



Geological Survey of Canada (Calgary)  
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July 11, 1996

Ms. Elizabeth Willson  
Room 18010  
237 4th Avenue S.W.  
Calgary, Alberta  
T2P 0H6

Dear Ms. Willson:

Enclosed please find the analytical results for the two core samples which you supplied to us from the Kotaneelee area along with an invoice for this data.

The data set includes Rock-Eval/TOC analyses (at no charge) so that you would have an estimate of the relative amount of bitumen in the organic fraction as well as the whole rock. Please note however, that the TOC results are not very reproducible during duplicate runs. We believe that this is due to the operating conditions of a Rock-Eval TOC analyzer (600°C in air) which do not appear to be vigorous enough to provide for complete combustion of these samples. Other analytical results include the weights of the total extract and fractions presented in two different formats. Extract and hydrocarbon "yields" have been normalized to TOC content. Weights and percentage distributions do not sum to 100% or the initial weight because of losses during handling. These losses may be due to irreversible adsorption of asphaltenes on the chromatography column or losses of volatiles (usually saturates) during solvent evaporation. You may wish to recalculate normalized distributions based on the recovered fractions. Please note that the sample weight (grams) has been truncated to the nearest gram in the report format. You should also be aware that the aromatic fraction of at least one of the samples was a lovely magenta colour. In other cases when we have observed similar phenomena, it has been due to contamination of the core sample by grease pencil or crayon, with the colour being one or more of the dyes eluting in the aromatic fraction. The saturate fraction chromatograms show a very large even/odd n-alkane predominance and this is likely also due to waxes from grease pencil or crayon used to mark the core.

The saturate fraction gas chromatograms (Varian 3700 coupled to a PE/Nelson data system) are also provided in two formats: a colour output from a plotter and a printer version.

The latter also includes peak area and height information along with expected retention times for n-alkanes and selected isoprenoids. The GC-MS data were generated using a VG 70SQ mass spectrometer coupled to a Hewlett Packard 5890 GC. Traces for  $m/z = 177, 191, 205, 217, 218, 231,$  and  $259$  have been included.

If you have any questions or comments, I would be pleased to hear from you. I can be reached at the Survey by phone at 403-292-7035, FAX at 403-292-7159 or via the internet at [snowdon@gsc.emr.ca](mailto:snowdon@gsc.emr.ca).

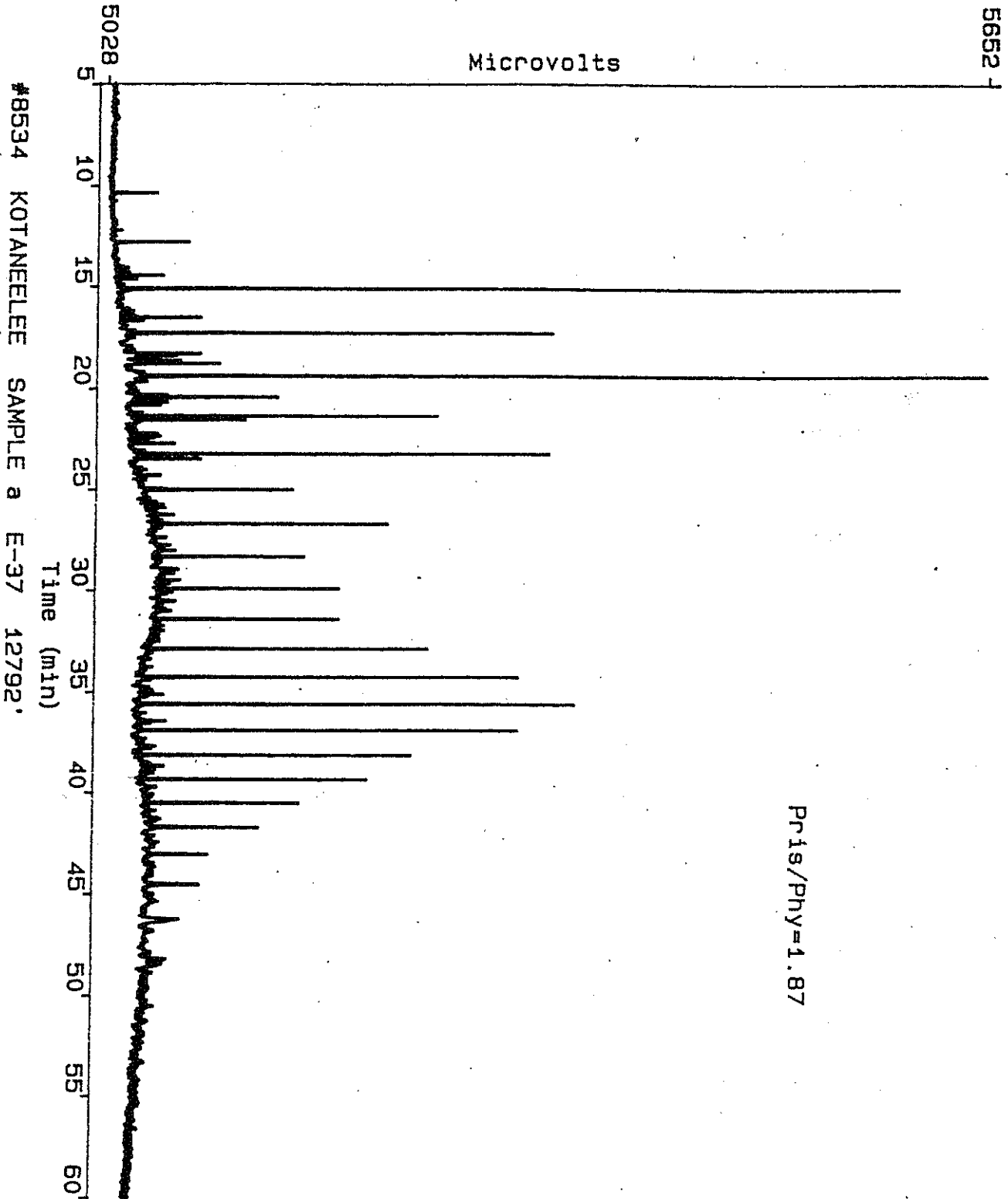
Regards,

A handwritten signature in cursive script, appearing to read "Lloyd R. Snowdon". The signature is written in black ink and is positioned above the typed name.

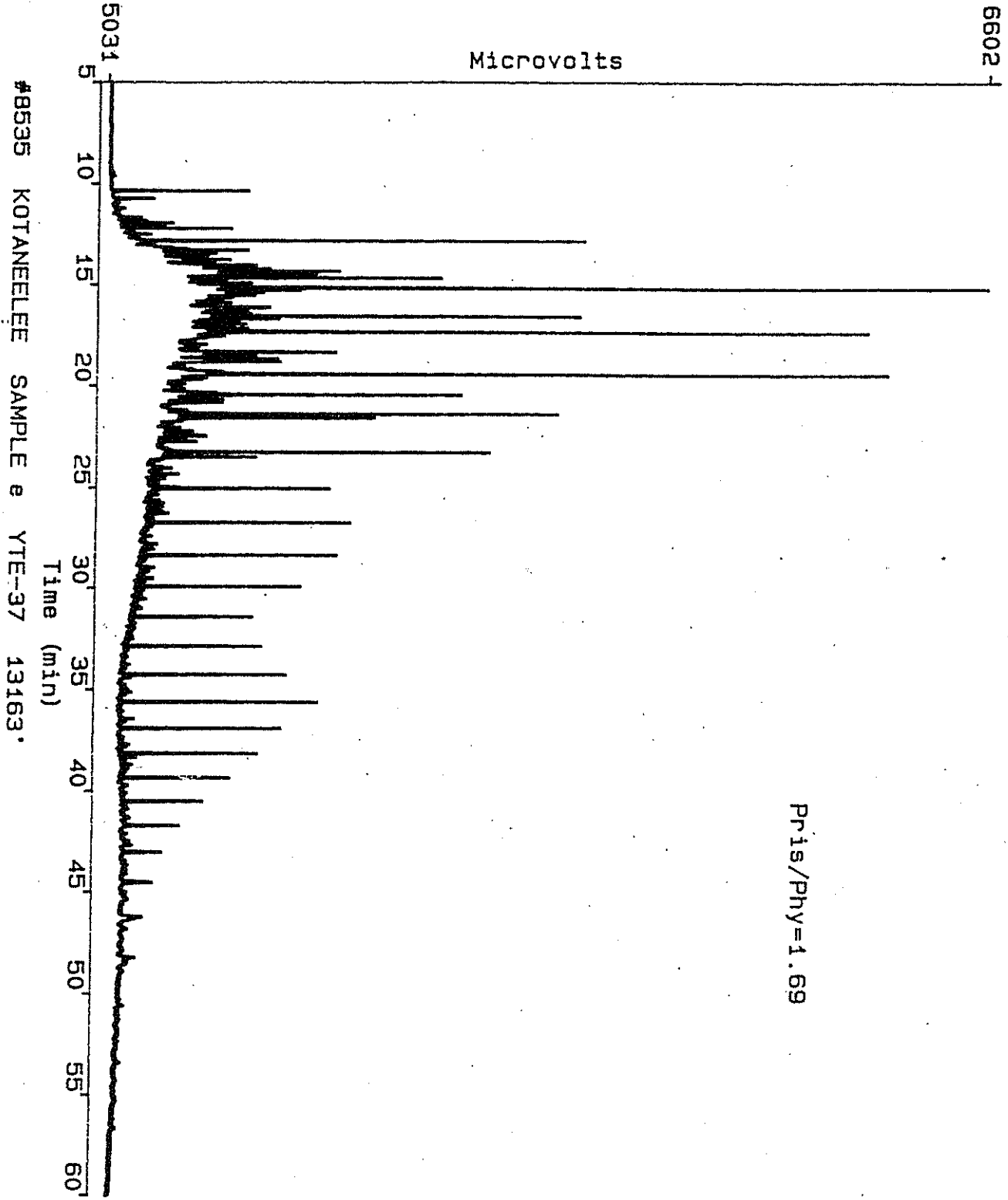
Lloyd R. Snowdon  
Head, Energy and Environment Subdivision

ESSO Kotaneelee Core Samples											
DEPTH	QTY	TMAX	S1	S2	S3	PI	S2/S3	PC	TOC	HI	OI
12987	100.1	592	0.10	0.57	0.73	0.15	0.78	0.05	10.56	5	6
12987	99.5	591	0.12	0.59	0.73	0.17	0.80	0.05	5.14	11	14
12792	100.3	593	0.03	0.19	1.17	0.14	0.16	0.01	4.39	4	26
12792	100.3	594	0.02	0.18	1.20	0.10	0.15	0.01	6.02	2	19

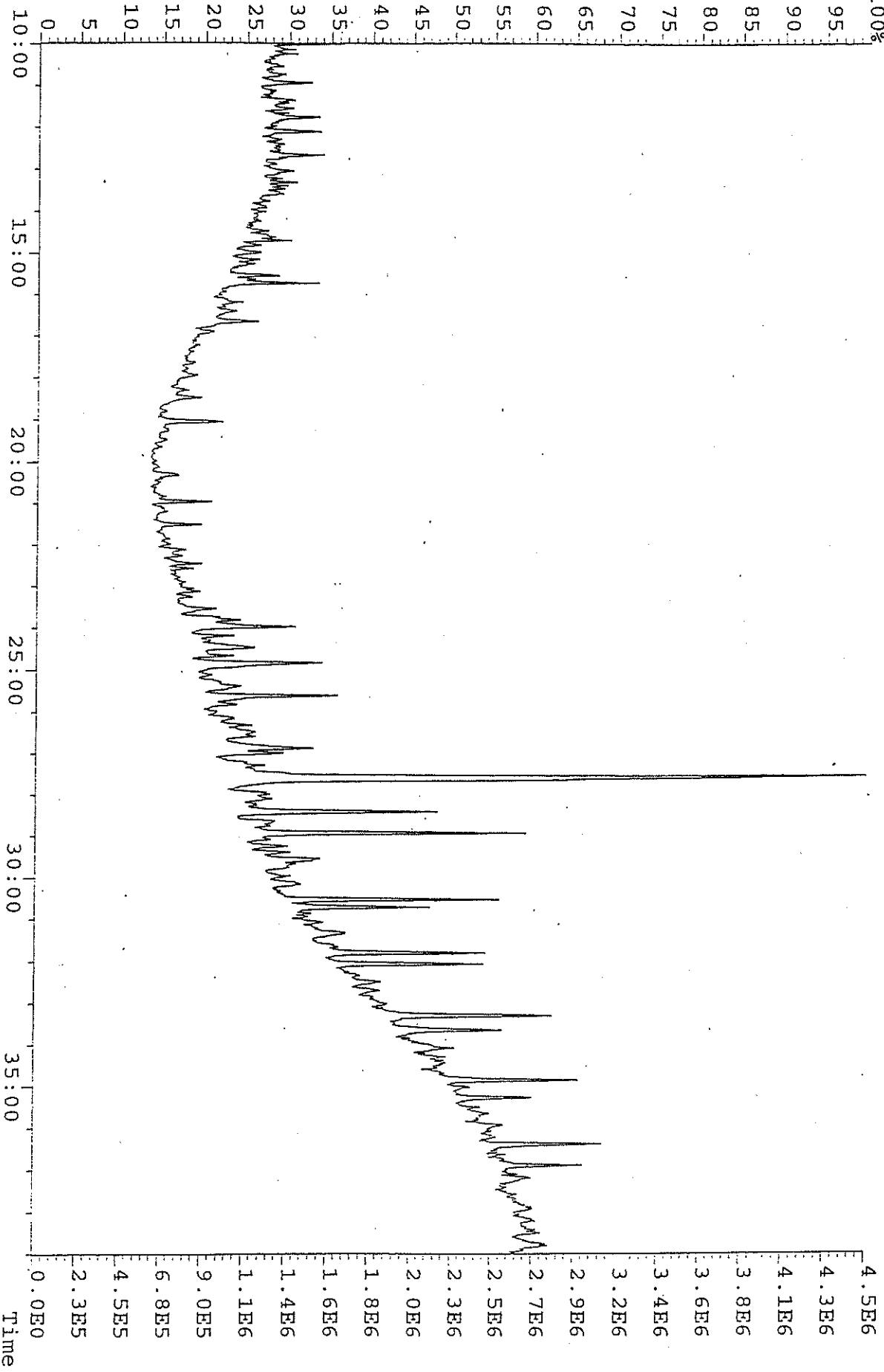
Data file: /VARIAN/MISC535  
Report: None  
Acquired: Thu Jul 4, 1996 2: 23: 20 pm  
Time range: 5.00-60.00



Data file: /VARIAN/MISC536  
Report: 16637  
Acquired: Mon Jul 8, 1996 7:36:30 am  
Time range: 5.00-60.00

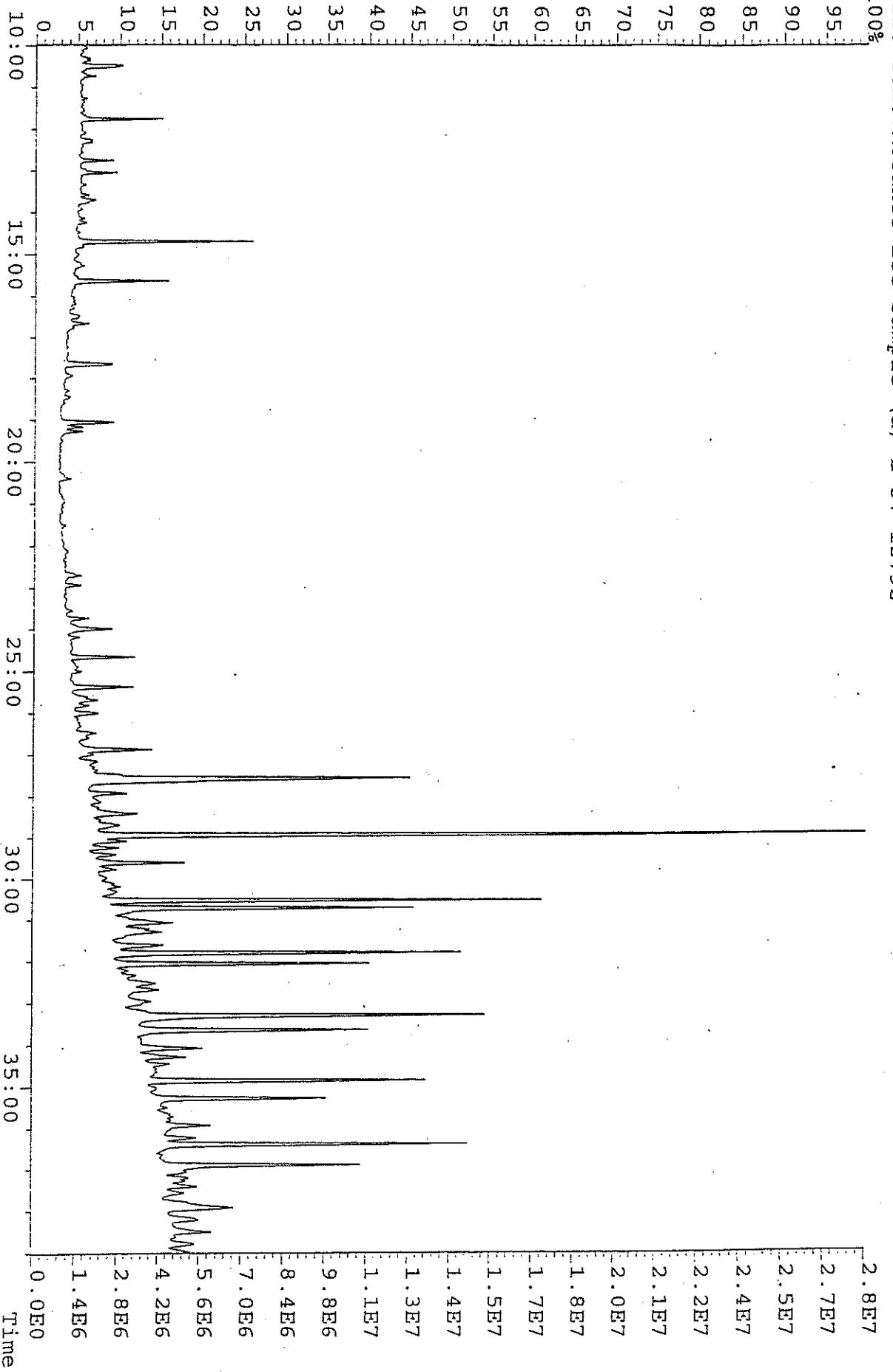


File:8534 #1-3665 Acq:10-JUL-1996 10:44:10 Septum EI+ Voltage SIR 705Q  
177.1638 Exp:BIOMARK  
File Text:Kotanee Lee Sample (a) E-37 12792'  
100%

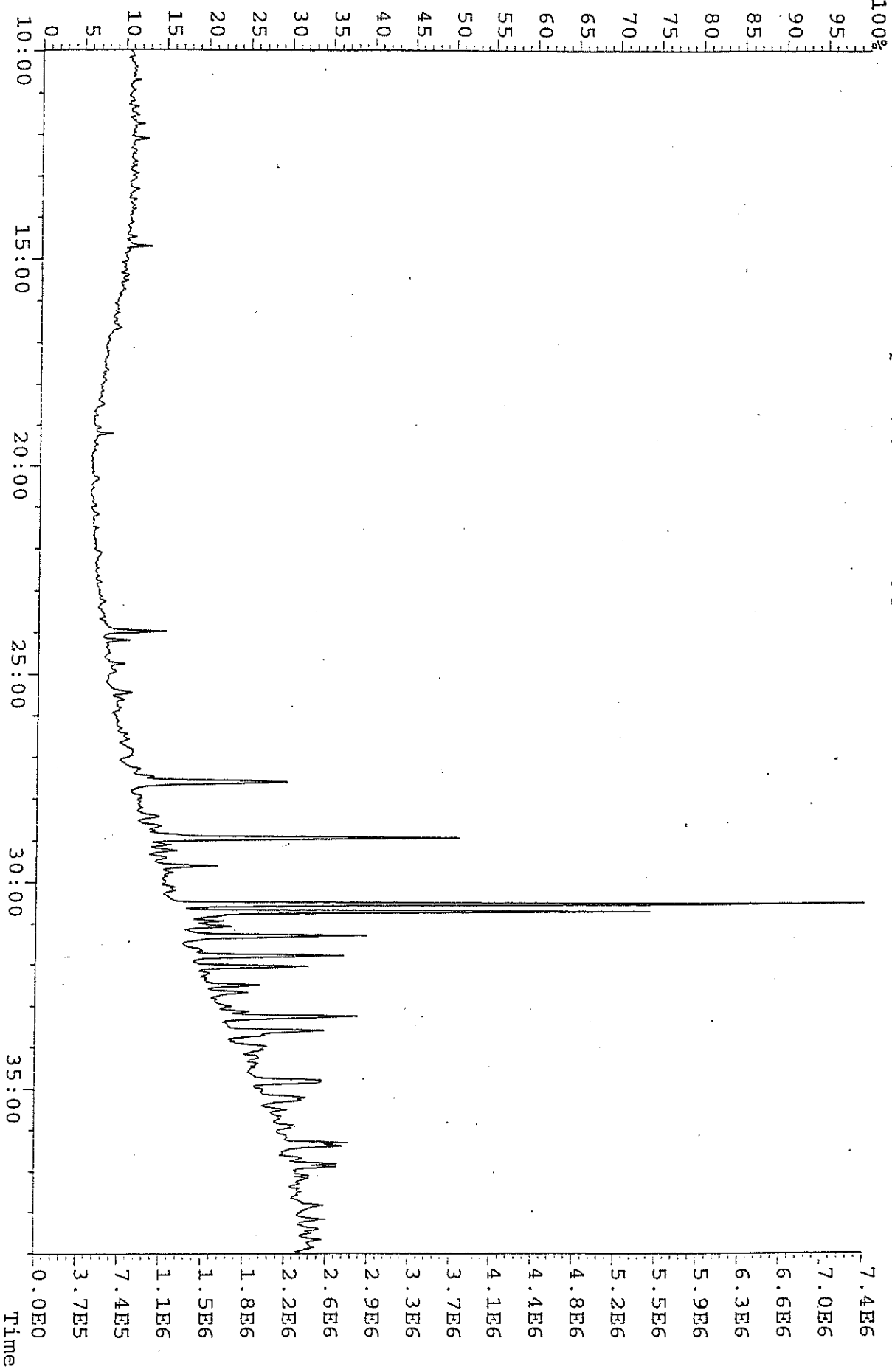


4.5E6  
4.3E6  
4.1E6  
3.8E6  
3.6E6  
3.4E6  
3.2E6  
2.9E6  
2.7E6  
2.5E6  
2.3E6  
2.0E6  
1.8E6  
1.6E6  
1.4E6  
1.1E6  
9.0E5  
6.8E5  
4.5E5  
2.3E5  
0.0E0  
Time

File:8534 #1-3665 Acq:10-JUL-1996 10:44:10 Septum EI+ Voltage SIR 70SQ  
191.1794 Exp:BIOMARK  
File Text:Kotanee Lee Sample (a) E-37 12792'

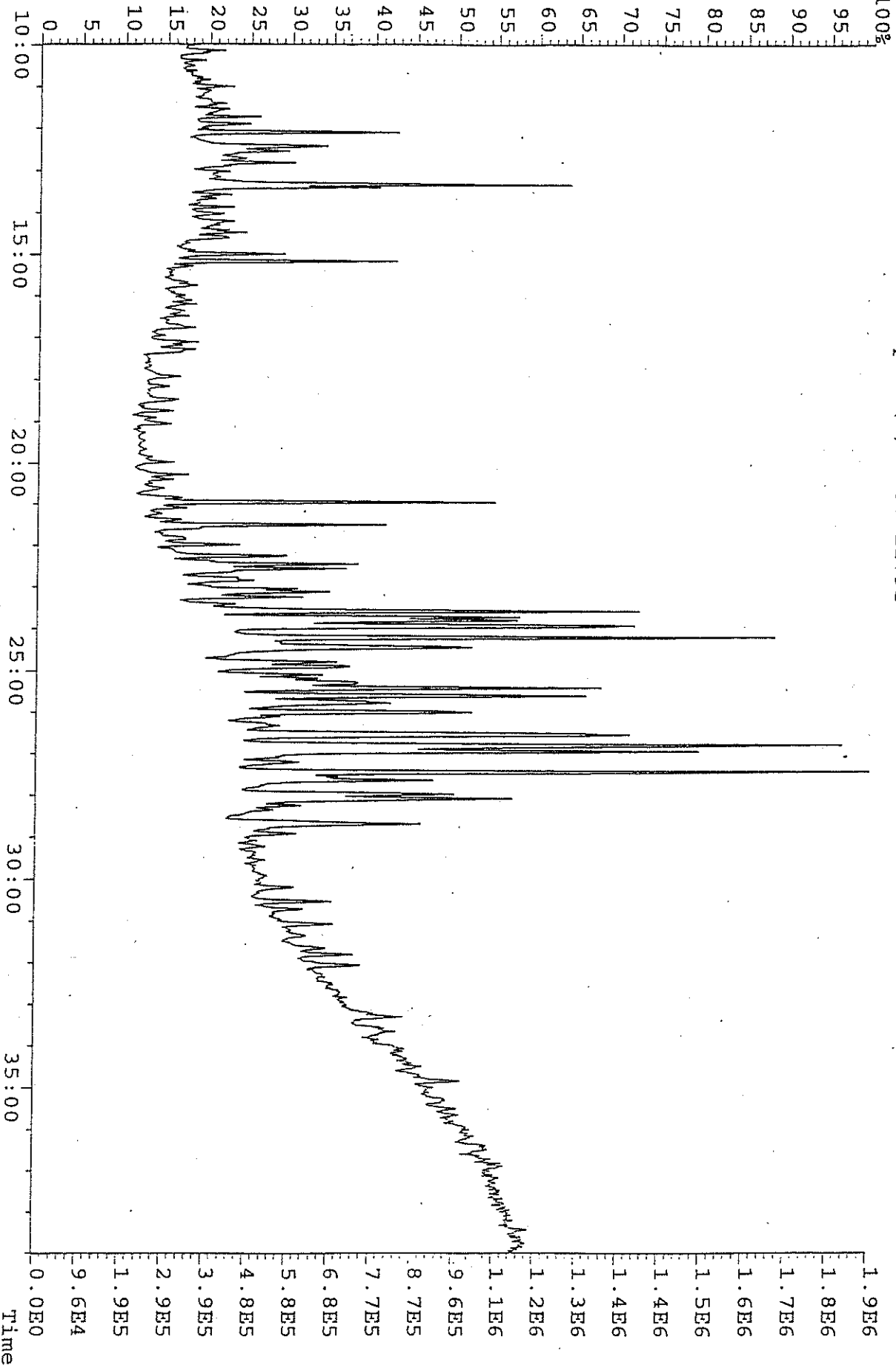


File:8534 #1-3665 Acq:10-JUL-1996 10:44:10 Septum EI+ Voltage SIR 70SQ  
205.1950 Exp:BIOMARK  
File Text:Kotanee Lee Sample (a) E-37 12792'

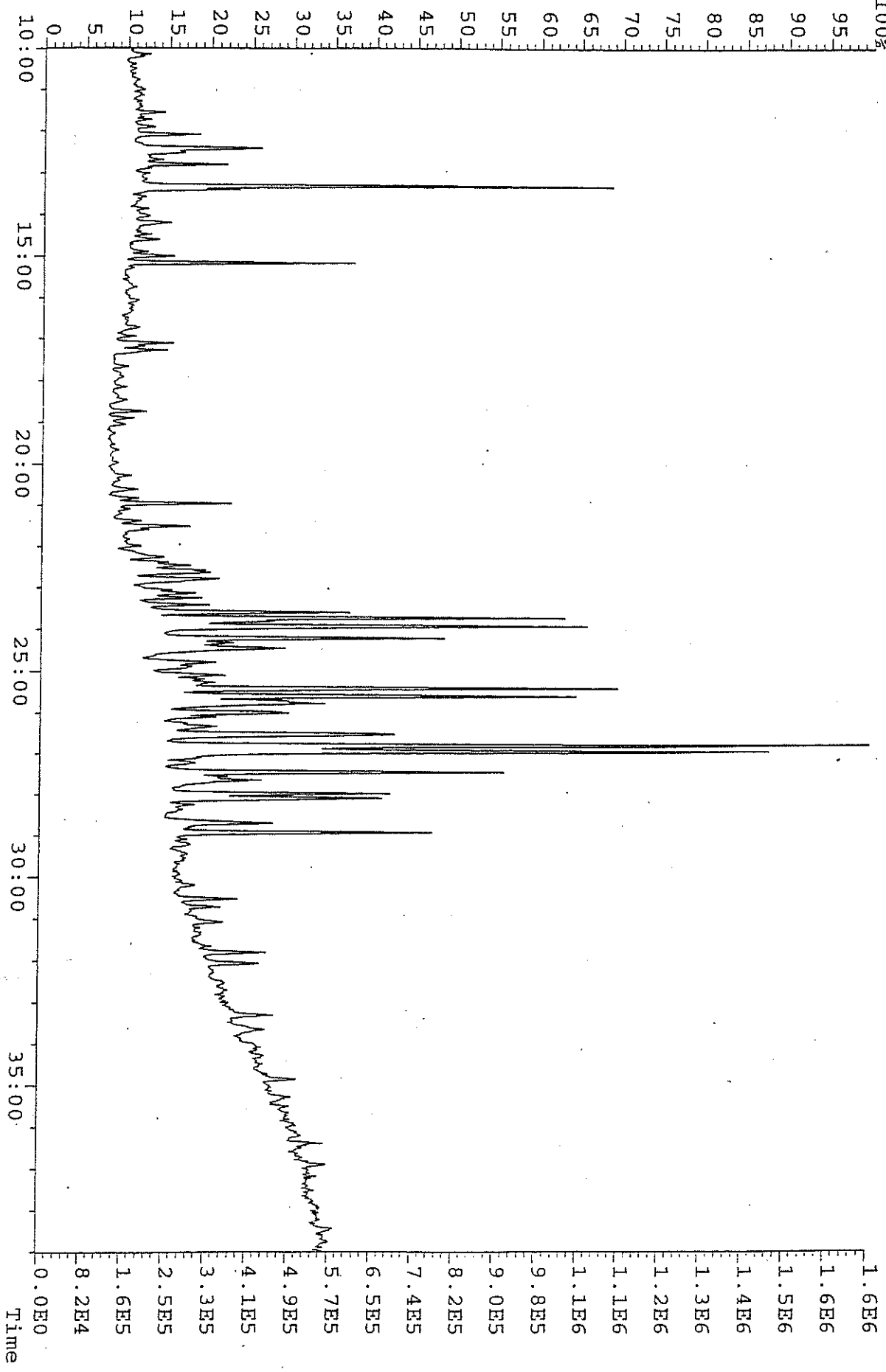




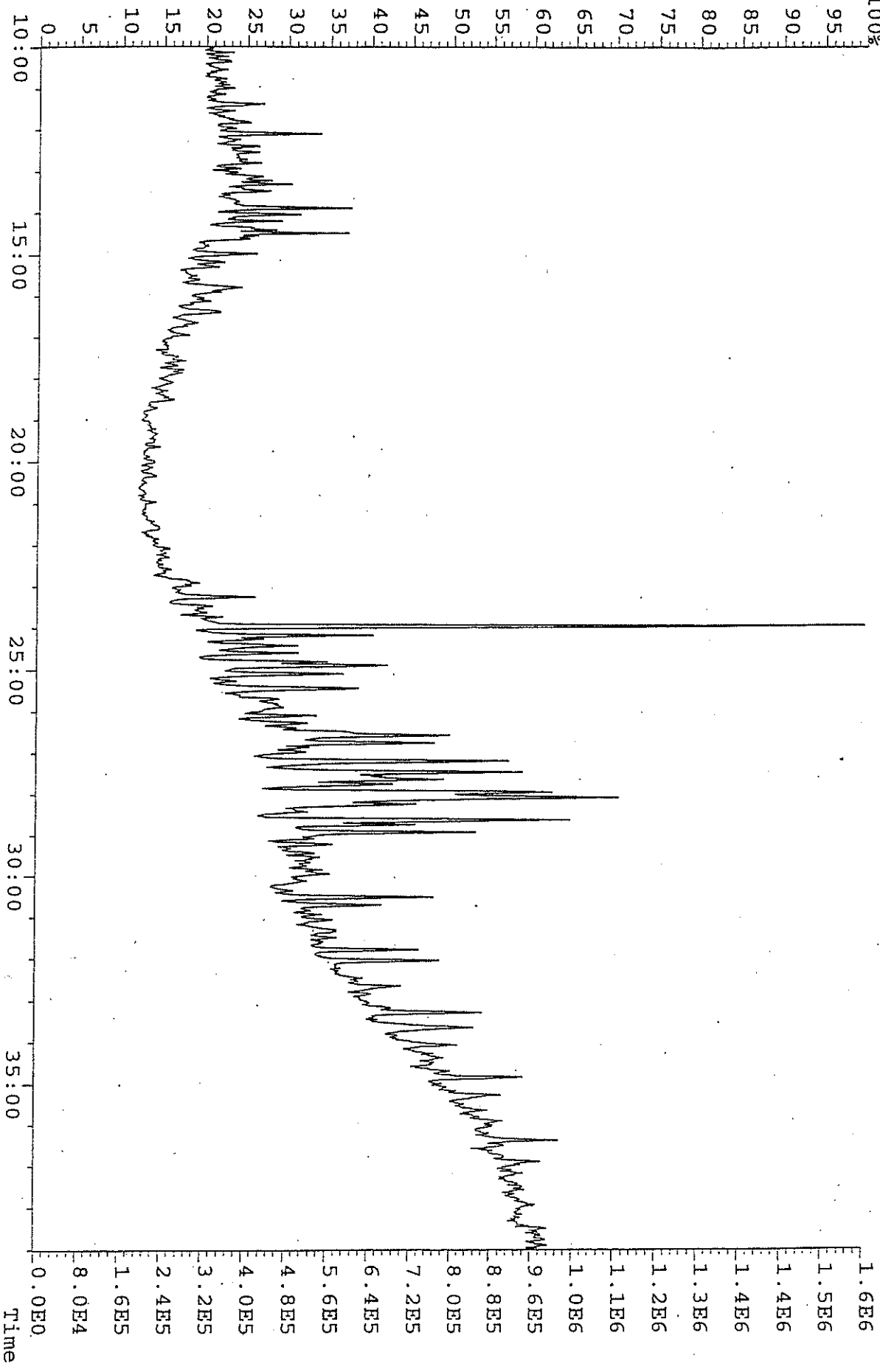
File: 8534 #1-3665 Acq: 10-JUL-1996 10:44:10 Septum EI+ Voltage SIR 705Q  
217.1950 Exp: BIOMARK  
File Text: Kotanee Lee Sample (a) E-37 12792'  
100%



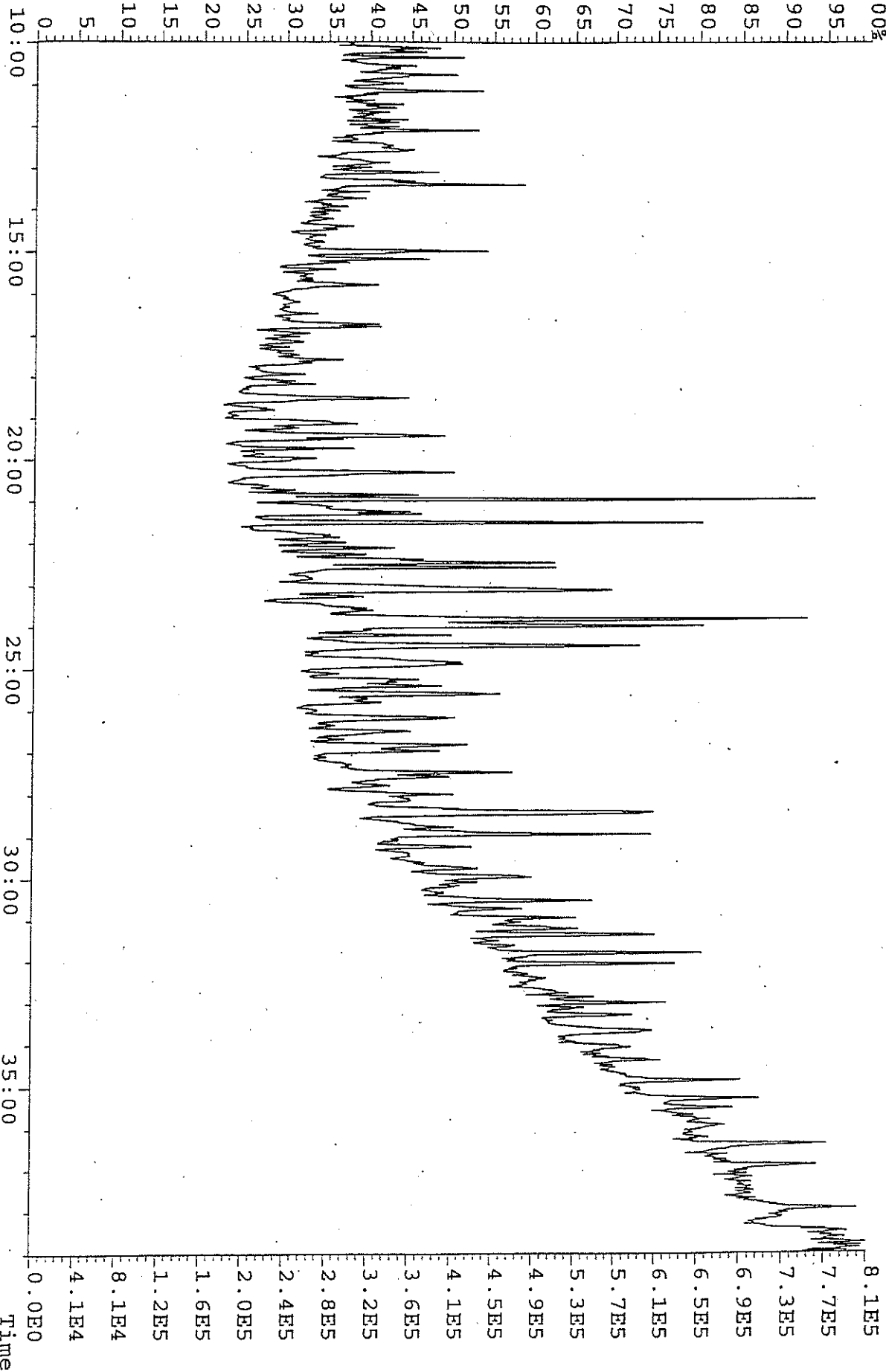
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218.2028 Exp: BIOMARK  
File Text: Kotanee Lee Sample (a) E-37 12792'



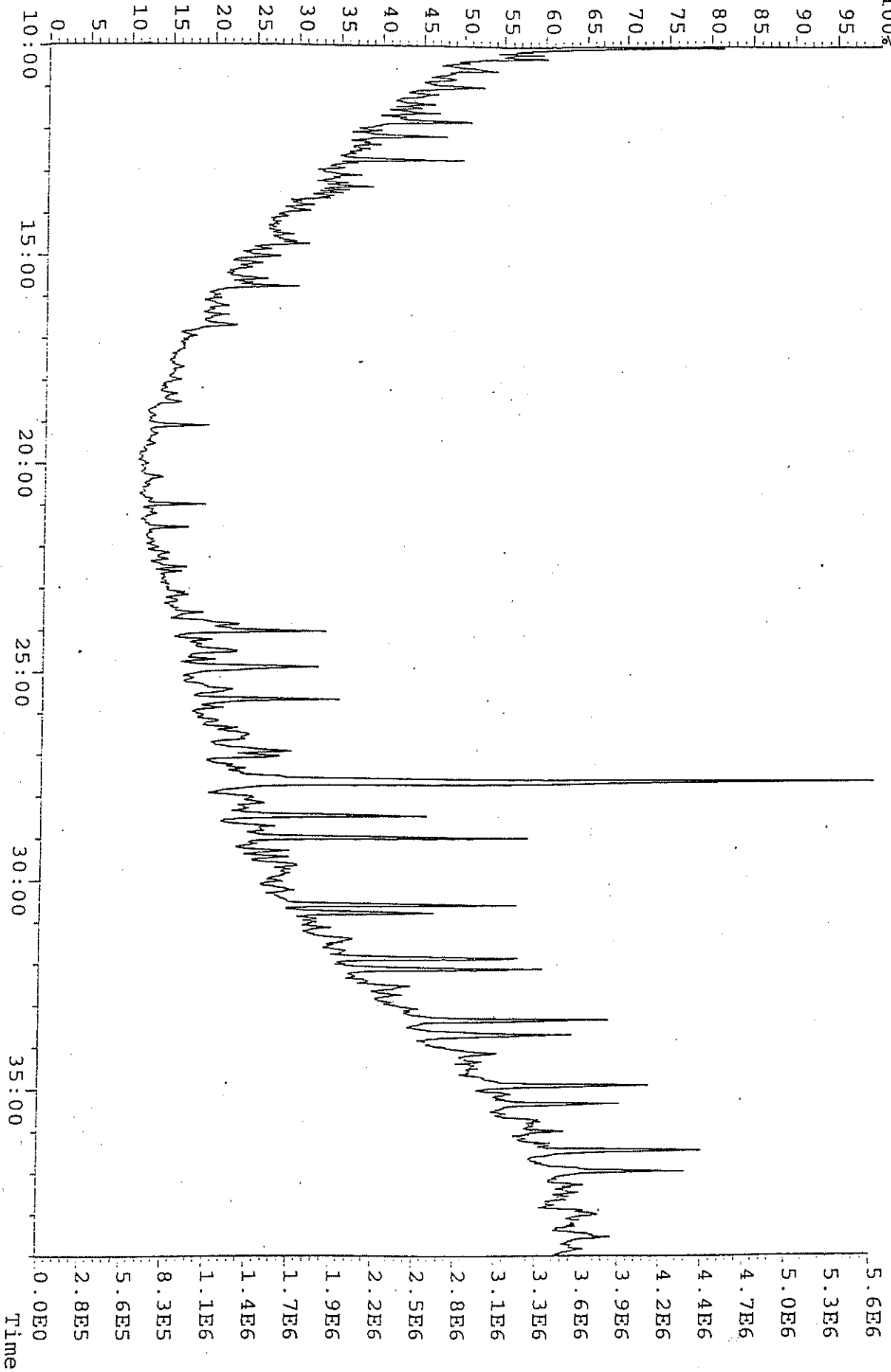
File: 8534 #1-3665 Acq: 10-JUL-1996 10:44:10 Septum EI+ Voltage SIR 70SQ  
231.2106 Exp: BIOMARK  
File Text: Kotanee Lee Sample (a) E-37 12792'  
100%



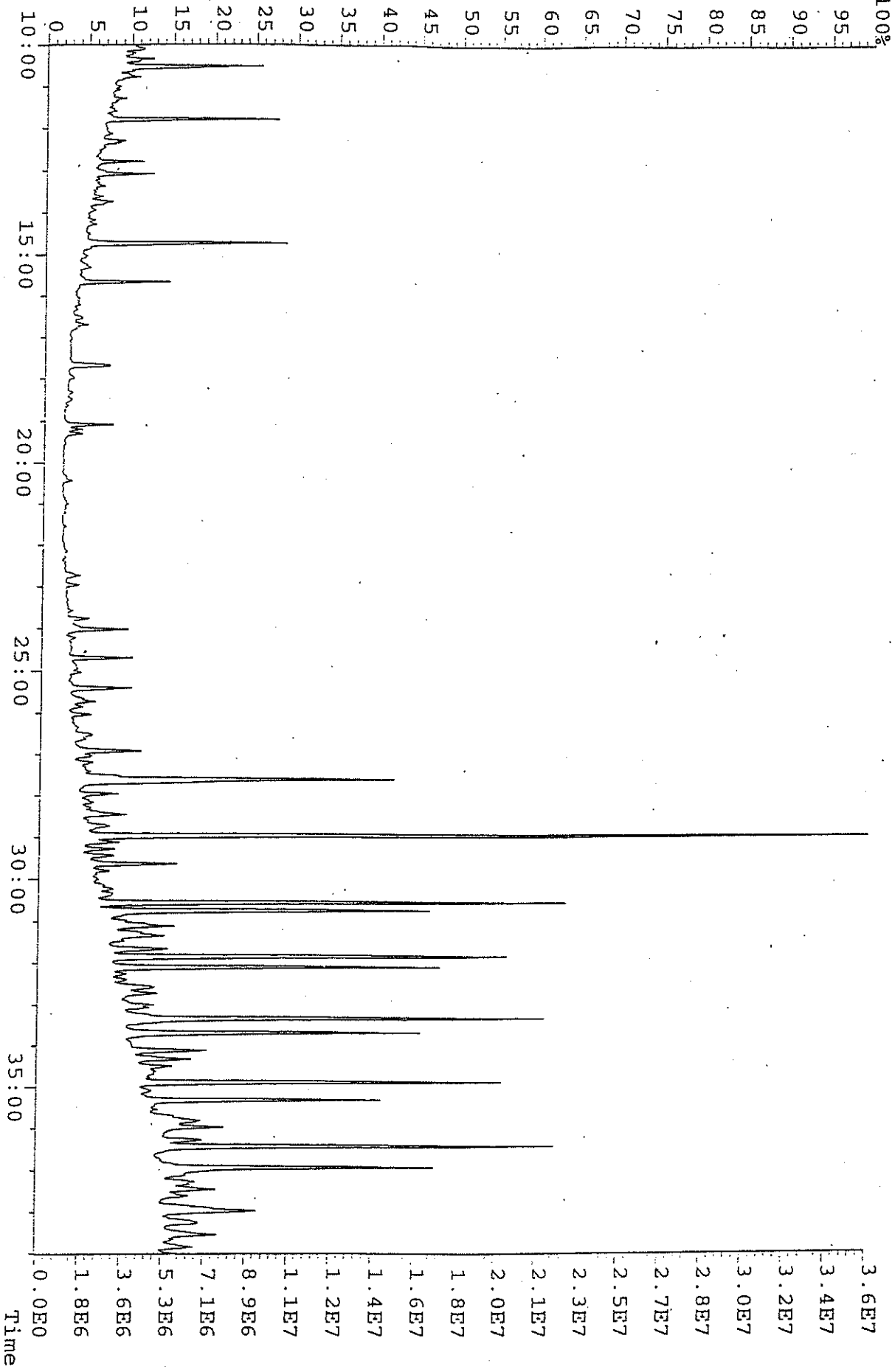
File:8534 #1-3665 Acq:10-JUL-1996 10:44:10 Septum EI+ Voltage SIR 705Q  
259.2262 Exp:BIOMARK  
File Text:Kotanee Lee Sample (a) E-37 12792'  
100%



File:8535 #1-3665 Acq:10-JUL-1996 12:13:03 Septum EI+ Voltage SIR 70SQ  
Sample#1 File Text:Kotanee Lee Sample (e) YTE-37 13163' Exp:BIOMARK  
177.1638

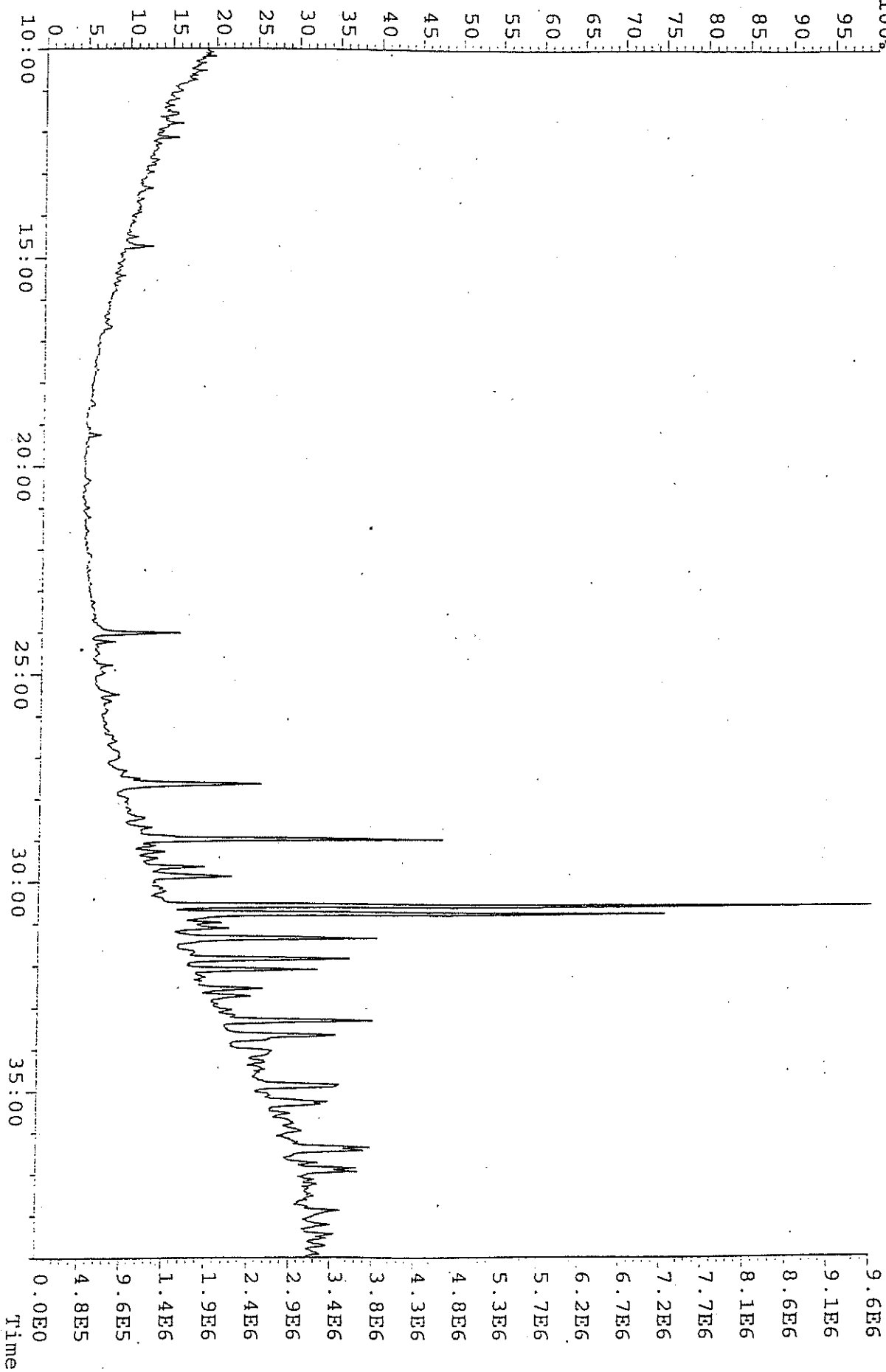


File: 8535 #1-3665 Acq: 10-JUL-1996 12:13:03 Septum FI+ Voltage SIR 70SQ  
Sample#1 File Text: Kotanee Lee Sample (e) YTE-37 13163' Exp: BIOMARK  
191.1794  
100%

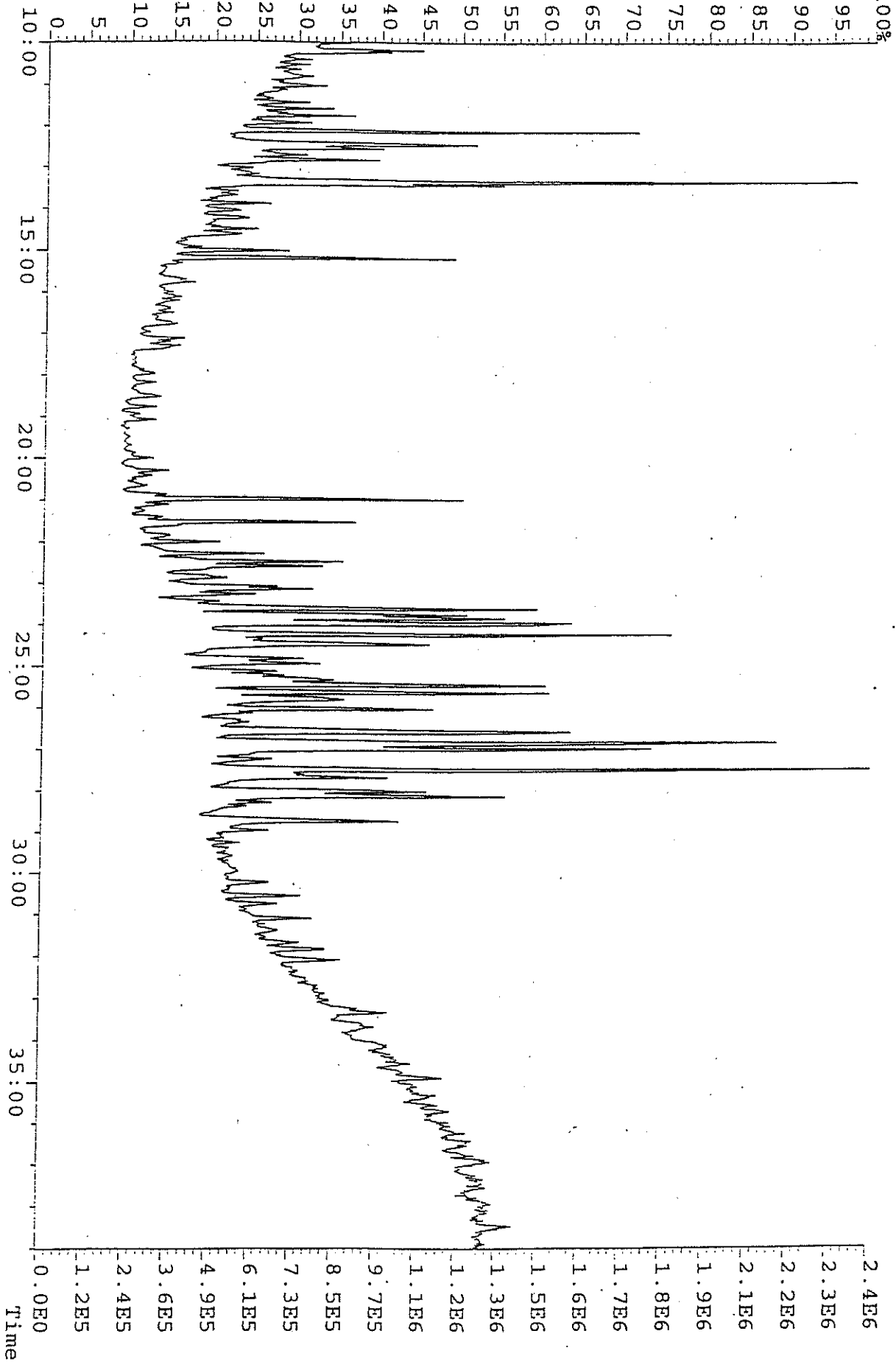


3.6E7  
3.4E7  
3.2E7  
3.0E7  
2.8E7  
2.7E7  
2.5E7  
2.3E7  
2.1E7  
2.0E7  
1.8E7  
1.6E7  
1.4E7  
1.2E7  
1.1E7  
8.9E6  
7.1E6  
5.3E6  
3.6E6  
1.8E6  
0.0E0  
Time

File:8535 #1-3665 Acq:10-JUL-1996 12:13:03 Septum EI+ Voltage SIR 70SQ  
Sample#1 File Text:Kotane Lee Sample (e) YTE-37 13163' Exp:BIOMARK  
205.1950

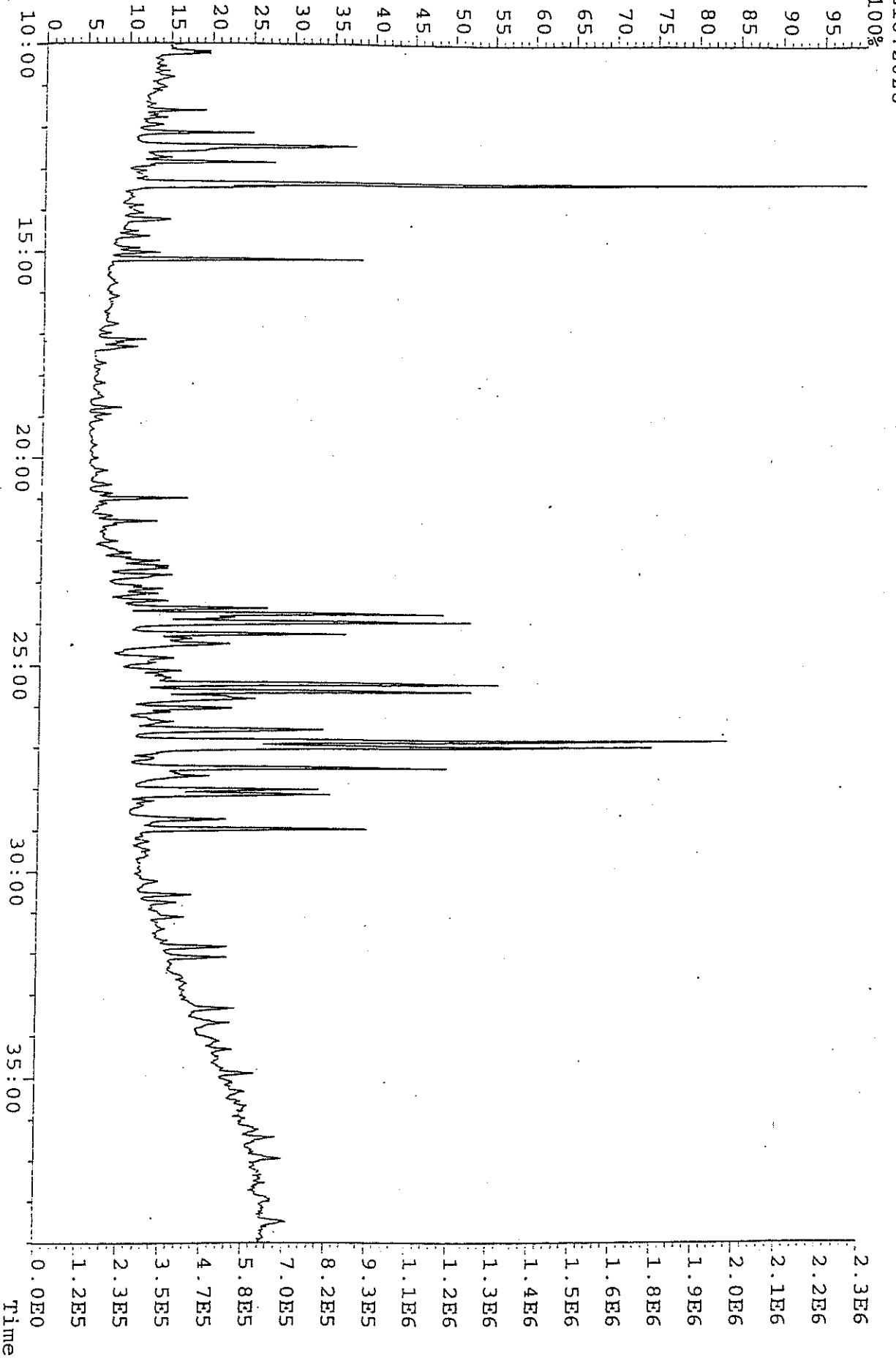


File: 8535 #1-3665 Acq: 10-JUL-1996 12:13:03 Septum EI+ Voltage SIR 70SQ  
Sample#1 File Text: Kotanee Lee Sample (e) YTE-37 13163' Exp: BIOMARK  
217.1950

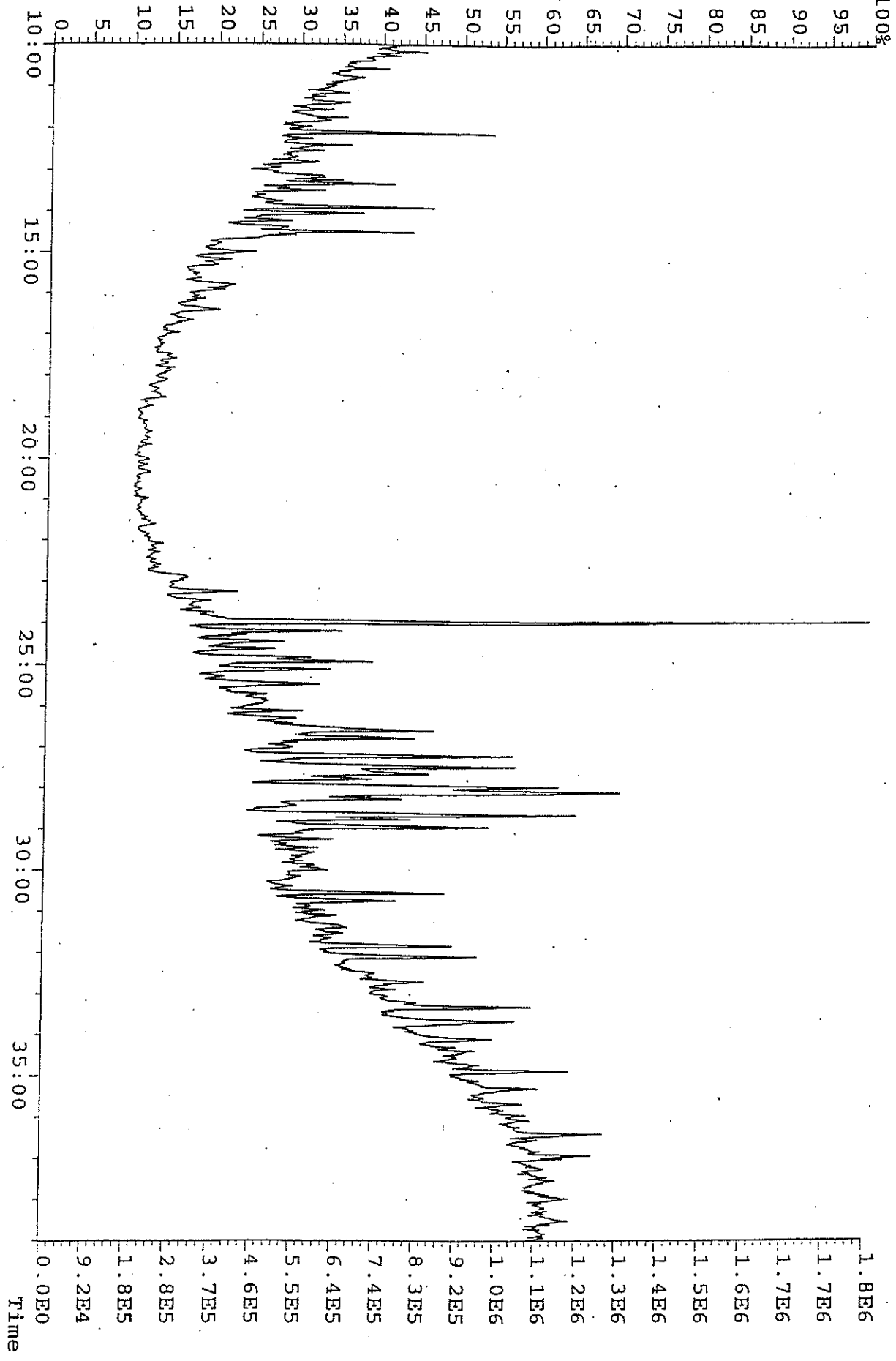




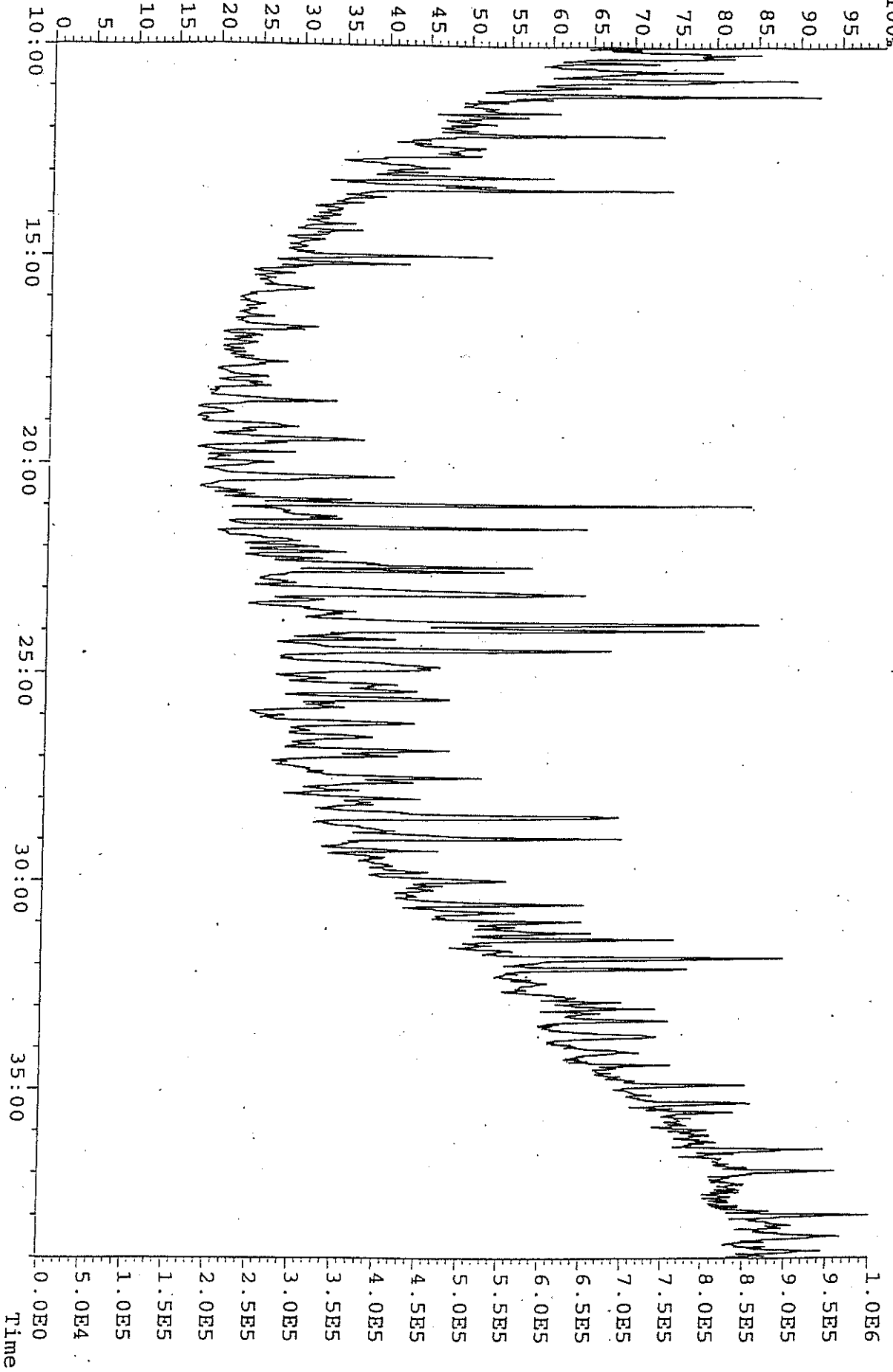
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Sample#1 File Text:Kotanee Lee Sample (e) YTE-37 13163' Exp:BIOMARK  
218.2028



File: 8535 #1-3665 Acq: 10-JUL-1996 12:13:03 Septum EI+ Voltage SIR 70S0  
Sample#1 File Text: Kotanee Lee Sample (e) YTE-37 13163' Exp: BIOMARK  
231.2106



File:8535 #1-3665 Acq:10-JUL-1996 12:13:03 Septum EI+ Voltage SIR 7050  
Sample#1 File Text:Kotanee Lee Sample (e) YTE-37 13163' Exp:BIOMARK  
259.2262  
100%



Date.....Mon Jul 8, 1996 8:46:35 am  
Report number.....16637  
Raw file...../VARIAN/MISC536  
Method file...../VARIAN/SATS  
Last method update..Tue Apr 23, 1996 9:19:07 am

Device.....NAI 840 A/D, Channel 3  
Device report.....3604

Acq. date.....Mon Jul 8, 1996 7:36:30 am  
Acq. run time.....70.00 min  
Acq. sample rate....3 pt(s)/sec

Sample name.....#8535 KOTANEELEE SAMPLE e YTE-37 13163'  
Notes.....ESSO

Author.....MARG  
Instrument.....NEW VARIAN 3700  
Column type.....FUSED SILICA  
    length.....30 m  
    diameter.....\*  
Stationary phase....DB1  
Mobile phase.....\*  
Detector.....FID  
Notes.....DEC 1, 1993 . NEW COLUMN

Anal. run time.....69.991 min                      Delay time.....5.000 min  
Area reject.....100 count(s)                      No. peaks found.....255  
Noise threshold....2 microvolts                    Area threshold.....20 counts  
Start peak width....5.00 sec(s)                    Area/Pk.Ht.....A  
Min. window.....10.00 sec                          % window.....0.00  
Analysis type.....AREA%                            A/D range.....1.0 volt(s)

TIMED EVENTS TABLE

R.T.(min)	Event codes
0.01	IP
3.00	-IP

MISSING PEAKS LIST

R.T.(min)	Peak name	Group	Ref Std
6.38	C10		

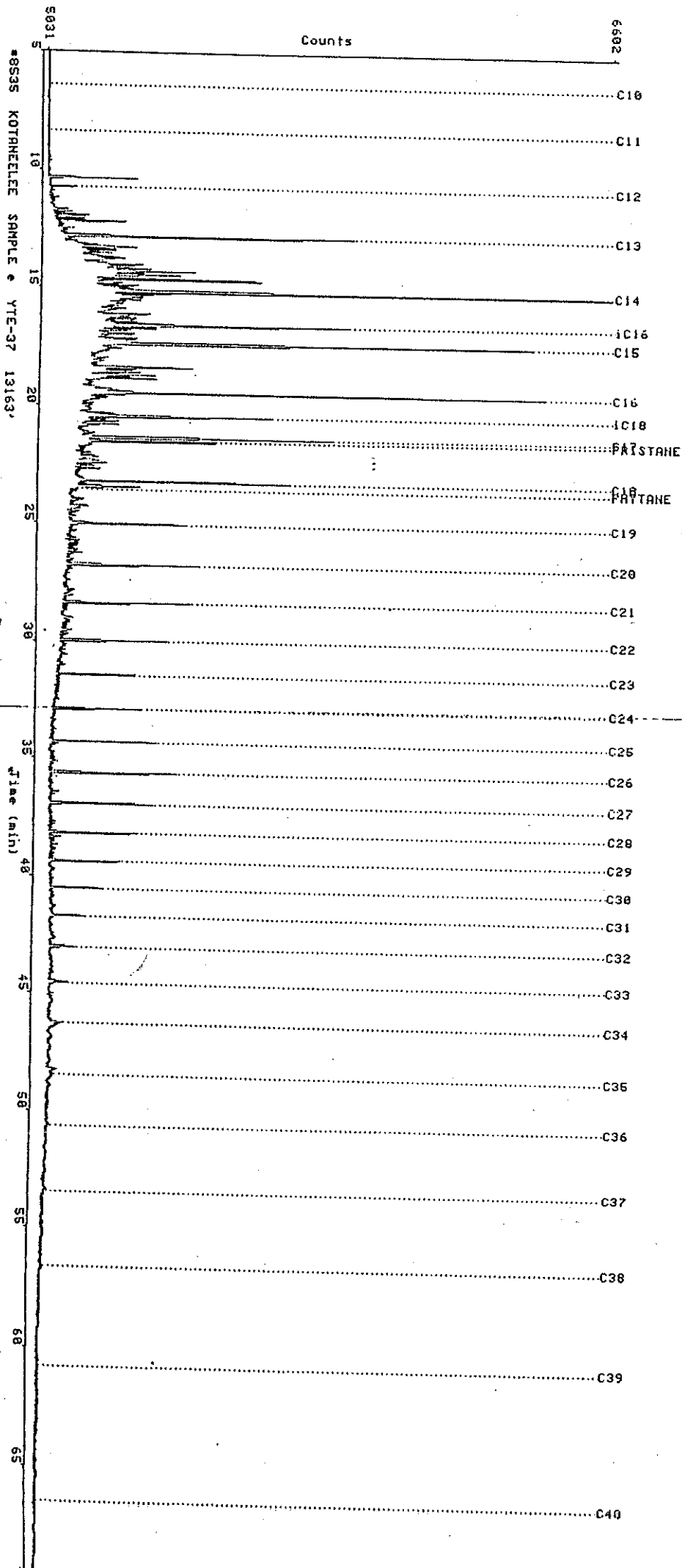
AREA PERCENT REPORT

Peak	R.T. (min)	Peak Area	Peak Ht	Area%	Ref Std	BL R	Peak Name
1	10.343	533	240	1.002		BB	
2	10.730	153	69	0.288		BB	C12
3	11.670	106	36	0.199		BB	
4	11.825	132	51	0.248		BU	
5	11.938	251	96	0.472		UB	
6	12.097	166	75	0.312		BB	
7	12.204	434	192	0.816		BE	
8	12.498	114	39	0.214		BB	
9	12.825	2101	797	3.949	R1	BE	C13
10	13.184	122	52	0.229		UU	
11	13.274	526	155	0.989		UB	
12	13.408	337	95	0.633		BU	
13	13.628	256	79	0.481		UB	
14	13.683	171	41	0.321		BU	
15	13.736	332	111	0.624		UU	
16	13.805	321	83	0.603		UB	
17	14.021	438	134	0.823		UU	
18	14.095	263	99	0.494		UU	
19	14.213	353	120	0.664		UU	
20	14.330	650	224	1.222		UB	
21	14.481	304	142	0.571		BB	
22	14.673	1244	450	2.338		BU	
23	14.797	192	67	0.361		UU	
24	14.837	114	56	0.214		UB	
25	14.921	279	107	0.524		BU	
26	15.056	333	65	0.626		UU	
27	15.192	5197	1380	9.769	R2	UB	C14
28	15.289	317	143	0.596		BB	
29	15.532	163	69	0.306		BB	
30	15.631	164	35	0.308		BB	
31	15.903	159	55	0.299		BB	
32	16.137	121	35	0.227		BB	
33	16.259	130	57	0.238		BB	
34	16.340	305	79	0.585		BB	
35	16.452	227	90	0.427		BU	
36	16.596	2171	633	4.031	R3	UU	C16
37	16.714	470	145	0.887		UU	
38	16.812	249	80	0.468		UB	
39	16.868	245	91	0.461		UU	
40	17.138	414	94	0.779		BU	
41	17.377	3920	1191	7.369	R4	UE	C15
42	17.560	148	45	0.278		BB	
43	17.643	132	44	0.248		BU	
44	18.350	1103	274	2.073		BU	
45	18.455	366	110	0.688		UU	
46	18.552	982	140	1.894		UU	
47	18.681	590	178	1.109		UU	
48	18.767	324	118	0.609		UU	
49	18.831	462	155	0.869		UB	
50	19.200	129	33	0.242		BU	
51	19.312	427	84	0.803		UU	
52	19.454	4809	1242	8.474	R5	UE	C16
53	19.607	161	43	0.303		UE	
54	19.763	112	35	0.211		BB	
55	20.039	344	34	0.647		BU	
56	20.467	1982	570	3.669	R6	UE	C18
57	20.514	244	69	0.459		UE	
58	20.689	310	97	0.583		BB	
59	20.833	195	95	0.348		BB	
60	21.410	2132	636	4.008	6	BE	C17
61	21.589	1144	349	2.150	6	UB	PRISTANE
62	22.066	119	33	0.224		BE	
63	22.386	138	53	0.259		BU	
64	22.462	375	79	0.705		UB	
65	22.734	175	64	0.329		BB	
66	23.280	1649	597	3.100	7	UE	C18
67	23.334	139	37	0.261		UE	
68	23.503	626	186	1.271		UE	
69	25.058	987	315	1.855	R7	BB	C19
70	25.761	1052	364	1.978	7	BB	C20
71	28.387	867	348	1.630	7	BU	C21
72	28.856	117	24	0.220		BU	
73	29.093	779	297	1.464	7	BB	C22
74	31.442	564	215	1.060		BB	C23
75	32.890	652	242	1.226		BB	C24
76	34.282	812	288	1.526		BB	C25
77	35.633	934	355	1.750		BB	C26
78	36.904	862	284	1.620		BB	C27
79	38.150	636	235	1.230		BB	C28
80	39.353	980	395	1.290	8	BB	C28
		803	194	1.134	9	BB	C29
81	40.517	414	141	0.778	9	BB	C30
82	41.730	311	95	0.585	R9	BB	C31
83	43.055	233	66	0.438	9	BB	C32
84	44.961	222	46	0.417	9	BB	C33
Totals		53198		100.000			

ANALYSIS NOTES

1: WARNING: Peak windows overlap. Check peak identification. (245)

Data file: /VARIAN/MISC636  
Report: 16637  
Acquired: Mon Jul 8, 1996 7:36:30 am  
Time range: 5.00-70.00  
Vert. scale/offset: 1.0/0



ESSO

Date.....Thu Jul 4, 1996 3:50:04 pm  
 Report number.....16629  
 Raw file.....\VARIAN\MISC935  
 Method file.....\VARIAN\SATS  
 Last method update..Tue Apr 23, 1996 9:19:07 am

Device.....NAI 640 A/D, Channel 3  
 Reprocess number.....1

Acq. date.....Thu Jul 4, 1996 2:23:20 pm  
 Acq. run time.....70.00 min  
 Acq. sample rate....3 pt(s)/sec

Sample name.....#8534 KOTAMEELEE SAMPLE a E-37 12792  
 Notes.....E690

Author.....MARG  
 Instrument.....NEW VARIAN 3700  
 Column type.....FUSED SILICA  
   length.....30 m  
   diameter....."  
 Stationary phase....DB1  
 Mobile phase.....  
 Detector.....FID  
 Notes.....DEC 1, 1993 . NEW COLUMN

Anal. run time.....69.993 min                   Delay time.....5.000 min  
 Area reject.....100 count(s)                No. peaks found.....117  
 Noise threshold.....2 microvolts            Area threshold.....20 counts  
 Start peak width....5.00 sec(s)            Area/Pk.Ht.....A  
 Min. window.....10.00 sec                   % window.....0.00

Analysis type.....APeak                      A/D range.....1.0 volt(s)

TIMED EVENTS TABLE

R.T. (min)	Event codes
0.11	IP
7.00	-IP

MISSING PEAKS LIST

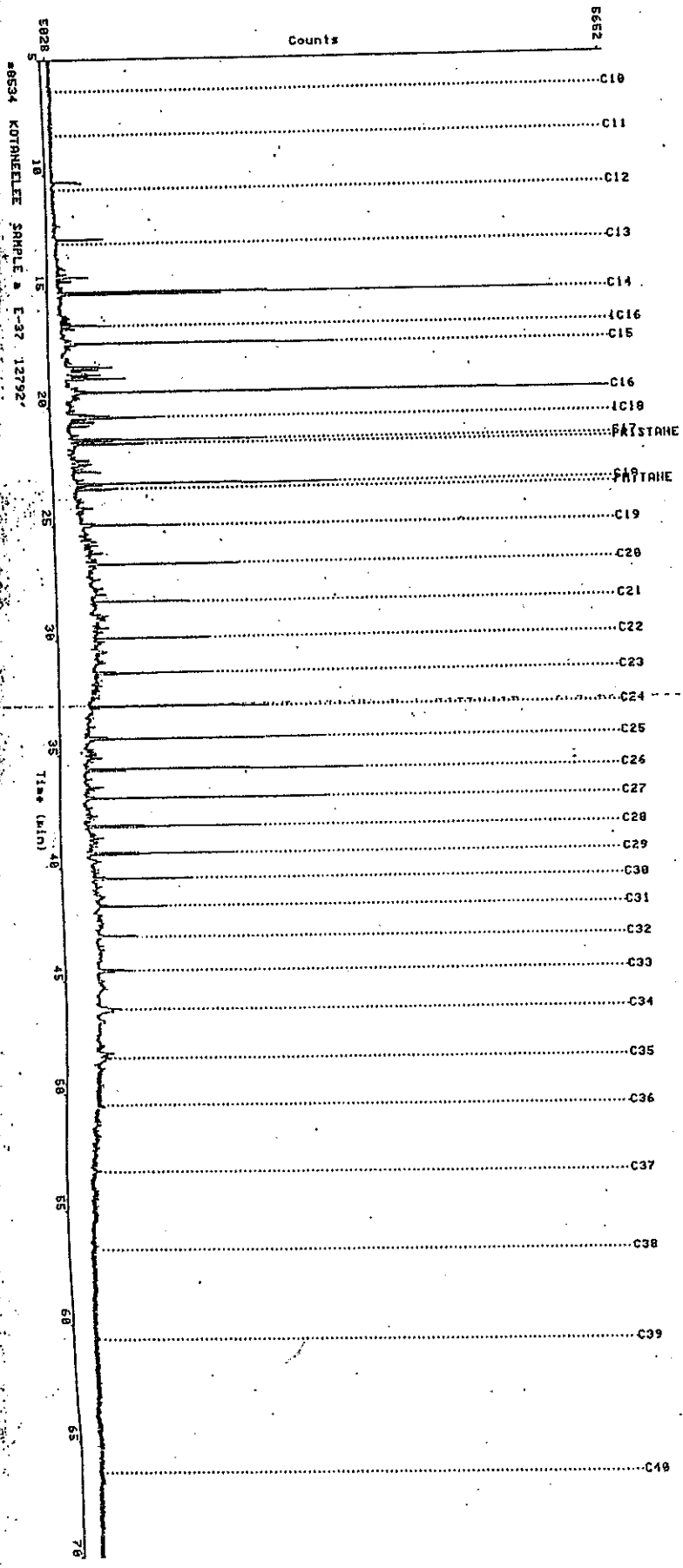
R.T. (min)	Peak name	Group	Ref Std
6.58	C10		
8.33	C11		
10.63	C12		
12.99	C13		R1
26.68	C18		
26.69	C40		

Peak	R.T. (min)	Peak Area	Peak Ht	Area%	Ref Std	BL	R	Peak Name
1	12.776	125	53	0.976		00		
2	15.118	1501	549	11.717	R2	00		C14
3	16.521	153	56	1.194	R3	00		iC16
4	17.301	733	303	5.722	R4	00		C15
5	18.307	211	52	1.647		00		
6	18.785	143	61	1.116		00		
7	19.397	1674	599	13.068	R5	00		C16
8	20.414	287	95	2.240	R6	00		iC18
9	21.353	519	215	4.052	6	00		C17
10	21.537	332	80	1.911	6	00		PRISTANE
11	23.232	746	296	5.824	7	00		C18
12	23.464	124	45	0.968	7	00		PHYTANE
13	25.009	339	103	2.646	R7	00		C19
14	26.724	412	165	3.216	7	00		C20
15	28.354	280	110	2.186	7	00		C21
16	29.924	340	132	2.654	7	00		C22
17	31.427	356	134	2.779	7	00		C23
18	32.870	533	201	4.161	7	00		C24
19	34.253	703	267	5.488	R8	00		C25
20	35.606	825	308	6.440	8	00		C26
21	36.893	736	268	5.738	8	00		C27
22	38.133	573	195	4.473	8	00		C28
23	39.338	479	180	3.739	9	00		C29
24	40.500	316	109	2.467	9	00		C30
25	41.710	218	74	1.702	R9	00		C31
26	43.058	142	40	1.109	9	00		C32
27	44.517	111	31	0.867	9	00		C33
Totals		12810		100.000				

ANALYSIS NOTES

- 1: Declared REFERENCE was not found during peak search. (142)
- 2: WARNING: Peak windows overlap. Check peak identification. (245)

Date file: /VARIAN/HISC635  
Report: 16629  
Acquired: Thu Jul 4, 1996 21:23:20 pm  
Time range: 5.00-78.00  
Vert. scale/offset: 1.0/0



ESSO



WELL-NAME	DEPTH-RANGE(H)	XTOC	EXT YLD	HC YLD	ZHC	ZK+A	ZSAI	ZARV	DT-9	SAT	AROM	NSQS	ASPH	SPL
KOTANELEE * YTESJ	4012	4012	.71 425.1	57.8	13.6	76.9	7.1	6.5	5	16.9	1.2	1.1	10.8	2.2 1.6
														B515

KOTANELEE ae-jt	3899.00	12792	5.21000	144.843	7.10884	4.90798				1.87000		0.00000			B514 0
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WELL-NAME	DEPTH-RANGE-H	% CORG	EXT YLD	HC YLD	% HC	ZR+A	% SAT	% AROM	ROCK WT.	EXT (mg)	SATS (mg)	AROM (mg)	NSQS (mg)	ASPH (mg)	SPL *	
KOTANELEE e-jt	3899	3899.00	5.210	144.843	7.10884	4.90798	87.1166	3.68098	1.2269	2.1600	16.30	6000	2000	12.30	1.900	B514

KOTANELEE eYTESJ	4012.08	13163	7.10000	425.050	57.8471	13.6095			1.69000		0.00000					B515 0
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WELL-NAME	DEPTH-RANGE-H	% CORG	EXT YLD	HC YLD	% HC	ZR+A	% SAT	% AROM	ROCK WT.	EXT (mg)	SATS (mg)	AROM (mg)	NSQS (mg)	ASPH (mg)	SPL *	
KOTANELEE YTESJ	4012	4012.08	7.100	425.050	57.8471	13.6095	76.9231	7.10059	6.5088	5.6000	16.90	1.200	1.100	10.80	2.200	B515