QUANTITATIVE CLAY MINERALOGY OF NORMANBY–1 SAMPLES

1. INTRODUCTION

Samples were received from Lindsay Elliott of Beach Petroleum with a request for determination of their mineralogy.

2. PROCEDURE

Subsamples were taken and dispersed in water with the aid of deflocculants and allowed to settle to produce -2μm size fractions by the pipette method. The resulting dispersions were then used to prepare oriented clay preparations on ceramic plates. One plate was prepared per sample, it being saturated with Mg^{++} ions and in addition being treated with glycerol. When air-dry, these were examined in the X-ray diffractometer. A further treatment involved heating one plate per sample at 550℃ for 1 hour.

The relative amounts of the clay minerals in the -2μm size fraction were estimated from the XRD trace. These peak areas were measured

- first order kaolinite peak (which includes a contribution from chlorite)
- first order illite peak
- the 10Å peak of the plate heated at 550°

The kaolinite/chlorite abundana was estimated from the relative peak heights of the second order kaolinite peak and the fourth order chlorite peak. The mixed-layer proportion was determined by subtracting the illite peak area from the 550° peak area.

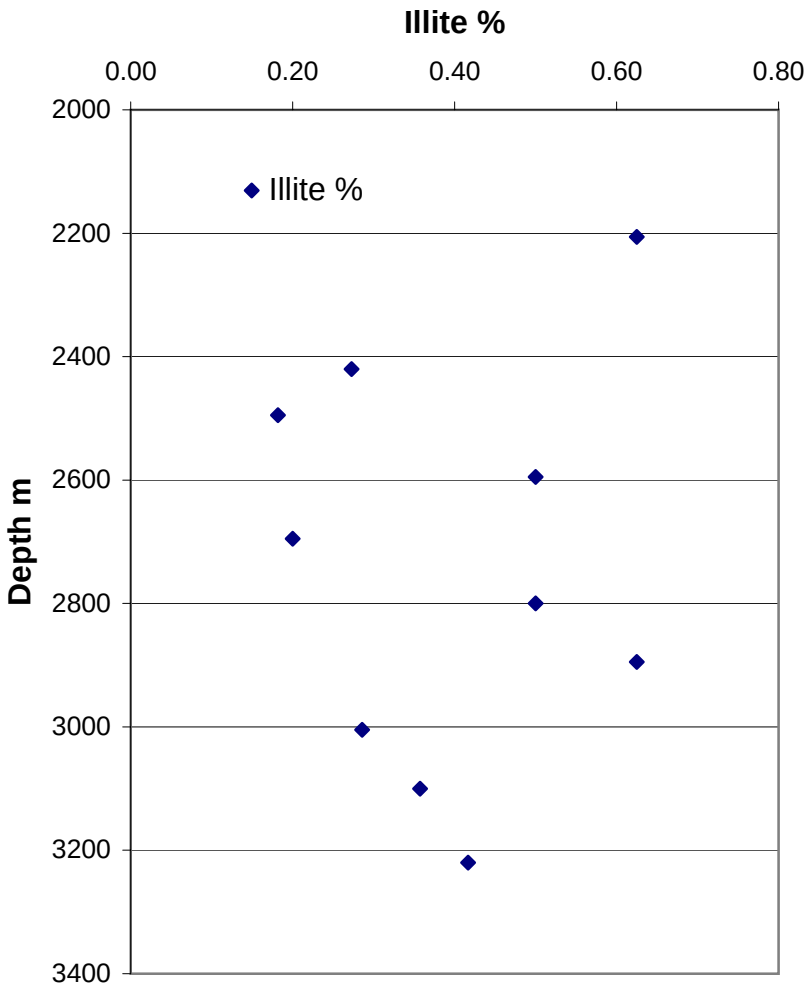
Sample	Depth (m)	Kaolinite	Mixed-layer	Illite	Chlorite
1	2205 – 2210	50	15	25	10
2	2420 – 2425	40	40	15	5
3	2495 – 2500	40	45	10	5
4	2595 – 2600	55	20	20	5
5	2695 – 2700	45	40	10	5
6	2800 – 2805	45	25	25	5
7	2895 – 2900	55	15	25	5
8	3005 – 3010	60	25	10	5
9	3100 – 3105	25	45	25	5
10	3220 – 3225	20	35	25	20

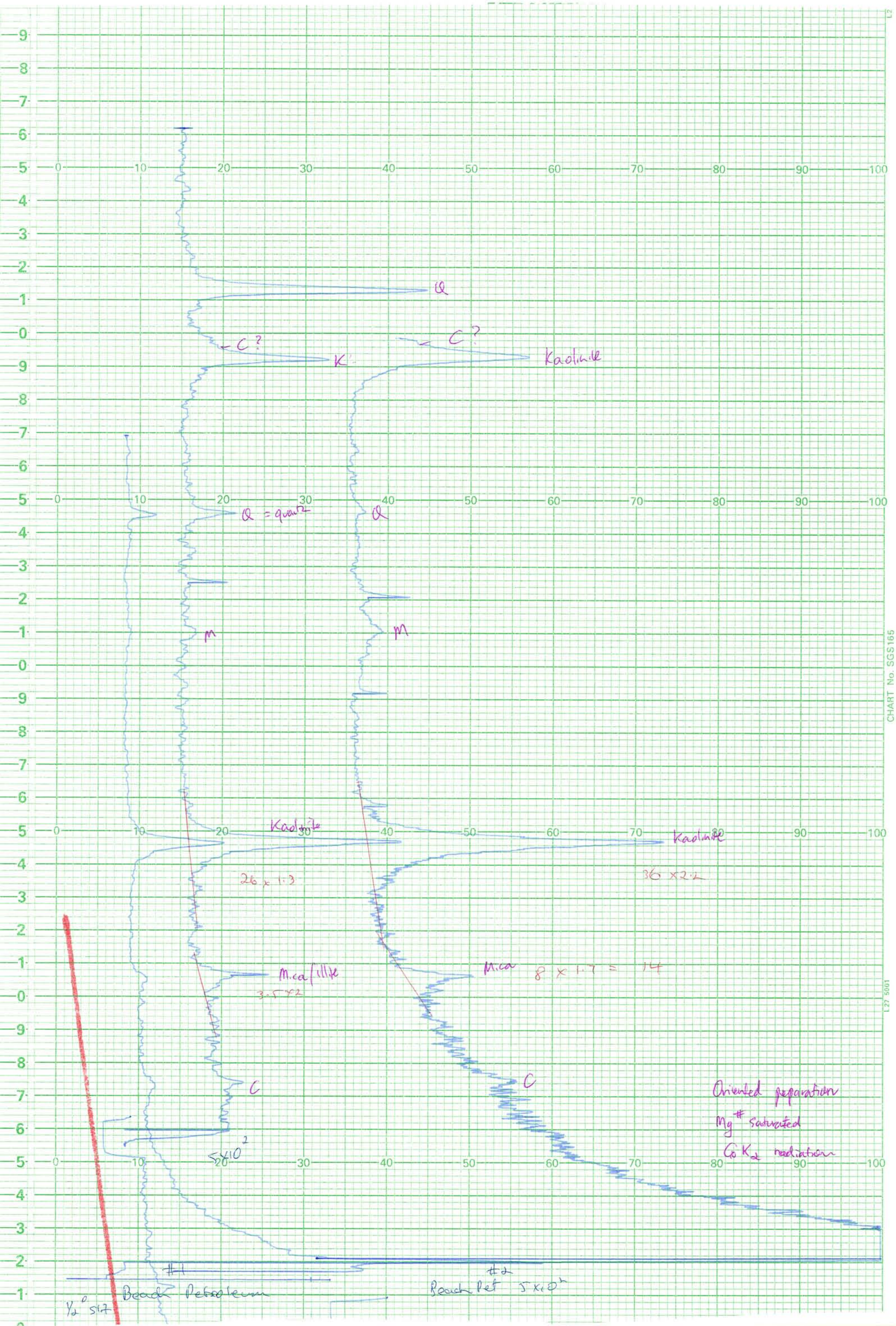
3. RESULTS

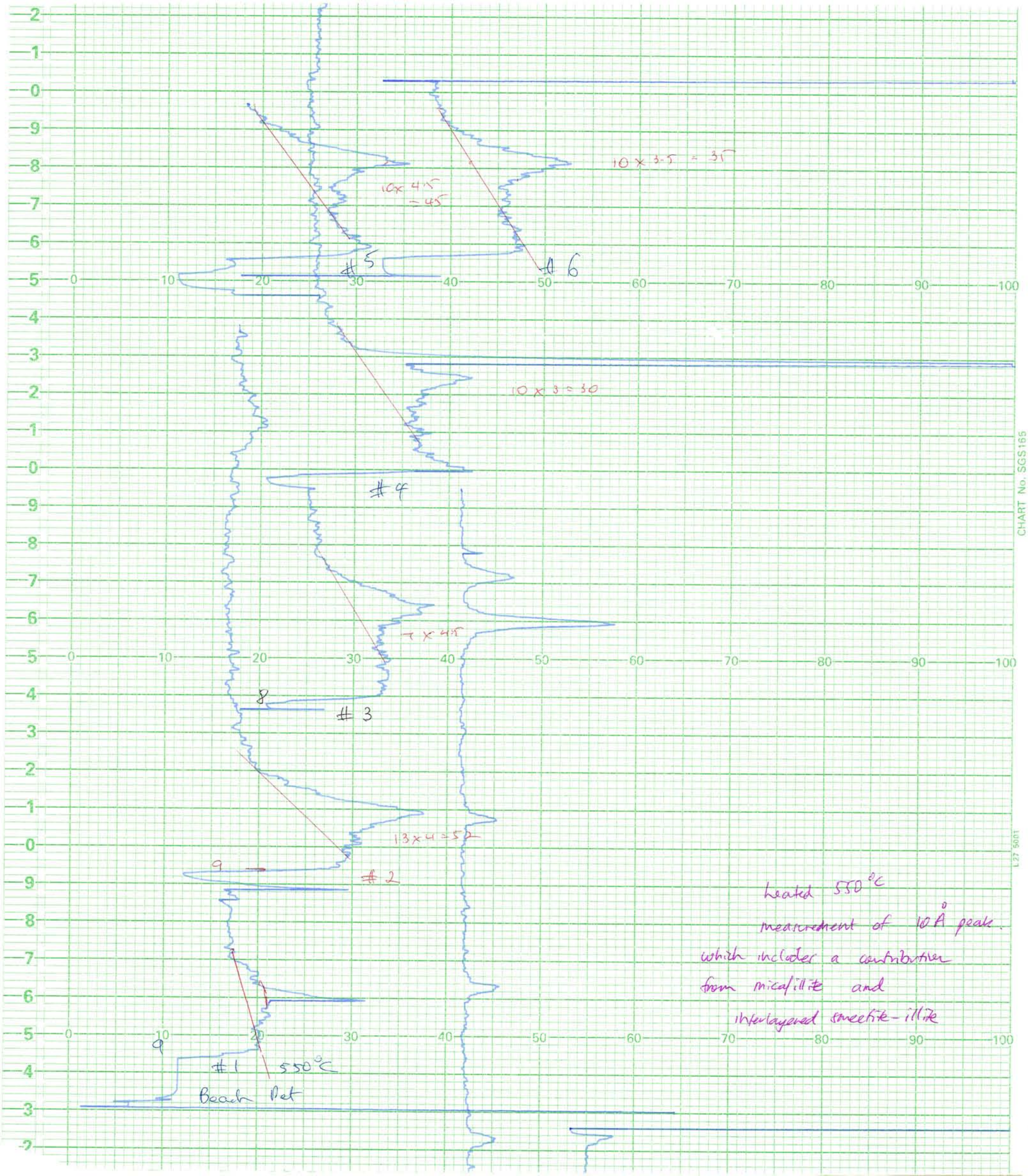
The estimated percentage of the clay minerals in the -2μm size fraction are as follows. The mixed-layer clay is a poorly crystalline smectite-illite. Note that although the mineral contents are quoted to one unit for convenience, such a degree of accuracy is not implied; this is because the calculated values are dependent on the assumptions given in the 'Procedure' section and measurements from XRD traces can have an error of up to ±20% relative for major minerals and up to ±50% relative for minor minerals.

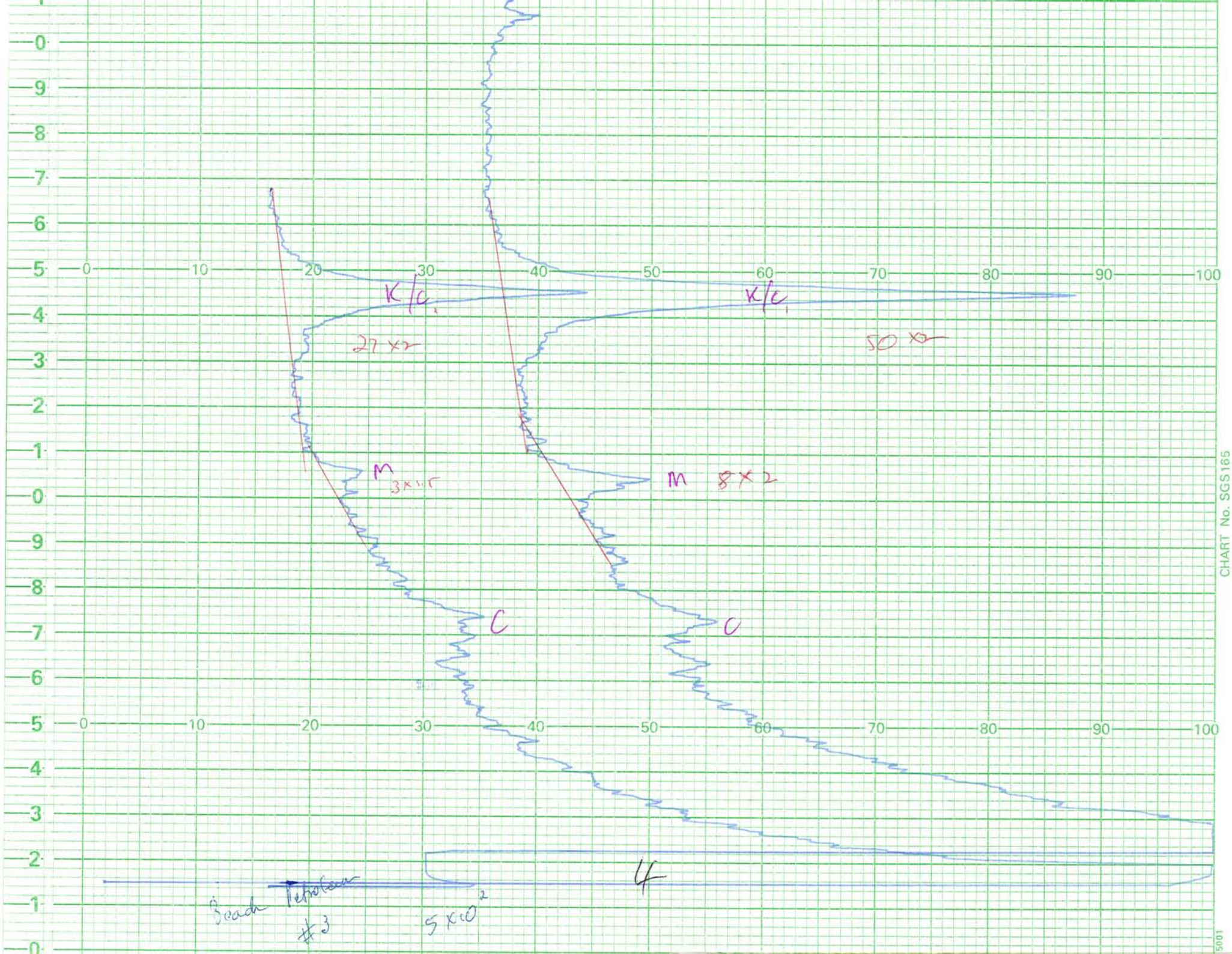
Top	Bottom	Clay Type					
Depth m	Depth m	Kaolinite	Mixed Layer	Illite	Chlorite	Illite+Smectite	illite/I+S
2206	2210	50	15	25	10	40	0.63
2420	2425	40	40	15	5	55	0.27
2495	2500	40	45	10	5	55	0.18
2595	2600	55	20	20	5	40	0.50
2695	2700	45	40	10	5	50	0.20
2800	2805	45	25	25	5	50	0.50
2895	2900	55	15	25	5	40	0.63
3005	3010	60	25	10	5	35	0.29
3100	3105	25	45	25	5	70	0.36
3220	3225	25	35	25	20	60	0.42

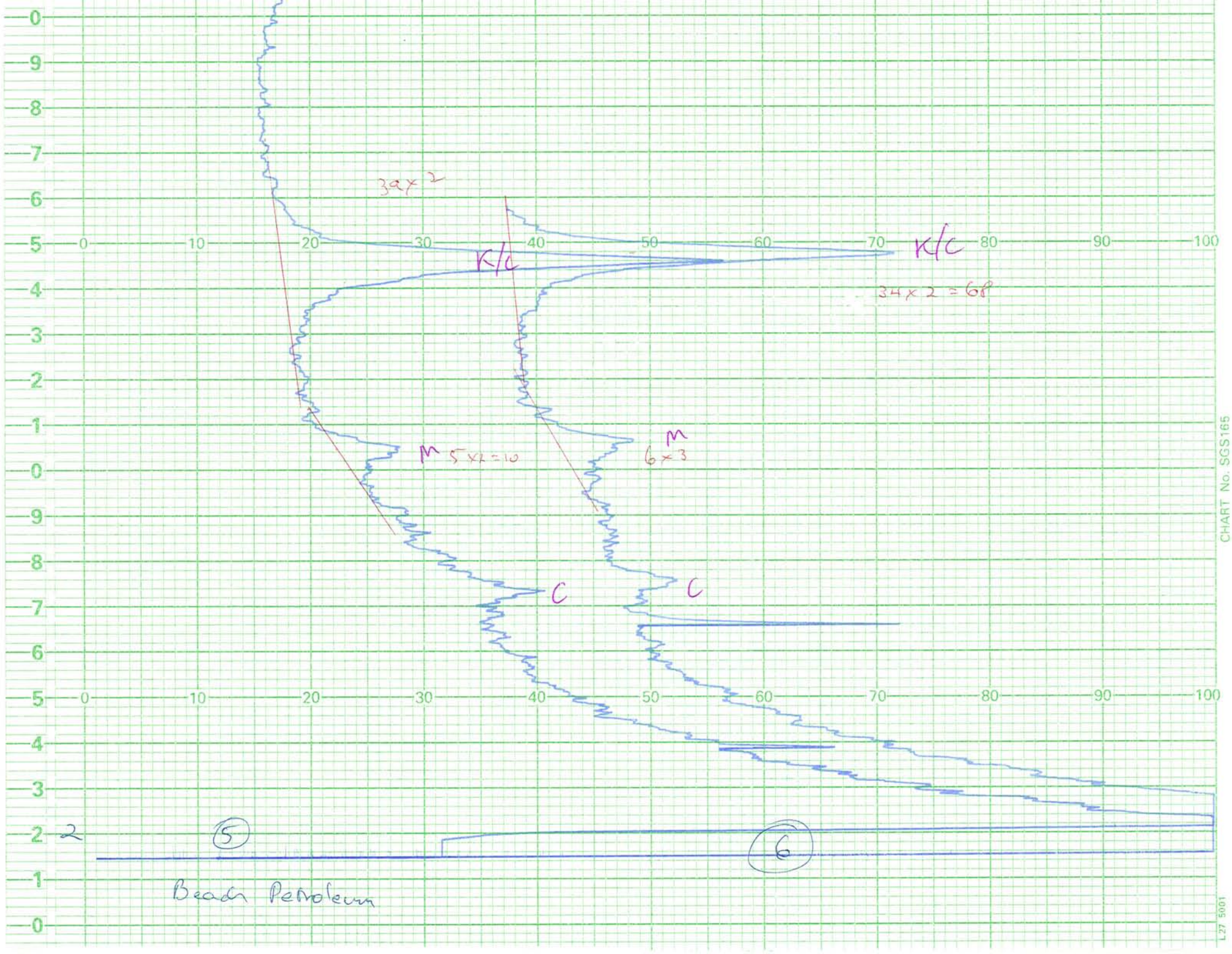
Illite %

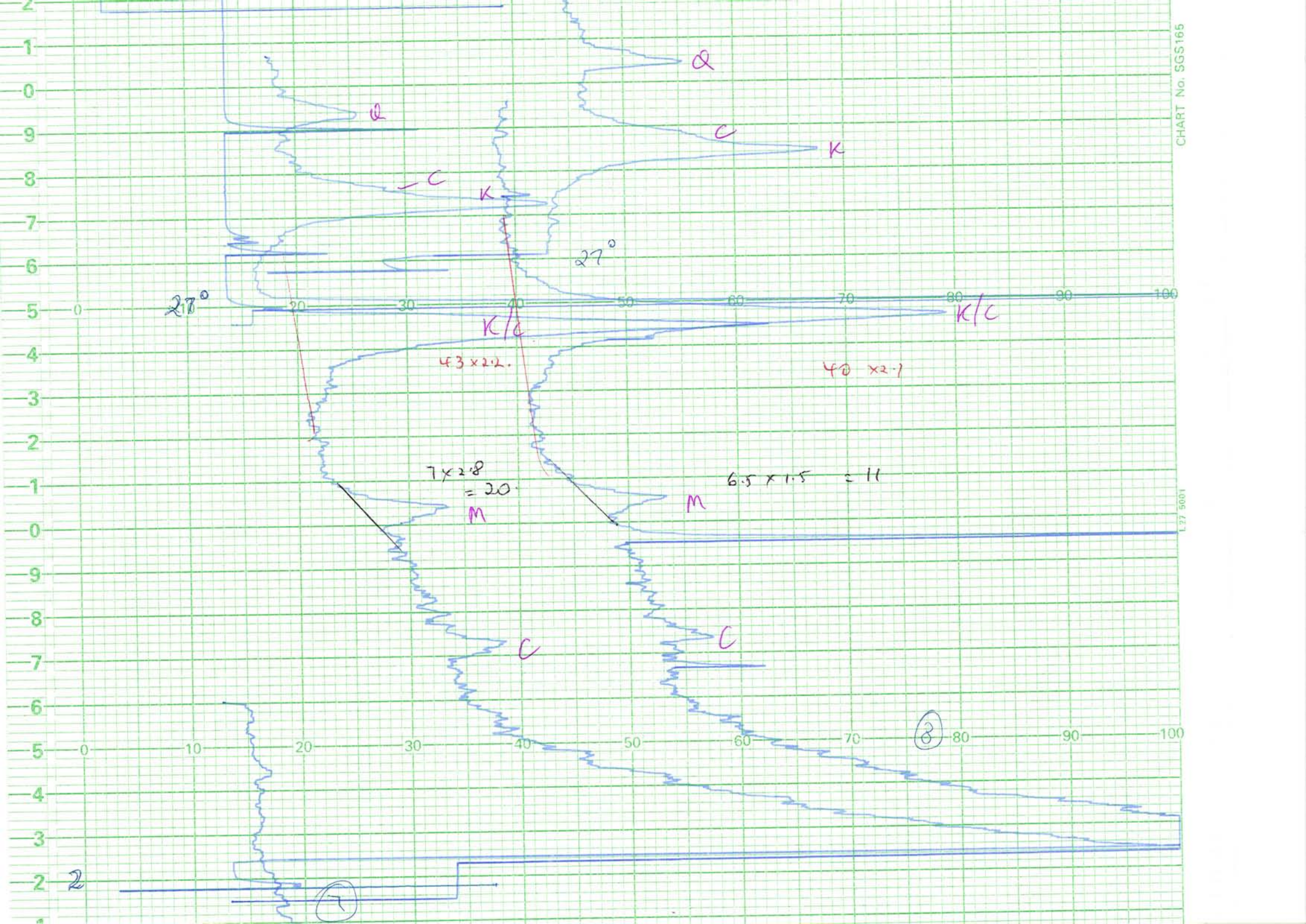

Illite %
0.00
0.20
0.40
0.60
0.80
2000
2200
2400
2600
2800
3000
3200
3400
Depth m
Illite %


Q
C ?
K
C ?
Kaolinite
Q = quartz
Q
m
m
Kaolinite
26 x 1.3
Kaolinite
36 x 2.2
Mica/illite
3.5 x 2
Mica 8 x 1.7 = 14
C
C
Oriented preparation
Mg# saturated
Co Kα radiation
5x10²
#1
Beach Petroleum
½° slit
#2
Beach Pet 5x10²
CHART No. SGS165
L27 5001


heated 550°C
measurement of 10Å peak which includes a contribution from mica/illite and interlayered smectite-illite
Beach Pet #1 550°C
#2
#3
#4
#5
#6
10 × 3.5 = 35
10 × 3 = 30
10× 4.5 = 45
7 × 4.5
13 × 4 = 52
CHART No. SGS165


K/c
27 x2
K/c
50 x2
m 3x1.5
m 8x2
C
C
4
Beach Petroleum
#3
5x10²
CHART No. SGS165


3ax 2
K/C
K/C
34 x 2 = 68
M
5 x 2 = 10
M
6 x 3
C
C
0
10
20
30
40
50
60
70
80
90
100
5
6
Beach Petroleum
CHART No. SGS165
L27 5001


Q
Q
C
K
C
K
27°
28°
K/C
43 x 2.2.
40 x 2.1
K/C
7 x 2.8
= 20.
M
6.5 x 1.5 = 11
M
C
C
CHART No. SGS165
L27 5001

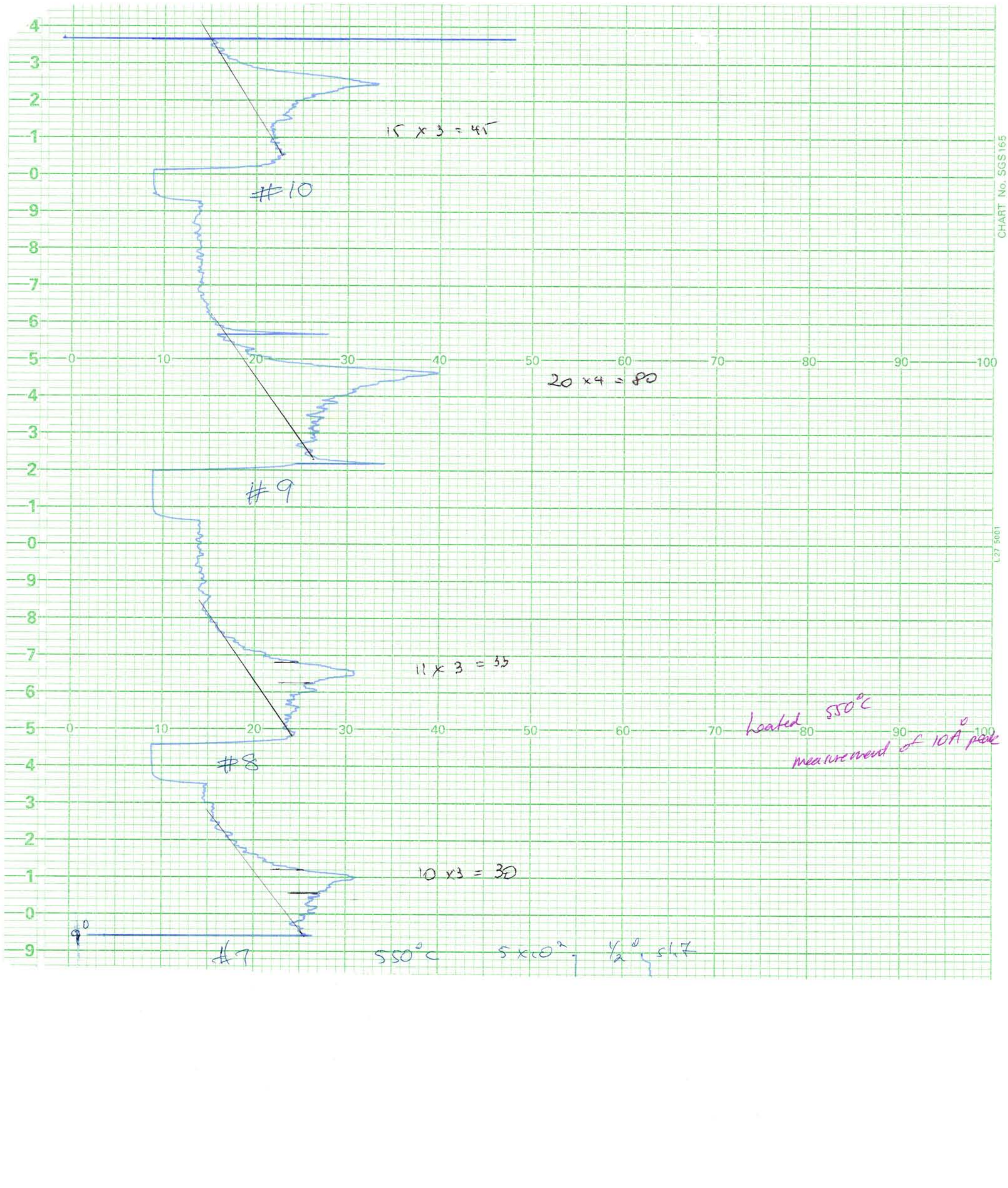


CHART No. SGS165
L27 5001
15 x 3 = 45
#10
20 x 4 = 80
#9
11 x 3 = 33
#8
heated 550°C
measurement of 10Å peak
10 x3 = 30
#7
550°C

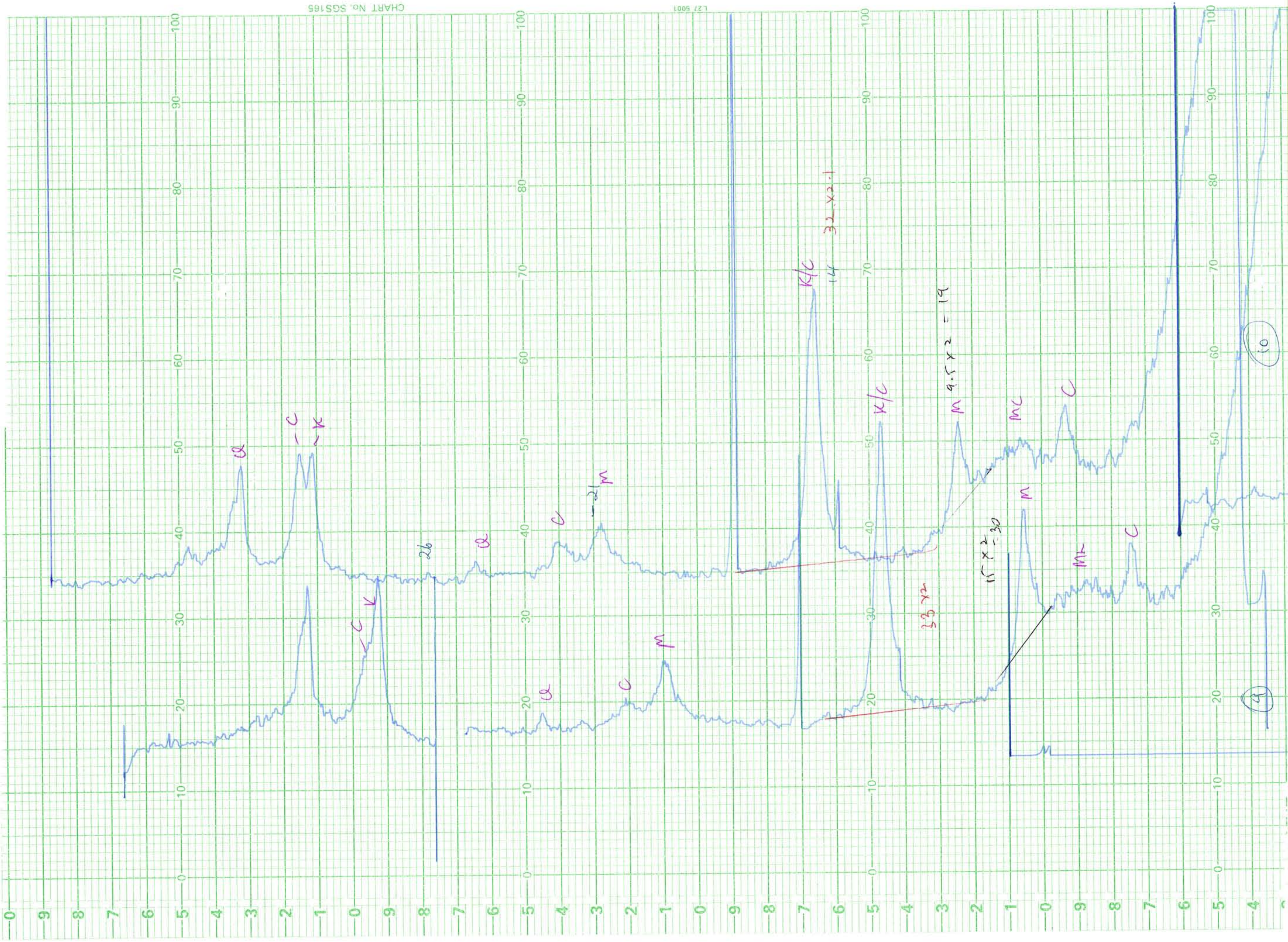


CHART No. SGS165
L27 5001
α
C
K
M
K/C
26
21
14
32 x2.1
9.5 x 2 = 19
33 x2
15 x 2 = 30
MC
10
9