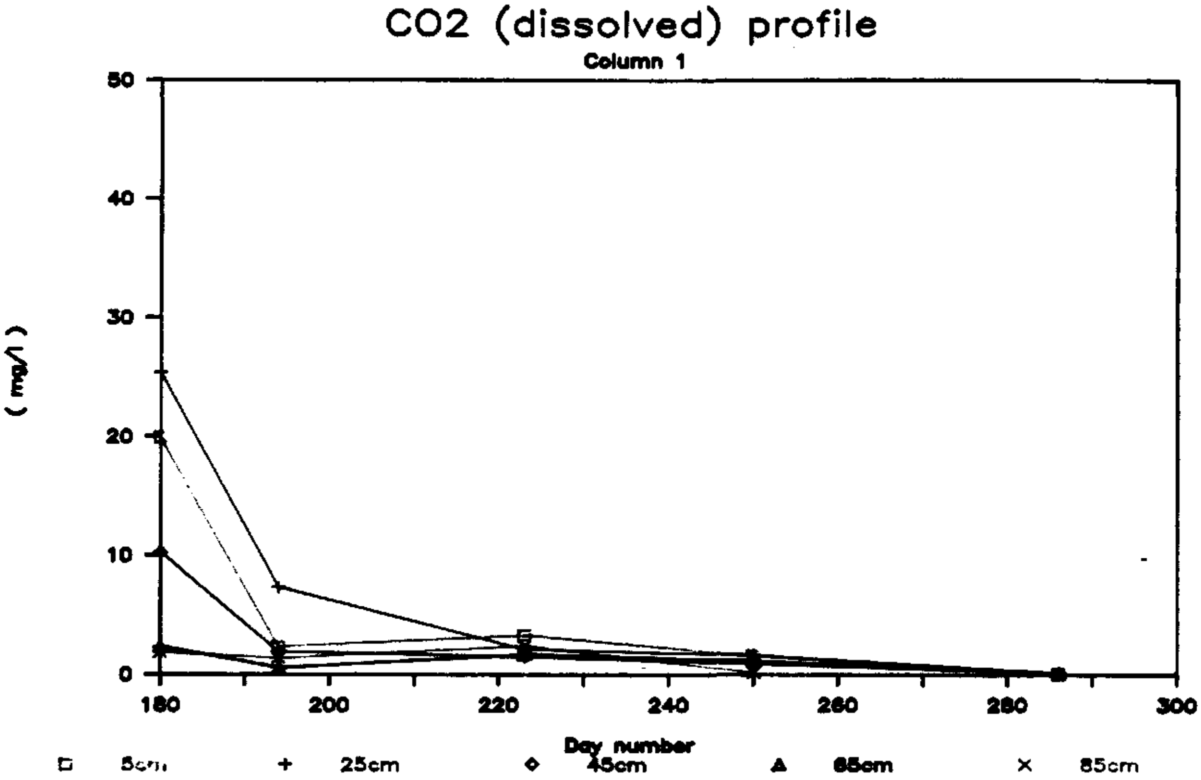
CO3 profile
Column 4
(meq/l)
12
11
10
9
8
7
6
5
4
3
2
1
0
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm

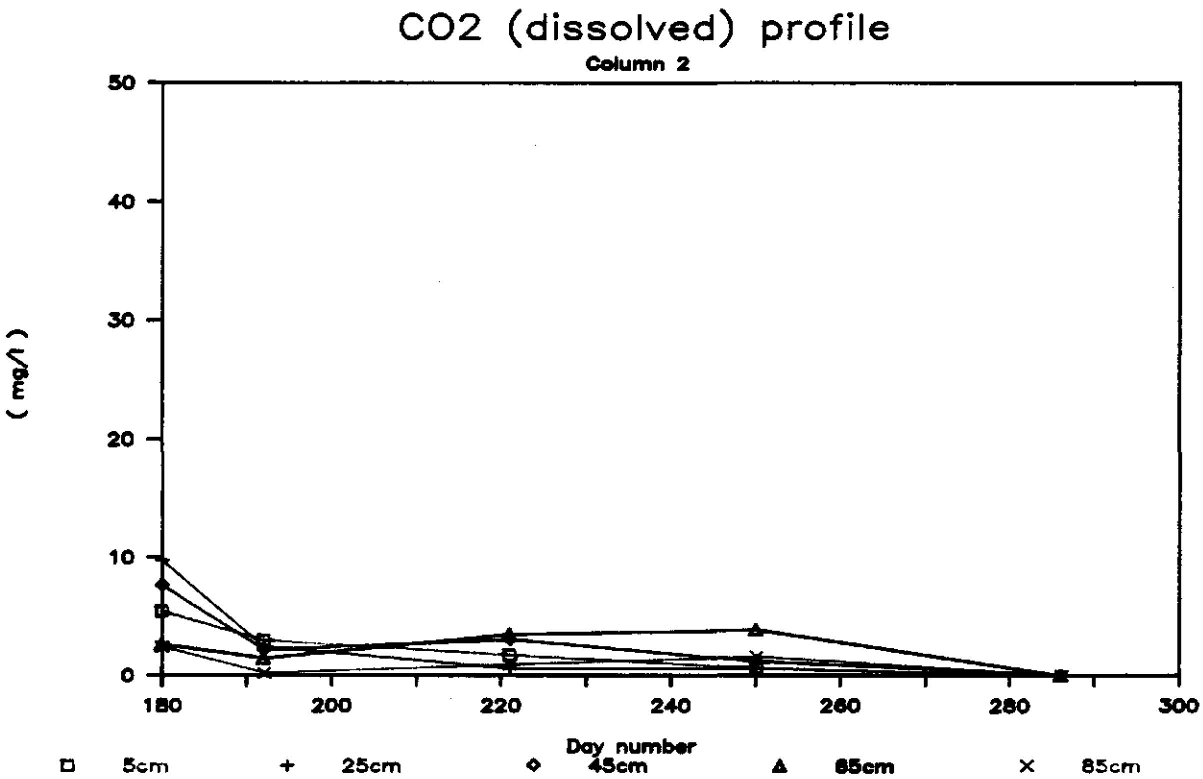

CO3 profile
column 5
(meq/l)
Day number
5cm
25cm
45cm
65cm
85cm

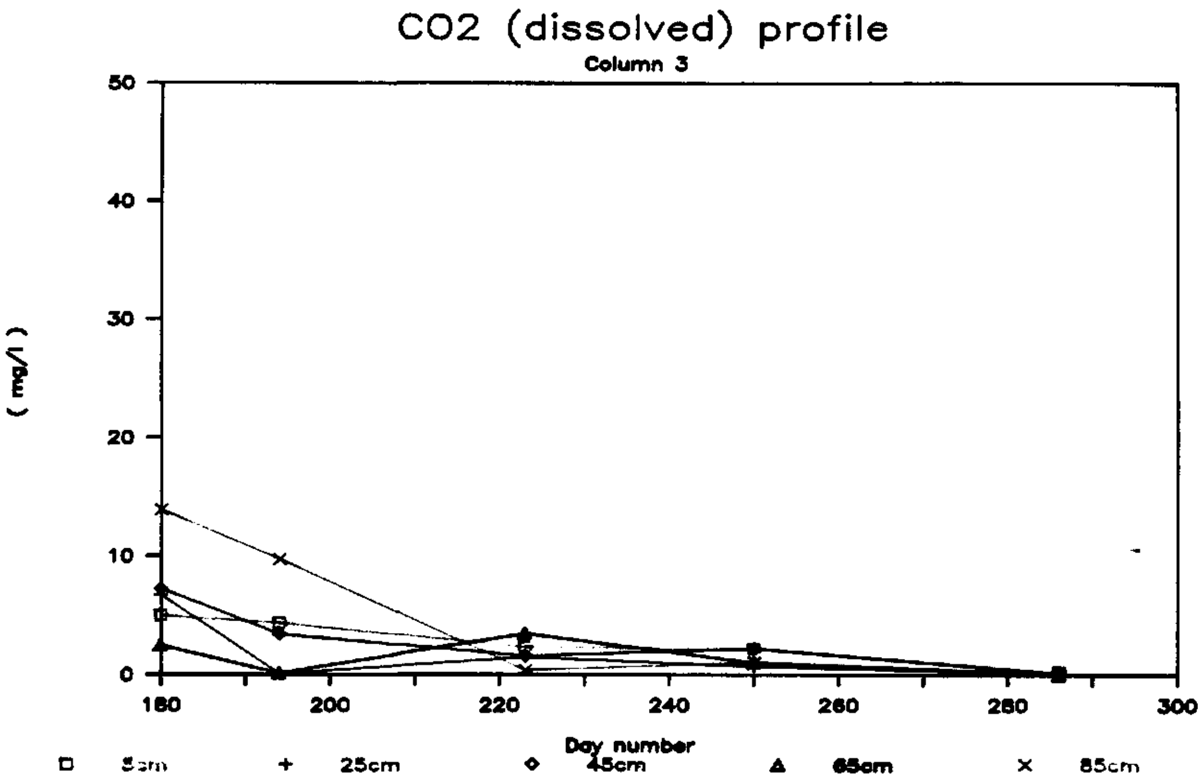

CO3 profile
Column 6
(meq/l)
Day number
5cm
25cm
45cm
65cm
85cm

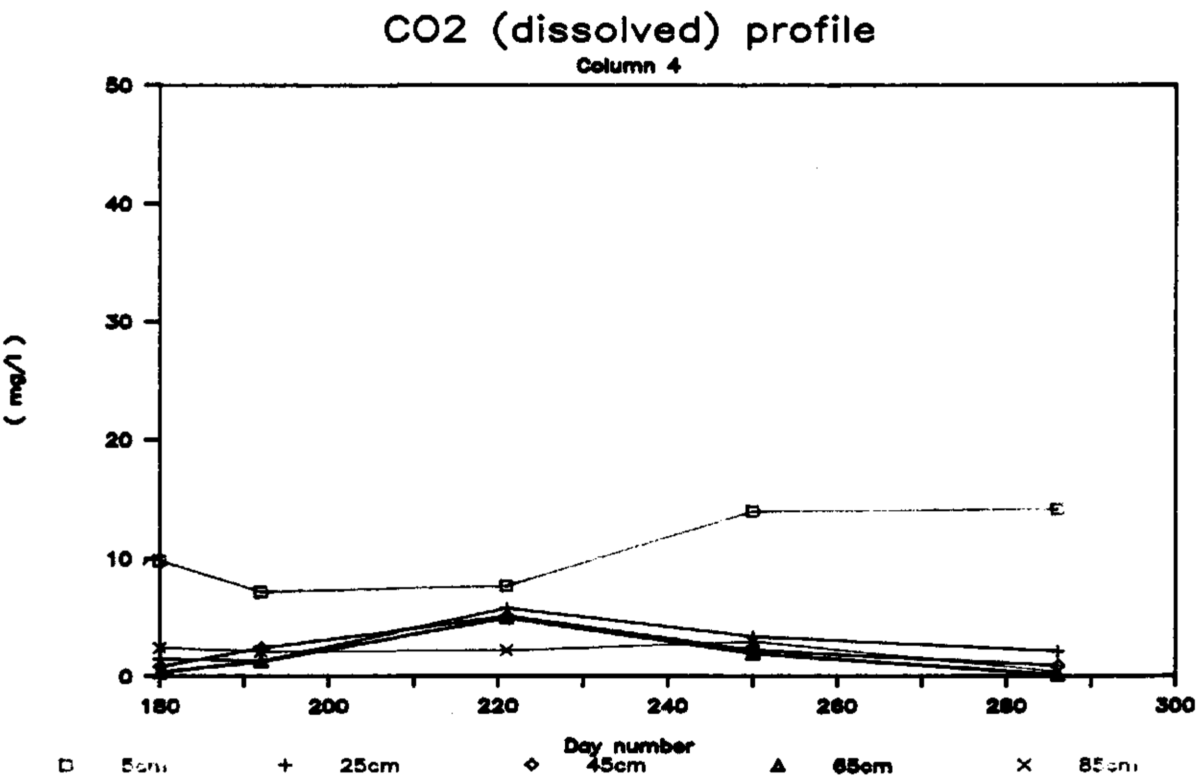


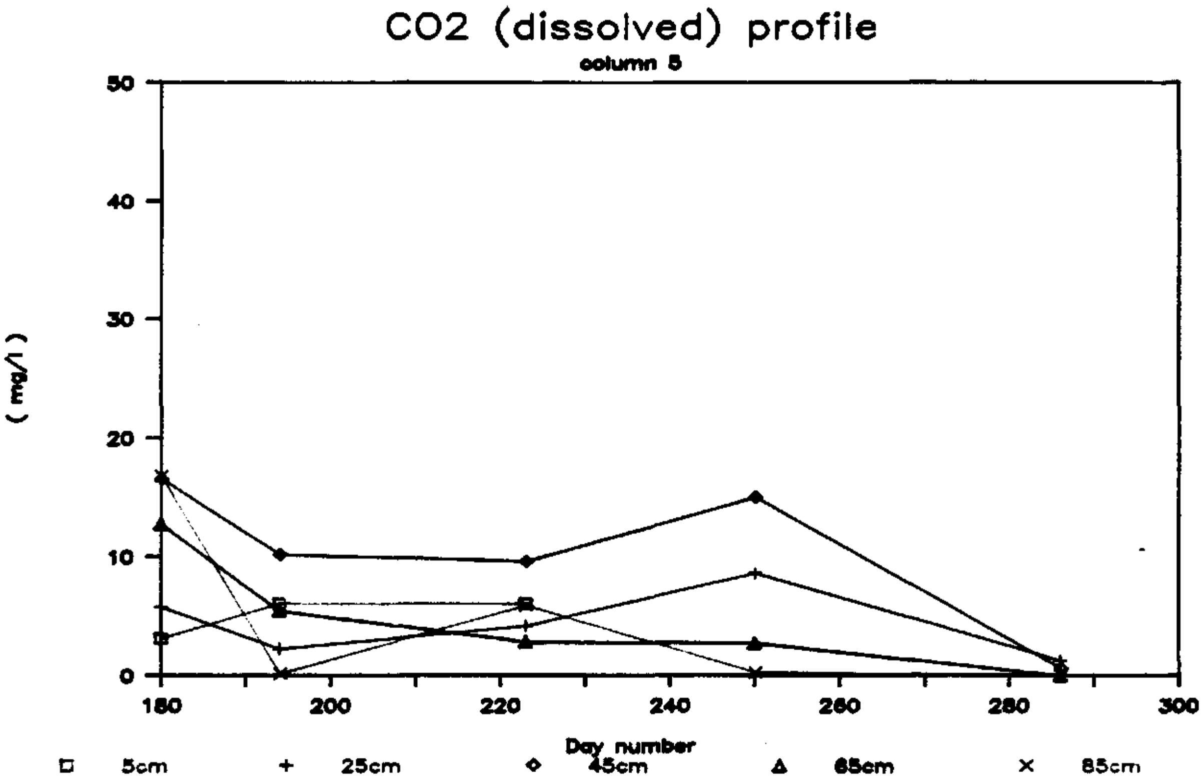
CO3 profile
column 7
(meq/l)
day number
5cm
25cm
45cm
65cm
85cm

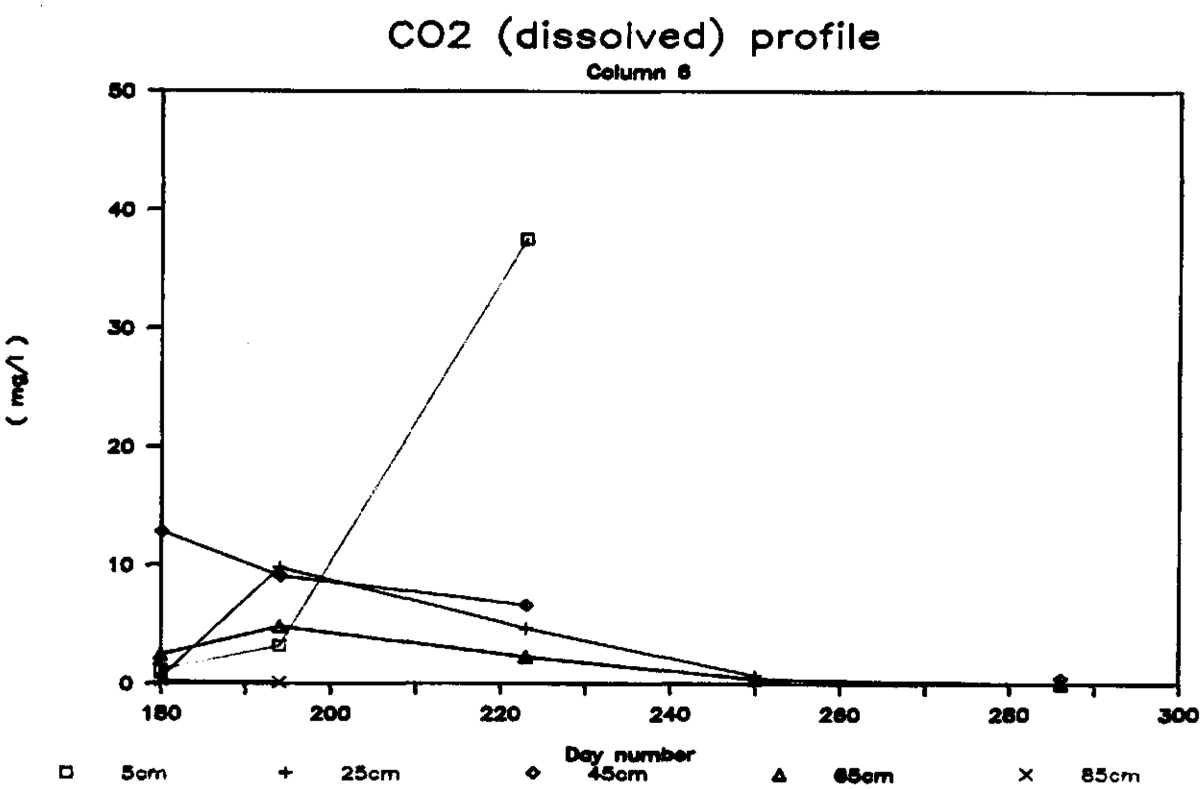

CO2 (dissolved) profile
Column 1
50
40
30
20
10
0
(mg/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm

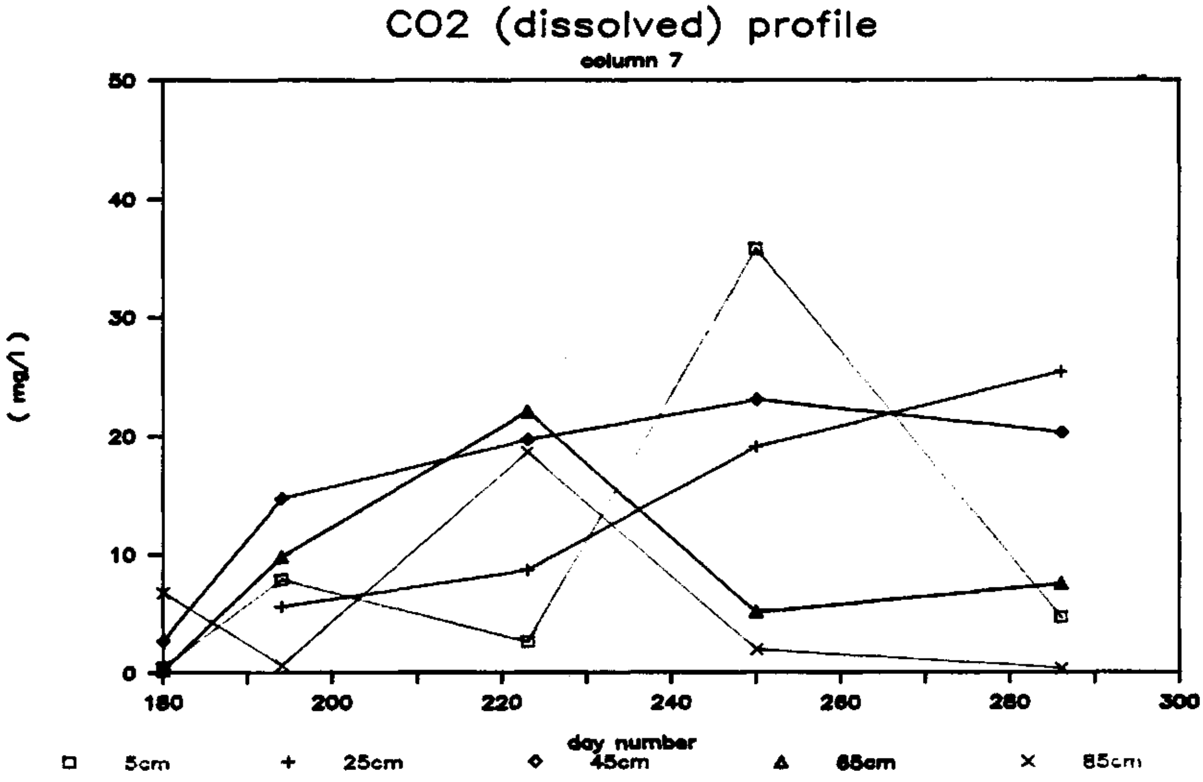

CO2 (dissolved) profile
Column 2
50
40
30
20
10
0
(mg/l)
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm


CO2 (dissolved) profile
Column 3
(mg/l)
Day number
5cm
25cm
45cm
65cm
85cm


CO2 (dissolved) profile
Column 4
(mg/l)
Day number
5cm
25cm
45cm
65cm
85cm


CO2 (dissolved) profile
column 5
(mg/l)
50
40
30
20
10
0
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm


CO2 (dissolved) profile
Column 6
(mg/l)
50
40
30
20
10
0
180
200
220
240
260
280
300
Day number
5cm
25cm
45cm
65cm
85cm


CO2 (dissolved) profile
column 7
(mg/l)
day number
5cm
25cm
45cm
65cm
85cm

3. BANJARBARU, INDONESIA

Banjarbaru, Indonesia

3.1. Initial properties of soils for column experiments

3.1.1. Profile description

profile description - Belawang, columns A, B, C, D.

I Information on the site sampled

a. Profile number: BEL 6
b. Soil name:
c. Higher category classification:
   FAO:
   USDA:
   Indonesian:
d. Date of examination: 26 October 1988
e. Authors of description: Carla J.M. Konsten and Supardi Suping
f. Location: 100 m N of rai 4, 600 m E of Saluran Sekondar Kiri Belawang, desa Sidomulyo, kecamatan Belawang, province Kalimantan Selatan, Indonesia.
g. Elevation:
h. Land-form:
   physiographic position: plain
   surrounding landform: flat
   microtopography: dikes of 50 cm high
i. Slope on which the profile is sited: class 1 - flat
j. Vegetation or landuse: abandoned rice field, overgrown with grass (kalamenta). Last year variety IR 36 was planted, which did not grow at all. On the dikes vegetables, mainly taro. All neighbouring fields also abandoned, one is turned into raised beds and planted with vegetable (taro).
k. Climate: tropical rainforest climate, annual precipitation about 2300 mm with a relatively dry season from June untill Novembre.

II General information on the soil

a. Parent material: pyritic marine sediments, probably overlain with highly kaolinitic fluviatile sediments of Barito river system.
b. Drainage: class 1 - poorly drained
c. Moisture conditions in the soil: wet throughout
d. Depth of ground water table: -45 cm
e. Presence of surface stones or rock outcrops: none
f. Evidence of erosion: none
g. Presence of salt of alkali: none
h. Human influence: clearing of gelam forest and occasionally burning of peat topsoil. Construction of dikes and shallow drainage canals.

III Description of individual soil horizons

O	+14 - 0 cm	black (mixed 10 YR 2/1 and 7.5 YR 2/0) burned sapric peat; in parts clayey peat; ripe; few medium distinct clear brown (7.5 YR 5/4) mottles; moderate medium crumb structure; slightly sticky, non-plastic when wet; many very fine and fine, common medium continuous random exped tubular pores; common very fine

		and fine roots; clear irregular boundary; pH 3.9; <u>sample BEL 6.1</u>.
Ah	0 - 37 cm	mixed brown (7.5 YR 5/2) and dark brown (7.5 YR 4/2 and 3/2) clay and some black (10 YR 2/1) peat; nearly ripe; moderate coarse and very coarse subangular blocky structure; sticky, slightly plastic when wet; broken thin reddish brown (5 YR 4/4) iron oxide cutans on ped faces; many very fine and fine, common medium, few coarse continuous vertical inped tubular pores; few very fine to coarse continuous vertical exped cracks; frequent very fine, common fine roots; many hollow reddish brown root remnants (nipah?), Ø 3 to 5 mm; diffuse irregular boundary; pH 3.8; <u>sample BEL 6.2</u>.
Bg	37 - 70 cm	mixed light brownish gray (10 YR 6/2) and gray brown (10 YR 5/2) silty clay; nearly ripe; common fine distinct clear dark gray (7.5 YR 4/0) mottles; few fine prominent sharp brownish yellow (10 YR 6/8) mottles; moderate very coarse angular blocky structure; slightly sticky, slightly plastic when wet; continuous moderately thick yellowish brown (10 YR 5/6) iron cutans on ped faces and along wood and root remnants; many very fine and fine, few medium and coarse continuous vertical inped tubular pores; few very fine and fine continuous vertical exped cracks; few very fine roots; many hollow reddish brown root remnants (nipah?), Ø 3 mm; gradual broken boundary; pH 3.8; <u>sample BEL 6.3</u>.
C	70 - 150+ cm	grayish brown (2.5 Y 5/2), changing upon aeration to dark gray (5 Y 4/1) silty clay; half ripe; few large (Ø 20 cm) spherical inclusions of light olive gray (2.5 Y 6/2) silty clay; below -90 cm common inclusions of light gray (2.5 Y 7/2) and white (2.5 Y 8/2) clay, somewhat indurated; many coarse distinct diffuse very dark gray (2.5 Y 3/0) and dark gray (2.5 Y 4/0) mottles of organic matter; many very fine distinct clear olive (5 Y 4/4) mottles; common fine prominent clear yellow (2.5 Y 7/6) jarosite mottles; few very coarse (Ø 10 cm) distinct diffuse dark brown (10 YR 3/3) mottles; below -140 cm few coarse prominent clear greenish gray (5 GY 5/1) mottles; weak very coarse prismatic structure; sticky, slightly plastic when wet; broken thin yellowish brown (10 YR 5/6) iron oxide cutans on

profile description - BEL 6

the surface of wood; broken thin yellow (2.5 Y 7/6) jarosite cutans along root remnants; many very fine, common fine, few medium and coarse continuous vertical inped tubular pores; few very fine to medium continuous vertical exped cracks; common yellowish hollow root remnants (Ø 3 mm); many pieces of pelantan wood; black pieces of decomposed wood;

70 - 90 cm: pH 4.3, <u>sample BEL 6.4</u>;
90 -110 cm: pH 4.7, <u>sample BEL 6.5</u>;
110 -130 cm: pH 5.0, <u>sample BEL 6.6</u>;
130 -150 cm: pH 5.0; <u>sample BEL 6.7</u>.

The pH of the ground water is 3.5; it smells of H_2S.

IV <u>List of samples</u>

a. of all horizons bulk samples were taken for chemical and mineralogical analyses (samples frozen within 16 h and freeze dried), granular composition (air dried), incubation and actual and potential acidity determinations (field moist samples sent directly to the lab and analyzed within 16 h);

V <u>Results of chemical analyses</u>

profile description - Barambai, columns E, F, G

I <u>Information on the site sampled</u>

a. Profile number: BAR 6
b. Soil name:
c. Higher category classification:
FAO:
USDA:
Indonesian:
d. Date of examination: 25 Oktober 1988
e. Authors of description: Carla J.M. Konsten and Supardi Suping
f. Location: 100 m to the W of the bend in Saluran Sekondar Kolam Kiri, 2 km S of the village Kolam Kiri, desa Barambai Kolam Kiri, Kecamatan Barambai, province Kalimantan Selatan, Indonesia.
g. Elevation:
h. Land-form:
physiographic position: plain
surrounding landform: flat
microtopography: 50 cm high dikes, penpendicular to the - secondary canal, 100 m apart; tertiary drainage canals, 1 m deep.
i. Slope on which the profile is sited: class 1 - flat
j. Vegetation or landuse: abondoned rice field, overgrown with ferns (piai), shrubs (karamunting), grass (rumput pedang), sedges (bundung) and some 4 m high trees (gelam; Melaleuca leucadendron).
k. Climate: tropical rainforest climate, annual precipitation about 2300 mm with a relatively dry season from June untill Novembre.

II General information on the soil

a. Parent material: pyritic marine sediments, probably overlain with highly kaolinitic fluviatile sediments of Barito river system.
b. Drainage: class 1 - poorly drained
c. Moisture conditions in the soil: peat topsoil is dry; from 0 cm downwards wet.
d. Depth of ground water table: - 30 cm.
e. Presence of surface stones or rock outcrops: none
f. Evidence of erosion: none
g. Presence of salt of alkali: soft red and dark brown iron oxide concentrations on surface.
h. Human influence: drainage and bunding.

III Description of individual soil horizons

Ocsp +12 - 0 cm mixed dark reddish brown (5 YR 3/2) and dusky red (2.5 YR 3/2) clayey peat, mixed with frequent very small soft iron oxide concretions; inclusions of strong brown (7.5 YR 4/6) clay; ripe; moderate medium crumb strucprofile description – BAR 6

		ture; firm when moist; non-sticky, non-plastic when wet; many very fine and fine, common medium and few coarse continuous random exped tubular pores; hard black (N 2.5/) organic matter nodules; frequent very fine, common fine and medium, few coarse roots; sharp broken boundary; no reaction with H_2O_2; pH 3.0; sample BAR 6.1.
Ahg	0 – 20 cm	mixed pinkish gray (7.5 YR 6/2) and brown (7.5 YR 5/2) clay; nearly ripe; few medium faint diffuse yellowish brown (10 YR 5/4) iron mottles; moderate coarse subangular blocky structure; sticky, slightly plastic when wet; continuous thin dark brown (7.5 YR 3/2) organic matter cutans along cracks; continuous thin brown (7.5 YR 4/2) iron oxide cutans on ped faces; many very fine and fine random, common medium and few coarse vertical, continuous, inped tubular pores; few very fine to coarse continuous vertical exped cracks; frequent very fine roots; common reddish brown root remnants(Ø 3 mm), probably of purun; few remnants of nipah; gradual smooth boundary; no reaction with H_2O_2; pH 3.2; sample BAR 6.2.
Bg	20 – 35 cm	brown (7.5 YR 5/2) silty clay; half ripe; moderate coarse and very coarse angular blocky; slightly sticky, slightly plastic when wet; continuous moderately thick yellowish brown (10 YR 5/8) iron cutans along cracks; many very fine and fine, common medium, few coarse, continuous vertical inped tubular pores; few very fine to coarse continuous vertical exped cracks; few very fine roots; many hollow reddish brown root remnants (Ø 3 mm); many small pieces of decomposed wood; gradual broken boundary; strong reaction with H_2O_2; pH 3.2; sample BAR 6.3.
BC	35 – 55 cm	mainly gray (10 YR 5/1), in parts grayish brown (10 YR 5/2) silty clay; half ripe; moderate very coarse angular blocky and prismatic structure; sticky, slightly plastic when wet; broken thick yellowish brown (10 YR 5/6) iron cutans; along root remnants broken thick yellow (2.5 Y 8/8) jarosite cutans; many very fine, common fine, few medium and coarse, continuous vertical inped tubular pores; few very fine continuous vertical exped cracks; many hollow reddish brown root remnants (Ø 3

mm); many small pieces of decomposed wood; clear broken boundary; strong reaction with H_2O_2; pH 3.3; <u>sample BAR 6.4</u>.

C1 55 - 85 cm grayish brown (2.5 Y 5/2), changing upon aeration into gray (5 Y 5/1) silty clay; half ripe; very weak very coarse prismatic structure; sticky, slightly plastic when wet; patchy thich olive yellow iron (?) cutans; many very fine, common fine, few medium and coarse, continuous vertical inped tubular pores; many hollow reddish brown (Ø 3 mm) root remnants; many very fine root remnants; remnants of pelantan wood; clear broken boundary; strong reaction with H_2O_2; pH 4.3 <u>sample BAR 6.5</u>.

C2 85 - 130+ cm mixed gray (5 Y 5/1) and olive gray (5 Y 5/2) silty clay; half ripe; very weak very coarse prismatic structure; continuous moderately thick olive yellow (2.5 Y 6/8) iron cutans along root remnants; continuous thick greenish gray (5 GY and 5 G 5/1) (decomposed organic matter?) cutans inside pores; many very fine, few fine, medium and coarse, continuous vertical inped tubular pores; few very fine continuous vertical exped cracks; inclusions of pale yellow (2.5 Y 8/4) silty clay, Ø about 1 cm; many hollow root remnants (Ø 3 mm), many very fine and fine root remants; many pieces of decomposed wood; strong reaction with H_2O_2; pH 5.5; <u>sample BAR 6.6</u>.

The groundwater smells of H_2S; the pH at -70 cm is 3.

IV <u>List of samples</u>

a. of all horizons bulk samples were taken for chemical and mineralogical analyses (samples frozen within 16 h and freeze dried), granular composition (air dried), incubation and actual and potential acidity determinations (field moist samples sent directly to the lab and analyzed within 16 h);

V <u>Results of chemical analyses</u>

3.1.2. Mineralogical composition (texture, pyrite, org. matter rontgen fluor./diffr.)

soil G depth cm		weight soil after ox.	%sand	%clay	%silt
30-40	1.0	15.2	2.8	86.3	10.9
40-50	2.0	15.2	3.8	87.1	9.1
50-60	3.0	15.6	6.9	84.0	9.1
60-70	4.0	16.2	2.2	69.4	28.4
70-80	5.0	16.8	3.5	88.4	8.2
80-90	6.0	16.5	32.1	62.2	5.6
90-100	7.0	16.5	19.1	73.5	7.3
100-110	8.0	15.6	9.4	82.2	8.5
110-120	9.0	16.7	12.6	81.8	5.7
120-130	10.0	15.8	21.8	72.1	6.2
130-140	11.0	16.3	16.3	74.4	9.3
140-150	12.0	16.6	10.8	80.8	8.5
150-160	13.0	17.8	6.6	82.8	10.5
160-170	14.0	18.1	5.5	85.3	9.3

texture analysis from belawang from 30-170 cm each 10 cm
field G

RONTGENDIFFRACTION ANALYSES

Mineralogy of twentyfour soil samples of the Indonesian columns was determined by rontgendiffraction method. The analyses did show that the Indonesian soils contain a lot of clayminerals (a.o. kaolinite) and quarts. Further some feldspars and anatase could be determined. Special attention was given on the occurence of pyrite. Samples with no pyrite, less than 3.3 (weight)% and more than 3.3 (weight)% pyrite were distinguished. These results are shown in the following table:

Column A	depth (cm)	no pyrite	less than 3.3%	more than 3.3%
A	2.5-5.0	X		
A	12.5			X
A	22.5-25.0			X
A	42.5-45.0			X
A	65.0			X
A	82.5-85.0			X
B	2.5-5.0	X		
B	12.5		X	
B	22.5-25.0		X	
B	42.5-45.0			X
B	65.0			X
B	82.5-85.0			X
F	2.5-5.0	X		
F	12.5	X		
F	22.5-25.0	X		
F	42.5-45.0		X	
F	65.0		X	
F	82.5-85.0		X	
G	2.5-5.0	X		
G	12.5	X		
G	22.5-25.0	X		
G	42.5-45.0			X
G	65.0			X
G	82.5-85.0		X	

COLUMN A INDONESIA

MACRO ELEMENT	WEIGHT (%)					
	DEPTH					
	2.5-5.0	12.5	22.5-25.0	42.5-45.0	65.0	82.5-85.0
O	47.56	47.04	46.20	43.24	45.61	46.22
Si	23.41	20.96	21.26	20.75	24.13	22.56
Al	10.86	9.95	10.36	9.82	10.24	8.91
C	7.11	9.08	7.17	4.78	4.18	6.61
Fe	1.42	2.86	4.92	7.64	4.98	5.85
K	1.25	1.17	1.29	1.27	1.33	1.15
H	1.18	1.51	1.20	0.80	0.70	1.10
Ti	0.66	0.61	0.63	0.61	0.65	0.61
Mg	0.45	0.42	0.46	0.61	0.67	0.70
Ca	0.00	0.00	0.00	0.04	0.03	0.08
Mn	0.00	0.01	0.01	0.03	0.02	0.02
Na	0.09	0.10	0.10	0.10	0.15	0.16
Ba	X 0.01	X 0.01	X 0.01	X 0.01	X 0.01	0.01
P	0.02	0.02	0.02	0.02	0.02	0.02
TOTAL	94.01	93.74	93.63	89.72	92.71	93.99
S	not yet determined					
Pyrite-Fe *	0.01	1.82	1.91	4.17	2.92	3.61
Pyrite-S *	0.01	2.09	2.19	4.77	3.34	4.13

* determined by wet chemical analyses (Bouter P. and C.J. Ritsema, 1988)

MICRO ELEMENT	WEIGHT (ppm)					
	DEPTH					
	2.5-5.0	12.5	22.5-25.0	42.5-45.0	65.0	82.5-85.0
V	165	174	161	157	187	168
Cr	X 56	X 56	X 56	X 56	X 56	X 56
Co	20	46	40	94	17	18
Ni	X 47	X 47	X 47	X 47	X 47	X 47
Cu	14	22	25	28	25	27
Zn	37	40	72	84	125	88
Ga	22	18	20	19	20	14
Rb	89	81	104	101	99	79
Sr	79	70	79	90	88	92
Zr	116	94	105	107	116	111
Nb	9	7	8	7	9	8
Ba	244	238	266	250	231	242
La	50	39	43	44	41	44
Pb	19	20	15	10	18	121
TOTAL	967	952	1041	1094	1079	1115

COLUMN B INDONESIA

MACRO ELEMENT	WEIGHT (%)					
	DEPTH					
	2.5-5.0	12.5	22.5-25.0	42.5-45.0	65.0	82.5-85.0
O	46.70	45.27	46.42	45.38	45.45	45.29
Si	21.88	21.42	24.11	21.70	23.50	15.58
Al	11.15	11.08	11.63	10.12	10.72	6.89
C	7.54	6.54	4.52	5.73	4.04	12.16
Fe	1.58	2.74	3.02	6.48	5.78	9.61
K	1.29	1.34	1.43	1.31	1.34	0.80
H	1.26	1.09	0.75	0.96	0.67	2.03
Ti	0.66	0.62	0.68	0.60	0.67	0.50
Mg	0.45	0.47	0.59	0.62	0.59	0.57
Ca	0.00	0.00	0.00	0.02	0.01	0.08
Mn	0.01	0.01	0.01	0.03	0.01	0.02
Na	0.07	0.08	0.11	0.11	0.11	0.11
Ba	X 0.01	X 0.01	X 0.01	X 0.01	X 0.01	0.01
P	0.02	0.02	0.02	0.02	0.05	0.03
TOTAL	92.62	90.69	93.29	93.09	92.95	93.68
S	not yet determined					
Pyrite-Fe *	0.04	0.89	0.98	4.00	2.69	6.86
Pyrite-S *	0.04	1.02	1.11	4.58	3.07	7.84

* determined by wet chemical analyses (Bouter P. and C.J. Ritsema, 1988)

MICRO ELEMENT	WEIGHT (ppm)					
	DEPTH					
	2.5-5.0	12.5	22.5-25.0	42.5-45.0	65.0	82.5-85.0
V	197	176	186	165	192	165
Cr	X 56	X 56	X 56	X 56	X 56	X 56
Co	17	17	25	16	33	17
Ni	X 47	X 47	X 47	X 47	X 47	X 47
Cu	17	17	22	29	26	35
Zn	39	46	57	160	71	90
Ga	25	22	22	21	21	13
Rb	93	98	109	100	101	65
Sr	74	75	85	86	86	77
Zr	104	100	108	109	106	114
Nb	8	8	8	8	8	6
Ba	274	267	256	261	265	245
La	60	58	40	54	55	52
Pb	19	32	15	86	19	19
TOTAL	1030	1019	1036	1198	1086	1001

COLUMN F INDONESIA

MACRO ELEMENT	WEIGHT (%)					
	DEPTH					
	2.5-5.0	12.5	22.5-25.0	42.5-45.0	65.0	82.5-85.0
O	46.33	478.76	46.30	47.90	44.79	44.40
Si	23.76	12.96	24.34	16.70	24.76	24.15
Al	11.68	7.21	12.48	8.82	12.39	11.08
C	5.42	19.56	4.27	13.84	1.94	2.40
Fe	1.37	1.86	1.44	3.92	3.86	5.41
K	1.30	0.73	1.35	0.92	1.32	1.24
H	0.90	3.26	0.71	2.31	0.32	0.40
Ti	0.73	0.41	0.73	0.53	0.75	0.71
Mg	0.41	0.25	0.44	0.33	0.53	0.81
Ca	0.00	0.00	0.00	0.00	0.00	0.11
Mn	0.00	0.00	0.00	0.02	0.01	0.09
Na	0.01	0.01	0.03	0.06	0.10	0.13
Ba	X 0.01	X 0.01	X 0.01	X 0.01	X 0.01	0.01
P	0.05	0.06	0.03	0.03	0.05	0.03
TOTAL	91.97	95.08	92.12	95.38	90.82	90.96
S	not yet determined					
Pyrite-Fe *	0.00	0.00	0.00	1.99	1.35	0.70
Pyrite-S *	0.00	0.00	0.00	2.28	1.55	0.81

* determined by wet chemical analyses (Bouter P. and C.J. Ritsema, 1988)

MICRO ELEMENT	WEIGHT (ppm)					
	DEPTH					
	2.5-5.0	12.5	22.5-25.0	42.5-45.0	65.0	82.5-85.0
V	167	101	189	152	201	184
Cr	X 56	136	59	X 56	X 56	X 56
Co	9	13	13	42	21	24
Ni	X 47	X 47	X 47	X 47	X 47	X 47
Cu	19	43	19	33	27	35
Zn	27	22	37	42	49	104
Ga	24	13	28	21	24	22
Rb	91	49	92	68	103	89
Sr	184	63	96	67	75	90
Zr	125	70	110	84	112	115
Nb	9	5	8	6	8	8
Ba	304	192	279	X 188	253	284
La	72	49	67	44	57	66
Pb	32	66	17	36	17	26
TOTAL	1166	869	1061	886	1050	1150

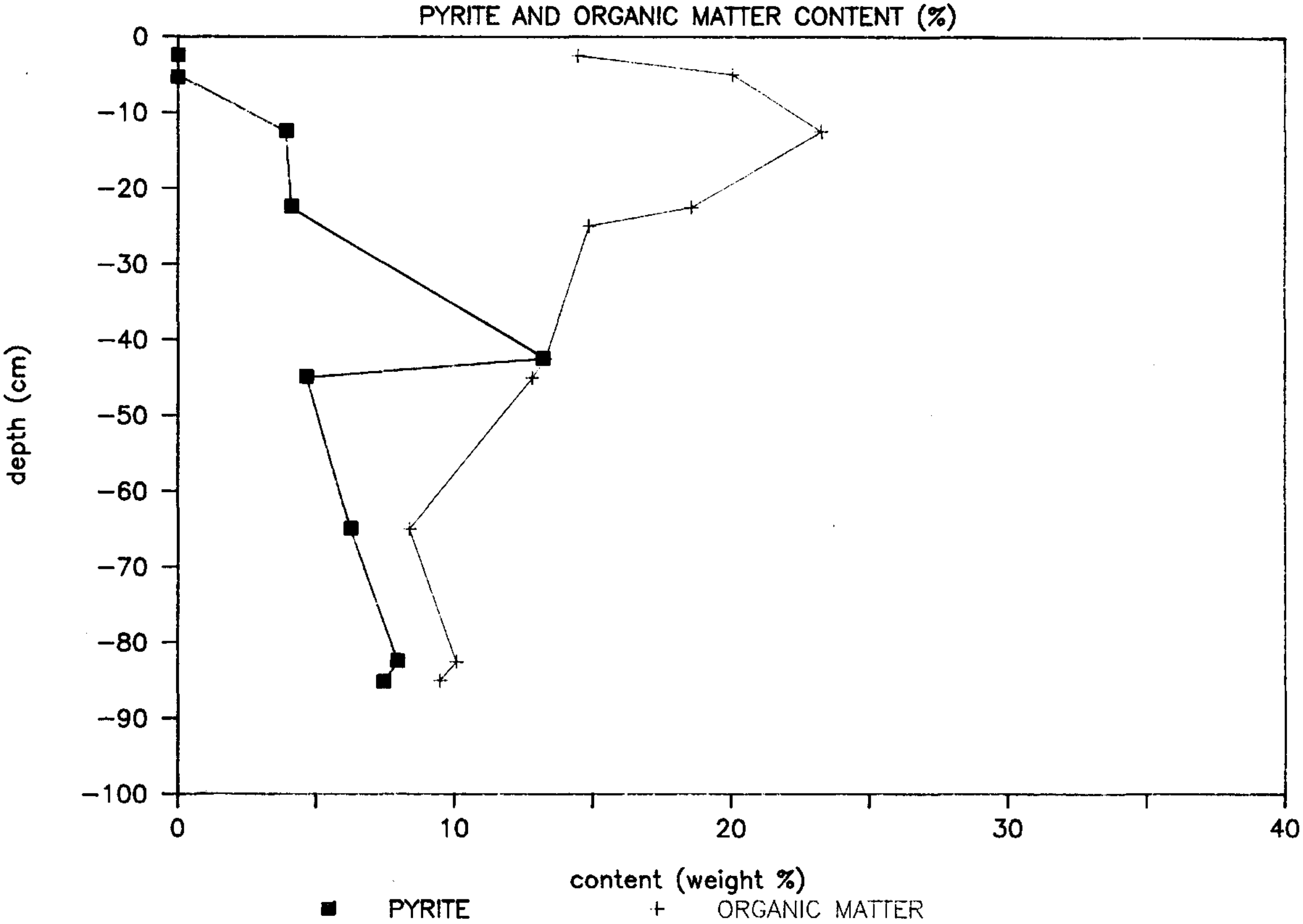
COLUMN G INDONESIA

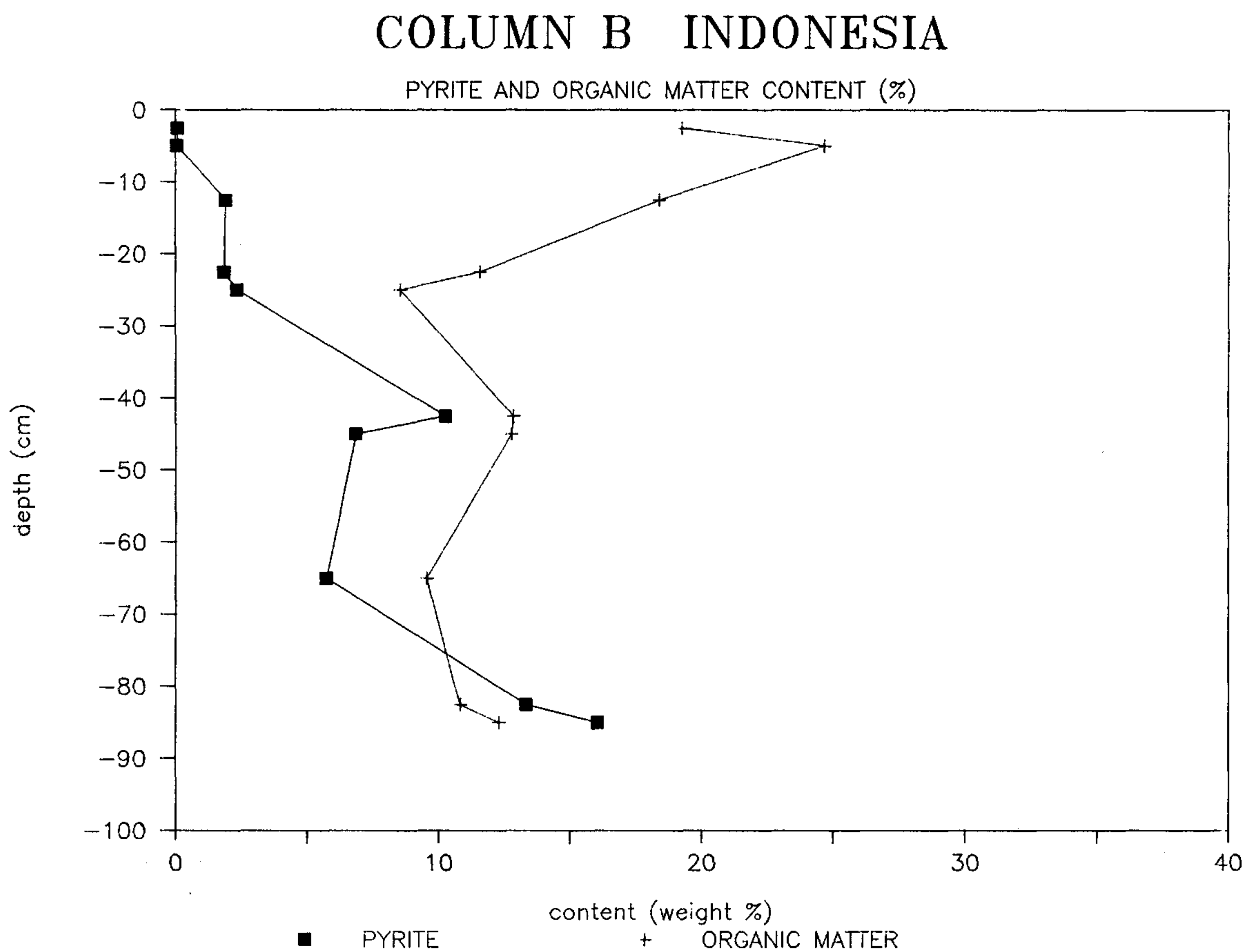
MACRO ELEMENT	WEIGHT (%)					
	DEPTH					
	2.5-5.0	12.5	22.5-25.0	42.5-45.0	65.0	82.5-85.0
O	48.49	47.09	46.81	45.63	44.85	45.75
Si	25.77	24.47	23.68	22.47	23.97	24.54
Al	13.03	12.45	12.22	11.60	11.77	11.13
C	4.31	4.79	5.39	4.49	2.72	3.10
Fe	1.37	1.34	1.46	5.99	4.74	5.34
K	1.39	1.29	1.34	1.19	1.28	1.20
H	0.72	0.80	0.90	0.75	0.45	0.52
Ti	0.77	0.76	0.70	0.68	0.71	0.70
Mg	0.47	0.44	0.45	0.47	0.71	0.81
Ca	0.00	0.00	0.00	0.00	0.04	0.07
Mn	0.00	0.00	0.00	0.02	0.02	0.07
Na	0.01	0.02	0.03	0.07	0.10	0.13
Ba	X 0.01	X 0.01	X 0.01	X 0.01	X 0.01	0.01
P	0.03	0.03	0.03	0.02	0.03	0.03
TOTAL	96.37	93.47	93.01	93.37	91.39	93.39
S	not yet determined					
Pyrite-Fe *	0.00	0.00	0.00	3.98	2.10	1.02
Pyrite-S *	0.00	0.00	0.00	4.54	2.39	1.17

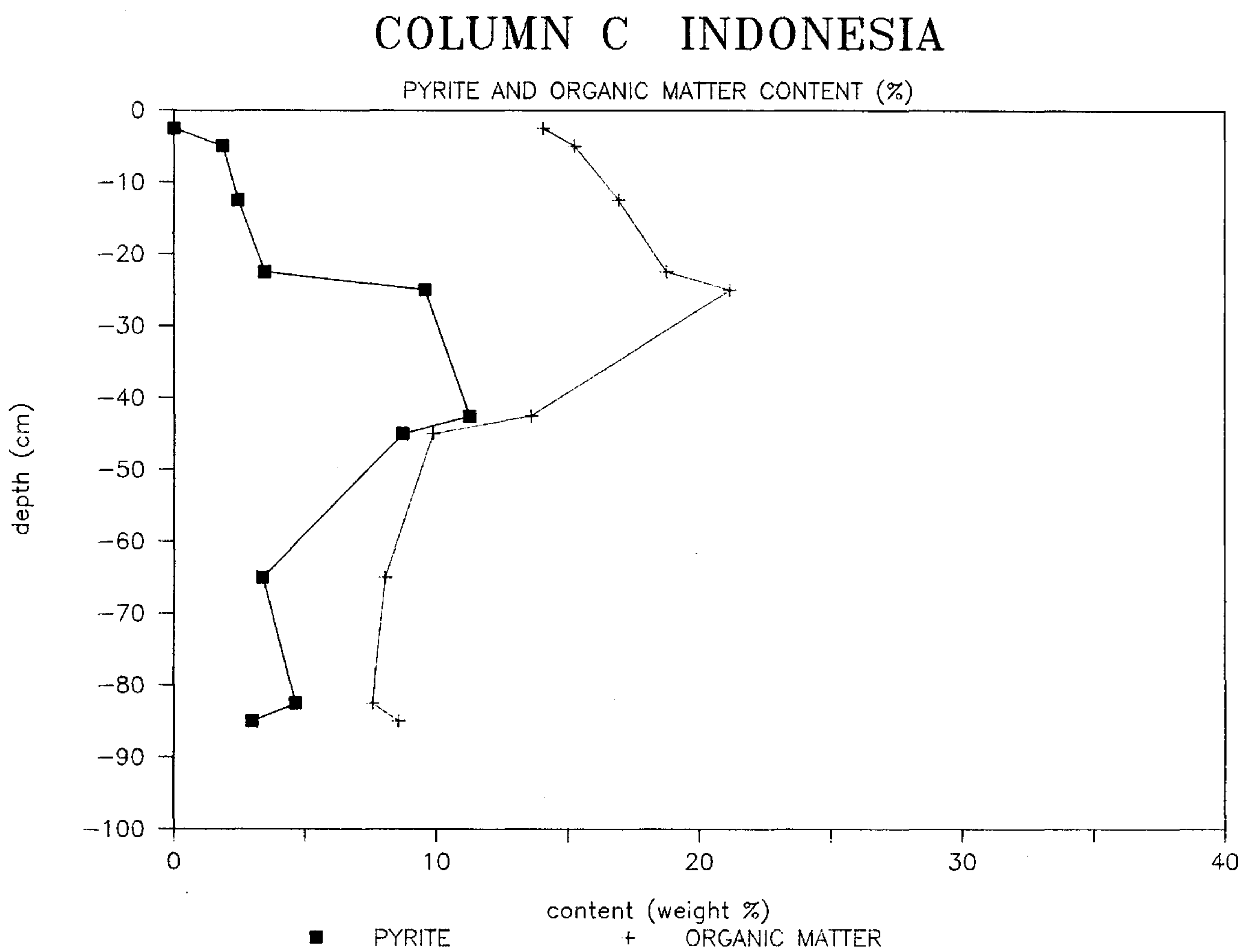
* determined by wet chemical analyses (Bouter P. and C.J. Ritsema, 1988)

MICRO ELEMENT	WEIGHT (ppm)					
	DEPTH					
	2.5-5.0	12.5	22.5-25.0	42.5-45.0	65.0	82.5-85.0
V	200	193	184	185	210	199
Cr	X 56	X 56	X 56	X 56	64	57
Co	18	13	16	28	28	23
Ni	X 47	X 47	X 47	X 47	X 47	X 47
Cu	19	14	18	43	31	30
Zn	31	32	37	77	114	102
Ga	28	27	25	19	22	23
Rb	93	93	91	88	95	91
Sr	105	112	86	77	83	85
Zr	101	115	107	102	109	115
Nb	8	8	8	7	7	9
Ba	253	286	224	240	258	264
La	56	54	53	59	47	58
Pb	19	64	15	88	9	13
TOTAL	1034	1114	967	1116	1124	1116

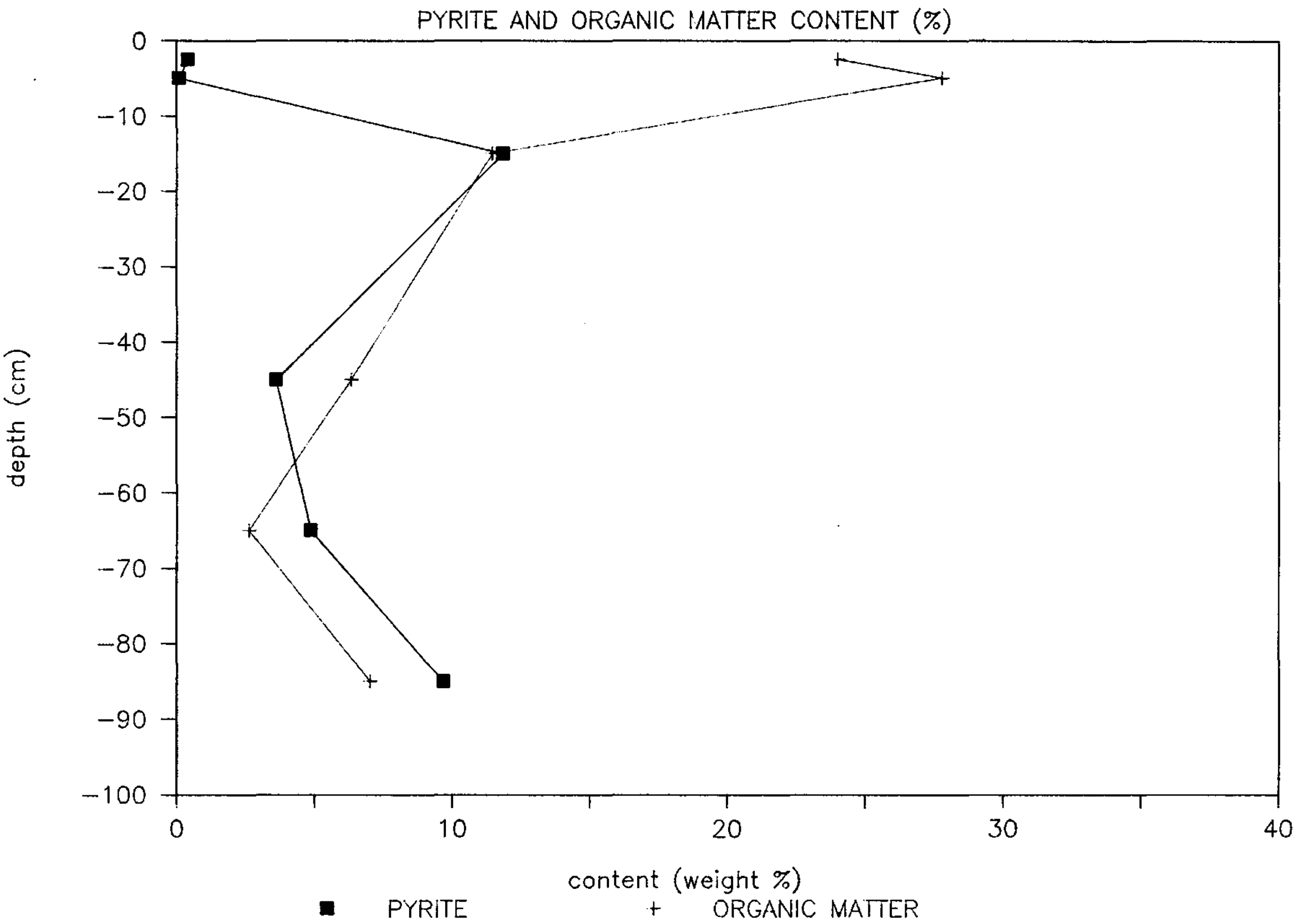
COLUMN A INDONESIA




COLUMN B INDONESIA
PYRITE AND ORGANIC MATTER CONTENT (%)
depth (cm)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
0
10
20
30
40
content (weight %)
PYRITE
ORGANIC MATTER


COLUMN C INDONESIA
PYRITE AND ORGANIC MATTER CONTENT (%)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
depth (cm)
0
10
20
30
40
content (weight %)
PYRITE
ORGANIC MATTER

COLUMN D INDONESIA



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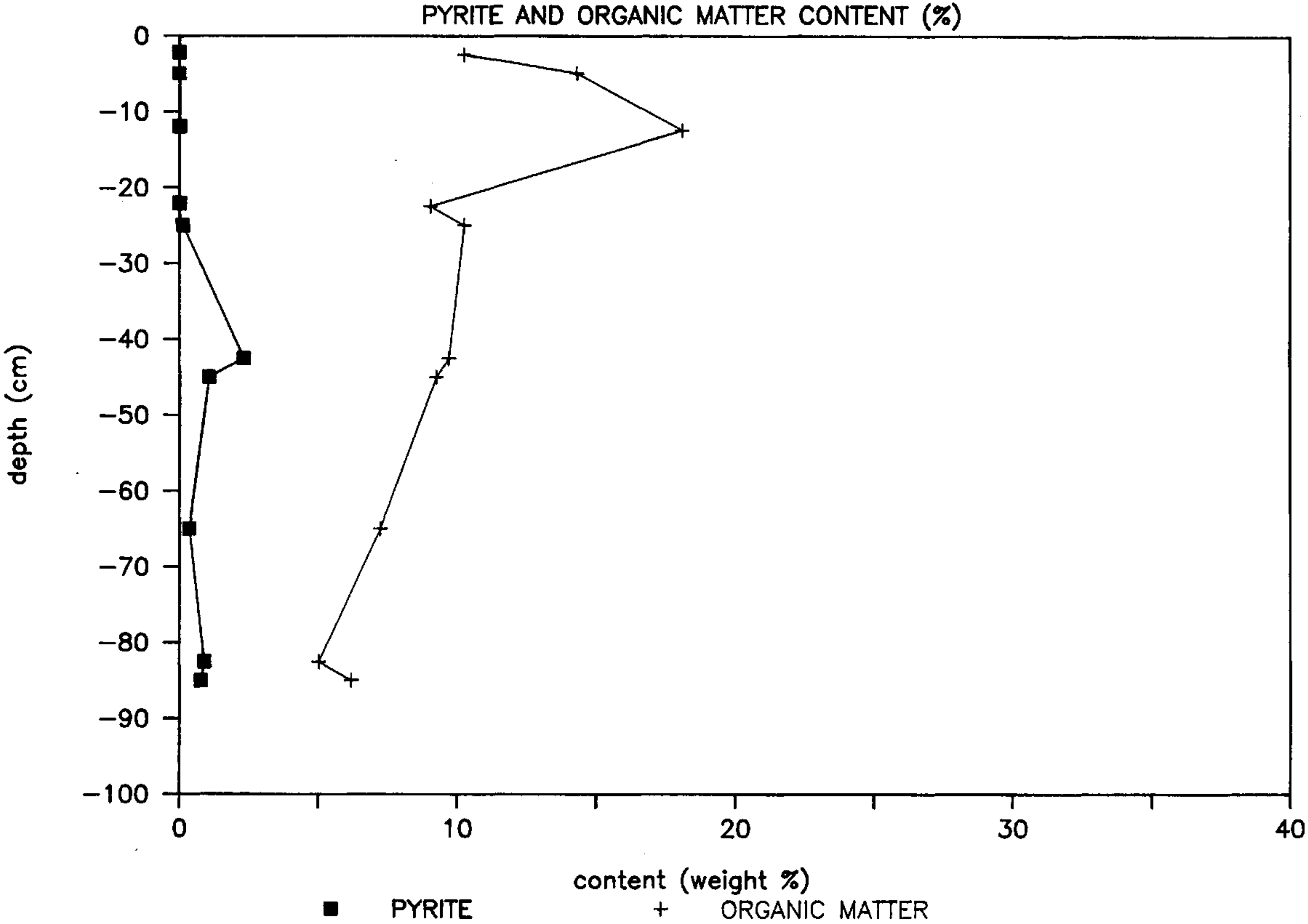
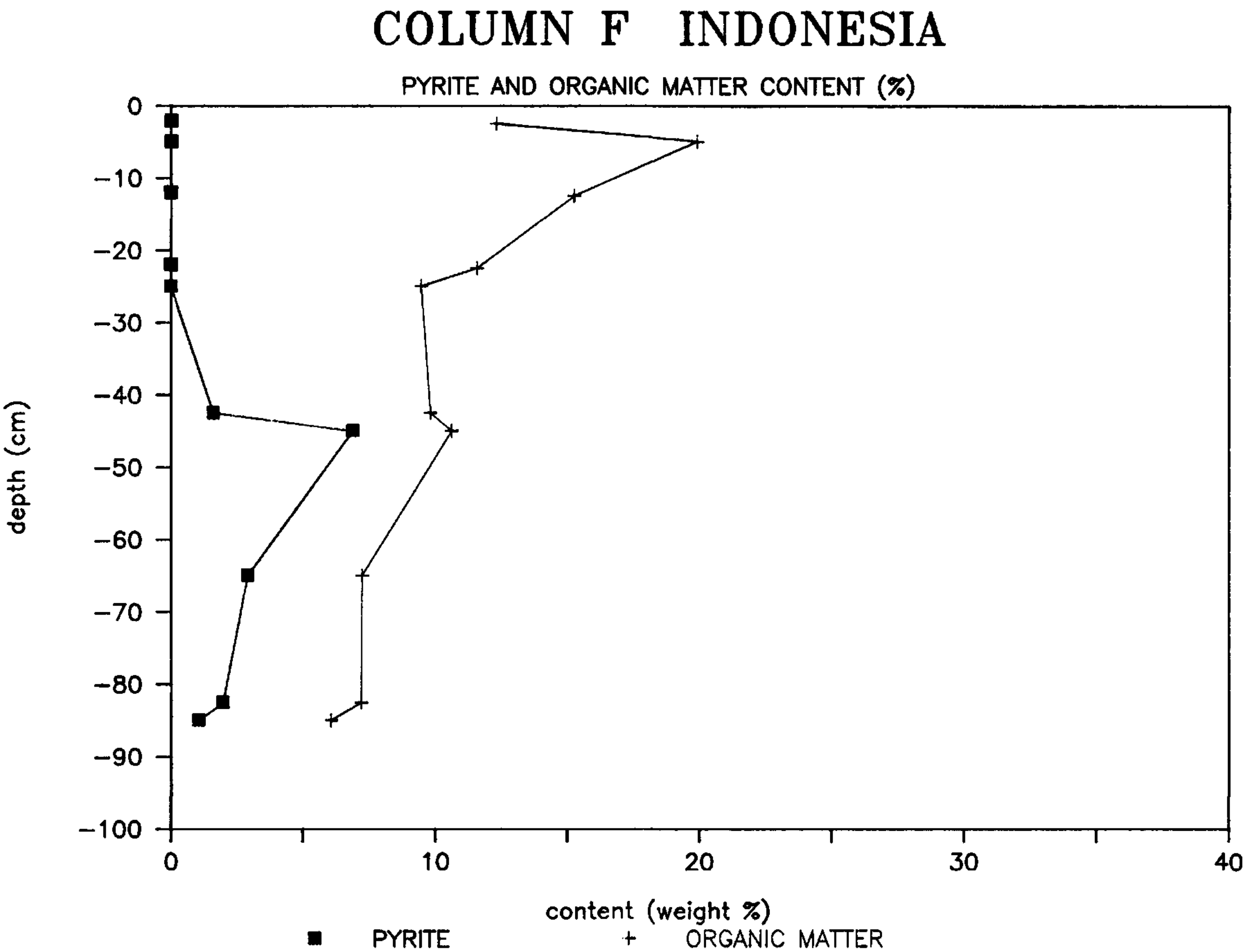
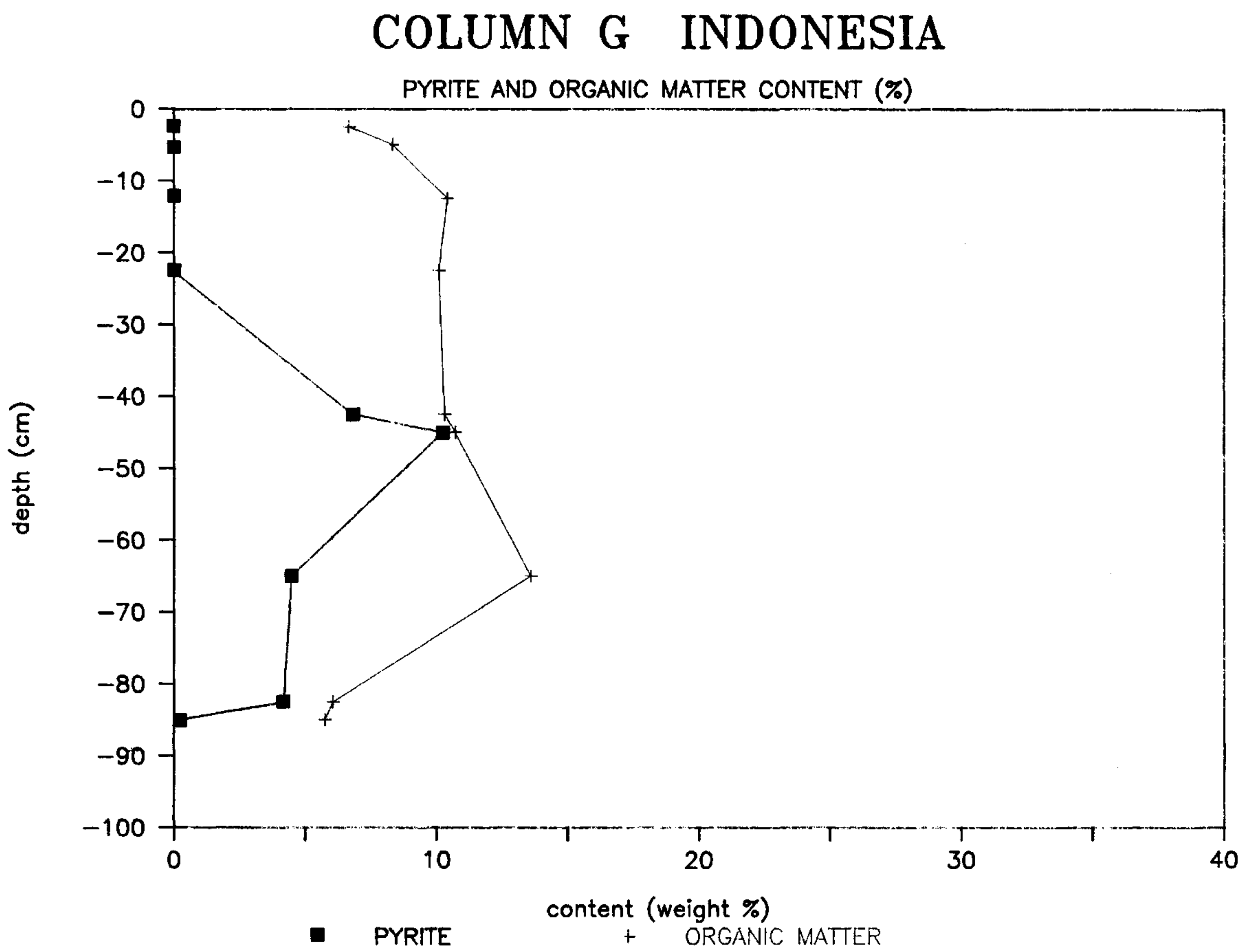
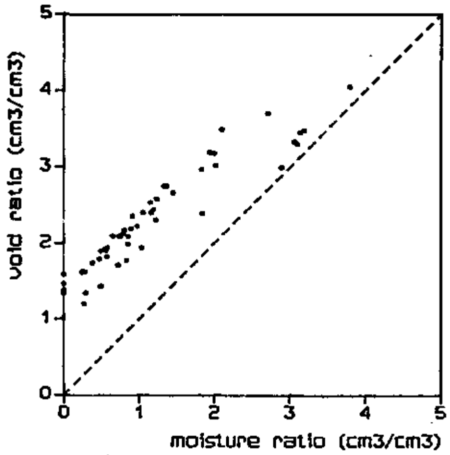



COLUMN F INDONESIA
PYRITE AND ORGANIC MATTER CONTENT (%)
0
−10
−20
−30
−40
−50
−60
−70
−80
−90
−100
depth (cm)
0
10
20
30
40
content (weight %)
PYRITE
ORGANIC MATTER

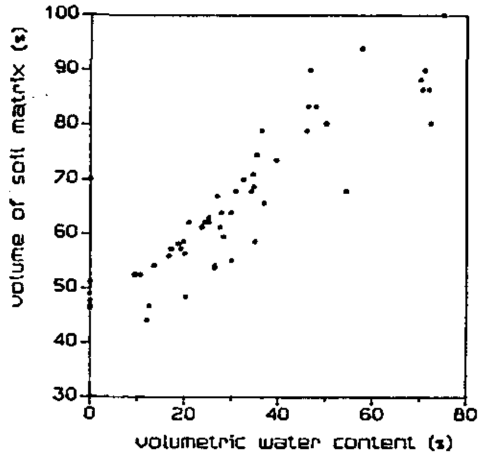


COLUMN G INDONESIA
PYRITE AND ORGANIC MATTER CONTENT (%)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
depth (cm)
0
10
20
30
40
content (weight %)
PYRITE
+ ORGANIC MATTER

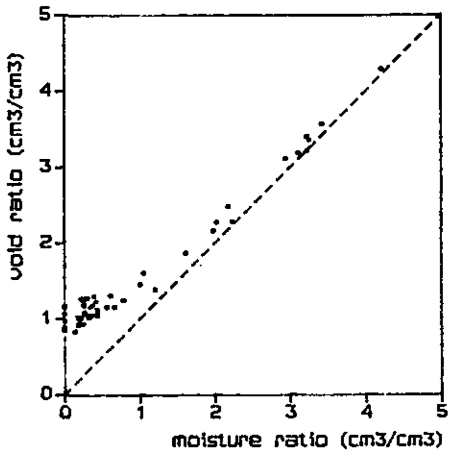
3.1.3. Shrinkage characteristics



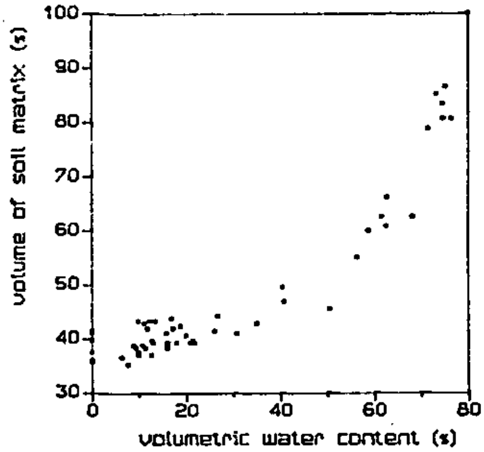
Belawang 10 cm



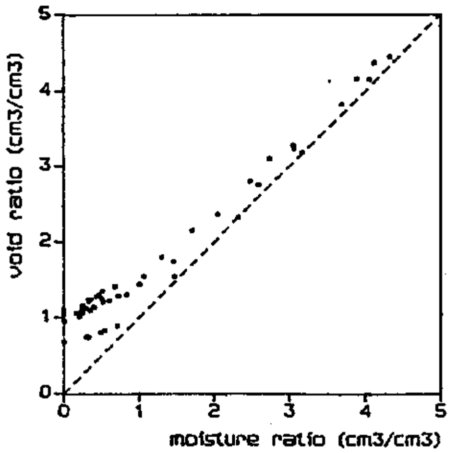
Belawang 10 cm



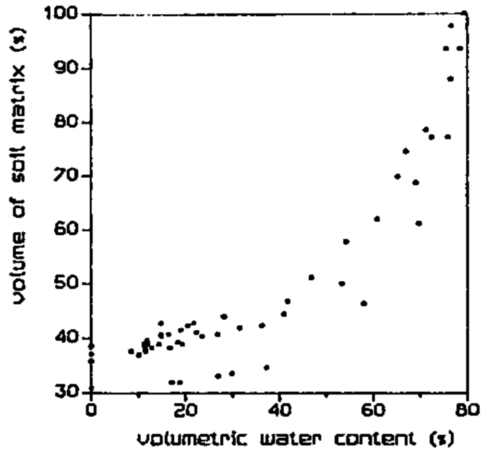
Belawang 25 cm



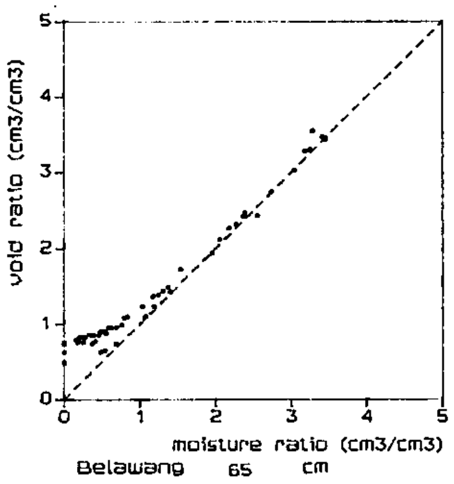
Belawang 25 cm



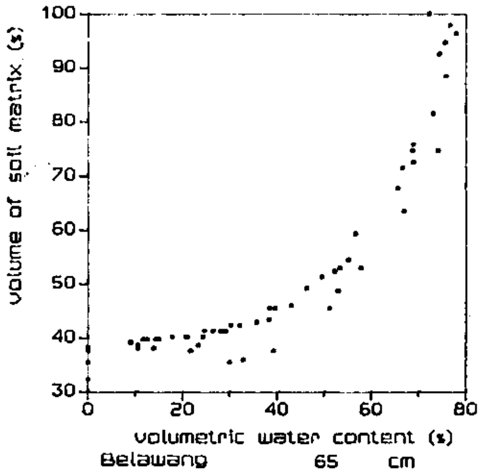
Belawang 45 cm



Belawang 45 cm



void ratio (cm3/cm3)
moisture ratio (cm3/cm3)
Belawang 65 cm



volume of soil matrix (%)
volumetric water content (%)
Belawang 65 cm

Belawang

Nr of measurements per sample : 60

Nr of samples : 4

Density solid phase: Sample 1: 2.21 g/cm3
Sample 2: 2.35 g/cm3
Sample 3: 2.40 g/cm3
Sample 4: 2.42 g/cm3

Properties SARAN-resin:
Specific mass : 1.50 g/cm3
Weightloss upon ovendrying : 0.10 g/g

Weight SARAN-coating: Sample 1: 1-2 g
Sample 2: 1-2 g
Sample 3: 1-2 g
Sample 4: 1-2 g

Time of measurements: june-july 1989

Explanation of used symbols :
Depth : Sampling depth in soil profile (cm)
Thetag : Gravimetric water content (gram water/100 gram dry soil)
Thetav : Volumetric water content (cm3 water/100 cm3 soil)
Poros : Porosity (cm3 pores/100 cm3 soil)
Moistr : Moisture ratio (cm3 water/cm3 solid matter)
Voidr : Void ratio (cm3 pores/cm3 solid matter)
Volmas : Dry bulkdensity (gram dry soil/cm3 soil)
Volclod: Volume clod (cm3)

Results shrinkage measurements :
****

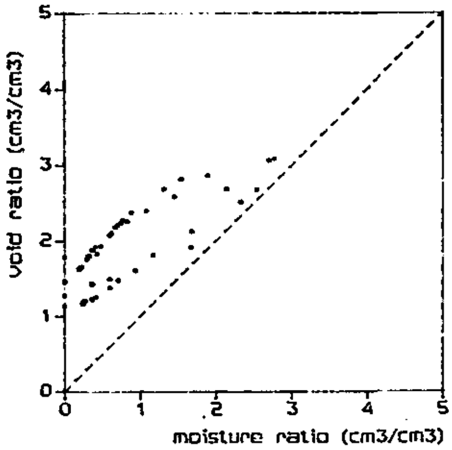
Depth	Thetag	Thetav	Poros	Moistr	Voidr	Volmas
10	171.6	75.0	80.2	3.79	4.05	0.44
	122.6	57.6	78.8	2.71	3.70	0.47
	95.1	46.8	77.7	2.10	3.49	0.49
	61.8	36.4	73.4	1.37	2.75	0.56
	59.9	35.3	73.4	1.33	2.75	0.59
	65.8	39.6	72.7	1.45	2.66	0.60
	40.3	27.9	68.6	0.89	2.19	0.69
	52.0	32.6	71.7	1.15	2.53	0.63
	56.0	34.6	72.1	1.23	2.58	0.62
	0.0	0.0	61.1	0.00	1.58	0.86
	144.2	71.2	77.7	3.19	3.48	0.49
	91.3	50.2	75.2	2.02	3.02	0.55
	55.2	36.9	69.8	1.22	2.30	0.67
	43.6	29.9	68.9	0.97	2.22	0.69
	38.5	27.6	67.5	0.85	2.08	0.72
	38.5	28.4	66.5	0.85	1.99	0.74
	25.6	20.1	64.5	0.57	1.82	0.78
	12.7	10.7	61.9	0.28	1.62	0.84
	11.4	9.6	61.9	0.25	1.62	0.84
	0.0	0.0	57.9	0.00	1.38	0.63
	130.6	72.4	74.9	2.89	2.99	0.55
	83.4	54.4	70.5	1.84	2.39	0.65
	46.5	35.0	65.9	1.03	1.94	0.75
	37.6	30.0	63.9	0.83	1.77	0.80
	32.5	26.5	63.2	0.72	1.71	0.81

	32.5	26.5	63.1	0.72	1.71	0.82
	22.3	20.3	58.9	0.49	1.43	0.91
	13.4	12.6	57.3	0.29	1.34	0.94
	12.1	12.1	54.6	0.27	1.20	1.00
	0.0	0.0	59.4	0.00	1.46	0.90
	141.8	70.3	77.6	3.14	3.45	0.50
	90.7	48.0	76.0	2.00	3.18	0.53
	47.6	30.9	70.6	1.05	2.40	0.65
	36.2	25.2	68.5	0.80	2.17	0.70
	24.9	18.8	65.7	0.55	1.92	0.76
	24.9	18.8	65.7	0.55	1.92	0.76
	16.9	13.6	63.5	0.38	1.74	0.81
	11.2	9.5	61.7	0.25	1.62	0.84
	11.2	9.5	61.7	0.25	1.62	0.84
	0.0	0.0	57.0	0.00	1.33	0.95
	140.5	72.1	76.7	3.10	3.30	0.51
	88.1	46.4	76.1	1.94	3.19	0.53
	54.0	34.7	70.9	1.19	2.44	0.64
	33.1	23.7	67.6	0.73	2.09	0.72
	33.1	23.7	67.6	0.73	2.09	0.72
	35.7	25.3	68.0	0.79	2.12	0.71
	21.3	16.8	64.3	0.47	1.79	0.79
	26.5	19.9	65.9	0.58	1.94	0.75
	25.2	19.3	65.3	0.56	1.89	0.77
	0.0	0.0	57.2	0.00	1.34	0.94
	138.4	70.7	76.9	3.06	3.33	0.51
	82.7	46.1	74.8	1.83	2.97	0.56
	52.6	34.2	70.6	1.16	2.40	0.65
	34.0	24.3	67.6	0.75	2.09	0.71
	34.0	24.3	67.6	0.75	2.09	0.71
	41.0	27.0	70.1	0.91	2.35	0.66
	22.4	17.2	65.3	0.49	1.89	0.77
	22.4	17.2	65.3	0.49	1.89	0.77
	29.4	21.0	67.6	0.65	2.09	0.71
	0.0	0.0	57.8	0.00	1.37	0.93
25	179.4	79.9	81.1	4.21	4.28	0.45
	124.8	71.4	75.6	2.94	3.11	0.57
	68.5	56.3	65.0	1.61	1.86	0.82
	23.8	26.0	53.5	0.56	1.15	1.09
	18.8	21.3	51.8	0.44	1.08	1.13
	18.8	21.7	50.9	0.44	1.04	1.15
	15.5	17.9	50.8	0.36	1.04	1.15
	13.9	16.0	50.8	0.33	1.03	1.15
	13.9	16.0	50.9	0.33	1.04	1.15
	0.0	0.0	46.9	0.00	0.88	1.25
	138.2	74.5	77.0	3.25	3.35	0.54
	84.0	62.5	68.3	1.98	2.16	0.74
	33.3	34.9	55.3	0.78	1.24	1.05
	18.1	20.0	52.9	0.43	1.12	1.11
	11.3	12.7	52.0	0.27	1.08	1.13
	11.3	13.0	51.1	0.27	1.04	1.15
	9.6	11.3	50.0	0.22	1.00	1.17
	7.9	9.3	50.0	0.19	1.00	1.17
	7.9	9.3	50.0	0.19	1.00	1.17
	0.0	0.0	48.9	0.00	0.96	1.20
	137.0	73.2	77.2	3.22	3.40	0.53
	78.2	58.7	68.1	1.84	0.36	0.75
	26.1	26.6	56.5	0.61	1.30	1.02
	14.3	15.7	53.3	0.34	1.14	1.10
	9.2	10.7	50.5	0.21	1.02	1.16
	7.6	8.8	50.5	0.18	1.02	1.16
	7.6	6.3	47.5	0.18	0.91	1.23
	5.6	7.6	45.2	0.14	0.83	1.29

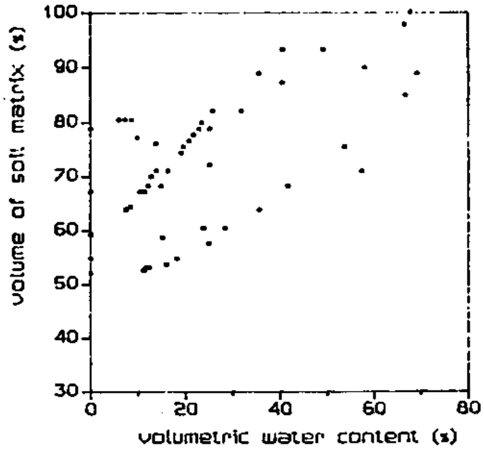
	5.9	7.6	45.2	0.14	0.83	1.29
	0.0	0.0	53.3	0.00	1.14	1.10
	136.8	76.3	75.2	3.22	3.21	0.56
	95.0	68.1	69.6	2.23	2.28	0.72
	51.1	50.5	57.9	1.20	1.38	0.99
	28.0	30.7	53.3	0.66	1.15	1.10
	18.1	20.8	50.9	0.43	1.04	1.15
	13.7	16.0	50.3	0.32	1.01	1.17
	10.4	12.6	48.4	0.25	0.93	1.22
	8.2	9.9	48.4	0.20	0.93	1.21
	8.2	9.9	48.2	0.20	0.93	1.22
	0.0	0.0	46.1	0.00	0.85	1.27
	145.6	75.1	78.0	3.42	3.56	0.52
	92.8	62.7	71.2	2.18	2.48	0.68
	44.6	40.4	61.4	1.05	1.60	0.91
	16.5	16.9	56.4	0.39	1.29	1.03
	12.9	13.4	55.8	0.30	1.26	1.04
	12.9	13.4	55.8	0.30	1.26	1.04
	11.8	12.2	55.8	0.27	1.26	1.04
	9.4	9.8	55.8	0.22	1.26	1.04
	10.6	11.1	55.2	0.25	1.23	1.05
	0.0	0.0	53.8	0.00	1.16	1.09
	132.5	74.6	76.1	3.11	3.18	0.56
	85.9	61.6	69.4	2.02	2.27	0.72
	42.6	40.8	59.2	1.00	1.45	0.96
	17.6	18.7	54.8	0.42	1.22	1.06
	15.9	17.2	54.0	0.37	1.17	1.08
	15.9	17.2	54.0	0.37	1.17	1.08
	10.9	11.8	54.0	0.26	1.17	1.08
	10.9	11.8	54.0	0.26	1.17	1.08
	10.9	11.8	54.0	0.26	1.17	1.08
	0.0	0.0	51.4	0.00	1.06	1.14
45	180.2	79.3	81.7	4.33	4.45	0.44
	127.5	71.2	76.7	3.05	3.28	0.56
	71.2	54.2	68.2	1.71	2.15	0.76
	28.5	28.4	58.4	0.68	1.40	1.00
	21.1	21.7	57.2	0.51	1.34	1.03
	19.6	20.5	56.5	0.47	1.30	1.04
	15.2	16.4	55.1	0.36	1.23	1.08
	13.7	14.8	55.1	0.33	1.23	1.03
	13.7	14.8	55.1	0.33	1.23	1.08
	0.0	0.0	52.2	0.00	1.09	1.15
	153.6	76.5	79.2	3.69	3.82	0.50
	107.8	69.1	73.3	2.59	2.75	0.64
	60.8	53.3	63.5	1.46	1.74	0.88
	34.6	36.2	56.5	0.83	1.30	1.04
	21.6	23.5	54.6	0.52	1.20	1.09
	16.3	18.3	53.3	0.39	1.14	1.12
	11.1	12.8	51.9	0.26	1.07	1.15
	9.8	11.5	51.2	0.24	1.05	1.17
	8.5	10.1	50.3	0.21	1.01	1.19
	0.0	0.0	48.8	0.00	0.95	1.23
	171.6	76.7	81.3	4.12	4.37	0.45
	114.5	67.0	75.6	2.74	3.10	0.59
	54.5	46.8	64.2	1.30	1.80	0.86
	28.2	28.1	58.5	0.68	1.41	1.00
	17.9	19.0	55.9	0.43	1.27	1.06
	13.5	14.8	54.5	0.33	1.20	1.09
	10.6	11.8	53.8	0.25	1.16	1.11
	10.6	12.0	53.1	0.25	1.13	1.13
	10.6	12.0	53.0	0.25	1.13	1.13
	0.0	0.0	52.3	0.00	1.10	1.14
	162.4	75.5	80.7	3.89	4.16	0.47

	103.3	65.2	73.7	2.48	2.80	0.63
	44.2	41.7	60.8	1.06	1.54	0.94
	20.9	22.3	55.6	0.50	1.25	1.07
	12.6	14.3	52.7	0.30	1.12	1.13
	9.9	11.2	52.7	0.24	1.12	1.13
	9.9	11.4	52.1	0.24	1.08	1.15
	7.1	8.4	51.3	0.17	1.06	1.17
	7.1	8.4	51.2	0.17	1.05	1.17
	0.0	0.0	50.6	0.00	1.03	1.19
	132.2	75.9	76.0	3.17	3.18	0.57
	96.6	69.7	70.0	2.32	2.32	0.72
	61.0	57.9	60.5	1.47	1.54	0.95
	29.4	37.2	47.2	0.71	0.89	1.27
	22.8	29.9	45.5	0.54	0.83	1.31
	20.2	26.9	44.6	0.49	0.80	1.33
	13.6	18.8	42.5	0.33	0.74	1.38
	12.3	17.0	42.5	0.30	0.74	1.38
	12.3	17.0	42.5	0.30	0.74	1.38
	0.0	0.0	40.5	0.00	0.68	1.43
	168.6	78.5	80.6	4.05	4.15	0.47
	127.5	72.4	76.4	3.06	3.23	0.57
	85.2	60.8	70.3	2.05	2.36	0.71
	41.5	40.9	58.9	1.00	1.44	0.99
	29.9	31.5	56.2	0.72	1.28	1.05
	24.8	26.8	55.0	0.60	1.22	1.08
	17.1	19.3	53.0	0.41	1.13	1.13
	14.5	16.7	52.3	0.35	1.09	1.15
	14.5	16.6	52.3	0.35	1.09	1.15
	0.0	0.0	48.5	0.00	0.95	1.23
65	135.5	72.2	78.0	3.28	3.54	0.53
	94.1	68.9	69.8	2.27	2.31	0.73
	51.5	52.2	58.1	1.24	1.38	1.01
	31.4	38.3	49.6	0.76	0.98	1.22
	20.7	26.4	47.3	0.50	0.90	1.28
	16.0	21.0	45.6	0.38	0.84	1.32
	11.2	15.0	44.8	0.27	0.81	1.34
	10.1	13.9	42.9	0.25	0.75	1.38
	7.7	10.6	42.9	0.18	0.75	1.38
	0.0	0.0	42.0	0.00	0.73	1.40
	131.3	74.4	76.6	3.18	3.27	0.57
	89.8	66.6	69.3	2.17	2.26	0.74
	48.2	49.5	57.5	1.17	1.36	1.03
	28.8	35.7	48.8	0.69	0.95	1.24
	19.1	24.6	46.9	0.47	0.88	1.28
	13.6	17.8	45.9	0.33	0.85	1.31
	9.4	12.5	44.9	0.23	0.82	1.33
	6.6	9.0	43.9	0.16	0.78	1.36
	6.6	9.0	43.9	0.16	0.78	1.36
	0.0	0.0	42.6	0.00	0.74	1.39
	134.2	75.6	76.7	3.25	3.29	0.56
	97.5	68.8	70.9	2.36	2.42	0.71
	56.7	55.1	59.8	1.37	1.48	0.97
	34.2	39.6	52.1	0.83	1.09	1.16
	22.0	28.1	47.1	0.53	0.89	1.28
	15.9	20.8	45.7	0.38	0.84	1.31
	10.8	14.3	45.0	0.26	0.82	1.33
	8.7	11.6	45.0	0.21	0.82	1.33
	7.7	10.6	43.5	0.18	0.77	1.37
	0.0	0.0	42.6	0.00	0.74	1.39
	142.6	77.9	77.4	3.45	3.43	0.55
	112.9	73.1	73.3	2.73	2.74	0.65
	84.6	65.6	67.9	2.05	2.11	0.78
	53.5	53.3	58.8	1.30	1.43	1.00

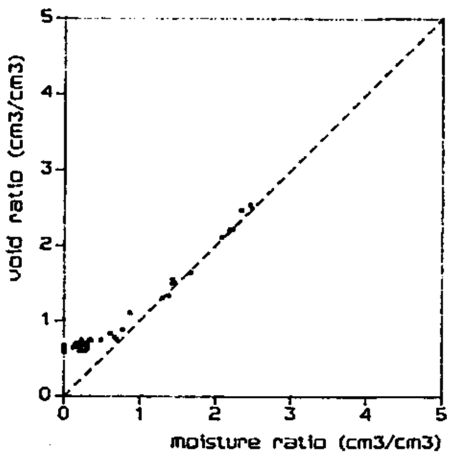
42.7	46.3	55.2	1.03	1.23	1.08
37.3	43.0	52.5	0.90	0.19	1.15
22.5	29.1	46.6	0.55	0.87	1.29
18.5	24.3	45.6	0.45	0.84	1.32
15.8	20.7	45.7	0.38	0.84	1.31
0.0	0.0	42.5	0.00	0.74	1.39
125.8	75.8	75.1	3.04	3.02	0.60
105.1	74.1	70.9	2.55	2.43	0.71
80.9	66.9	65.8	1.95	1.93	0.83
57.9	57.8	58.7	1.40	1.42	1.00
48.7	52.9	55.1	1.18	1.23	1.09
44.1	51.1	52.1	1.07	1.09	1.16
28.0	39.2	42.1	0.68	0.73	1.40
22.2	32.8	39.1	0.54	0.64	1.47
19.9	29.9	38.1	0.48	0.62	1.50
0.0	0.0	32.3	0.00	0.48	1.64
140.9	76.6	77.6	3.41	3.46	0.54
98.6	68.9	71.1	2.38	2.46	0.70
63.6	56.6	63.2	1.54	1.72	0.89
33.0	38.4	51.9	0.79	1.08	1.16
25.7	32.1	48.4	0.62	0.94	1.25
24.2	30.2	48.4	0.58	0.94	1.25
16.9	23.3	43.3	0.41	0.76	1.37
15.5	21.7	42.1	0.37	0.73	1.40
15.5	21.7	42.1	0.37	0.73	1.40
0.0	0.0	38.2	0.00	0.62	1.50



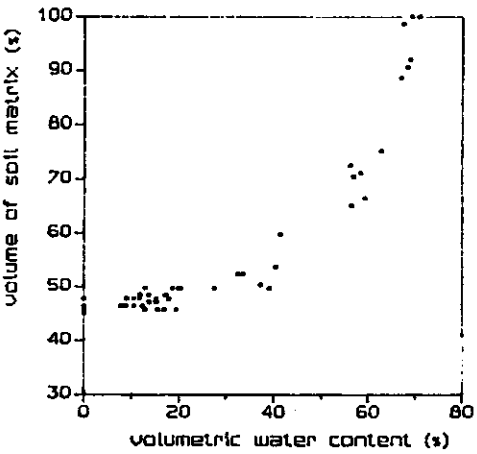
Barambai 10 cm



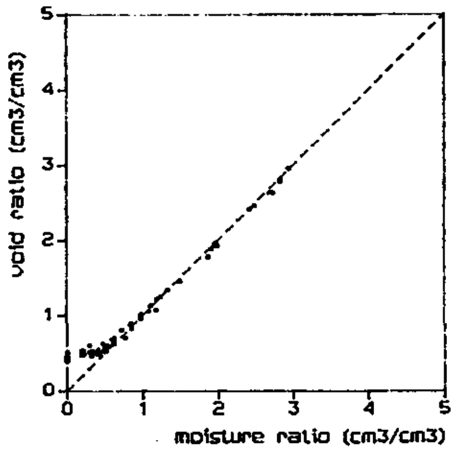
Barambai 10 cm



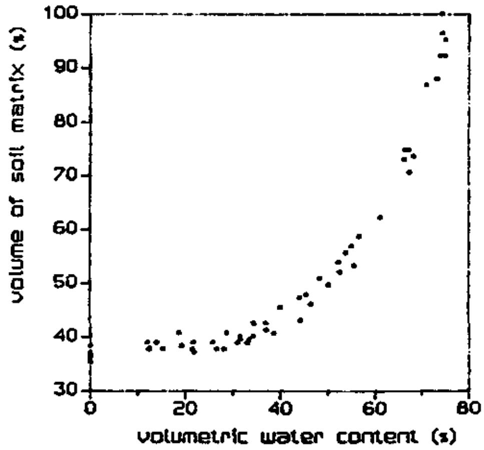
Barambai 35 cm



Barambai 35 cm



Barambai 50 cm



Barambai 50 cm

Barambai

Nr of measurements per sample : 60

Nr of samples : 3

Density solid phase: Sample 1: 2.30 g/cm3
Sample 2: 2.36 g/cm3
Sample 3: 2.36 g/cm3

Properties SARAN-resin:
Specific mass : 1.50 g/cm3
Weightloss upon ovendrying : 0.10 g/g

Weight SARAN-coating: Sample 1: 1-2 g
Sample 2: 1-2 g
Sample 3: 1-2 g

Time of measurements: june-july 1989

Explanation of used symbols :
Depth : Sampling depth in soil profile (cm)
Thetag : Gravimetric water content (gram water/100 gram dry soil)
Thetav : Volumetric water content (cm3 water/100 cm3 soil)
Poros : Porosity (cm3 pores/100 cm3 soil)
Moistr : Moisture ratio (cm3 water/cm3 solid matter)
Voidr : Void ratio (cm3 pores/cm3 solid matter)
Volmas : Dry bulkdensity (gram dry soil/cm3 soil)
Volclod: Relative Volume clod (1/volmas)

Results shrinkage measurements :
****

Depth	Thetag	Thetav	Poros	Moistr	Voidr	Volmas
10	120.3	67.8	75.5	2.77	3.08	0.56
	82.3	49.1	74.1	1.89	2.86	0.60
	57.0	35.6	72.8	1.31	2.68	0.63
	33.3	23.4	69.5	0.76	2.27	0.70
	30.1	21.6	68.8	0.69	2.20	0.72
	28.5	20.7	68.4	0.66	2.17	0.73
	17.4	13.8	65.7	0.40	1.91	0.79
	15.9	12.7	65.2	0.36	1.87	0.80
	15.9	12.7	65.2	0.36	1.87	0.80
	0.0	0.0	59.2	0.00	1.45	0.94
	92.9	58.0	72.8	2.14	2.68	0.62
	63.0	40.5	72.0	1.45	2.58	0.64
	47.0	31.8	70.5	1.08	2.39	0.68
	37.8	25.8	70.3	0.87	2.37	0.68
	32.0	22.8	69.1	0.74	2.23	0.71
	26.3	19.5	67.7	0.61	2.10	0.74
	20.6	16.2	65.7	0.47	1.92	0.79
	13.7	11.3	64.1	0.31	1.79	0.83
	12.5	10.4	63.7	0.29	1.75	0.83
	0.0	0.0	59.1	0.00	1.45	0.94
	92.9	58.0	72.8	2.14	2.68	0.62
	63.0	40.5	72.0	1.45	2.58	0.64
	47.0	31.8	70.5	1.08	2.39	0.68
	37.8	25.8	70.3	0.87	2.37	0.68
	32.0	22.8	69.1	0.74	2.23	0.71
	26.3	19.5	67.7	0.61	2.10	0.74
	20.6	16.2	65.7	0.47	1.92	0.79

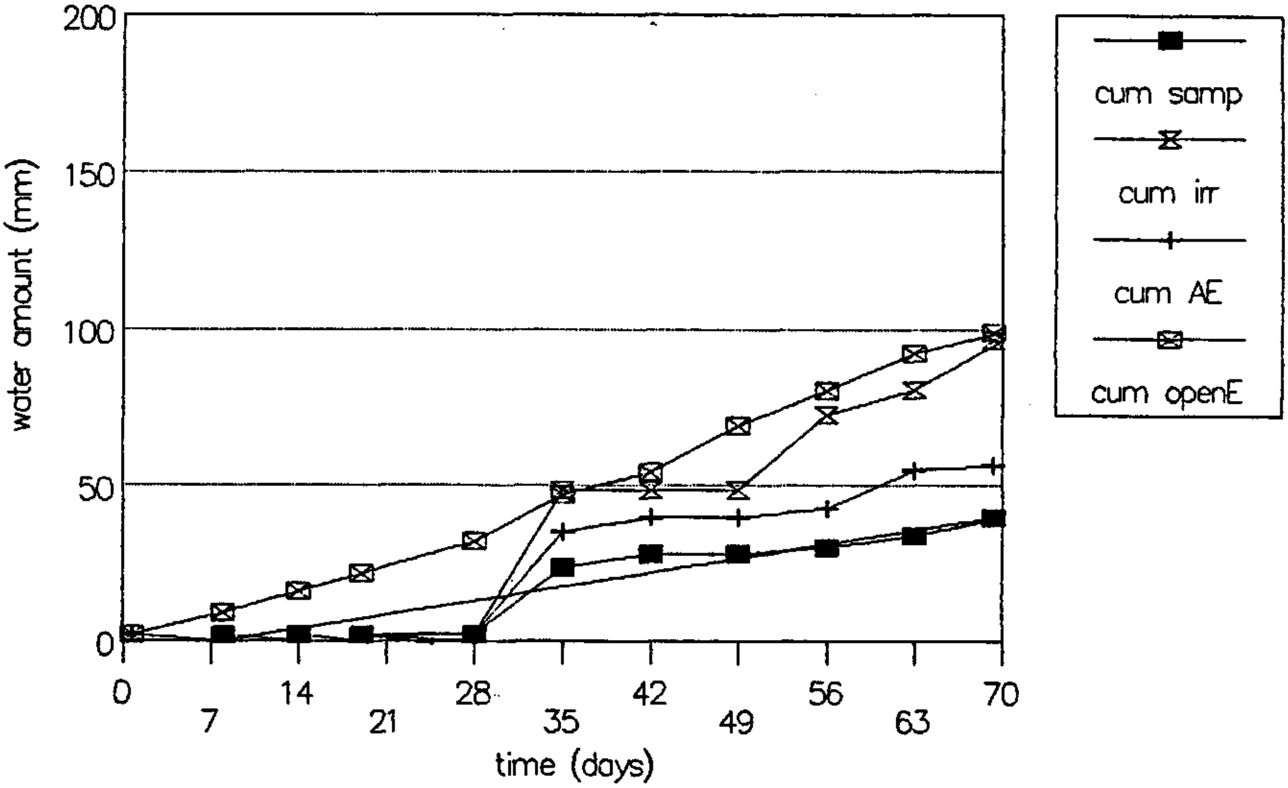
	13.7	11.3	64.1	0.31	1.79	0.83
	12.5	10.4	63.7	0.29	1.75	0.83
	0.0	0.0	59.1	0.00	1.45	0.94
	117.5	66.5	75.3	2.70	3.06	0.57
	67.2	40.6	73.7	1.54	2.81	0.60
	35.4	25.1	69.1	0.82	2.25	0.71
	25.6	19.1	67.5	0.59	2.07	0.75
	18.2	14.8	64.5	0.42	1.82	0.82
	14.5	12.0	64.2	0.33	1.79	0.82
	9.6	8.3	62.2	0.22	1.65	0.87
	8.4	7.4	61.9	0.19	1.62	0.88
	8.4	7.4	61.9	0.19	1.62	0.88
	0.0	0.0	63.9	0.00	1.78	0.83
	101.7	66.7	71.5	2.33	2.51	0.66
	72.7	53.6	68.0	1.68	2.12	0.74
	51.0	41.7	64.4	1.17	1.81	0.82
	30.4	28.3	59.7	0.70	1.47	0.93
	25.6	24.9	57.7	0.59	1.37	0.97
	25.6	23.8	59.7	0.59	1.48	0.93
	15.9	15.1	58.8	0.36	1.42	0.95
	11.1	11.6	54.5	0.25	1.20	1.05
	15.9	15.1	58.8	0.36	1.42	0.95
	0.0	0.0	55.8	0.00	1.27	1.02
	110.5	69.2	72.8	2.54	2.67	0.63
	72.4	57.3	65.5	1.67	1.91	0.79
	40.3	35.6	61.6	0.93	1.60	0.88
	17.7	18.1	55.5	0.41	1.25	1.02
	15.3	15.9	55.0	0.36	1.22	1.04
	15.3	15.9	55.0	0.36	1.22	1.04
	11.8	12.4	54.4	0.27	1.20	1.05
	10.6	11.2	53.8	0.24	1.16	1.06
	10.6	11.2	53.8	0.24	1.17	1.06
	0.0	0.0	52.9	0.00	1.13	1.08
35	103.9	69.3	71.7	2.45	2.54	0.67
	60.7	56.2	60.7	1.43	1.55	0.93
	25.1	32.5	45.2	0.60	0.83	1.29
	13.7	18.6	42.3	0.32	0.74	1.36
	9.8	13.6	41.3	0.23	0.70	1.38
	8.6	12.3	39.1	0.20	0.65	1.44
	7.3	10.5	39.1	0.17	0.65	1.44
	6.0	8.7	39.1	0.14	0.65	1.44
	6.0	8.7	39.1	0.14	0.65	1.44
	0.0	0.0	40.0	0.00	0.67	1.41
	92.8	68.4	68.8	2.19	2.21	0.74
	61.9	58.4	60.0	1.46	1.50	0.94
	32.3	40.5	46.9	0.77	0.88	1.25
	20.2	27.5	42.5	0.48	0.74	1.36
	12.8	17.9	40.8	0.30	0.69	1.40
	10.8	15.2	40.3	0.26	0.67	1.41
	7.5	10.5	40.3	0.18	0.67	1.41
	6.1	8.8	39.1	0.14	0.65	1.44
	5.4	7.8	39.1	0.12	0.64	1.44
	0.0	0.0	38.1	0.00	0.61	1.46
	99.4	67.5	71.3	2.34	2.47	0.68
	60.1	56.9	59.9	1.42	1.49	0.95
	26.0	33.5	45.5	0.61	0.83	1.29
	14.7	19.9	42.4	0.35	0.74	1.36
	9.5	12.9	42.4	0.22	0.74	1.36
	8.5	11.8	40.7	0.20	0.69	1.40
	6.4	9.0	40.8	0.15	0.69	1.40
	6.4	9.0	40.8	0.15	0.69	1.40
	6.4	9.0	40.7	0.15	0.69	1.40
	0.0	0.0	39.1	0.00	0.65	1.44

	94.4	69.0	69.0	2.23	2.22	0.73
	58.6	59.3	57.1	1.38	1.33	1.01
	28.0	37.2	43.7	0.66	0.78	1.33
	12.7	17.8	40.5	0.30	0.68	1.40
	10.7	15.2	39.7	0.25	0.66	1.42
	10.7	15.2	39.7	0.25	0.66	1.42
	10.7	15.2	39.6	0.25	0.66	1.43
	9.6	13.7	39.6	0.23	0.66	1.43
	9.6	13.7	39.7	0.23	0.66	1.42
	0.0	0.0	38.8	0.00	0.63	1.44
	88.4	67.1	67.9	2.08	2.11	0.76
	55.0	56.5	56.5	1.30	1.30	1.03
	29.0	39.1	42.8	0.69	0.75	1.35
	13.3	19.4	38.2	0.31	0.62	1.46
	11.4	16.9	37.5	0.27	0.59	1.48
	11.4	16.9	37.3	0.27	0.59	1.48
	10.5	15.5	37.3	0.25	0.59	1.48
	8.6	12.8	37.3	0.20	0.59	1.48
	8.6	12.8	37.3	0.20	0.59	1.48
	0.0	0.0	36.7	0.00	0.58	1.50
	105.2	70.9	71.5	2.48	2.50	0.67
	70.4	62.8	62.3	1.67	1.64	0.89
	36.9	41.5	52.4	0.87	1.10	1.12
	15.0	20.4	42.3	0.36	0.73	1.36
	12.4	17.2	41.3	0.29	0.70	1.39
	12.4	17.2	41.3	0.29	0.70	1.39
	9.8	13.6	41.2	0.23	0.70	1.39
	8.5	11.8	41.2	0.20	0.70	1.39
	8.5	11.8	41.3	0.20	0.70	1.39
	0.0	0.0	40.2	0.00	0.67	1.41
50	124.4	74.3	74.7	2.94	2.95	0.60
	102.8	71.0	70.7	2.42	2.41	0.69
	83.4	66.6	66.2	1.97	1.96	0.80
	56.1	56.7	57.2	1.33	1.33	1.02
	47.0	52.3	53.0	1.11	1.12	1.11
	41.3	48.4	50.4	0.98	1.01	1.17
	26.5	37.0	40.8	0.62	0.69	1.40
	22.0	33.4	35.7	0.52	0.56	1.52
	20.8	31.6	35.8	0.49	0.56	1.52
	0.0	0.0	29.8	0.00	0.42	1.66
	113.9	73.9	72.5	2.69	2.63	0.65
	82.7	66.4	66.0	1.95	1.94	0.80
	52.3	55.1	55.4	1.24	1.24	1.05
	36.3	45.5	46.9	0.85	0.89	1.25
	25.6	37.0	38.7	0.61	0.63	1.45
	21.1	31.4	37.0	0.50	0.59	1.49
	14.0	21.6	34.4	0.33	0.52	1.55
	9.5	15.2	32.5	0.22	0.48	1.59
	7.7	12.3	32.5	0.19	0.48	1.59
	0.0	0.0	30.4	0.00	0.43	1.64
	120.0	74.4	73.7	2.83	2.81	0.62
	80.6	66.2	65.2	1.91	1.88	0.82
	45.7	52.6	51.2	1.08	1.05	1.15
	30.5	40.1	44.3	0.72	0.80	1.31
	22.9	34.2	36.8	0.54	0.59	1.49
	16.8	25.7	35.3	0.40	0.54	1.53
	12.3	19.2	33.7	0.29	0.51	1.56
	7.7	12.4	32.2	0.19	0.47	1.60
	7.7	12.4	32.1	0.19	0.47	1.60
	0.0	0.0	31.4	0.00	0.46	1.62
	120.1	75.1	73.5	2.83	2.78	0.63
	83.5	67.2	65.9	1.97	1.93	0.80
	50.4	53.9	54.6	1.19	1.21	1.07

35.0	44.2	46.6	0.83	0.87	1.26
24.4	34.4	40.3	0.58	0.67	1.41
19.7	28.7	38.2	0.46	0.62	1.46
12.6	18.6	37.1	0.29	0.59	1.48
9.0	13.9	34.9	0.21	0.53	1.54
7.8	12.0	34.8	0.19	0.53	1.54
0.0	0.0	33.5	0.00	0.51	1.57
108.6	73.3	71.4	2.49	2.46	0.68
84.6	68.2	65.9	1.99	1.93	0.81
63.6	61.2	59.2	1.50	1.45	0.96
41.5	50.2	48.8	0.98	0.95	1.21
35.8	46.5	45.0	0.85	0.82	1.30
32.0	44.3	41.4	0.76	0.70	1.38
21.4	33.2	34.3	0.51	0.52	1.55
17.6	28.1	32.3	0.42	0.48	1.60
16.6	26.6	32.3	0.39	0.48	1.60
0.0	0.0	28.0	0.00	0.39	1.70
115.5	75.0	72.5	2.73	2.63	0.65
79.4	67.4	64.1	1.87	1.78	0.85
49.7	55.6	52.5	1.18	1.07	1.12
26.5	38.6	38.2	0.62	0.62	1.46
21.3	32.9	34.5	0.50	0.53	1.54
20.0	30.9	34.5	0.47	0.52	1.55
13.5	21.4	33.2	0.32	0.50	1.58
13.5	21.8	31.7	0.32	0.46	1.61
13.5	21.8	31.7	0.32	0.47	1.61
0.0	0.0	30.4	0.00	0.43	1.64

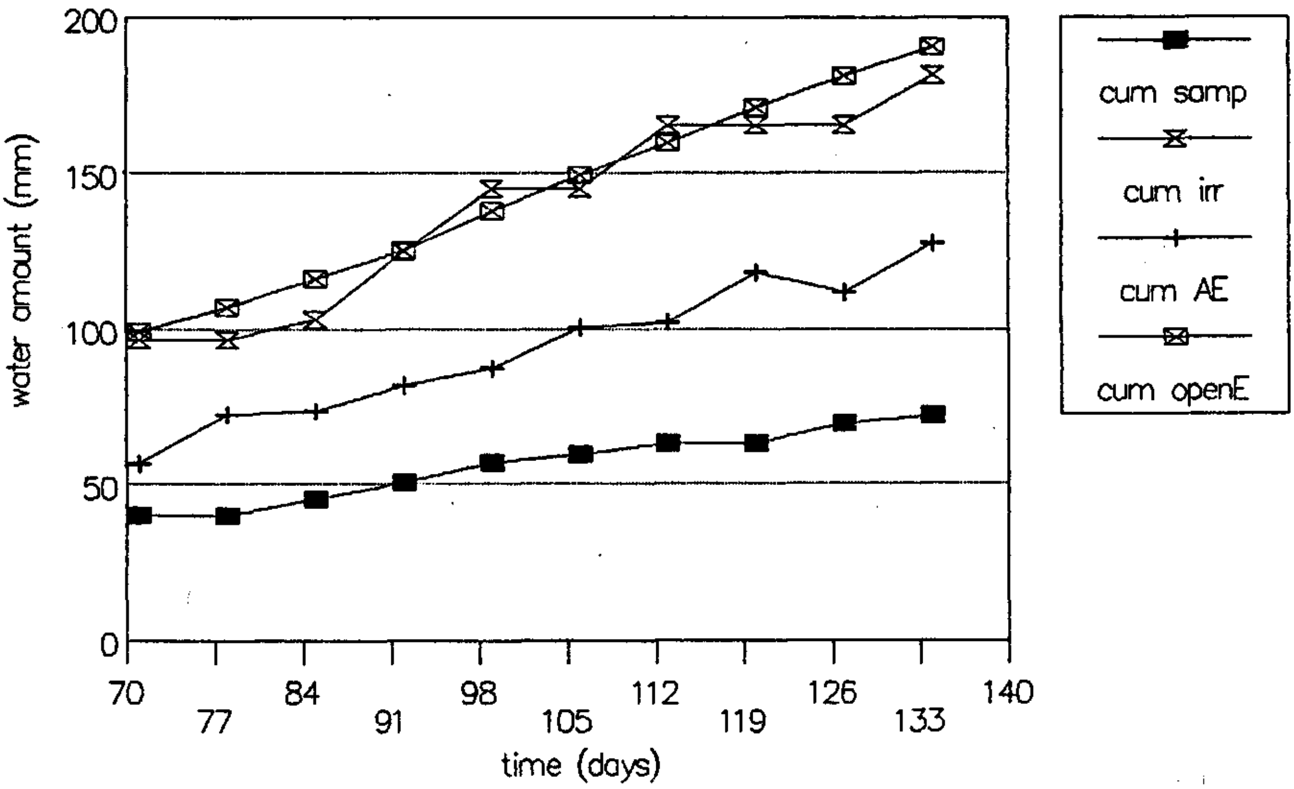
3.2. WATER MANAGEMENT AND WATER BALANCE OF SOIL COLUMNS

water balans



column A - Belawang

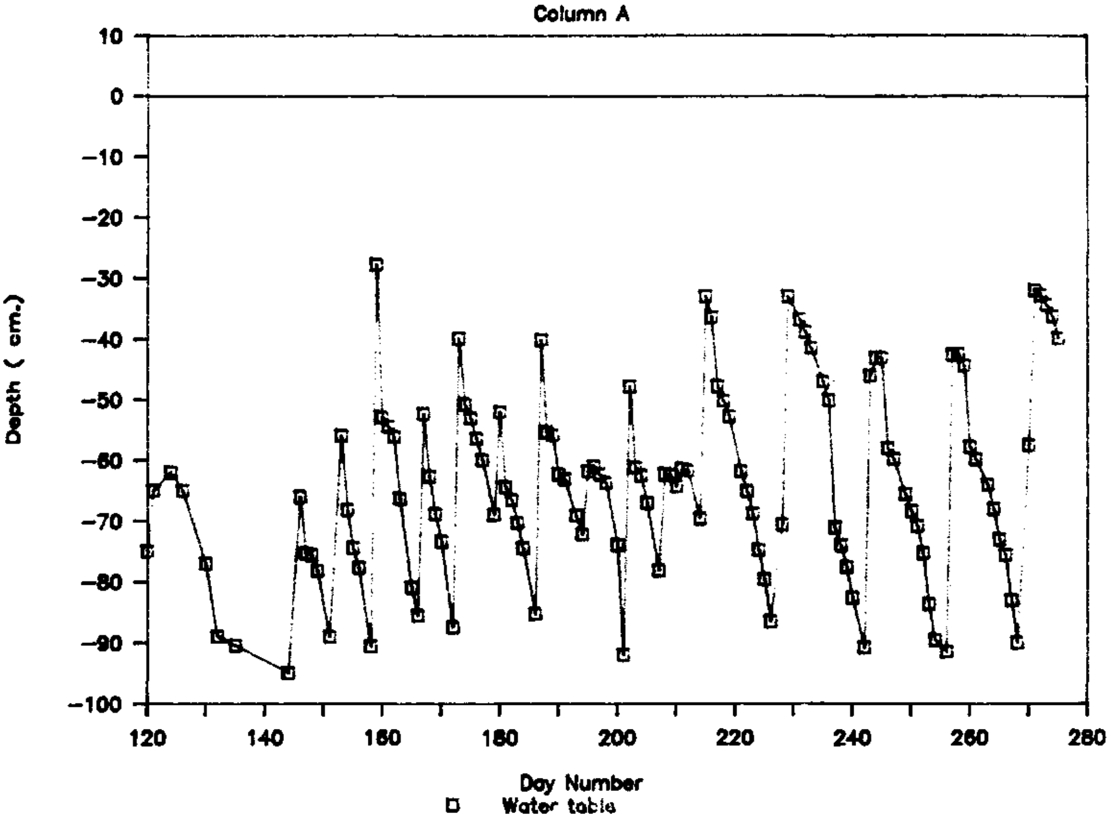
water balans



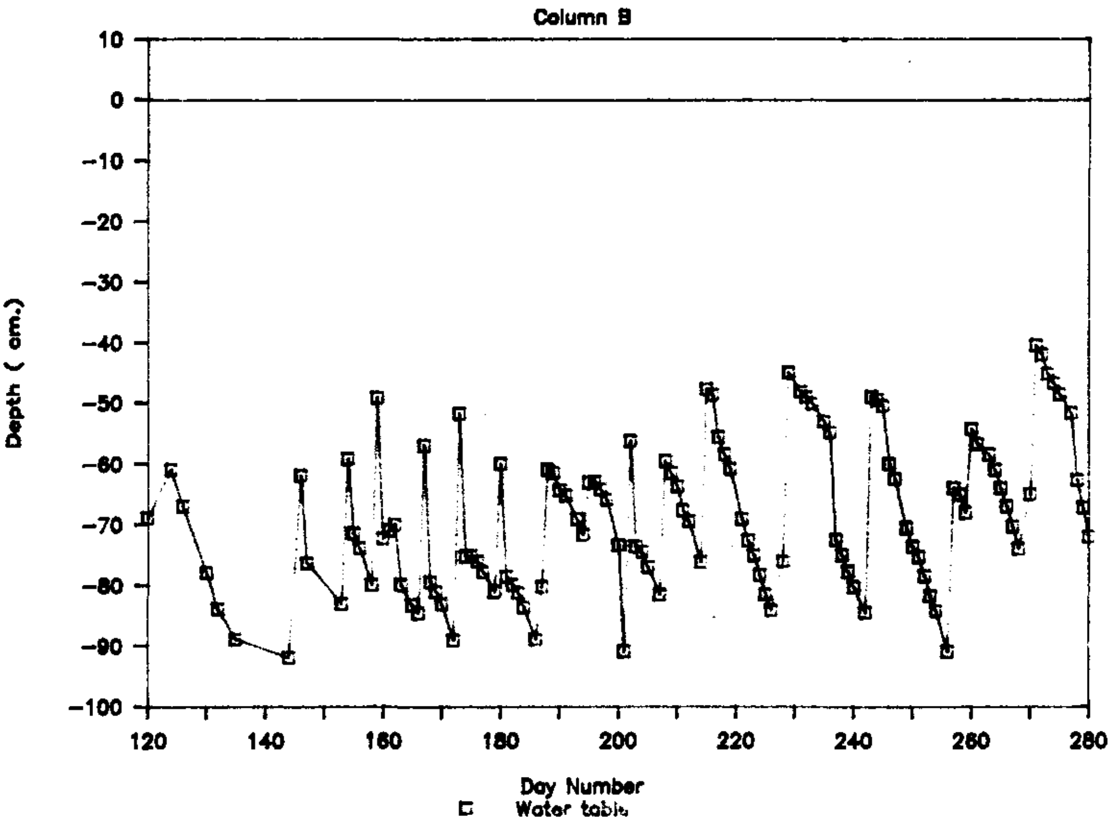
3.3. PHYSICAL MEASUREMENTS IN COLUMNS

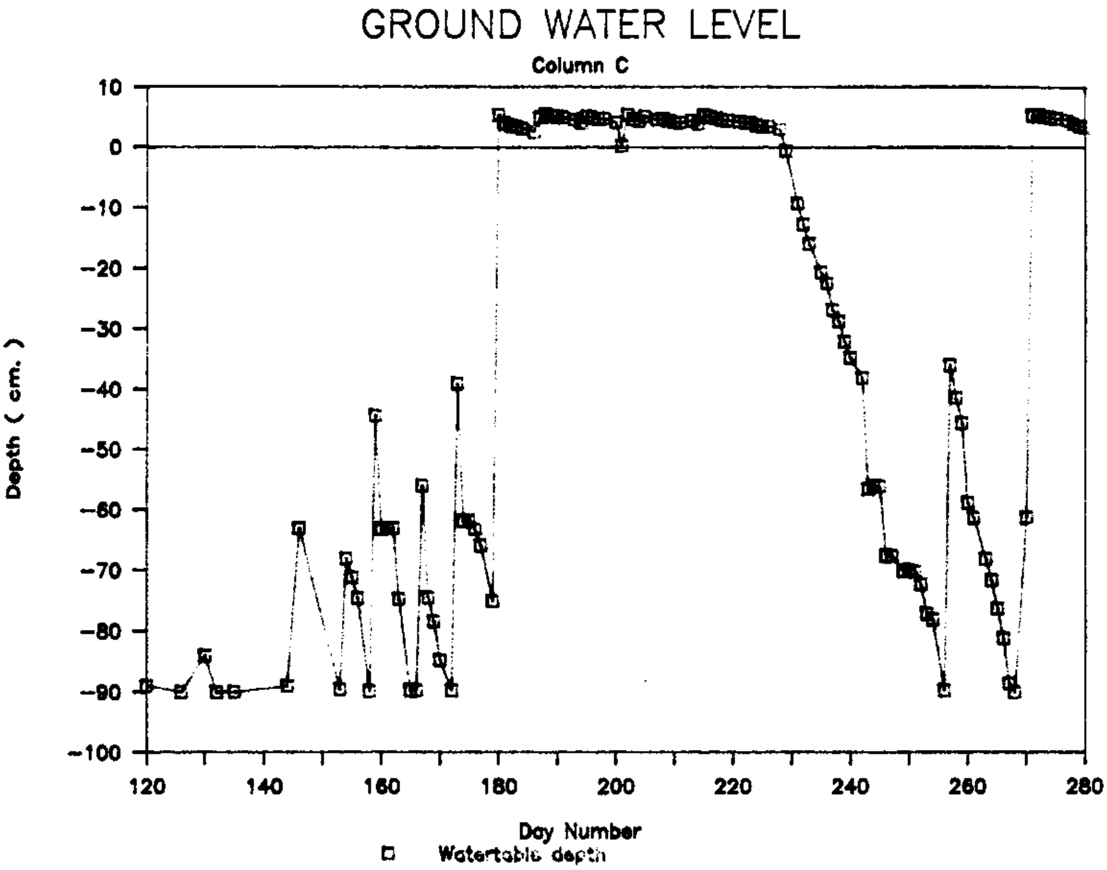
3.3.1. Groundwater levels

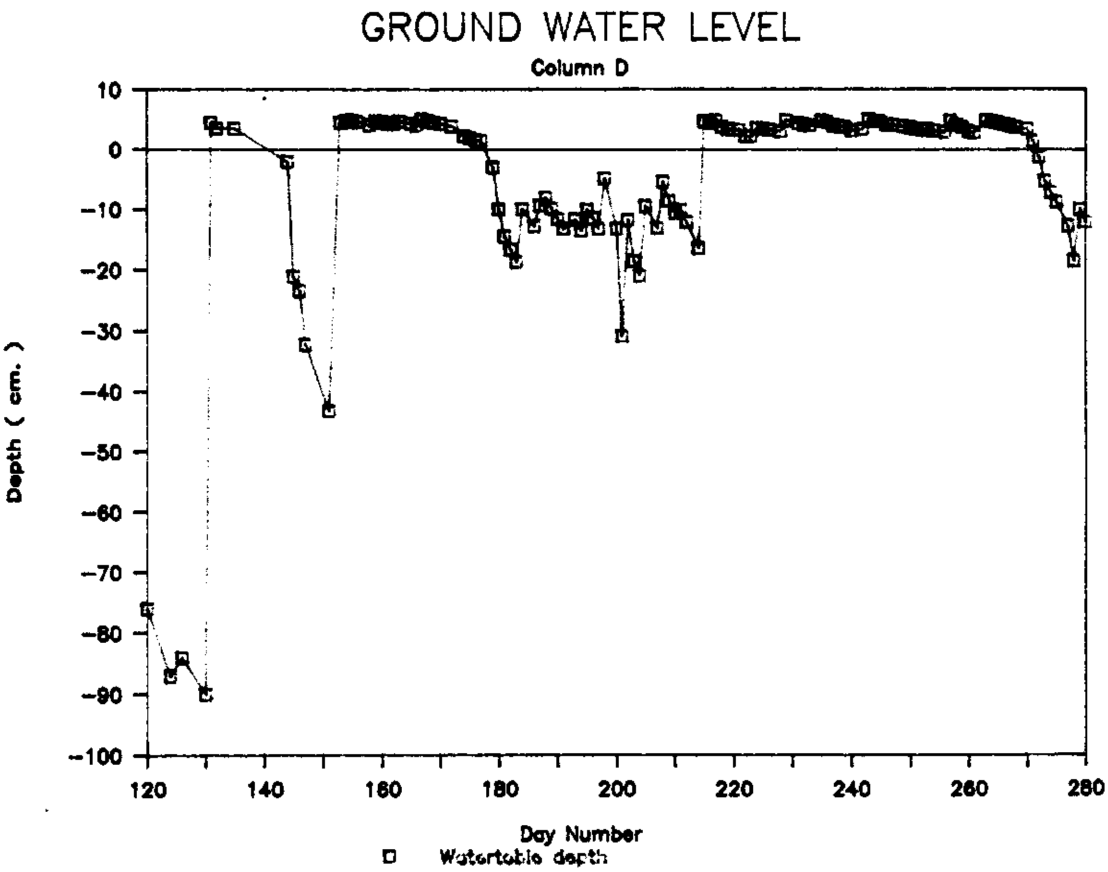
GROUND WATER LEVEL

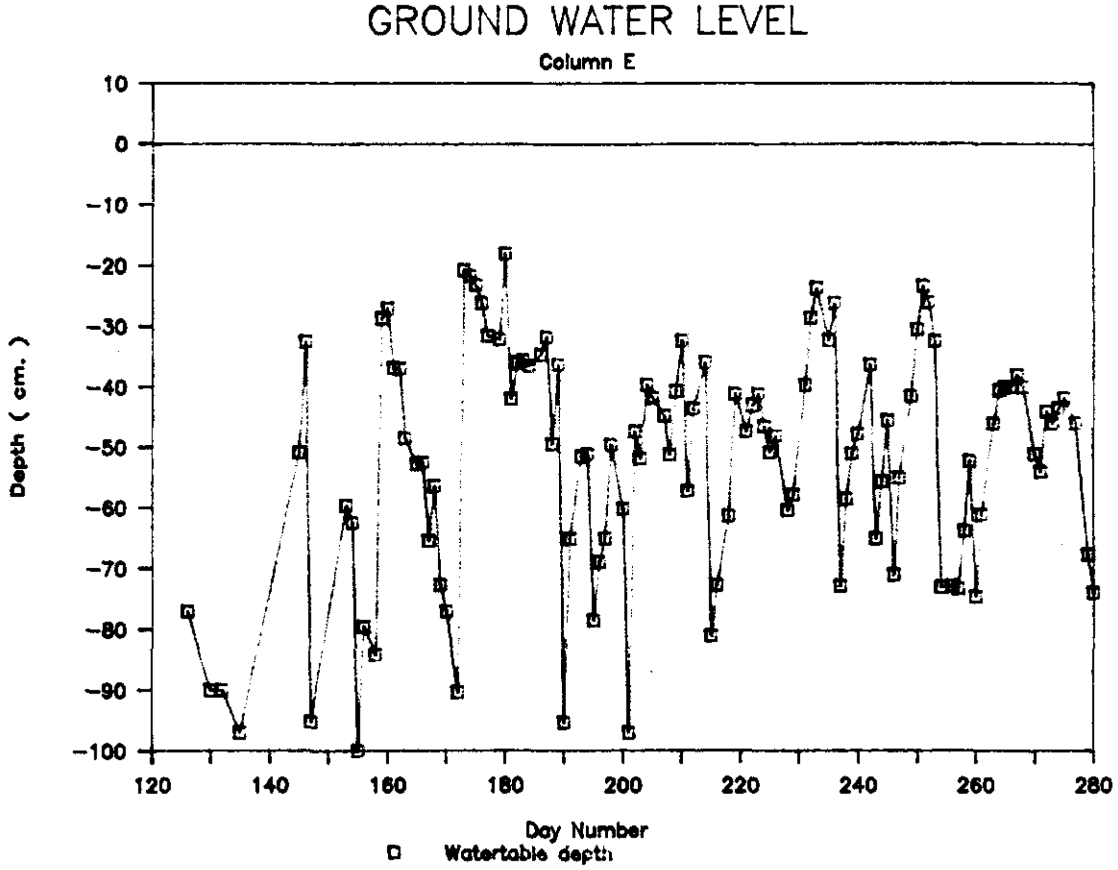


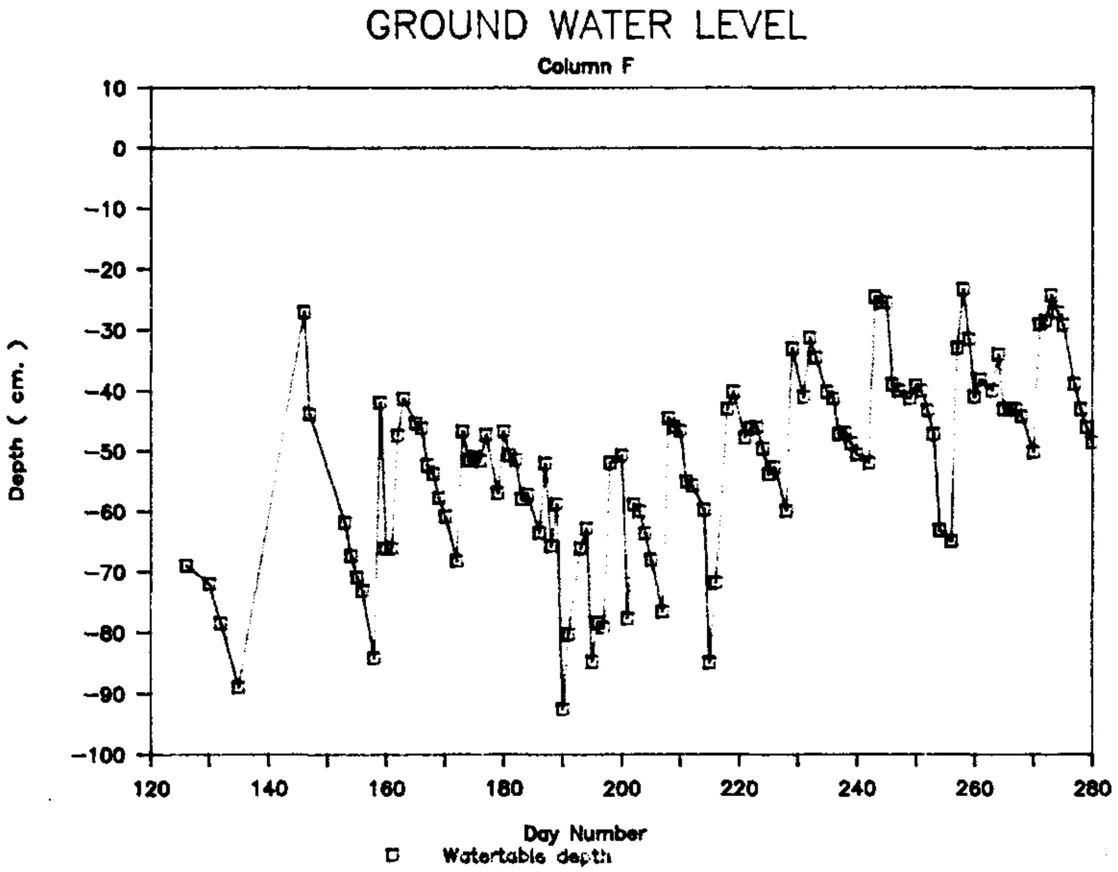
GROUND WATER DEPTH

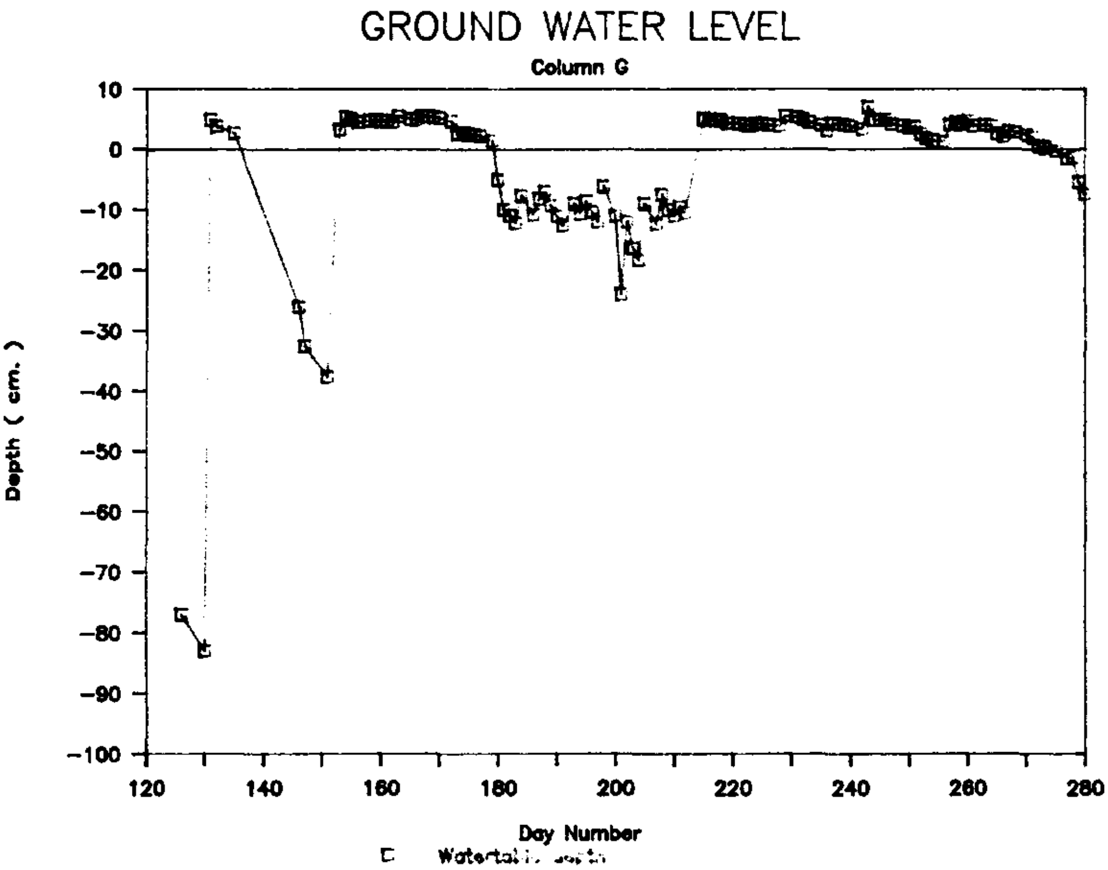



GROUND WATER LEVEL
Column C
Depth (cm.)
Day Number
Watertable depth


GROUND WATER LEVEL
Column D
Depth (cm.)
Day Number
Watertable depth

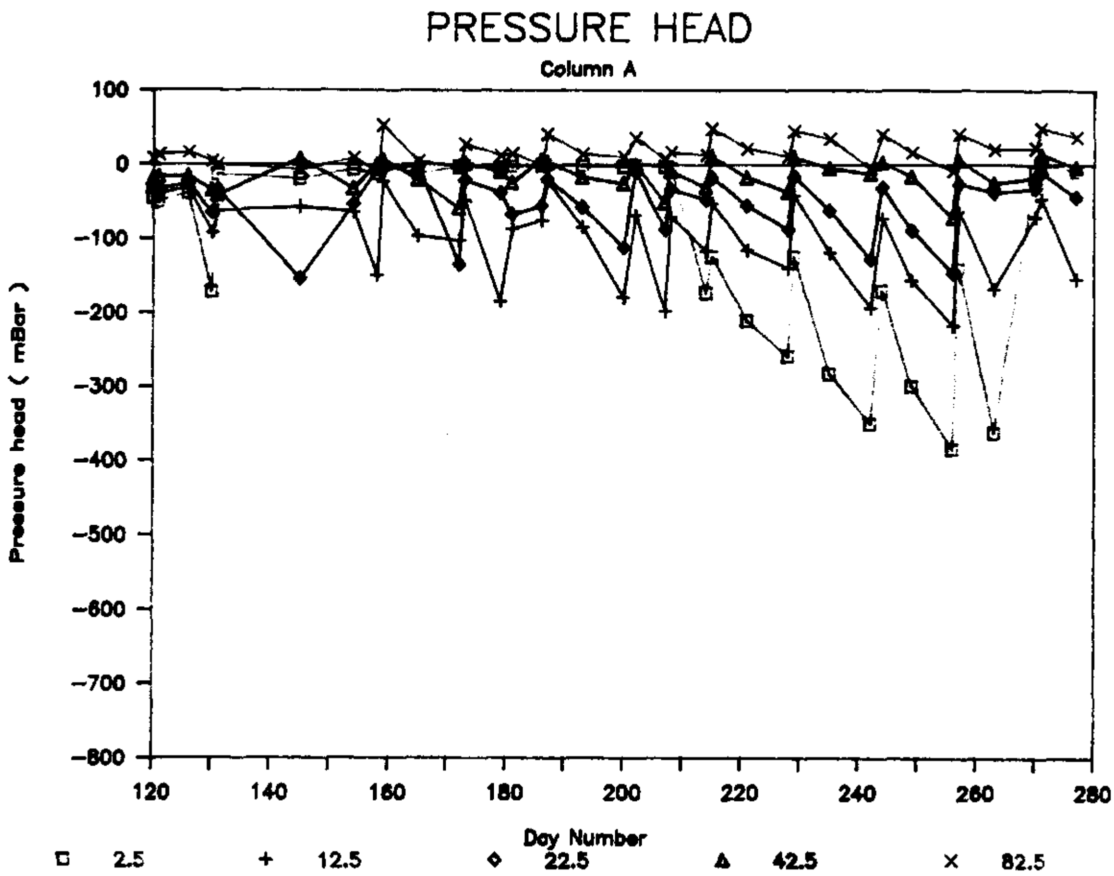

GROUND WATER LEVEL
Column E
Depth (cm.)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
120
140
160
180
200
220
240
260
280
Day Number
Watertable depth


GROUND WATER LEVEL
Column F
Depth (cm.)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
120
140
160
180
200
220
240
260
280
Day Number
Watertable depth

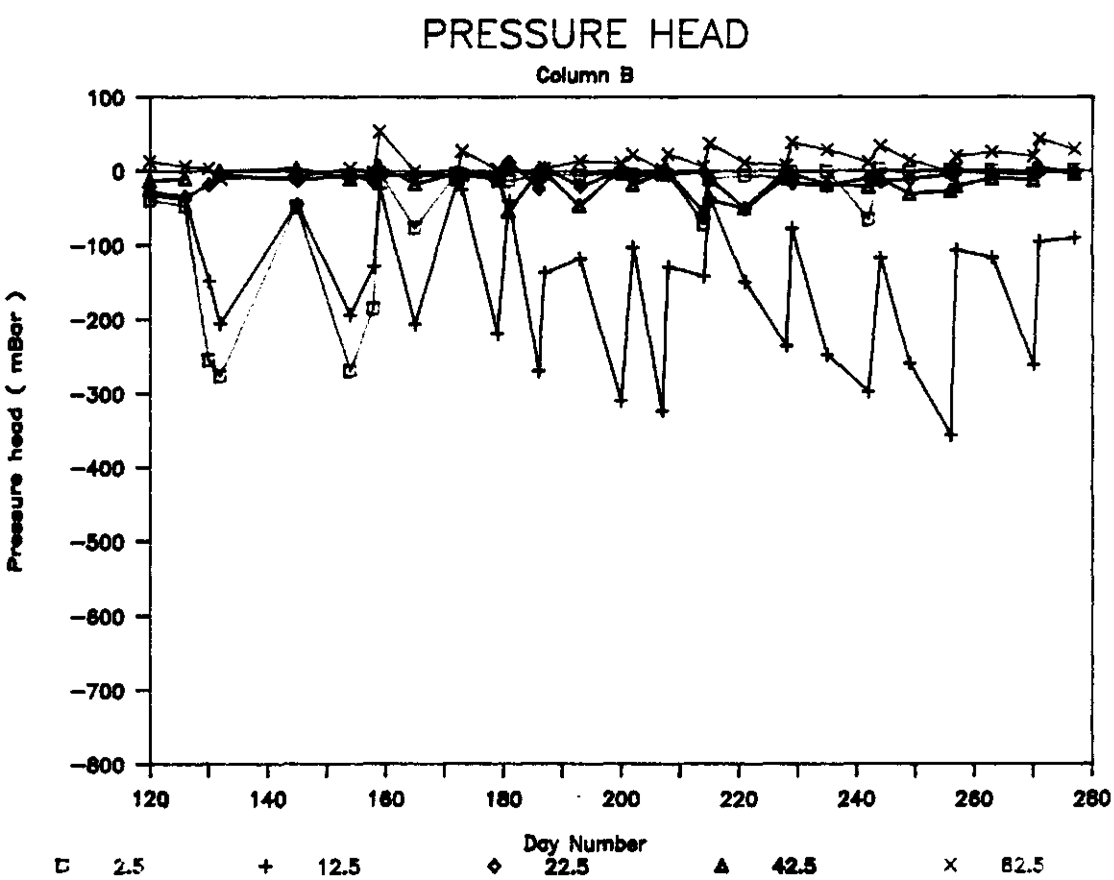


GROUND WATER LEVEL
Column G
Depth (cm.)
Day Number
10
0
−10
−20
−30
−40
−50
−60
−70
−80
−90
−100
120
140
160
180
200
220
240
260
280

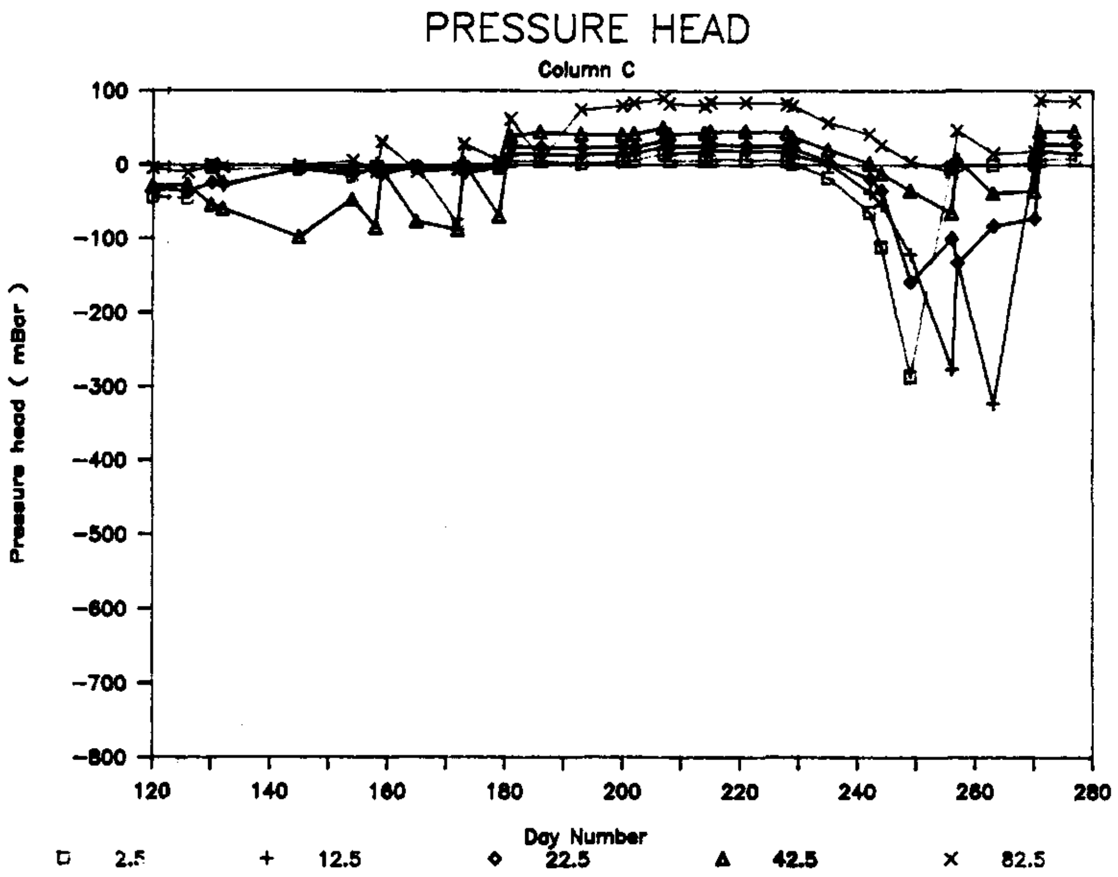
3.3.2. Pressure heads

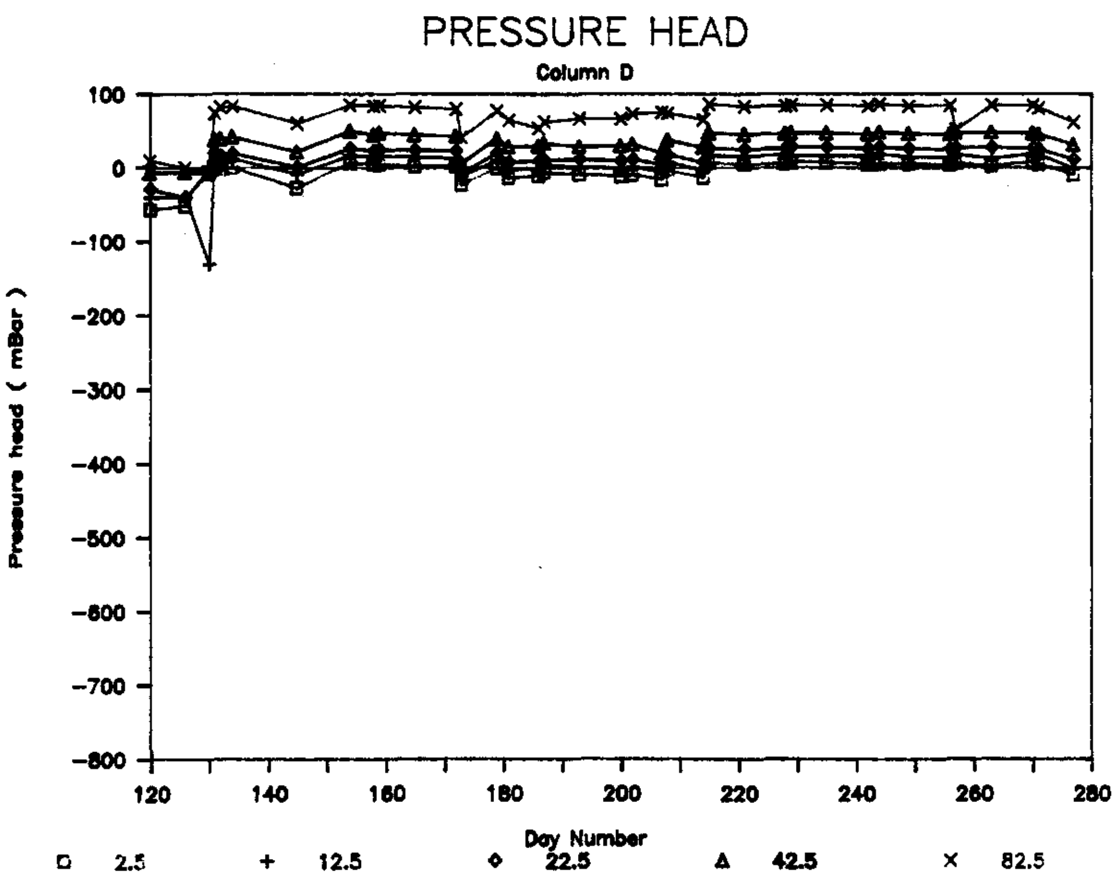


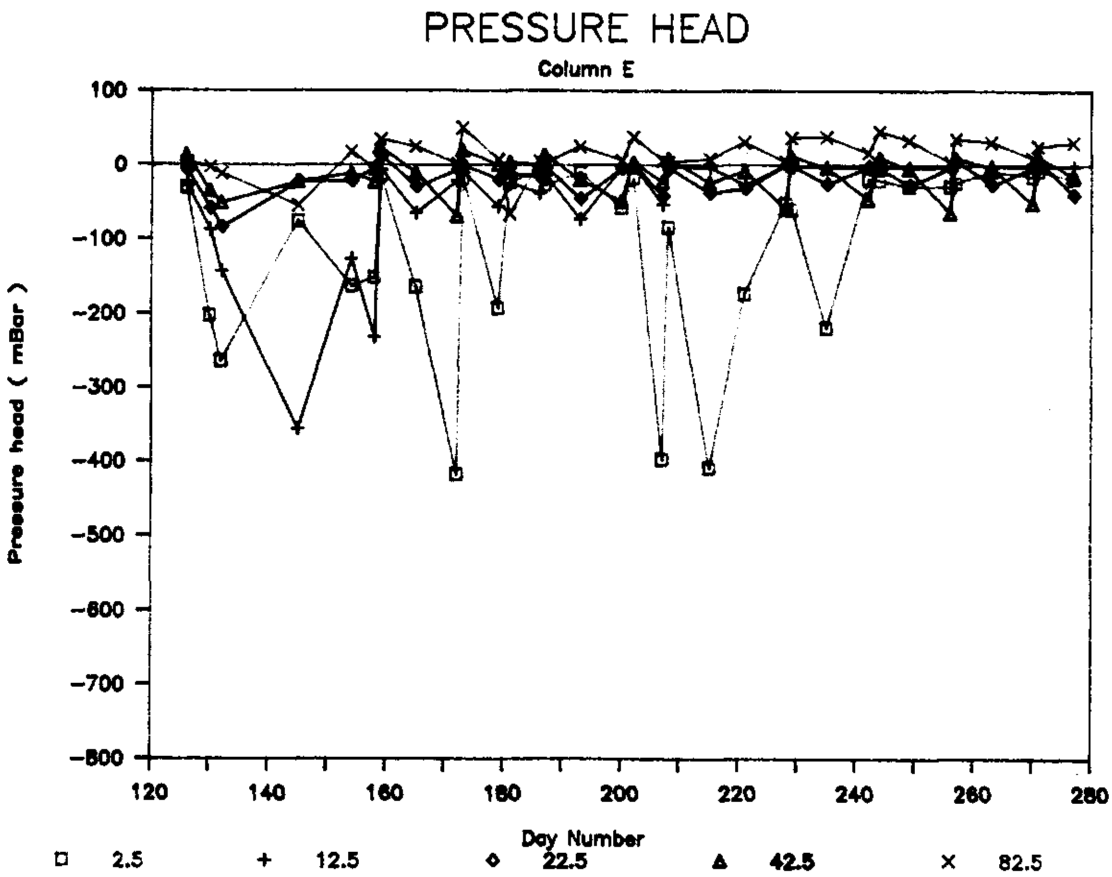
PRESSURE HEAD
Column A
Pressure head (mBar)
Day Number
2.5
12.5
22.5
42.5
82.5

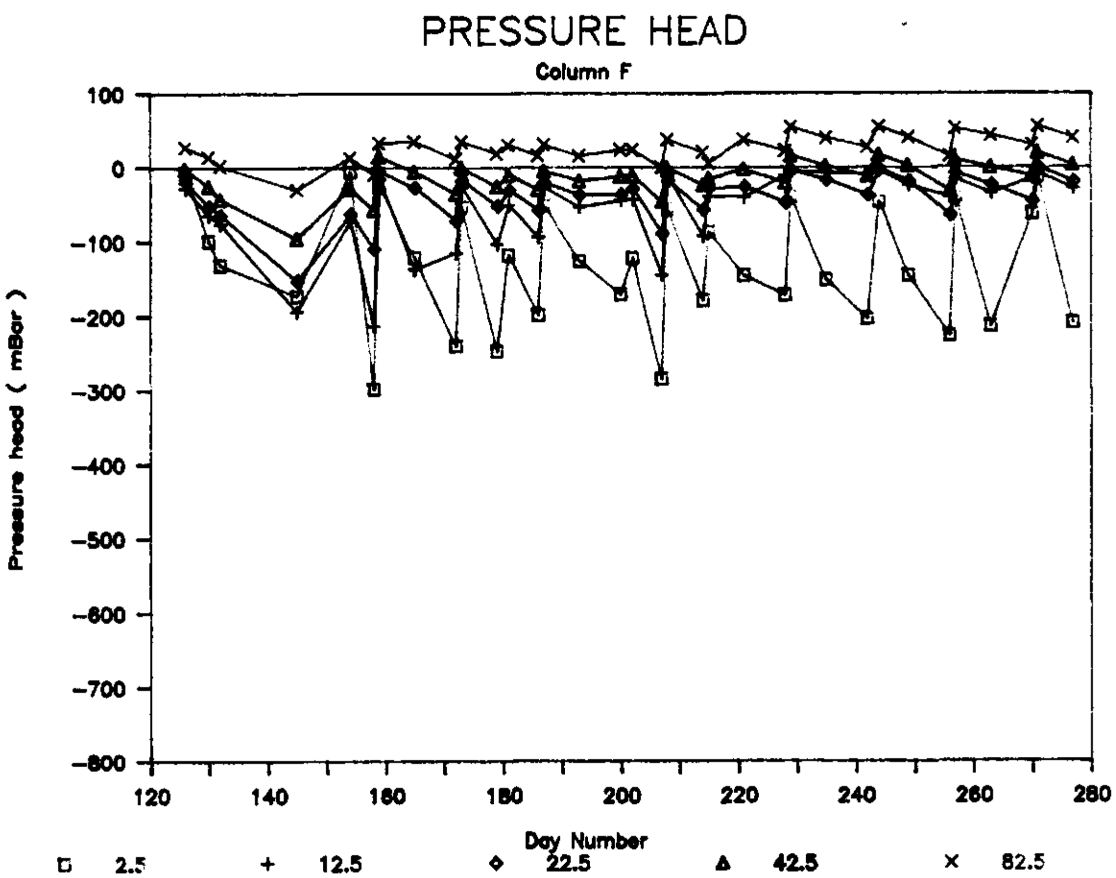


PRESSURE HEAD
Column B
Pressure head (mBar)
Day Number
2.5
12.5
22.5
42.5
82.5

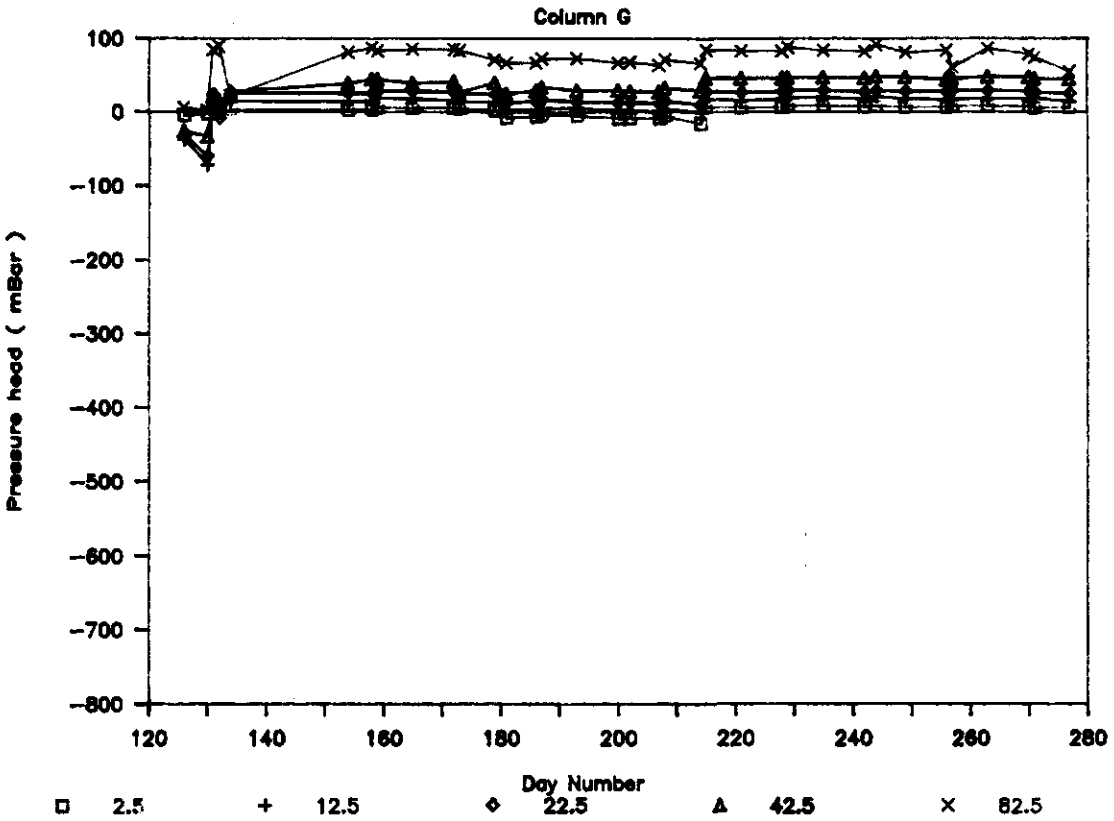

PRESSURE HEAD
Column C
Pressure head (mBar)
100
0
-100
-200
-300
-400
-500
-600
-700
-800
120
140
160
180
200
220
240
260
280
Day Number
2.5
12.5
22.5
42.5
82.5


PRESSURE HEAD
Column D
Pressure head (mBar)
100
0
-100
-200
-300
-400
-500
-600
-700
-800
120
140
160
180
200
220
240
260
280
Day Number
2.5
12.5
22.5
42.5
82.5

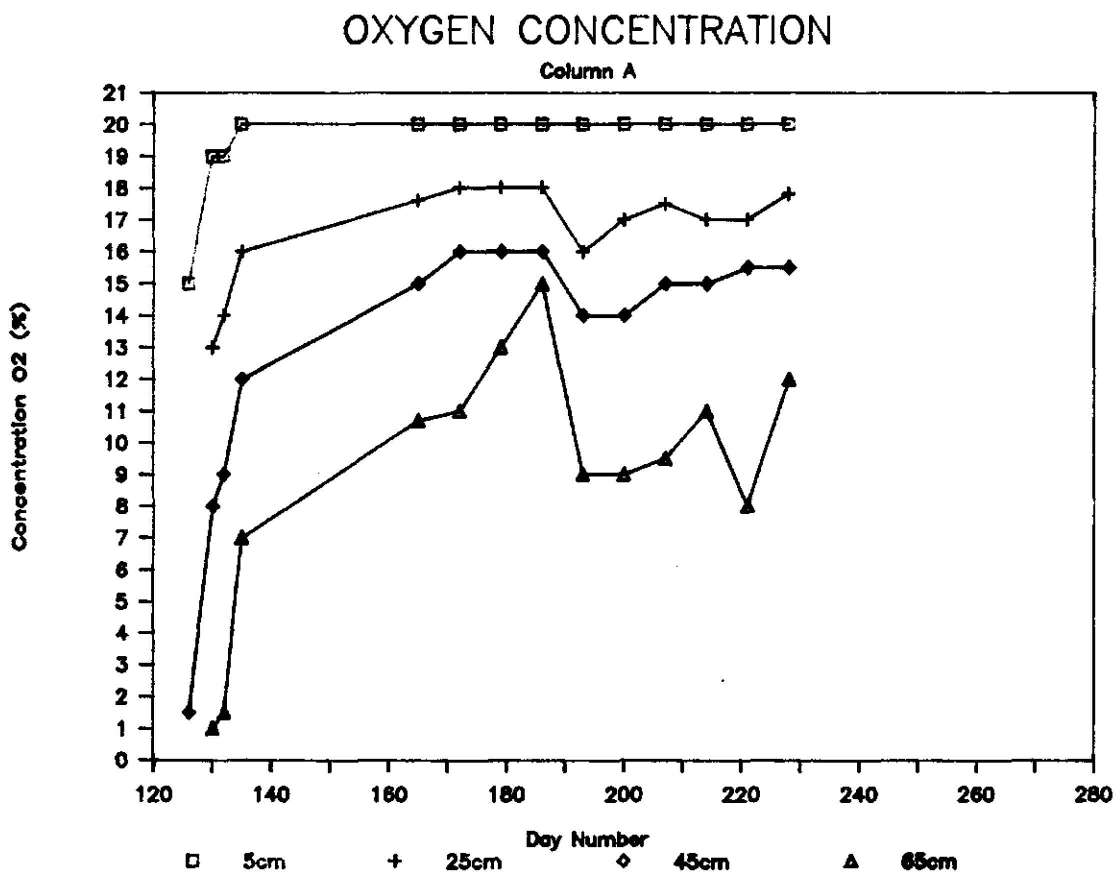

PRESSURE HEAD
Column E
100
0
-100
-200
-300
-400
-500
-600
-700
-800
Pressure head (mBar)
120
140
160
180
200
220
240
260
280
Day Number
2.5
12.5
22.5
42.5
82.5

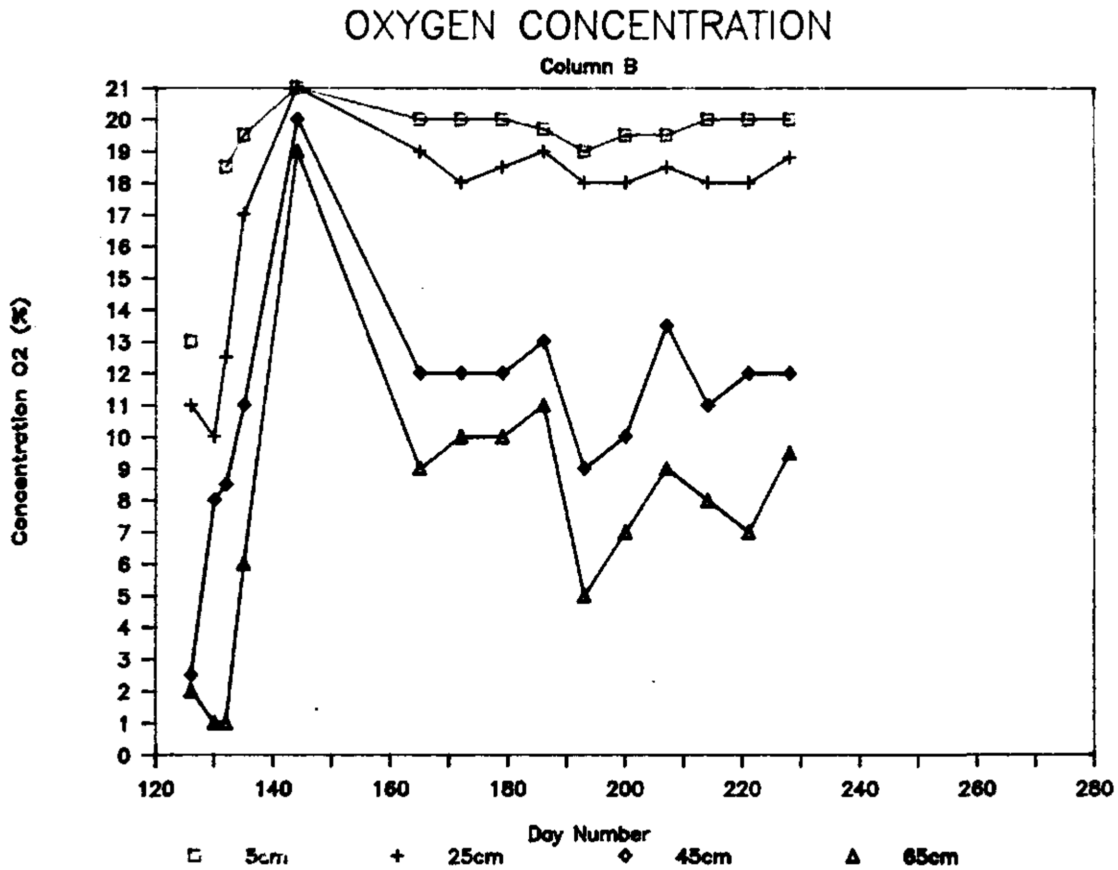

PRESSURE HEAD
Column F
100
0
-100
-200
-300
-400
-500
-600
-700
-800
Pressure head (mBar)
120
140
160
180
200
220
240
260
280
Day Number
2.5
12.5
22.5
42.5
82.5

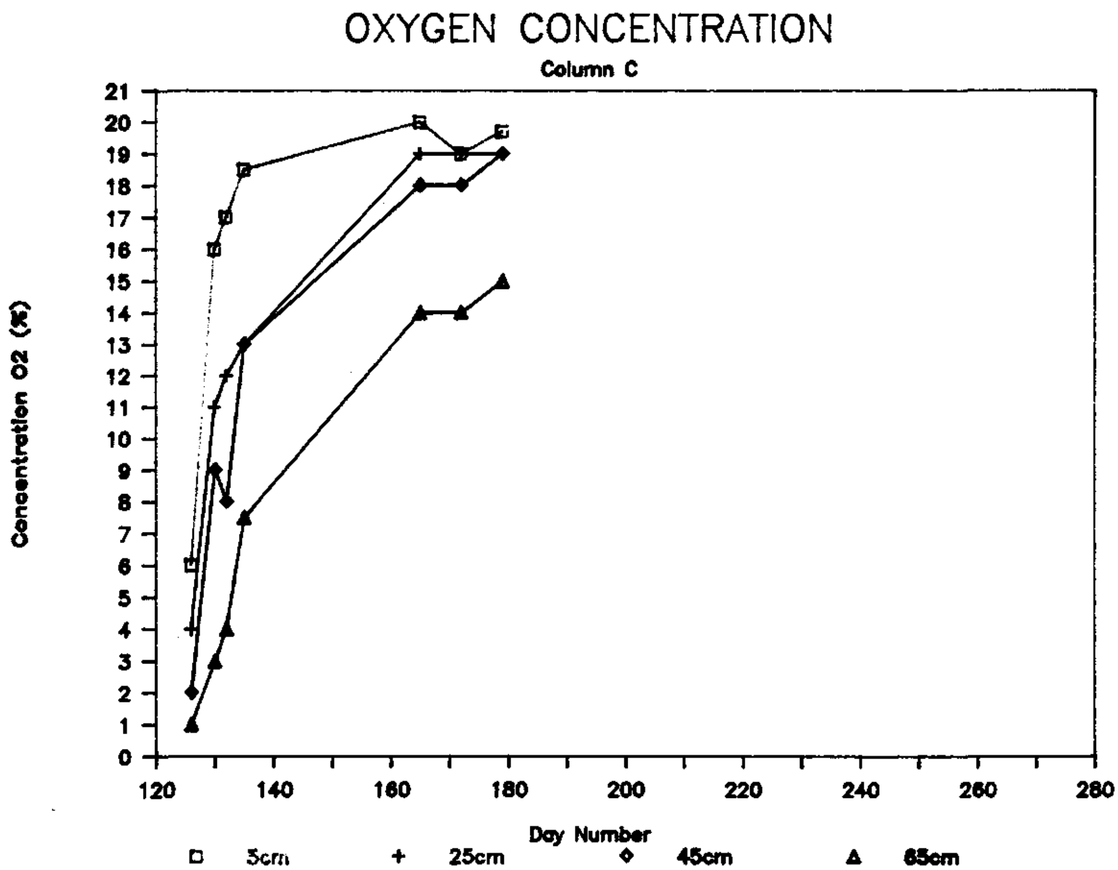
PRESSURE HEAD

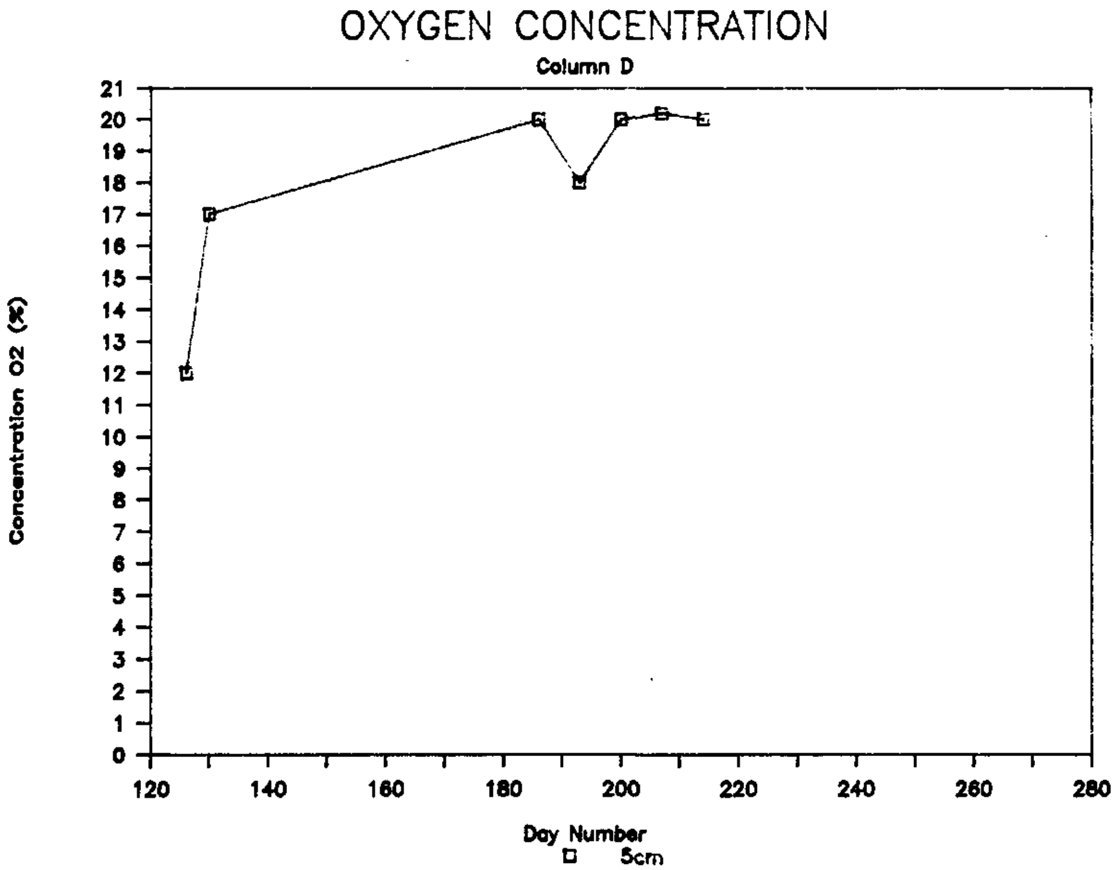


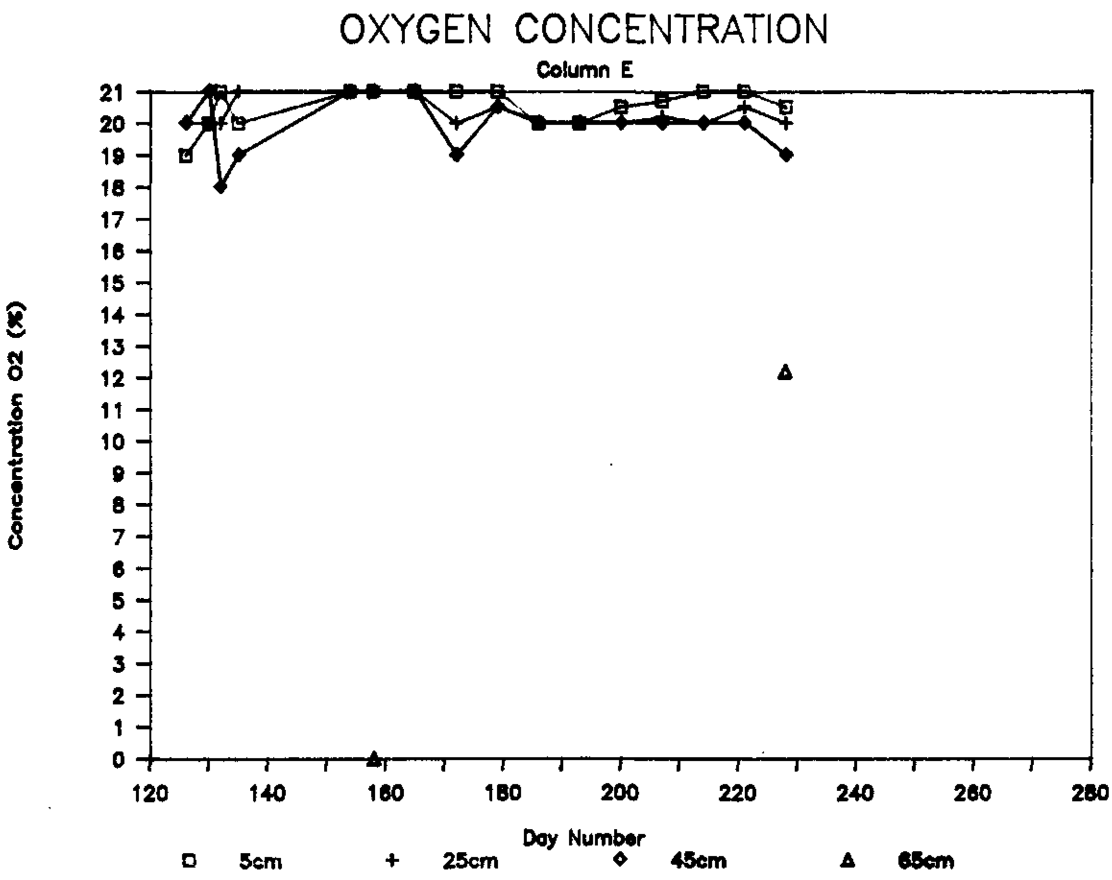
3.3.3. Oxygen concentration in soil air

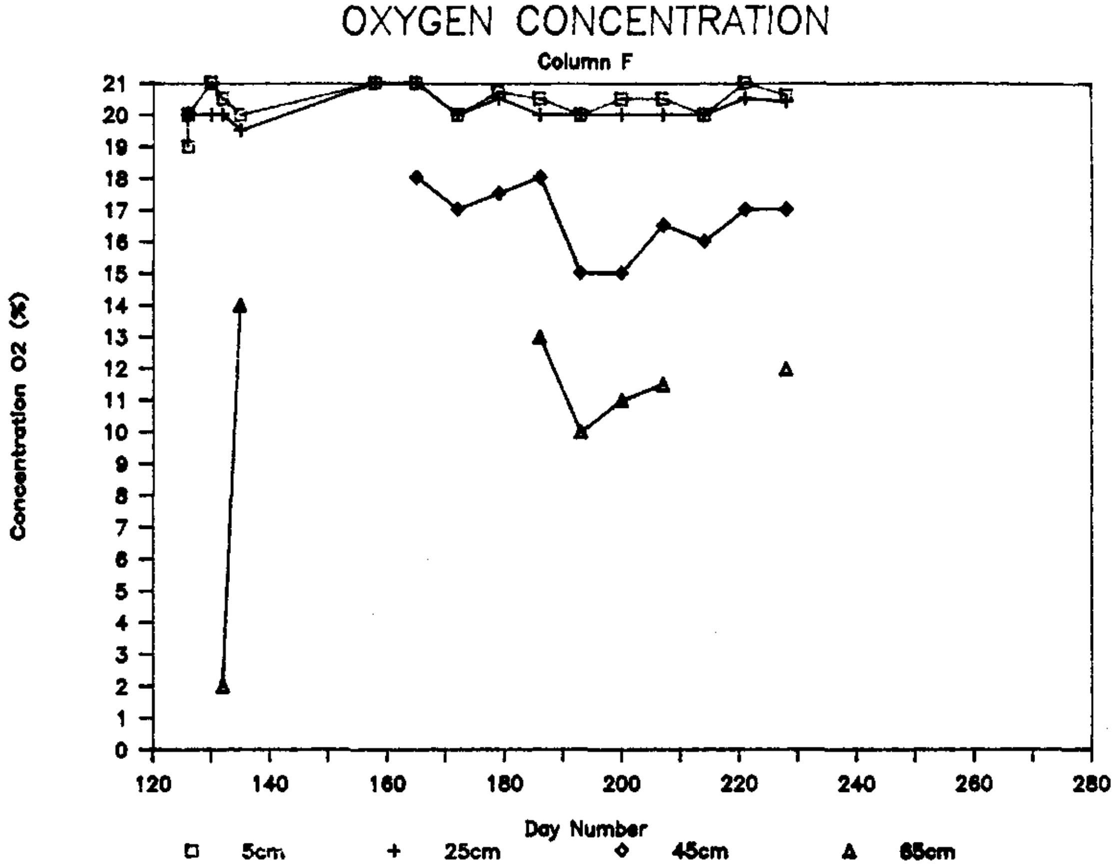

OXYGEN CONCENTRATION
Column A
Concentration O2 (%)
Day Number
5cm
25cm
45cm
65cm

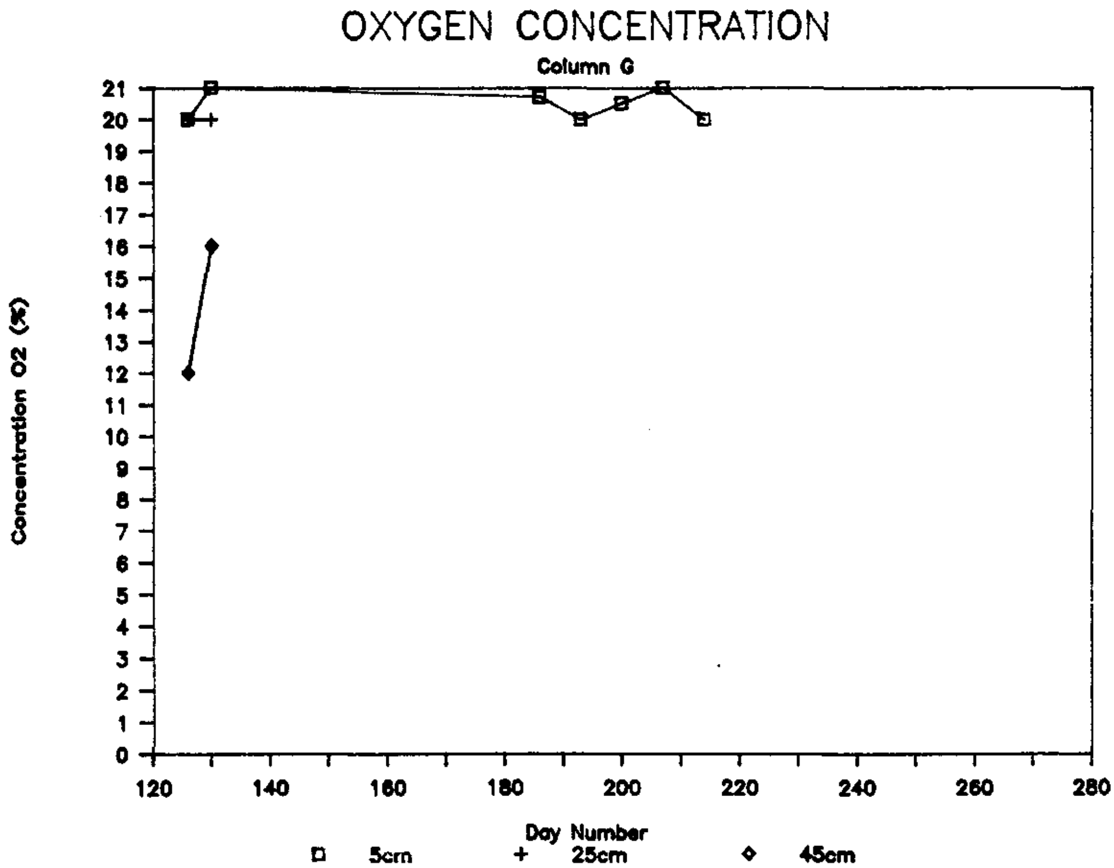

OXYGEN CONCENTRATION
Column B
Concentration O2 (%)
Day Number
5cm
25cm
45cm
65cm


OXYGEN CONCENTRATION
Column C
Concentration O2 (%)
Day Number
5cm
25cm
45cm
65cm

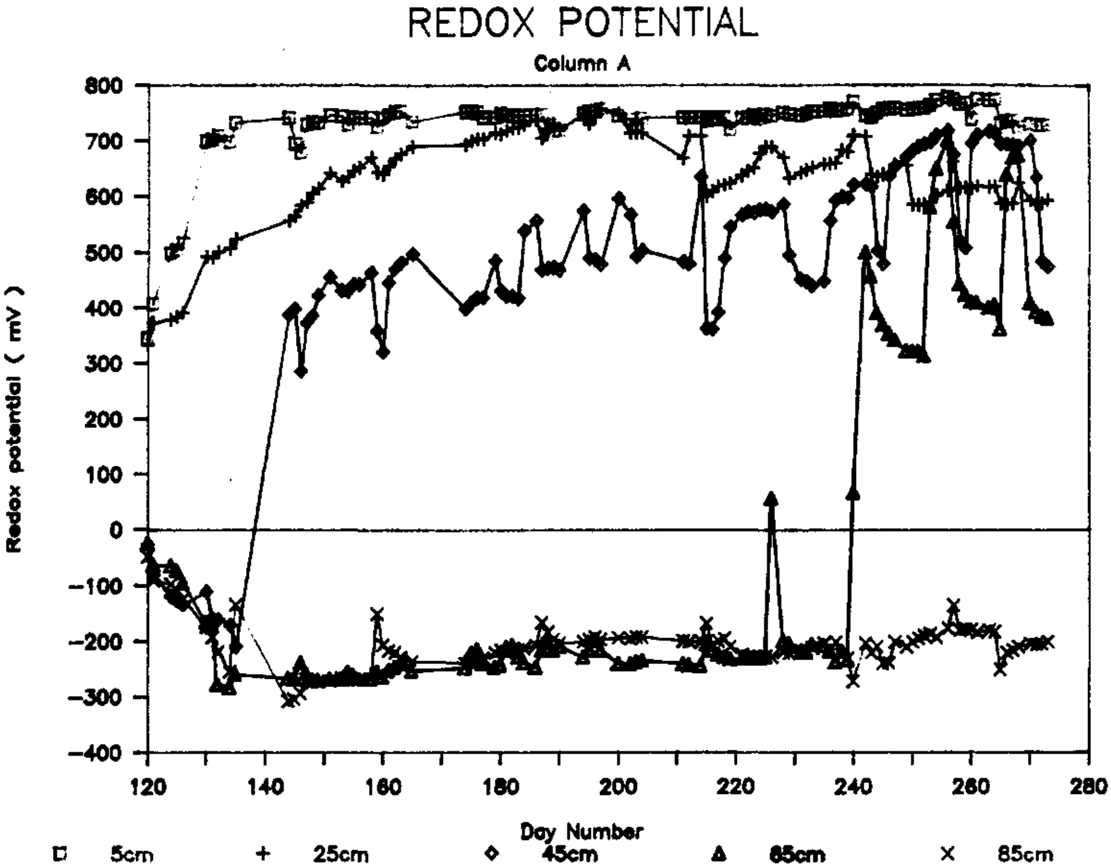

OXYGEN CONCENTRATION
Column D
Concentration O2 (%)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
120
140
160
180
200
220
240
260
280
Day Number
5cm

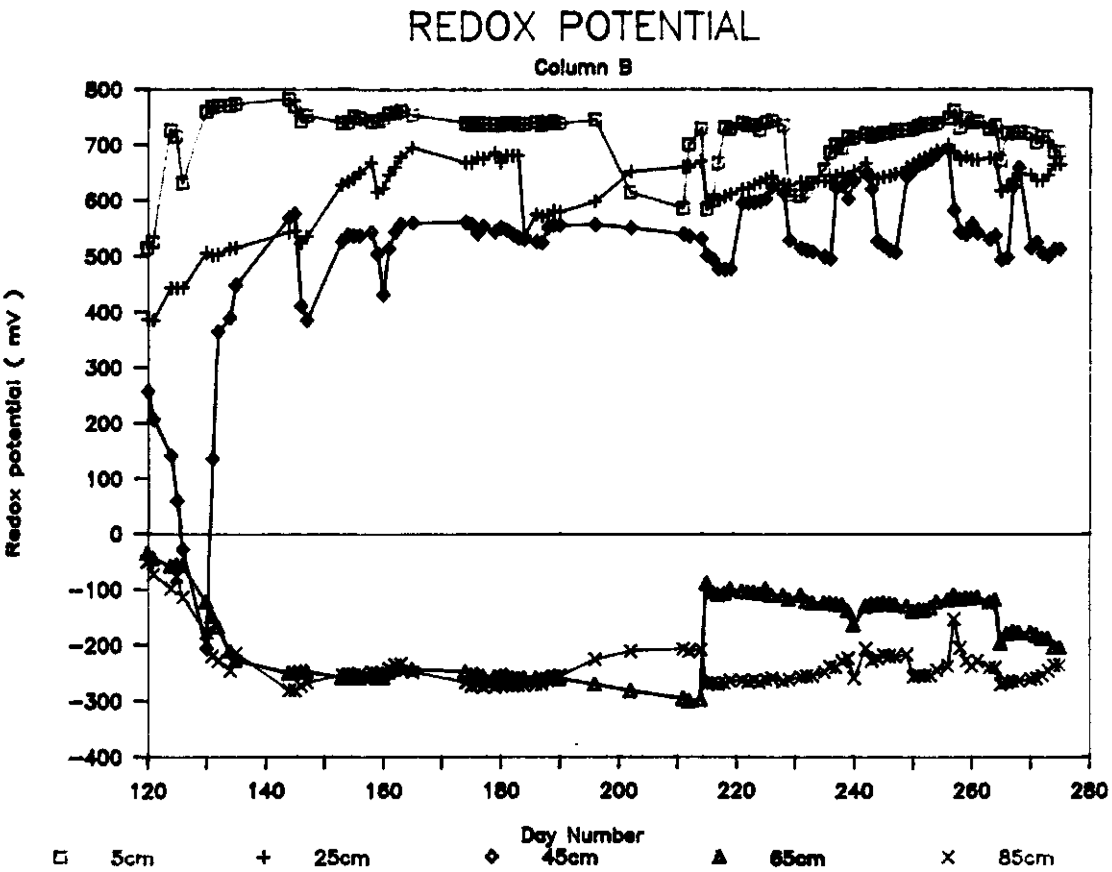

OXYGEN CONCENTRATION
Column E
Concentration O2 (%)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
120
140
160
180
200
220
240
260
280
Day Number
5cm
25cm
45cm
65cm

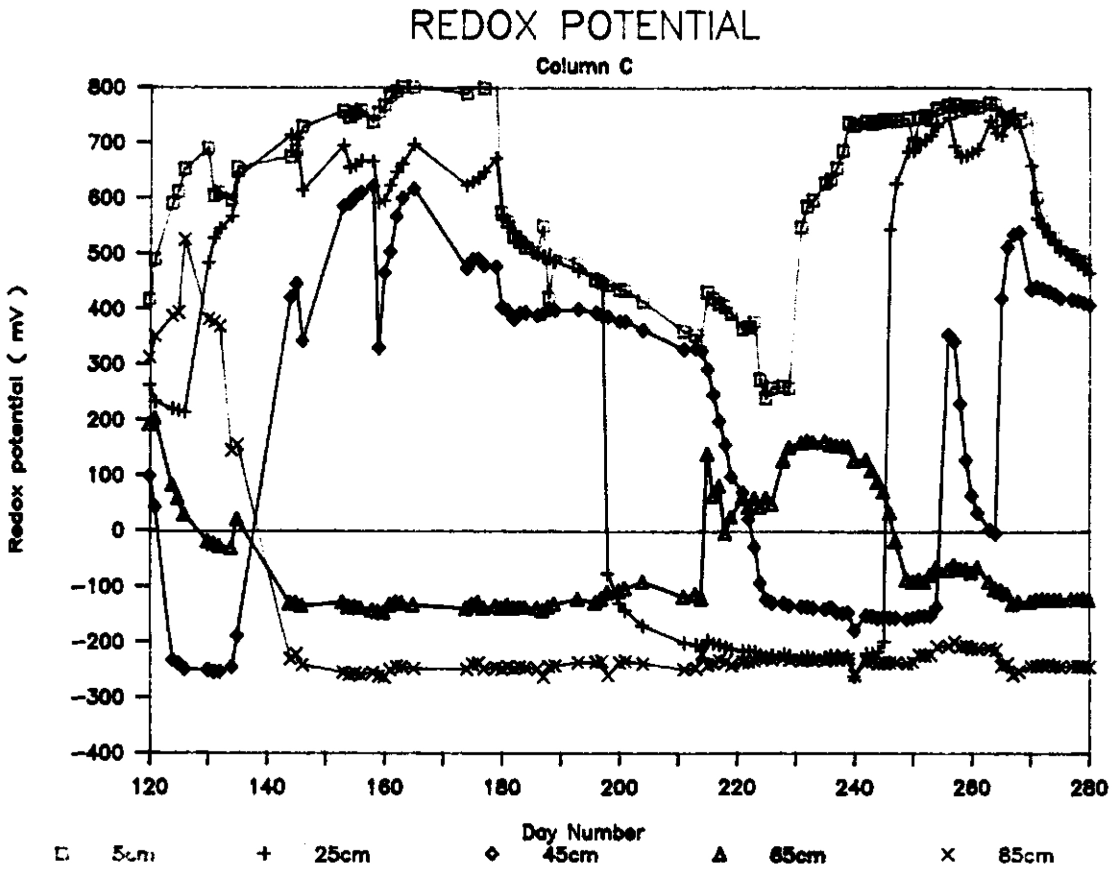

OXYGEN CONCENTRATION
Column F
Concentration O2 (%)
Day Number
5cm
25cm
45cm
65cm


OXYGEN CONCENTRATION
Column G
Concentration O2 (%)
Day Number
5cm
25cm
45cm

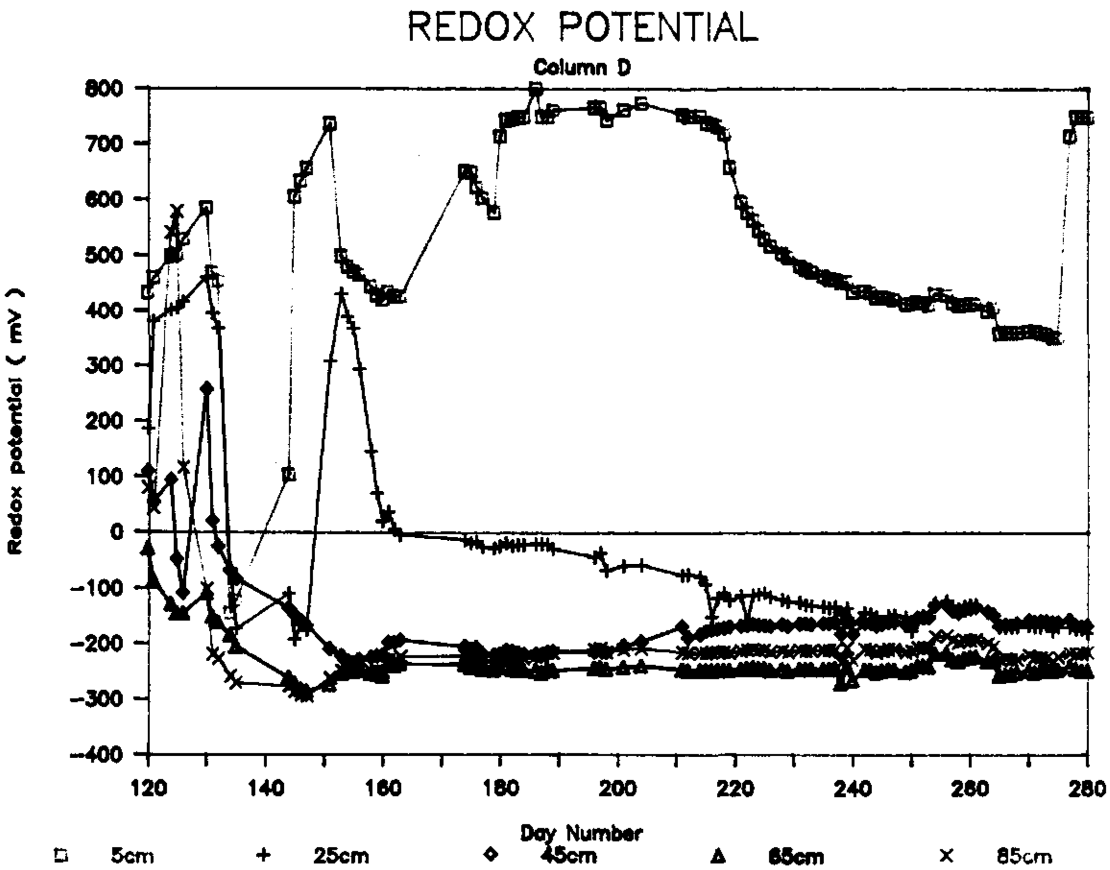
3.3.4. Redox potentials


REDOX POTENTIAL
Column A
Redox potential (mV)
800
700
600
500
400
300
200
100
0
-100
-200
-300
-400
120
140
160
180
200
220
240
260
280
Day Number
5cm
25cm
45cm
65cm
85cm

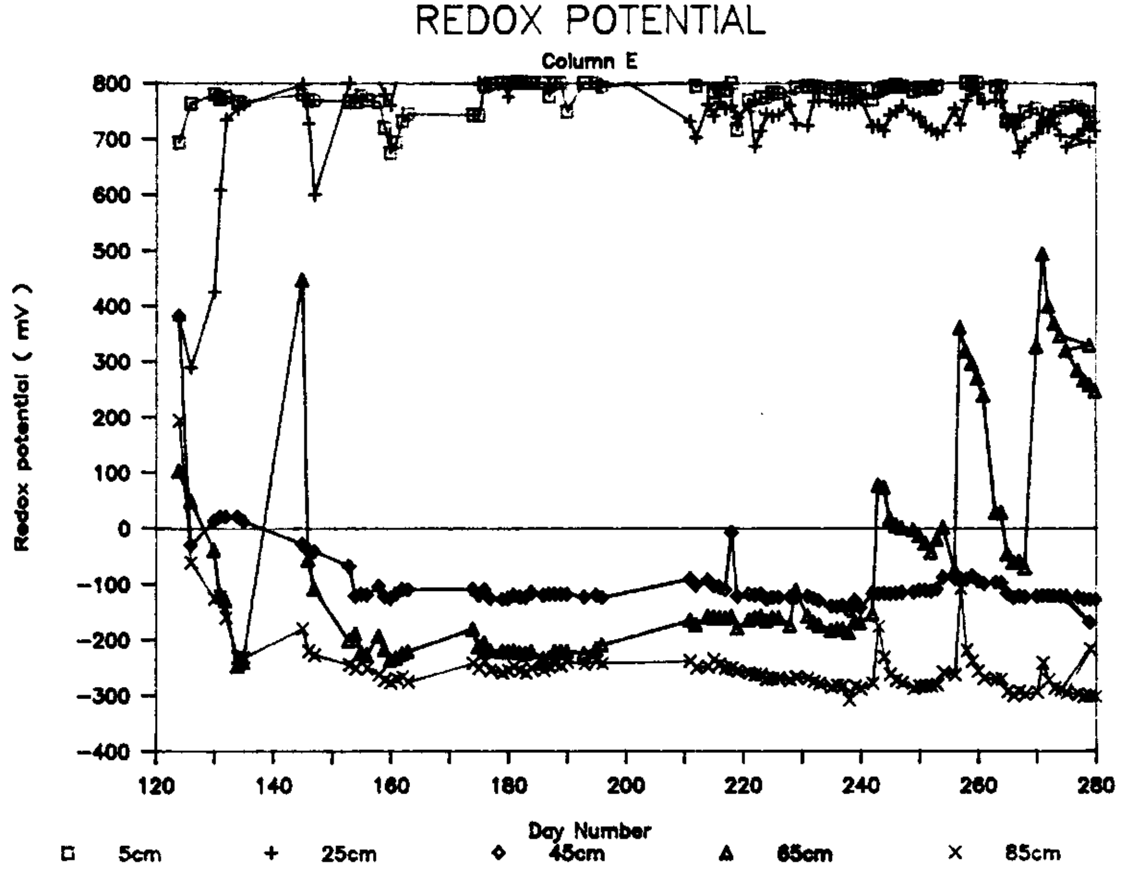

REDOX POTENTIAL
Column B
Redox potential (mV)
800
700
600
500
400
300
200
100
0
-100
-200
-300
-400
120
140
160
180
200
220
240
260
280
Day Number
5cm
25cm
45cm
65cm
85cm

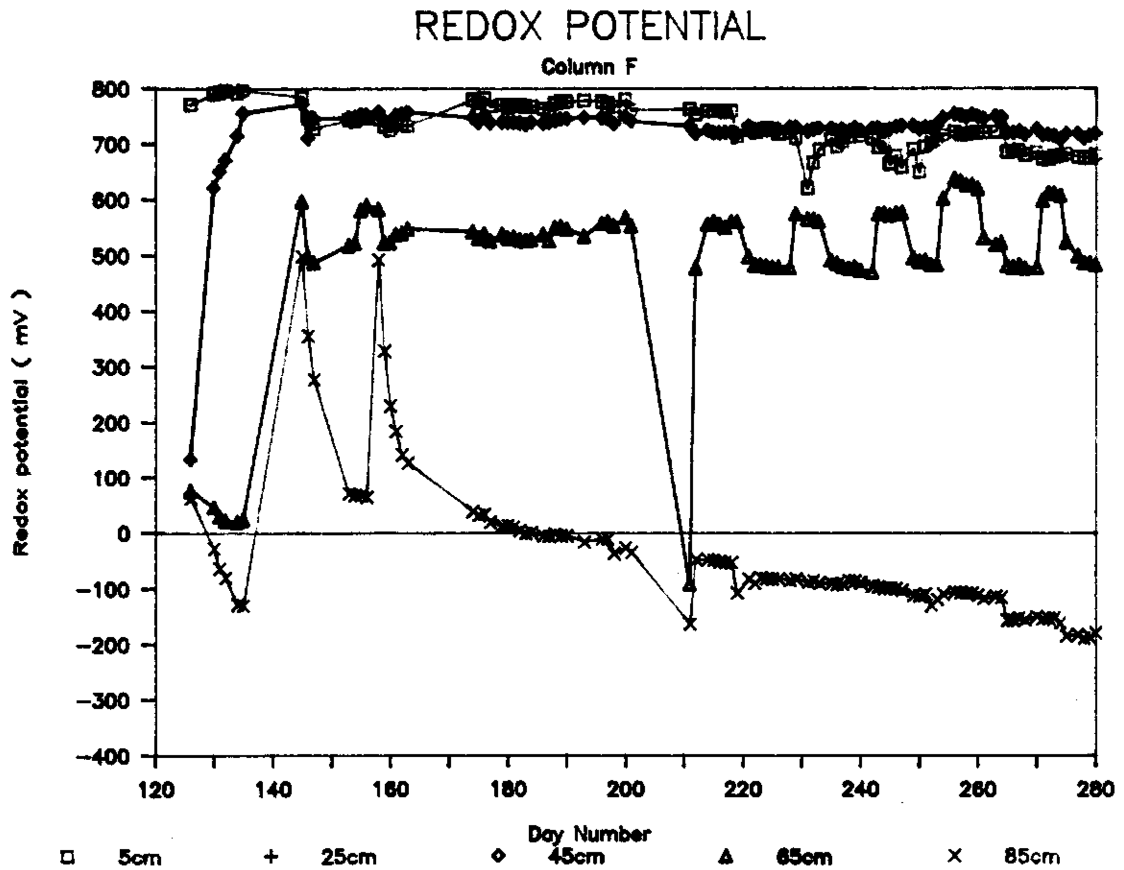


REDOX POTENTIAL
Column C
Redox potential (mV)
800
700
600
500
400
300
200
100
0
-100
-200
-300
-400
120
140
160
180
200
220
240
260
280
Day Number
5cm
25cm
45cm
65cm
85cm

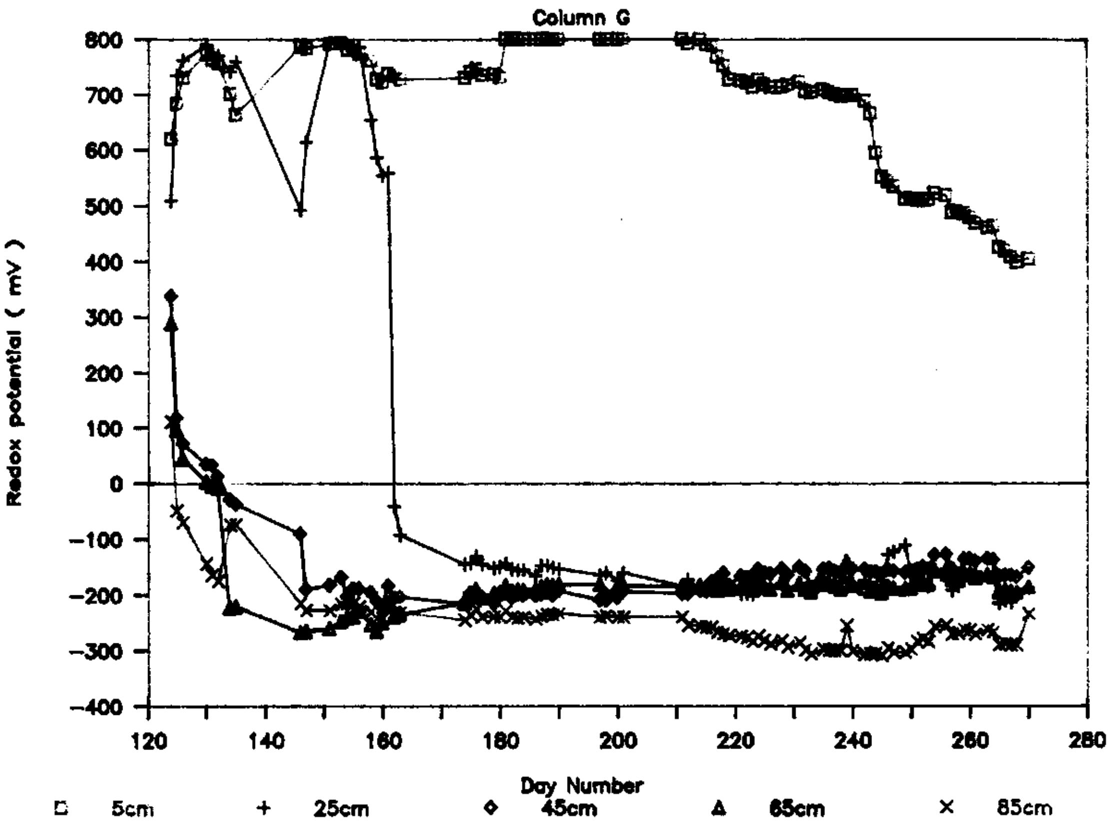


REDOX POTENTIAL
Column D
Redox potential (mV)
800
700
600
500
400
300
200
100
0
-100
-200
-300
-400
120
140
160
180
200
220
240
260
280
Day Number
5cm
25cm
45cm
65cm
85cm


REDOX POTENTIAL
Column E
Redox potential (mV)
800
700
600
500
400
300
200
100
0
-100
-200
-300
-400
120
140
160
180
200
220
240
260
280
Day Number
5cm
25cm
45cm
65cm
85cm


REDOX POTENTIAL
Column F
Redox potential (mV)
800
700
600
500
400
300
200
100
0
-100
-200
-300
-400
120
140
160
180
200
220
240
260
280
Day Number
5cm
25cm
45cm
65cm
85cm

REDOX POTENTIAL



3.4. CHEMICAL MEASUREMENTS IN COLUMNS

3.4.1. Chemical composition of irrigation water

COLUMN A
QUALITY OF IRRIGATION WATER

O2 in mg/l; EC in mS/m; cations and anions in meq/l

DATE	pH	HCO3-	O2	EC	Fe2+	Mn2+	Na+	K+	Ca2+	Mg2+	Al3+	Cl-	NO3-	SO42-	Sum+	Sum-
145	8,03	2,25	5,2	183	0,05	0	0,28	0,09	0,31	1,07	0,09	0	0	0,14	1,89	
159	7,94	2,00	5,6	278	0,05	0	0,09	0,08	0,07	1,32	0,02	0	0	0,08	1,63	2,08
172	8,12	2,25	6,9	173	0,04	0,001	0,24	0,09	0,09	0,87	0	0,1	0	0,26	1,33	2,61
179	8,09	2,00	5,2	174	0,02	0	0,28	0,08	0,07	0,82	0	0,5		0,02	1,27	2,52
186	7,80	2,00	6,2	173	0,02	0	0,21	0,07	0,06	0,65	0	0		0	1,01	2
194	7,94	2,10	5,1	176	0,03	0	0,26	0,07	0,17	0,49	0	0		0	1,02	2,1
202	7,78	2,30	4,5	178	0,03	0	0,25	0,07	0,08	0,65	0,01	0		0,09	1,09	2,39
207	7,94	2,25	7,0	175	0	0	0,25	0,07	0,06	0,51	0	0		0,06	0,89	2,31
210	7,85	1,90	6,8	175	0,01	0	0,27	0,06	0,06	0,53	0	0		0,06	0,93	1,96
214	7,63	1,00	5,3	183	0,01	0	0,33	0,07	0,03	0,46	0,08	0		0,06	0,98	1,06
216	7,65	2,00	5,7	180	0,007	0	0,25	0,08	0,04	0,71	0	0		0,06	1,087	2,06
228	7,53	2,00	5,1	180	0,003	0	0,25	0,06	0,17	0,87	0	0		0,03	1,353	2,03
243	7,88	2,25	5,2	177	0,01	0	0,26	0,07	0,06	0,67	0	0		0,05	1,07	2,3

COLUMN B

QUALITY OF IRRIGATION WATER

O2 in mg/l; EC in mS/m; cations and anions in meq/l

DATE	pH	HCO3-	O2	EC	Fe2+	Mn2+	Na+	K+	Ca2+	Mg2+	Al3+	Cl-	NO3-	SO42-	Sum+	Sum-
145	7,7	1,25	4,6	16450	0,21	0	6,26	2,23	9,26	31,41	0,07	163,65	0	13,51	49,44	178,41
159	7,58	1,1	5,5	16700	0,01	0	7,03	3,47	9,79	34,02	0,03	163,65		14,18	54,35	178,93
172	7,79	1,25	6,4	16990	0,03	0	37,64	1,67	10,14	24,8	0	165,35	0	8,44	74,28	175,04
179	7,78	1,5	5,6	16050	0,004	0	75,14	2,2	9,98	20,7	0,01	181,8		7,36	108,03	190,66
186	7,76	1,4	9,9	16780	0,01	0	31,81	1,51	10,37	22,85	0	156,16		9,67	66,55	167,23
194	7,65	1,15	5,7	16750	0,01	0	51,47	2,39	12,07	17,19	0	150,38		13,49	83,13	165,47
202	7,56	1,6	3,9	16750	0,01	0	56,72	1,33	10	11,4	0,003	0		12,07	79,463	13,67
207	7,38	2	6,8	16740	0	0	32,32	1,23	8,62	20,78	0	149,42		12,21	62,95	163,63
210	7,71	1,35	7,3	17010	0	0	40,36	2,24	4,24	10,17	0,006	155,94		11,76	57,016	169,05
214	7,9	2	4,8	16630	0	0	36,5	2,32	6,64	12,02	0,11	154,6		11,28	57,59	167,88
216	7,67	1	5,5	16680	0	0	36,5	1,65	8,36	15,7	0	154,03		13,44	62,21	168,47
228	7,51	1,25	6	16560	0	0	36,39	2,36	8,41	21,06	0	156,89		12,4	68,22	170,54
243	7,52	1,15		15940	0	0	72,56	2,49	6,09	16,97	0	152,94		18,91	98,11	173

COLUMN C
QUALITY OF IRRIGATION WATER

O2 in mg/l; EC in mS/m; cations and anions in meq/l

DATE	pH	HCO3-	O2	EC	Fe2+	Mn2+	Na+	K+	Ca2+	Mg2+	Al3+	Cl-	NO3-	SO42-	Sum+	Sum-
145	8,03	2,25	5,2	183	0,05	0	0,28	0,09	0,31	1,07	0,09	0	0	0,14	1,89	2,39
153	8,03	2,25	5,2	183	0,05	0	0,28	0,09	0,31	1,07	0,09	0	0	0,14	1,89	2,39
172	8,12	2,25	6,9	173	0,04	0,001	0,24	0,09	0,09	0,87	0	0,1		0,26	1,33	2,61
179	8,09	2	5,2	174	0,02	0	0,28	0,08	0,07	0,82	0	0,5		0,02	1,27	2,52
186	7,80	2	6,2	173	0,02	0	0,21	0,07	0,06	0,65	0	0		0	1,01	2
194	7,94	2,1	5,1	176	0,03	0	0,26	0,07	0,17	0,49	0	0		0	1,02	2,1
202	7,78	2,3	4,5	178	0,03	0	0,25	0,07	0,08	0,65	0,01	0		0,09	1,09	2,39
207	7,94	2,25	7	175	0	0	0,25	0,07	0,06	0,51	0	0		0,06	0,89	2,31
210	7,85	1,9	6,8	175	0,01	0	0,27	0,06	0,06	0,53	0	0		0,06	0,93	1,96
214	7,63	1	5,3	183	0,01	0	0,33	0,07	0,03	0,46	0,08	0		0,06	0,98	1,06
216	7,65	2	5,7	180	0,007	0	0,25	0,08	0,04	0,71	0	0		0,06	1,087	2,06

COLUMN D
QUALITY OF IRRIGATION WATER

O2 in mg/l; EC in mS/m; cations and anions in meq/l

DATE	pH	HCO3-	O2	EC	Fe2+	Mn2+	Na+	K+	Ca2+	Mg2+	Al3+	Cl-	NO3-	SO42-	Sum+	Sum-
130	7,36	2	5,9	174	0,05	0,004	0,33	0,02	0,05	1,43	1,78	0	0	0,25		
151	8,03	2,25	5,2	183	0,05	0	0,28	0,09	0,31	1,07	0,09	0	0	0,14	1,89	2,39
153	8,03	2,25	5,2	183	0,05	0	0,28	0,09	0,31	1,07	0,09	0	0	0,14	1,89	2,39
186	7,8	2	6,2	173	0,02	0	0,21	0,07	0,06	0,65	0	0		0	1,01	2
194	7,94	2,1	5,1	176	0,03	0	0,26	0,07	0,17	0,49	0	0		0	1,02	2,1
202	7,78	2,3	4,5	178	0,03	0	0,25	0,07	0,08	0,65	0,01	0		0,09	1,09	2,39
207	7,94	2,25	7	175	0	0	0,25	0,07	0,06	0,51	0	0		0,06	0,89	2,31
210	7,85	1,9	6,8	175	0,01	0	0,27	0,06	0,06	0,53	0	0		0,06	0,93	1,96
214	7,63	1	5,3	183	0,01	0	0,33	0,07	0,03	0,46	0,08	0		0,06	0,98	1,06
216	7,65	2	5,7	180	0,007	0	0,25	0,08	0,04	0,71	0	0		0,06	1,087	2,06
228	7,53	2	5,1	180	0,003	0	0,25	0,06	0,17	0,87	0	0		0,03	1,353	2,03
233	7,53	2	5,1	180	0,003	0	0,25	0,06	0,17	0,87	0	0		0,03	1,353	2,03

COLUMN E
QUALITY OF IRRIGATION WATER

O2 in mg/l; EC in mS/m; cations and anions in meq/l

DATE	pH	HCO3-	O2	EC	Fe2+	Mn2+	Na+	K+	Ca2+	Mg2+	Al3+	Cl-	NO3-	SO42-	Sum+	Sum-
145	8,03	2,25	5,2	183	0,05	0	0,28	0,09	0,31	1,07	0,09	0	0	0,14	1,89	2,39
147	8,03	2,25	5,2	183	0,05	0	0,28	0,09	0,31	1,07	0,09	0	0	0,14	1,89	2,39
179	8,09	2	5,2	174	0,02	0	0,28	0,08	0,07	0,82	0	0,5		0,02	1,27	2,52
186	7,80	2	6,2	173	0,02	0	0,21	0,07	0,06	0,65	0	0		0	1,01	2
202	7,78	2,3	4,5	178	0,03	0	0,25	0,07	0,08	0,65	0,01	0		0,09	1,09	2,39
207	7,94	2,25	7	175	0	0	0,25	0,07	0,06	0,51	0	0		0,06	0,89	2,31
215	7,65	2	5,7	180	0,007	0	0,25	0,08	0,04	0,71	0	0		0,06	1,087	2,06

COLUMN F
QUALITY OF IRRIGATION WATER

O2 in mg/l; EC in mS/m; cations and anions in meq/l

DATE	pH	HCO3-	O2	EC	Fe2+	Mn2+	Na+	K+	Ca2+	Mg2+	Al3+	Cl-	NO3-	SO42-	Sum+	Sum-
145	7,7	1,25	4,6	16450	0,21	0	6,26	2,23	9,26	31,4	0,07	164	0	13, 5	49,44	178,41
179	7,78	1,5	5,6	16050	0,004	0	75,14	2,2	9,98	20,7	0,01	181,8		7,36	108,03	190,66
186	7,76	1,4	9,9	16780	0,01	0	31,81	1,51	10,37	22,85	0	156,16		9,67	66,55	167,23
202	7,56	1,6	3,9	16750	0,01	0	56,72	1,33	10	11,4	0,003	0		12,07	79,463	13,67
207	7,38	2	6,8	16740	0	0	32,32	1,23	8,62	20,78	0	149,42		12,21	62,95	163,63
210	7,71	1,35	7,3	17010	0	0	40,36	2,24	4,24	10,17	0,006	155,94		11,76	57,016	169,05
214	7,9	2	4,8	16630	0	0	36,5	2,32	6,64	12,02	0,11	154,6		11,28	57,59	167,88
215	7,67	1	5,5	16680	0	0	36,5	1,65	8,36	15,7	0	154,03		13,44	62,21	168,47

COLUMN G
QUALITY OF IRRIGATION WATER

O2 in mg/l; EC in mS/m; cations and anions in meq/l

DATE	pH	HCO3-	O2	EC	Fe2+	Mn2+	Na+	K+	Ca2+	Mg2+	Al3+	Cl-	NO3-	SO42-	Sum+	Sum-
145	7,7	1,25	4,6	16450	0,21	0	6,26	2,23	9,26	31,4	0,07	164	0	13, 5	49,44	178,41
130	7,36	2	5,9	174	0,05	0,004	0,33	0,02	0,05	1,43	1,78	0	0	0,25		
151	8,03	2,25	5,2	183	0,05	0	0,28	0,09	0,31	1,07	0,09	0	0	0,14	1,89	2,39
153	8,03	2,25	5,2	183	0,05	0	0,28	0,09	0,31	1,07	0,09	0	0	0,14	1,89	2,39
186	7,8	2	6,2	173	0,02	0	0,21	0,07	0,06	0,65	0	0		0	1,01	2
202	7,78	2,3	4,5	178	0,03	0	0,25	0,07	0,08	0,65	0,01	0		0,09	1,09	2,39
207	7,94	2,25	7	175	0	0	0,25	0,07	0,06	0,51	0	0		0,06	0,89	2,31
210	7,85	1,9	6,8	175	0,01	0	0,27	0,06	0,06	0,53	0	0		0,06	0,93	1,96
214	7,63	1	5,3	183	0,01	0	0,33	0,07	0,03	0,46	0,08	0		0,06	0,98	1,06
216	7,65	2	5,7	180	0,007	0	0,25	0,08	0,04	0,71	0	0		0,06	1,087	2,06
228	7,53	2	5,1	180	0,003	0	0,25	0,06	0,17	0,87	0	0		0,03	1,353	2,03
236	8,04	2,25	3,3	175	0,02	0	0,33	0,07	0,13	0,55	0	0		0,04	1,1	2,29

3.4.2. Chemical composition of ponding water

COLUMN D
QUALITY OF PONDING WATER

O2 in mg/l; EC in mS/m; cations and anions in meq/l

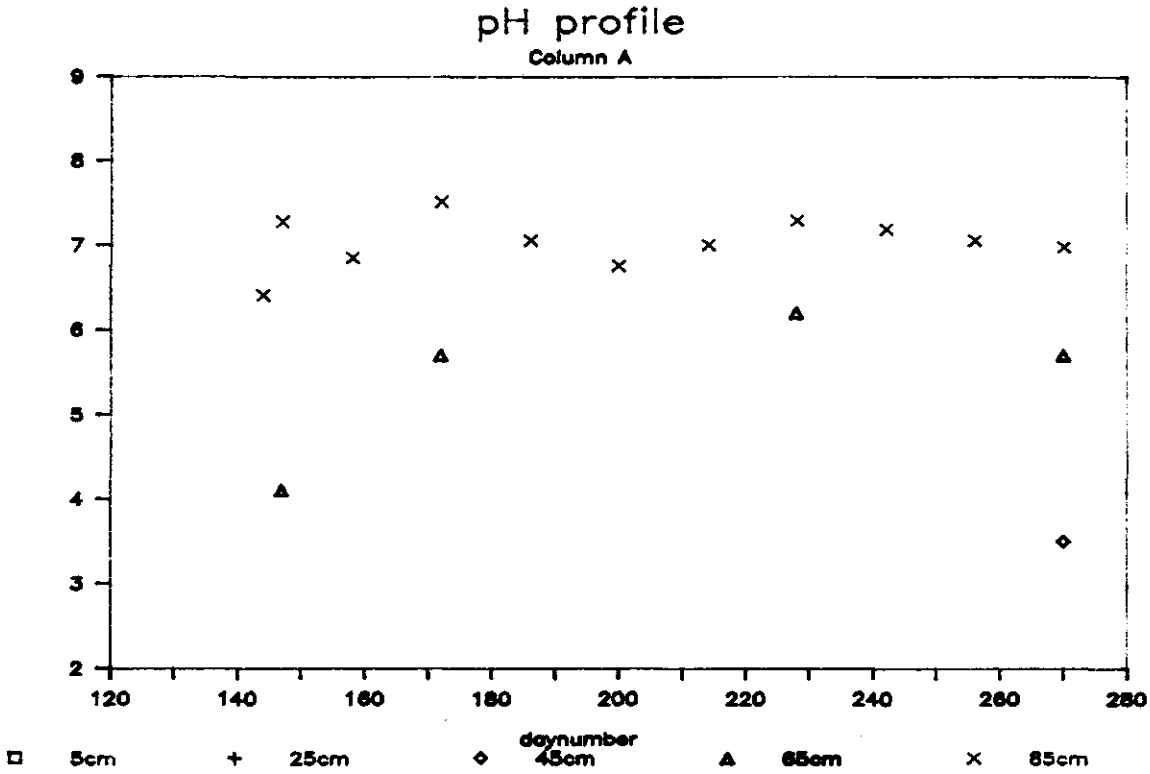
DATE	pH	HCO3-	O2	EC	Fe2+	Mn2+	Na+	K+	Ca2+	Mg2+	Al3+	Cl-	NO3-	SO42-	Sum+	Sum-
158	3,78	0	6,6	763	0,01	0,05	1,06	0,24	0,22	6,05	1,88	0,15		6,6	9,51	6,75
159	3,98	0	6,6	605	0,03	0,04	1,41	0,22	0,08	5,67	0,29	0,15		5,4	7,74	5,55
166	3,92	0	7,3	654	0,007	0,04	0,73	0,21	0,17	4,42	0,39	0,2		8,05	5,97	8,25
172	3,91	0	7,4	719	0,04	0,04	0,78	0,22	0,15	3,47	0,02	0,15		5,71	4,72	5,86
216	3,93	0	5,5	842	0,16	0,06	0,63	0,19	1,17	4,37	0,68	0		0,48	7,26	0,48
228	3,7	0	4,6	1092	0,14	0,08	0,4	0,19	1,31	5,45	1,47	0		9,2	9,04	9,2
236	4,03	0	4,5	528	0,007	0,02	0,57	0,13	0,68	2,55	0,06	0		4,18	4,017	4,18
242	3,69	0	5,2	780	0,01	0,04	0,55	0,19	1,08	4,05	1,04	0		9,92	6,96	9,92
245	4,37	0	5	331	0,01	0,01	0,43	0,13	0,53	1,49	0	0		1,76	2,6	1,76
256	3,83	0	4,8	818	0	0,05	0,67	0,21	1,32	4,31	0,5	0		7,13	7,06	7,13
259	4,41	0	5	287	0,01	0,01	0,4	0,11	0,4	1,25	0,12	0		1,94	2,3	1,94
270	3,98	0	5,3	484	0	0,02	0,57	0,15	0,73	2,4	0,03	0		3,58	3,9	3,58

COLUMN G
QUALITY OF PONDING WATER

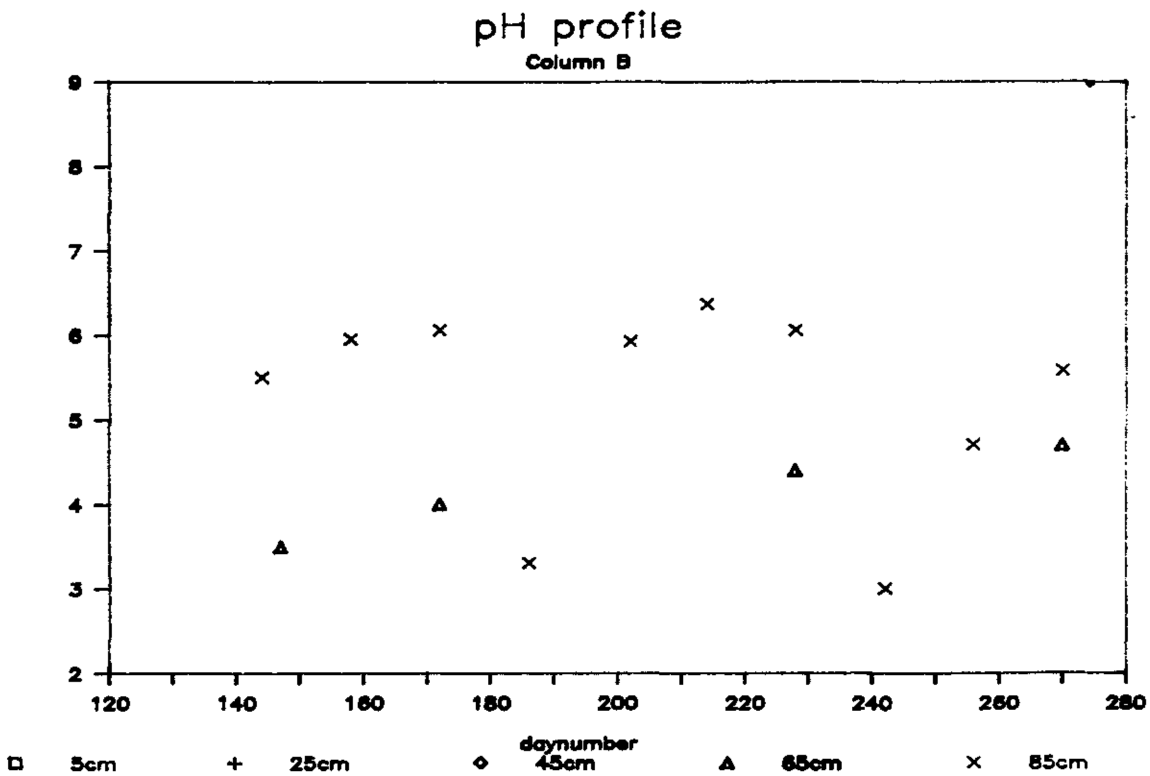
O2 in mg/l; EC in mS/m; cations and anions in meq/l

DATE	pH	HCO3-	O2	EC	Fe2+	Mn2+	Na+	K+	Ca2+	Mg2+	Al3+	Cl-	NO3-	SO42-	Sum+	Sum-
130	6,99															
131	3,63															
132	3,49															
135	3,38															
153	3,3	0	5,2	590	0,04	0,03	7,61	0,09	0,01	1,77	2,15	0,1	0	4,78	11,7	4,88
158	3,3	0	7,1	763	0,02	0,04	0,6	0,1	0,06	2,65	2,45	0,1	0	5,02	5,92	5,12
166	3,51	0	7,6	467	0,014	0,02	0,58	0,08	0,06	1,81	0,84	0,15		4,65	3,4	4,8
172	3,42	0	7,3	474	0,04	0,02	0,48	0,07	0,02	1,28	0,08	0,15		3,64	1,99	3,79
216	3,85	0	5,4	275	0,09	0,006	0,33	0,08	0,37	0,77	0,12	0		0,48	1,766	0,48
228	3,56	0	4,8	442	0,01	0,01	0,45	0,06	0,33	1,24	0,31	0		2,8	2,41	2,8
236	3,66	0	4,6	326	0,004	0,007	0,41	0,04	0,3	0,97	0,03	0		1,34	1,761	1,34
242	3,42	0	5,3	425	0,04	0,01	0,42	0,08	0,4	1,2	0,19	0		2,63	2,34	2,63
245	3,98	0	4,7	199	0	0	0,29	0,06	0,3	0,72	0	0		0,47	1,37	0,47
256	3,61	0	4,9	397	0	0,01	0,39	0,08	0,47	1,04	0,26	0		2	2,25	2
259	4,02	0	4,5	208	0	0	0,29	0,06	0,25	0,68	0,04	0		0,97	1,32	0,97
270	3,56	0	5,3	340	0	0,01	0,43	0,09	0,39	1,08	0,07	0		1,79	2,07	1,79

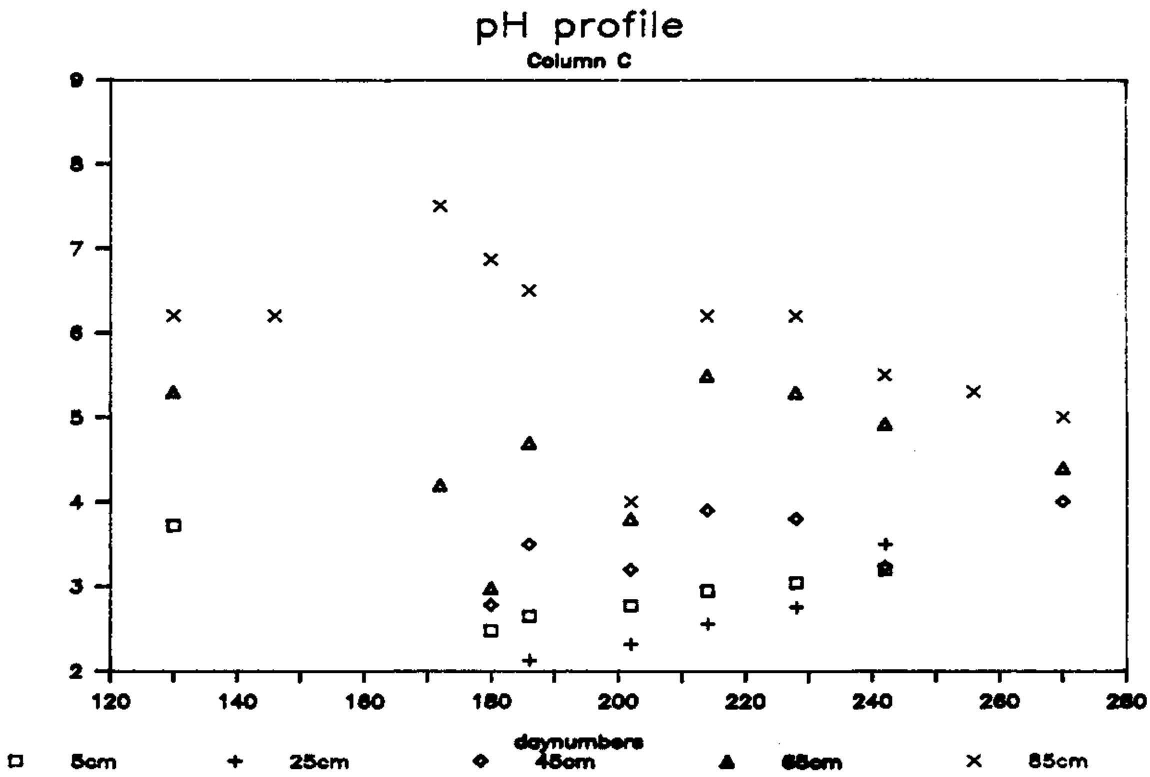
3.4.3. Chemical composition of soil solution

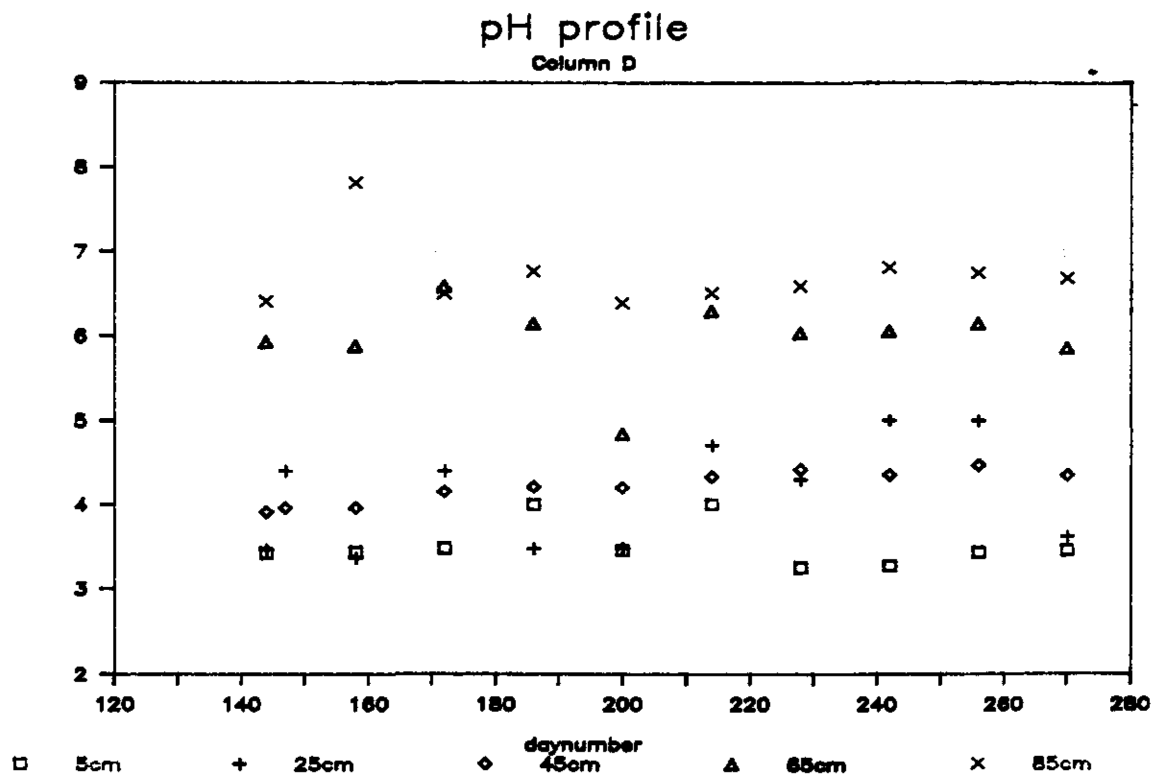


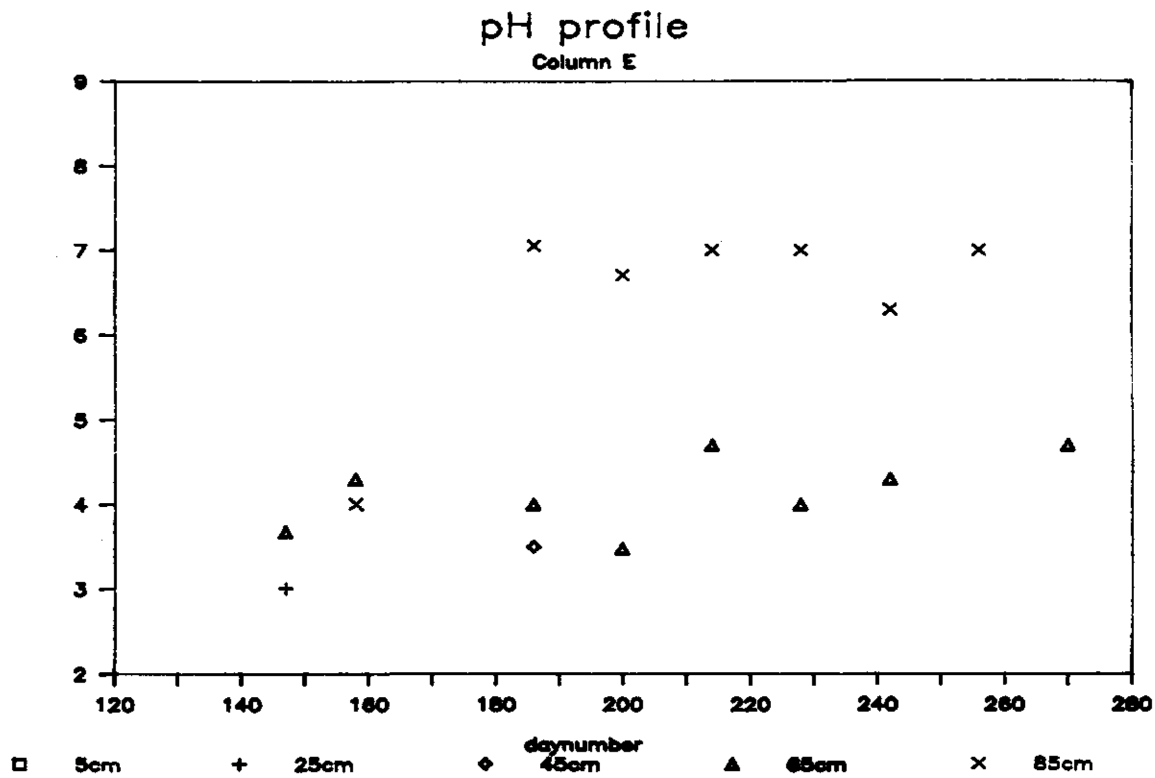
pH profile
Column A
9
8
7
6
5
4
3
2
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm

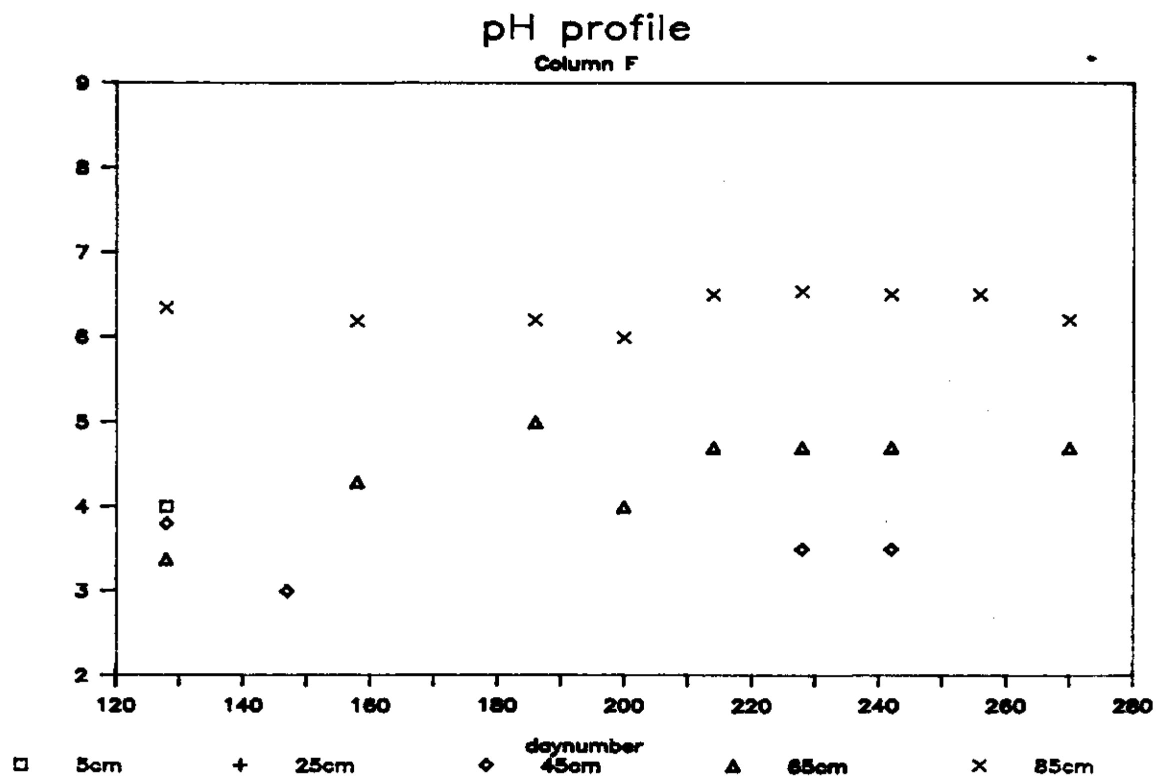


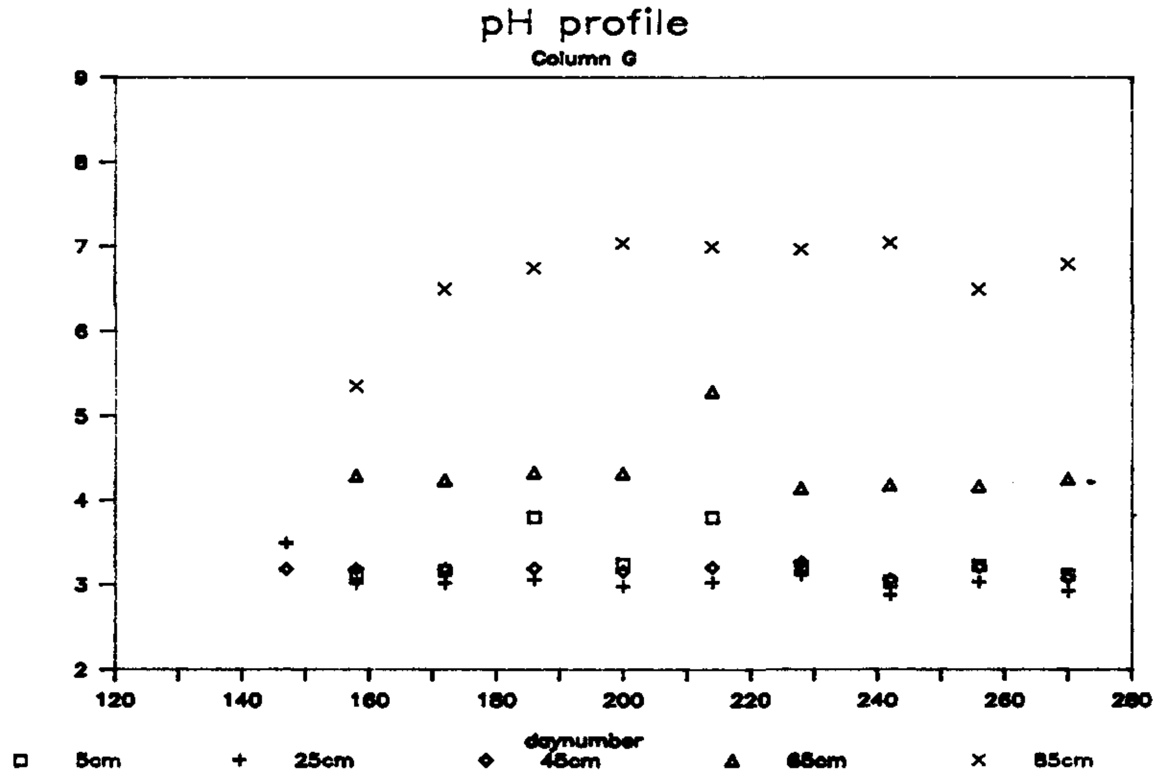
pH profile
Column B
9
8
7
6
5
4
3
2
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm

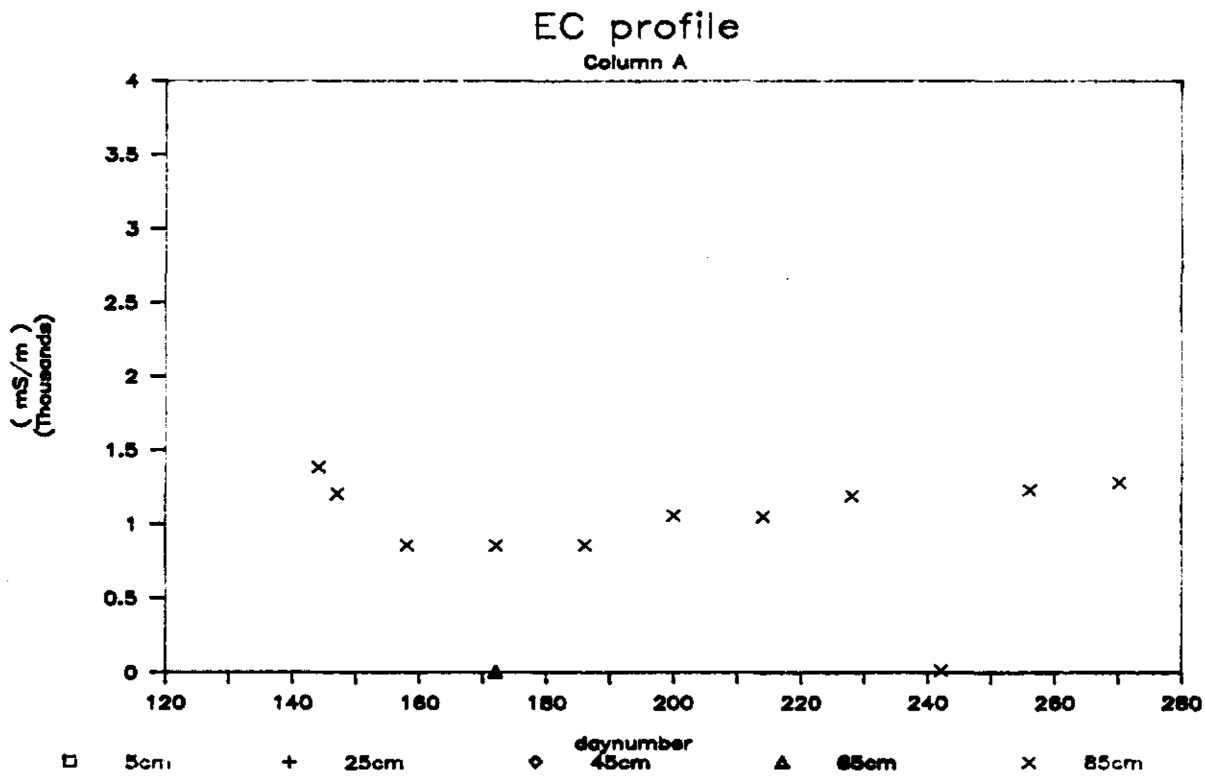

pH profile
Column C
9
8
7
6
5
4
3
2
120
140
160
180
200
220
240
260
280
daynumbers
5cm
25cm
45cm
65cm
85cm

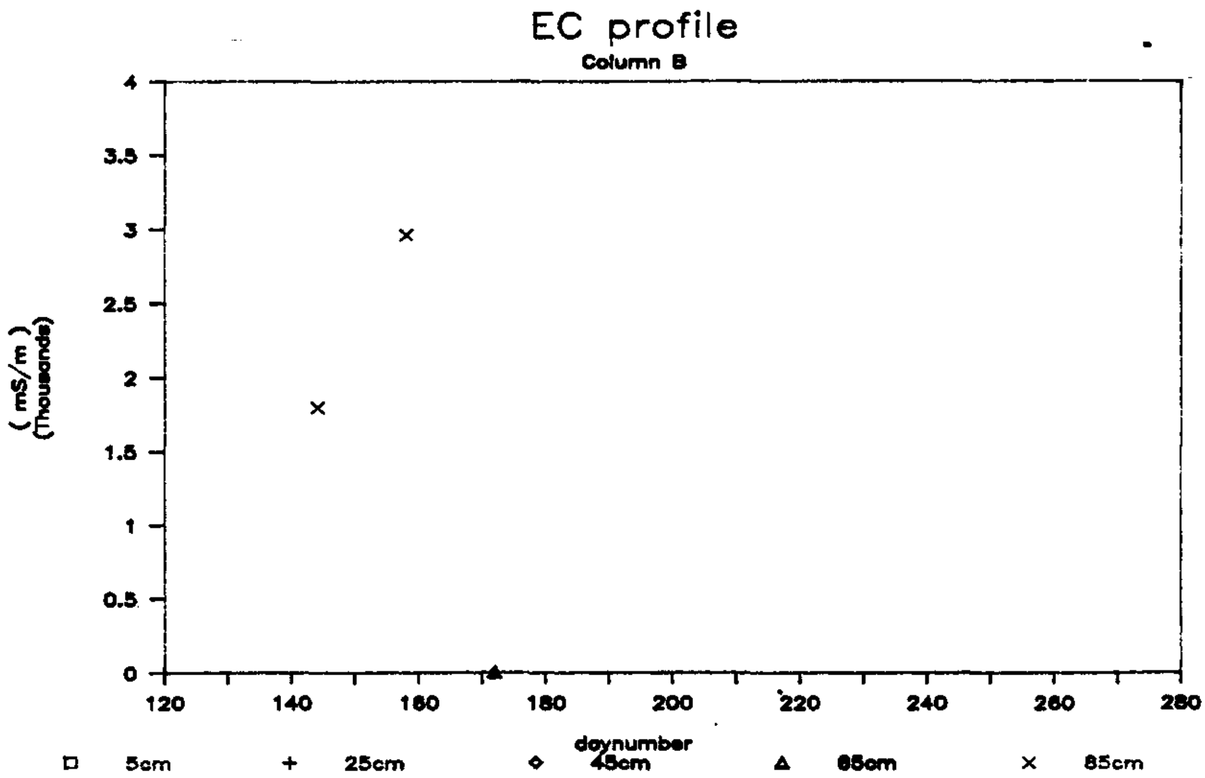

pH profile
Column D
9
8
7
6
5
4
3
2
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm

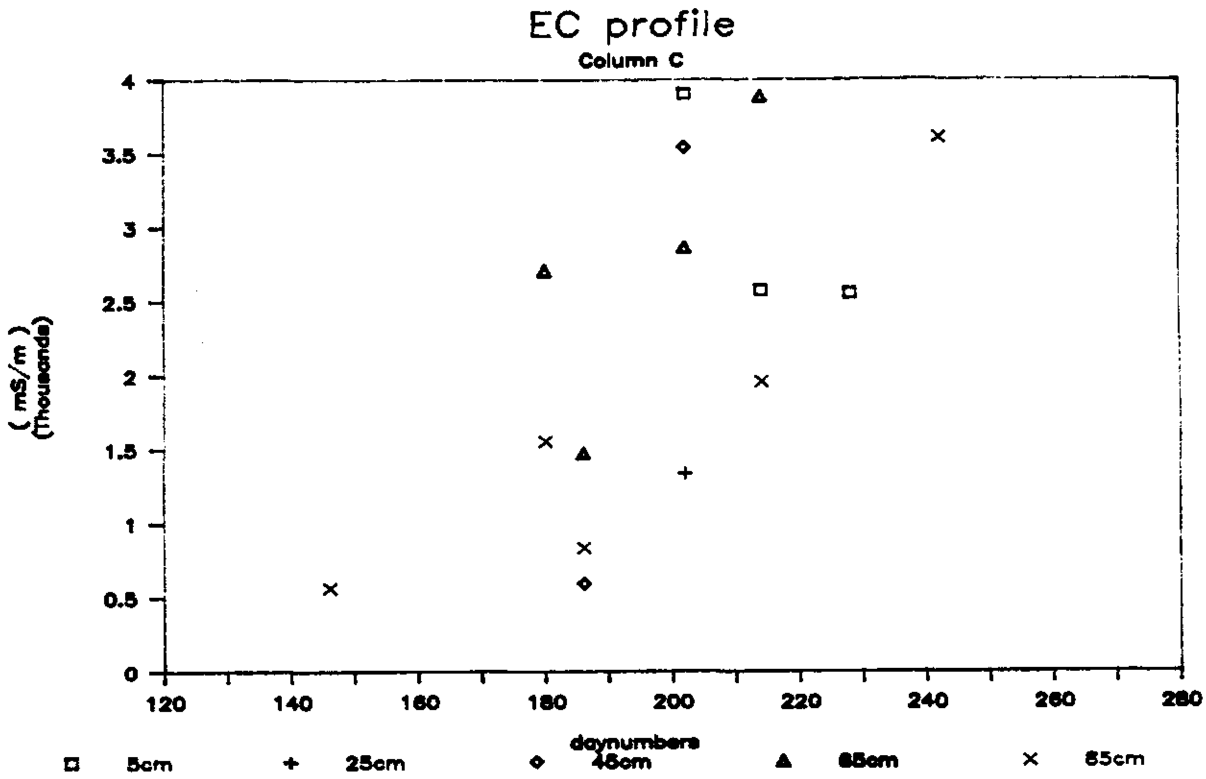

pH profile
Column E
daynumber
5cm
25cm
45cm
65cm
85cm

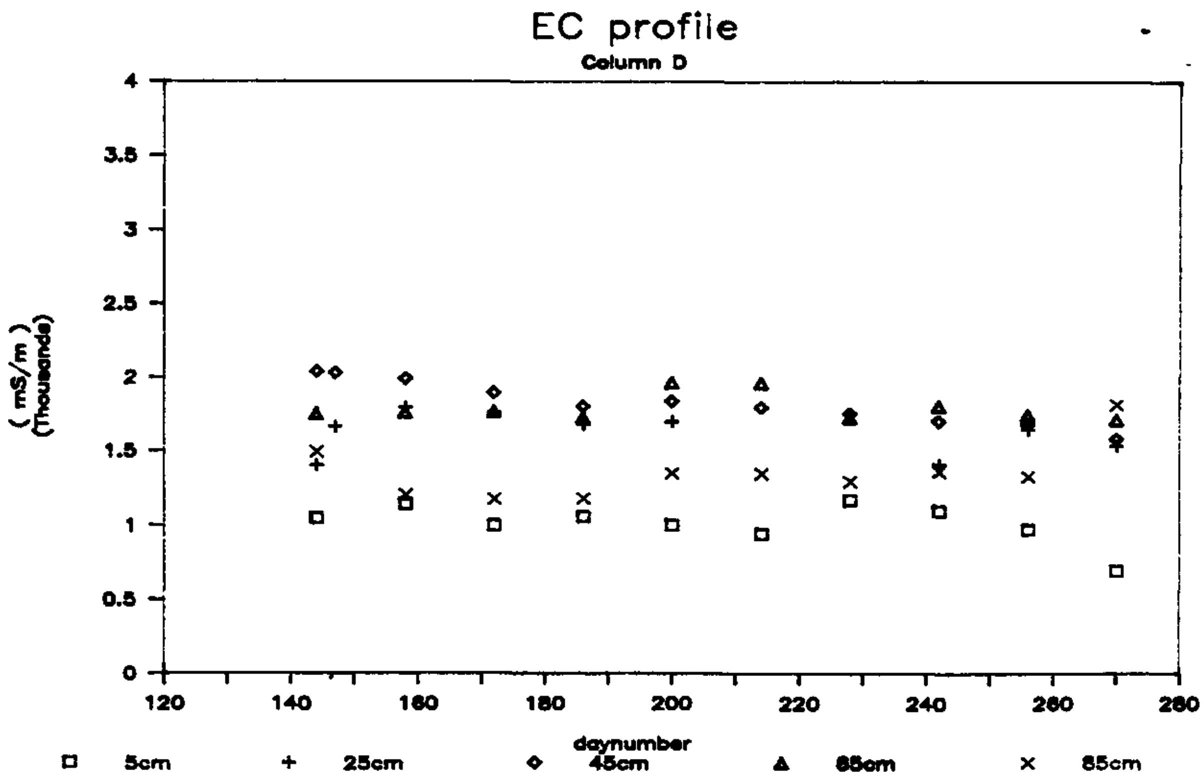

pH profile
Column F
daynumber
5cm
25cm
45cm
65cm
85cm


pH profile
Column G
9
8
7
6
5
4
3
2
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm


EC profile
Column A
4
3.5
3
2.5
2
1.5
1
0.5
0
(mS/m)
(Thousands)
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm

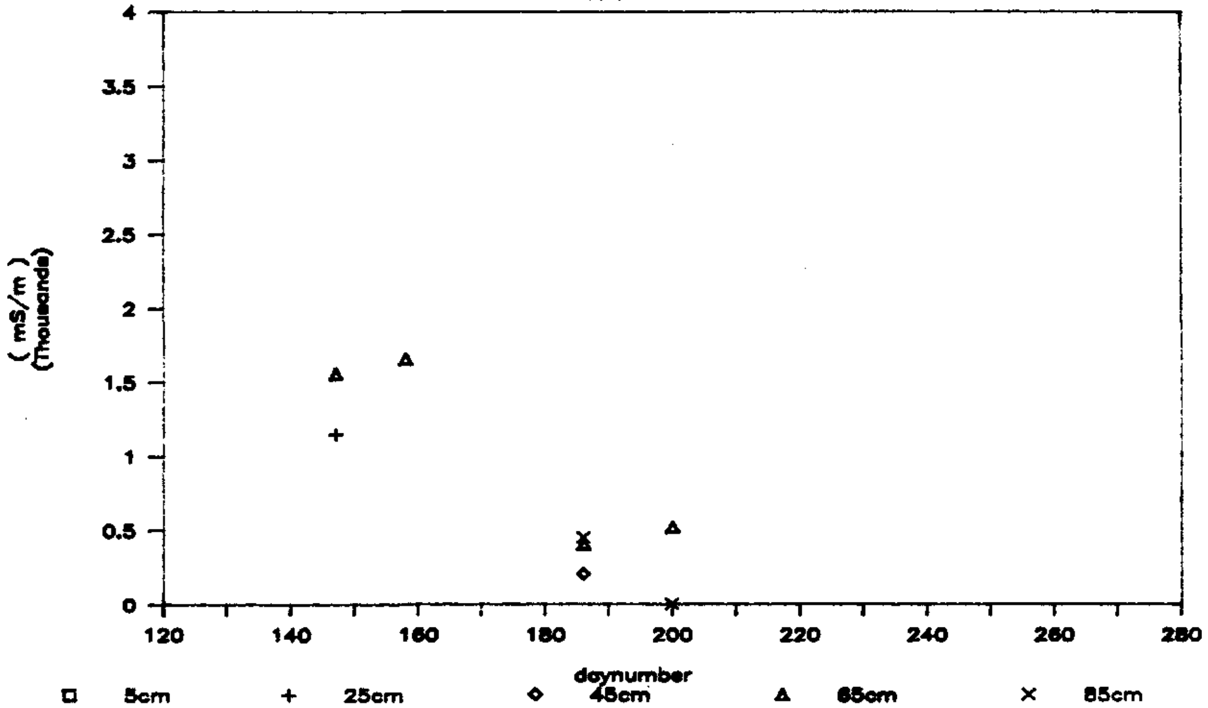

EC profile
Column B
4
3.5
3
2.5
2
1.5
1
0.5
0
(mS/m)
(Thousands)
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm


EC profile
Column C
(mS/m)
(Thousands)
daynumbers
5cm
25cm
45cm
65cm
85cm


EC profile
Column D
(mS/m)
(Thousands)
daynumber
5cm
25cm
45cm
65cm
85cm

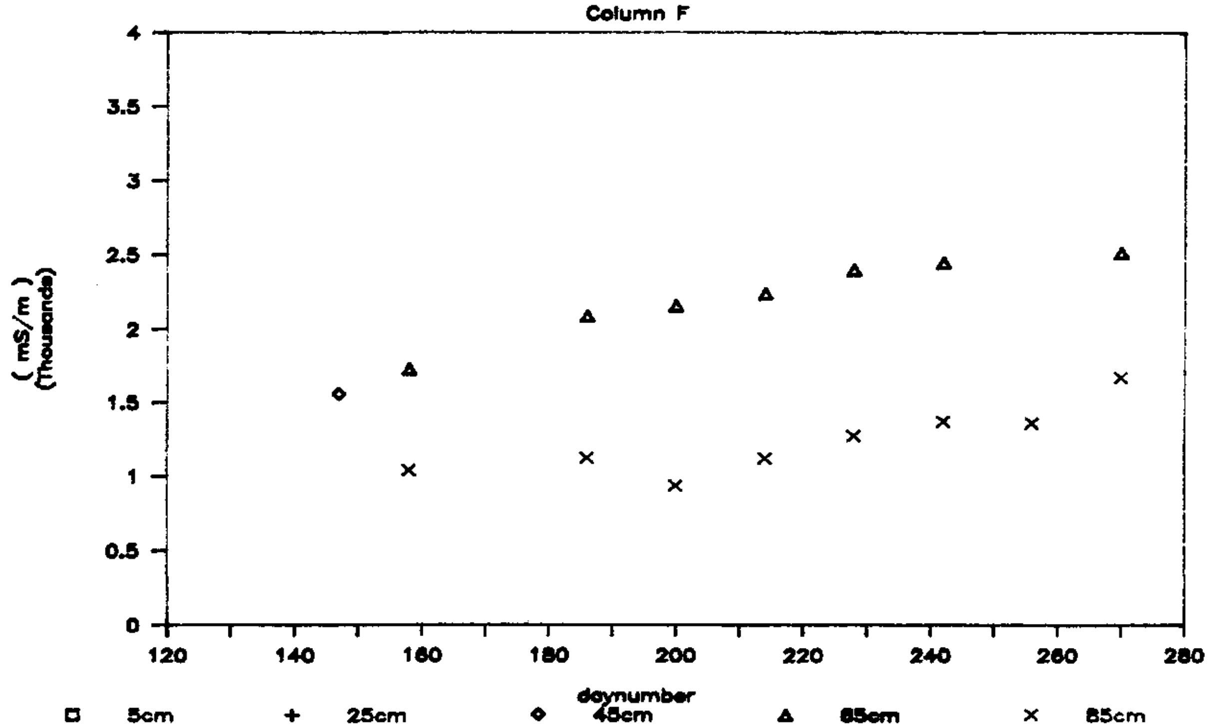
EC profile

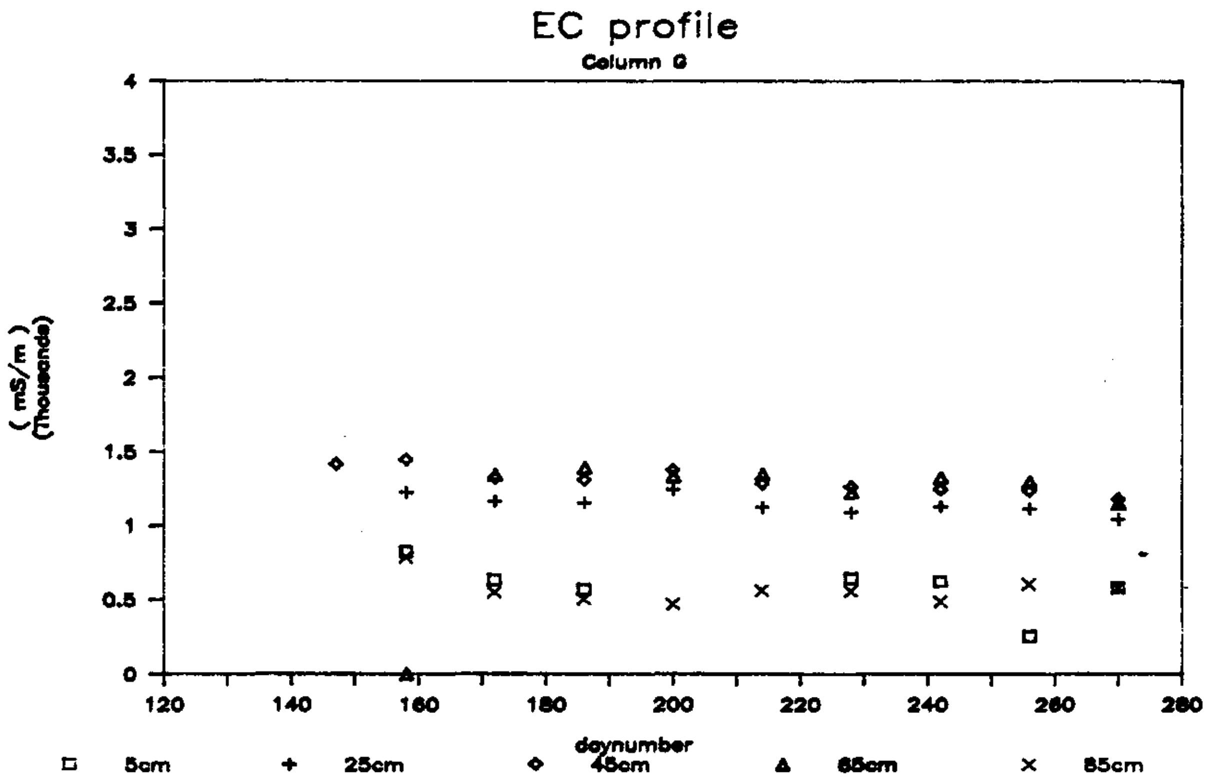
Column E



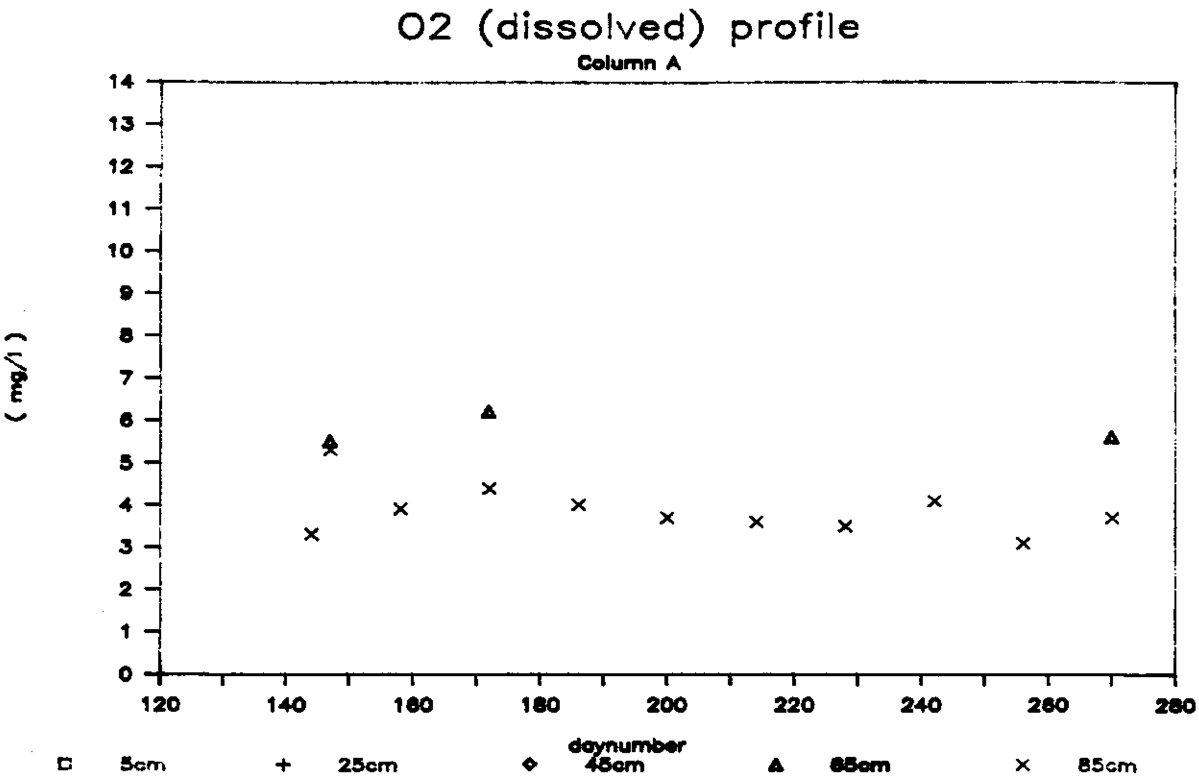
EC profile

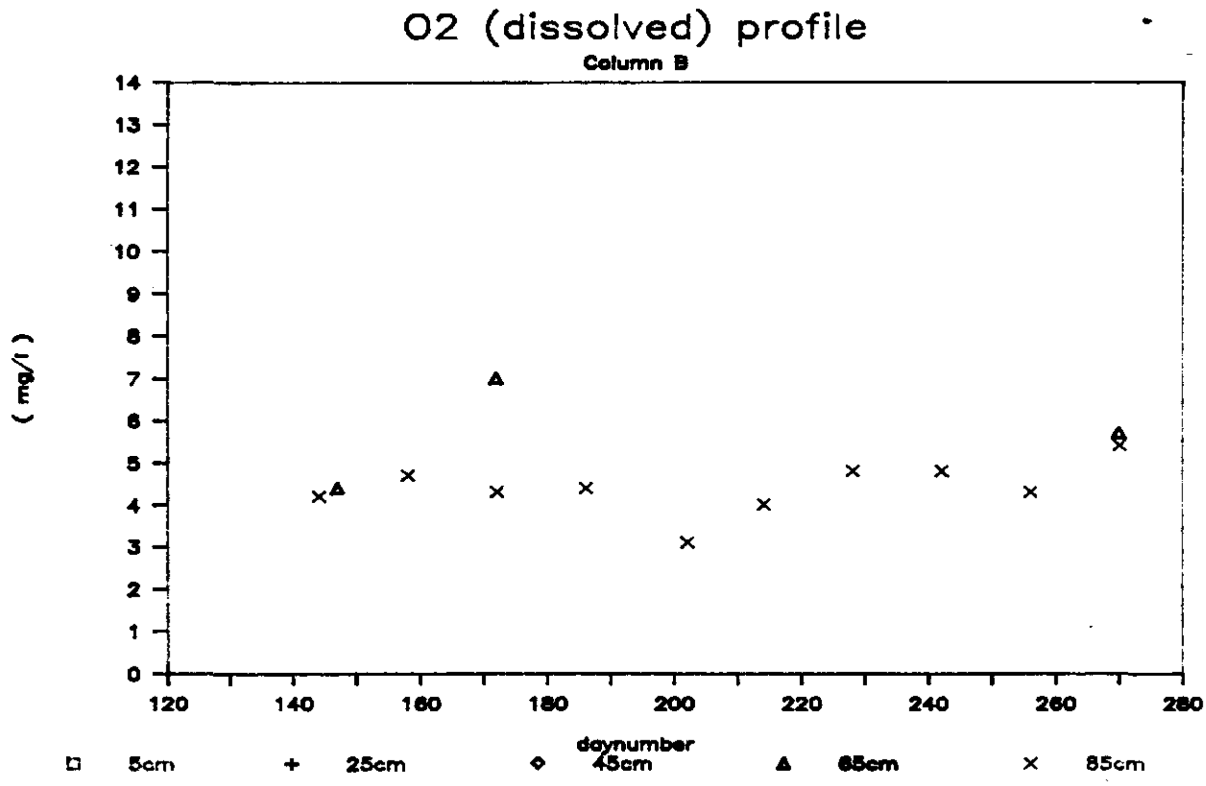
Column F

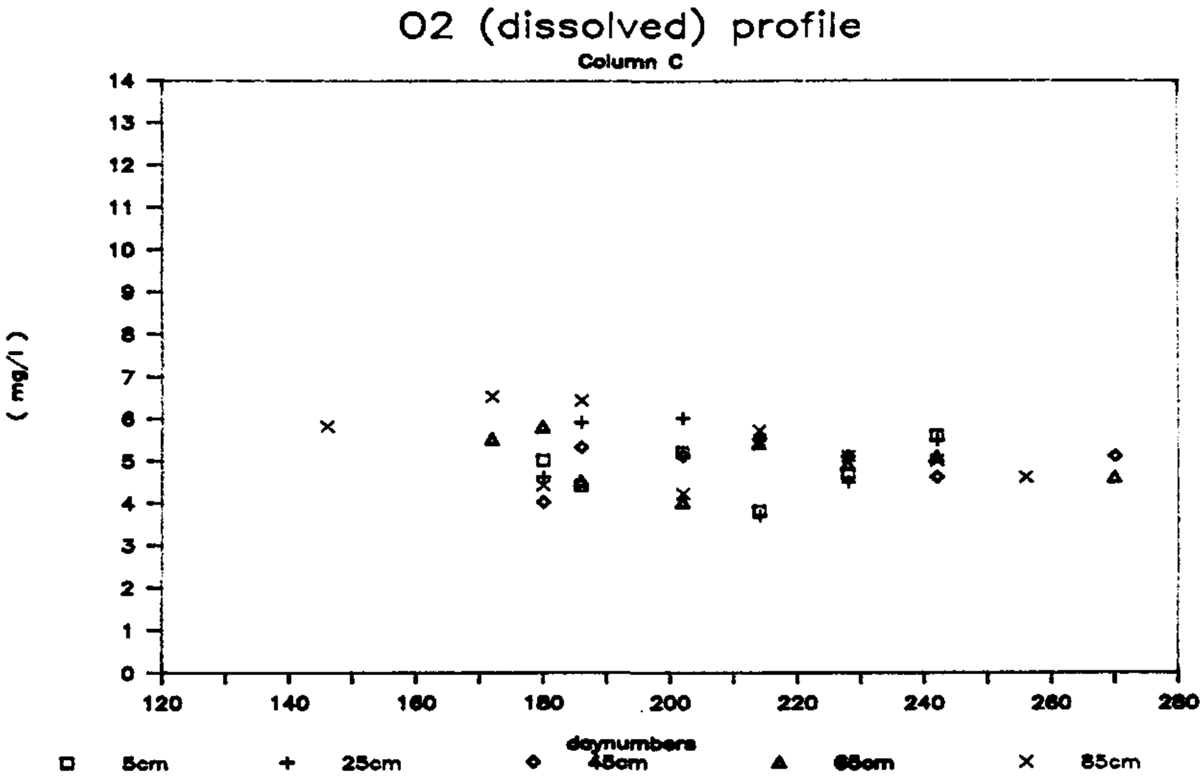




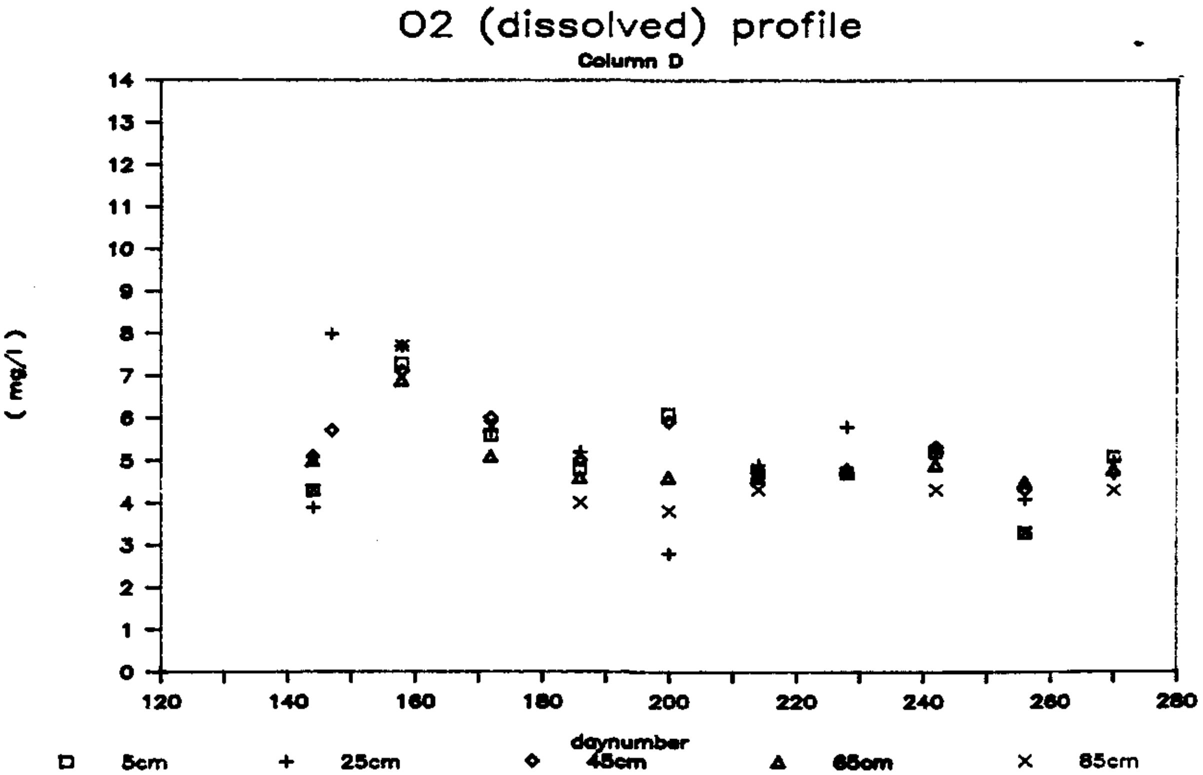
EC profile
Column G
(mS/m)
(Thousands)
4
3.5
3
2.5
2
1.5
1
0.5
0
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm


O2 (dissolved) profile
Column A
(mg/l)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm

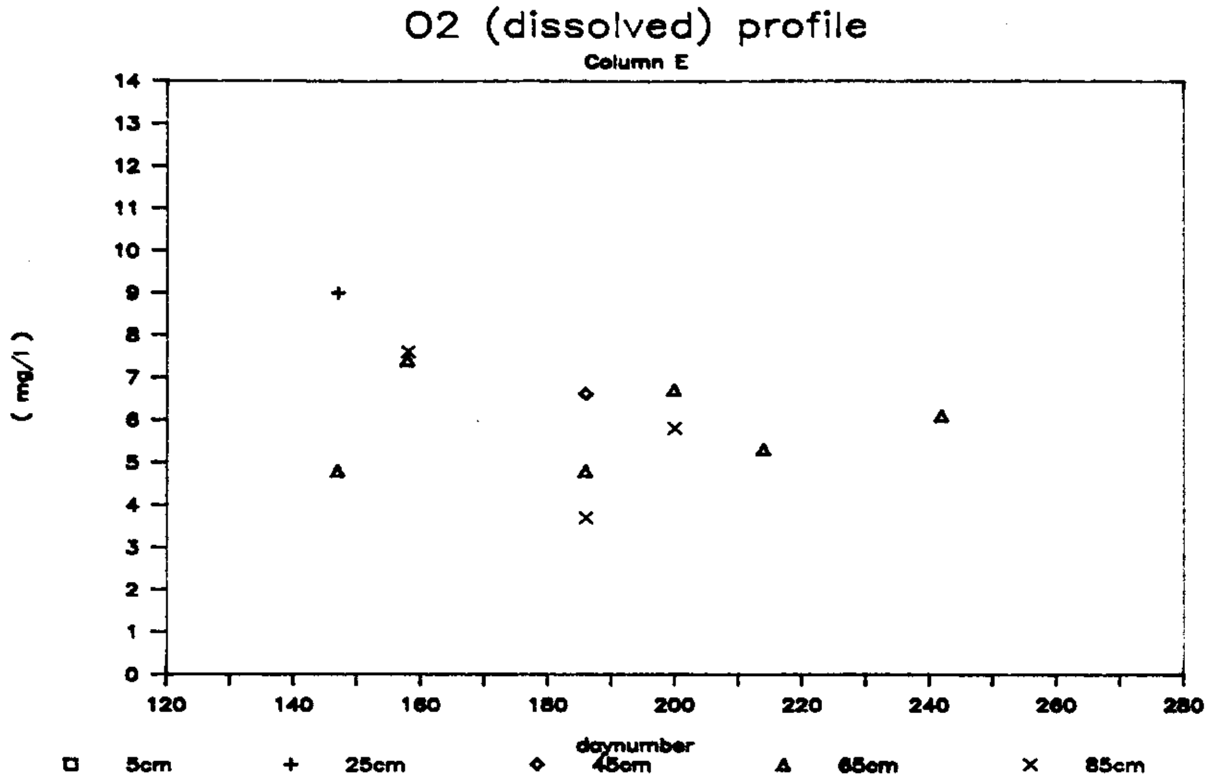

O2 (dissolved) profile
Column B
(mg/l)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm



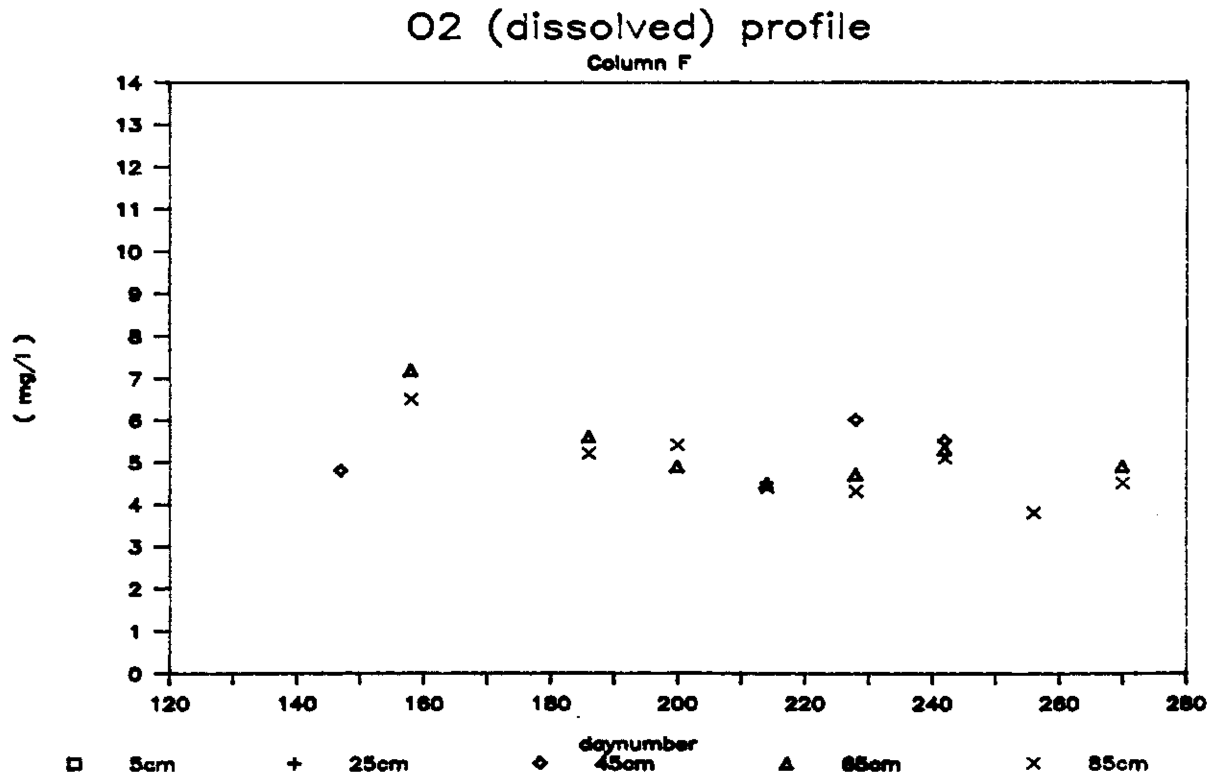
O2 (dissolved) profile
Column C
(mg/l)
daynumbers
5cm
25cm
45cm
65cm
85cm



O2 (dissolved) profile
Column D
(mg/l)
daynumber
5cm
25cm
45cm
65cm
85cm

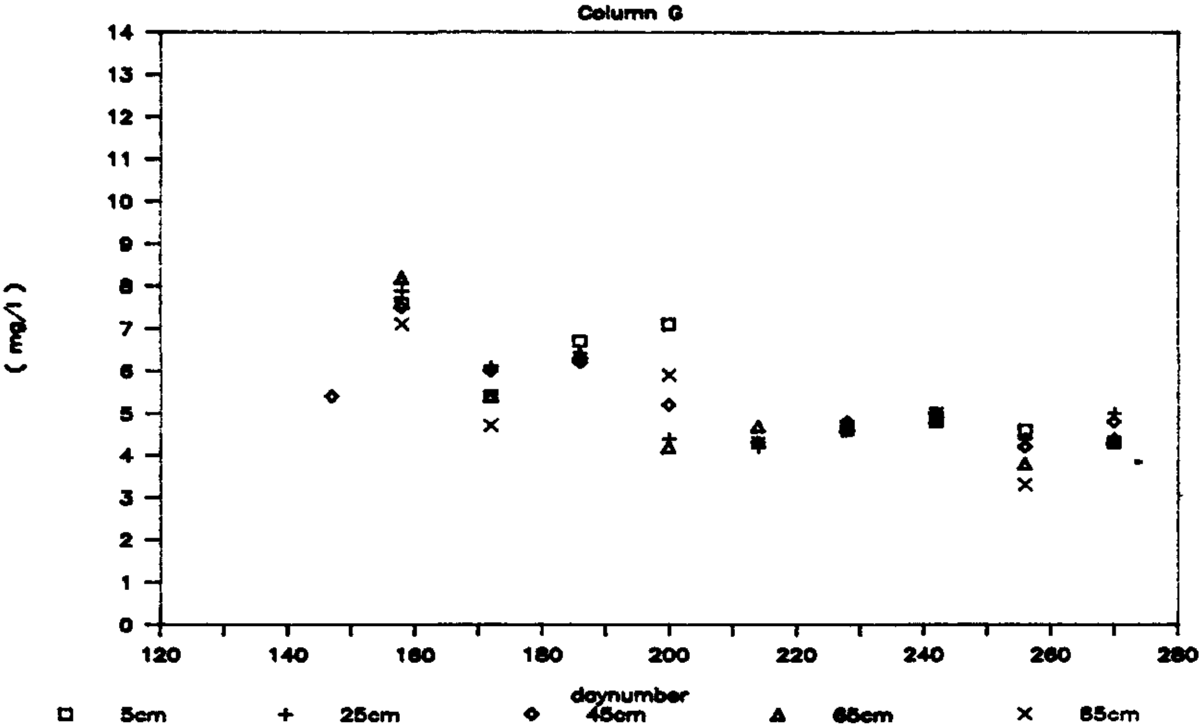


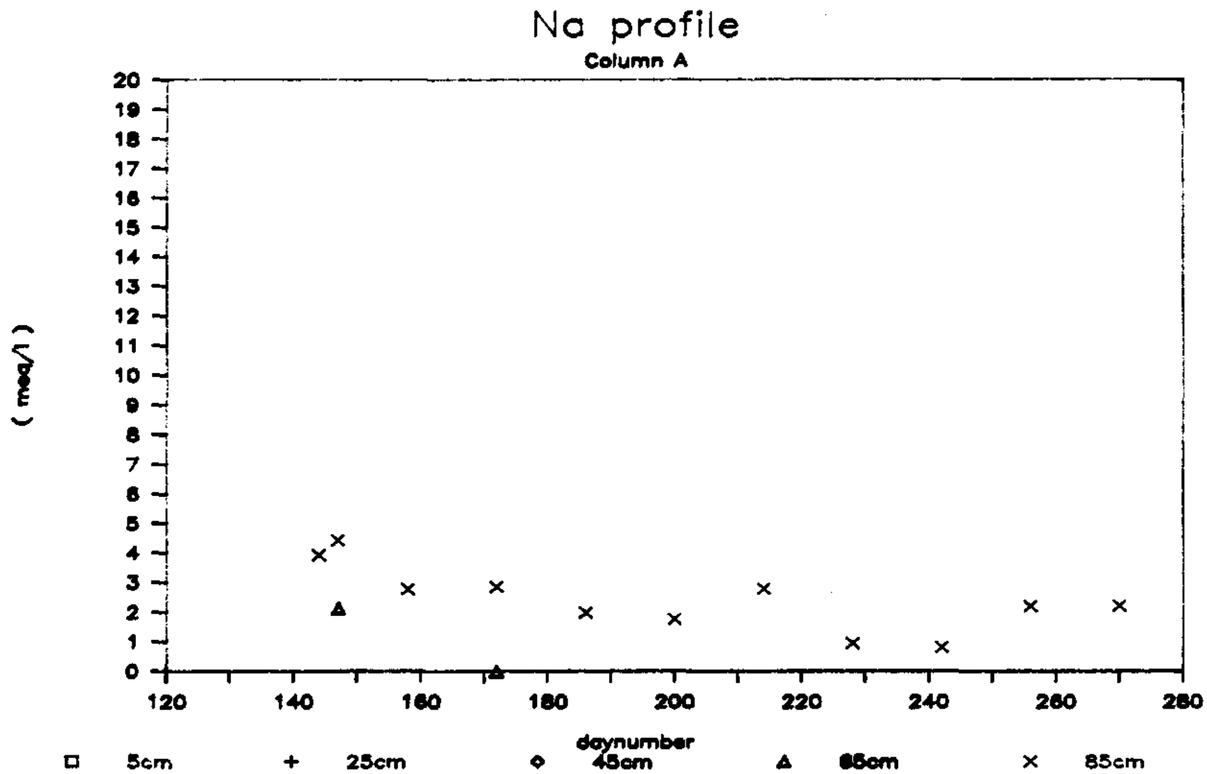
O2 (dissolved) profile
Column E
(mg/l)
daynumber
5cm
25cm
45cm
65cm
85cm

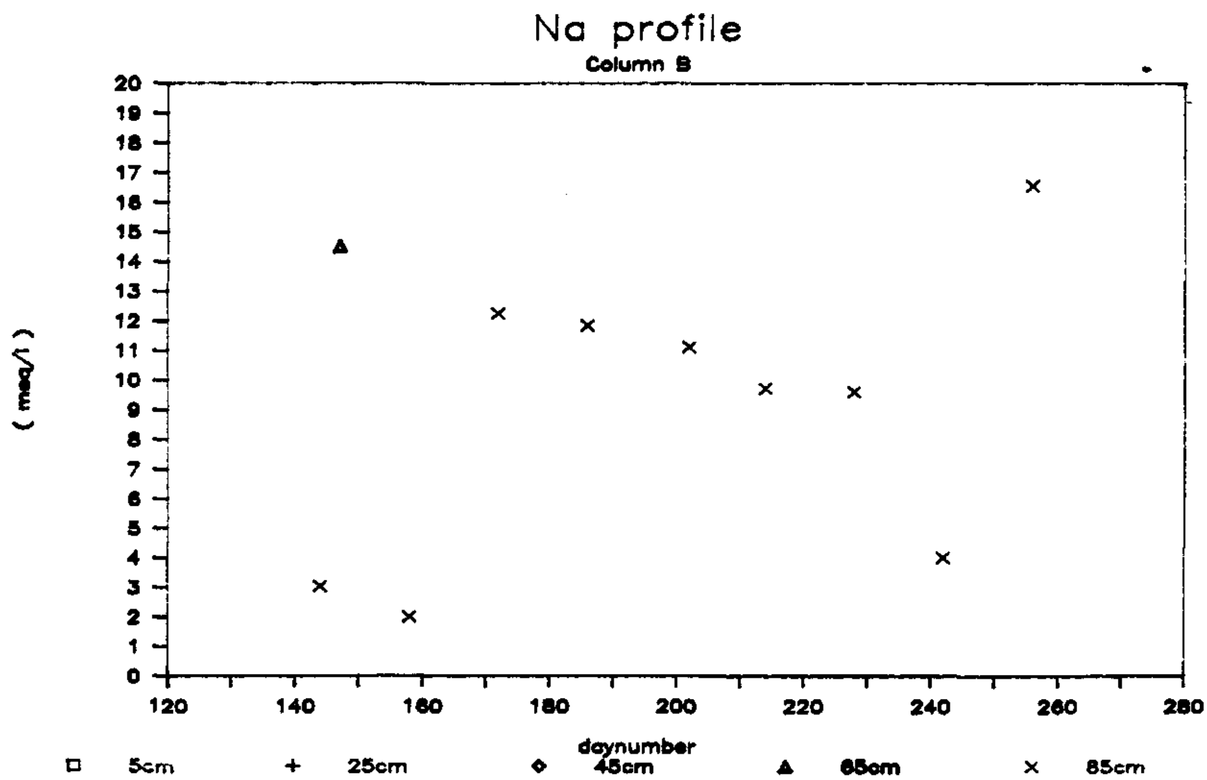


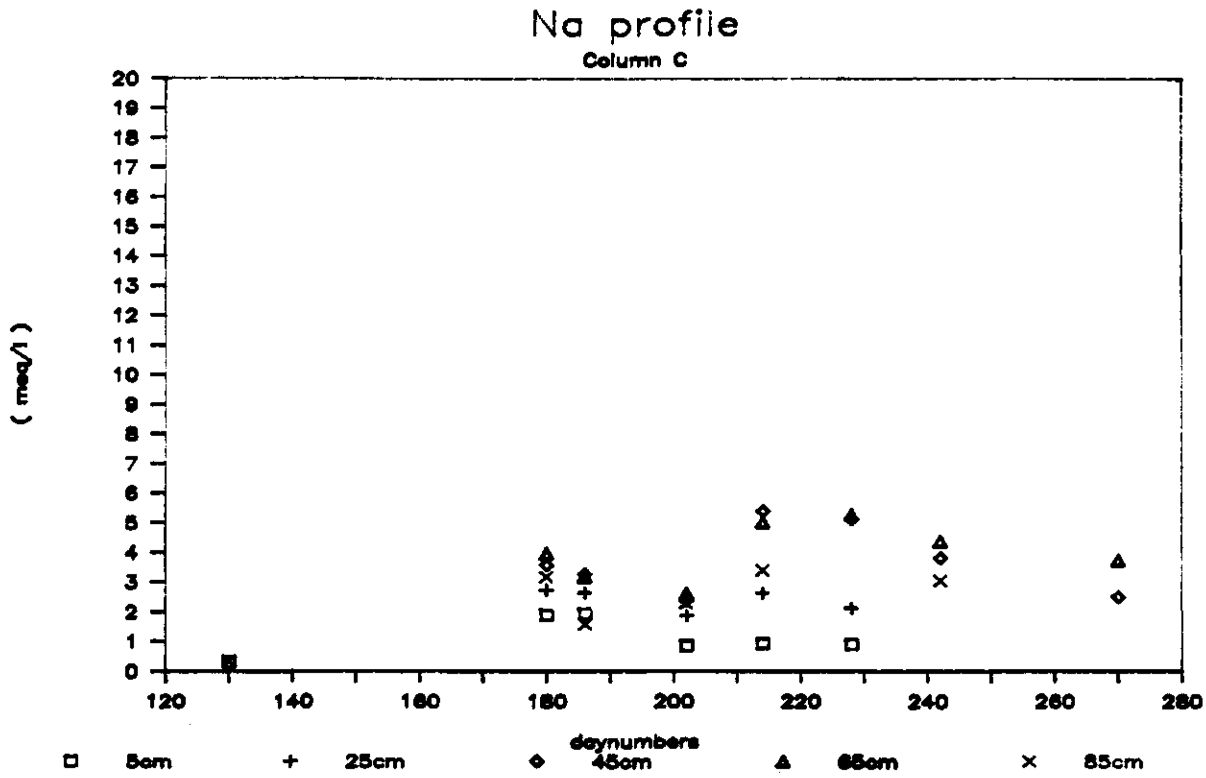
O2 (dissolved) profile
Column F
(mg/l)
daynumber
5cm
25cm
45cm
65cm
85cm

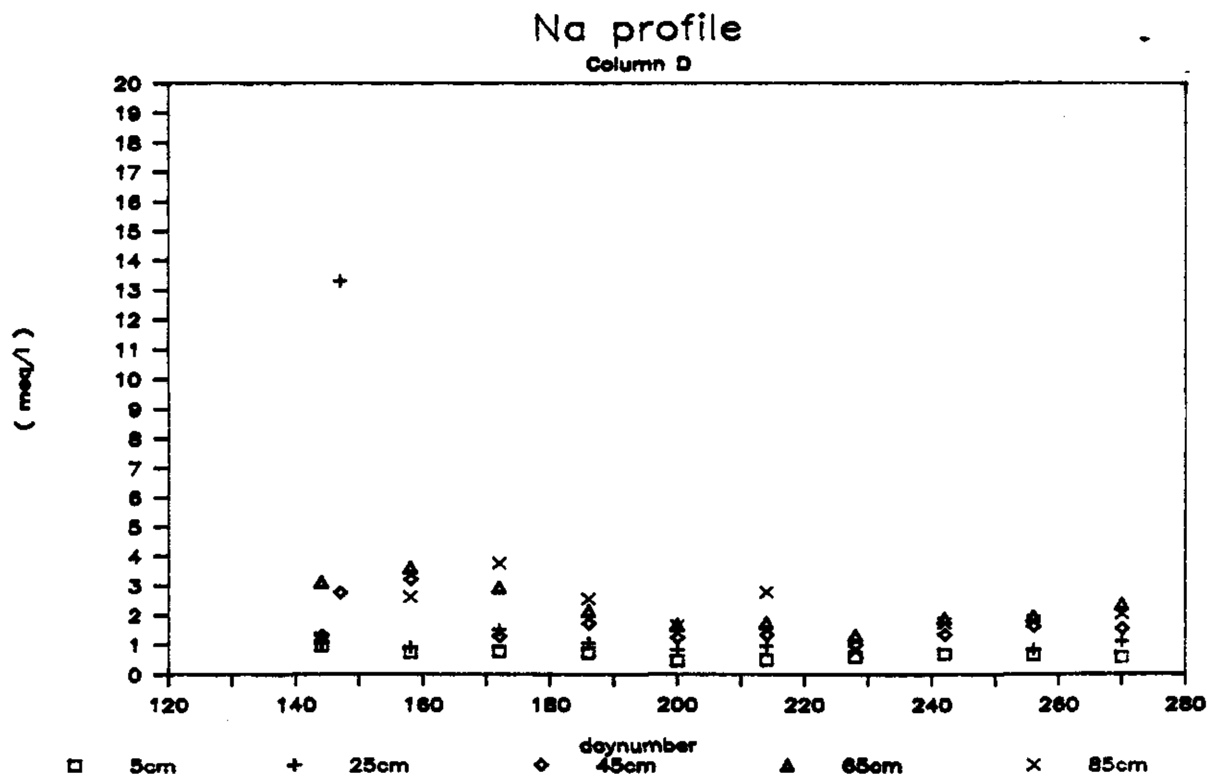
O2 (dissolved) profile



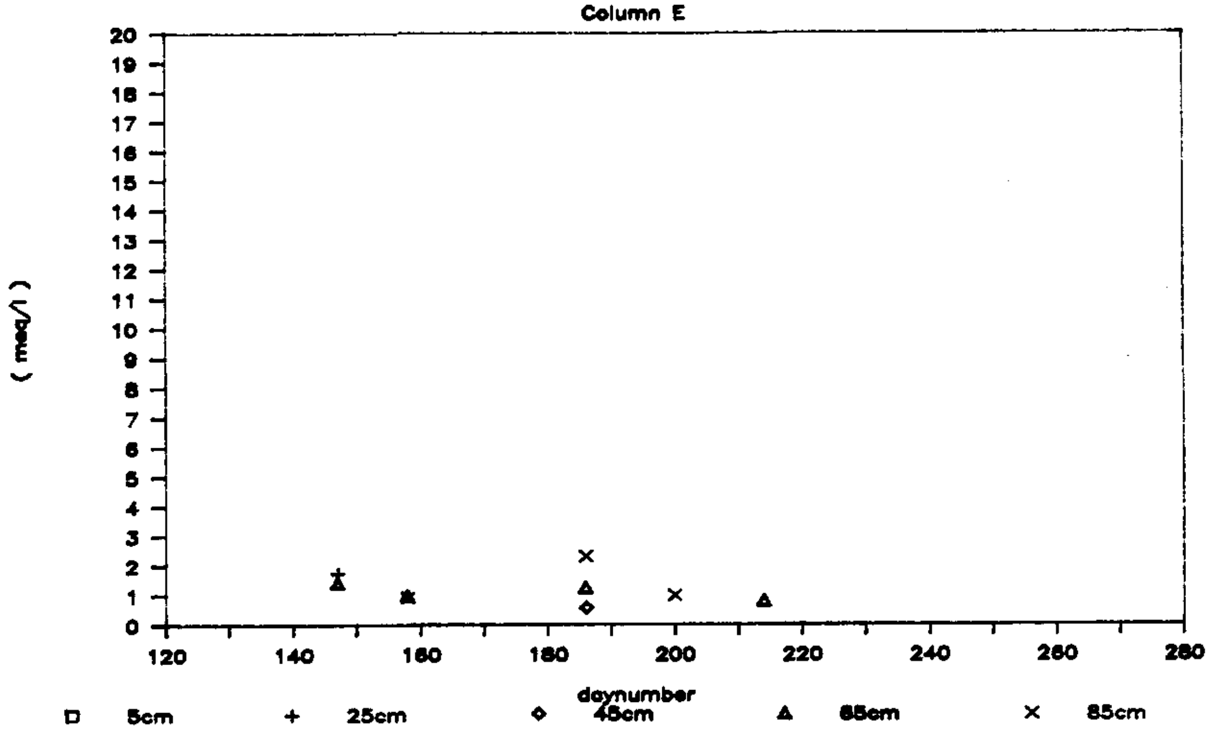

Na profile
Column A
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm


Na profile
Column B
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm

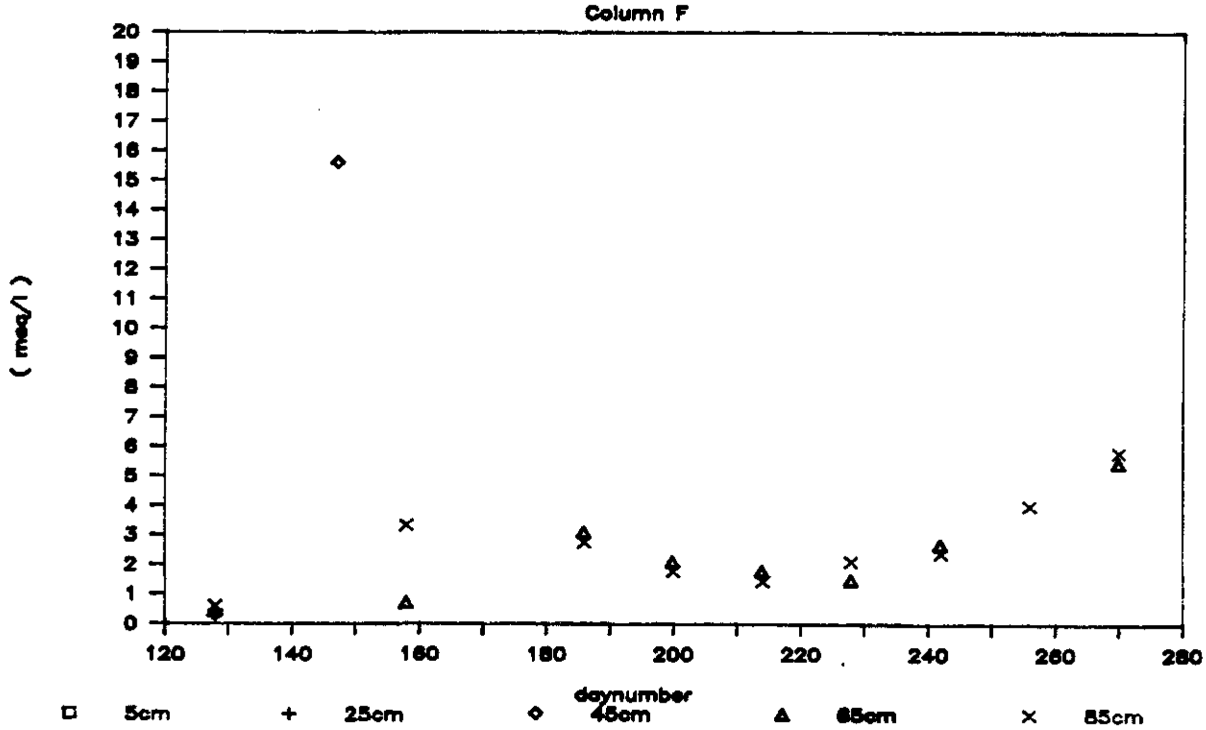

Na profile
Column C
(meq/l)
daynumbers
5cm
25cm
45cm
65cm
85cm

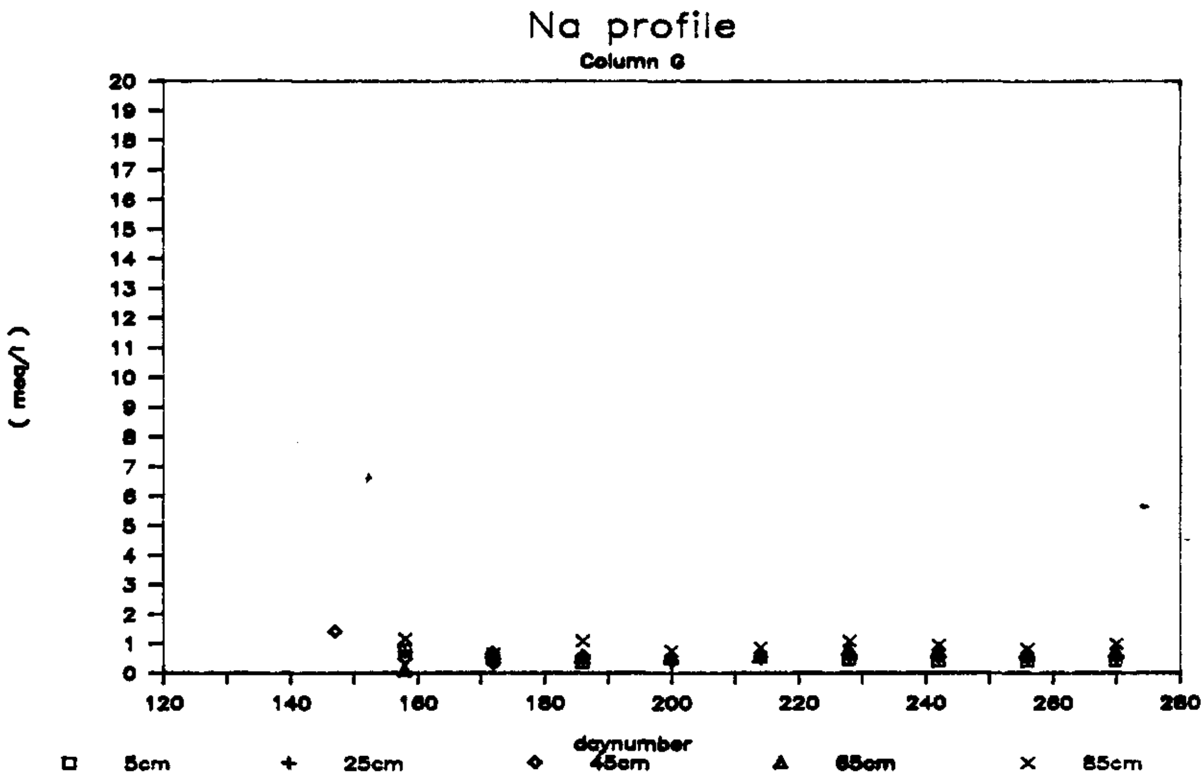

Na profile
Column D
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm

Na profile
Column E

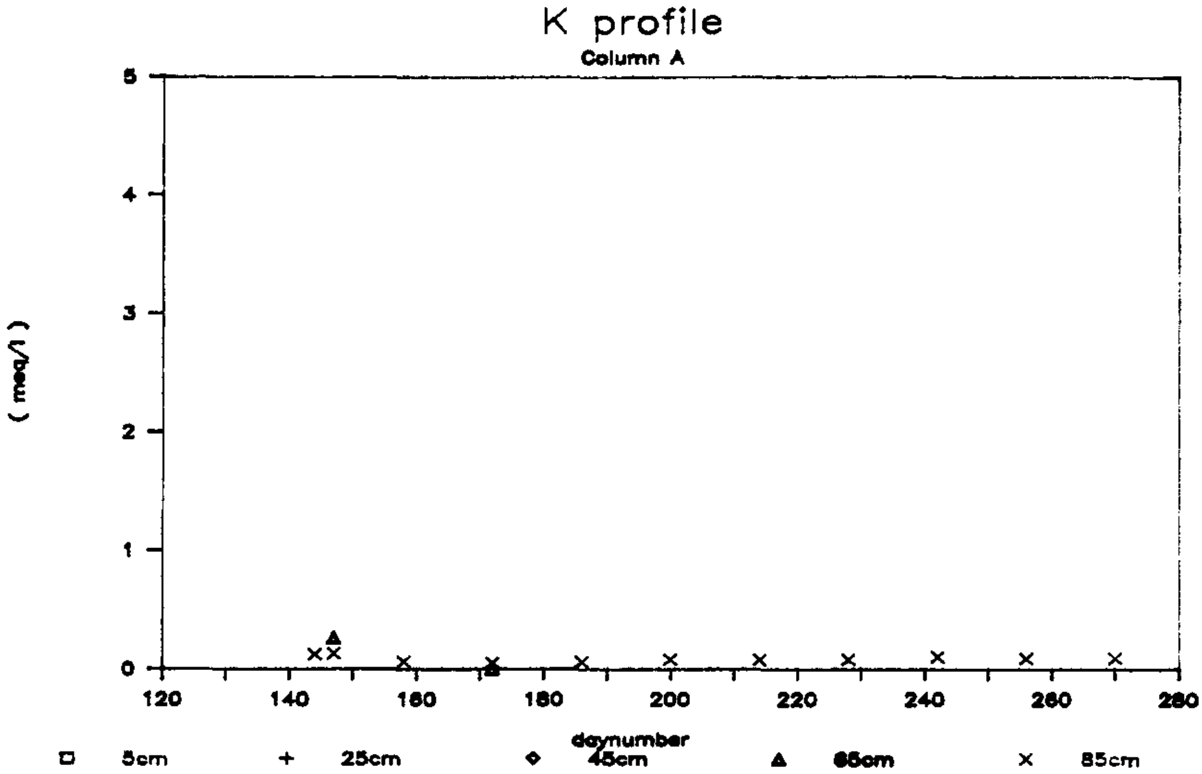


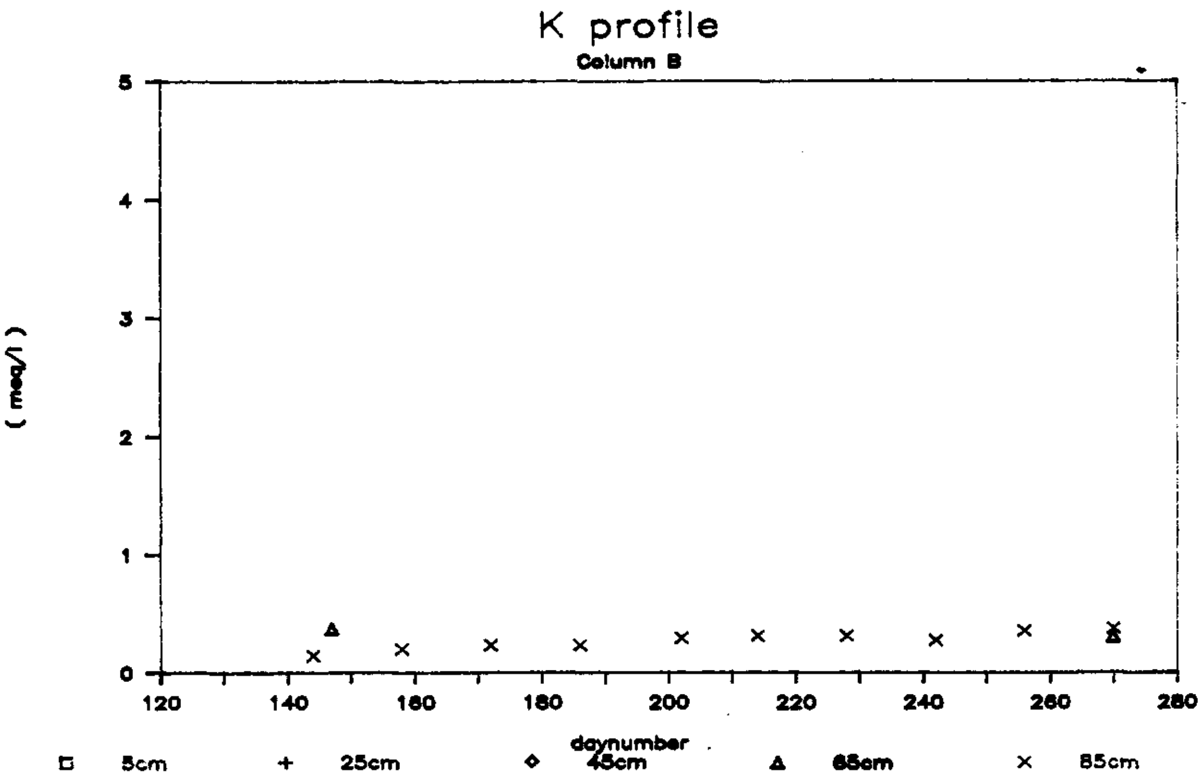
Na profile
Column F

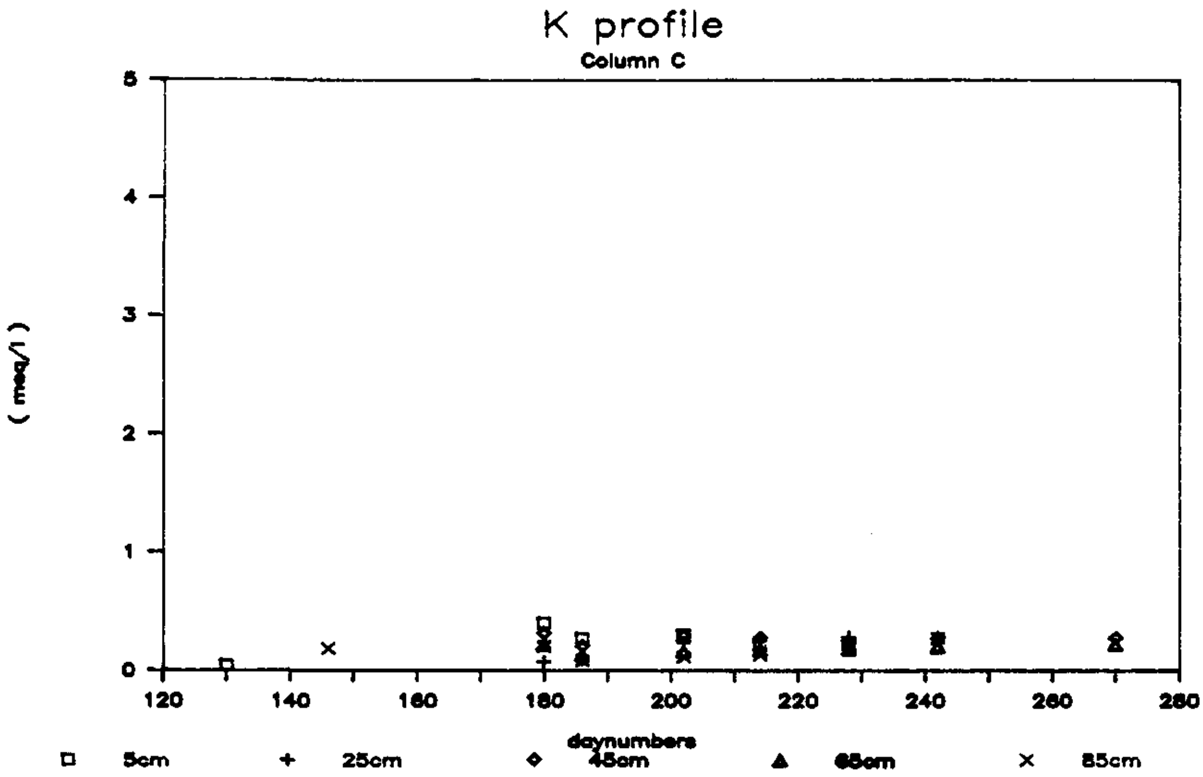




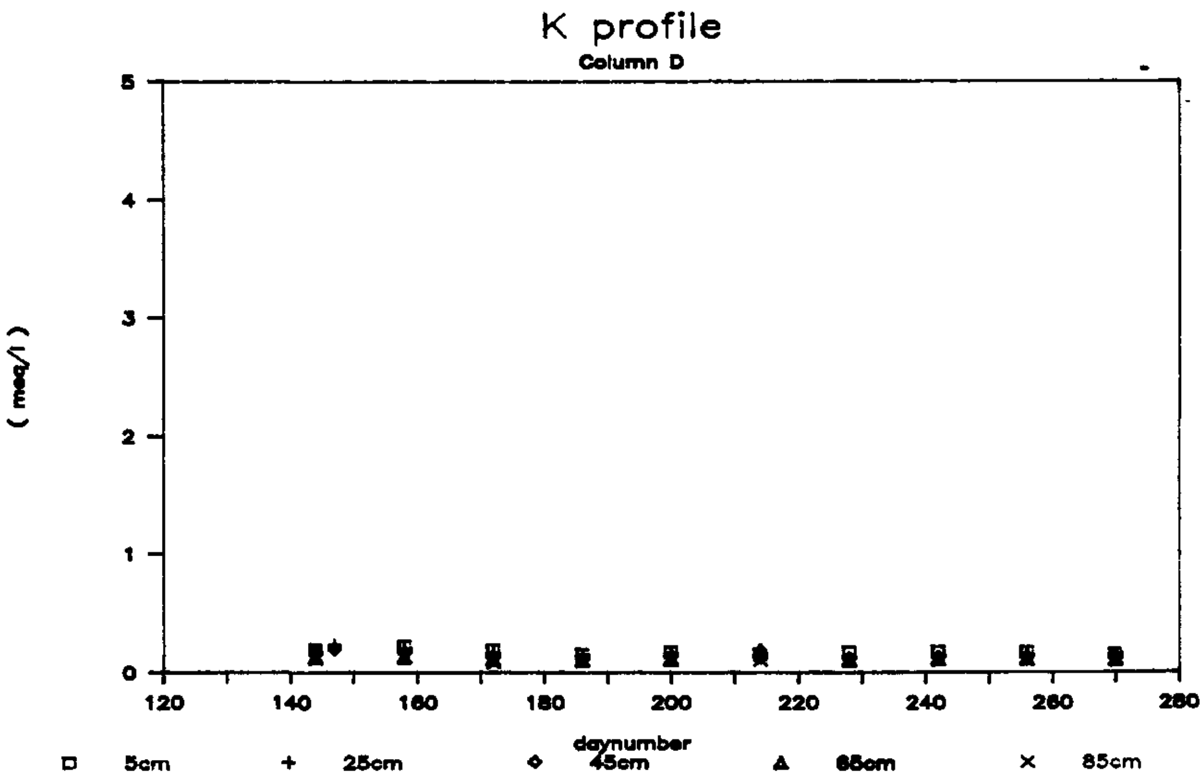
Na profile
Column G
(meq/l)
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm


K profile
Column A
5
4
3
2
1
0
(meq/l)
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm

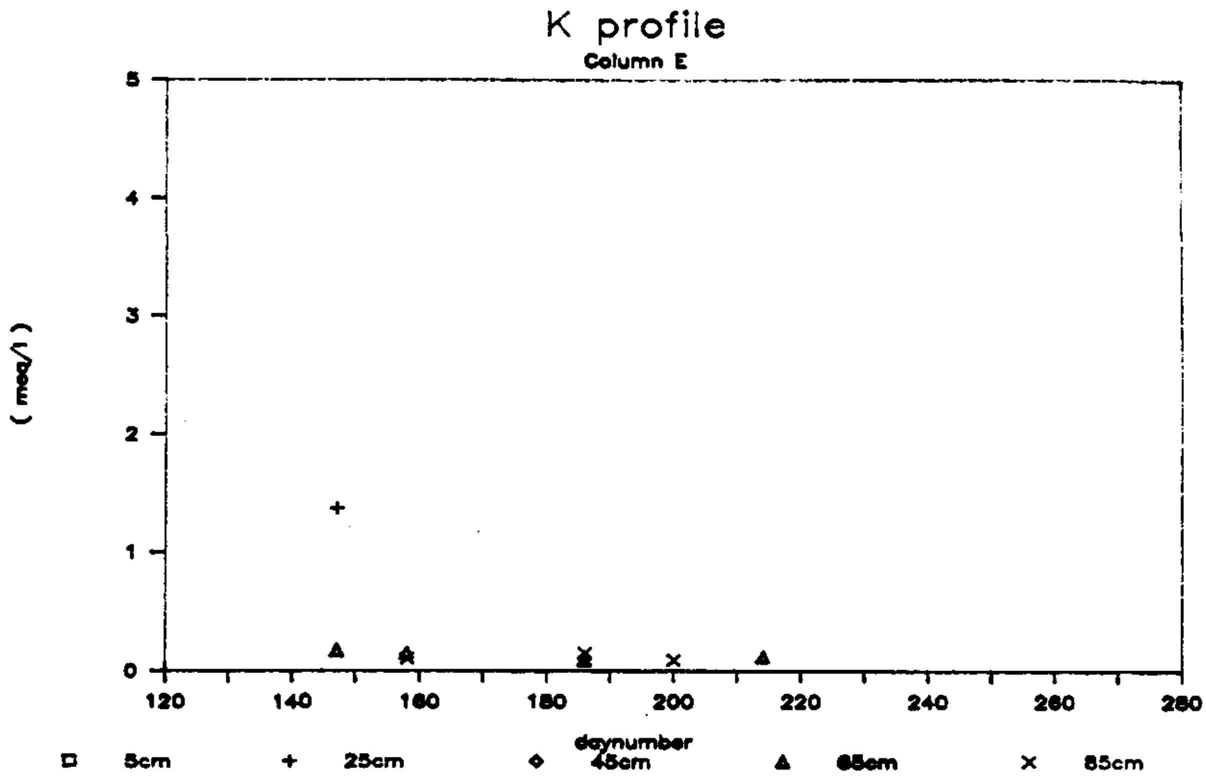

K profile
Column B
5
4
3
2
1
0
(meq/l)
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm

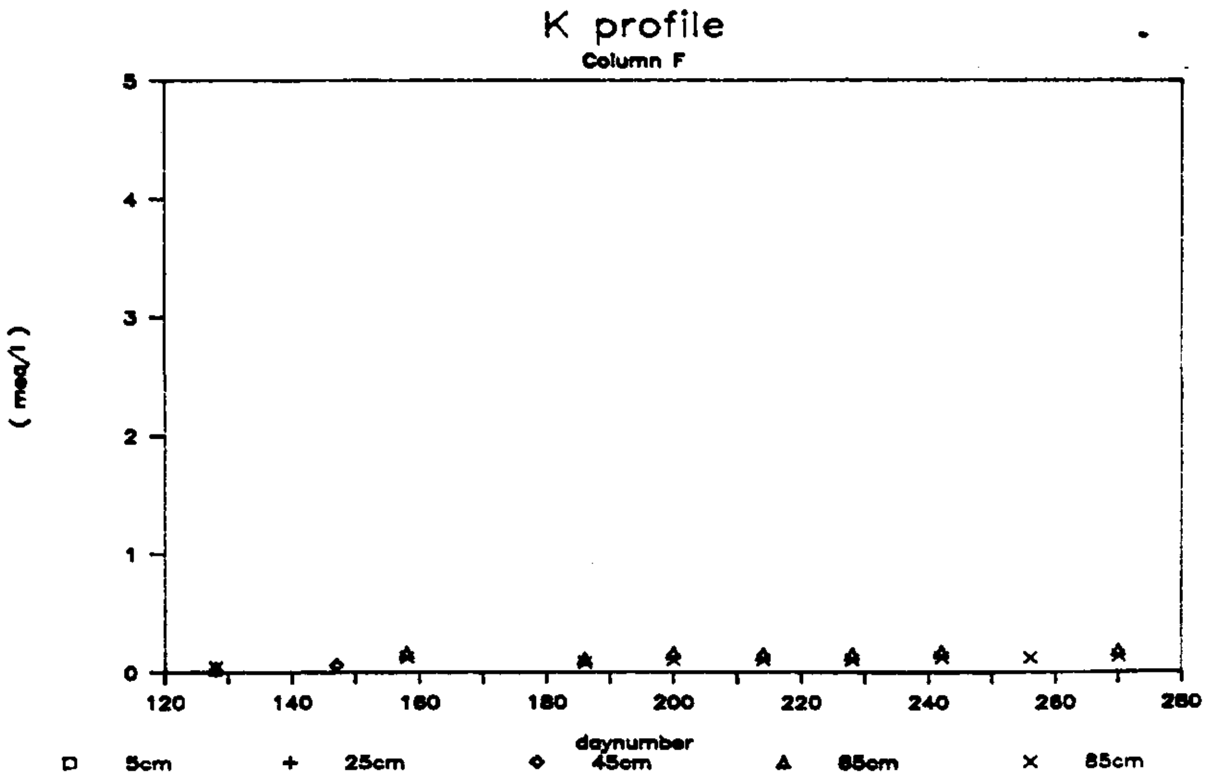


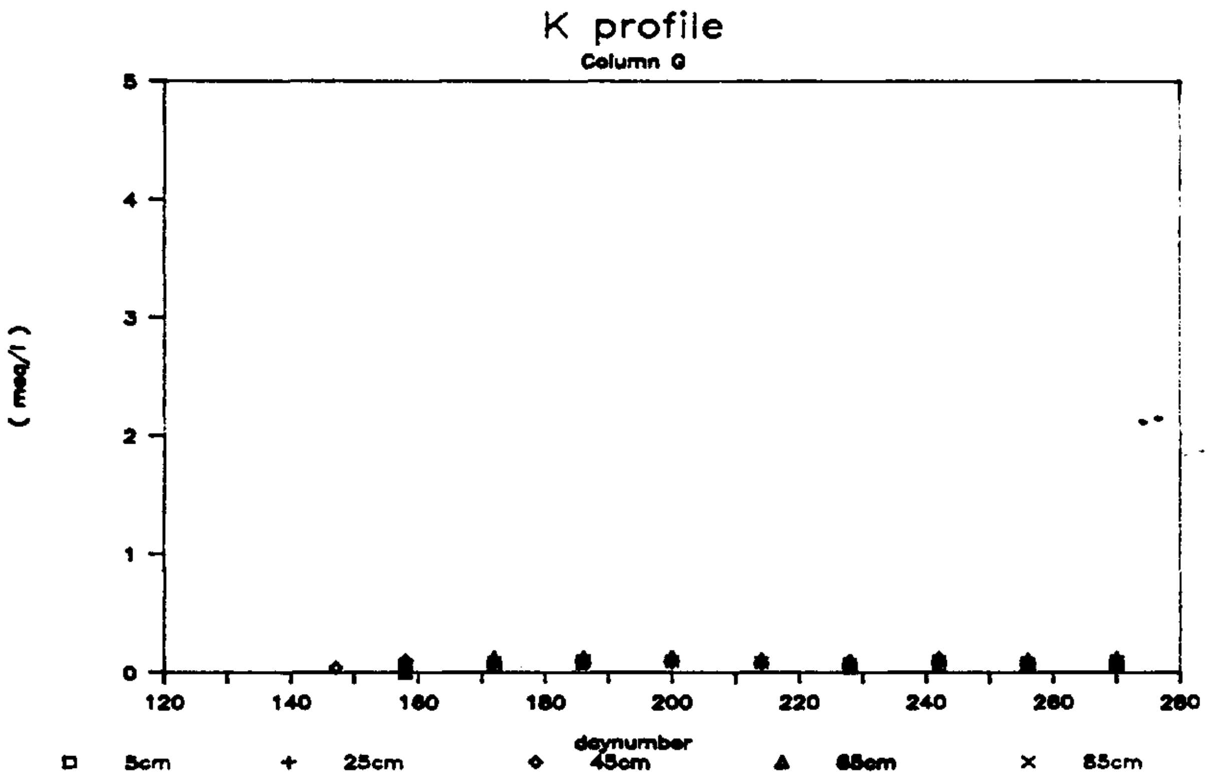
K profile
Column C
(meq/l)
0
1
2
3
4
5
120
140
160
180
200
220
240
260
280
daynumbers
5cm
25cm
45cm
65cm
85cm



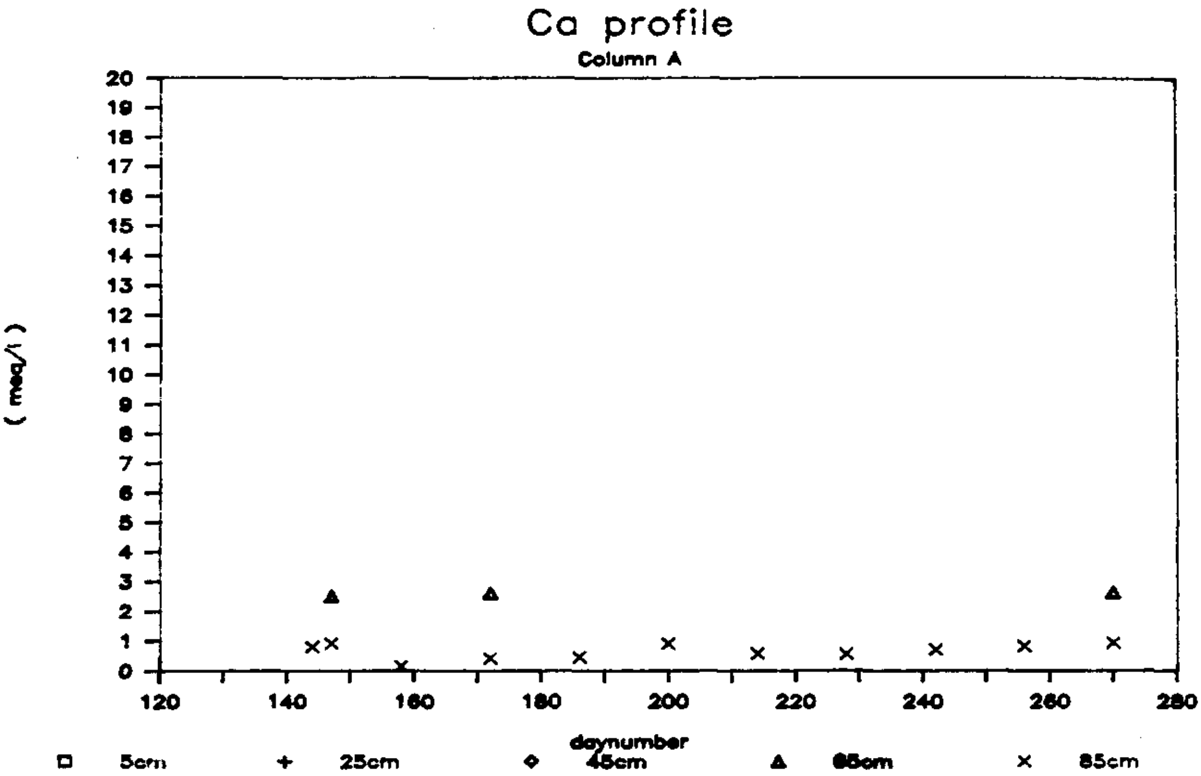
K profile
Column D
(meq/l)
0
1
2
3
4
5
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm


K profile
Column E
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm

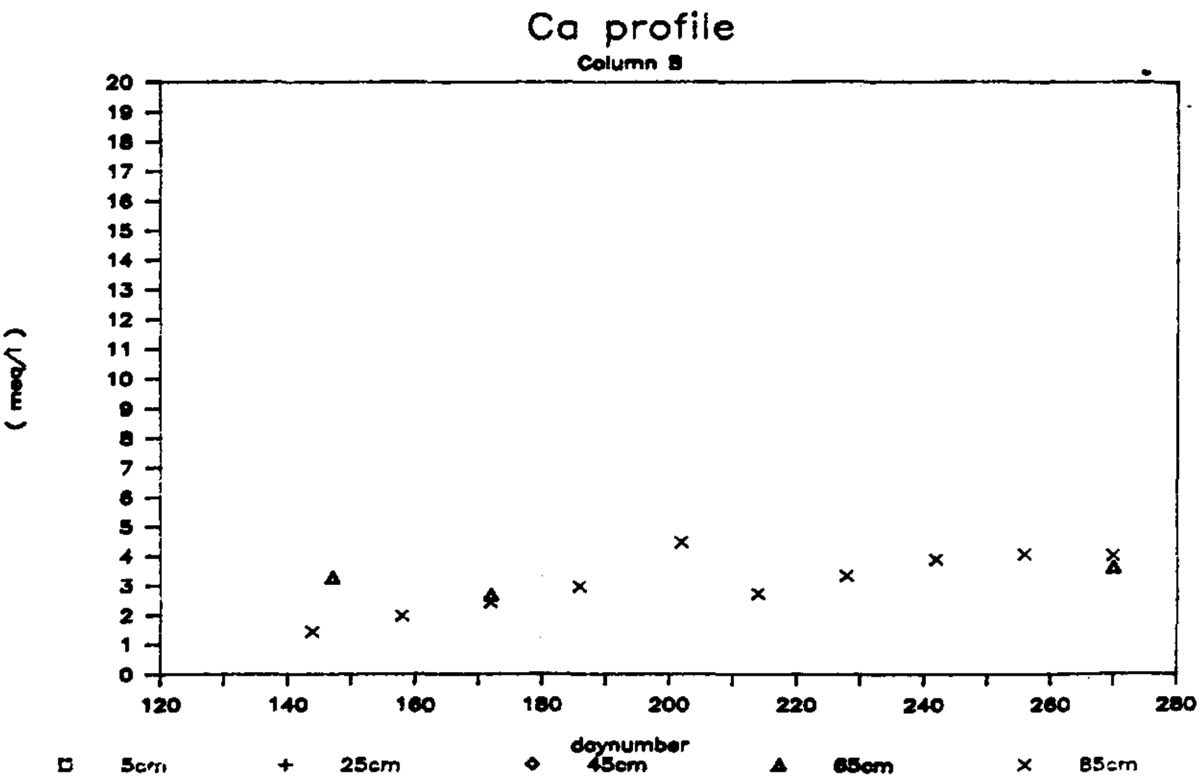

K profile
Column F
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm



K profile
Column G
(meq/l)
0
1
2
3
4
5
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm



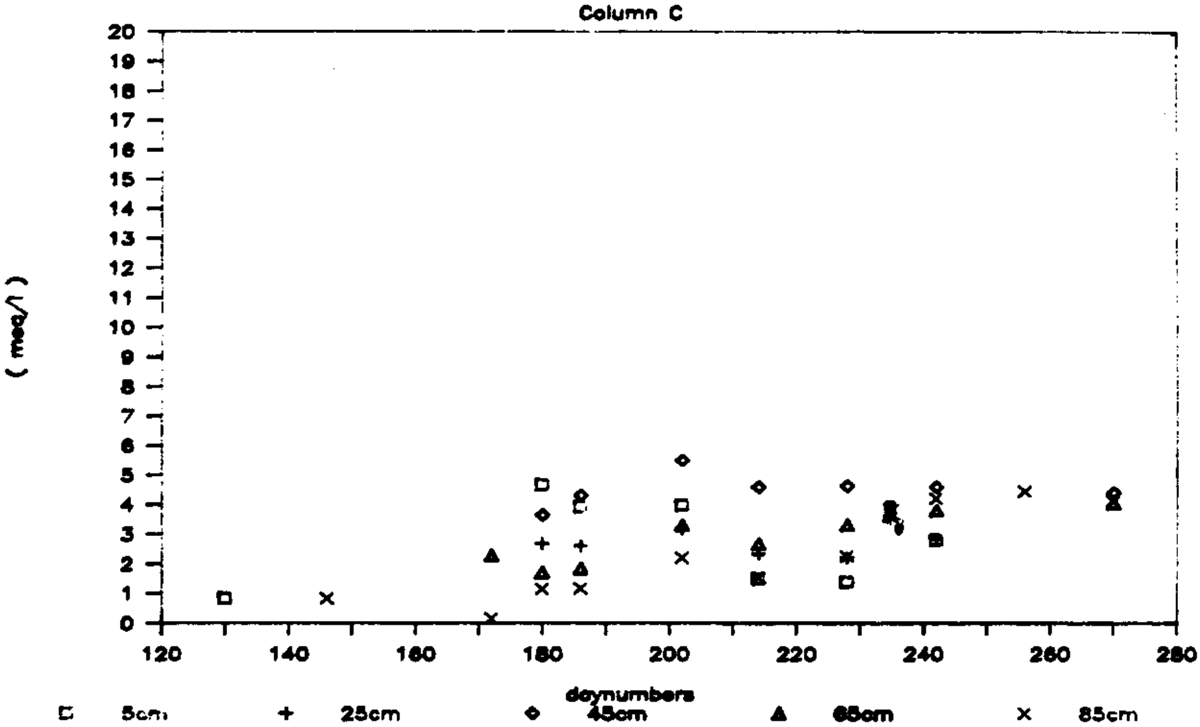
Ca profile
Column A
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm



Ca profile
Column B
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm

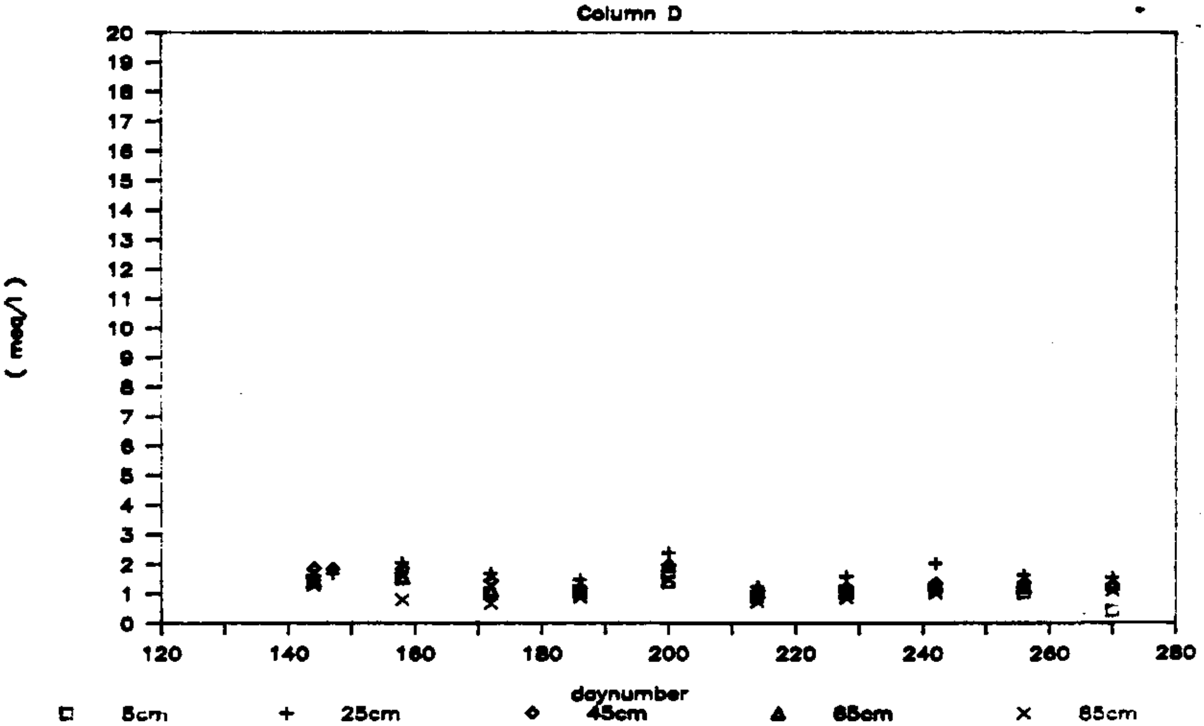
Ca profile

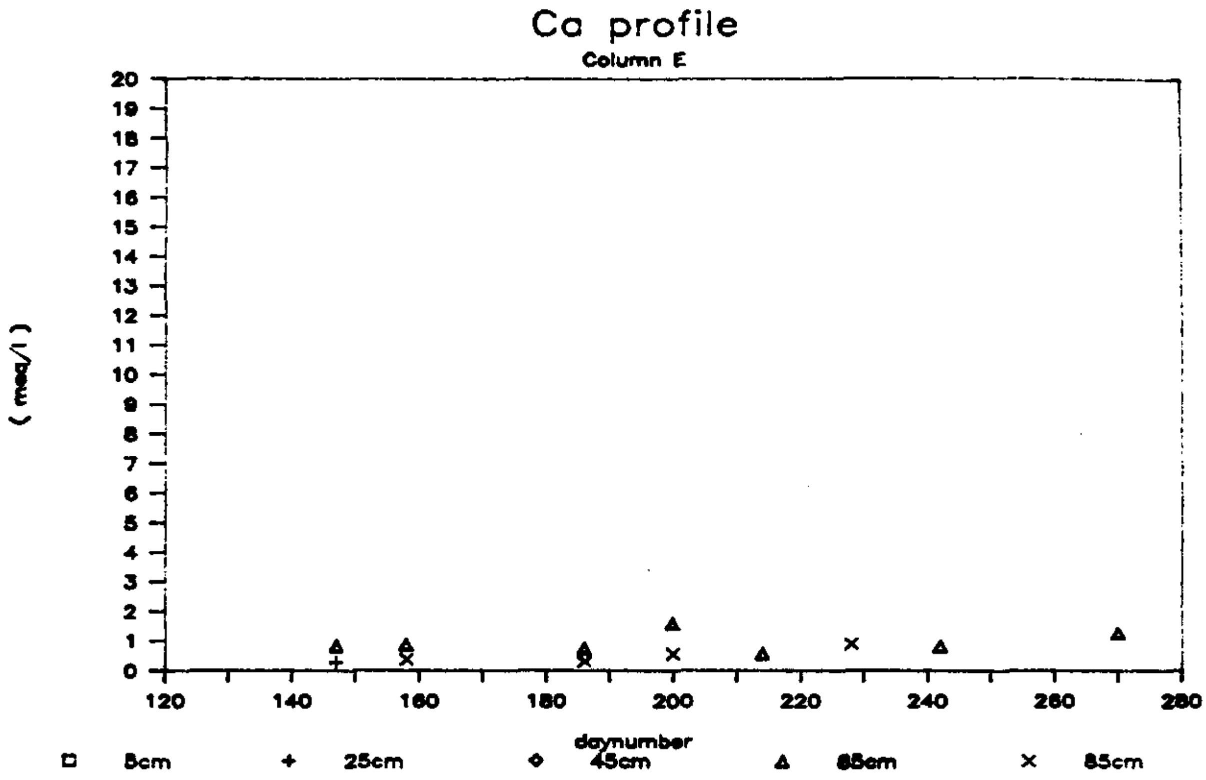
Column C

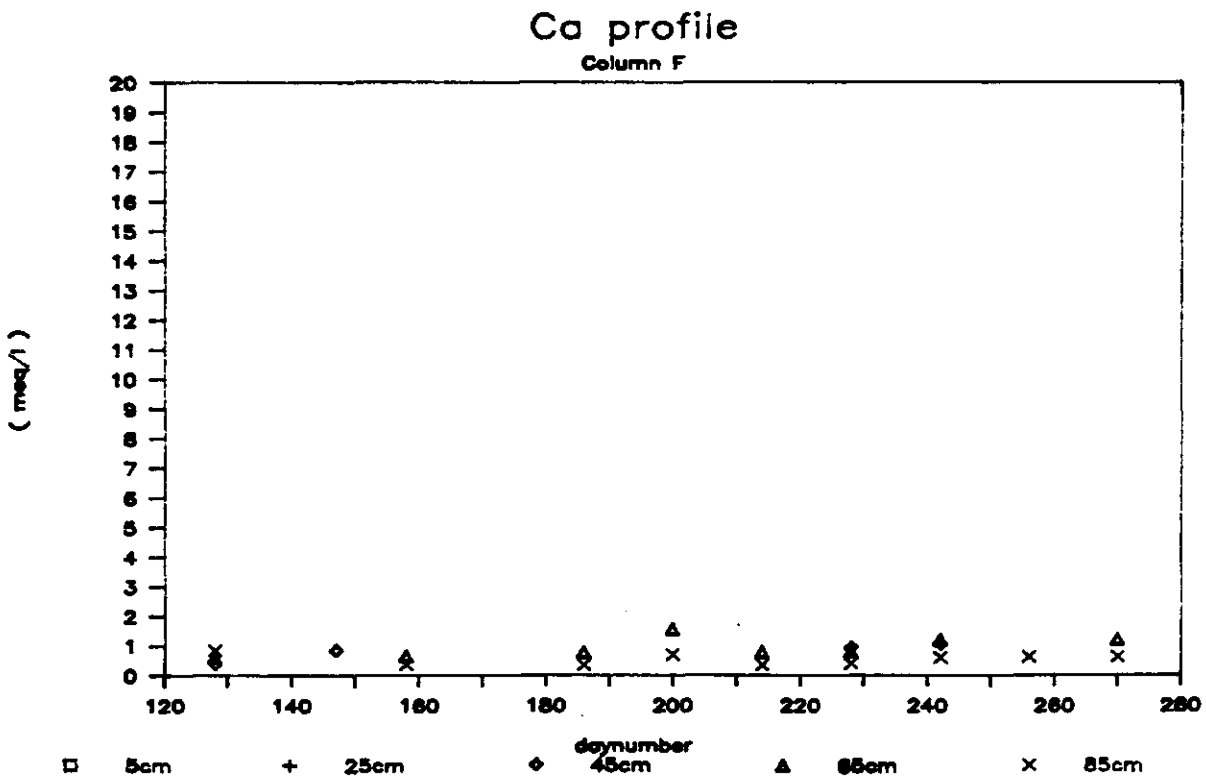


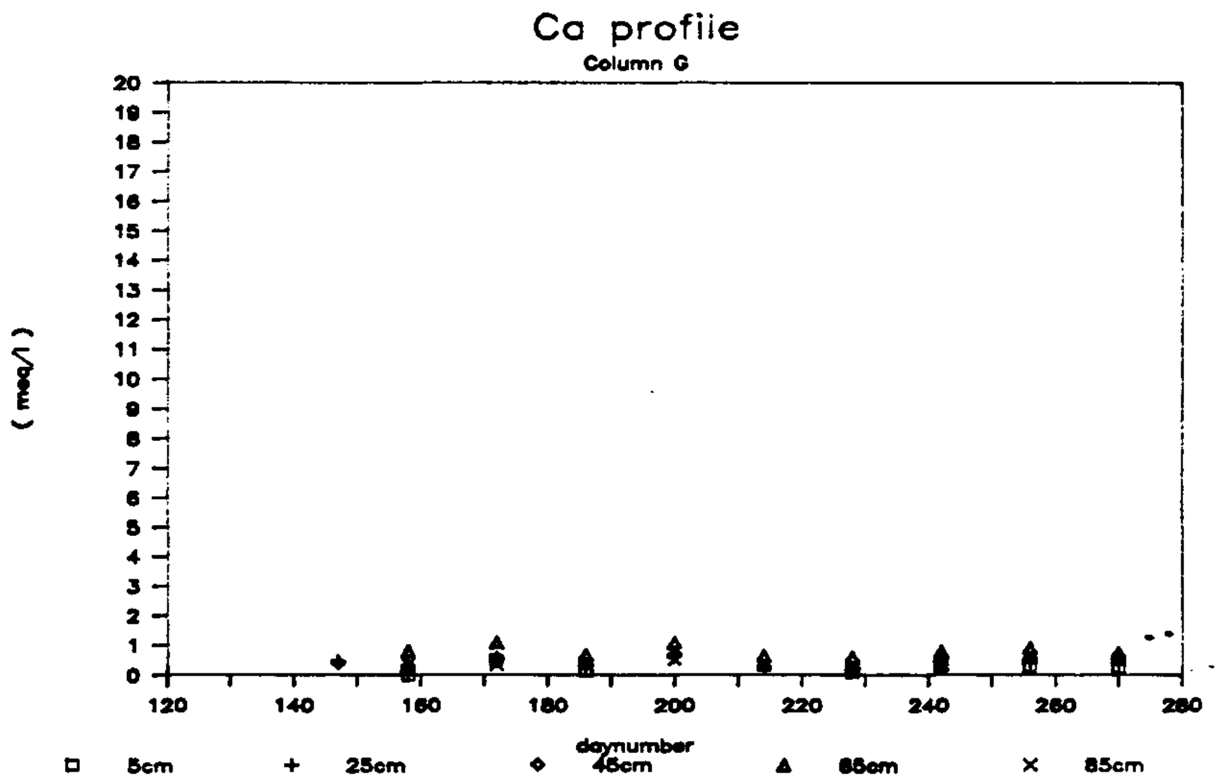
Ca profile

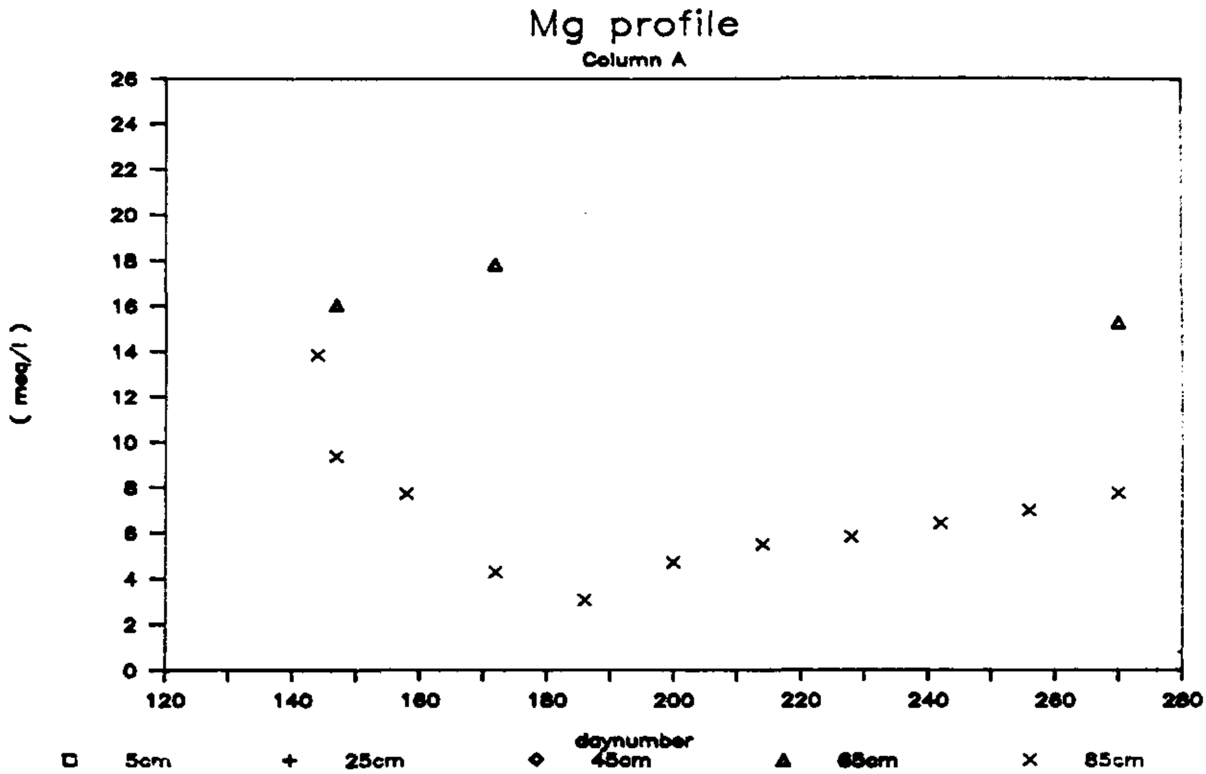
Column D

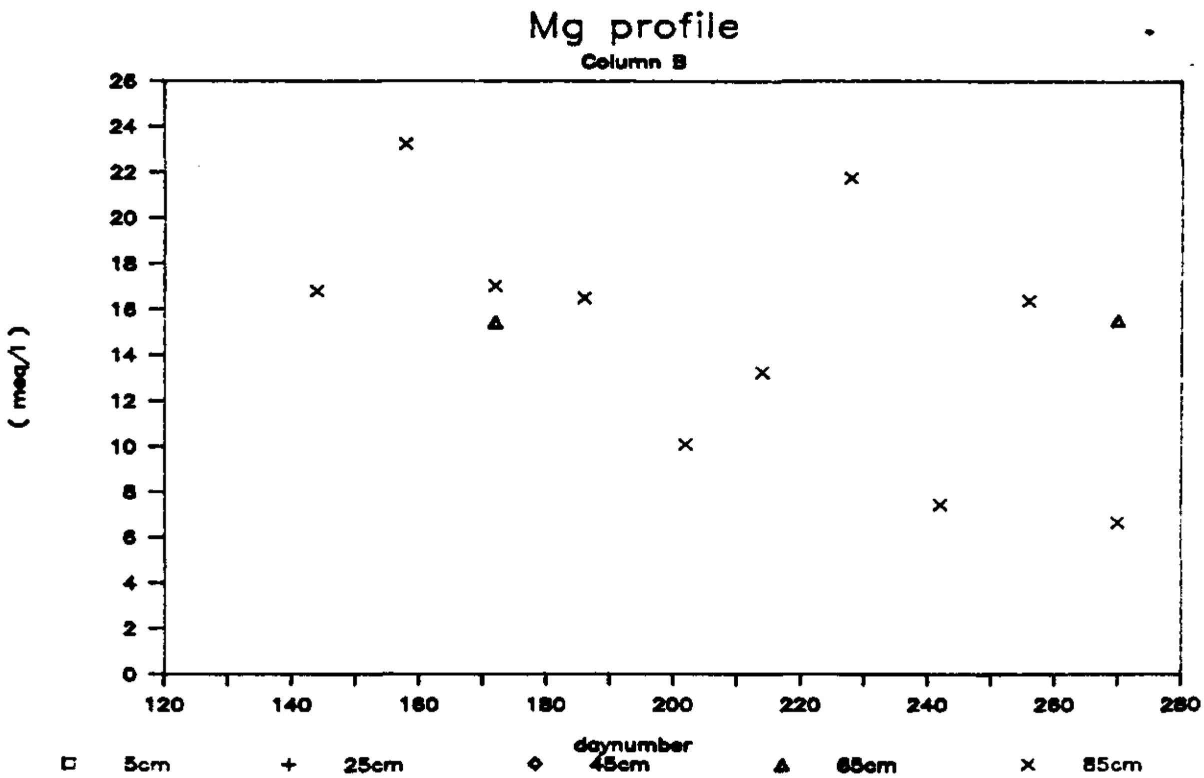


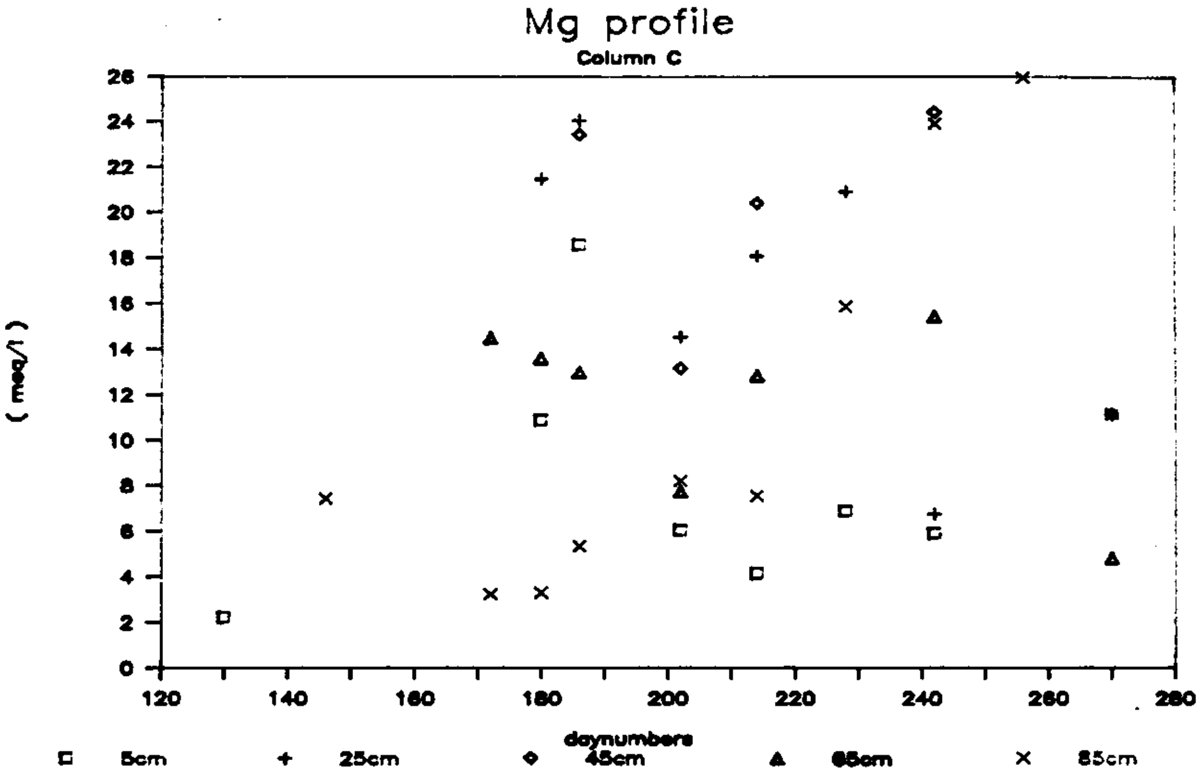

Ca profile
Column E
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm


Ca profile
Column F
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm

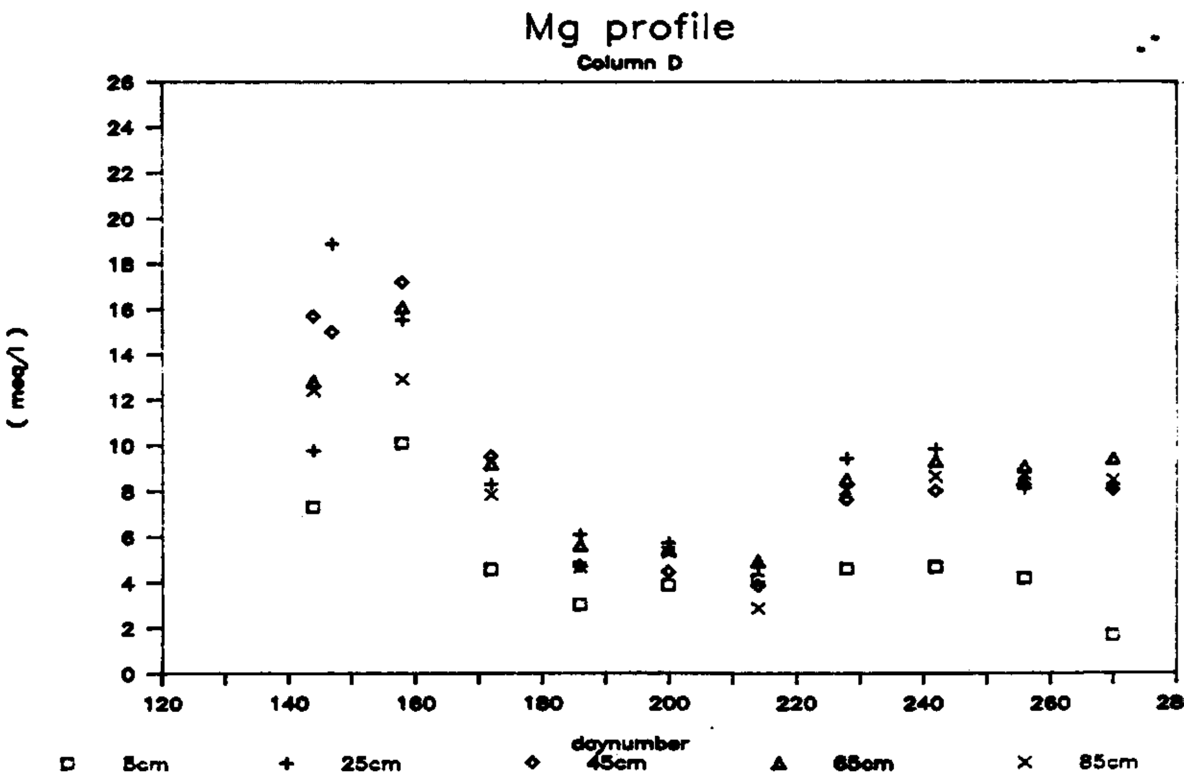

Ca profile
Column G
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm


Mg profile
Column A
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm

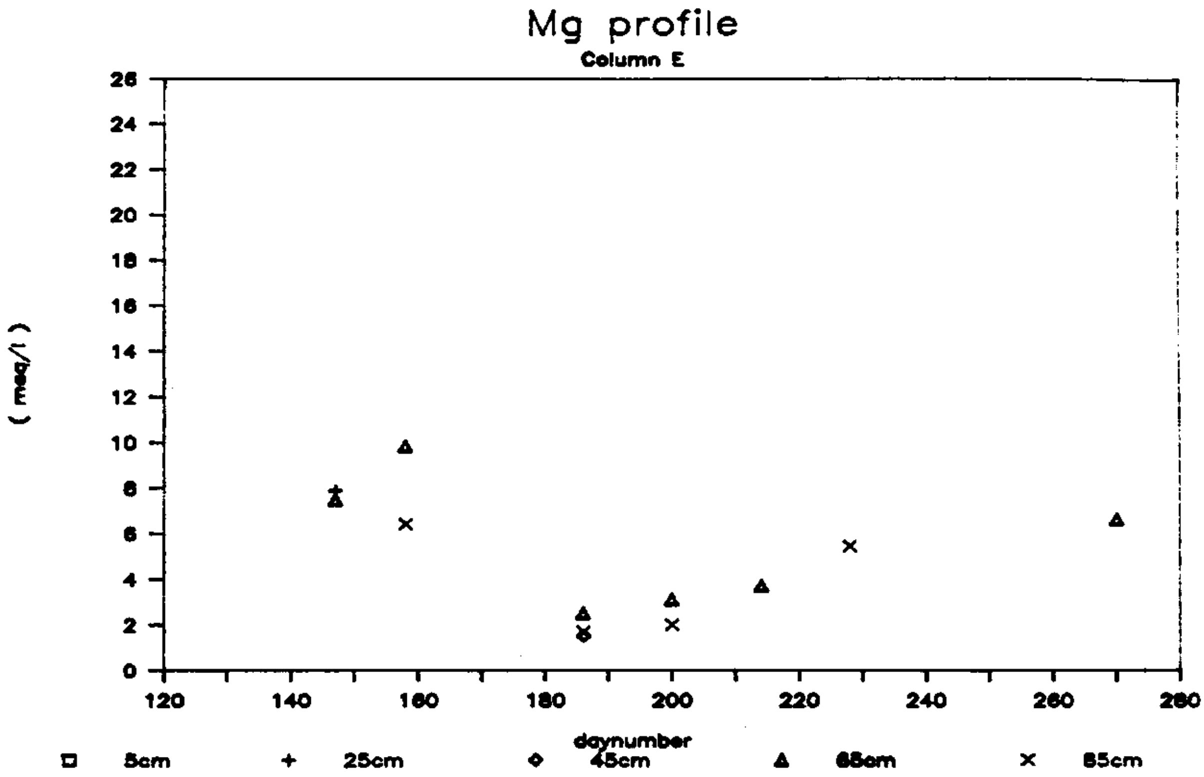

Mg profile
Column B
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm

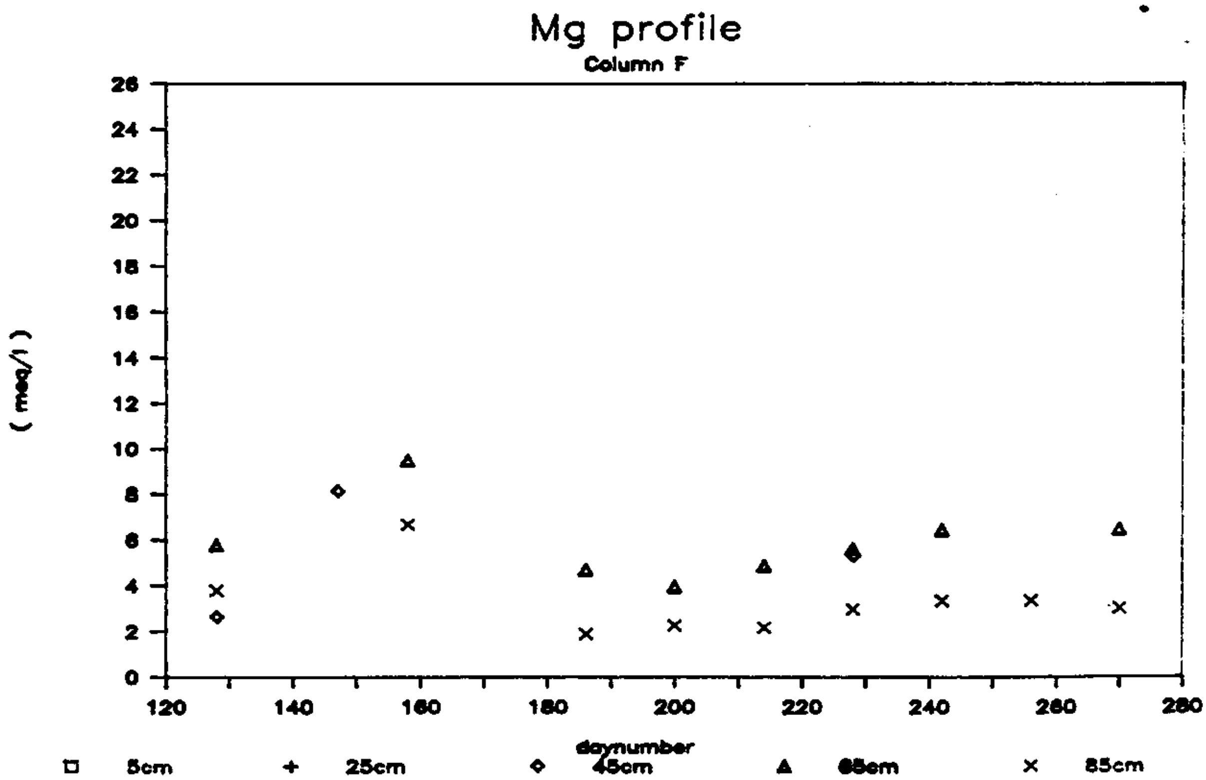


Mg profile
Column C
(meq/l)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
120
140
160
180
200
220
240
260
280
daynumbers
5cm
25cm
45cm
65cm
85cm



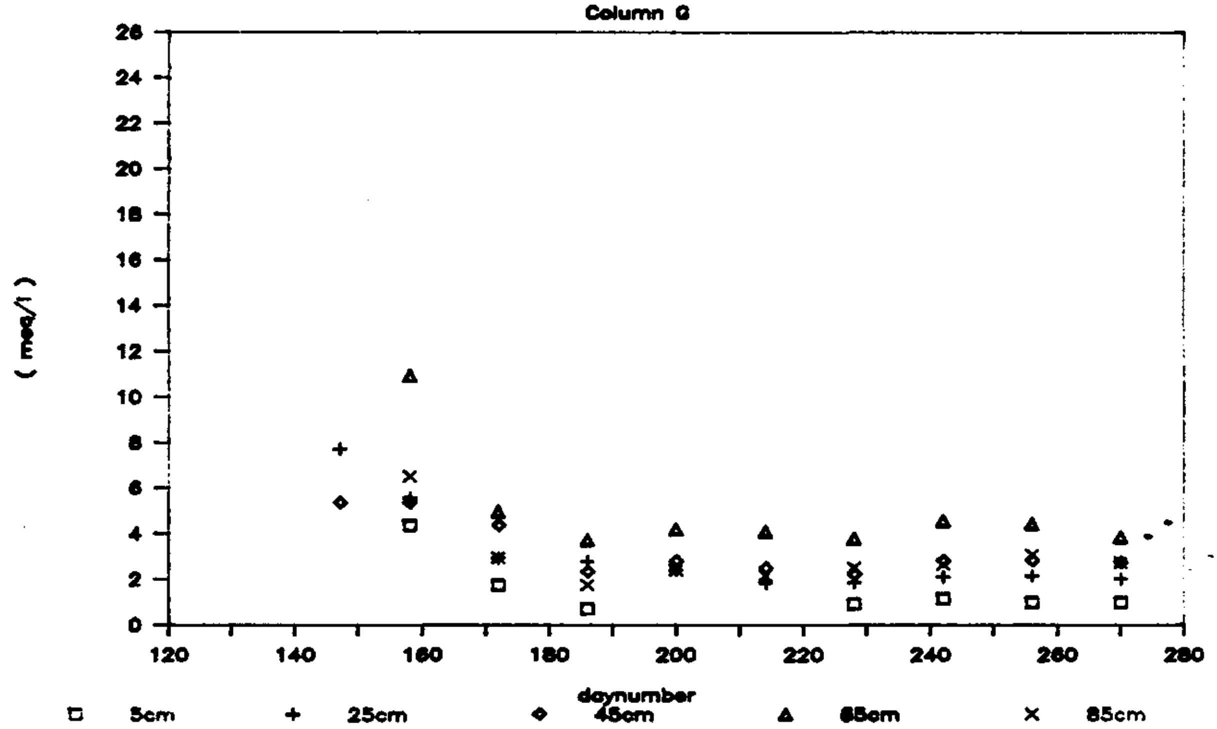
Mg profile
Column D
(meq/l)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm


Mg profile
Column E
(meq/l)
26
24
22
20
18
16
14
12
10
8
6
4
2
0
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm


Mg profile
Column F
(meq/l)
26
24
22
20
18
16
14
12
10
8
6
4
2
0
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm

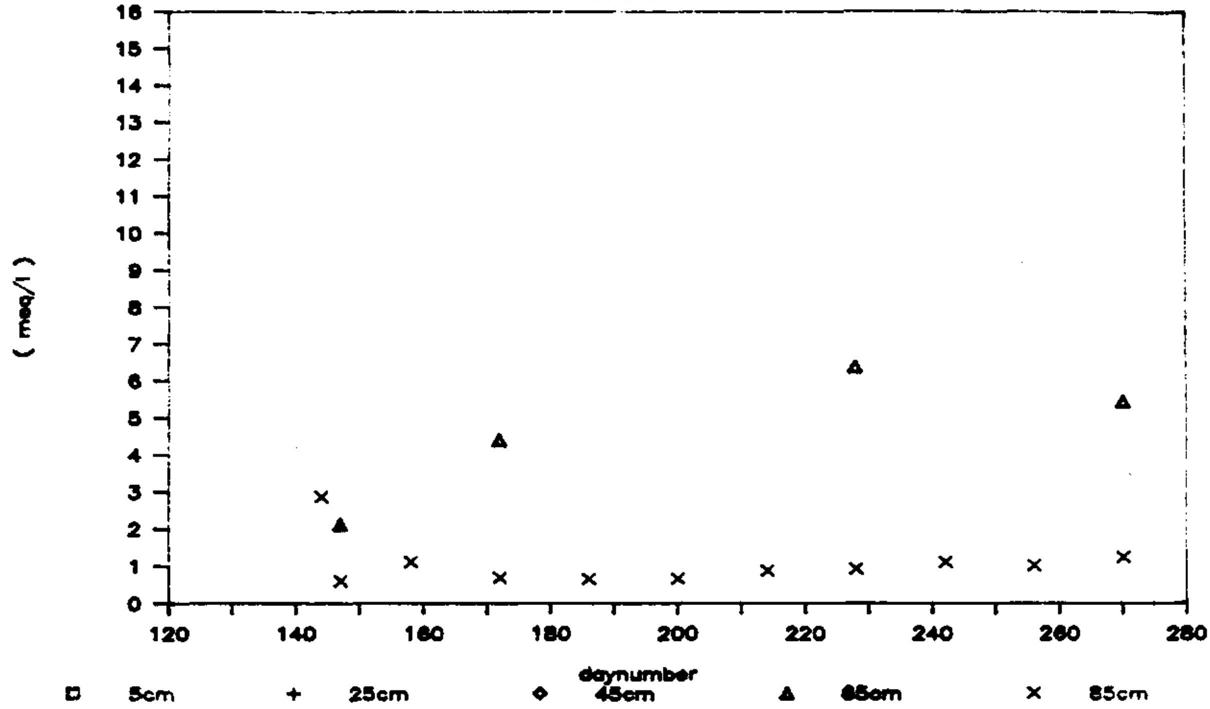
Mg profile

Column G



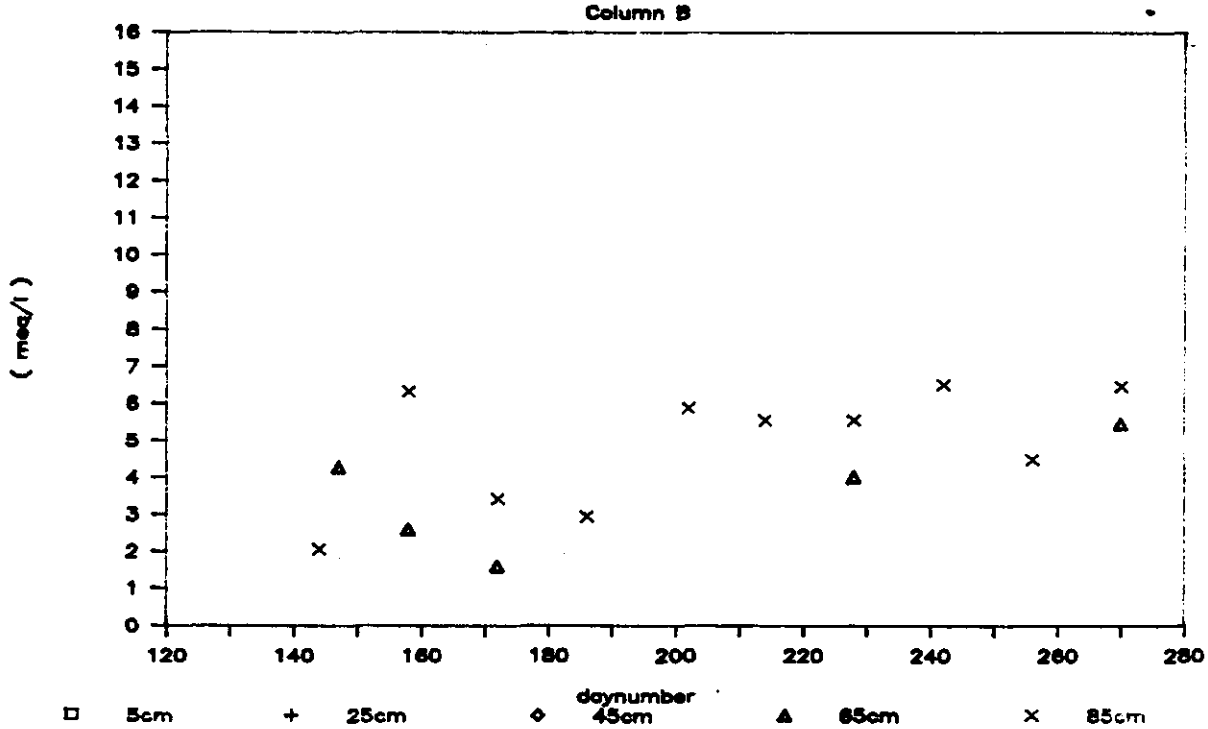
Fe profile

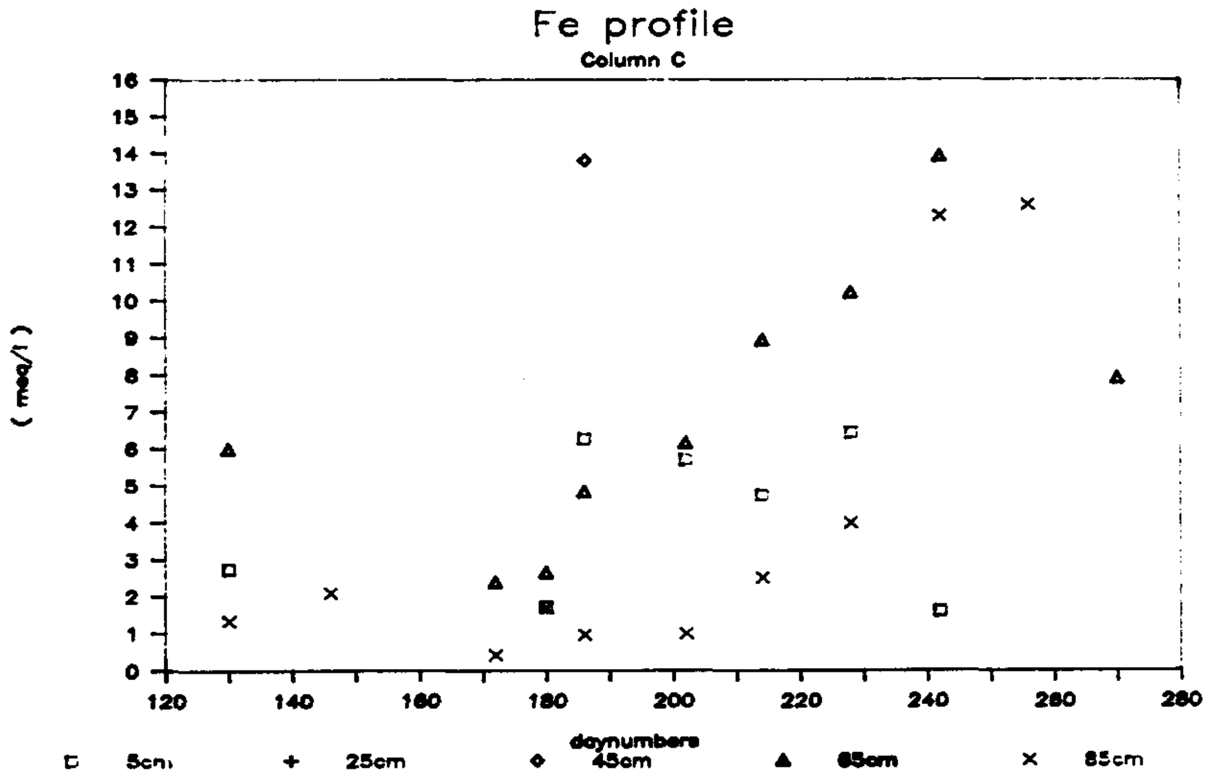
Column A



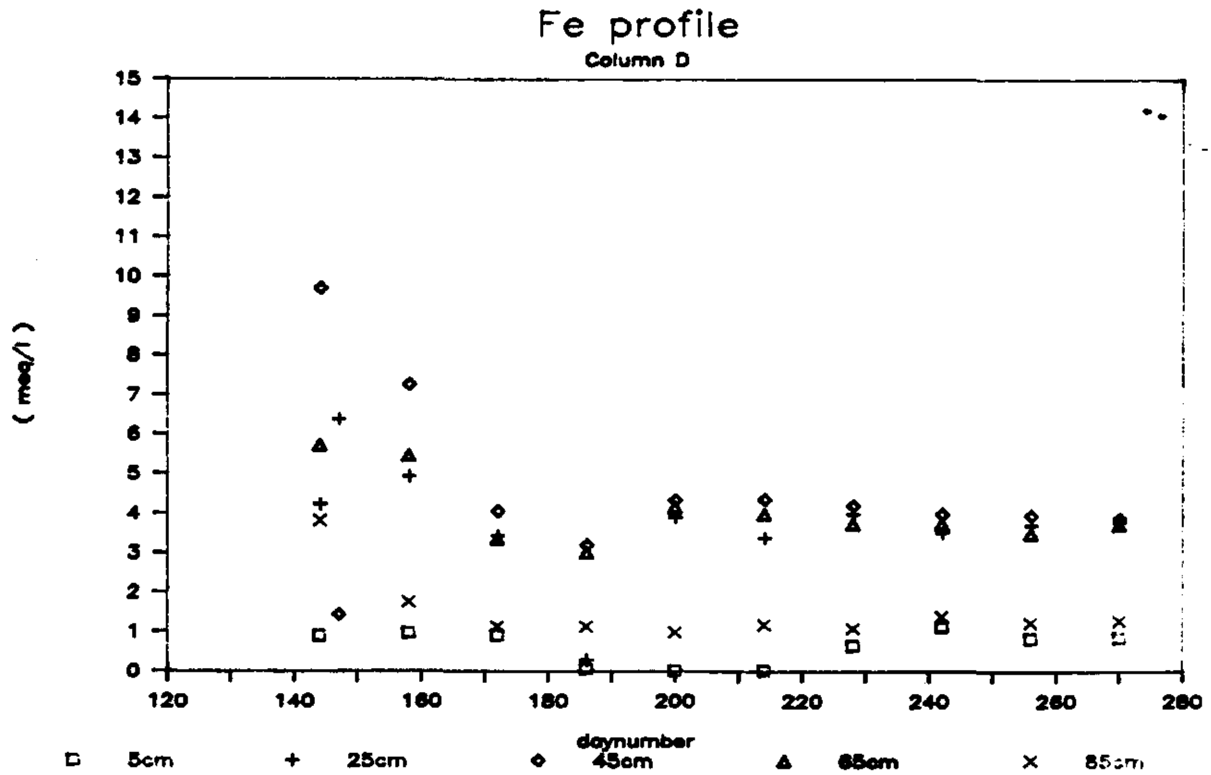
Fe profile

Column B

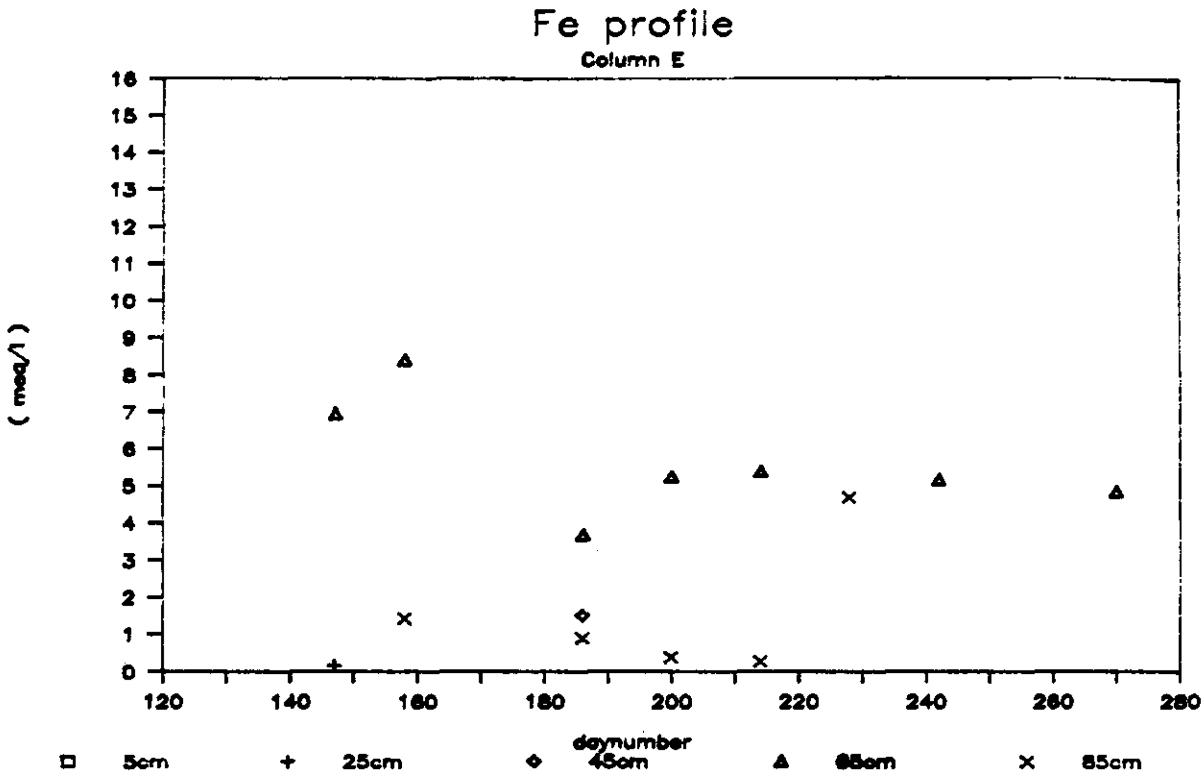




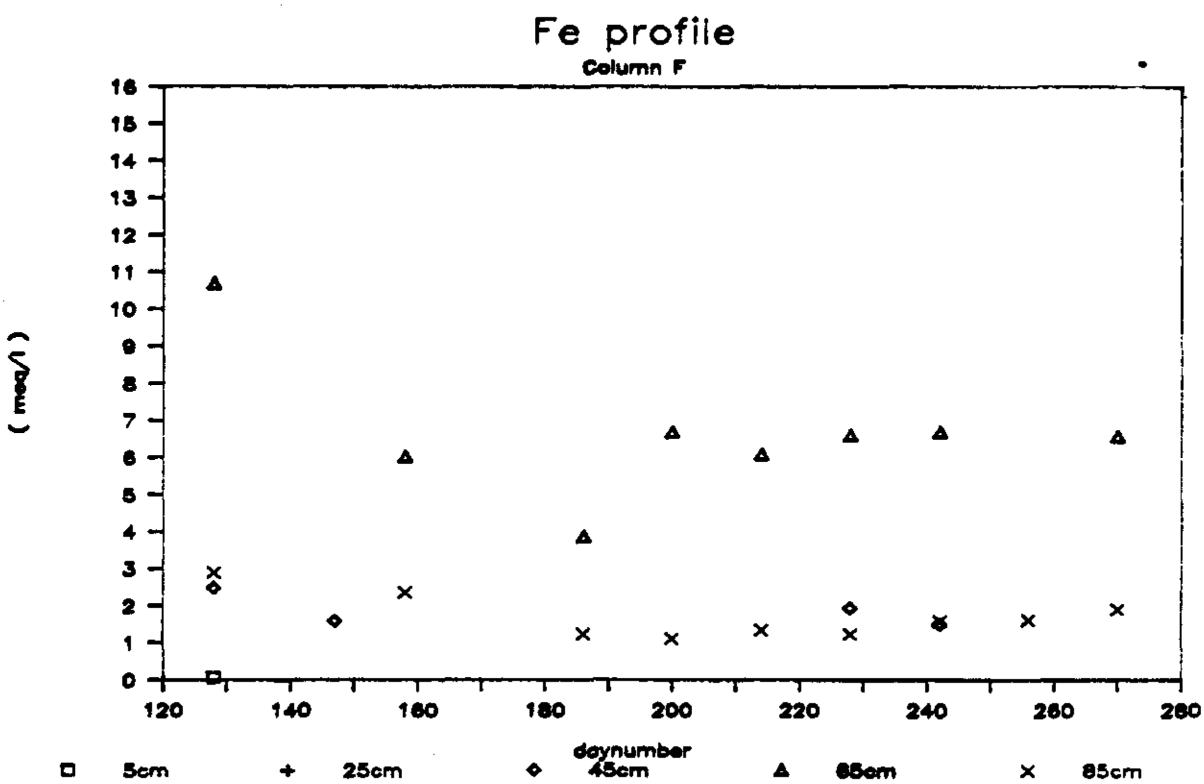
Fe profile
Column C
(meq/l)
daynumbers
5cm
25cm
45cm
65cm
85cm



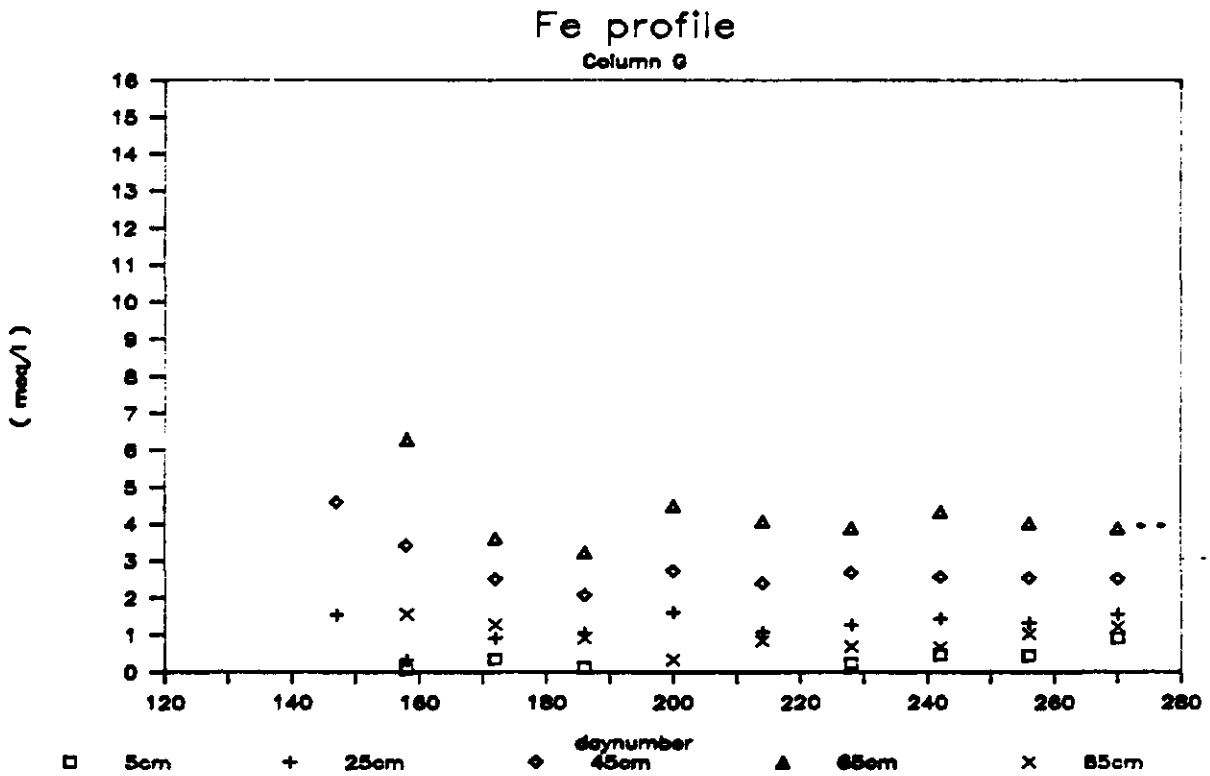
Fe profile
Column D
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm



Fe profile
Column E
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm



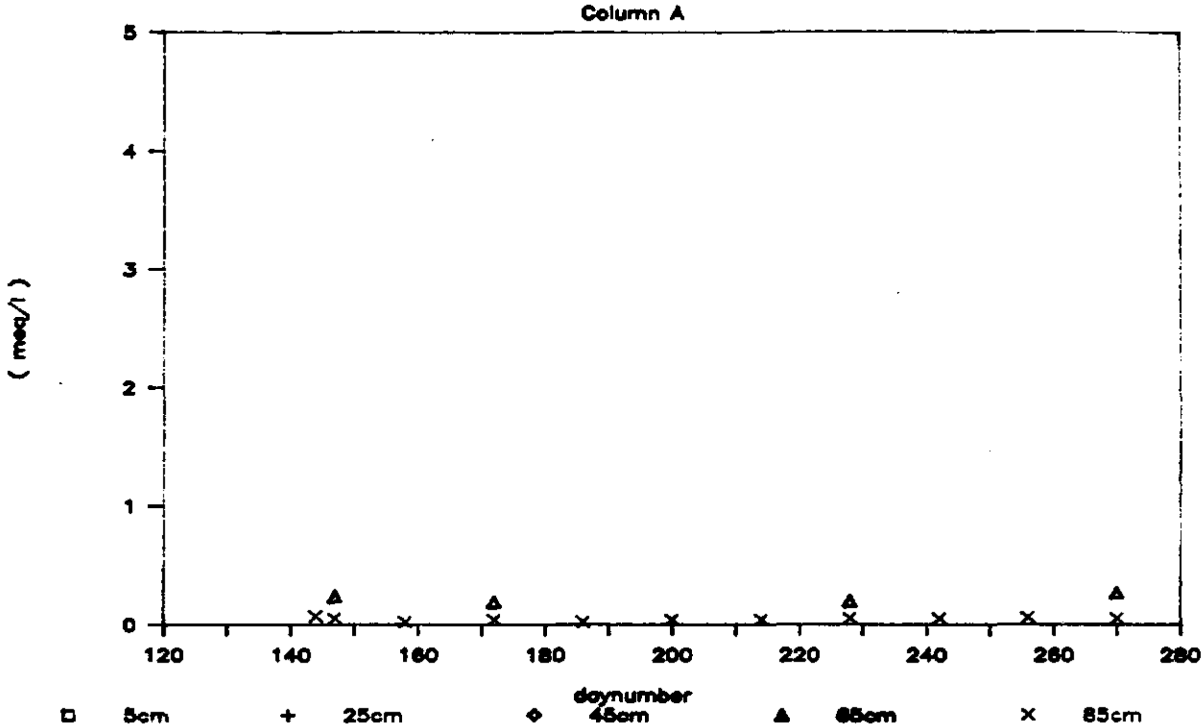
Fe profile
Column F
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm



Fe profile
Column G
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
(meq/l)
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm

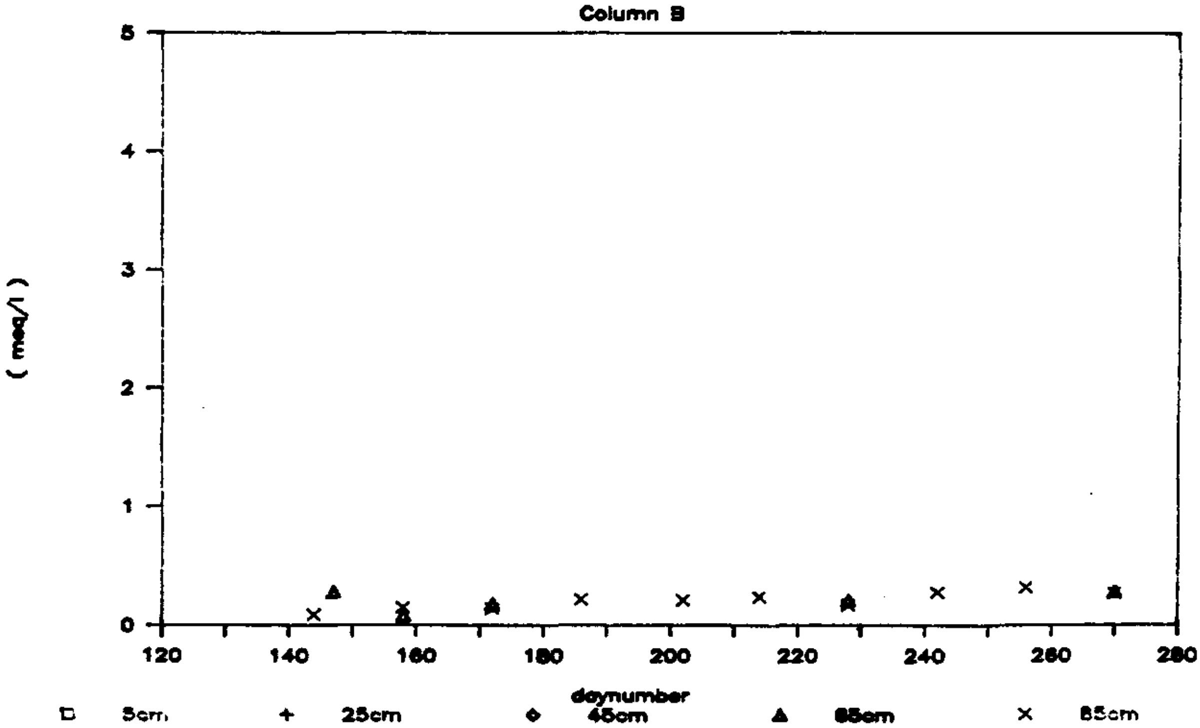
Mn profile

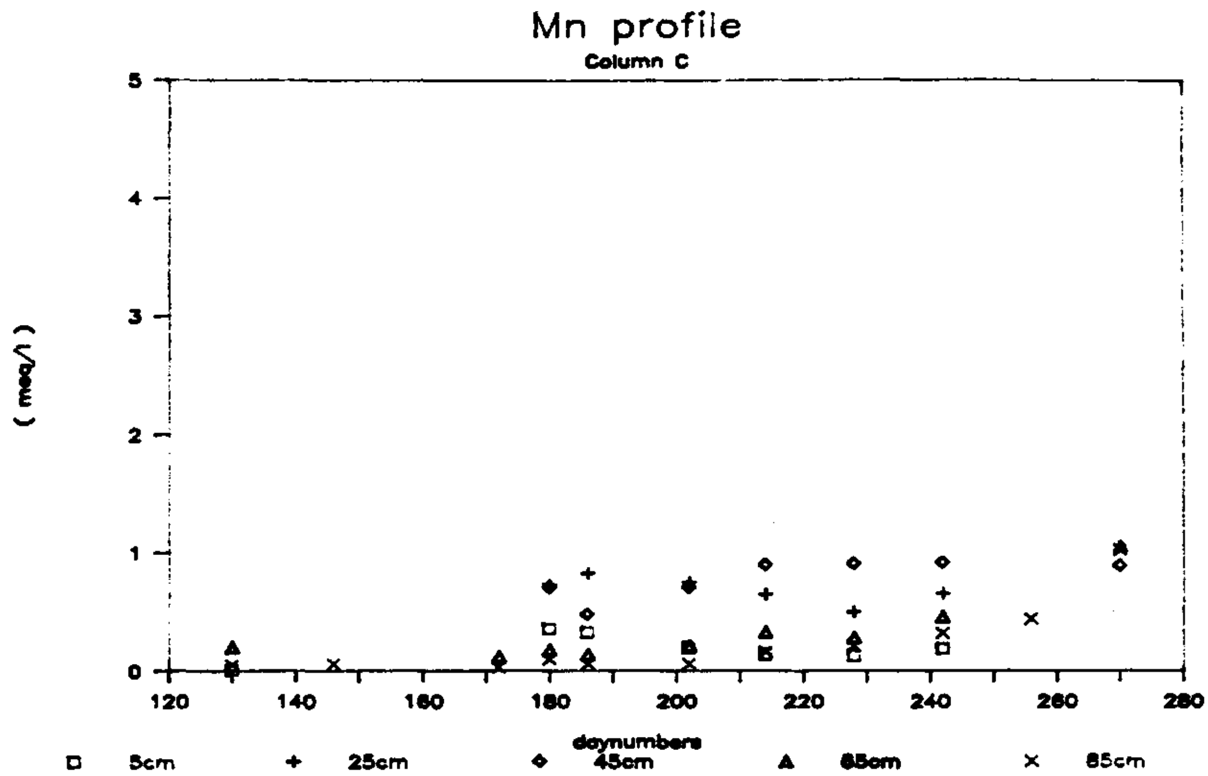
Column A

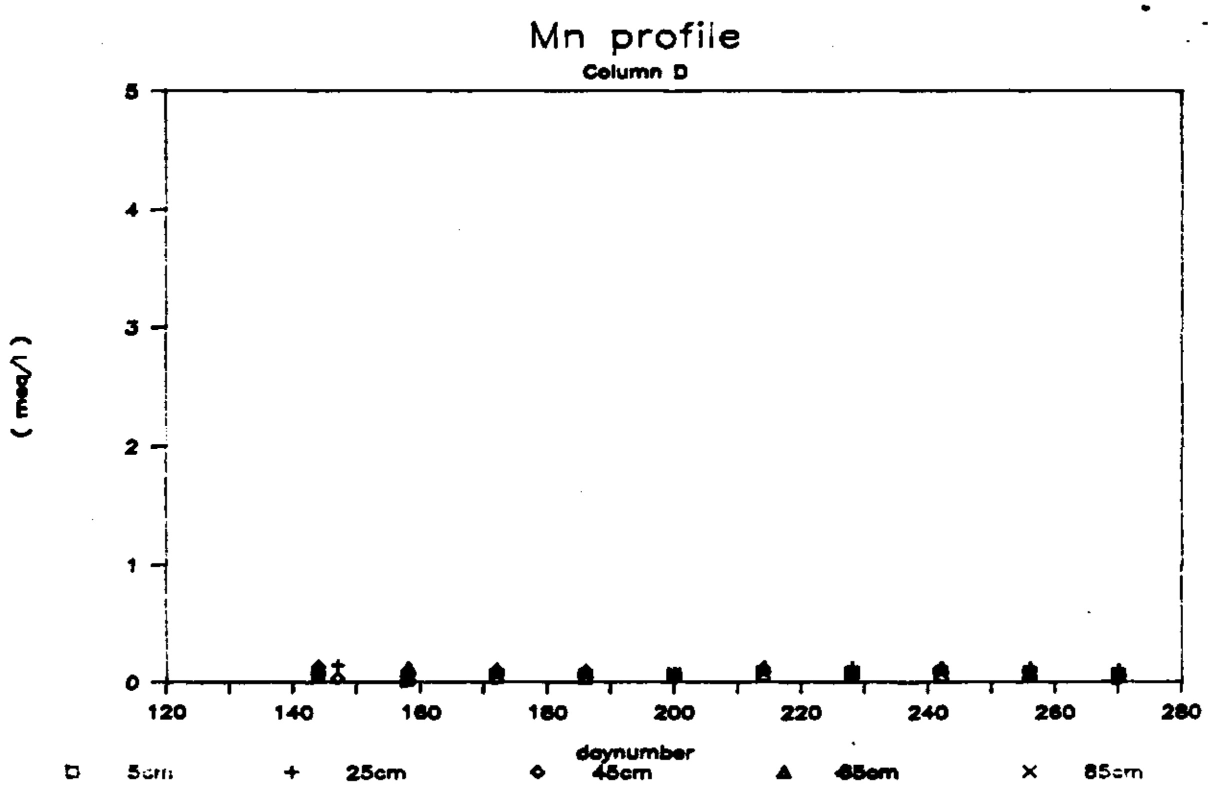


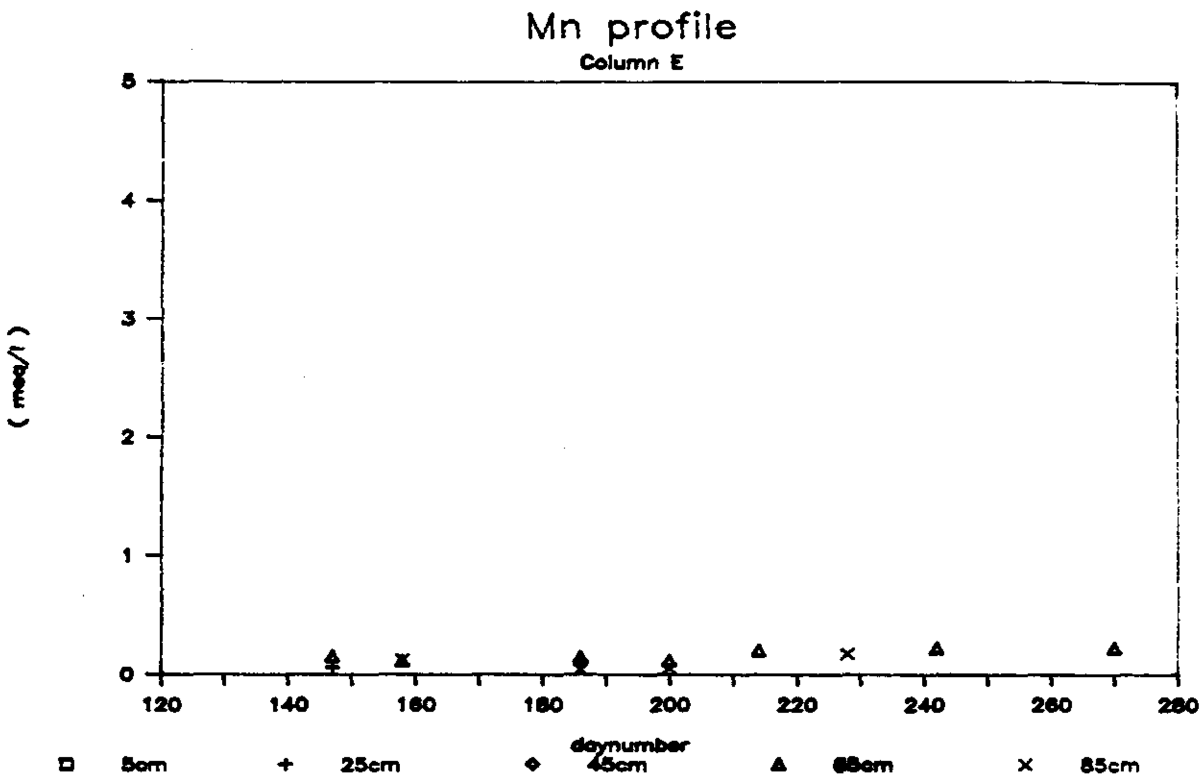
Mn profile

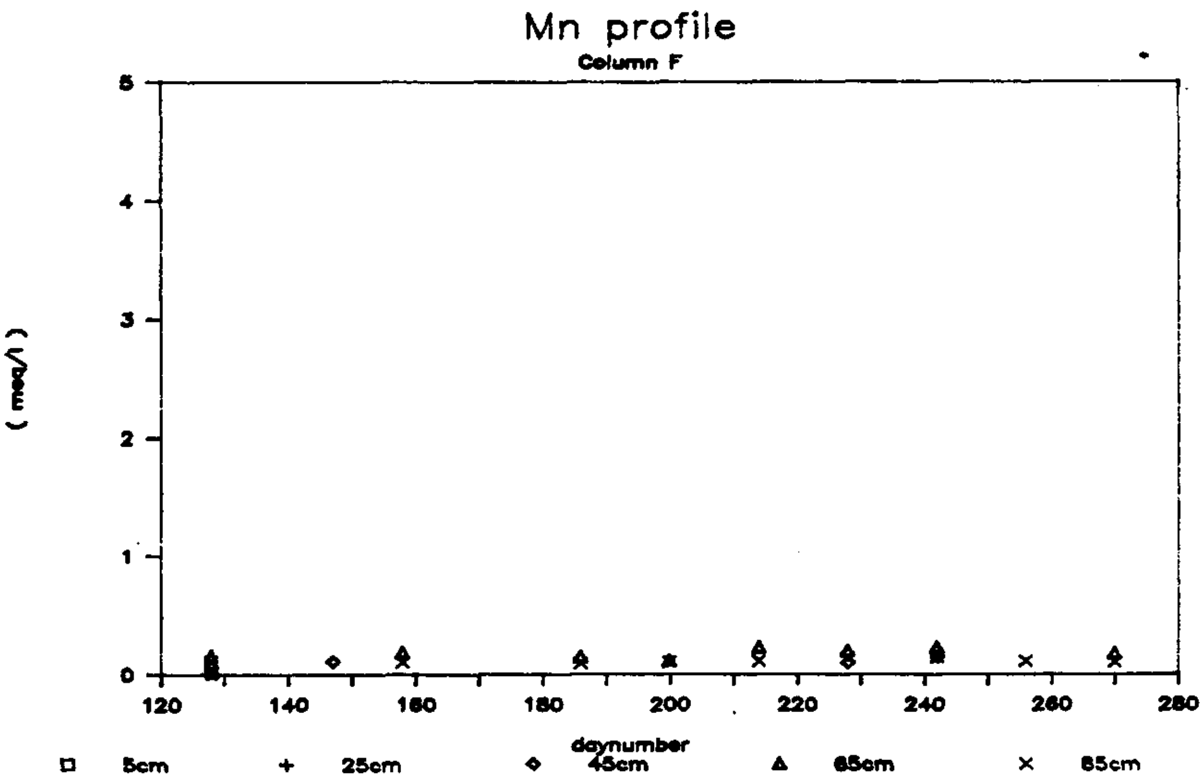
Column B

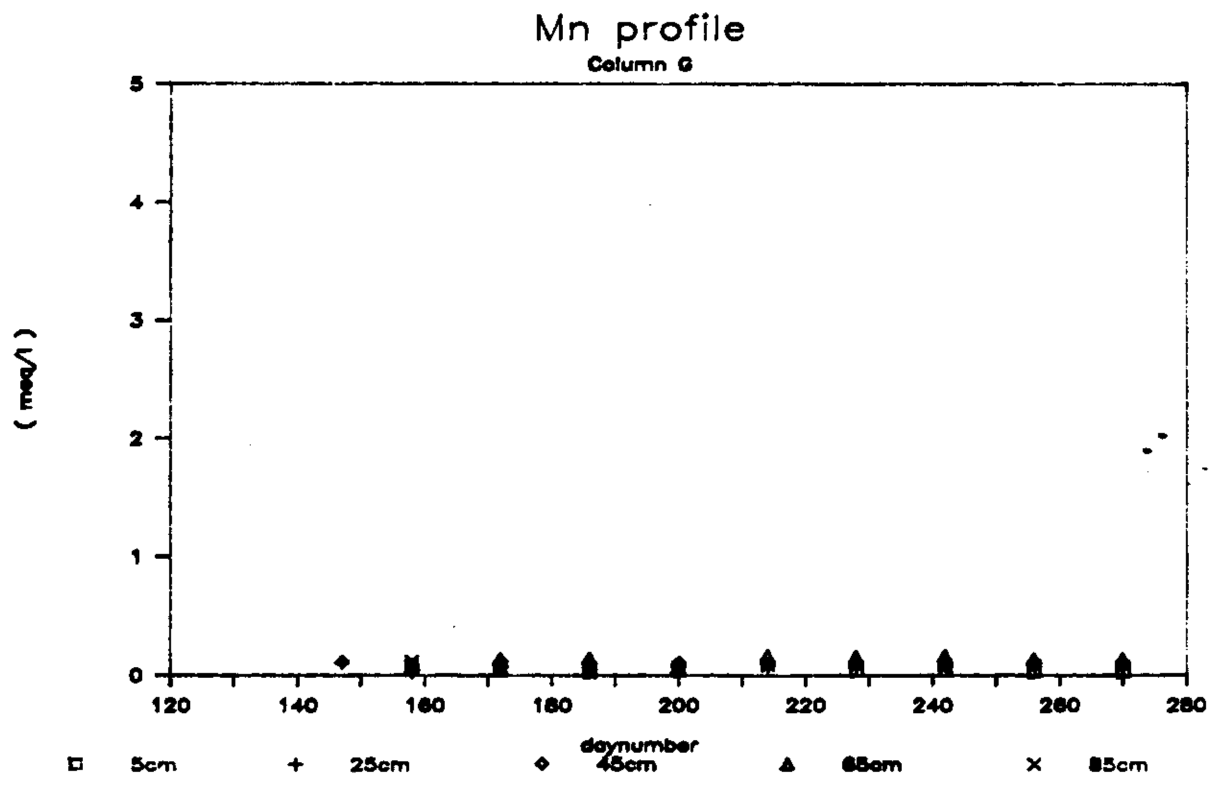


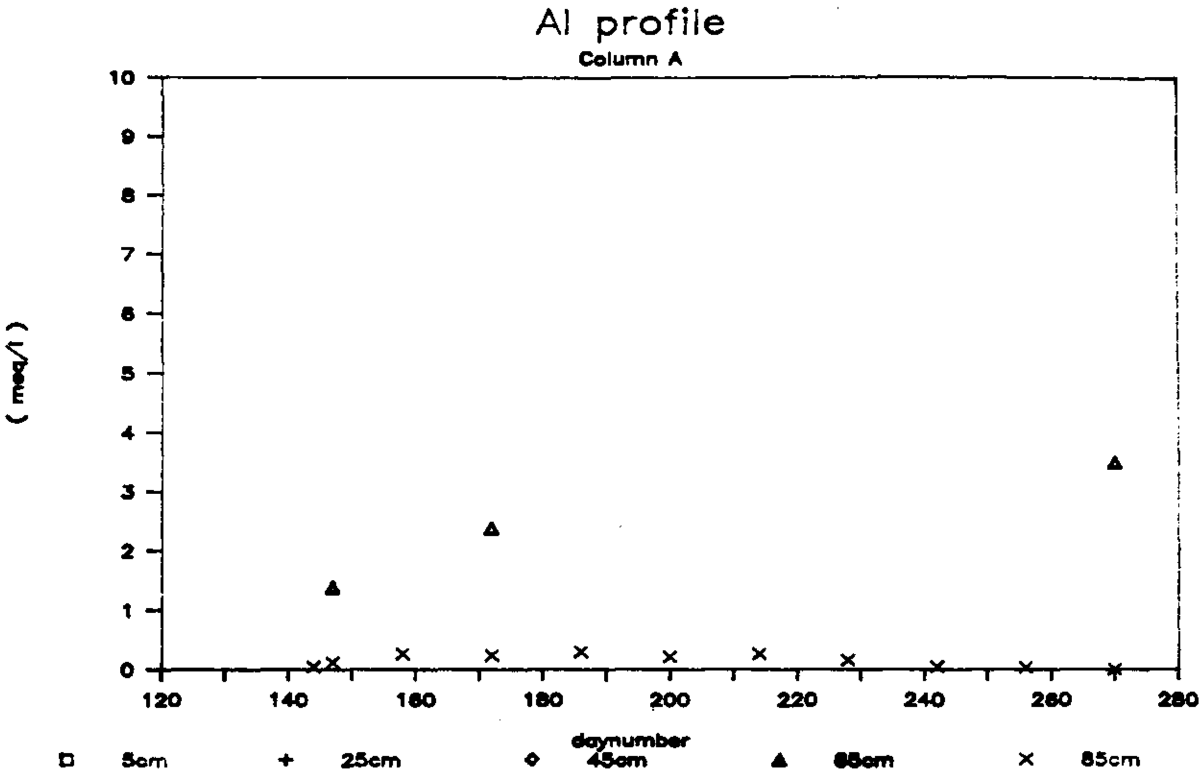

Mn profile
Column C
(meq/l)
daynumbers
5cm
25cm
45cm
65cm
85cm


Mn profile
Column D
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm

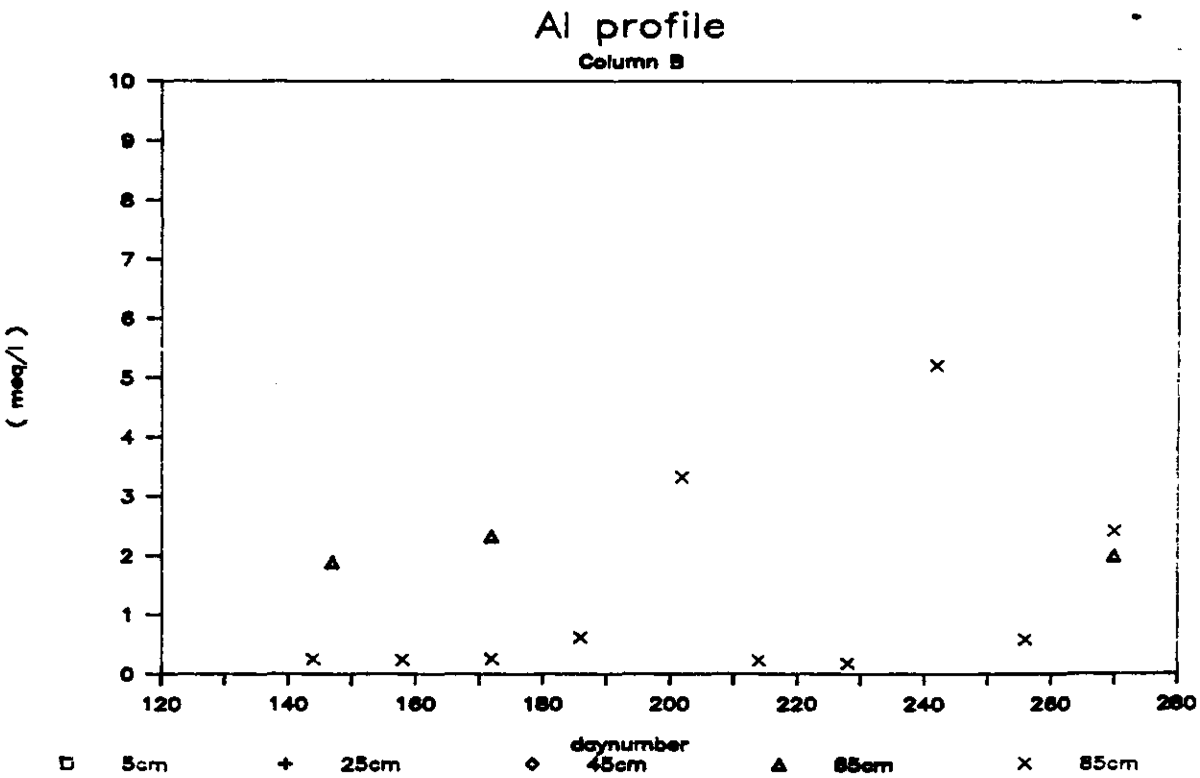

Mn profile
Column E
5
4
3
2
1
0
(meq/l)
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm


Mn profile
Column F
5
4
3
2
1
0
(meq/l)
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm

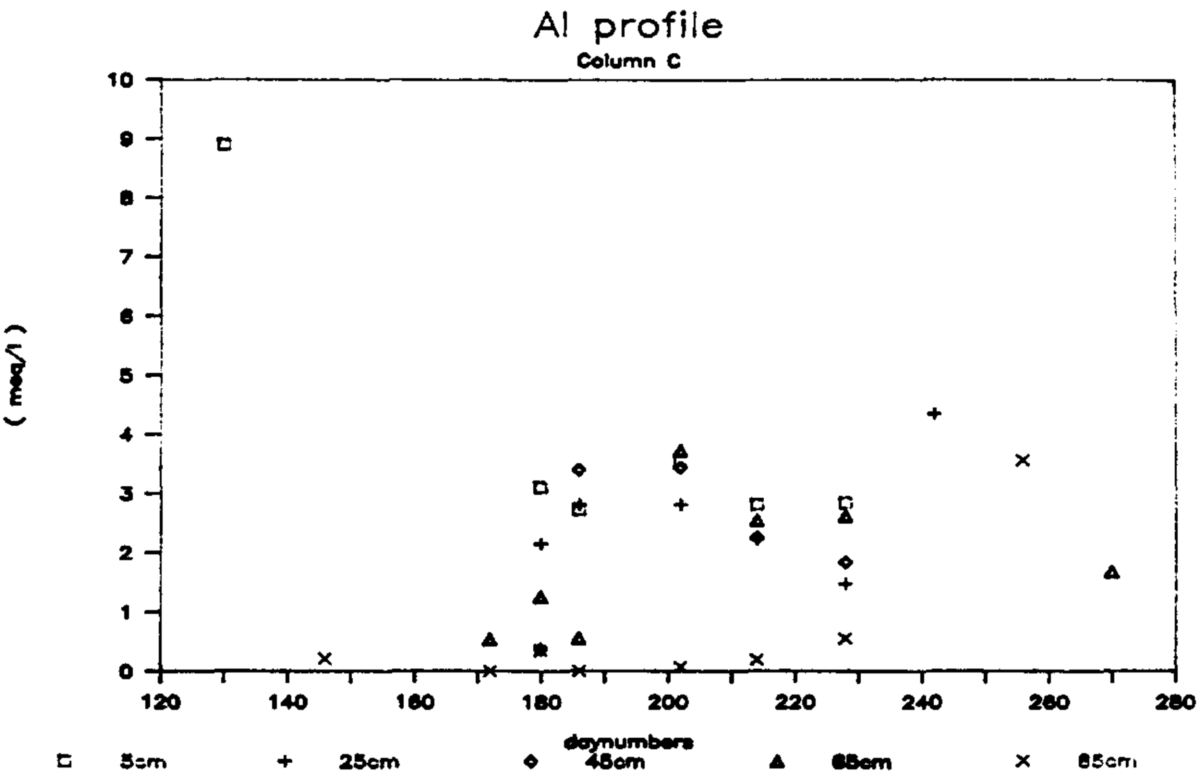

Mn profile
Column G
5
4
3
2
1
0
(meq/l)
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm



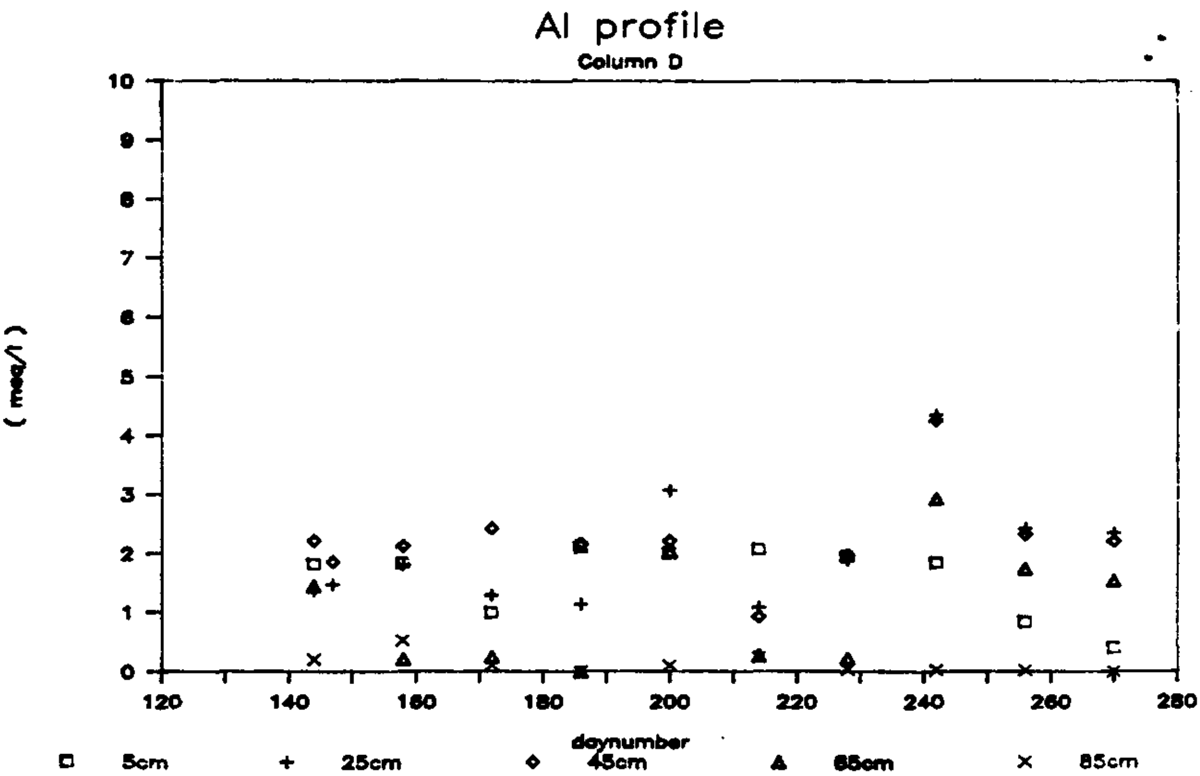
Al profile
Column A
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm



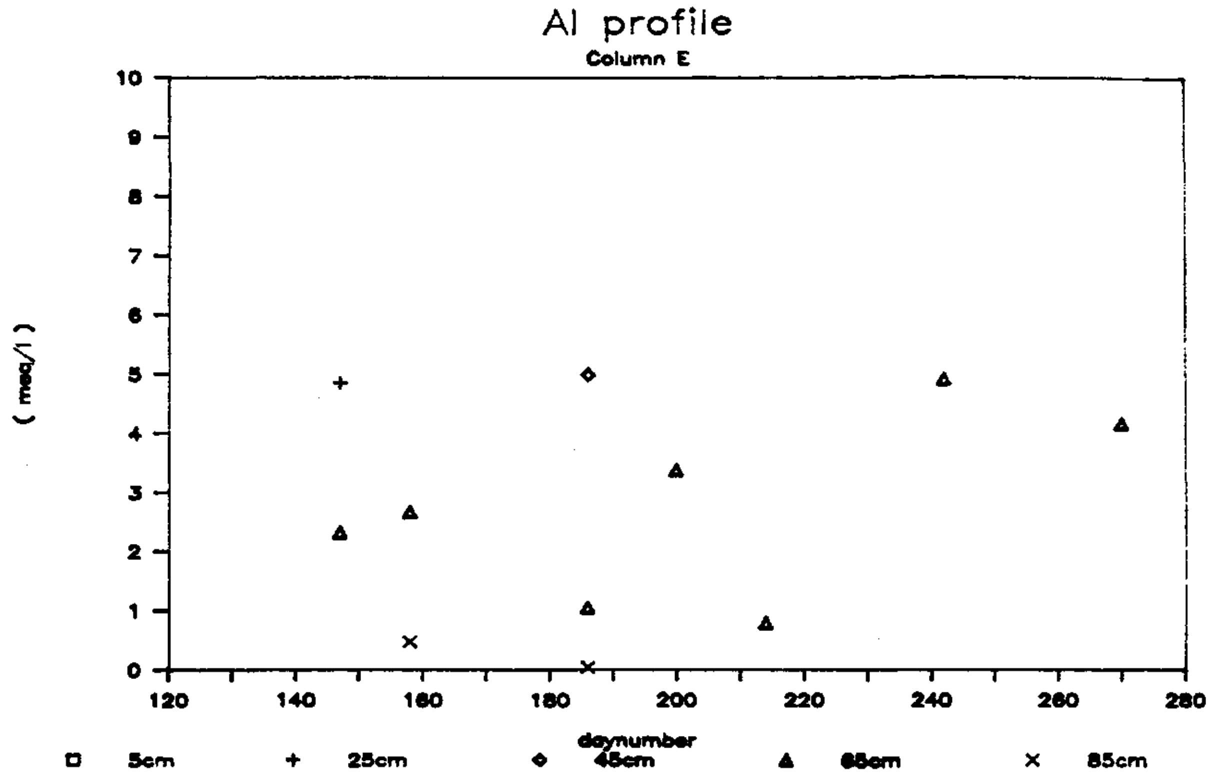
Al profile
Column B
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm

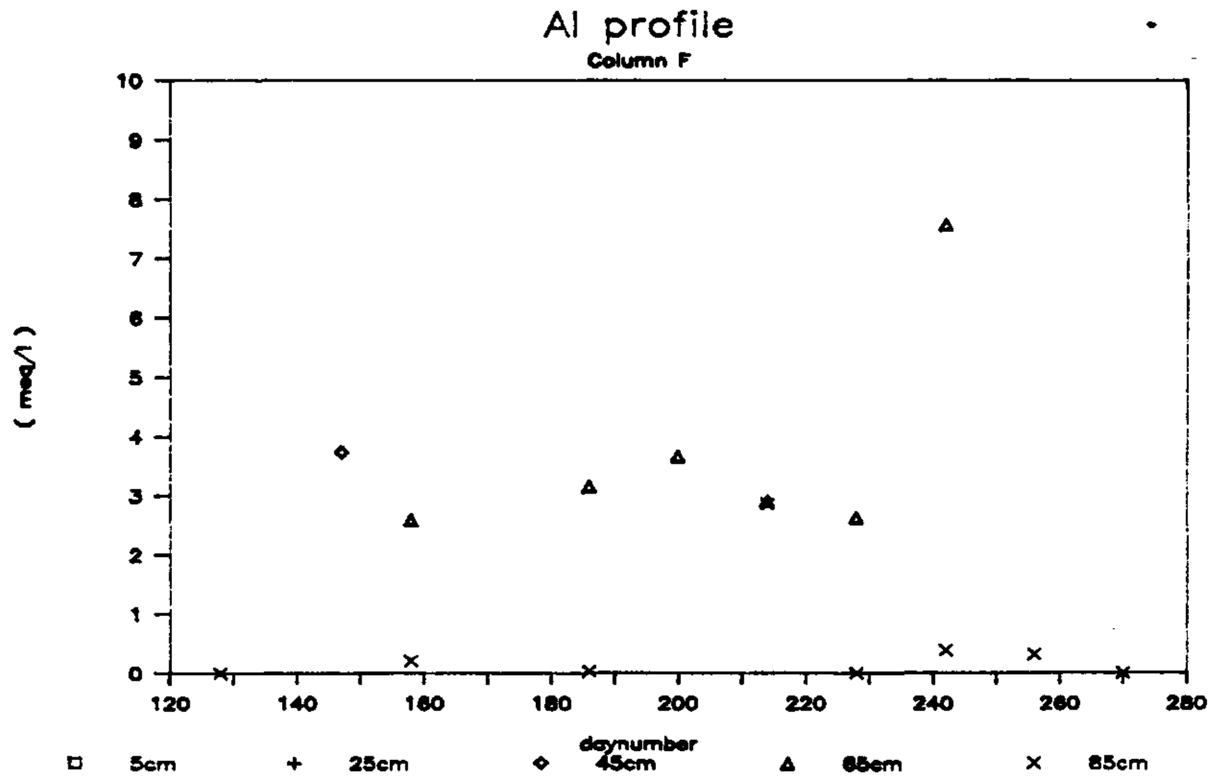


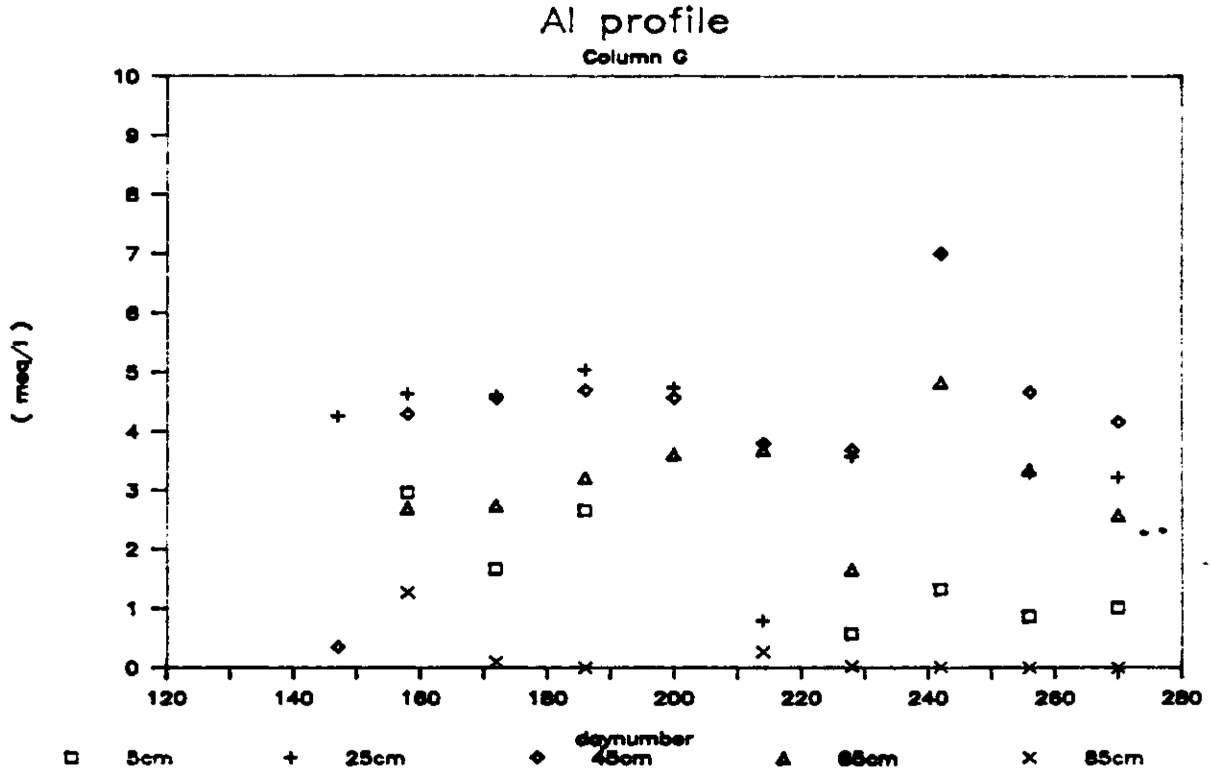
Al profile
Column C
(meq/l)
0
1
2
3
4
5
6
7
8
9
10
120
140
160
180
200
220
240
260
280
daynumbers
5cm
25cm
45cm
65cm
85cm



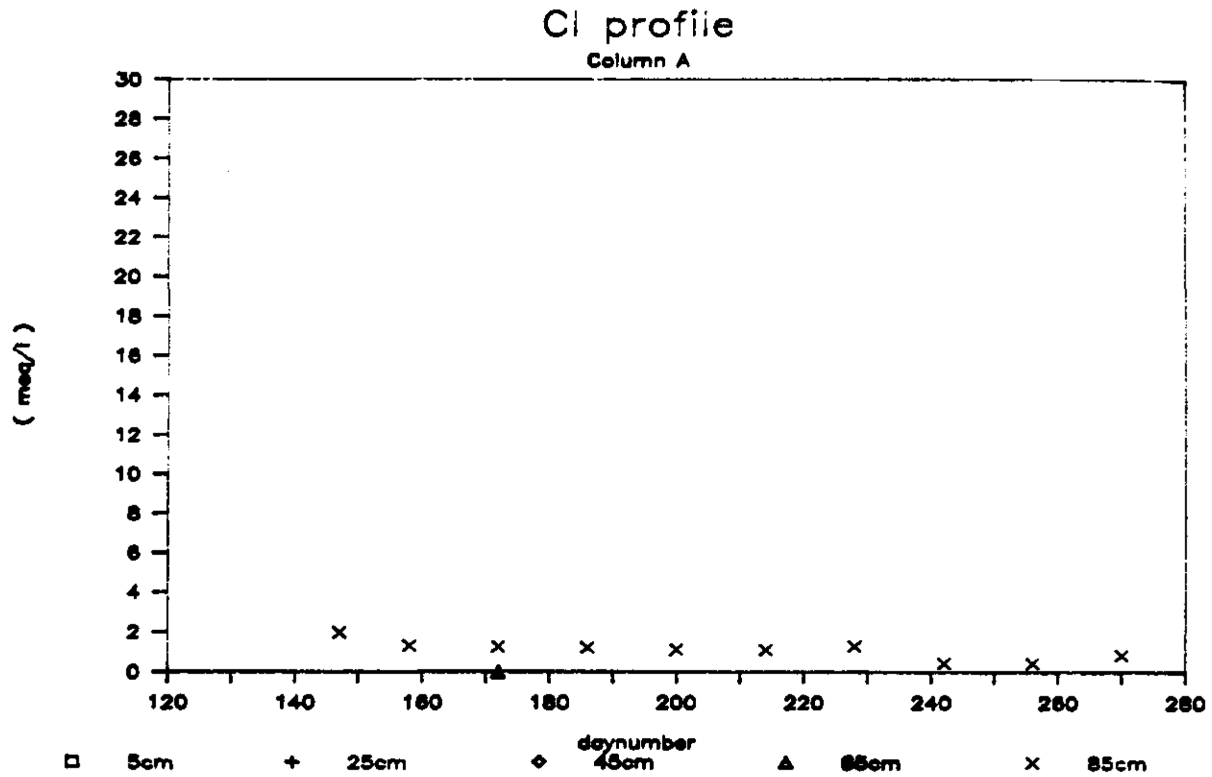
Al profile
Column D
(meq/l)
0
1
2
3
4
5
6
7
8
9
10
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm

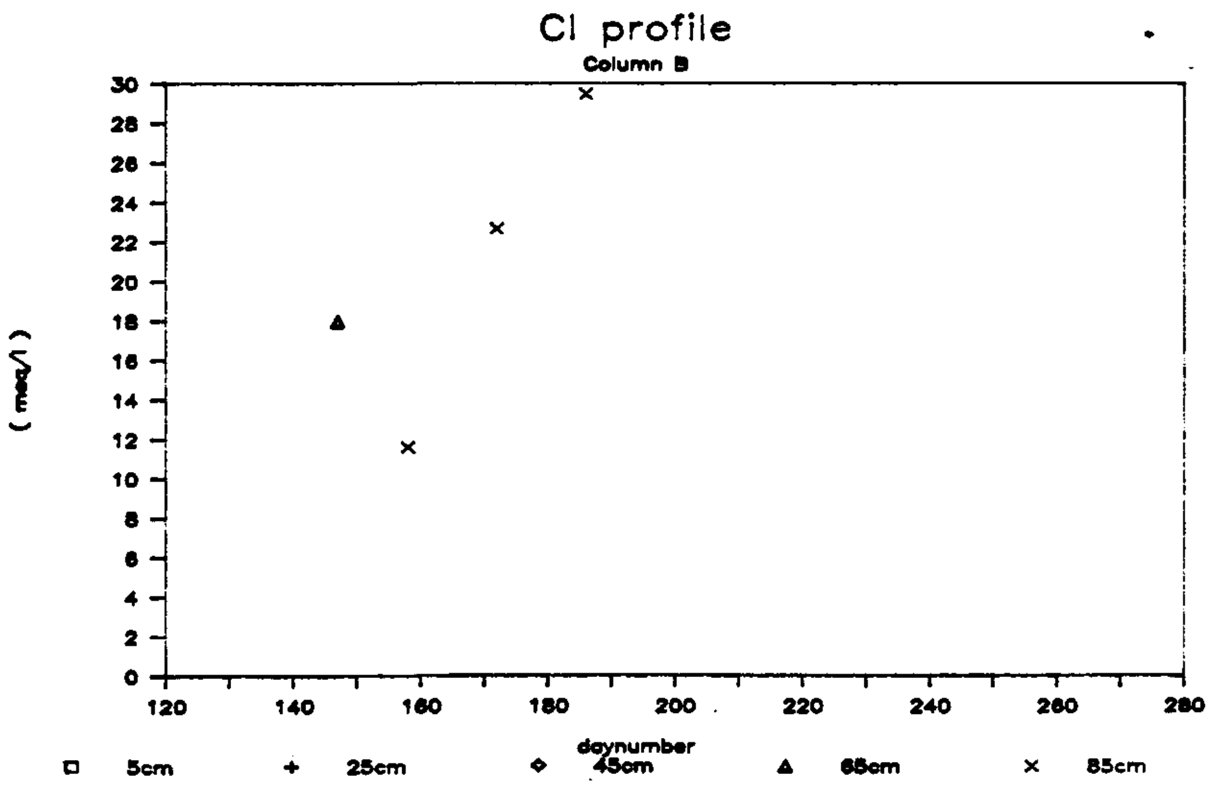

Al profile
Column E
10
9
8
7
6
5
4
3
2
1
0
(meq/l)
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm

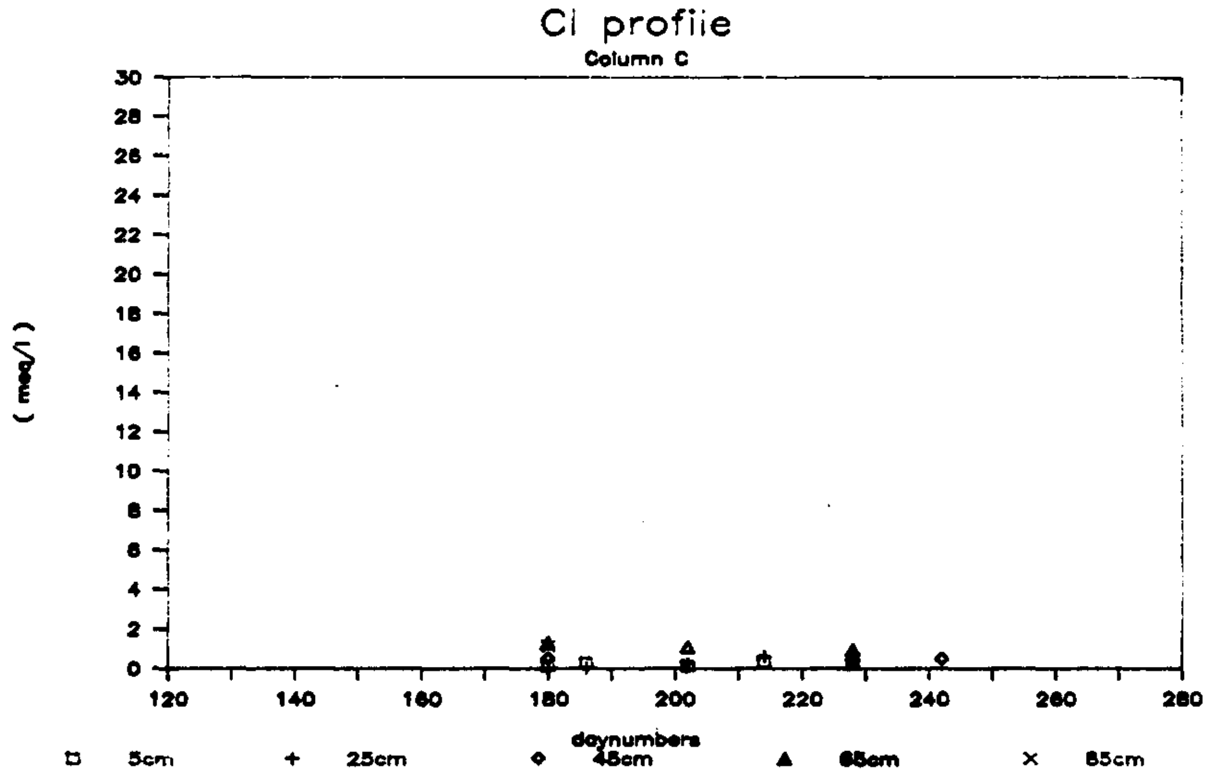

Al profile
Column F
10
9
8
7
6
5
4
3
2
1
0
(meq/l)
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm

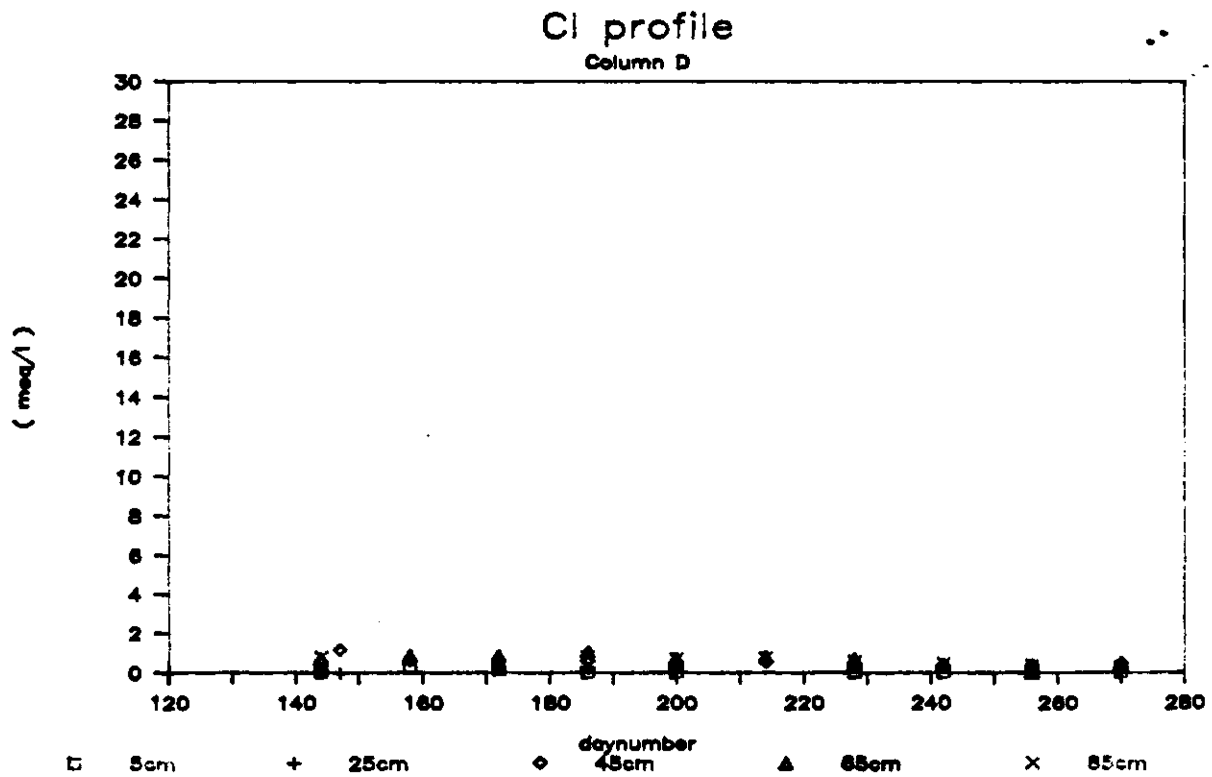


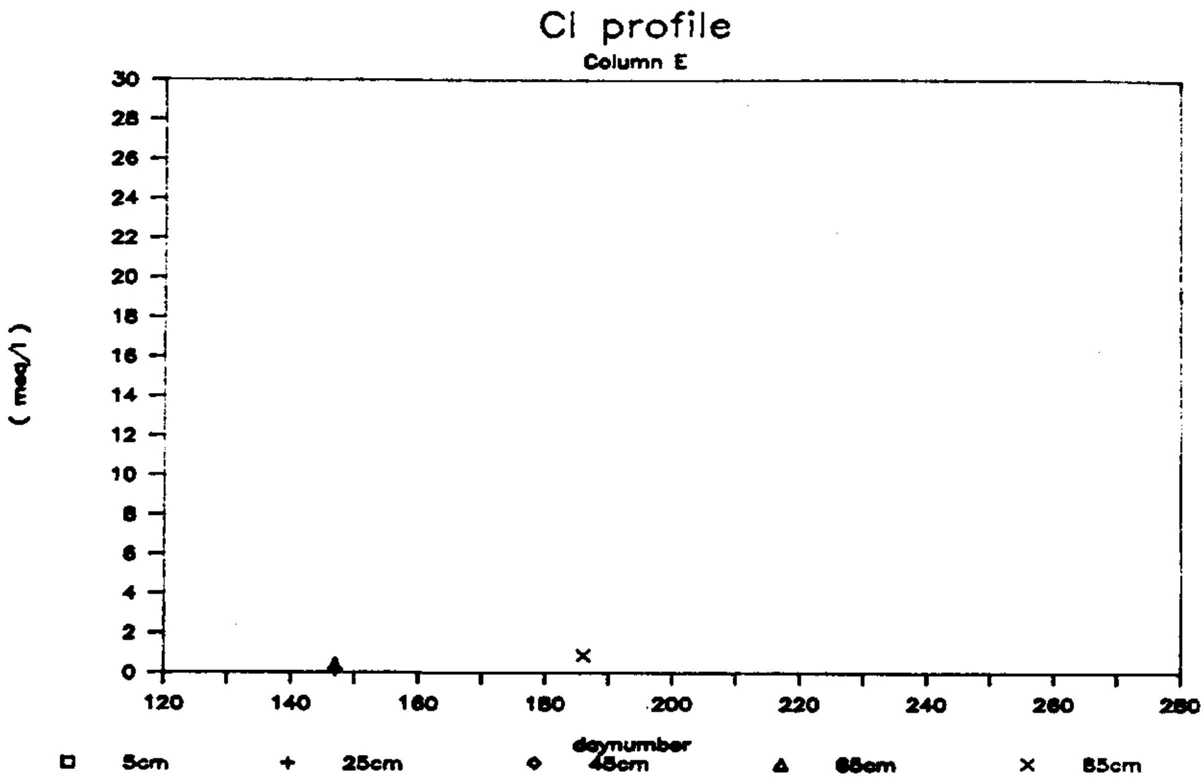
Al profile
Column C
(meq/l)
10
9
8
7
6
5
4
3
2
1
0
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm


Cl profile
Column A
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm

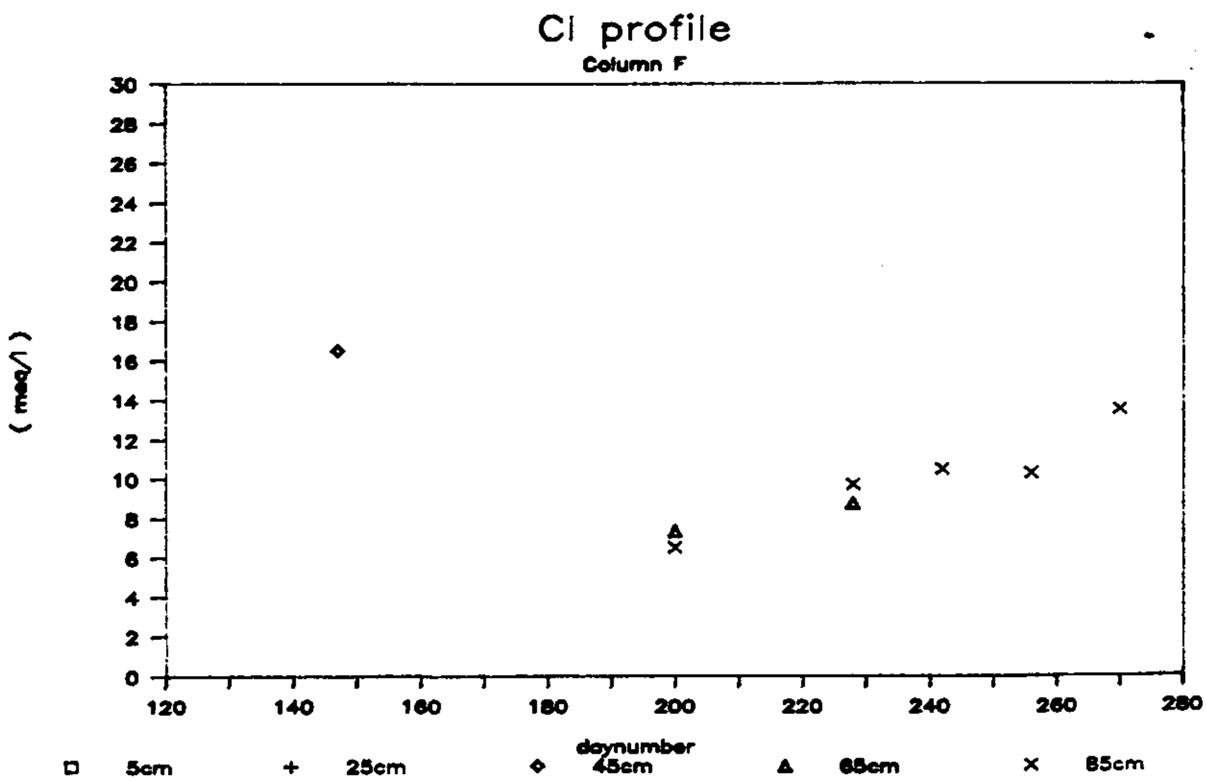

Cl profile
Column B
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm


Cl profiie
Column C
(meq/l)
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
120
140
160
180
200
220
240
260
280
daynumbers
5cm
25cm
45cm
65cm
85cm

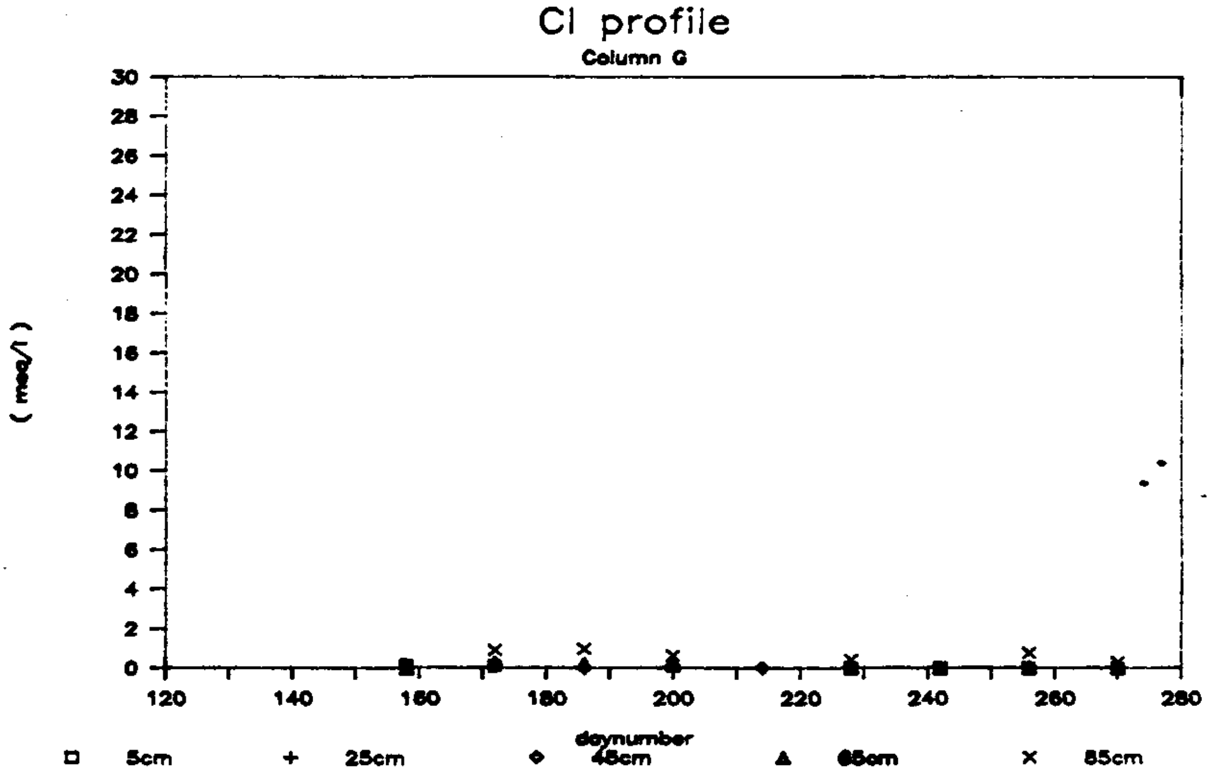

Cl profile
Column D
(meq/l)
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm



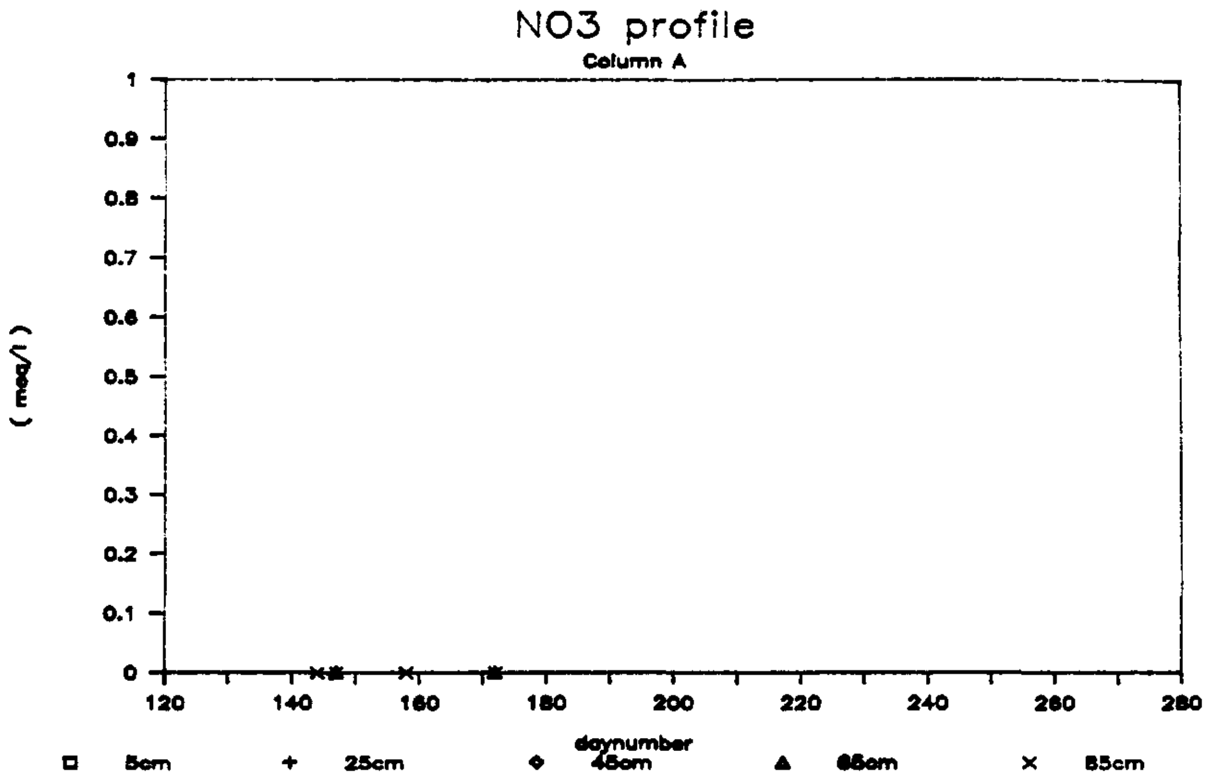
Cl profile
Column E
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm

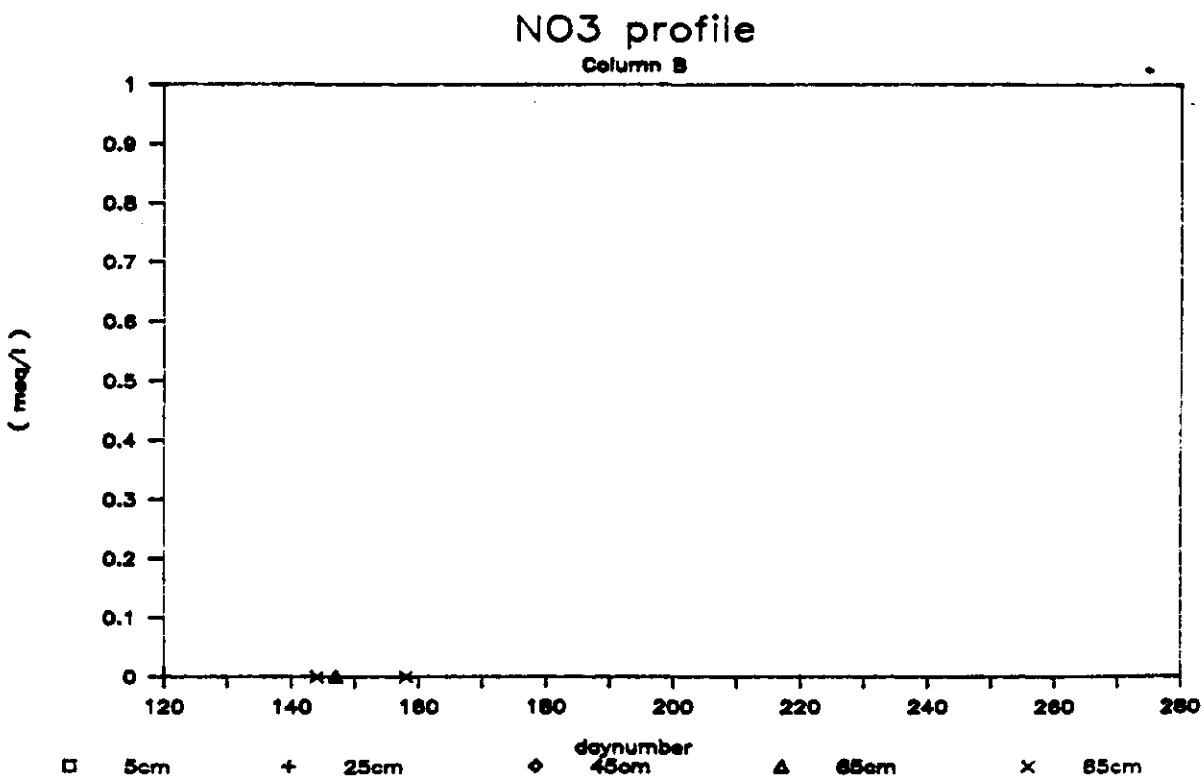


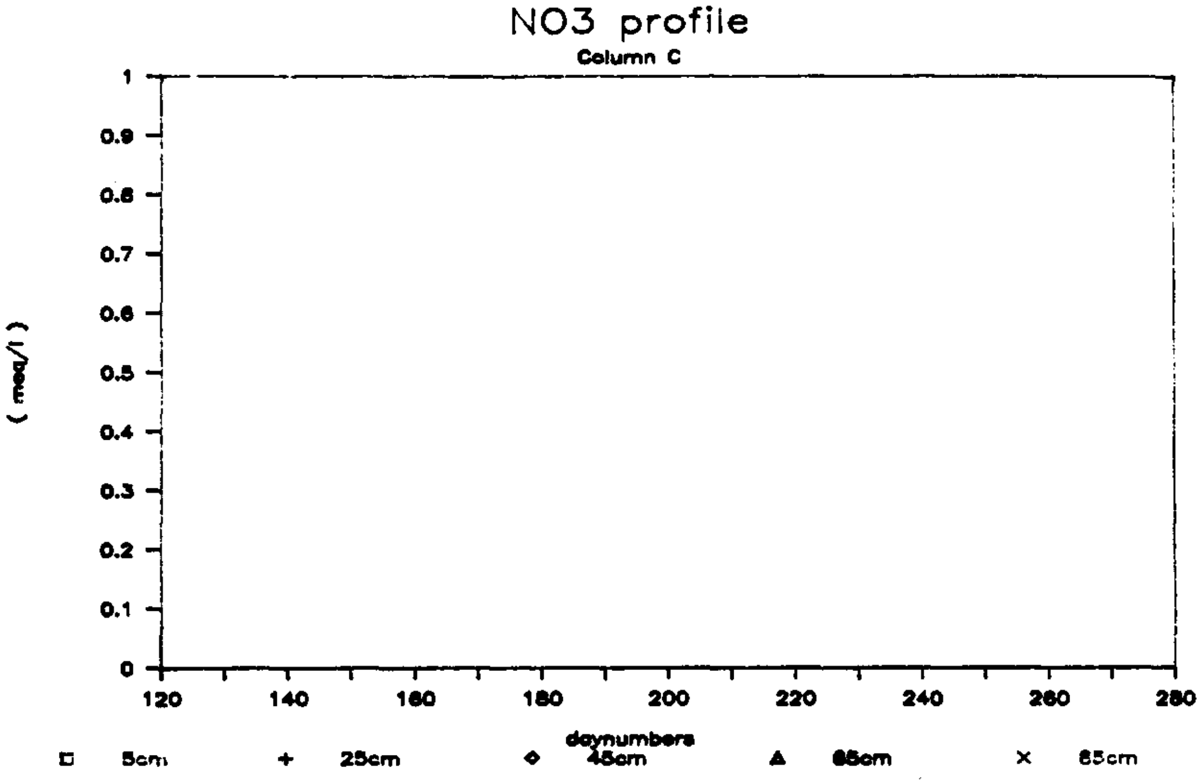
Cl profile
Column F
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm

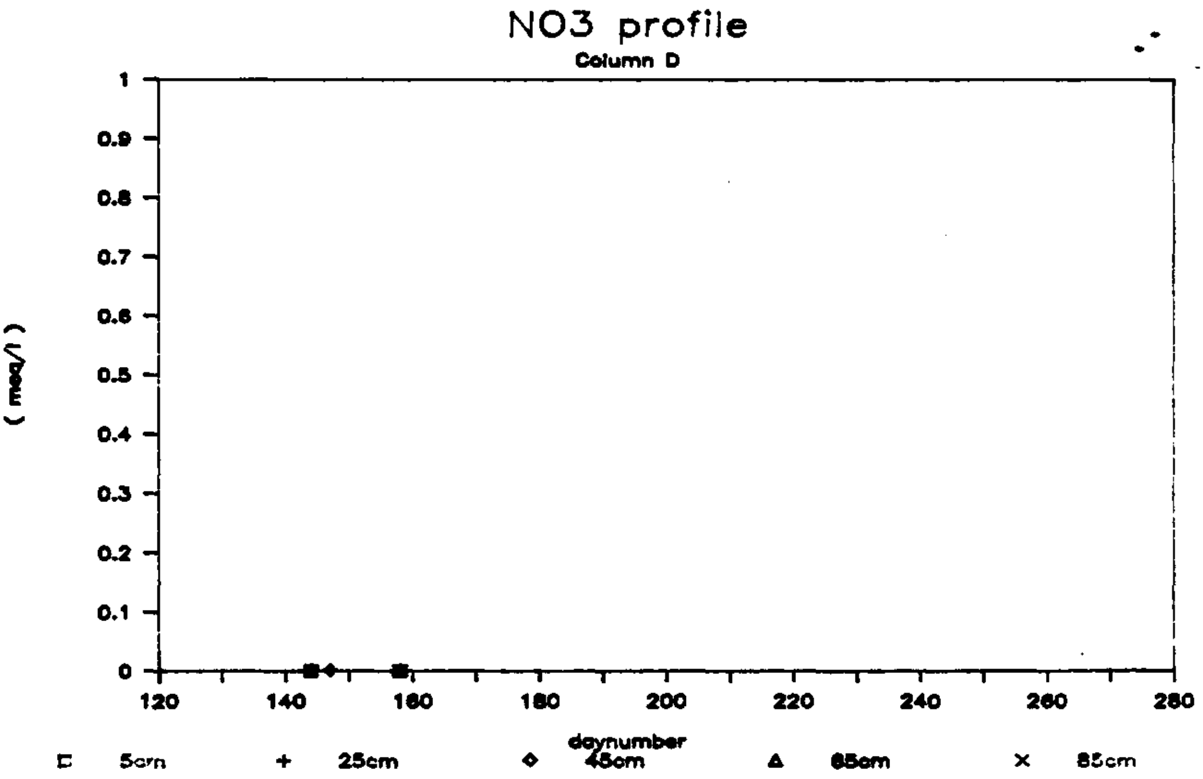


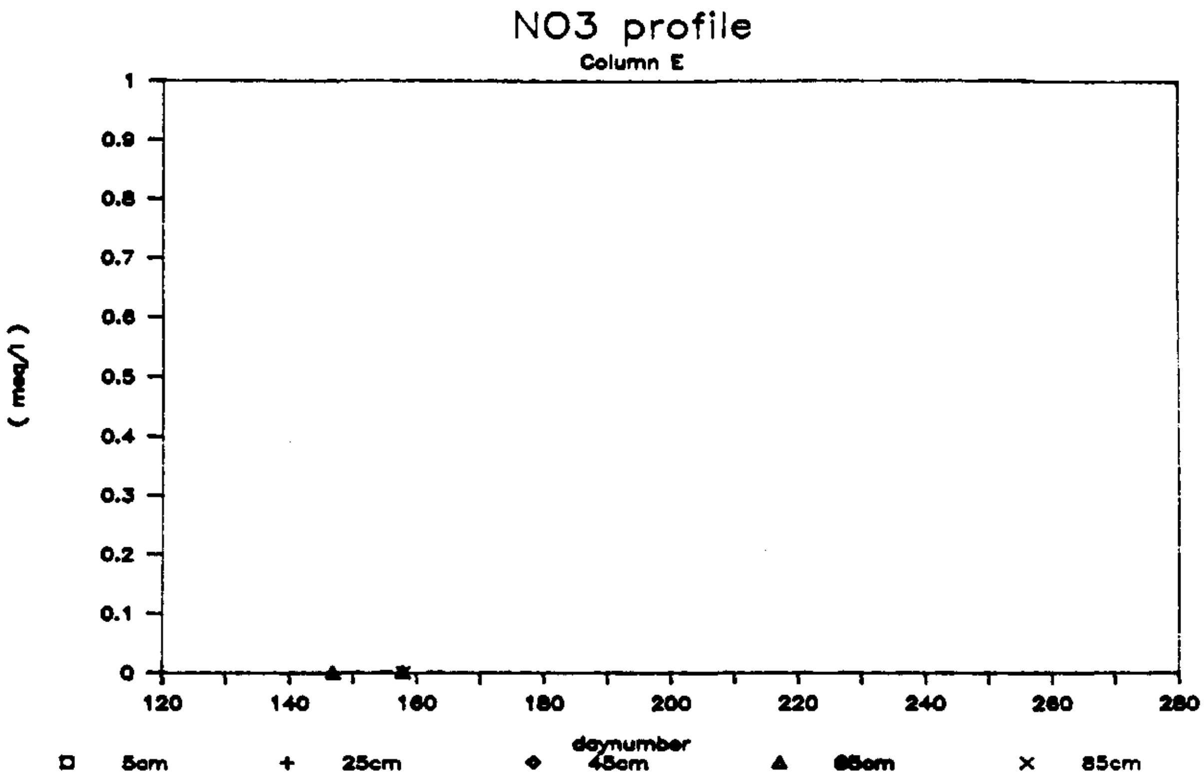
Cl profile
Column G
(meq/l)
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm

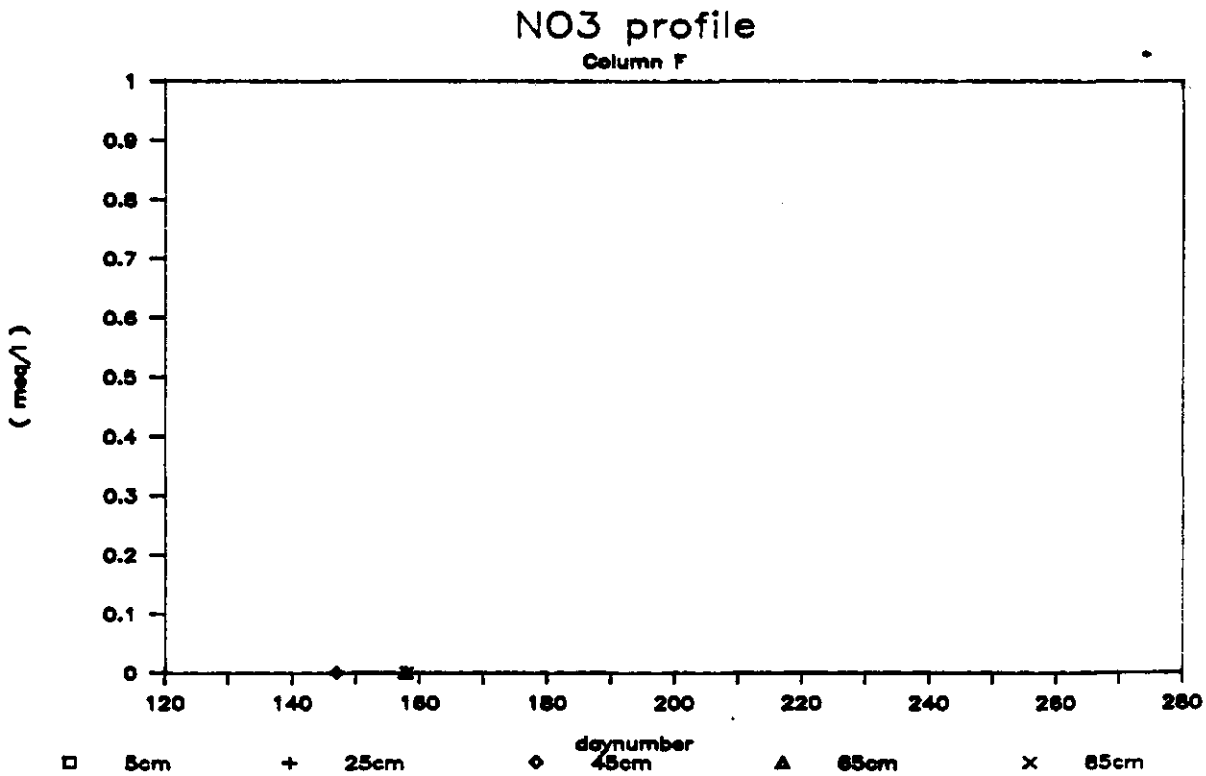

NO3 profile
Column A
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm

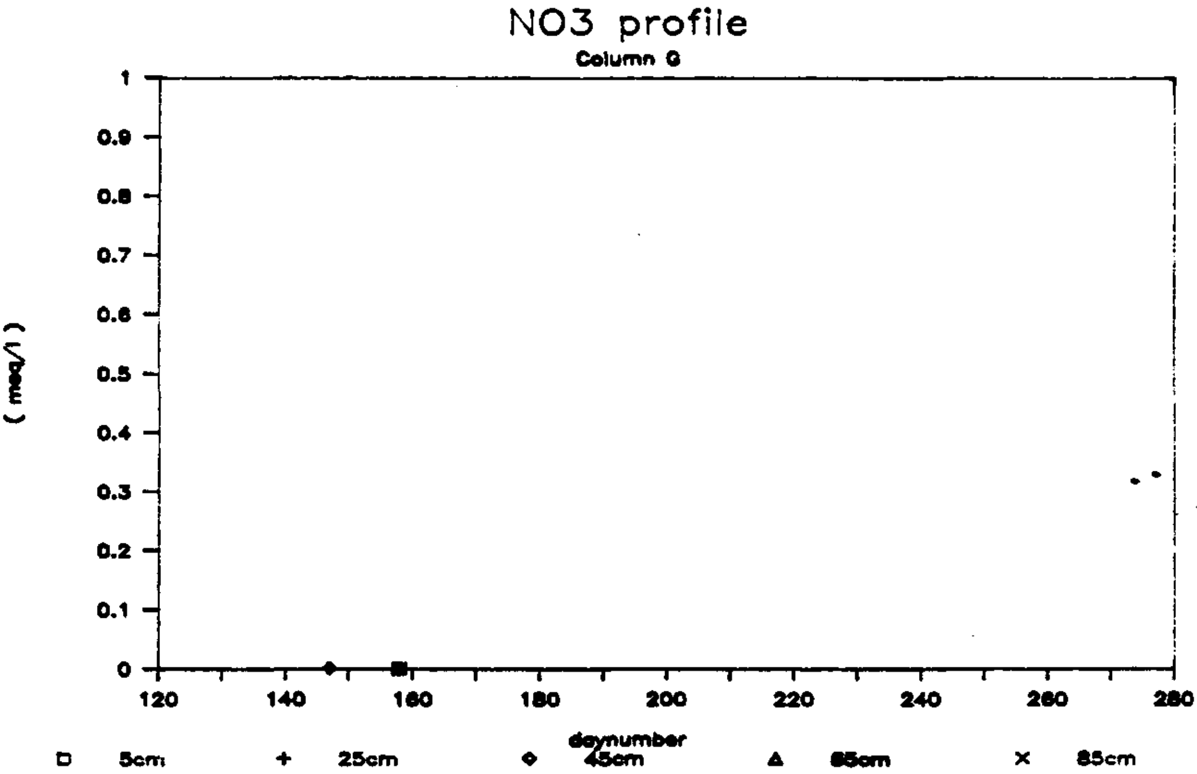

NO3 profile
Column B
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm

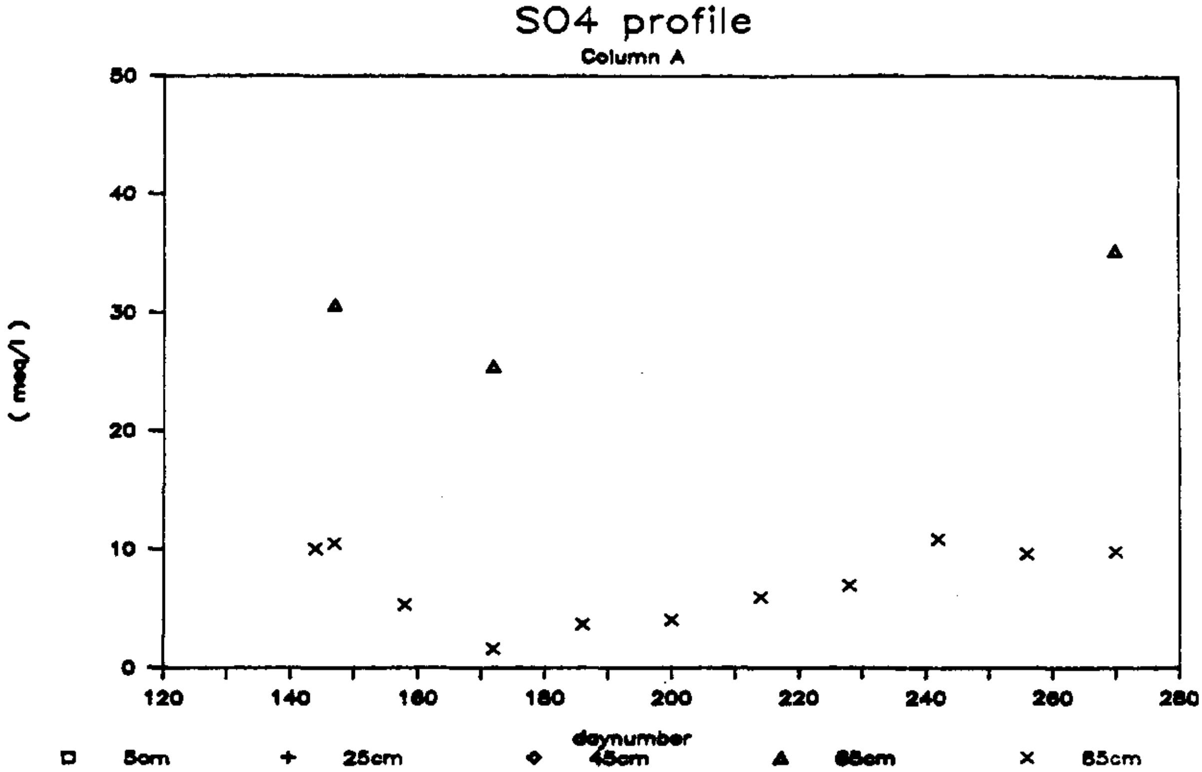

NO3 profile
Column C
(meq/l)
daynumbers
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
120
140
160
180
200
220
240
260
280
5cm
25cm
45cm
65cm
85cm

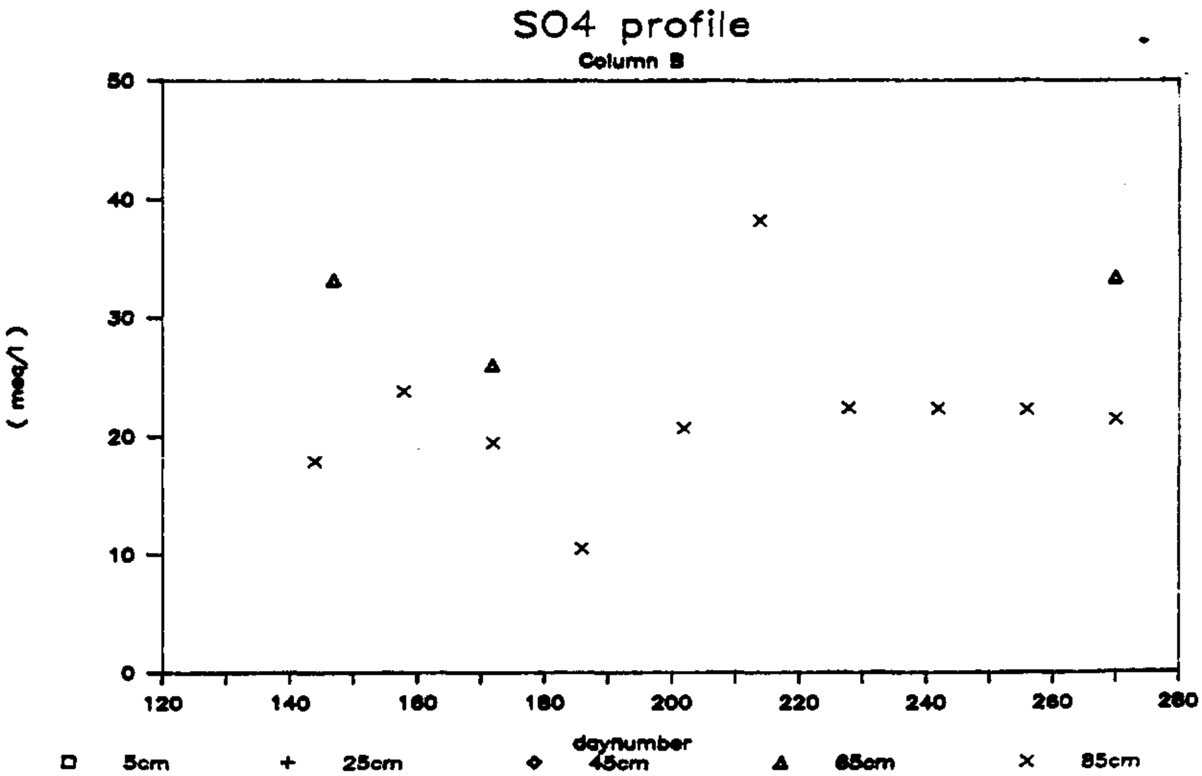

NO3 profile
Column D
(meq/l)
daynumber
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
120
140
160
180
200
220
240
260
280
5cm
25cm
45cm
65cm
85cm

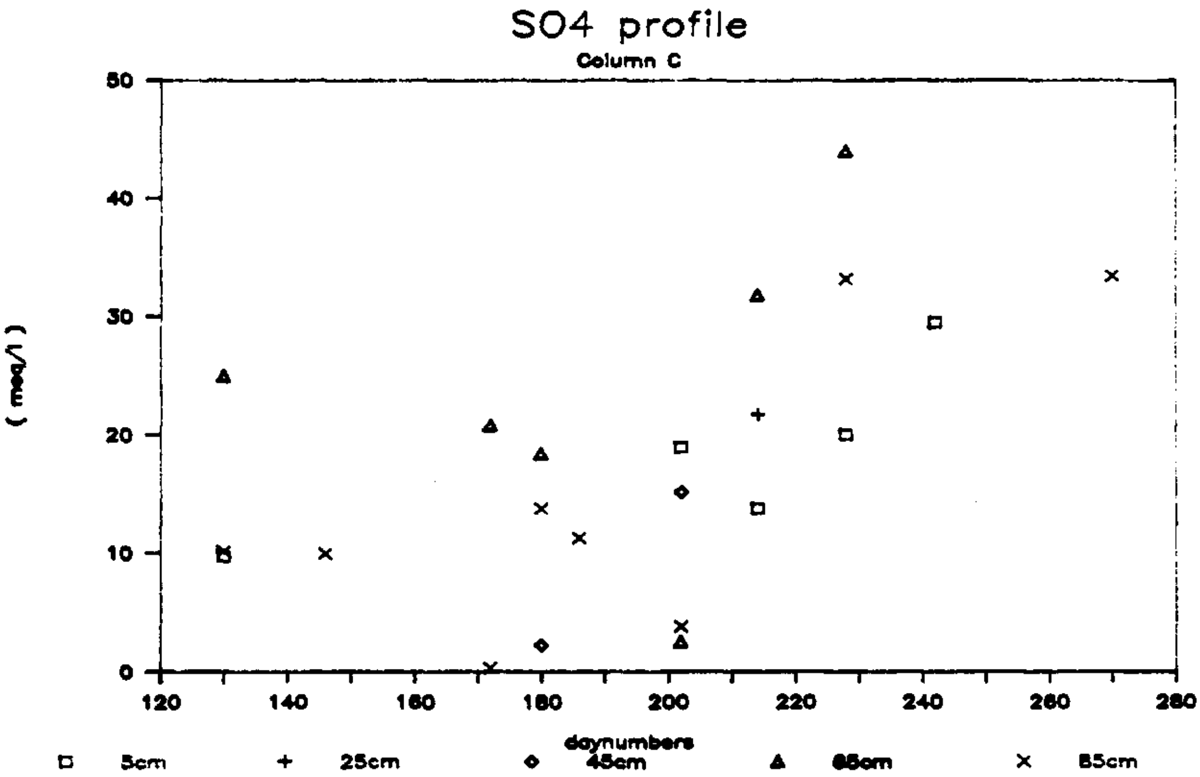

NO3 profile
Column E
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm

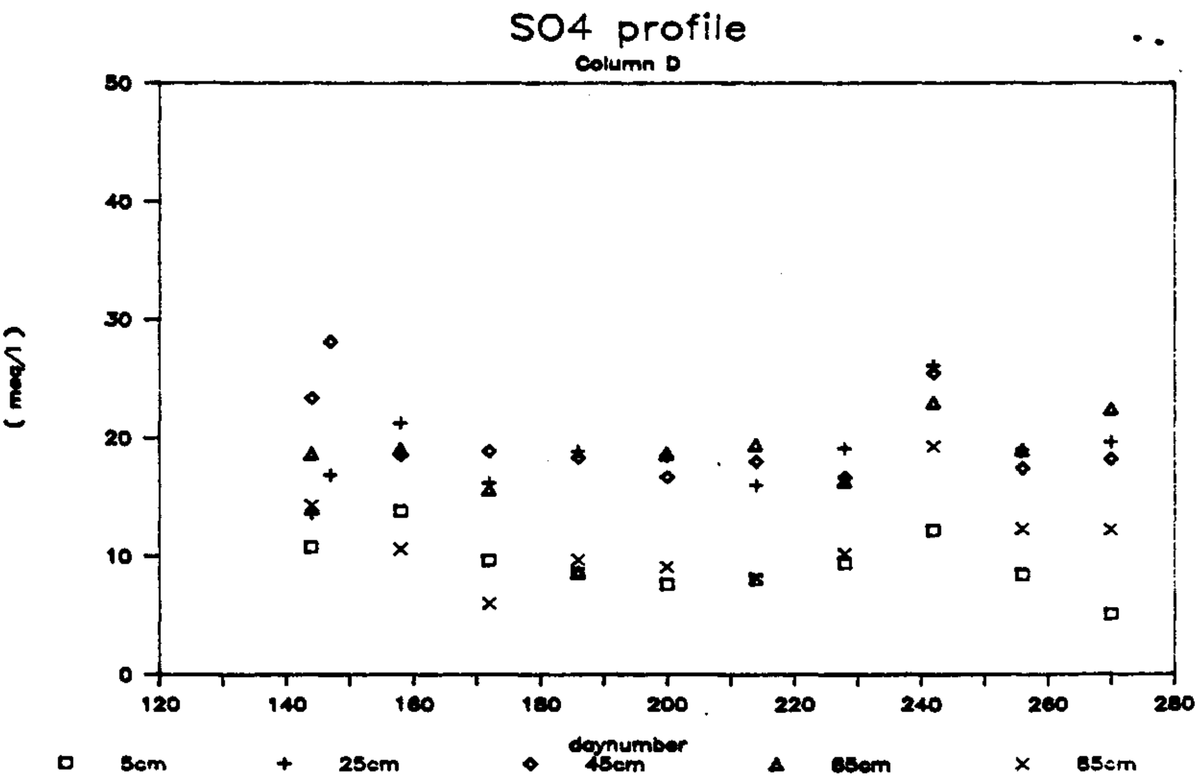

NO3 profile
Column F
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm

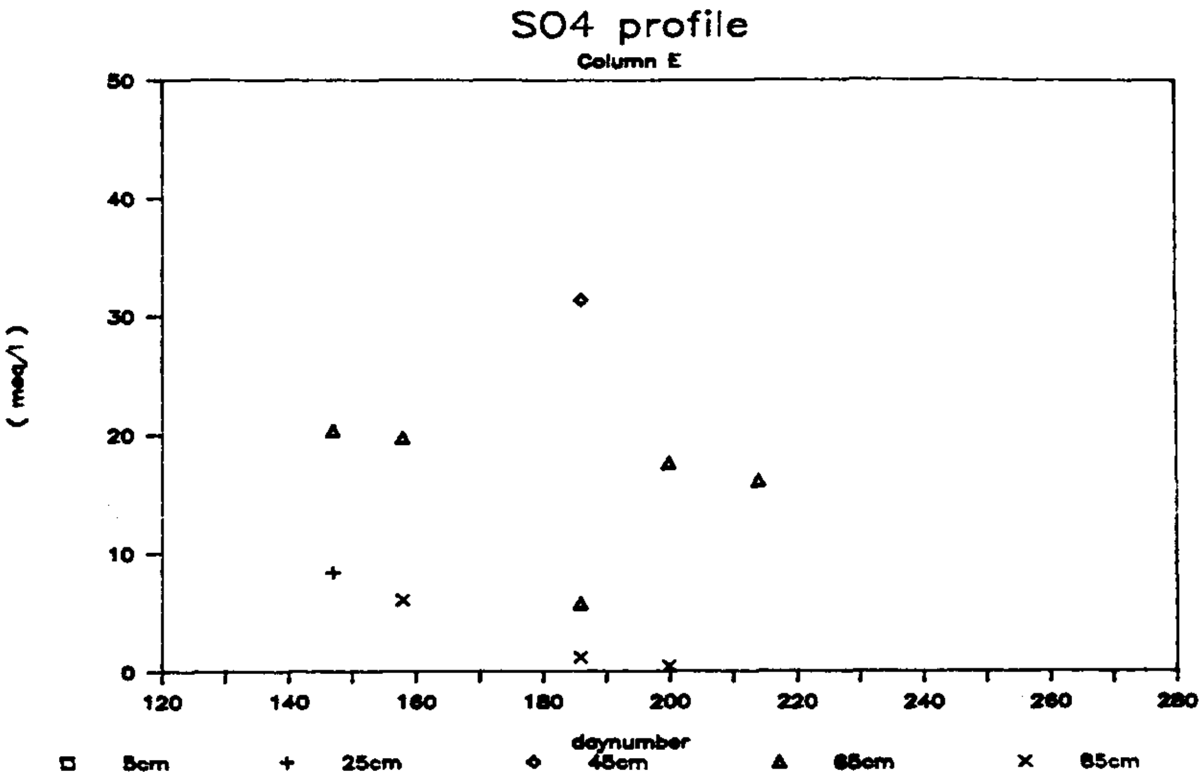

NO3 profile
Column G
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm

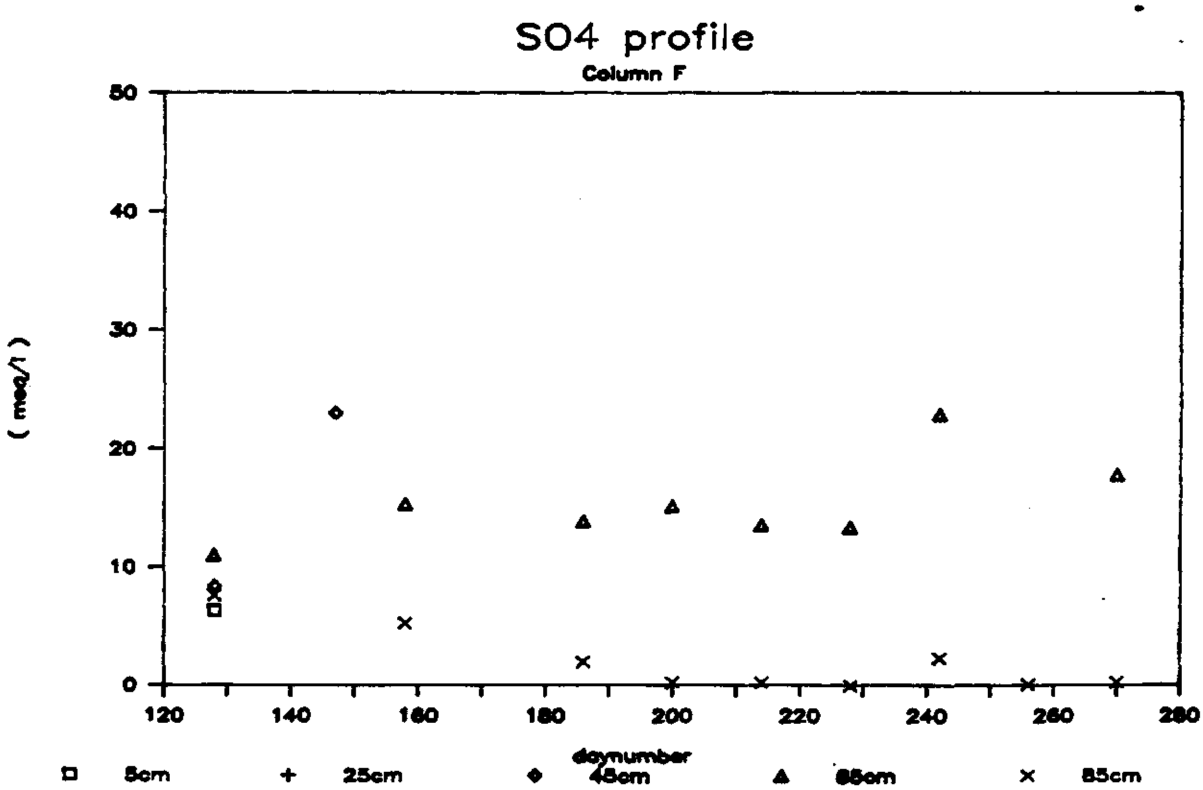

SO4 profile
Column A
(meq/l)
50
40
30
20
10
0
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm

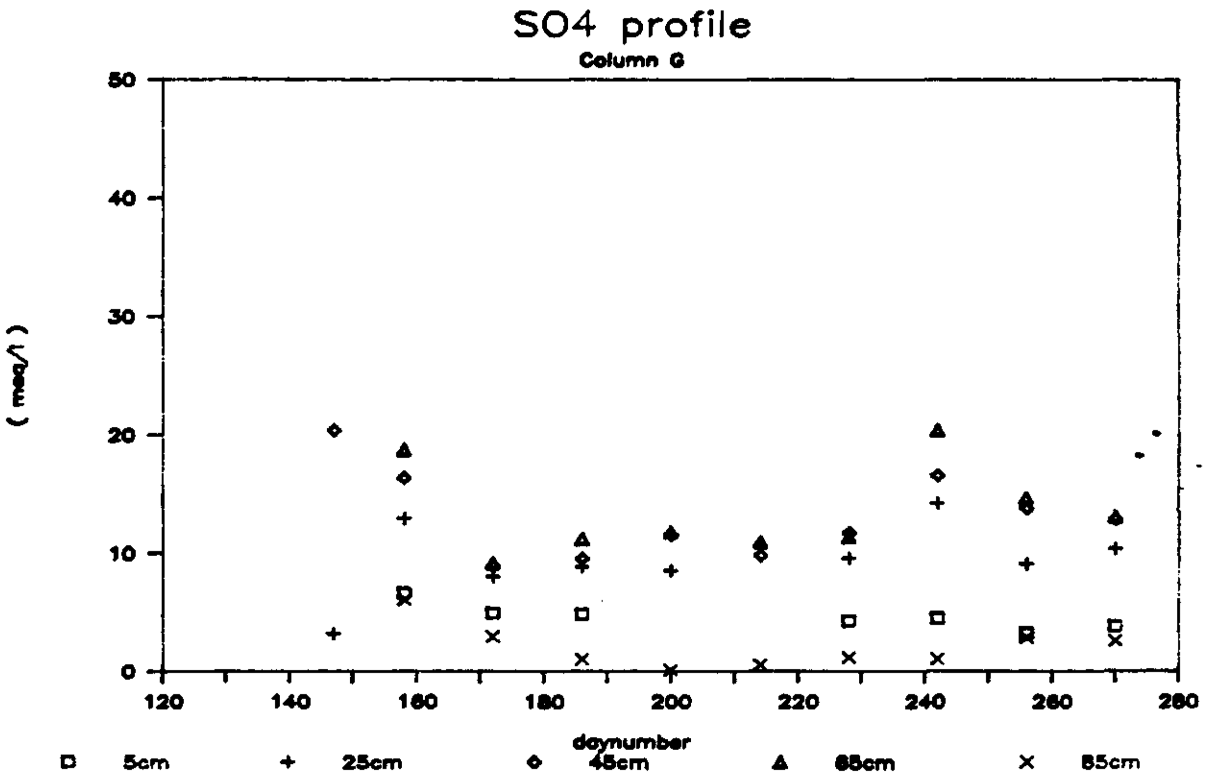

SO4 profile
Column B
(meq/l)
50
40
30
20
10
0
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm


SO4 profile
Column C
50
40
30
20
10
0
(meq/l)
120
140
160
180
200
220
240
260
280
daynumbers
5cm
25cm
45cm
65cm
85cm

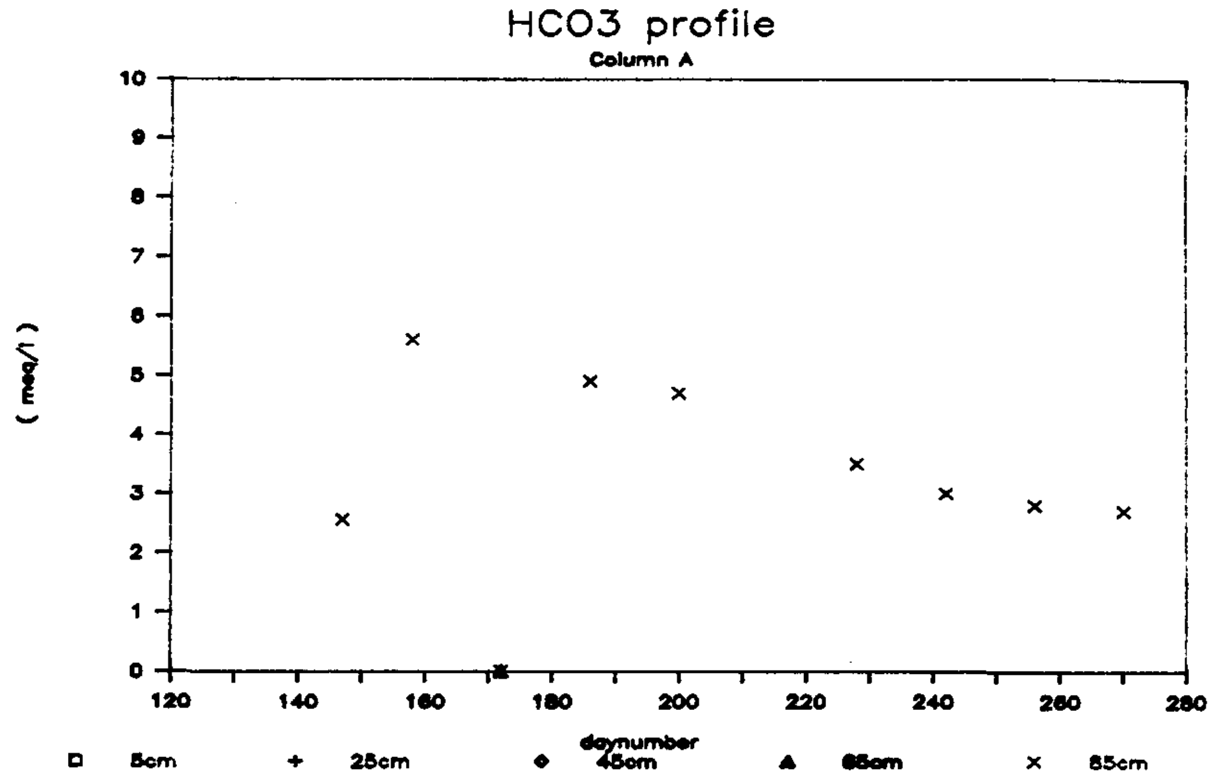

SO4 profile
Column D
50
40
30
20
10
0
(meq/l)
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm


SO4 profile
Column E
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm

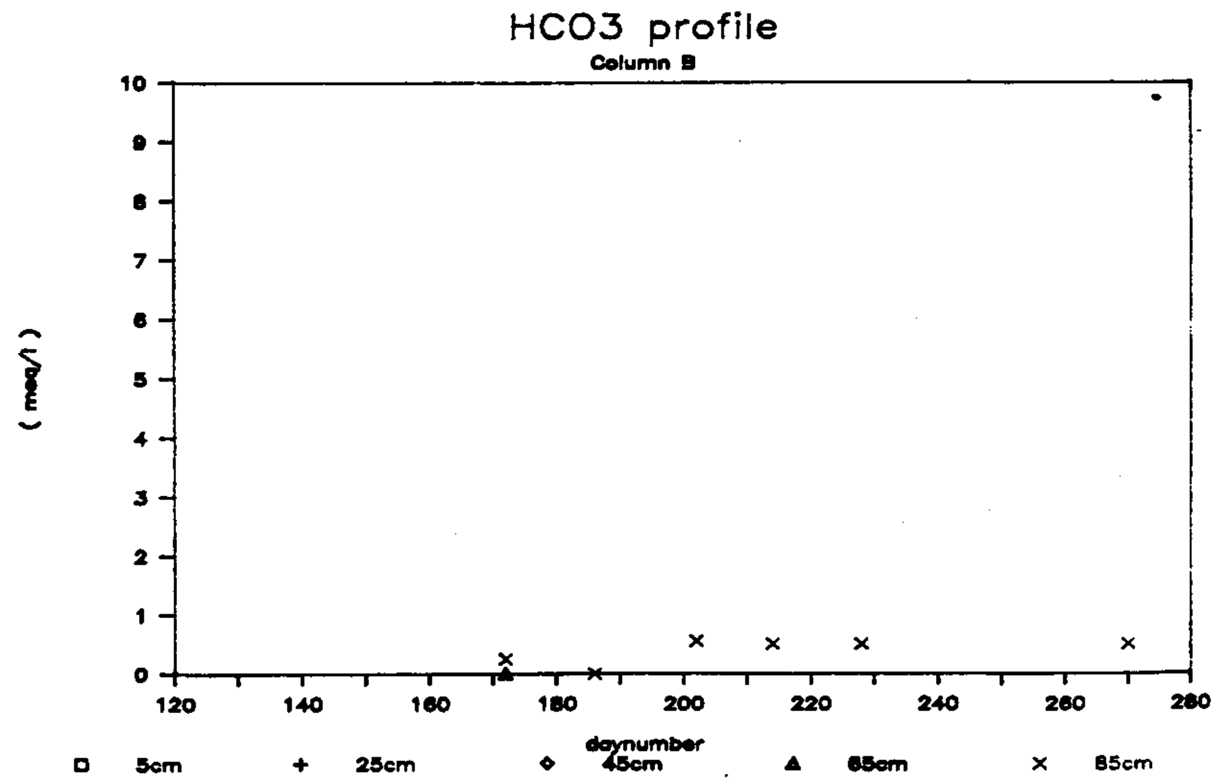

SO4 profile
Column F
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm



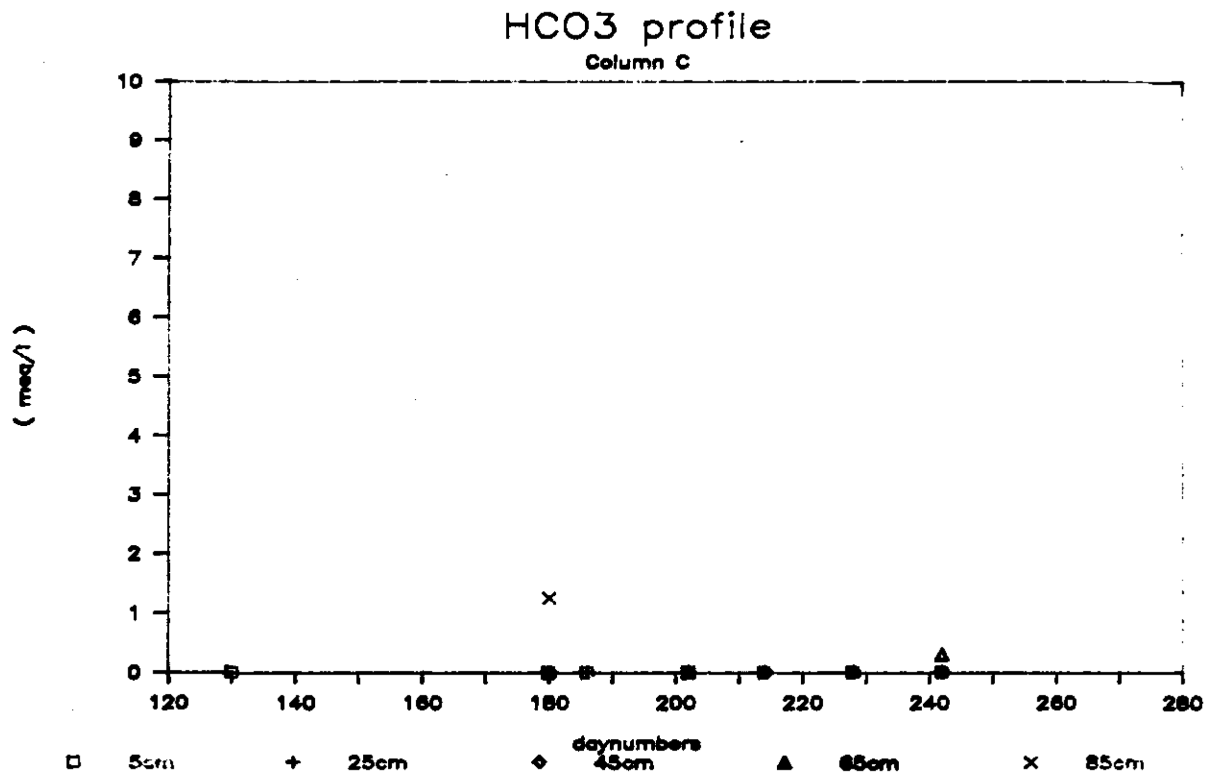
SO4 profile
Column G
50
40
30
20
10
0
(meq/l)
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm

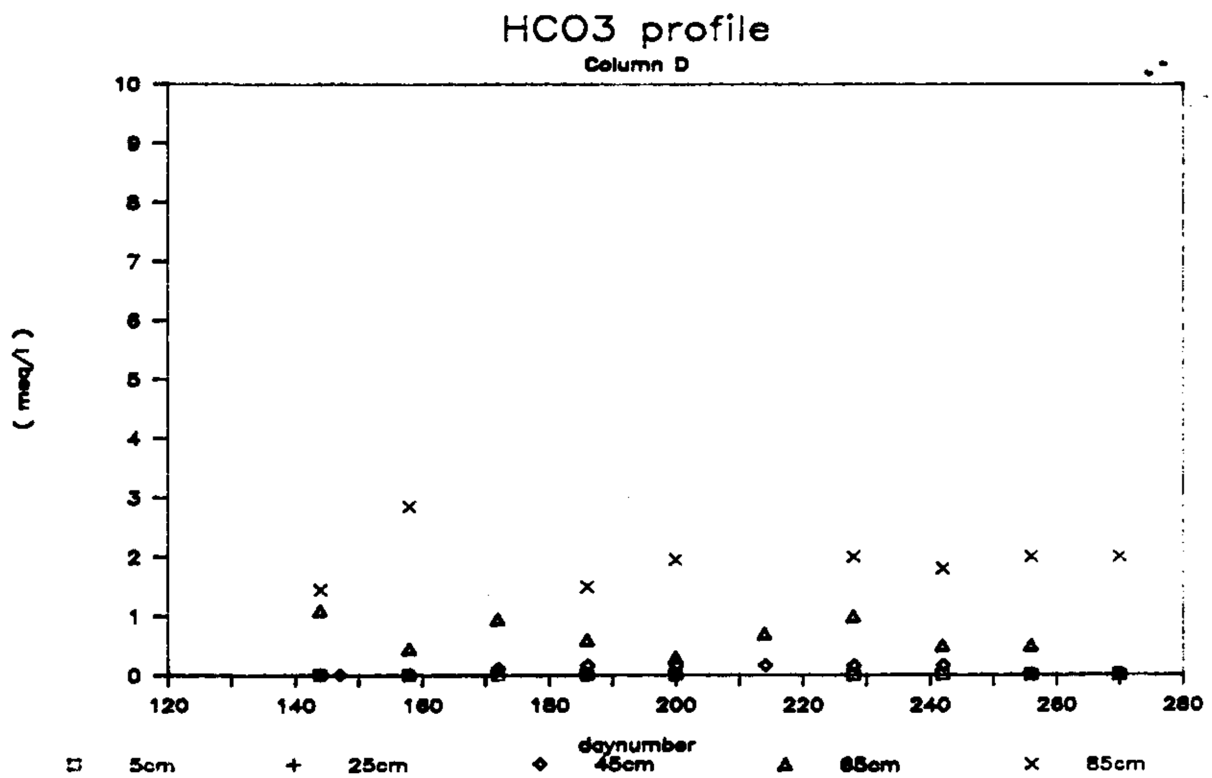


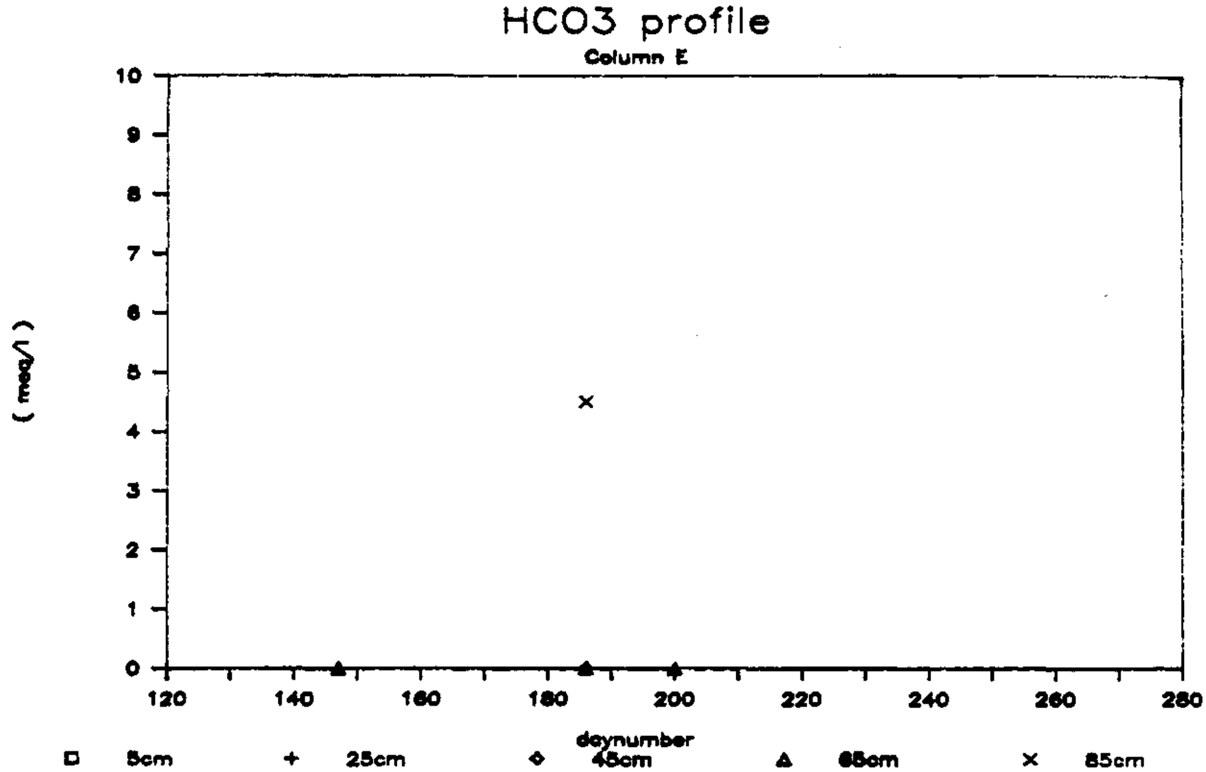
HCO3 profile
Column A
10
9
8
7
6
5
4
3
2
1
0
(meq/l)
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm

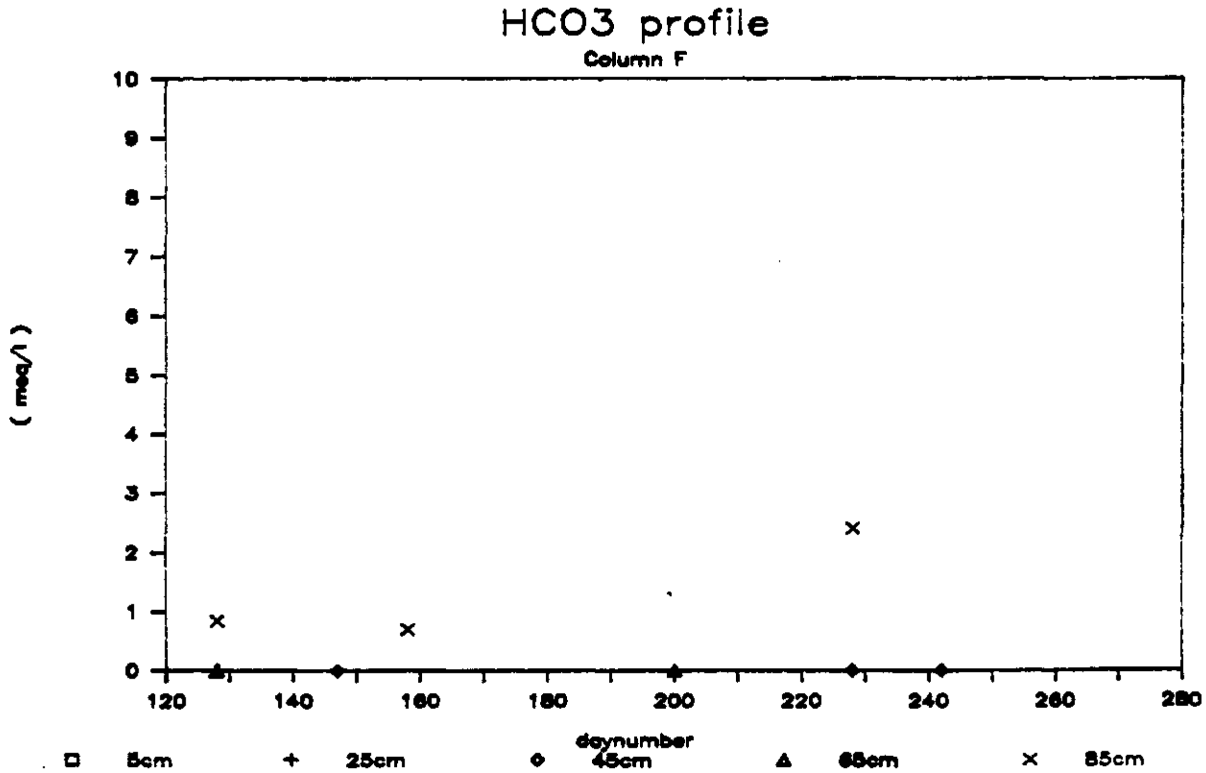


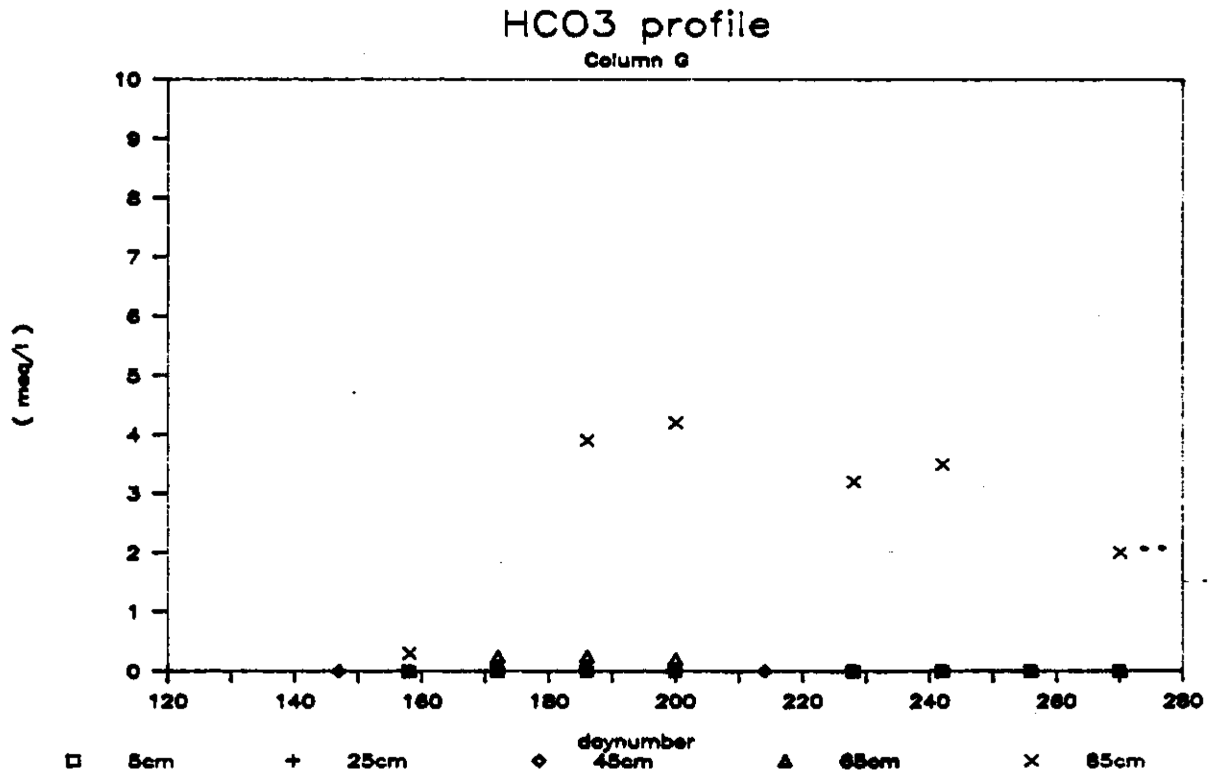
HCO3 profile
Column B
10
9
8
7
6
5
4
3
2
1
0
(meq/l)
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm


HCO3 profile
Column C
10
9
8
7
6
5
4
3
2
1
0
(meq/l)
120
140
160
180
200
220
240
260
280
daynumbers
5cm
25cm
45cm
65cm
85cm


HCO3 profile
Column D
10
9
8
7
6
5
4
3
2
1
0
(meq/l)
120
140
160
180
200
220
240
260
280
daynumber
5cm
25cm
45cm
65cm
85cm


HCO3 profile
Column E
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm


HCO3 profile
Column F
(meq/l)
daynumber
5cm
25cm
45cm
65cm
85cm


HCO3 profile
Column G
(meq/l)
daynumber
0
1
2
3
4
5
6
7
8
9
10
120
140
160
180
200
220
240
260
280
5cm
25cm
45cm
65cm
85cm

3.4.4. Chemical composition of drainage water

COLUMN A
QUALITY OF DRAINAGE WATER

O2 in mg/l; EC in mS/m; cations and anions in meq/l

DATE	pH	HCO3-	O2	EC	Fe2+	Mn2+	Na+	K+	Ca2+	Mg2+	Al3+	Cl-	NO3-	SO42-	Sum+	Sum-
144	6,49	4,75	3,3	1485	1,89	0,05	4,49	0,13	1,54	13,7	0,19	1,05	0	10,9		
145	6,79	2,1	5,6	1400	1,04	0,09	4,26	0,21	1,84	3,29	0,21	1,4	0	13,3	10,94	16,77
153	6,65	3,15	3,2	1337	0,66	0,02	4,19	0,39	1,83	11,4	0,23	1,15		8,8	18,75	13,1
158	6,72	5	1,9	1242	0,17	0,05	1,72	0,16	0,81	13,71	0,05	1,25		8,72	16,67	14,97
159	7,58	3,75	4,8	1214	0,61	0,05	69,92	1,08	1,03	12,7	0,11	0,9		12,48	85,5	17,13
160	6,6	0,75	3,7	1438	1,86	0,08	15,89	0,87	1,52	13,04	0,23	1,1		13,05	33,49	14,9
163	6,82	0,5	6,9	1689	3,1	0,18	2,57	0,22	1,75	2,36	0,43	1		19,62	10,61	21,12
165	6,82	0,85	4,6		3	0,2	2,89	0,21	1,56	15,9	0,24	0,9		19,91	24	21,66
167	6,82	1,5	2,7	1648	1,96	0,12	2,83	0,17	2,45	12,75	0,27	0,85		18,28	20,55	20,63
172	7,09	1,85	3,4	1559	1,07	0,12	2,38	0,15	1,69	10,59	0,27	1		8,18	16,27	10,03
173	7,26	1,8	7,7	1569	0,88	0,11	3,48	0,13	1,76	9,74	0,01	1,25		11,09	16,11	14,14
179	7,12	2,25	4,1	1588	1,1	0,13	2,44	0,13	1,7	8,34	0,01	1		13,33	13,85	16,58
180	7,04	2	6	1495	0,63	0,11	2,6	0,19	1,51	7,25	0,3	1,1		19,63	12,59	22,73
186	7,2	3	2,9	1465	0,77	0,11	2,87	0,1	1,61	5,71	0,08	1,01		14,64	11,25	18,65
188	7,33	2,4	8,6	1415	0,46	0,12	2,63	0,11	1,33	3,4	0,34	0,96		10,14	8,39	13,5
189	7,15	2,5	6,7	1557	0,71	0,12	1,32	0,08	1,31	7,41	0,03	1,01		12,86	10,98	16,37
194	7,02	2,5	3,7	1590	0,78	0,09	1,86	0,12	2,57	6,38	0,005	0,91		14,77	11,80	18,18
200	6,48	3,5	3,5	1560	0,49	0,1	1,55	0,12	2,01	4,54	0,04	0,91		10,84	8,85	15,25
202	6,56	3,6	3,4	1477	0,46	0,08	1,43	0,1	1,47	4,91	0,11	1,2		7,04	8,56	11,84
207	7,4.	3,75	7,3	1506	0,86	0,09	1,51	0,11	1,18	5,54	0,14	1,3		10,08	9,43	15,13
210	7,28	2,9	3,7	1465	0,34	0,1	1,32	0,11	1,39	5,55	0,06	1,14		10,44	8,87	14,48
214	6,96	3,5	4,2	1446	0,41	0,1	2,22	0,1	1,11	4,37	0,03	0,76		8,53	8,34	12,79
216	7,06	3,4	3,9	1459	0,43	0,08	2,46	0,11	1,37	7,39	0,13	0,9		12,8	11,97	17,1
228	6,34	2,75	3,3	1666	0,8	0,14	2,72	0,12	1,48	9,35	0,23	1,38		10,91	14,84	15,04
236	7,05	3,1	4,1	1504	0,52	0,1	3,04	0,1	1,41	8,44	0,03	0,9		14,48	13,64	18,48
242	6,37	3	4,5	1641	0,89	0,12	2,14	0,11	1,61	10,45	0,25	0,76		20,46	15,57	24,22
245	6,48	3,05	3,9	1540	0,77	0,09	2,09	0,11	1,58	10,12	0,09	0,71		14,35	14,85	18,11
256	6,29	2,3	2,3	1635	0,82	0,22	2,5	0,11	1,83	11,02	0,22	0,71		15,15	16,72	18,16
259	6,53	1,75	4,1	1530	0,85	0,11	2,12	0,12	1,69	5,81	0,32	0,66		17,45	11,02	19,86
270	6,43	1,45	4,3	1651	0,98	0,07	2,28	0,13	1,72	11,71	0,37	0,71		19,56	17,26	21,72

COLUMN B
QUALITY OF DRAINAGE WATER

O2 in mg/l; EC in mS/m; cations and anions in meq/l

DATE	pH	HCO3-	O2	EC	Fe2+	Mn2+	Na+	K+	Ca2+	Mg2+	Al3+	Cl-	NO3-	SO42-	Sum+	Sum-
144	6,4	3,4	2,3	1414	2,1	0,05	3,51	0,12	1,81	12	0,12	0,95	0	10,7		
145	3,07	0	4,9	8200	5,78	0,21	40,7	0,99	5,05	29,6	3,26	55,5	0	31,9	85,85	87,4
146	3,49	0	4,6	7510	1,35	0,28	35,4	0,98	5,28	23,9	0,18	52	0	40,8	77,39	92,81
153	3,44	0	1,2	7440	8,88	0,26	39,8	0,91	4,88	17,4	2,62	50,6	0	30,2	74,76	80,77
158	3,06	0	4,9	9970	6,12	0,18	4,45	0,2	5,1	29,22	0,5	77,5		34,04	45,77	111,54
159	3,12	0	1,6	9270	14,2	0,18	3,35	0,18	4,89	30,93	1,88	65,35		31,2	55,61	96,55
160	3,92	0	4,7	8460	4,4	0,03	41,99	1,03	4,41	31,73	2,31	64		26,44	85,9	90,42
163	3,34	0	7,8	9110	10,97	0,29	140,26	1,02	4,81	31,36	2,87	66,95		31,29	191,58	98,24
167	3,48	0	2,2	9290	9,94	0,19	40,37	0,75	4,96	29,62	3,51	70		26,8	89,34	96,8
172	3,58	0	3,7	8720	4,43	0,22	30,64	0,81	5,58	23,55	3,64	63,75		19,48	68,87	83,23
173	3,7	0	9,2	9650	3,87	0,16	40,85	0,7	5,32	22,35	3,51	76,3		5,72	76,76	82,02
179	3,53	0	3,6	10060	4,35	0,2	47,3	1,09	5,48	19,86	4,43	74,55		30,42	82,71	104,97
180	3,67	0	6,4	9790	3,72	0,2	7,4	0,99	5,08	18,54	4,43	76,5		18,4	40,36	94,9
186	3,6	0	3,3	9310	3,46	0,18	29,4	0,8	5,64	20,6	3,92	68,11		29,8	64	97,91
188	3,73	0	8,3	9850	3,19	0,14	34,34	0,68	4,94	2,4	3,56	73,79		28,98	49,25	102,77
189	3,58	0	4,9	10310	3,13	0,18	16,75	0,32	4,76	18,11	3,19	78,81		26,67	46,44	105,48
194	3,57	0	3,5	10020	3,23	0,15	24,75	0,62	8,66	15,56	2,61	74,71		28,43	55,58	103,14
200	3,6	0	3,4	9840	3,5	0,09	2,73	0,38	6,79	13,3	3,14	69,89		28,23	29,93	98,12
202	3,58	0	2,5	10150	2,97	0,14	36,01	0,67	5,86	11,66	2,94	77,22		23,65	60,25	100,87
207	3,68	0	6,7	9620	3,09	0,15	40,71	0,81	5,34	14,44	1,89	72,2		24,73	66,43	96,93
210	3,61	0	3,5	10340	2,4	0,19	39,34	0,61	5,13	11,16	2,9	77,78		22,94	61,73	100,72
214	3,72	0	4,3	9810	2,81	0,21	7,7	0,68	4,87	14,3	3,01	75,49		24,87	33,58	100,36
216	3,44	0	3,8	10710	2,41	0,21	39,66	0,66	5,83	19,24	4,3	81,01		26,24	72,31	107,25
228	3,66	0	3,5	9950	2,78	0,24	8,39	0,83	4,96	17,82	2,63	75,78		21,33	37,65	97,11
236	3,43	0	3,5	9730	2,66	0,24	35,45	0,55	4,02	15,3	4,7	76,21		41,79	62,92	118
242	3,45	0	4	9580	3,25	0,25	27,03	0,61	5,36	21,58	7	73,3		10,85	65,08	84,15
245	3,29	0	3,7	10440	2,5	0,19	29,62	0,84	5,57	14,23	4,4	85,54		9,41	57,35	94,95
256	3,49	0	1,8	10370	2,85	0,22	39,24	0,85	5,61	14,39	3,88	79,49		23,4	67,04	102,89
259	3,39	0	3,7	10790	2,25	0,17	46,59	1,04	5,36	10,96	3,61	89,77		31,51	69,98	121,28
270	3,46	0	4,2	10400	2,52	0,16	35,06	0,72	5,17	19,43	2,55	87,2		22,66	65,61	109,86

COLUMN C
QUALITY OF DRAINAGE WATER

O2 in mg/l; EC in mS/m; cations and anions in meq/l

DATE	pH	HCO3-	O2	EC	Fe2+	Mn2+	Na+	K+	Ca2+	Mg2+	Al3+	Cl-	NO3-	SO42-	Sum+	Sum-
130	6,43	1,85	5,8	749	1,35	0,02	2,44	0,03	0,82	5,26	1,33	0,87	0	6,98		
144	6,69	4,55	2,2	684	0,9	0	2,05	0,1	0,77	5,18	0,1	0,45	0	3,73	9,1	8,73
145	6,05	0,65	5,8	840	2,06	0,06	1,19	0,15	1,15	5,84	0,19	0,5	0	9,18	10,64	10,33
146	3,91	0	4,4	2250	12,8	0,17	2,72	0,22	2,29	15,7	2,79	1,5	0	31,9	36,68	33,4
153	3,96	0	1	2180	3,8	0,22	2,83	0,2	2,74	13,9	2,69	1,4	0	27,7	36,33	29,06
158	3,9	0	4,8	2180	6,48	0,05	2,66	0,23	1,54	15,66	2,59	1	0	29,06	29,21	30,06
159	4,24	0,15	4,7	1910	8,82	0,16	1,7	0,13	1,72	11,54	0,1	1,15		19,85	24,17	21,15
160	7,5		1,1	3220	0,76	0,13	2,05	0,1	1,65	14,71	0,4	0,25		43,97	19,8	44,22
163	3,29	0	7,6	3130	18,71	0,2	1,98	0,2	1,81	15,17	2,63	0,45		39,82	40,7	40,27
165	3,32	0	4,7	3190	20	0,24	2,13	0,2	1,81	3,95	3,15	0,45		34,13	31,48	34,58
167	3,32	0	2,3	3110	16,25	0,15	2,87	0,19	1,56	14,43	2,67	0,65		43,37	38,12	44,02
172	3,36	0	4,1	3050	5,89	0,18	2,38	0,17	2,11	11,12	2,81	1,35		18,96	24,66	20,31
173	3,56	0	7,8	3150	7,11	0,15	2,87	0,15	1,94	11,05	2,51	0,75		23,15	25,78	23,9
179	3,36	0	3,8	3180	6,96	0,17	3,3	0,15	1,89	10,5	3,61	1		40,24	26,58	41,24
180	3,27	0	5,8	3210	7,48	0,22	2,94	0,31	1,76	10,72	3,8	1,2		15,21	27,23	16,41
186	2,94	0	2,3	4530	17,44	0,27	2,64	0,13	2,66	13,56	2,87	1,25		58,82	39,57	60,07
188	3,09	0	6,5	5480	20,11	0,35	2,37	0,15	2,58	9,59	2,68	1,3		86,95	37,83	88,25
189	2,88	0	5,8	6360	24,75	0,39	1,25	0,09	2,3	16,06	2,32	0,82		54,76	47,16	55,58
194	2,94	0	2,6	6850	24,23	0,44	2,46	0,16	2,83	12,44	2,39	1,11		39,02	44,95	40,13
200	3,01	0	2,6	7010	31,58	0,31	2,05	0,18	3,06	16,03	2,79	0,87		60,5	56	61,37
202	3,04	0	2,8	7600	33,12	0,46	1,68	0,18	2,64	10,85	2,91	1,25		72,95	51,84	74,2
207	3,08	0	6,4	7700	26,75	0,45	1,87	0,19	2,57	15,43	2,87	1,01		70,23	50,13	71,24
210	3,12	0	3,9	8100	21,46	0,51	2,53	0,19	2,68	15,21	2,6	0,76		64,7		
214	3,1	0	3,4	8060	32,85	0,51	4,26	0,21	2,28	16,56	1,87	1,24		104,09	58,54	105,33
215	3,14	0	3,3	7680	27,86	0,49	0,97	0,21	2,24	18,44	2,13	0,71		99,76	52,34	100,47
216	3,11	0	3,2	7710	36,55	0,52	2,41	0,24	2,48	17,01	2,15	0,95		121,6	61,36	122,55
228	3,18	0	3,1	8080	39,71	0,66	2,07	0,26	2,83	17,42	0,79	0,76		108	63,74	108,76
236	3,12	0	3,6	7670	40,71	0,54	2,18	0,25	3,18	15,75	3,2	0,57		170,14	65,81	170,71
242	3,	0	4,2	7960	38,12	0,58	2,53	0,26	3,01	5,11	5,06	0,86		54,67	86,13	
245	3,04	0	3,8	7670	31,51	0,57	2,75	0,26	3,07	18,58	3,69	0,95		94,12	60,43	95,07
256	3,1	0	2,4	8050	30,65	0,64	2,53	0,25	2,89	15,35	2,91	1,38		140,39	55,22	141,77
259	3,18	0	4	7680	42,58	0,59	2,63	0,25	2,69	11,77	3,13	0,66		160	63,64	160,66
270	3,01	0	4,2	7620	35,47	0,56	2,85	0,24	2,68	13,63	3,15	0,86		143,14	58,58	144

COLUMN D
QUALITY OF DRAINAGE WATER

O2 in mg/l; EC in mS/m; cations and anions in meq/l

DATE	pH	HCO3-	O2	EC	Fe2+	Mn2+	Na+	K+	Ca2+	Mg2+	Al3+	Cl-	NO3-	SO42-	Sum+	Sum-
144	6,26	2,3	3	1550	4,33	0,06	3,09	0,12	1,4	8,96	0,25	0,75	0	16,3	18,2	19,35
158	6,2	2,3	3,8	1505	2,96	0,12	3,8	0,15	0,22	13,66	0,22	0,9	0	17,83	21,13	21,03
172	6,78	2	3,8	1539	2,67	0,07	3,02	0,11	1,1	8,45	0,27	0,9		13,51	15,69	16,41
173	6,79	0,9	7,5	1520	3,11	0,08	3,01	0,11	1,21	7,77	0,24	0,8		10,48	15,53	12,18
179	6,78	1,5	3,4	1510	2,85	0,09	2,82	0,11	1,09	6,6	0,32	0,8		13,8	13,88	16,1
180	6,74	1,2	5,8	1405	2,3	0,09	2,42	0,22	0,88	6,56	0,33	0,75		12,76	12,8	14,71
186	6,8	2	2,2	1334	1,91	0,08	1,17	0,09	1,06	4,96	0,3	0,58		15,95	9,57	18,53
188	6,53	1	7,7	1354	1,48	0,06	24,75	0,1	0,94	2,4	0,31	0,77		12,46	30,04	14,23
189	6,78	1,9	5,2	1464	1,21	0,09	0,95	0,05	0,85	5,5	0,07	0,63		12,86	8,72	15,39
194	6,67	1,5	3,2	1480	2,03	0,07	1,95	0,11	1,6	4,28	0,29	0,67		14,21	10,33	16,38
200	6,23	2,3	2,6	1451	2,11	0,09	1,55	0,11	1,56	4,87	0,33	0,67		12,6	10,62	15,57
202	6,41	2,3	3,1	1502	2,39	0,09	1,45	0,1	1,07	4,01	0,32	0,82		11,07	9,43	14,19
207	6,62	1,9	4,8	1494	2,2	0,09	1,49	0,1	1,02	4,62	0,33	0,72		13,89	9,85	16,51
210	6,43	1,9	3,3	1474	2,16	0,09	1,39	0,09	1,09	4,63	0,33	0,81		11,32	9,78	14,03
214	6,28	1,85	4,1	1536	2,22	0,1	2,02	0,1	0,94	4,54	0,26	0,81		15,9	10,18	18,56
216	6,57	2,05	3,8	1550	2,44	0,09	1,22	0,12	1,11	6,58	0,24	0,67		12,8	11,8	15,52
228	6,37	1,85	3,6	1572	2,43	0,12	1,82	0,11	1,06	7,07	0,02	0,81		13,8	12,63	16,46
236	6,3	1,75	3,3	1519	2,54	0,09	1,12	0,09	1,06	4,83	0,36	0,81		17,61	10,09	20,17
242	6,08	1,5	4,1	1566	2,8	0,1	1,7	0,11	1,14	8,22	0,61	0,62		17,98	14,68	20,1
245	6,28	1,65	3,7	1516	2,61	0,08	1,79	0,11	1,29	8,26	0,42	0,81		13,65	14,56	16,11
256	6,06	1,9	2,3	1584	2,46	0,09	1,59	0,11	1,23	8,74	0,31	0,48		17,6	14,53	19,98
259	6,53	1,5	4,2	1498	2,55	0,1	0,1	1,28	8,43	0,51	0,7			17,94	15,13	20,14
270	6,26	1,35	4,1	1499	2,36	0,09	1,88	0,1	1,18	8,77	0,3	0,67		16,7	14,68	18,72

COLUMN E
QUALITY OF DRAINAGE WATER

O2 in mg/l; EC in mS/m; cations and anions in meq/l

DATE	pH	HCO3-	O2	EC	Fe2+	Mn2+	Na+	K+	Ca2+	Mg2+	Al3+	Cl-	NO3-	SO42-	Sum+	Sum-
146	6,89	1,15	4,8	3180	1,28	0,09	2,27	0,19	0,76	6,85	0,18	1	0	7,4	11,35	9,55
153	6,5		4,2		1,63	0,06	1,82	0,16	0,91	4,44	0,22	0,15	0	4,78	9,24	4,93
158			7,7		0,77	0,09	3,3	0,32			0,25		0	5,28	4,73	5,28
166	8,46	0,5	5,5	480	0,36	0,08	1,6	0,11	0,13	4,77	0,16	1,05	0	1,24	7,21	6,49
179	7,08	4,75	4,5	484	1,08	0,09	1,95	0,1	0,61	1,44	0,31	0,85		0,7	5,58	6,3
188	8,25	4,7	7,6	488	0,3	0,07	1,26	0,09	0,37	2,16	0,32	0,67		1,39	4,57	6,76
189	8,36	4,75	5,6	494	0,61	0,08	0,56	0,05	0,43	3,01	0,04	0,72		0,38	4,78	5,85
194	8,35	2,25	5,8	501	0,78	0,09	1,11	0,09	0,81	1,66	0,03	0,87		1,25	4,57	4,37
200	7		4,2		1,05	0,05			0,77	2,18				1,76	4,05	1,76
202	7		3,8	523	0,98	0,08	0,59	0,09	0,65	1,22	0,23	0,77		0,88	3,84	1,65
207	7		7,2	551	1,11	0,08	1,12	0,09	0,55	2,24	0,19	0,87		1,37	5,38	2,24
210	7,58	4,5	6,2	545	0,74	0,08	1,08	0,08	0,53	1,93	0,21	1,05		1,76	4,65	7,31
214	7		5,9		1,04	0,07			0,54	2,57	2,34			0,65	6,56	0,65
216	7		6,2	501	0,76	0,07	1,28	0,09	0,55	2,3	0,07			0,16	5,12	0,16
228	7		4,9	523	0,49	0,09	1,71	0,09	0,48	2,28	0,03	0,67		2,19	5,17	2,86
236	6,92	4,95	2,5	483	1,26	0,08	0,68	0,05	0,57	2,3	0,22	0,81		1,64	5,16	7,4
242	7								0,59	3,12	0				3,71	
245	7,29	4,8	3,6	510	0,93	0,07	1,22	0,09	0,61	2,36	0,04	0,95		1,53	5,32	7,28
256	8,31	4,65	4,8	497	0,86	0,07	1,18	0,09	0,66	2,36	0,06	0,86		2,49	5,28	8
259	7,55	4,7	4,7	488	1,57	0,08	1,47	0,1	0,64	2,4	0,07	0,94		1,82	6,33	7,46
270	7,5				0,04	0,02			0,69	3,15					3,9	

COLUMN F
QUALITY OF DRAINAGE WATER

O2 in mg/l; EC in mS/m; cations and anions in meq/l

DATE	pH	HCO3-	O2	EC	Fe2+	Mn2+	Na+	K+	Ca2+	Mg2+	Al3+	Cl-	NO3-	SO42-	Sum+	Sum-
128					1,15	0,07			0,86	4,52		0	0	7,15		
145	5,06	0,7	5,3	1994	2,96	0,14	9,61	0,21	1,22	8,22	0,19	11,3	0	10,5	22,55	22,41
146	4,26	0,4	5,3	3040	3,88	0,19	14,4	0,03	1,68	6,25	2,45	19,8	0	16,3	28,83	36,48
153	4,22	0,15	5,4	2750	5,15	0,17	12,9	0,29	1,91	9,7	2,26	16	0	10,8	32,39	26,91
158	5,34	0,4	5,8	2270	3,42	0,01	2,58	0,21	0,81	10,36	0,51	12	0	12,68	17,9	25,08
166	4,06	0	7,2	3290	4,15	0,19	5,87	0,31	1,22	11,17	2,16	23,75		11,77	25,07	35,52
179	3,88	0	5,9	1245	2,24	0,24	16,28	0,25	1,89	5,94	4,05			7,72	30,89	7,72
180	5,65	0,25	5,8	2690	1,91	0,17	12,05	0,34	1,38	5,04	3,42	18,5		8,1	24,31	26,85
188	6,32	0,25	8	2500	0,85	0,14	4,8	0,21	1,2	3,29	0,33	17,5		5,22	10,82	5,47
189	6,57	1	3,6	295	1,19	0,17	2,32	0,13	1,17	4,18	0,31			5,48	9,47	6,48
194	6,5		6,7	2470	0,58	0,08	6,69	0,21	2,02	3,45	0,02	18,41		3,48	13,05	21,89
200	7		3,9	2270	0,07	0,13	6,58	0,22	1,89	3,72		17,93		1,76	12,61	19,69
202	7		4,6	2240	0,22	0,12	7,15	0,18	1,35	2,5	0,03	16,19		0,63	11,55	16,82
207	7		6,2	2330	0,56	0,1	9,95	0,21	1,24	4,15	0			0,46	16,21	0,46
210	7,15	4,5	5,6	2020	0,11	0,13	5,24	0,16	0,55	2,22	0,006	9,19		0,26	8,416	13,95
216	7		6,7	2080	0,21	0,13	8,61	0,18	1,21	4,73	0,02				15,09	
228	7		4,8	1665	0,14	0,12	8,05	0,19	0,96	4,93	0	14,66		0	14,39	14,66
236	7,12	4,4	4,8	1831	0,29	0,14	3,87	0,1	0,97	4,62	0,003	13,76		0,3	9,993	18,46
242	7			2080	0,18	0,13	7,9	0,18	1,16	5,52	0			0,77	15,07	0,77
245	7,01	4,25	4	2180	0,22	0,13	8,06	0,18	1,22	5,39	0,01	16,52		0,59	15,21	21,36
256	8,07	2,75		2230	0,23	0,14	5,79	0,21	1,29	5,6	0	16,99		0,89	13,26	20,63
259	6,82	2,45	4,2	2470	0,62	0,19	9,27	0,19	1,43	1,27	0,19	19,23		3,03	13,16	24,71

COLUMN G
QUALITY OF DRAINAGE WATER

O2 in mg/l; EC in mS/m; cations and anions in meq/l

DATE	pH	HCO3-	O2	EC	Fe2+	Mn2+	Na+	K+	Ca2+	Mg2+	Al3+	Cl-	NO3-	SO42-	Sum+	Sum-
158	6,27	1,4	3,7	1035	2,91	0,09	4,65	0,17	0,3	8,01	0,23	0,6	0	13,61	16,36	15,61
172	7,19	5,1	4,2	594	0,85	0,05	1,01	0,1	0,51	3,33	0,24	0,95		1,04	6,09	7,09
179	8,08	4,5	3,8	535	0,99	0,07	1,91	0,1	0,61	2,28	0,006	0,95		0,23	5,97	5,68
180	7,76	4,1	5,7	514	6,45	0,08	1,41	0,23	0,38	2,08	0,39	0,8		2,7	11,02	7,6
186	6,96	4,8	2,8	517	0,99	0,07	1,17	0,09	0,57	2,02	0,1	0,72		1,83	5,01	7,35
188	7,15	2,8	8,1	557	0,22	0,06	0,96	0,09	0,37	2,7	0,33	0,82		1,74	4,73	5,36
189	7,09	3,7	5,5	588	0,68	0,09	0,54	0,05	0,39	2,49	0,02	0,63		2,14	4,26	6,47
200	6,78	5,2	5,2	558	0,77	0,07	0,5	0,06	0,69	2,47	0,19	0,72		2,9	4,75	8,82
202	6,82	4,6	4,2	591	0,9	0,07	0,64	0,09	0,6	1,19	0,04	0,53		1,26	3,53	6,39
207	7,13	4,85	6	541	0,89	0,07	0,87	0,09	0,44	1,88	0,07	0,58		1,53	4,31	6,96
208	7,03	4,15	6	593	1,08	0,07	0,84	0,09	0,47	1,75	0,35	0,67		3,21	4,65	8,03
210	6,6	2,8	5,7	633	0,61	0,1	0,86	0,09	1,15	4,59	0,05	0,48		2,35	7,45	5,63
214	6,87	3,9	4,4	555	0,42	0,09	0,78	0,09	0,37	2,26	0,11	0,57		0,72	4,12	5,19
216	6,68	3,4	4,1	562	0,4	0,08	0,85	0,1	0,47	2,57	0,13	0,57		1,12	4,6	5,09
228	7,14	4,4	4,2	524	0,37	0,08	1,39	0,1	0,36	2,36	0,01	0,43		0,6	4,67	5,43
236	7,37	4,55	4	456	0,31	0,07	0,75	0,05	0,41	2,36	0,03	0,57		0,45	3,98	5,57
242	6,78	4,25	4,5	528	0,42	0,08	1,26	0,09	0,45	2,61	0,09	0,57		0,93	5	5,75
245	6,68	4,55	4,5	524	0,21	0,08	1,03	0,1	0,55	2,74	0,04	0,43		1,06	4,75	6,04
256	6,85	4,55	4,3	494	0,36	0,07	1,05	0,09	0,5	2,39	0,04	0,57		0,22	4,5	5,34
259	6,86	4,25	4,3	494	0,39	0,08	1,1	0,09	0,48	2,67	0,05	0,61		0,87	4,86	5,73
270	7,13	4,55	4,5	476	0,35	0,07	0,97	0,09	0,47	2,55	0,06	0,38		0,24	4,56	5,17