N-Haslam Creek 80(1)A

GEOLOGICAL REPORT OF HASLAM CREEK

B.C. COAL LICENCES 6189, 6192-6193, 6195-6196, 6198

BRIGHT LAND DISTRICT

92 G4

by

Allister Raymond Peach
Project Geologist

49°03' 123°55'

Esso Resources Canada Limited
Esso Minerals Canada - Coal
237 - 4th Avenue S.W.
Calgary, Alberta

Date Completed: November 1980
Date Submitted: December 1981

TABLE OF CONTENTS

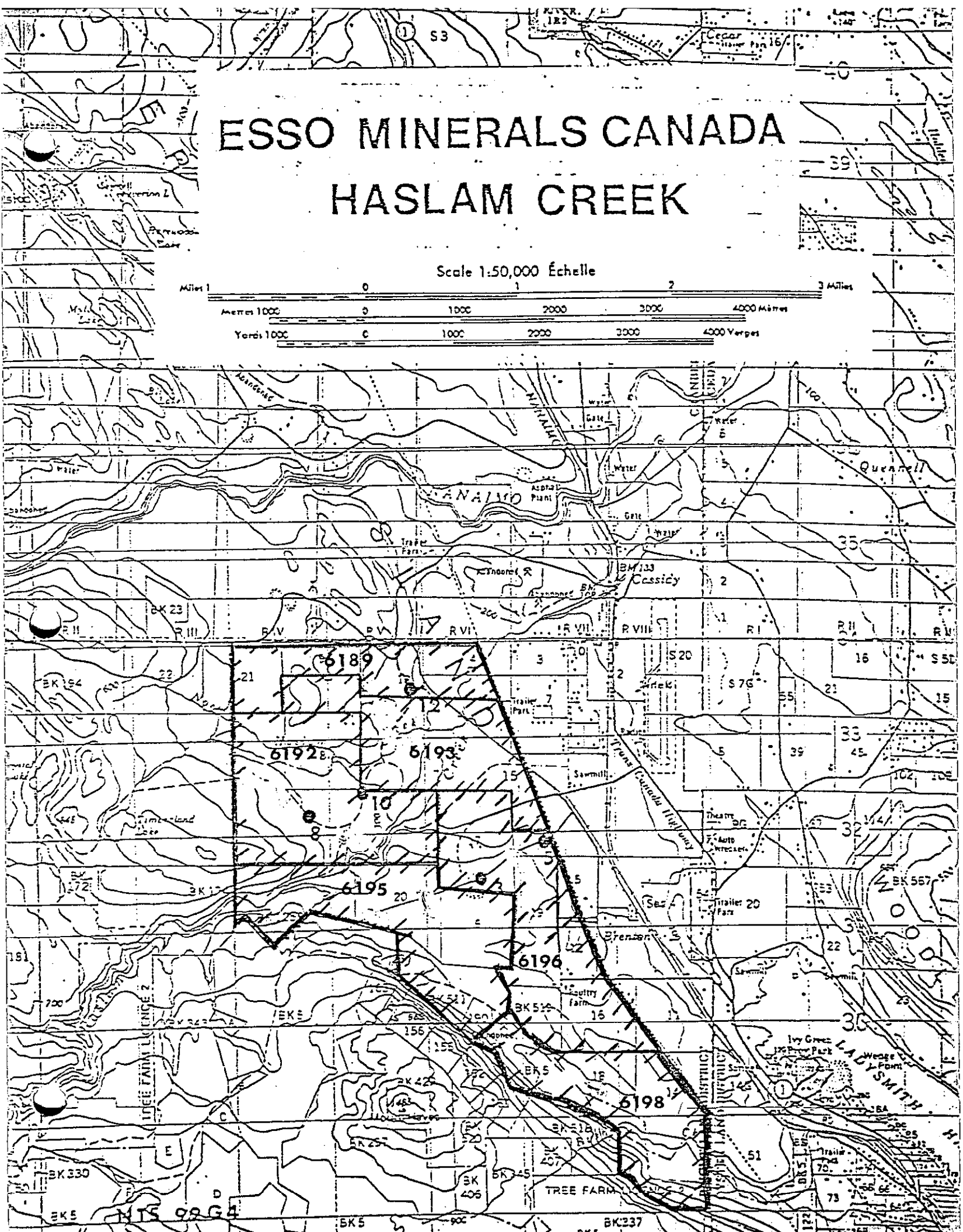
INTRODUCTION

On September 30, 1980, Esso Resources Canada Limited was granted coal licences on a property called Haslam Creek. The property is located about 4 kilometres southwest of the village of Cassidy on the east coast of Vancouver Island. Access to the property was via McMillan-Bloedel and British Columbia Department of Highway roads. Coal licences are numbered 6189, 6192-93, 6195-96, 6198 and are shown on Map 1.

The licences cover an area of 1381 hectares in an area believed to be the southern extention of the Nanaimo Coalfield.

In November of 1980 a reconnaissance drilling program was conducted within the property area. The drilling program consisted of 5 drillholes with a total of 1143 metres completed. Geophysical logging and reclamation were conducted upon the holes after the drilling operation. Geophysical logs completed on the drillholes include gamma ray, long space density (L.S.D.), bed resolution density (B.R.D.), caliper, focused electric and dipmeter. Numerous thin (45 cm or less) coal and carbonaceous shales beds were intersected in drillhole 5 (Map 2). Palynology and elemental spectrographic analysis (E.S.A.) was performed on a number of samples from this drillhole (Appendix 2). All other drillholes were barren.

The economic potential of the Haslam Creek is considered negative due to the lack of significant coal occurrances.


ESSO MINERALS CANADA
HASLAM CREEK
Scale 1:50,000 Échelle
Miles 1 0 1 2 3 Miles
Metres 1000 0 1000 2000 3000 4000 Mètres
Yards 1000 0 1000 2000 3000 4000 Verges
6189
6192
6193
6195
6196
6198
TREE FARM LICENCE 2
TREE FARM
NANAIMO
Cassidy
Cedar
Qualicum
Parksville
Lantzville
Nanoose
Trans Canada Highway
Island Highway
Sawmill
Trailer Park
Ivy Green Provincial Park
Wedge Point
LADYSMITH
NTS 92G4

GEOLOGY

Four (4) lithological units have been recognized within the Haslam Creek boundaries based upon previously existing geological information (Clapp, 1916) and knowledge gained through the reconnaissance drilling program (Map 2).

The lowest stratigraphic unit is called the Saanich Formation and consists of intrusive rocks of granodiorite composition. The unit is considered to be of upper Jurassic to lower Cretaceous period. (Clapp 1916).

The second stratigraphic unit recognized is called the Haslam Formation. The Haslam Formation consists of mainly dark grey to black shale, dark grey siltstone and minor grey sandstone. Some calcareous fragments occur in drillhole 8 which could be fracture-fill calcite or shell fragments. The Haslam Formation is considered to be marine in origin. (Clapp 1916). The thickness of the Haslam Formation was undetermined although the formation was penetrated for about 10 metres in drillholes 3, 5, 8 and 10. Bedding orientation as defined by a dipmeter log of drillhole 5 is 150° strike with a dip of 14° to the northeast. (Appendix 1). The contact between the basal Saanich Formation and the overlying Haslam Formation is unconformable.

The third stratigraphic unit recognized is called the Extension Protection Formation. This formation consists of conglomerate, coarse to fine grained sandstone and minor siltstone. The depositional environment for the sequence of lithologies is a fluvial-deltaic regime. Channel deposits are illustrated in drillhole logs for hole, 3, 8, 10 and 12, while overbank and levee type deposits can be seen in all drillholes.

The minimum thickness (179 m) of Extension Protection Formation sediments was intersected in drillhole 5. Bedding orientation depicted in dipmeter logs for drillholes 3 and 5 has a strike range of 90 to 115° with range of dip 6° to 15° northerly in drillhole 3 and 120 to 135° with range of dip 10° to 20° northeasterly in drillhole 5. The contact between the Extension Protection Formation and the Haslam Formation appears transitional.

The fourth stratigraphic unit is called the Cedar District Formation. It was intersected in drillhole 5 only and consisted predominantly of shale. The maximum thickness of sediments was 68 metres as depicted in the lithology log for drillhole 5. Bedding orientation is depicted in the dipmeter log for drillhole 5 and is 130° in strike with 12° to 15° northeasterly dip. The contact between the Extension Protection Formation and the Cedar District Formation is considered transitional from a fluvial-deltaic regime to a sandy shore marine regime. (Muller & Jeletzky 1970).

Palynology and elemental spectrographic analysis were performed on three lithologies in drillhole 5 to determine age and correlation. The results of the studies are contained in Appendix 2.

A geological cross-section illustrates the schematic geological configuration is shown in Appendix 3.

No structural disturbance was interpreted from geophysical logs although a fault has been postulated along Haslam Creek (Buckham 1947b) (Map 2).

DRILLING SPECIFICATIONS

Two drilling rigs were utilized during the drilling phase of exploration on the Haslam Creek property. The contractors and specifications regarding each rig are listed below.

Ken's Drilling Limited, Brentwood Bay, B.C.

Canadian Pneumatic T-650 w

- 450 C.F.M. at 250 P.S.I.
- 30,000 pounds pull down capacity
- 36,000 inch pounds of rotary torque
- Drill-Thru casing hammer model 662
- Downhole hammer and rotary capabilities

En-Air Drilling Ltd. Calgary, Alberta (Subcontracted Through Ken's Drilling Ltd.)

Schramm T685H Rotadrill

- 850 C.F.M. at 350 P.S.I.
- 35,000 pounds pull down capacity
- 41,000 to 89,500 in pounds constant torque
- Downhole hammer and rotary capabilities

LIST OF EXPENDITURES

Drilling	$52,940.68
Logging	12,049.77
Reclamation	985.55
Accommodation	804.35
Subsistance	1,038.76
Fuel	1,235.08
Cementing and Hole Plugging	1,001.46
Communications	400.00
Trucking	2,101.69
O/H and Reports	10,687.26
	$83,244.60

CONCLUSION

The area encompassing coal licences (6189, 6192-6193, 6195-6196, and 6198) Haslam Creek was investigated using a reconnaissance drilling program.

The occurrence of Nanaimo Group sediments was confirmed. Thin (less than 45 cm) coal beds were intersected in only one drillhole (5).

As a result of the absence of significant coal thicknesses with any degree of continuity, the value of the property as a possible economical coal deposit is very low and as of September 30, 1981 it is recommended that the licences be dropped.

REFERENCES

Buckham, A.F. 1947b — Preliminary map, Nanaimo Coal Field; Geol. Surv. Can., Paper 47-22.

Clapp, C.H. 1916 — Nanaimo Sheet, Geol. Surv. Can., Map 158A.

Muller, J.E. and Jeletzky, J.A. — Geology of the Upper Cretaceous Nanaimo Group, Vancouver Island and Gulf Islands, British Columbia, Geol. Surv. Can. Paper 69-25.

Statement of Author's Academic and Professional Qualifications

I, Allister Raymond Peach, received a Bachelor or Science degree from the University of New Brunswick on May 19, 1971. The degree consisted of a major in Geology with curriculum concentration on Stratigraphy and Sedimentary Geology.

My professional qualifications include 2 years and 5 months, commencing May 1977, as a Testhole Geologist with the Carboniferous Drilling Project, a federal-provincial project exploring for coal in the Pennsylvanian age strata of New Brunswick. Since October of 1979 I have been employed as a geologist with Esso Minerals Canada. My experience with E.M.C. included coal exploration in the west central foothills of Alberta and on Vancouver Island in British Columbia.

Allister Raymond Peach

Allister Raymond Peach

APPENDIX 1

COAL LITHOLOGY LOG

LOG SUITE
GAMMA RAY
DENSITY
CALIPER

SONDE TYPE
LOG COMBINATION
SONDE

BOREHOLE #12
CLIENT ESSO RESOURCES LTD.
AREA HASLAM CREEK
COUNTRY CANADA
DATE LOGGED 22/12/86
RUN NO. 1
DEPTH DRILLER 207m
DEPTH LOGGER 207m
BTM LOG INTERVAL 205m
TOP LOG INTERVAL 0m
CASING DRILLER 10m
CASING LOGGER 10m
BIT SIZE 6 3/4"
TYPE FLUID WATER BASE MUD
DENSITY 1.1
VISCOSITY 40
PH 9.5
FLUID LOSS 10
SOURCE OF SAMPLE CIRCULATION
RM @ MEAS TEMP 0.5 @ 20°C
RMF @ MEAS TEMP 0.4 @ 20°C
RMC @ MEAS TEMP 0.6 @ 20°C
SOURCE OF RMF & RMC MEASURED
RM @ BHT 0.3 @ 30°C
TIME SINCE CIRC 12 HRS
MAX REC TEMP 30°C
EQUIP LOCATION 1200
RECORDED BY A. GRIFFITH
WITNESSED BY

OPERATION DATA

BOREHOLE RECORD
BIT | FROM | TO
6 3/4" | 0 | 207m

CASING RECORD
SIZE | WGT | GRADE | FROM | TO
4" | 10.5 | J55 | 0 | 10m

REMARKS
Hole terminated due to large volumes of water - artesian flow - basin?
m. counts/min.

EQUIPMENT AND RECORDING DATA

COAL COMBINATION SONDE

LOG	EQUIPMENT: SONDE	SOURCE	CALIBRATOR	TAPING: CAL. TAPE NO.	RECORDED DIRECTION	REPEAT	SPEED	PANEL: SPEED m/hr	CAL. CONN. NORM	DEPTHS: FROM	TO	SEAM LOG RUN
CCS GAMMA RAY	101	6022		T	9m/M	D	9m/M	1	1.5	185	0	185m
DENSITY		292		T	9m/M	D	9m/M	1	7.5	186	1	185m
CALIPER	SIDEWALL POSITION	2085		T	9m/M	D	9m/M	2	1	186	1	185m

COAL QUALITY/SEAM THICKNESS LOG INTERVALS (Refer to relevant log)

	FROM	TO	INTERVAL	INTERVAL TOTAL

ADDITIONAL SONDE RUN

SONDE	LOG	LOGGING & DETAIL SCALE	CROSS-PLOT LOG

REFER TO ADDITIONAL HEADINGS

BPB COAL LITHOLOGY LOG

CALIBRATION DATA

AC No. 81 VALUE 1000 µ SIEMS
AC MARK SHOWN AT ABOVE VALUE 10

AC CAL DATE 19/10/86 VALUE 998 KEV/G/C3 Ubulk 2 cm 820 kg/m³
AC No. 002 SPAN 1200 NORM 2.7 2 cm 112 cm

GAMMA RAY | DEPTH | BULK DENSITY g/cm³ | CALIPER INCHES

HOLE SIZE CORRECTION DATA

API 150 1200 cm 2 3

0 150 1200

00

10

Glacial Material

CASING SHOE

Extensometer Protection

F.M. (Lignite Deposit)

Basal Unit?

185

[illegible] 0.1 150 1200 0.1 2 3

0 API 150 1200 cm 2 3

GAMMA RAY | DEPTH | BULK DENSITY g/cm³ | CALIPER INCHES

BPB

BOREHOLE #12 AREA HASLAM CREEK
CLIENT ESSO RESOURCES LTD COUNTRY CANADA

COAL LITHOLOGY LOG

MT 830561 9

N-Hayden Creek 85(23)-34-1

PROCESSED ELECTRIC LOG

BOREHOLE #10
CLIENT ESSO RESOURCES LTD
AREA HASLAM CREEK
COUNTRY CANADA
DATE LOGGED 17/5/80
RUN No. ONE
DEPTH-DRILLER 200m
DEPTH-LOGGER 200m
BTM. LOGGED INTERVAL 200m
TOP LOGGED INTERVAL 142m
CASING-DRILLER 142m
CASING-LOGGER 142m
BIT SIZE 8½"
TYPE FLUID WATER GEL FOAM
DENSITY
VISCOSITY
PH
FLUID LOSS
SOURCE OF SAMPLE
RM @ MEAS. TEMP.
RMF @ MEAS. TEMP.
RMC @ MEAS. TEMP.
SOURCE OF RMF & RMC
RM @ BHT
TIME SINCE CIRC.
MAX. REC. TEMP.
EQUIP. LOCATION
RECORDED BY
WITNESSED BY

BOREHOLE DATA
PERMANENT DATUM GROUND LEVEL
ELEVATION OF P.D. 0
LOG MEASURED FROM K.B.
DRILLING MEASURED FROM K.B.

CASING SIZES		FROM	TO
1	13⅜"	0	54m
2	9⅝"	0	142.5m
3	6"	142.5m	200m
4			

OPERATION DATA

RIG	42/24
UNIT - TRUCK No.	
ENGINEER	
WITNESS	

RM @ MEAS. TEMP.	1.42Ω @ 15°C
RMF @ MEAS. TEMP.	1.54Ω @ 15°C
RMC @ MEAS. TEMP.	38Ω @ 15°C
SOURCE OF RMF & RMC	CALC
RM @ BHT	0.42Ω @ 68°C
TIME SINCE CIRC.	4 HRS
MAX. REC. TEMP.	68°C
EQUIP. LOCATION	8 PB
RECORDED BY	DRILLER
WITNESSED BY	

EQUIPMENT AND RECORDING DATA

LOG	EQUIPMENT			TAPING			PANEL		CAT CONT	DEPTHS		
	SONDE	SOURCE	CALIBRATOR	LOG TAPE ID	RECORD SPEED	DIRECT REPLAY	SPEED	T.C. SECS	NORM	FROM	TO	INTERVAL
PE	112	-	-	7	5m/M	D	5m/M	.3	-	142m	54m	88m

ADDITIONAL SONDES RUN

SONDE	LOG	GENERAL SCALE LOG	DETAIL SCALE LOG
101	CCS	200:1	20:1

REFER TO ADDITIONAL HEADINGS

REMARKS

MONITOR	DEPTH	PROCESSED ELECTRIC LOG
		5 OHM-METERS 5000

10 100 1000

CASING SHOE

60
80
100
120
140
142

REPEAT SECTION

10 100 1000

		5 OHM-METERS 5000
MONITOR	DEPTH	PROCESSED ELECTRIC LOG

BOREHOLE #10
CLIENT ESSO RESOURCES LTD
AREA HASLAM CREEK
COUNTRY CANADA

MY 93160 B

COAL LITHOLOGY LOG

LOG SUITE
GAMMA RAY
DENSITY
CALIPER

COAL DENSITY SONDE

SONDE TYPE

BOREHOLE #13
CLIENT ESSO RESOURCES LTD.
AREA SASKATCHEWAN
COUNTRY CANADA
DATE LOGGED 24/10/1980

BOREHOLE DATA

	DRILLER	LOGGER
PERMANENT DATUM	GROUND LEVEL	
LOG MEASURED FROM	GROUND LEVEL	
DRILLING MEASURED FROM	GROUND LEVEL	
DEPTH-DRILLER	142m	
DEPTH-LOGGER	142m	
BOTTOM LOGGED INTERVAL	142m	
TOP LOGGED INTERVAL	130m	
CASING SIZE	114.3 mm	
CASING WEIGHT		
CASING DEPTH	130m	
BIT SIZE	152.4 mm	
TYPE FLUID IN HOLE	WATER	
DENSITY		
LEVEL		
SOURCE OF SAMPLE		
RM @ MEAS. TEMP.		
RM @ BHT		
TIME SINCE CIRC.		
MAX. REC. TEMP.		
EQUIP. LOCATION		
RECORDED BY		
WITNESSED BY		

OPERATION DATA

RUN NO.	1
DATE	24/10/80
TYPE LOG	GAMMA RAY DENSITY CALIPER
DEPTH-DRILLER	142m
DEPTH-LOGGER	142m
BOTTOM LOGGED INTERVAL	142m
TOP LOGGED INTERVAL	130m
CASING-DRILLER	114.3 mm @ 130m
CASING-LOGGER	114.3 mm @ 130m
BIT SIZE	152.4 mm
TYPE FLUID IN HOLE	WATER
DENSITY	
LEVEL	
MAX. REC. TEMP.	
EST. CEMENT TOP	
EQUIP. LOCATION	
RECORDED BY	
WITNESSED BY	

FLUID DATA

SOURCE	24/10/80 @ 21:45
RM @ MEAS. TEMP.	
RM @ BHT	
RMF @ MEAS. TEMP.	
RMF @ BHT	
RMC @ MEAS. TEMP.	
RMC @ BHT	
SOURCE RMF	
SOURCE RMC	
RM @ 25°C	
RMF @ 25°C	
RMC @ 25°C	
CHLORIDES	
PH	
VISCOSITY	
FLUID LOSS	

RUN 1

EQUIPMENT AND RECORDING DATA

COAL COMBINATION SONDE

LOG	EQUIPMENT: SONDE	SOURCE	CALIBRATOR	TAPING: LOG TAPE/S	RECORD SPEED	DIRECTION REPLAY	PANEL: SPEED	TC SECS	NORM	CAL ROUTE	DEPTHS: FROM	TO	MEAS/M	SEAM LOG RUN
GAMMA RAY	811	5022		Y	2M/M	L	2M/M	1	-		1.5	142	1	1+2+3
GAMMA RAY			292	Y	2M/M	L	2M/M	1	-		1.5	142	1	1+2+3
DENSITY														
CALIPER	SEEWALL POSITION		5985	Y	2M/M	L	2M/M	.3	7.3	-	142	1	1+2+3	
				Y	2M/S	B	2M/M	.3	-	-	142	1	1+2+3	

COAL QUALITY/SEAM THICKNESS LOG INTERVALS (Refer to relevant log)

	INTERVAL TOTAL
FROM	
TO	
INTERVAL	

ADDITIONAL SONDES RUN

SONDE	LOG	GENERAL SCALE LOG	DETAIL SCALE LOG
117	PE	20241	--

REFER TO ADDITIONAL HEADINGS

REMARKS

BPB COAL LITHOLOGY LOG

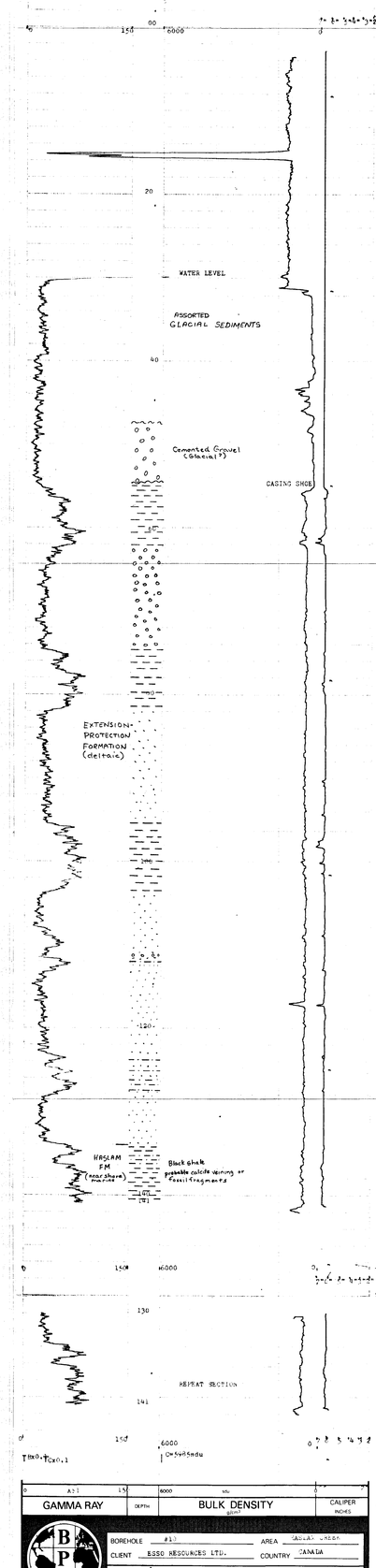
CALIBRATION DATA

JIG No. 81	VALUE 2·20 2 DIAM	JIG CAL DATE 14/10/80	JIG VALUE 5985	SCALE(S) 1000	2 in 439 cps
JIG MARK SHOWN AT ABOVE VALUE - 10		JIG No. 902	SPAN 6000	NORM 200 - 7.3	2 in 312 cps

GAMMA RAY	DEPTH (SCALE)	BULK DENSITY	CALIPER INCHES
API 0 150	6000 kg/m³	2.0	3

HOLE SIZE CORRECTION DATA

6 8 10 12 13 14 15 16 17 18 19 20 21



API 0	150	6000 kg/m³	2.0
GAMMA RAY	DEPTH (SCALE)	BULK DENSITY	CALIPER INCHES

BPB

BOREHOLE #13 AREA SASKATCHEWAN
CLIENT ESSO RESOURCES LTD. COUNTRY CANADA

COAL LITHOLOGY LOG

MY A50361 R

COAL LITHOLOGY LOG

BPB

BOREHOLE # 1
CLIENT ESSO RESOURCES LTD.
AREA HASLAM CREEK
COUNTRY CANADA
DATE LOGGED 22/10/86
RUN # ONE
DEPTH DRILLER 301
DEPTH LOGGER 299
BTM LOG INTERVAL 299
TOP LOG INTERVAL SURFACE
CASING DRILLER 12.75 @ 0
CASING LOGGER 12.75 @ 0
BIT SIZE 7.875
TYPE FLUID IN HOLE WATER
DENSITY 1.0
LEVEL FULL
MAX REC TEMP 25 DEG C
EQUIP LOCATION KAMLOOPS
RECORDED BY J. MACKAY
WITNESSED BY J. SUTTILL

SOURCE OF SAMPLE DRILLER
RM @ MEAS TEMP 0.6 @ 20 DEG C
RMF @ MEAS TEMP 0.5 @ 20 DEG C
RMC @ MEAS TEMP 0.7 @ 20 DEG C
SOURCE OF RMF & RMC MEASURED
RM @ BHT 0.3 @ 25 DEG C
TIME SINCE CIRC 24 HRS
TIME ON BOTTOM 0600 22/10/86
MAX REC TEMP 25 DEG C
EQUIP LOCATION KAMLOOPS
RECORDED BY J. MACKAY
WITNESSED BY J. SUTTILL

RUN NUMBER ONE
TIME LOGGER ON BOTTOM 0600 22/10/86
UNIT NUMBER 2
LOGGING DISTRICT KAMLOOPS
LOGGED BY J. MACKAY
WITNESSED BY J. SUTTILL

REMARKS
RUN 1 - 1:5 - 294.26-23.56
RUN 2 - 1:5 - 294.27-23.56
RUN 3 - 1:5 - 294.27-23.56

EQUIPMENT AND RECORDING DATA

COAL COMBINATION SONDE

LOG	EQUIPMENT SONDE	EQUIPMENT SOURCE	EXAMINER	TAPING LOG HEADING	TAPING RECORD NUMBER	PANEL DIRECTION	PANEL SPEED	PANEL GAIN NORM	COAL CLEAT DIRECTION	DEPTHS FROM	DEPTHS TO	DEPTHS SEAM LOG RUN
GAMMA RAY	101	5972										
FOCUSED ELECTRIC			T	86/R	0	1	-	1:5		294.26	23.56	
DENSITY CALIPER	VERTICAL POSITION	5985	T	86/R	0	3	-	1	-	294.27	23.56	
			T	86/R	0	3	-	1	-	294.27	23.56	

COAL QUALITY/SEAM THICKNESS LOG INTERVALS (Refer to relevant log)

FROM	TO	MATERIAL	THICKNESS
			INTERVAL TOTAL

ADDITIONAL SONDES RUN

SONDE	LOG	GENERAL BOUL LOG	DETAIL BOUL LOG
117	PE	2065	--

REFER TO ADDITIONAL HEADINGS

REMARKS
No Coal in evidence

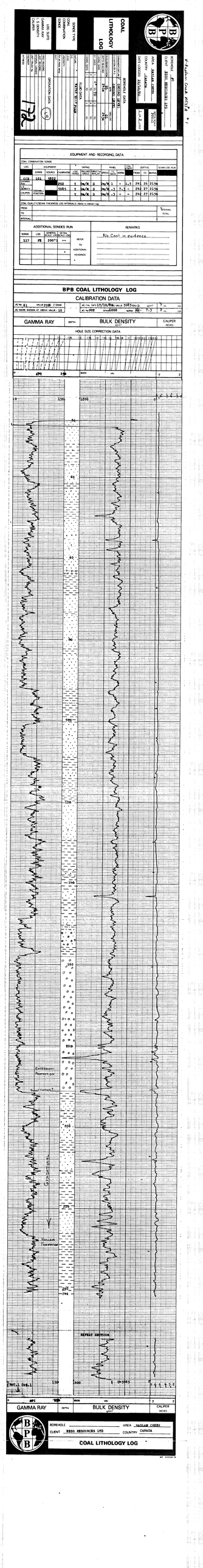
BPB COAL LITHOLOGY LOG

CALIBRATION DATA

AC No. 81	VALUE 2048	T-SAM	AC CAL run 13/10/86	value 5985	100% @	100%	0%
AC MARK SHOWN AT ABOVE VALUE - 10			AC No. 002	DENSITY 2.000	NORM 2.0 - 3.3	2.3	0%

HOLE SIZE CORRECTION DATA

GAMMA RAY	DEPTH	BULK DENSITY	CALIPER
			INCHES



GAMMA RAY | DEPTH | BULK DENSITY | CALIPER INCHES

BPB

BOREHOLE # 1
CLIENT ESSO RESOURCES LTD
AREA HASLAM CREEK
COUNTRY CANADA

COAL LITHOLOGY LOG

BPB

BOREHOLE # 5
CLIENT BSD. MINERALS CANADA
AREA HASLAM CREEK
COUNTRY CANADA
DATE LOGGED 15/7/1982
1 in = 5.000m
DEPTH DRILLER 338m
DEPTH LOGGER 338m
CASING DRILLER 72m
CASING LOGGER 72m
BOTTOM DRILLER 338m
BOTTOM LOGGER 338m
TOP LOG INTERVAL 72m
BOTTOM LOG INTERVAL 338m
PROBE TYPE 2" DIA. 3 ARM
PROBE SERIAL NO. 1
MAX. REC. TEMP. 10°C
EQUIP. LOCATION
RECORDED BY R.S.
WITNESS

RUN NO. 1
PRI. LOG MEAS. FROM 72m
ADDED LOG MEAS. FROM
TO 338m
CASING DRILLER 72m
CASING LOGGER 72m
BOTTOM LOG INTERVAL 338m
LOGGING SPEED 5m/min
TIME SINCE CIRC. 24 hrs
MAX. REC. TEMP. 10°C
EQUIP. LOCATION
RECORDED BY R.S.
WITNESS

OPERATION DATA

	RM	RMF	RMC
SOURCE OF SAMPLE			
R @ MEAS. TEMP.	5.2 @ 20°C		
R @ BHT	@ °C	@ °C	@ °C
R @ 25°C			
SOURCE OF R			

	RM	RMF	RMC
SOURCE OF SAMPLE			
R @ MEAS. TEMP.	@ °C	@ °C	@ °C
R @ BHT	@ °C	@ °C	@ °C
R @ 25°C			
SOURCE OF R			

	RM	RMF	RMC
SOURCE OF SAMPLE			
R @ MEAS. TEMP.	@ °C	@ °C	@ °C
R @ BHT	@ °C	@ °C	@ °C
R @ 25°C			
SOURCE OF R			

	RM	RMF	RMC
SOURCE OF SAMPLE			
R @ MEAS. TEMP.	@ °C	@ °C	@ °C
R @ BHT	@ °C	@ °C	@ °C
R @ 25°C			
SOURCE OF R			

MATRIX
MATRIX DENSITY
HOLE FLUID
DENSITY
VISCOSITY
PH
FLUID LOSS
SOURCE OF SAMPLE
RM @ MEAS. TEMP.
RMF @ MEAS. TEMP.
RMC @ MEAS. TEMP.
RM @ BHT
RMF @ BHT
RMC @ BHT
SOURCE OF RMF
SOURCE OF RMC
RM @ 25°C
RMF @ 25°C
RMC @ 25°C
TIME SINCE CIRC.
MAX. REC. TEMP.
EQUIP. LOCATION
RECORDED BY
WITNESS

EQUIPMENT AND RECORDING DATA

LOG	EQUIPMENT			TAPING			PANEL		CAL. OVER	DEPTH		
	SONDE	SOURCE	CALIBRATOR	UNITS	REC'D/RECORD'D ON	REF. PT.	SPEED	TC MODE	NORM	FROM	TO	INTVAL
RE	305	**********	T	9m/M	D	9m/M	5	******		338	72	266

ADDITIONAL SONDES RUN

SONDE	LOG	GENERAL SCALE-VSCALE	ZETAIL

REFER TO ADDITIONAL HEADINGS

REMARKS

Power lines were present on site, rendering calibrated log impossible. To avoid 60 cycle interference, an uncalibrated res log was employed as an alternative.

DEPTH | RESISTIVITY

70 CASING SHOE
90
110
130
150
170
190
210
230
250
270
290
310
330
338

DEPTH | RESISTIVITY

BPB

BOREHOLE # 5
CLIENT BSD. MINERALS CANADA
AREA HASLAM CREEK
COUNTRY CANADA

Re1

N-Haslam Creek 80 (3)A #1

BOREHOLE # 5
CLIENT ESSO MINERALS CANADA
AREA HASLAM CREEK
COUNTRY CANADA
DATE LOGGED 15/11/80
DEPTH SCALE 20:1
1 OF 1 LOGS

COAL QUALITY LOG

BOREHOLE DATA — REFER TO LITHOLOGY LOG
OPERATION DATA — REFER TO LITHOLOGY LOG

EQUIPMENT AND RECORDING DATA

COAL COMBINATION SONDE

SIDEWALL POSITION

LOG	TAPING		PANEL		CAL COEFF
	LOG TAPED	RECORD/DIRECTOR REPLAY SPEED	SPEED	T/C SECS	NORM
GAMMA RAY	Y	3m/M R	3m/M 2	-	1.5
LS DENSITY	Y	3m/M R	3m/M 1	7.6	-

SOURCE. SONDE AND CALIBRATION

REFER TO LITHOLOGY LOG

SONDE TYPE:
COAL
COMBINATION
SONDE

LOG SUITE:
GAMMA RAY
L.S. DENSITY

COAL QUALITY LOG INTERVALS

FROM	189
TO	185
INTERVAL	4m
FROM	
TO	
INTERVAL	

INTERVAL TOTAL: L6

REMARKS

187

BPB COAL QUALITY LOG

DEPTH

GAMMA RAY

COAL BULK DENSITY g/cm³

HOLE SIZE CORRECTION DATA

2" 4" 6" 8"

1.2 1.25 1.3 1.35 1.4 1.45 1.5 1.55 1.6 1.7 1.8 1.9 2.0 2.2 2.4 3.0

150 API 0

6.000 s d u 0

185

187

189

150 API 0

6000 s d u 0

COAL BULK DENSITY g/cm³

DEPTH

GAMMA RAY

BOREHOLE # 5
CLIENT ESSO MINERALS CANADA
AREA HASLAM CREEK
COUNTRY CANADA

COAL QUALITY LOG

MY 88002 R

BPB

BOREHOLE #8
CLIENT ESSO RESOURCES LTD.
AREA HASLAM CREEK
COUNTY CANADA
DATE LOGGED 22/3/85
RUN NO. ONE
DEPTH-DRILLER 243m
DEPTH-LOGGER 243m
BTM. LOG INTERVAL 243m
TOP LOG INTERVAL 0
CASING-DRILLER 243m @ 0
CASING-LOGGER 243m @ 0
BIT SIZE 216mm
TYPE FLUID IN HOLE WATER/GEL MUD
DENSITY 1.1
VISCOSITY 45
PH 9
FLUID LOSS 10 ml
SOURCE OF SAMPLE PIT
RM @ MEAS. TEMP. 0.2 @ 20°C
RMF @ MEAS. TEMP. 0.2 @ 20°C
RMC @ MEAS. TEMP. 0.2 @ 20°C
SOURCE OF RMF & RMC MEASURED
RM @ BHT 0.2 @ 20°C
TIME SINCE CIRC. 24hrs
MAX. REC. TEMP. 20°C
EQUIP. LOCATION 2004
RECORDED BY R. MACKENZIE
WITNESSED BY

OPERATION RIG TIMES

	ON LOCATION	LEFT LOCATION
DATE	22/3/85	23/3/85
TIME	2400	2400

PROGRAMMED DATA

	FROM	TO
DEPTH	0	243m
SPEED	3m/min	3m/min

RECORDED DATA

	FROM	TO
DEPTH	0	243m
SPEED	3m/min	3m/min

CALIBRATIONS USED BEFORE LOG / AFTER LOG

	BEFORE LOG	AFTER LOG
SHOP		
FIELD		

REMARKS: Hi Resistivity Guard 60cm Spacing

FOCUSED ELECTRIC LOG

EQUIPMENT AND RECORDING DATA

LOG	EQUIPMENT			TAPING			PANEL		CAL. SIGNAL	DEPTHS	
	SONDE	SOURCE	CALIBRATION	LOG	RECORD	REPEAT	SPEED	GAIN	NORM	FROM	TO
FE	117	-	-	T	56/R	Q	56/R	3	-	-	243
										26	222

ADDITIONAL SONDES RUN

SONDE	LOG	GENERAL SCALE	DETAIL SCALE
101	CCS	200 Ω	20 Ω

REFER TO ADDITIONAL HEADINGS

REMARKS

Lithology Interpretation on C.C.S. Log

DEPTH

FOCUSED ELECTRIC LOG

5 OHM-METERS 5000

10 100 1000

20 40 60 80 100 120 140 160 180 200 220 240 243

REPEAT SECTION

10 100 1000

5 OHM-METERS 5000

DEPTH

FOCUSED ELECTRIC LOG

BPB

BOREHOLE #8
CLIENT ESSO RESOURCES LTD.
AREA HASLAM CREEK
COUNTRY CANADA

W7 82565 A

N-Haslam Creek 80C3*A #1

BOREHOLE # 5

CLIENT ESSO MINERALS CANADA

AREA HASLAM CREEK

COUNTRY CANADA

DATE LOGGED 15/11/80

DEPTH SCALE 20:1

3 OF 4 LOGS

SEAM THICKNESS LOG

BOREHOLE DATA	REFER TO LITHOLOGY LOG
OPERATION DATA	REFER TO LITHOLOGY LOG

EQUIPMENT AND RECORDING DATA

COAL COMBINATION SONDE

SIDEWALL POSITION

LOG	TAPING			PANEL			CAL COEFF
	LOG TAPED	RECORD SPEED	DIRECT or REPLAY	SPEED	T.C. SECS	NORM	
CALIPER	Y	3m/M	R	3m/M	.3	-	-
B R DENSITY	Y	3m/M	R	3m/M	.3	8.21	-

SOURCE. SONDE AND CALIBRATION

REFER TO LITHOLOGY LOG

SEAM THICKNESS LOG INTERVALS

FROM	189
TO	185
INTERVAL	4m
FROM	
TO	
INTERVAL	

INTERVAL TOTAL =

REMARKS

172

SONDE TYPE: COAL COMBINATION SONDE

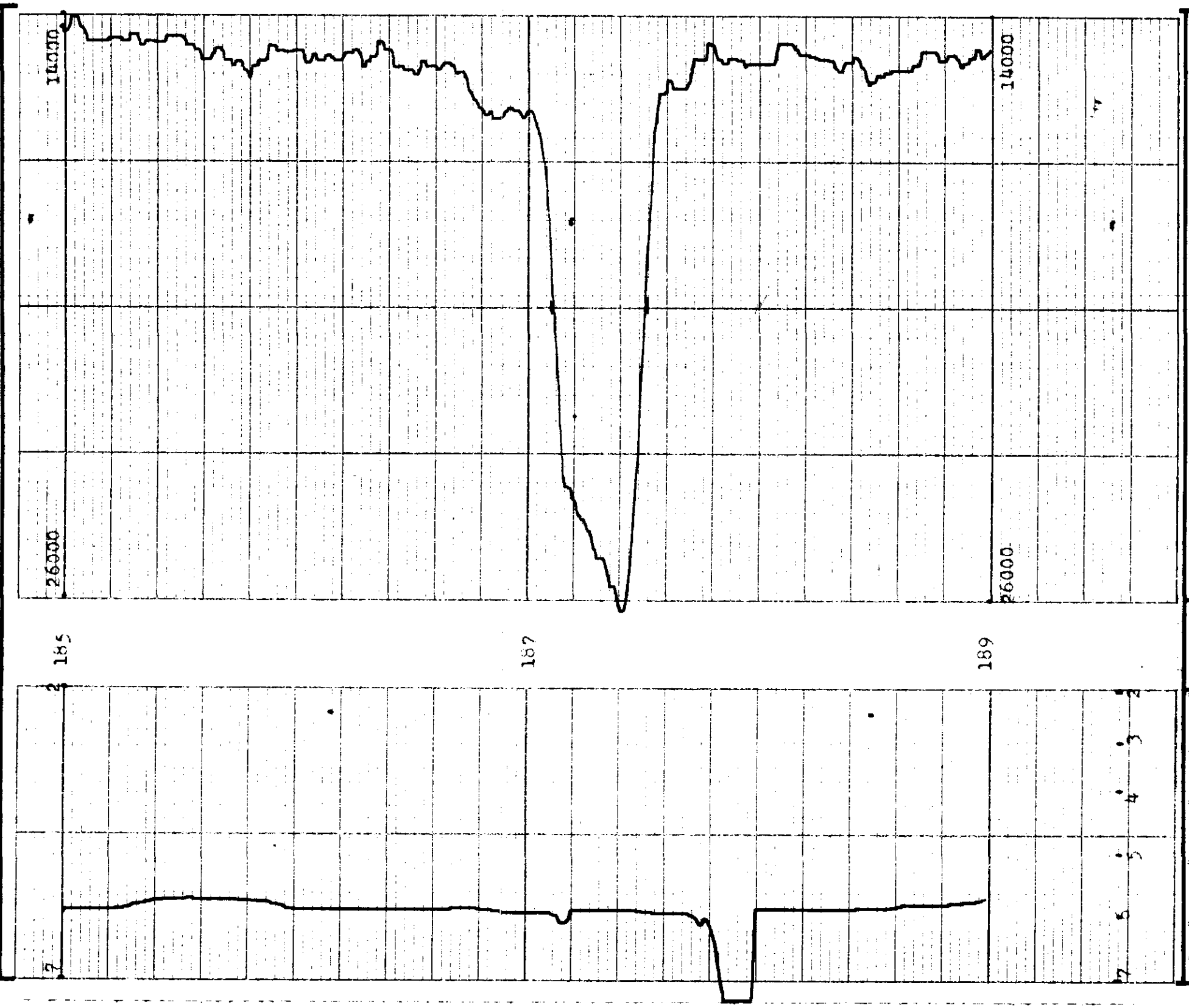
LOG SUITE: CALIPER, B.R. DENSITY

B P B SEAM THICKNESS LOG

BED RESOLUTION DENSITY — SCALE 1:20 — 14000 — 26000

DEPTH

CALIPER INCHES — 2" — 3" — 4" — 5" dia — 6" — 7"



BED RESOLUTION DENSITY — SCALE 1:20 — 14000 — 26000

DEPTH

CALIPER INCHES — 2" — 3" — 4" — 5" dia — 6" — 7"

BOREHOLE # 5

CLIENT ESSO MINERALS RESOURCES

AREA HASLAM CREEK

COUNTRY CANADA

SEAM THICKNESS LOG

MY 88002 R

N-Haslam Creek 8D(3)A *1

BPB

BOREHOLE # 5

CLIENT ESSO MINERALS CANADA

AREA HASLAM CREEK

COUNTRY CANADA

DATE LOGGED 15/11/80

DEPTH SCALE 200:1

___OF___LOGS

COAL LITHOLOGY LOG

BOREHOLE DATA

PERMANENT DATUM				
ELEVATION OF P.D				
		BPB		DRILLER
MEASUREMENTS FROM				
DEPTH REACHED		SEE ORIGINAL LITHOLOG		
CASING SHOE				
BIT SIZES	1	TO	2	TO
	3	TO	4	TO
CASING SIZES	1	TO	2	TO

FLUID DATA

NATURE	
S.G	
LEVEL	
VISCOSITY	
Rm at meas. temp	
B.H.T.	

OPERATION DATA

L9

FIRST READING	
LAST READING	SEE ORIGINAL LITHOLOGY
INTERVAL LOGGED	
UNIT-TRUCK No.	
ENGINEER	
WITNESS	

172

SONDE TYPE:
COAL COMBINATION SONDE

LOG SUITE:
GAMMA RAY
L.S. DENSITY
CALIPER

EQUIPMENT AND RECORDING DATA

COAL COMBINATION SONDE

LOG	EQUIPMENT: SONDE	EQUIPMENT: SOURCE	EQUIPMENT: CALIBRATOR	TAPING: LOG TAPED	TAPING: RECORD SPEED	TAPING: DIRECT or REPLAY	PANEL: SPEED	PANEL: TC SECS	PANEL: NORM	CAL COEFF	DEPTHS: FROM	DEPTHS: TO	DEPTHS: INTERVAL	SEAM LOG RUN
GAMMA RAY				SEE ORIGINAL LITHOLOGY										
L.S. DENSITY														
CALIPER	SIDEWALL POSITION													

COAL QUALITY/SEAM THICKNESS LOG INTERVALS (Refer to relevant log)

FROM	TO	INTERVAL	INTERVAL TOTAL

REMARKS

THIS LOG IS A REPLAY FROM THE ORIGINAL LITHOLOGY.

ADDITIONAL SONDES RUN

SONDE	LOG	GENERAL SCALE LOG	DETAIL SCALE LOG

? REFER TO ADDITIONAL HEADINGS

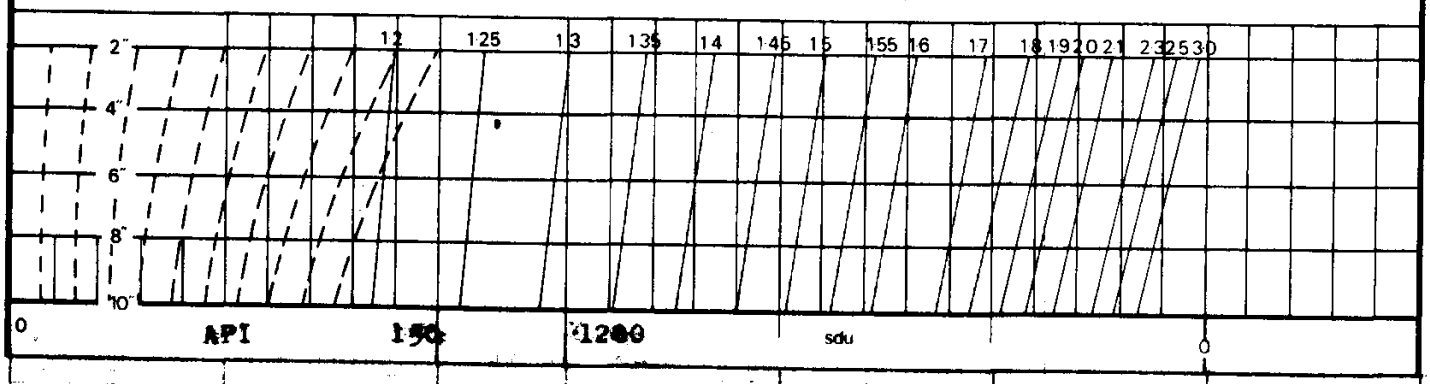
BPB COAL LITHOLOGY LOG

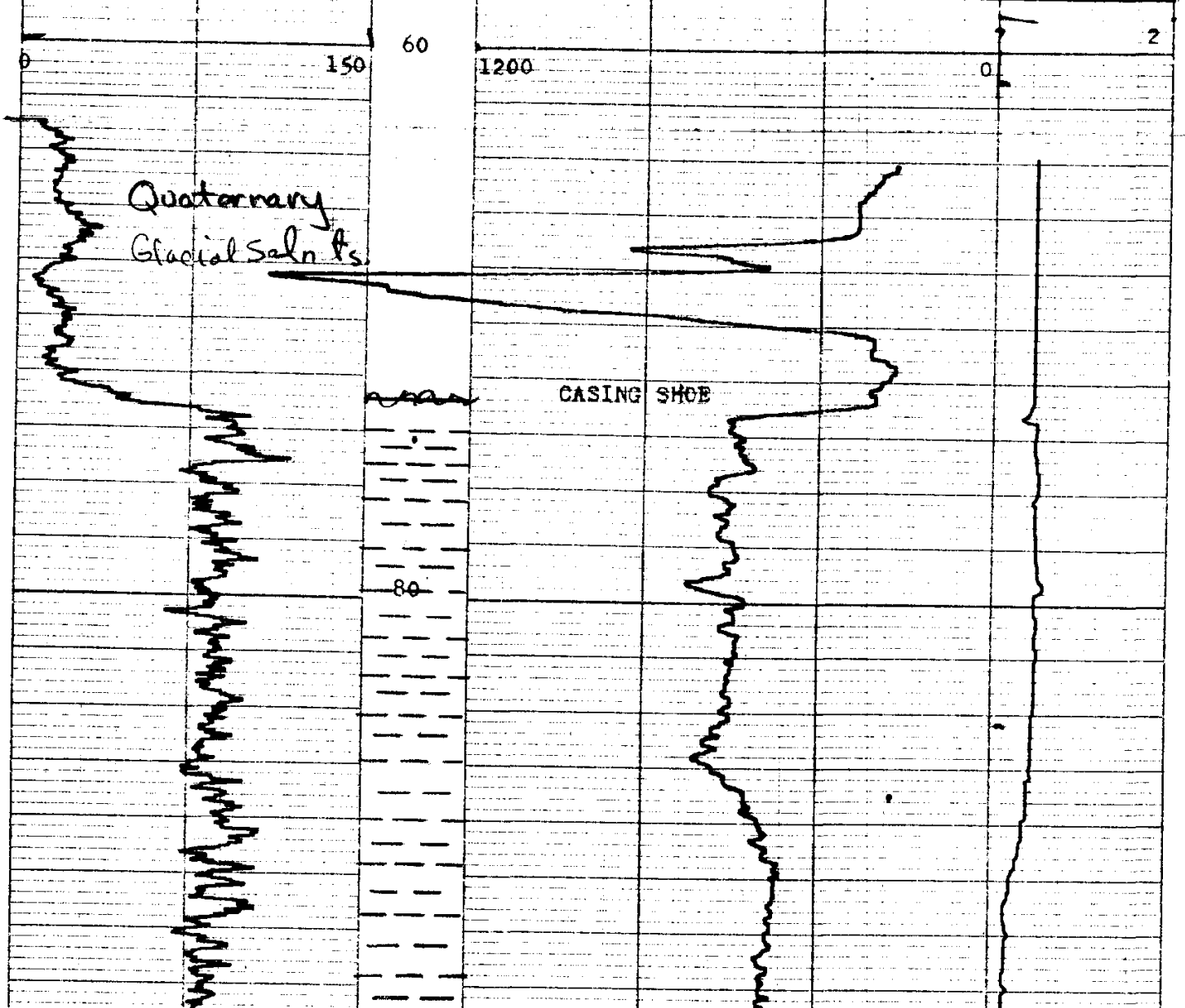
CALIBRATION DATA

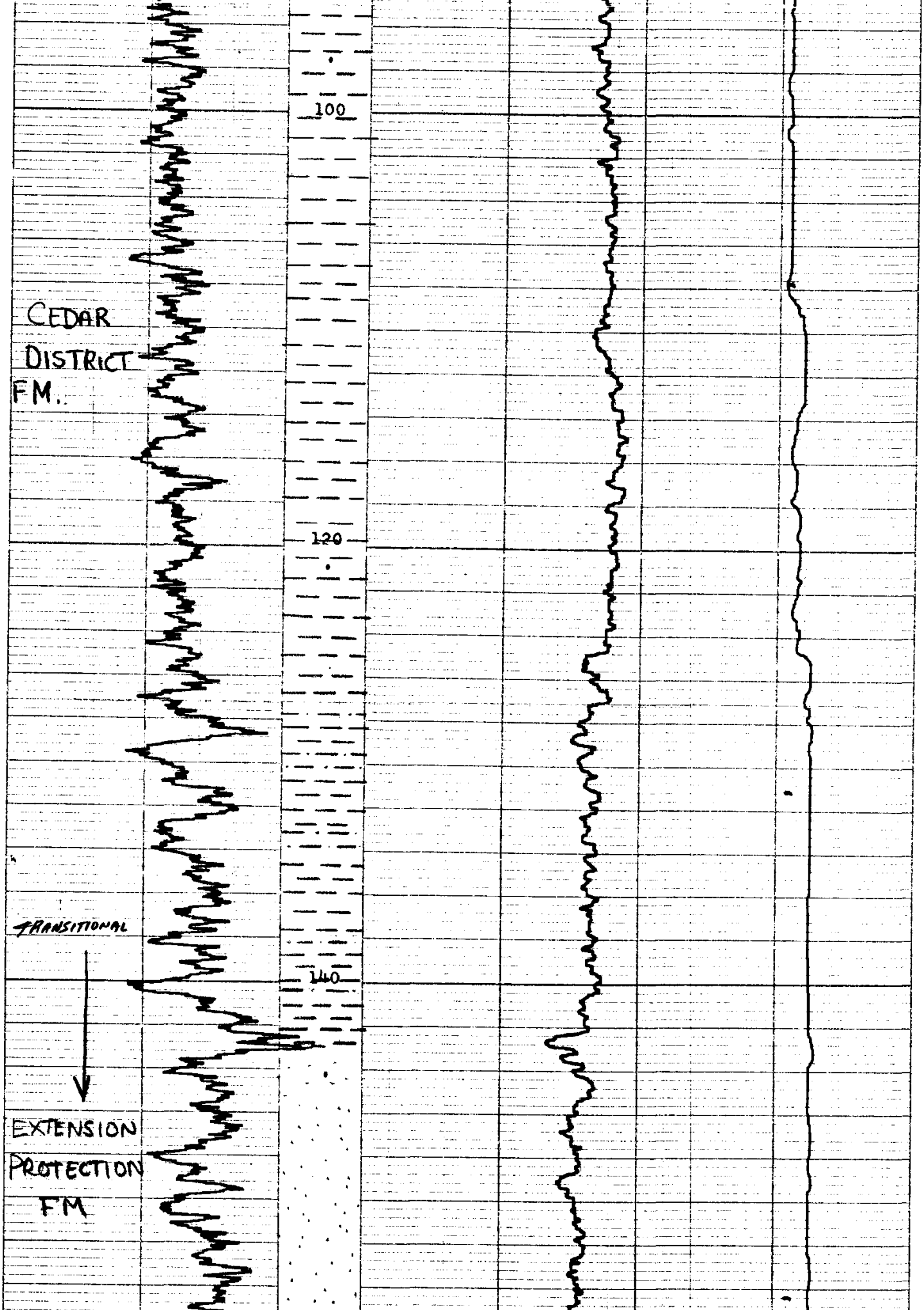
JIG No VALUE @ 2" DIAM	JIG CAL DATE JIG VALUE SDU @ g/cm³	ins	cps
JIG MARK SHOWN AT ABOVE VALUE -	~~SEE ORIGINAL LITHOLOGY~~ JIG No SPAN NORM SDU CPS	ins	cps

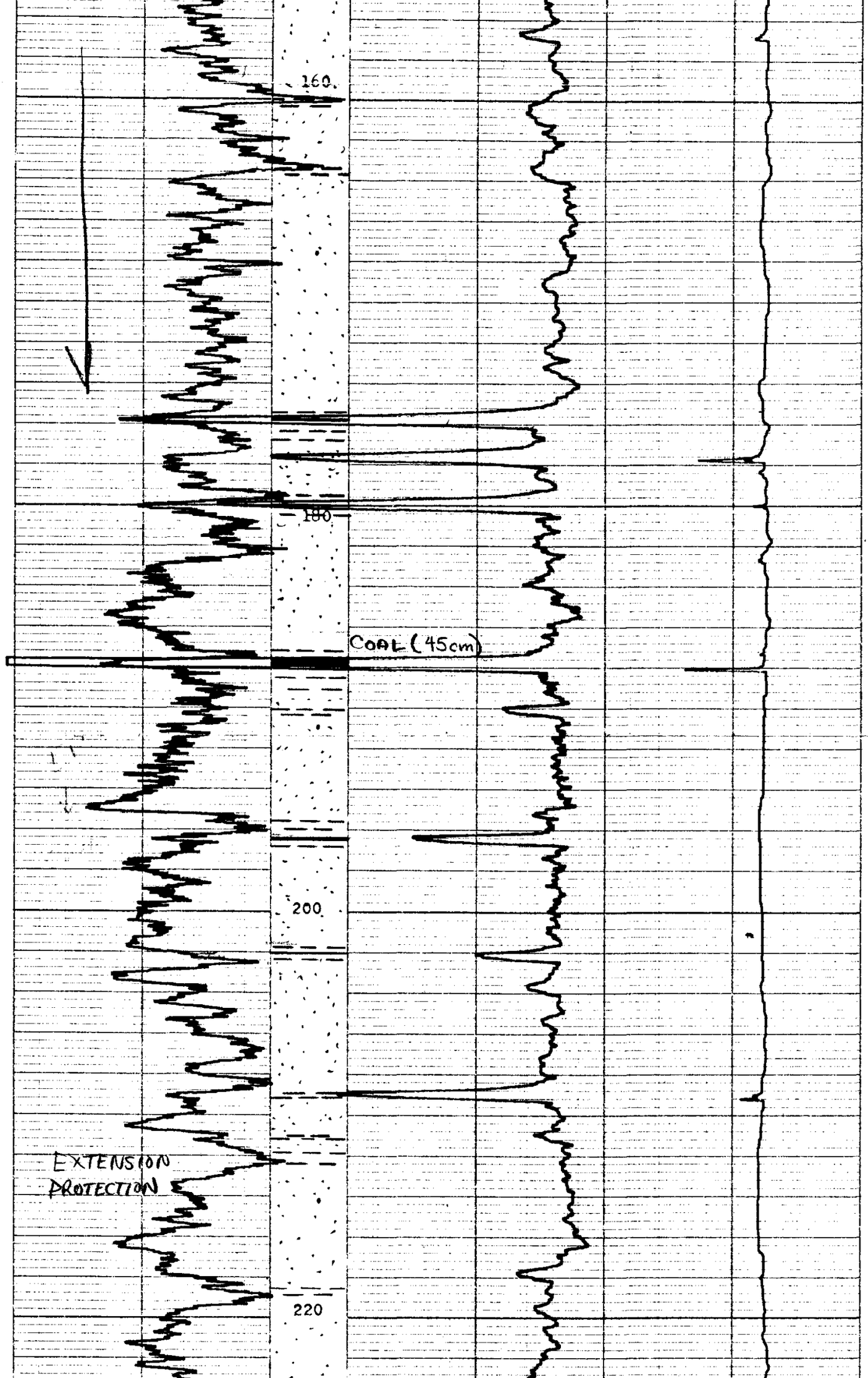
GAMMA RAY	DEPTH	BULK DENSITY g/cm³	CALIPER INCHES

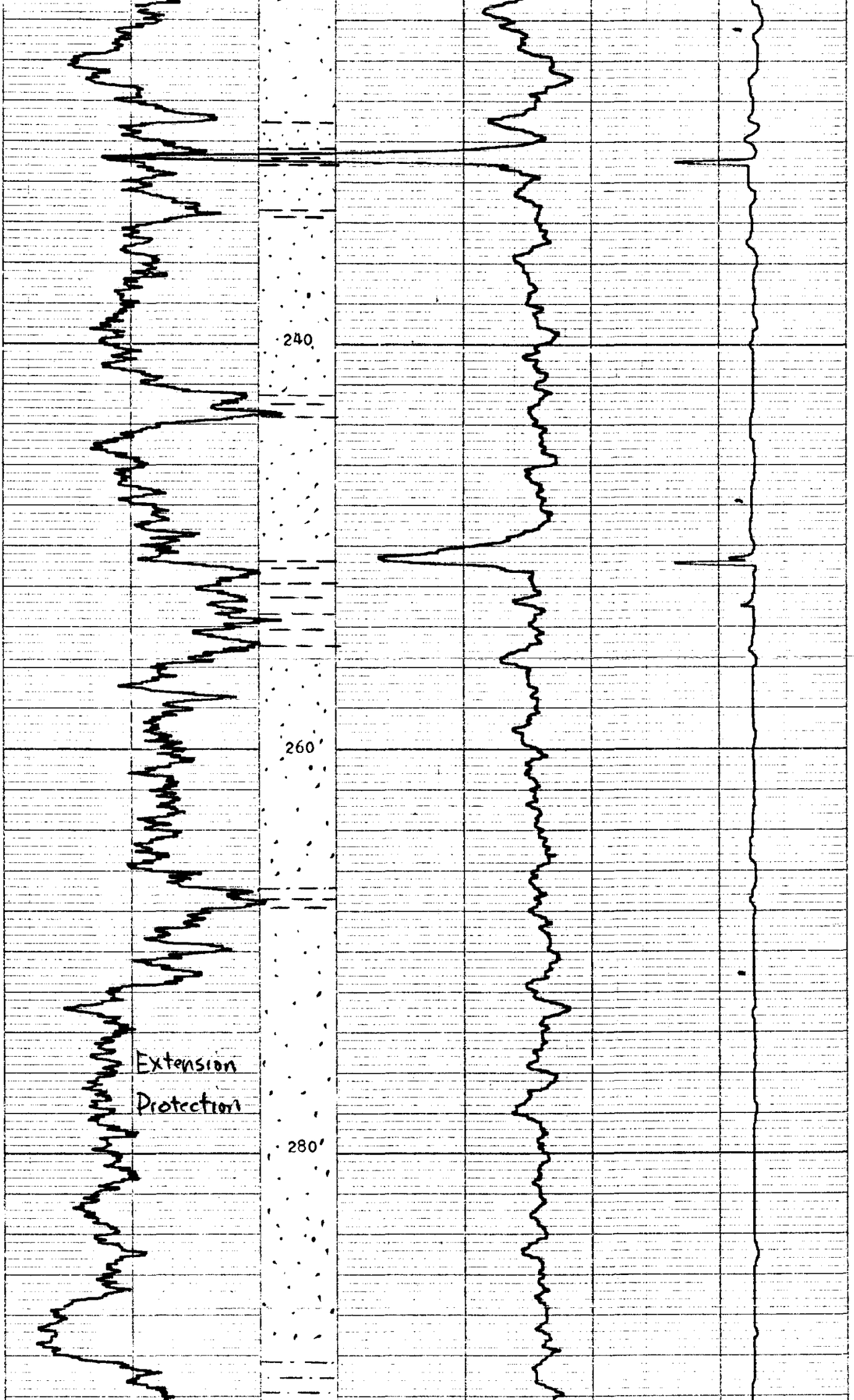
HOLE SIZE CORRECTION DATA

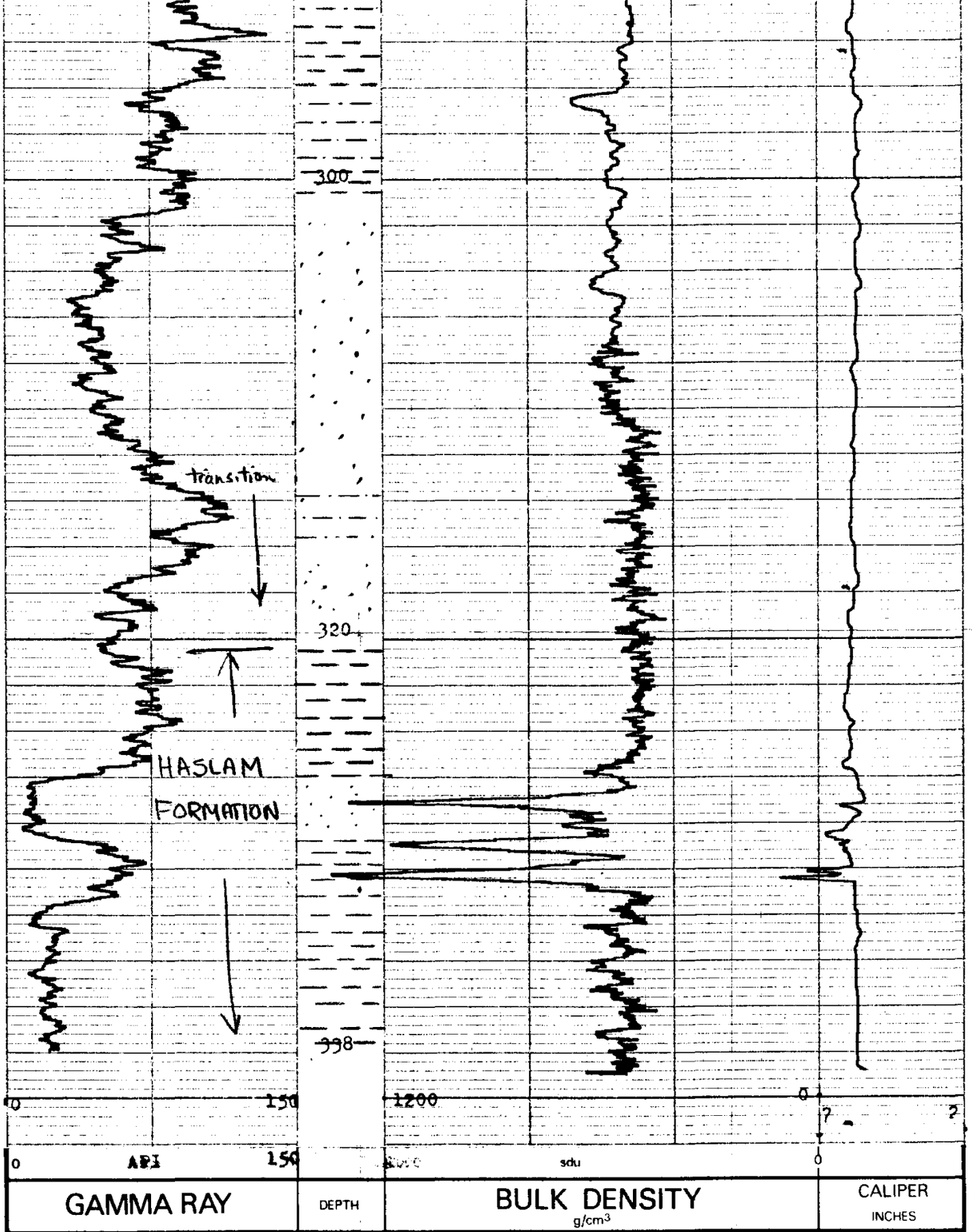





100
CEDAR
DISTRICT
FM.
120
TRANSITIONAL
140
EXTENSION
PROTECTION
FM


160
180
COAL (45cm)
200
EXTENSION
PROTECTION
220


240
260
Extension
Protection
280'



BOREHOLE # 5 AREA HASLAM CREEK

CLIENT ESSO MINERALS CANADA COUNTRY CANADA

COAL LITHOLOGY LOG

MY A50261 R

POCUSSED ELECTRIC LOG

BOREHOLE # 3
CLIENT ESSO MINERALS CANADA
AREA HASLAM CREEK
COUNTRY CANADA
DATE LOGGED 14/11/80
DEPTH SCALE 200 ft
1 of 2 runs

BOREHOLE DATA

PERMANENT DATUM	GROUND LEVEL
ELEVATION OF P.D.	" "
TYPE OF BOREHOLE FLUID	GEL. B P B
DEPTH REACHED	236m DRILLER
CASING SHOE	236m
BIT SIZES	1 to 10
	2 to
CASING SIZES	3 to 10
	4 to
	1 to
	2 to

FLUID DATA

NATURE	WATER GUK TUAY
DENSITY	
LEVEL	
VISCOSITY	
PH or M.F. Mask. temp	
BHT	

OPERATION DATA

FIRST READING	236m
LAST READING	125m
INTERVAL LOGGED	111m
LOGGING SPEED	5M/H
ENGINEER	JM
WITNESS	

PE1

EQUIPMENT AND RECORDING DATA

LOG	EQUIPMENT			TAPING			PANEL		CAL. COEFF.	DEPTHS		
	SONDE	SOURCE	CALIBRATOR	LOG TAPED	RECORD SPEED	DIRECT REPLAY	SPEED	T.C. SECS	NORM	FROM	TO	INTERVAL
PE	105	---------		Y	5m/M	D	5m/M	.3	------	236	125	111

ADDITIONAL SONDES RUN

SONDE	LOG	GENERAL SCALE LOG	DETAIL SCALE LOG
101	CCS	200:1	20:1

REFER TO ADDITIONAL HEADINGS

REMARKS

HOLE PREVIOUSLY LOGGED 29/10/80
TO 126m. HOLE DEEPENED.

DEPTH | POCUSSED ELECTRIC LOG

5 OHM-METERS 5000

10 100 1000

125
130
150
190
210
230
236

REPEAT SECTION

10 100 100

OHM-METERS

DEPTH | POCUSSED ELECTRIC LOG

BOREHOLE # 3
CLIENT ESSO MINERALS CANADA
AREA HASLAM CREEK
COUNTRY CANADA

MY 93160 R

FOCUSSED ELECTRIC LOG

BOREHOLE #3
CLIENT ESSO RESOURCES LTD.
AREA HASLAM CREEK
COUNTRY CANADA
DEPTH SCALE 200:1
DATE LOGGED 29/10/80
1 OF 2 LOGS

BOREHOLE DATA

PERMANENT DATUM	GROUND LEVEL								
ELEVATION OF F.D.	GROUND LEVEL								
LOG MEASURED FROM	B P B								
DEPTH-READING	GL								
CASING SHOE	126m								
DRILLER	GL								
BIT SIZES	1	6"	TO	TD	2		TO		
	3		TO		4		TO		
CASING SIZES	1		TO		2		TO		

FLUID DATA

NATURE	WATER GEL/K FOAM -
S.G.	
LEVEL	
VISCOSITY	27m
Rm at meas. temp.	
Rm F	

OPERATION DATA

FIRST READING	126m
LAST READING	27m
INTERVAL LOGGED	99m
UNIT / TRUCK No.	24/42
ENGINEER	DM
WITNESS	

10R

12

EQUIPMENT AND RECORDING DATA

LOG	EQUIPMENT			TAPING			PANEL			CAL. CURVE	DEPTHS		
	SONDE	SOURCE	CALIBRATOR	LOG TAPED	RECORD SPEED	DIRECT or REPLAY	SPEED	T.C. SECS	NORM		FROM	TO	INTERVAL
FE		--	-	Y	5m/M	D	5m/M	.3	-	-	126m	27	99m

ADDITIONAL SONDES RUN

SONDE	LOG	GENERAL SCALE LOG	DETAIL SCALE LOG
101	CCS	200:1	20:1

REFER TO ADDITIONAL HEADINGS

REMARKS

DEPTH	FOCUSSED ELECTRIC LOG
	5 OHM-METERS 5000

20 40 60 80 100 120 126

10 100 1000

REPEAT SECTION

10 100 1000

	5 OHM-METERS 5000
DEPTH	FOCUSSED ELECTRIC LOG

BOREHOLE #3 AREA HASLAM CREEK
CLIENT ESSO RESOURCES LTD. COUNTRY CANADA

MT 93160 R

COAL LITHOLOGY LOG

SONDE TYPE: COAL COMBINATION SONDE

LOG SUITE: GAMMA RAY / DENSITY / CALIPER

BPB

BOREHOLE # 3
CLIENT ESSO MINERALS CANADA
AREA HASLAM CREEK
COUNTRY CANADA
DATE LOGGED 24/11/80
RUN NUMBER ONE
2 OF 2 RUNS

W. Holden Creek 86/3/18

BOREHOLE DATA
PERMANENT DATUM: GROUND LEVEL
ELEVATION OF P.D.: 0 ft
LOG MEASUREMENTS FROM: KB
DEPTH REACHED: 236 ft
DRILLER TD: 236 ft
CASING SIZES: 1) 3 TO 2) 4 TO
BIT SIZES: 1) 2 TO 2) TO
CASING SHOE: 1) 215 TO 2) TO
RECORDED BY: JM
WITNESS:

OPERATION DATA
FIRST READING: 2356
LAST READING: 132
CHART SPEED: 1
CHART TRACK No.: 1
ENGINEER: JM
RECEIVED IN BAY:
RECEIVED IN LEVEL:
RECEIVED IN OFFICE:
SCALE CHANGE:

FILED DATA
WATER QUALITY PPM:

EQUIPMENT AND RECORDING DATA

COAL COMBINATION SONDE

LOG	EQUIPMENT SONDE	EQUIPMENT SOURCE	EQUIPMENT CALIBRATION	TAPING LOG TAPED	TAPING RECORD SPEED	TAPING DIRECT or REPLAY	PANEL SPEED	PANEL TC SECS	PANEL NORM	CAL COEFF.	DEPTHS FROM	DEPTHS TO	DEPTHS INTERVAL	SEAM LOG RUN
GAMMA RAY	CCS 101	5822												
DENSITY	SIDEWALL POSITION	292		Y	9m/M	D	9m/M	1	--	1.5	235	125	110	
CALIPER		5985		"	"	"	"	1	7.3	-	236	126	110	
				"	"	"	"	.3	-	-	236	126	110	

COAL QUALITY/SEAM THICKNESS LOG INTERVALS (Refer to relevant log)

FROM		INTERVAL
TO		TOTAL
INTERVAL		

ADDITIONAL SONDES RUN

SONDE	LOG	GENERAL SCALE	DETAIL LOG/SCALE

REFER TO ADDITIONAL HEADINGS

REMARKS

TOP PORTION OF THIS HOLE LOGGED ON PREVIOUS OCCASION.

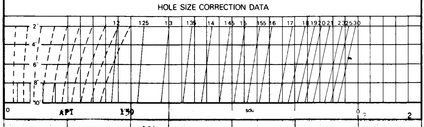
BPB COAL LITHOLOGY LOG

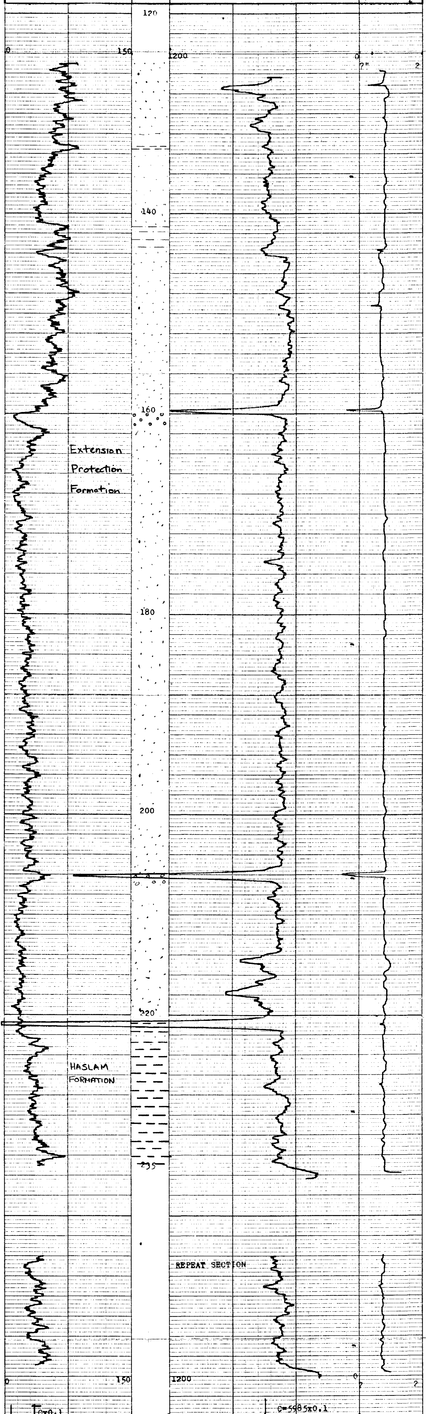
CALIBRATION DATA

JG No: 81 VALUE 200 @ 2" DIAM	JG CAL DATE 12/10/80 VALUE 5985 SDU@ gm/cm³	2" DIAM 836 cps	
JG MARK SHOWN AT ABOVE VALUE - 10	JG No 002 SPAN 1200 NORM 7.3	2 in 310 cps	

GAMMA RAY | DEPTH | BULK DENSITY gm/cm³ | CALIPER INCHES

HOLE SIZE CORRECTION DATA





GAMMA RAY | DEPTH | BULK DENSITY gm/cm³ | CALIPER INCHES

BPB

BOREHOLE # 3 AREA HASLAM CREEK
CLIENT ESSO MINERALS CANADA COUNTRY CANADA

COAL LITHOLOGY LOG

MY A50361 R

COAL LITHOLOGY LOG

BPB

BOREHOLE #3
CLIENT ESSO RESOURCES LTD.
AREA HASLAM CREEK
COUNTRY CANADA
DATE LOGGED 23/10/80
RUN No. 1
DEPTH DRILLER 127m
DEPTH LOGGER 123m
CASING DRILLER 6m
CASING LOGGER 6m
BOTTOM HOLE TEMP. 15°C
TIME SINCE CIRC. 24 hrs
MAX. REC. TEMP. 15°C
EQUIP. LOCATION PRINCE GEORGE
RECORDED BY J. MACKIE
WITNESSED BY

RUN	BIT FROM	BIT TO	CASING SIZE	WT/FT	GRADE	FROM	TO
1	SURF.	6m	6"			SURF.	6m
	6m	127m	4½"			SURF.	127m

BOREHOLE & DATA
DRILLING CONTRACTOR: DIAMOND DRILLING
RIG: LONGYEAR 34
DRILLER: J. MACKIE
DRILLING MEASURED FROM: GROUND LEVEL
ELEVATION: 0m
LOG MEASURED FROM: GROUND LEVEL
DRILLING FLUID: WATER
TYPE: GEL
VISCOSITY: 35 sec
FLUID LOSS: 10cc
WEIGHT: 9.0 lbs/gal
SOURCE: CREEK
RESISTIVITY: 2.5Ωm @ 15°C
SAMPLE: MUD
SOURCE: MUD PIT
RESISTIVITY: 2.5Ωm @ 15°C
TEMPERATURE: 15°C
SOURCE: MUD PIT
RESISTIVITY: 2.5Ωm @ 15°C
TEMPERATURE: 15°C
MATRIX DENSITY: 2.65 gm/cc
MATRIX ΔT: 57 μsec/ft
FLUID DENSITY: 1.0 gm/cc
FLUID ΔT: 189 μsec/ft
MATRIX No.: 2½/42
FLUID No.: 2½/42

OPERATION DATA
LOGGING UNIT NUMBER: 1325
LOGGING ENGINEER: J. MACKIE
WITNESS: J. MACKIE

SOURCE TYPE
COAL COMBINATION SONDE

LOG SUITE
GAMMA RAY
L.S. DENSITY
CALIPER

EQUIPMENT AND RECORDING DATA

COAL COMBINATION SONDE

LOG	EQUIPMENT: SONDE	SOURCE	CALIBRATION	TAPING: LOG TAPED	RECORD SPEED	DIRECT/ REPLAY	PANEL: SPEED	TC SECS	NORM	CAL. BODY	DEPTHS: FROM	TO	INTERVAL	SEAM LOG RUN
COAL WIDE SPACING GAMMA RAY	101	3822												
			292	Y	9m/M	D	9m/M	1	- 1.5	125	27	98m		
Density			1985	Y	9m/M	D	9m/M	+3	7.3	126	27	99m		
CALIPER	SIDEWALL POSITION			Y	9m/M	D	9m/M	+3	-	-	126	27	99m	

COAL QUALITY/SEAM THICKNESS LOG INTERVALS (Refer to relevant log)

FROM	127m	INTERVAL TOTAL
TO	123m	
INTERVAL	4m	

ADDITIONAL SONDES RUN

SONDE	LOG	GENERAL SCALE	DETAIL SCALE
	78		

REFER TO ADDITIONAL HEADINGS

REMARKS

BPB COAL LITHOLOGY LOG

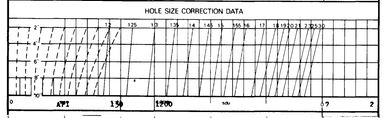
CALIBRATION DATA

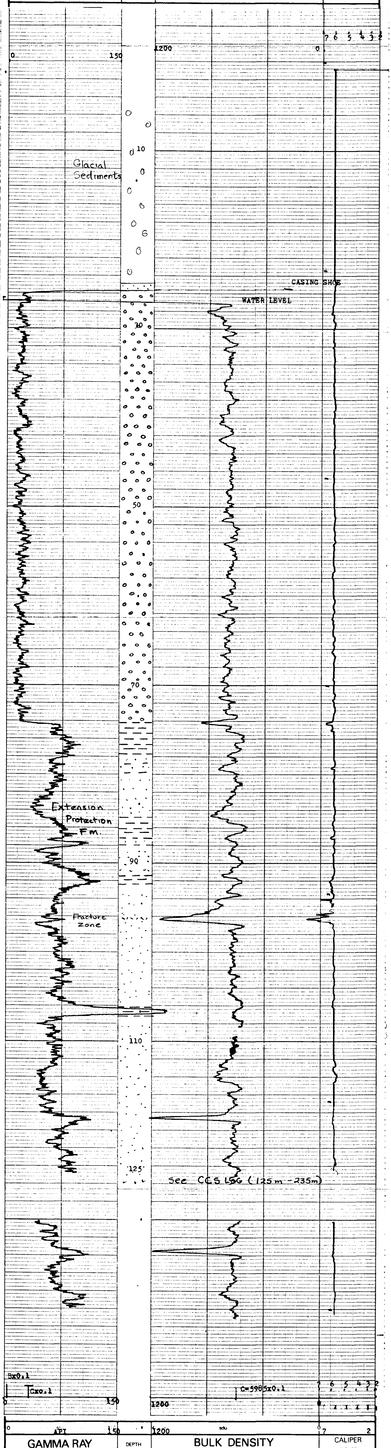
JG No. 81 VALUE 3822 @ 2 DIAM
JG MARK SHOWN AT ABOVE VALUE - 10

JG CAL DATE 17/10/80c VALUE 6985 SDU @ 5/cm³ 7 cts 816 cps
JG No 002 SPAN 1200 NORM 7.3 2 cts 310 cps

GAMMA RAY | DEPTH | BULK DENSITY g/cm³ | CALIPER INCHES

HOLE SIZE CORRECTION DATA





0 API 150 | 1200 MN | 7 2 CALIPER INCHES
GAMMA RAY | DEPTH | BULK DENSITY g/cm³

BPB

BOREHOLE #3 AREA HASLAM CREEK
CLIENT ESSO RESOURCES LTD COUNTRY CANADA

COAL LITHOLOGY LOG

MT A50161 K

(13)

DIPMETER ANALYSIS

172

N-Haslam Creek 80(3)A #1

CLIENT---	ESSO
BOREHOLE-	#3
AREA-----	HASLAM CREEK
COUNTRY--	CANADA

COMMENTS.....

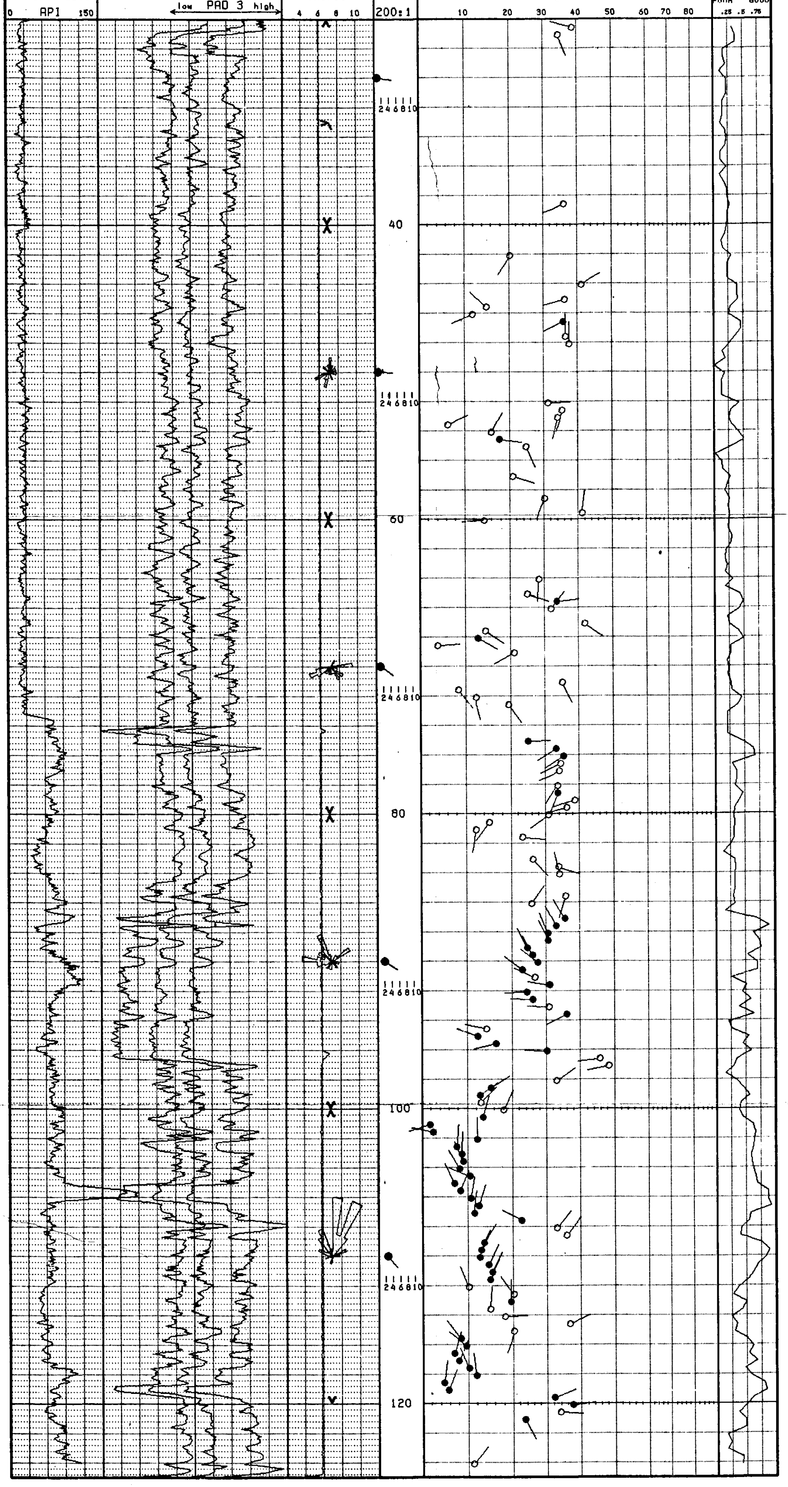
INTERPRETATION PARAMETERS

STEP 0.50m.
INTERVAL 1.00m.
SEARCH ANGLE 45°
DECLINATION 23.1° East
DEPTH RANGE 26.00 - 125.00m.
DATE PROCESSED 25-NOV-80

AVERAGE BOREHOLE DEVIATION & DIRECTION ANNOTATED EVERY 20.0m.

ROSE DIAGRAMS SEGMENTED EVERY TEN DEGREES, .1 in. RADIUS/DIP MARKER DISPLAYED

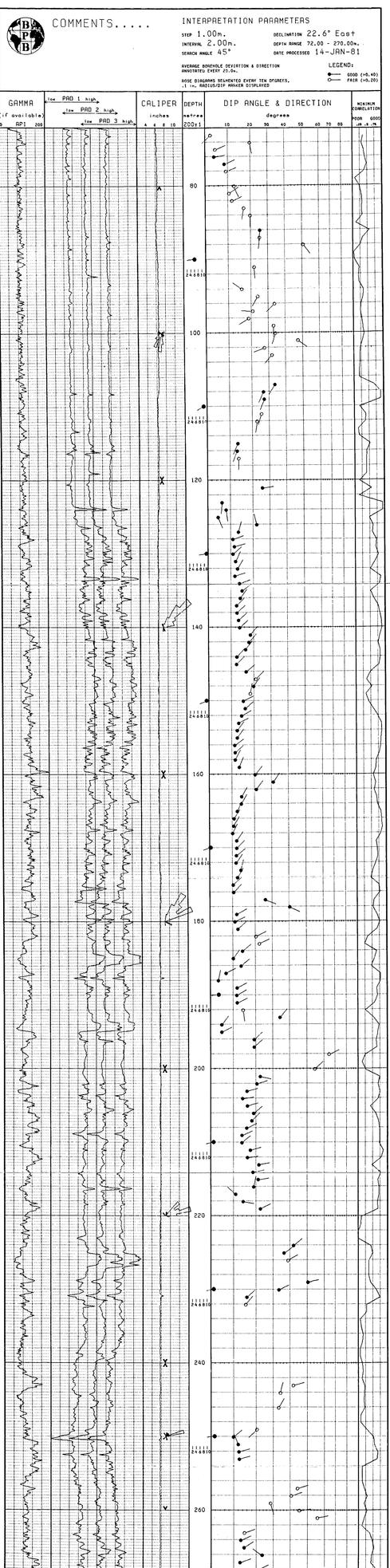
LEGEND:
GOOD (>0.45)
FAIR (>0.25)



DIPMETER ANALYSIS

CLIENT--- ESSO MINERALS
BOREHOLE- #5
AREA----- HASLEM CREEK
COUNTRY-- CANADA

L14
172
N-Haslam Creek 50(3)A #1



APPENDIX 2

MEMORANDUM

ESSO RESOURCES CANADA LIMITED
RESEARCH DEPARTMENT

1980 12 09

Mr. Al. Peach
Minerals - Coal

Samples from Haslam Creek

The samples submitted for examination have now been processed and examined. All samples yielded some pollen and spores, but due to severe bacterial action (biodegradation) identification was both difficult and hazardous. Apart from confirming a dating within the middle of the Upper Cretaceous palynological dating and correlation was useless.

Since I observed three distinct lithologies in the cuttings (white mottled, pepper and salt sand, grey shale and coal) I first made separate elemental analyses for each lithology present in each sample. I then combined the lithologies, extracted the particulate organic matter present and carried out a further analysis for this material in each sample. The spectra are appended to this memorandum.

Once differences in lithology of the various samples have been allowed for, the spectra compare very well indeed. Note particularly the striking similarity between spectra derived from the extracted organic matter, which fall into two obvious groups, spectra from the uppermost two samples contrasting strikingly with those from the remaining four.

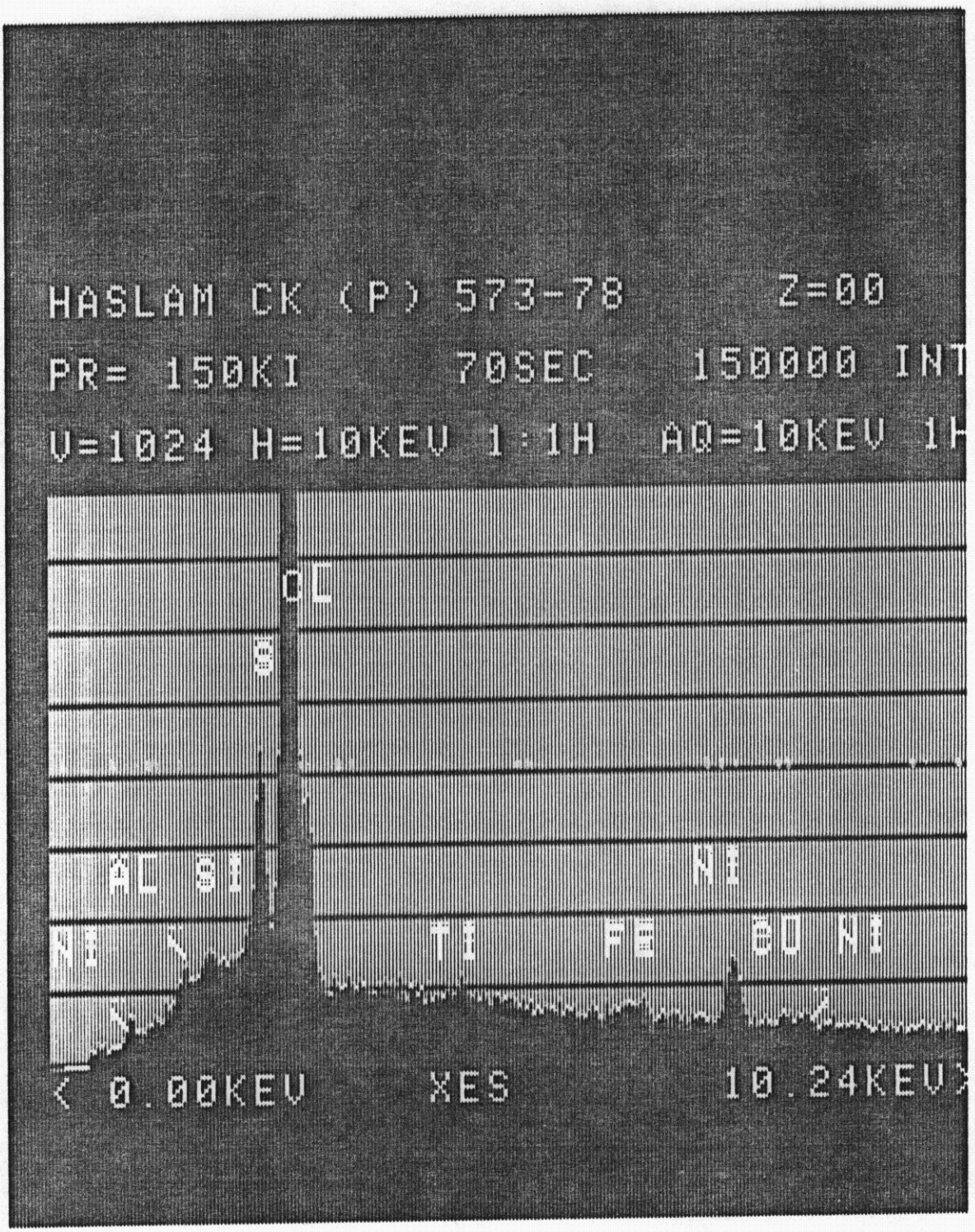
Regarding correlation and dating, it would appear that the two samples 573-578 ft. and 610-616 ft. probably correlate with the lower part of the Protection Formation, while the remainder are clearly correlative with the Comox Formation. The reason for the striking similarity of analyses from the particulate organic matter extracts from the the same stratigraphic unit is not clear and needs further investigation, but it appears, at least in this area, to provide a reliable, and reasonably sensitive, correlation tool.

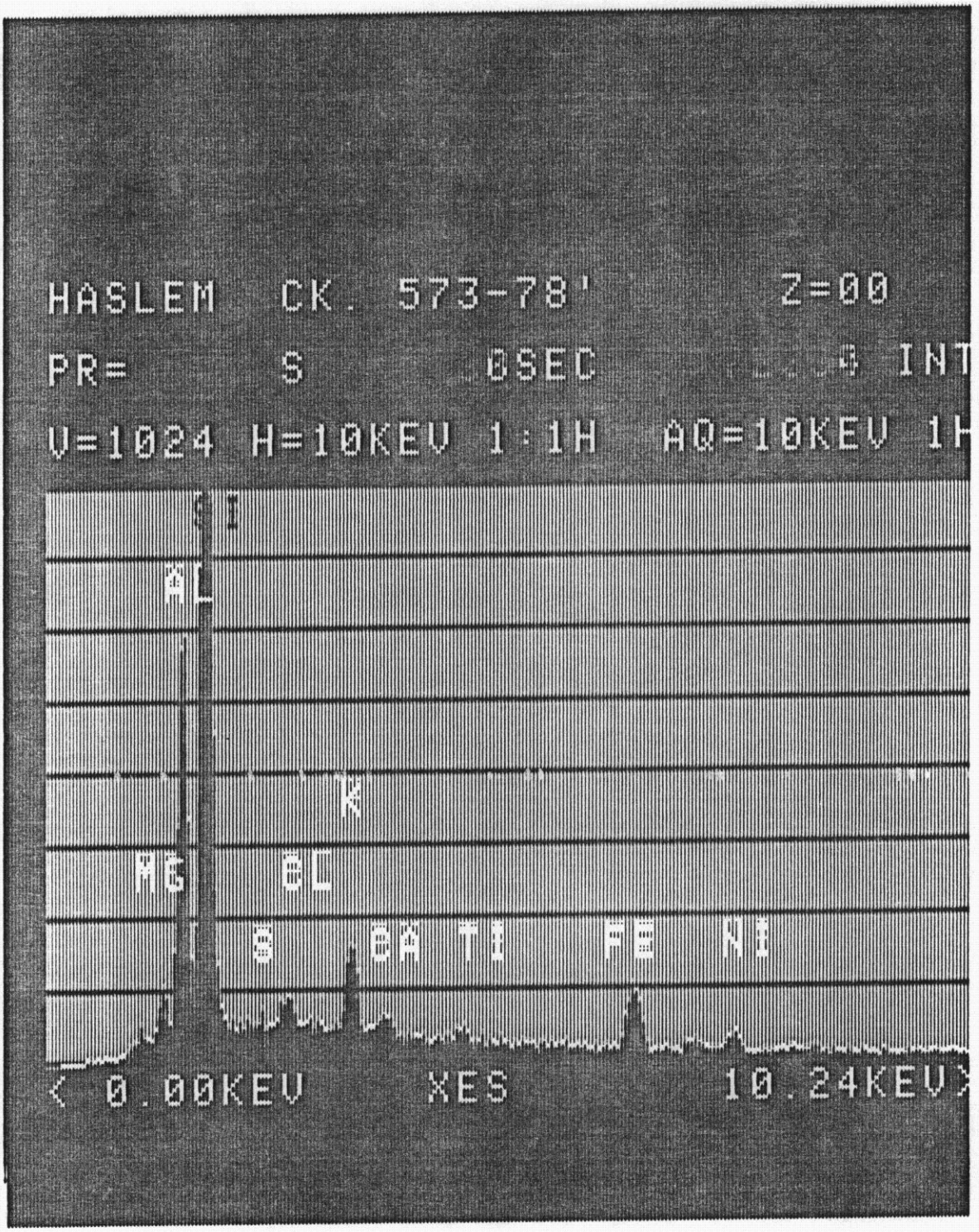
Stanley A.J. Pocock

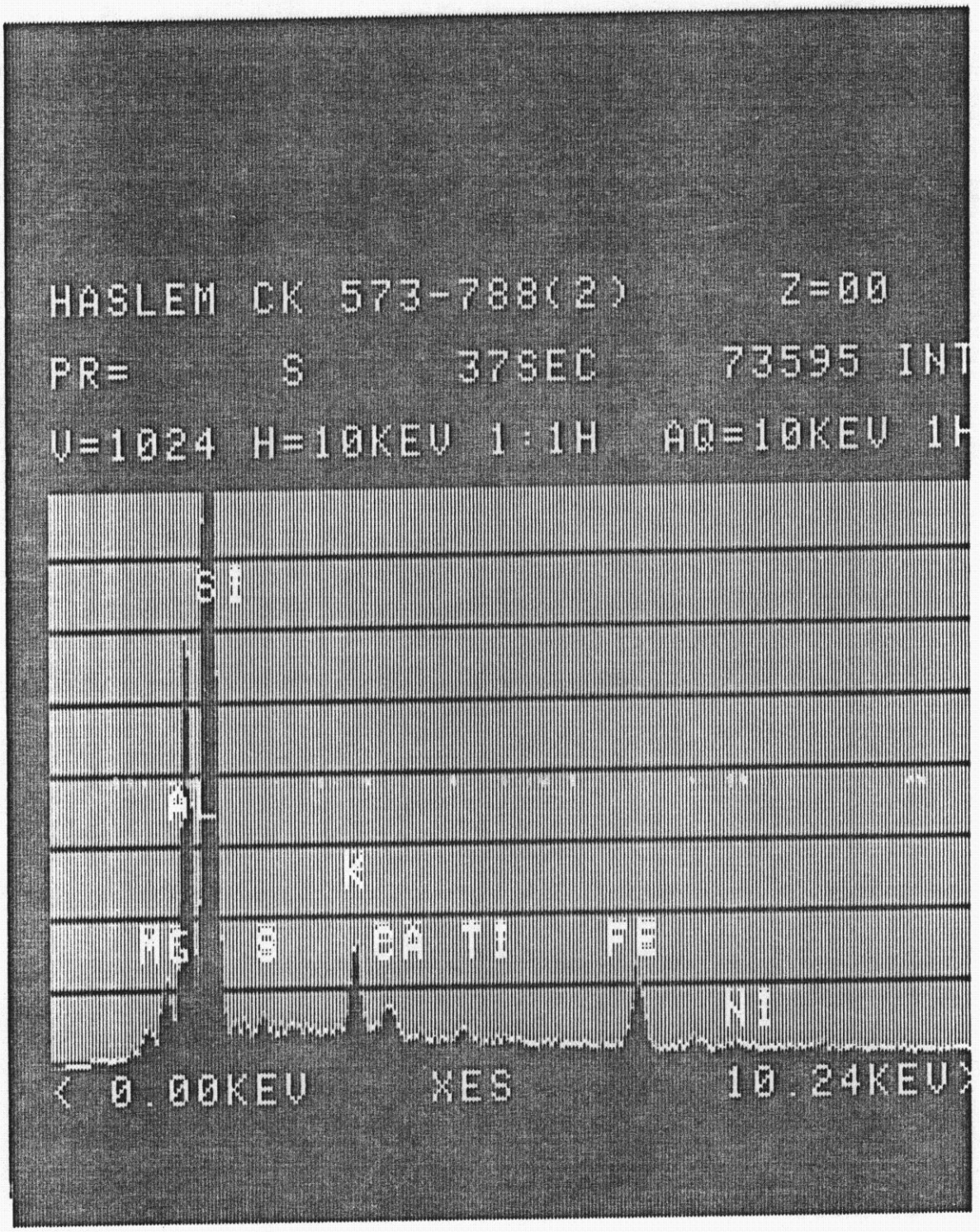
Key to lithologies for Elemental Analysis

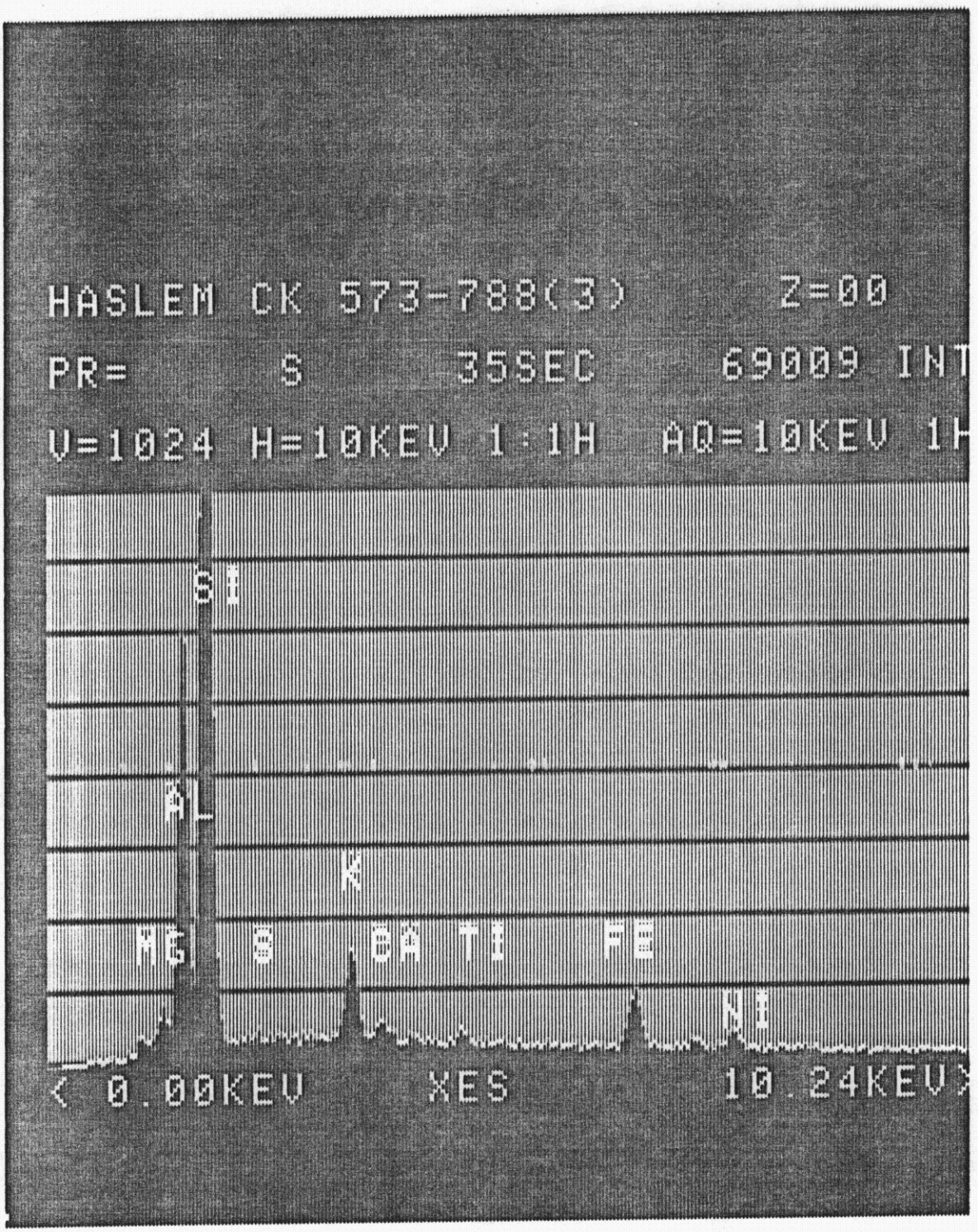
B.	(Black)	-	coal
G.	(Grey)	-	shale
W.	(White)	-	calcareous "salt and pepper" sand
P.	(Processed)	-	Particulate organic matter extract

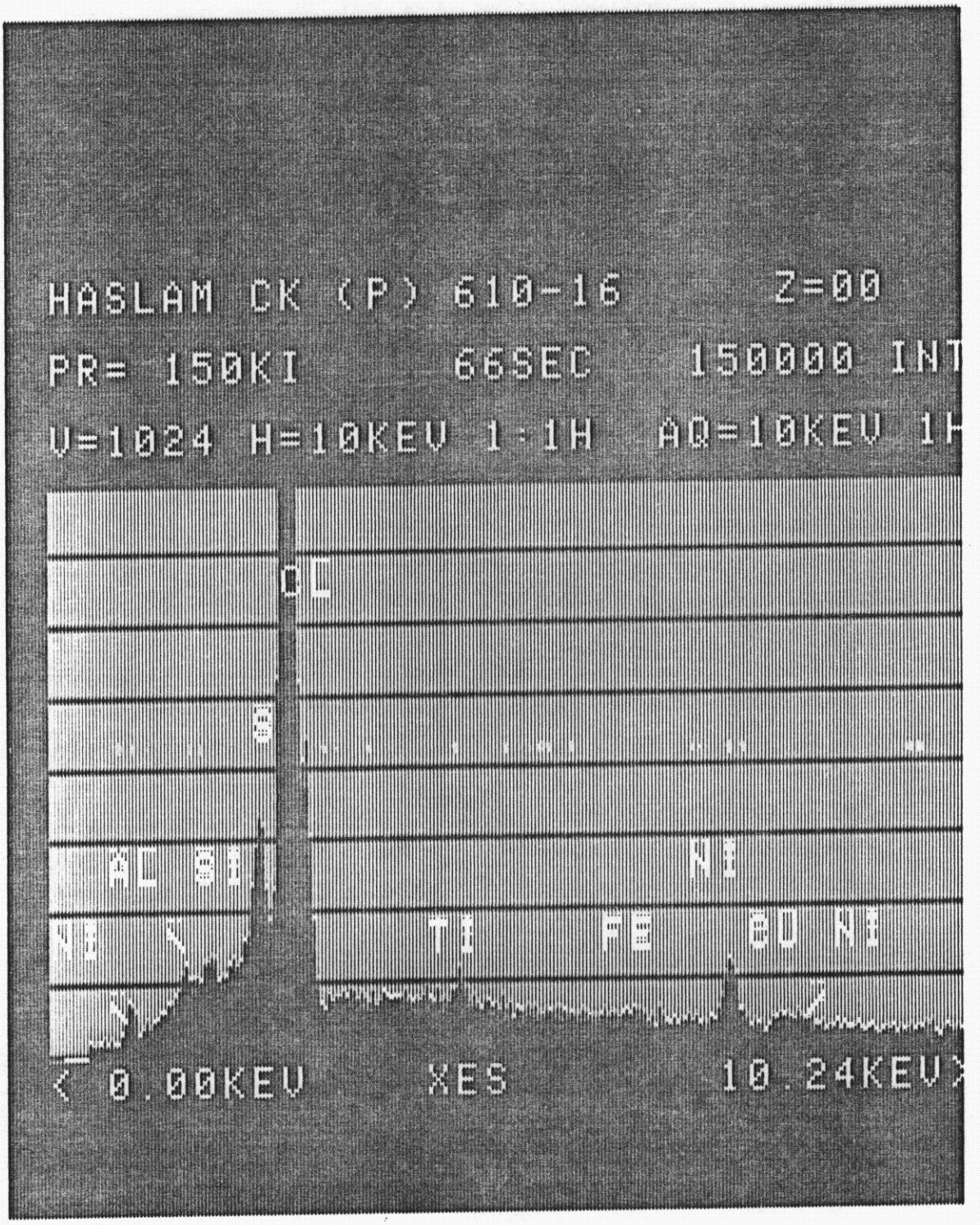
SAJP/bm
Attach.
xc: R. Sarmiento

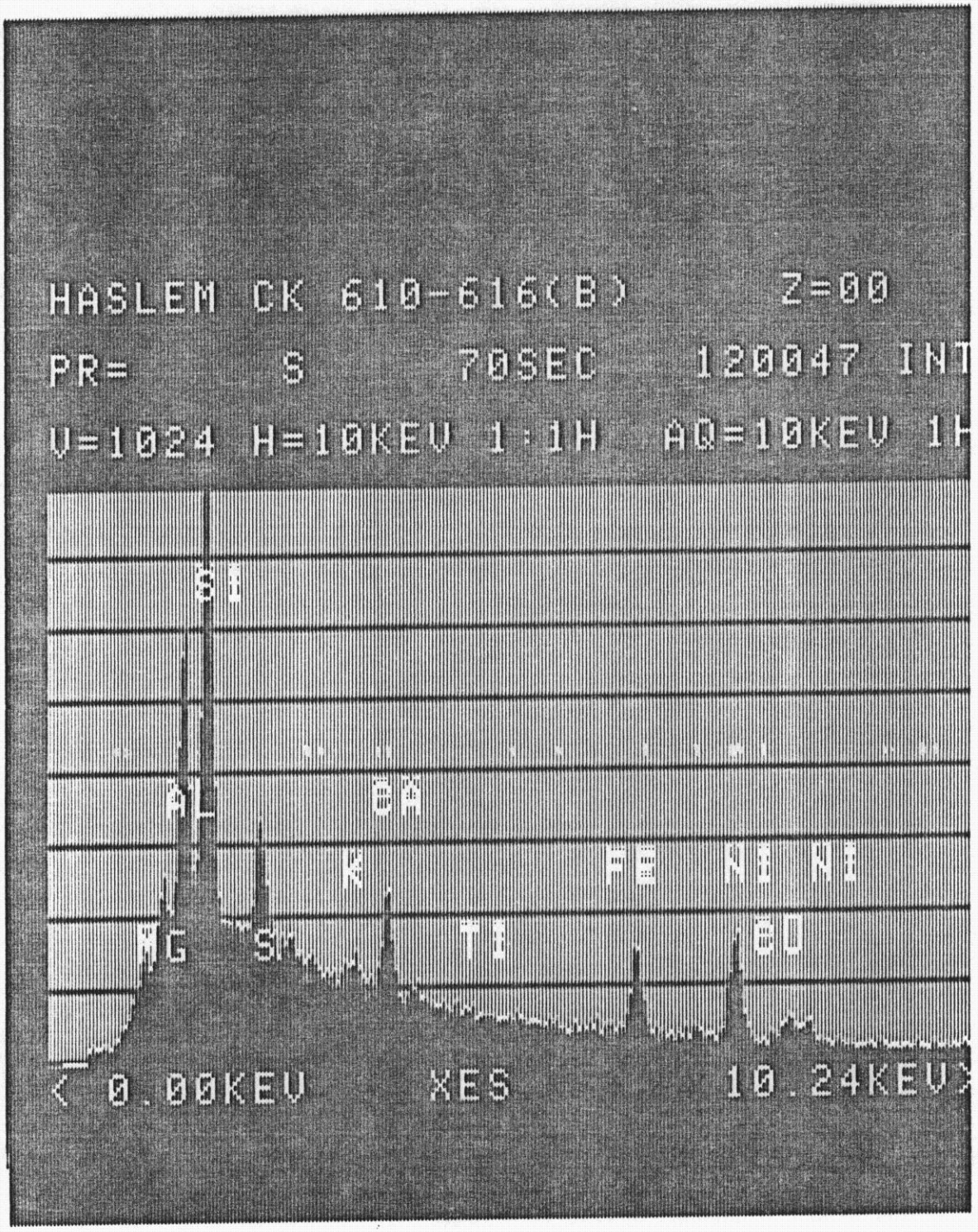

HASLAM CK (P) 573-78 Z=00
PR= 150KI 70SEC 150000 INT
V=1024 H=10KEV 1:1H AQ=10KEV 1H
CL
AL
NI
TI
FE
CO NI
0.00KEV XES 10.24KEV

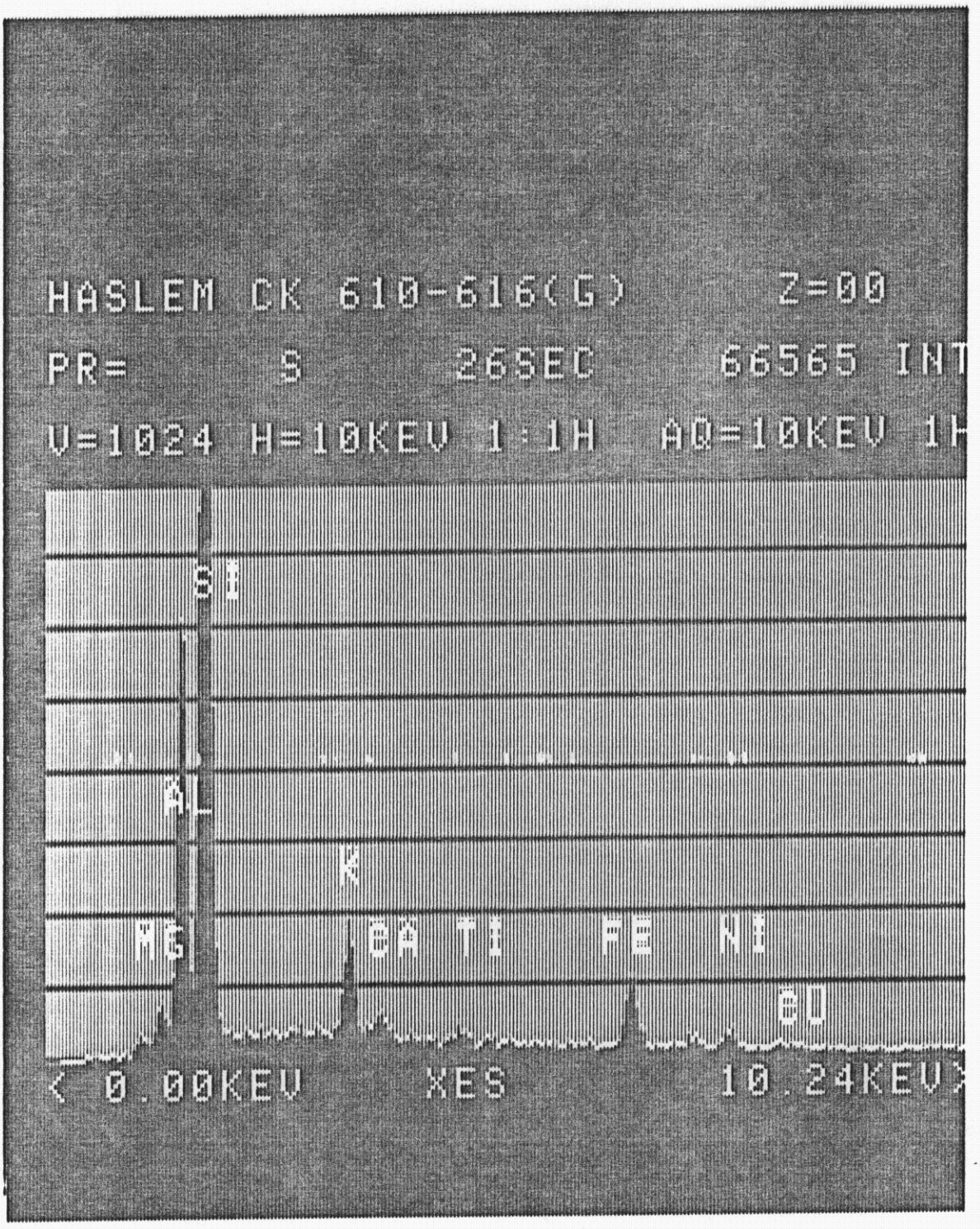

HASLEM CK. 573-78' Z=00
PR= S .0SEC .0 INT
V=1024 H=10KEV 1:1H AQ=10KEV 1H
AL
K
MG CL
TI FE NI
< 0.00KEV XES 10.24KEV>


HASLEM CK 573-788(2) Z=00
PR= S 37SEC 73595 INT
V=1024 H=10KEV 1:1H AQ=10KEV 1H
SI
AL
K
MG S CA TI FE
NI
< 0.00KEV XES 10.24KEV>

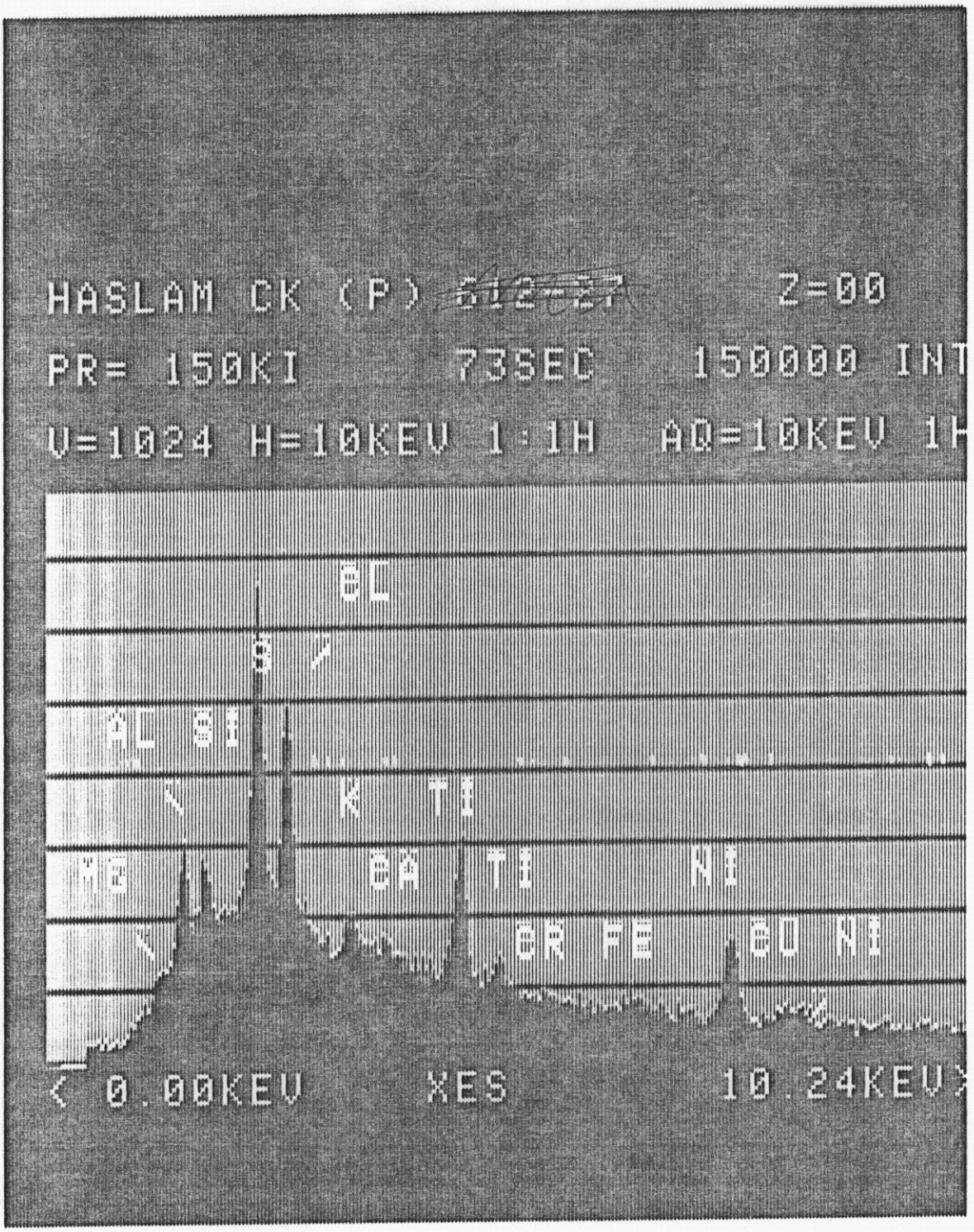

HASLEM CK 573-788(3) Z=00
PR= S 35SEC 69009 INT
V=1024 H=10KEV 1:1H AQ=10KEV 1H
SI
AL
K
MG
CA
TI
FE
NI
< 0.00KEV XES 10.24KEV>

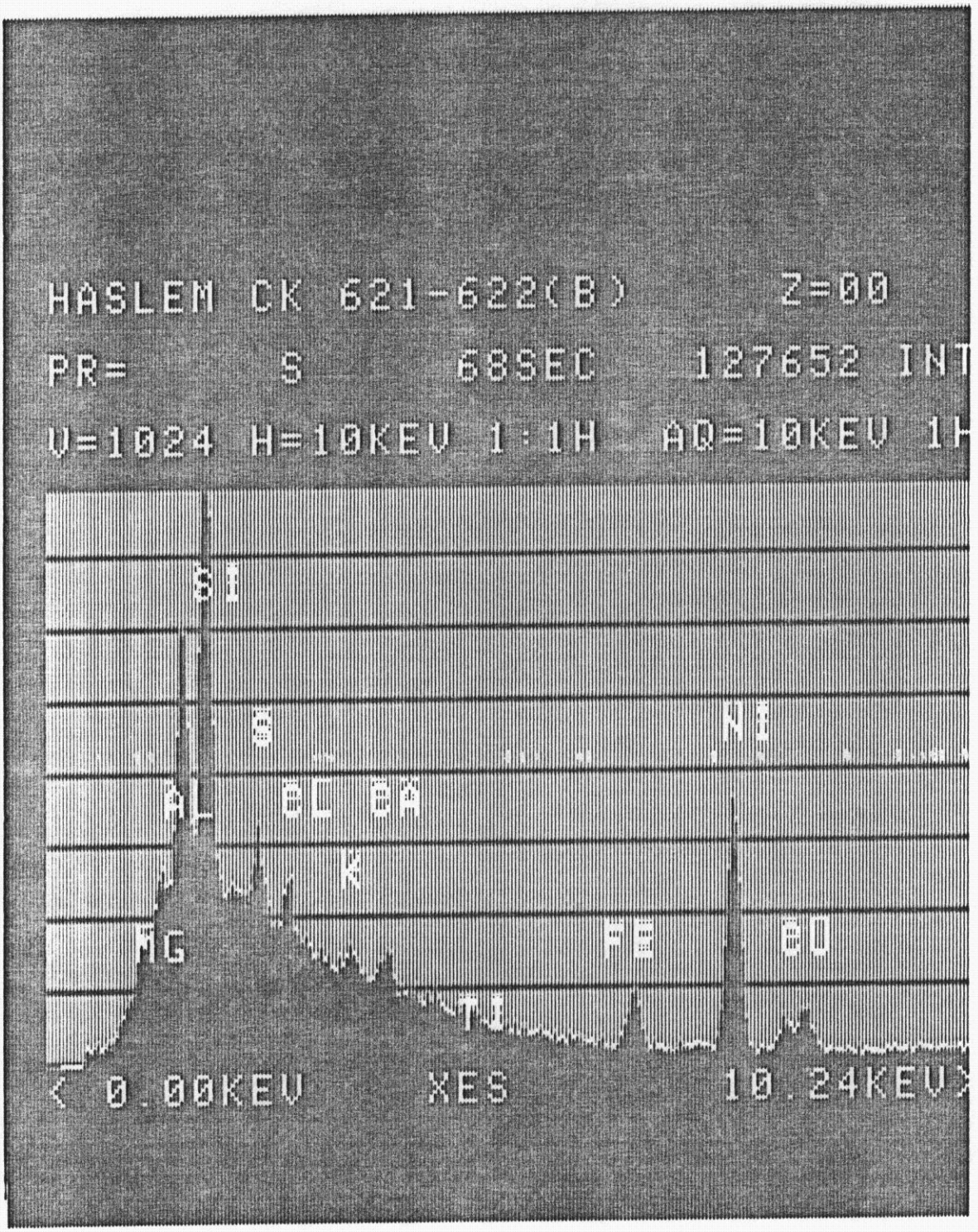

HASLAM CK (P) 610-16 Z=00
PR= 150KI 66SEC 150000 INT
V=1024 H=10KEV 1:1H AQ=10KEV 1H
0.00KEV XES 10.24KEV

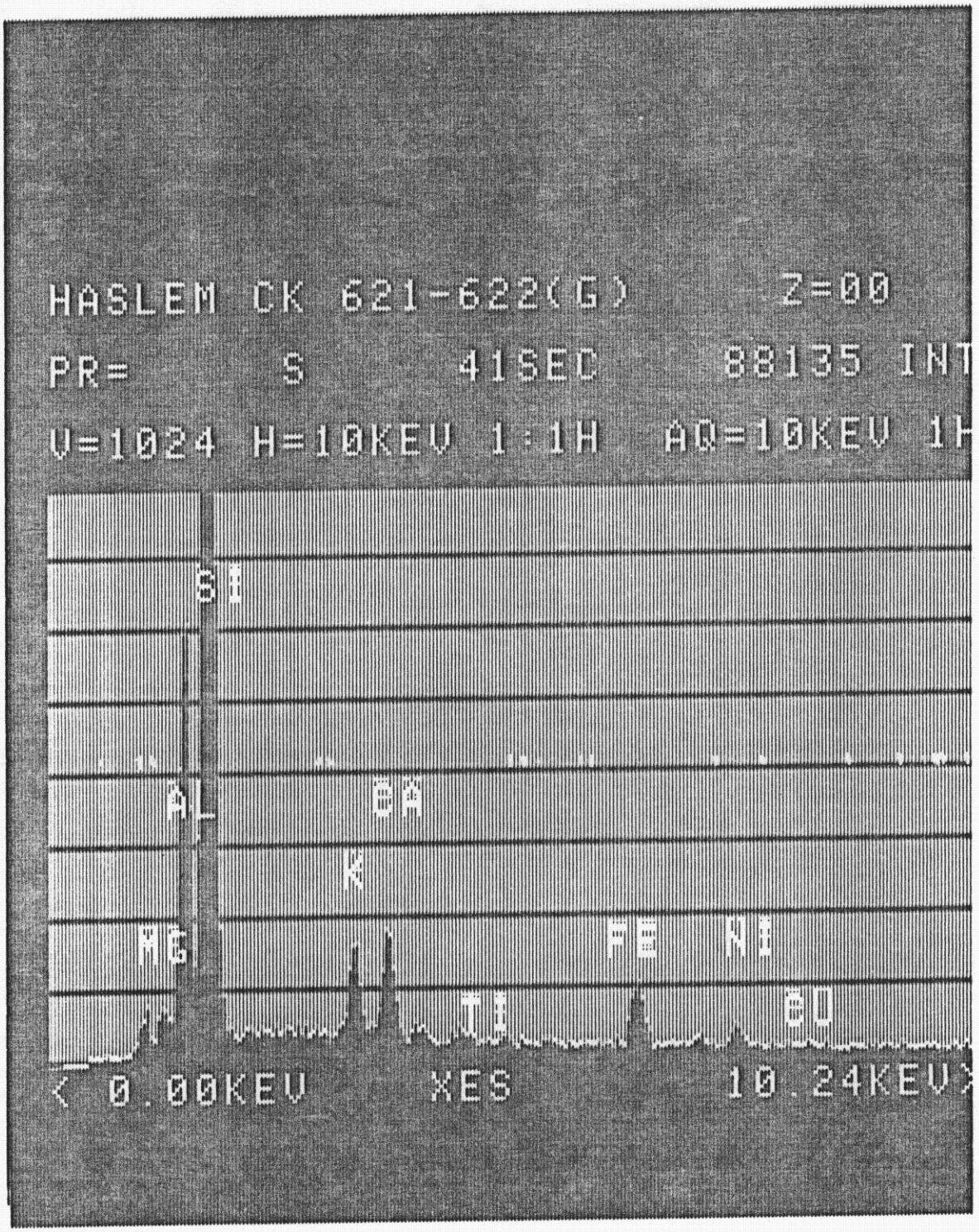

HASLEM CK 610-616(B) Z=00
PR= S 70SEC 120047 INT
V=1024 H=10KEV 1:1H AQ=10KEV 1H
SI
AL
CA
K
FE
NI NI
MG
TI
BQ
< 0.00KEV XES 10.24KEV>

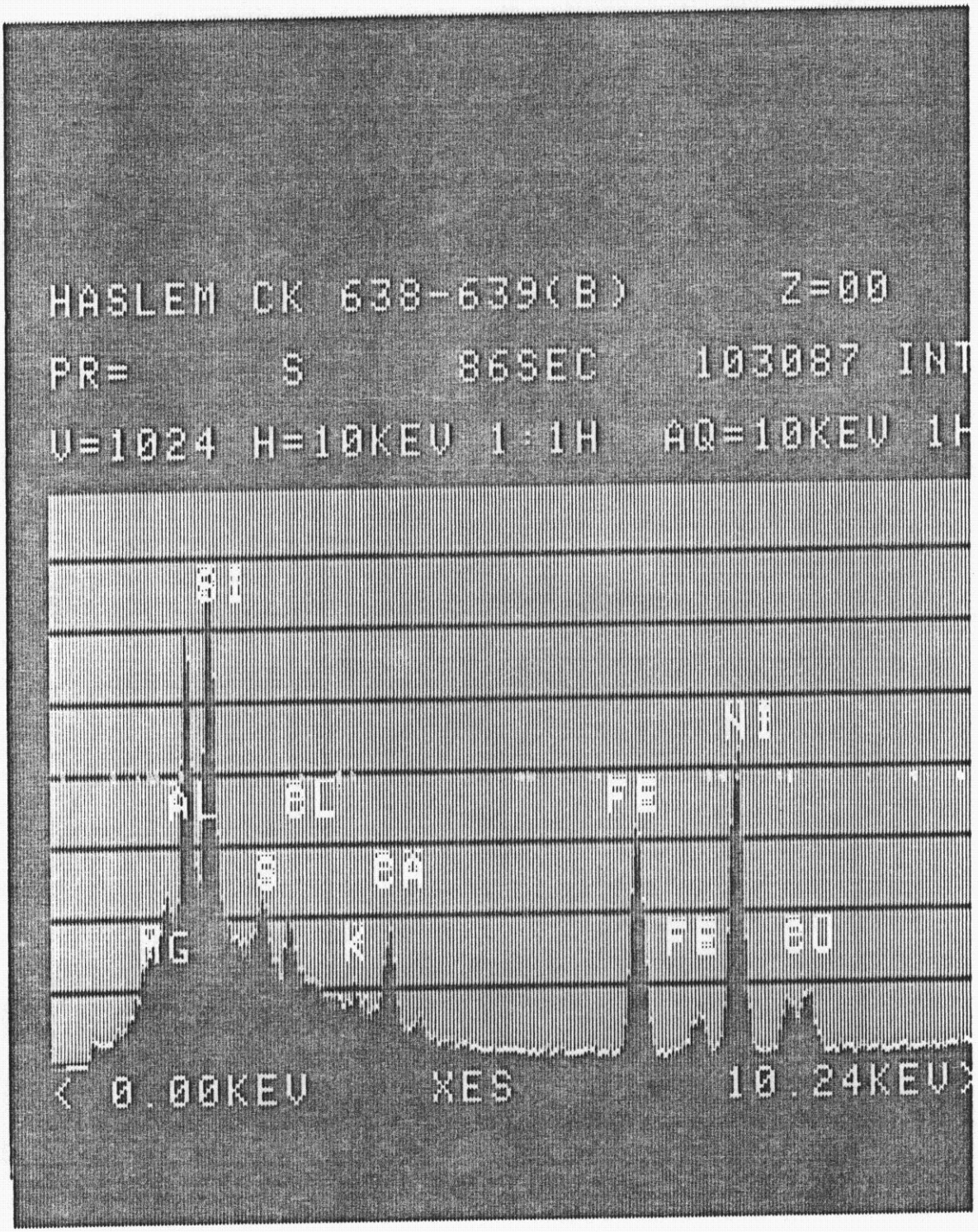

HASLEM CK 610-616(G) Z=00
PR= S 26SEC 66565 INT
V=1024 H=10KEV 1:1H A0=10KEV 1H
SI
AL
K
MG
CA TI FE NI
CU
< 0.00KEV XES 10.24KEV>

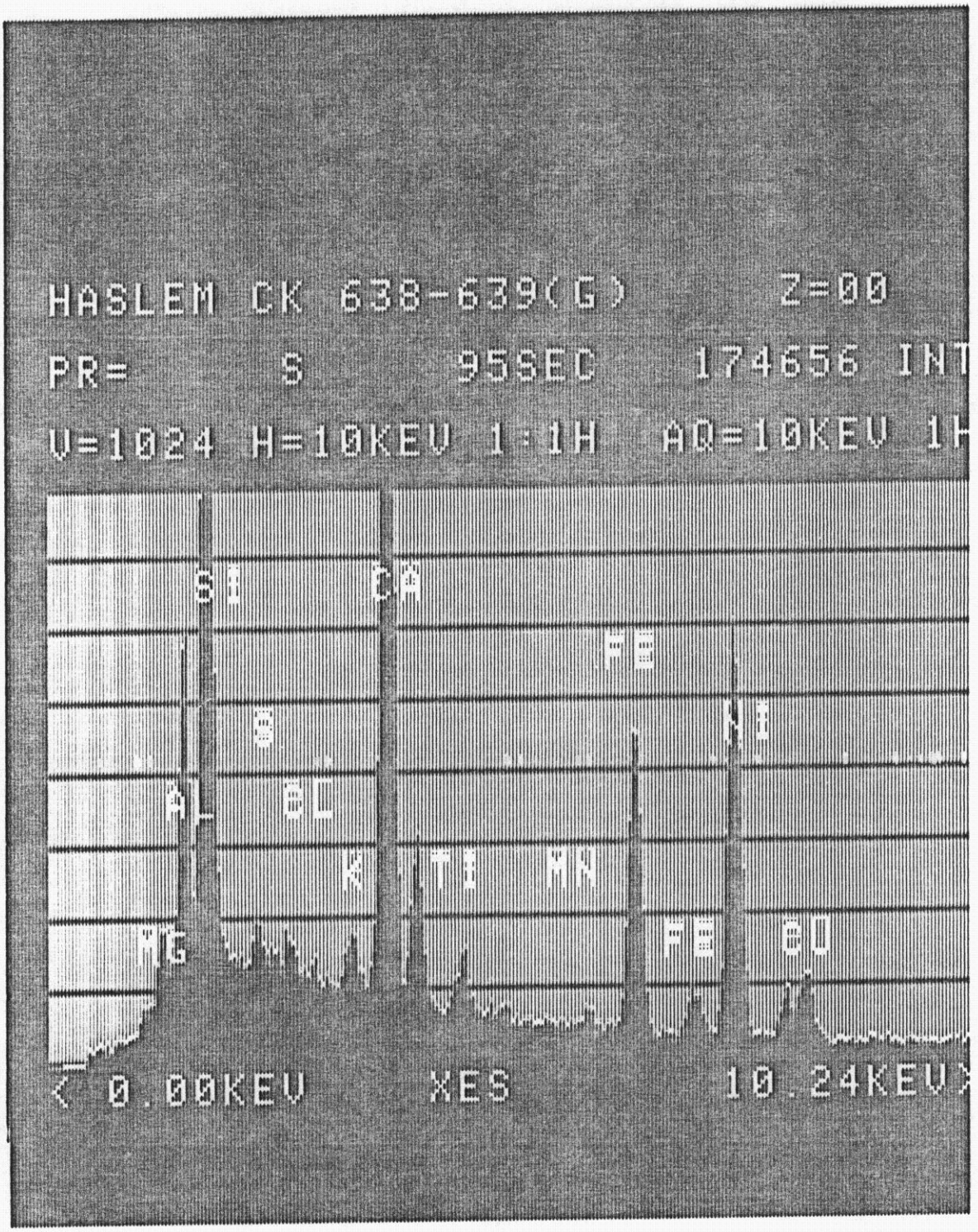
621-622

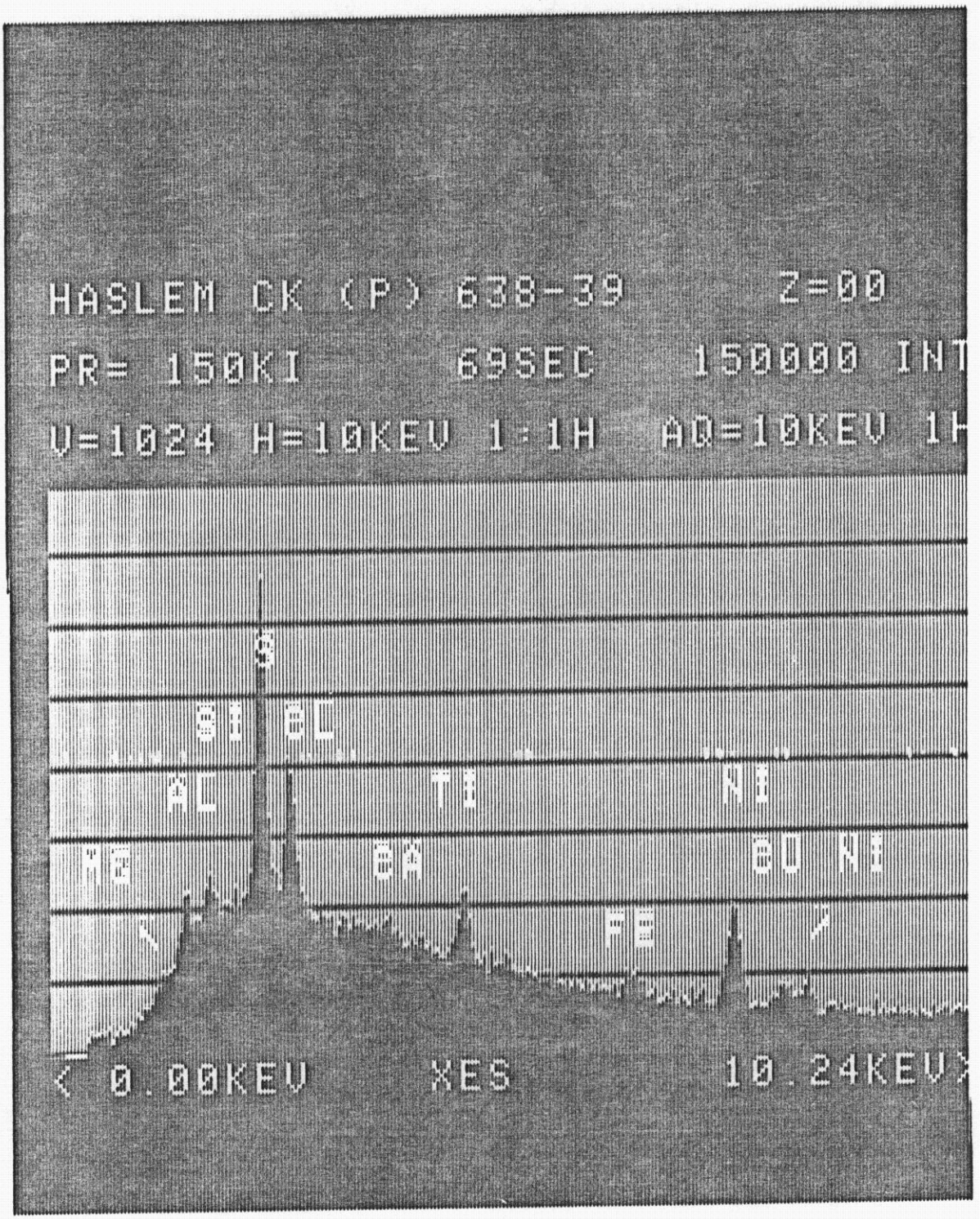

HASLAM CK (P) 612-27
Z=00
PR= 150KI
73SEC
150000 INT
V=1024 H=10KEV 1:1H
AQ=10KEV 1H
< 0.00KEV
XES
10.24KEV>

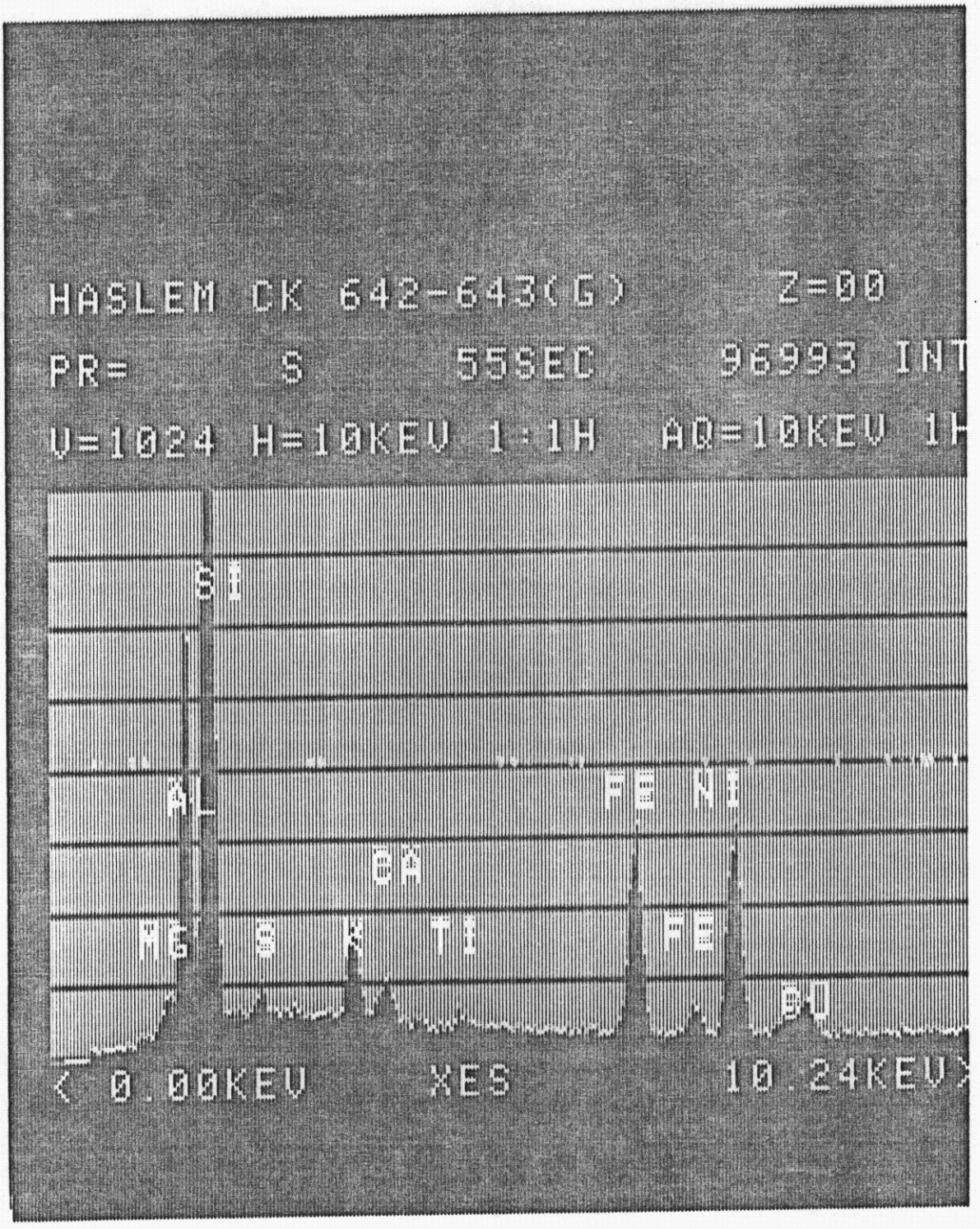

HASLEM CK 621-622(B) Z=00
PR= S 68SEC 127652 INT
V=1024 H=10KEV 1:1H AQ=10KEV 1H
SI
NI
AL BC BA
K
MG
FE
BO
TI
< 0.00KEV XES 10.24KEV>

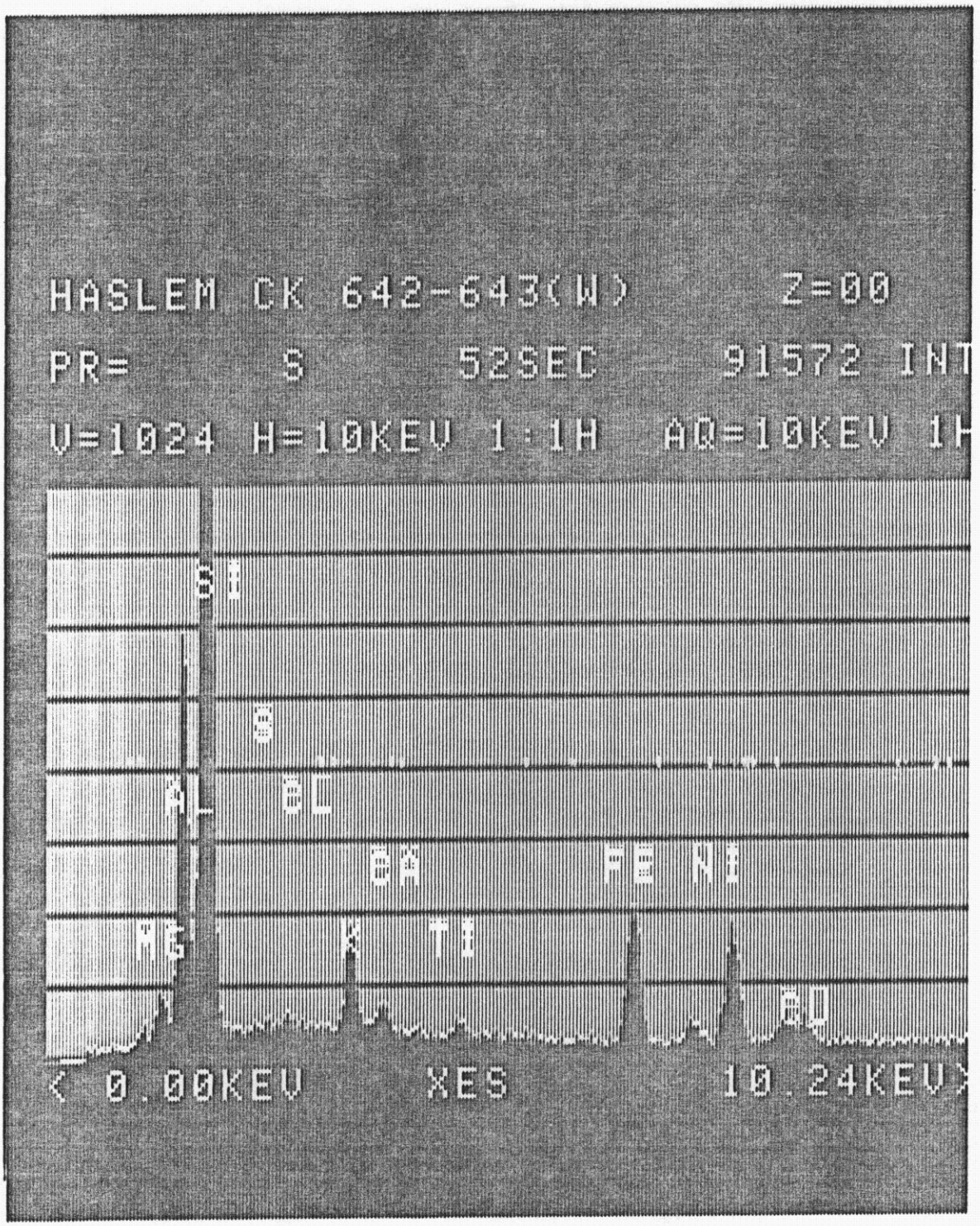

HASLEM CK 621-622(G) Z=00
PR= S 41SEC 88135 INT
V=1024 H=10KEV 1:1H AQ=10KEV 1H
SI
AL
CA
K
MG
FE
NI
CU
TI
0.00KEV XES 10.24KEV

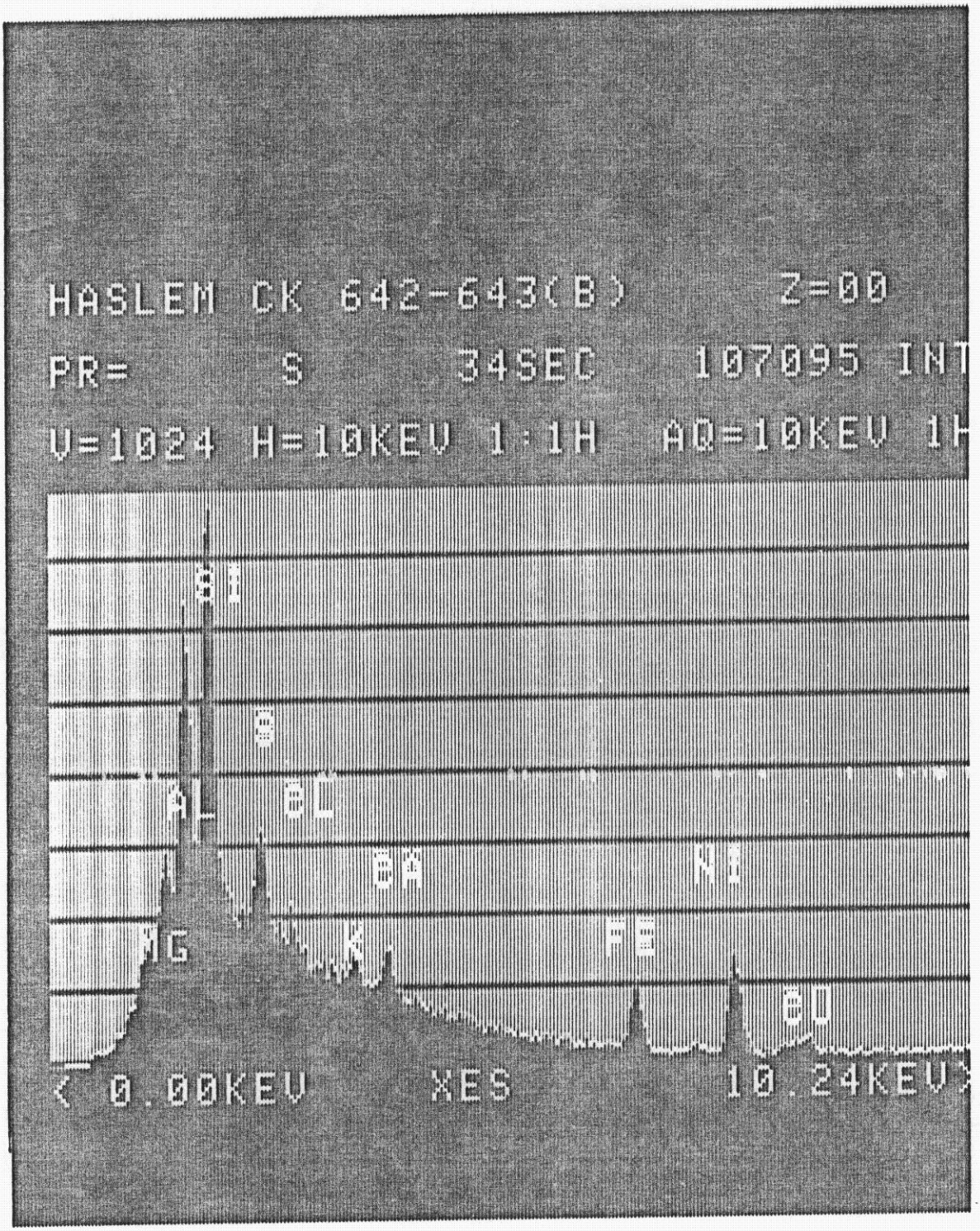

HASLEM CK 638-639(B) Z=00
PR= S 86SEC 103087 INT
V=1024 H=10KEV 1:1H AQ=10KEV 1H
SI
NI
AL
CL
FE
S
CA
MG
K
FE
CU
0.00KEV
XES
10.24KEV

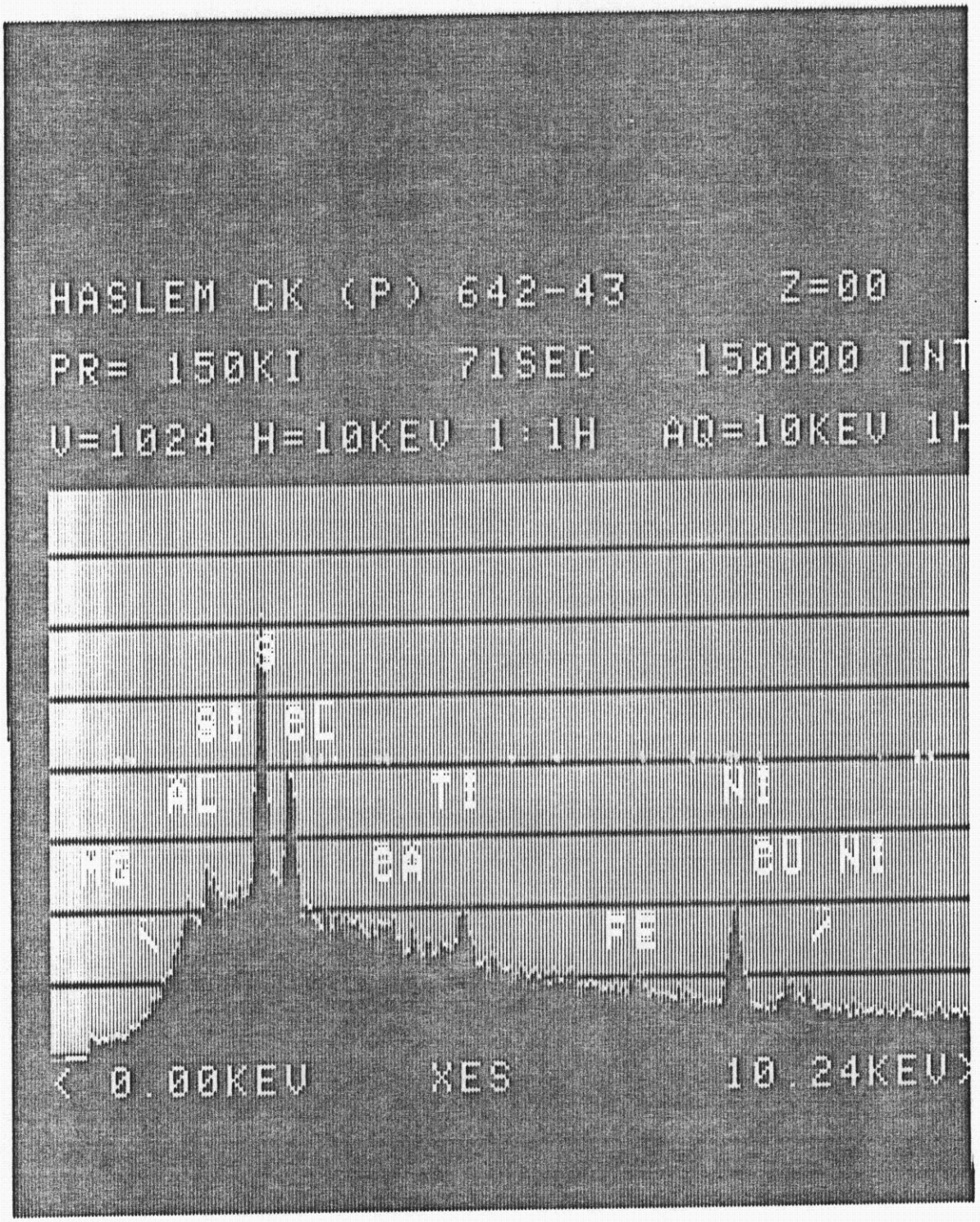

HASLEM CK 638-639(G) Z=00
PR= S 95SEC 174656 INT
V=1024 H=10KEV 1:1H AQ=10KEV 1H
SI CA
FE
NI
AL CL
K TI MN
MG
FE CO
< 0.00KEV XES 10.24KEV>

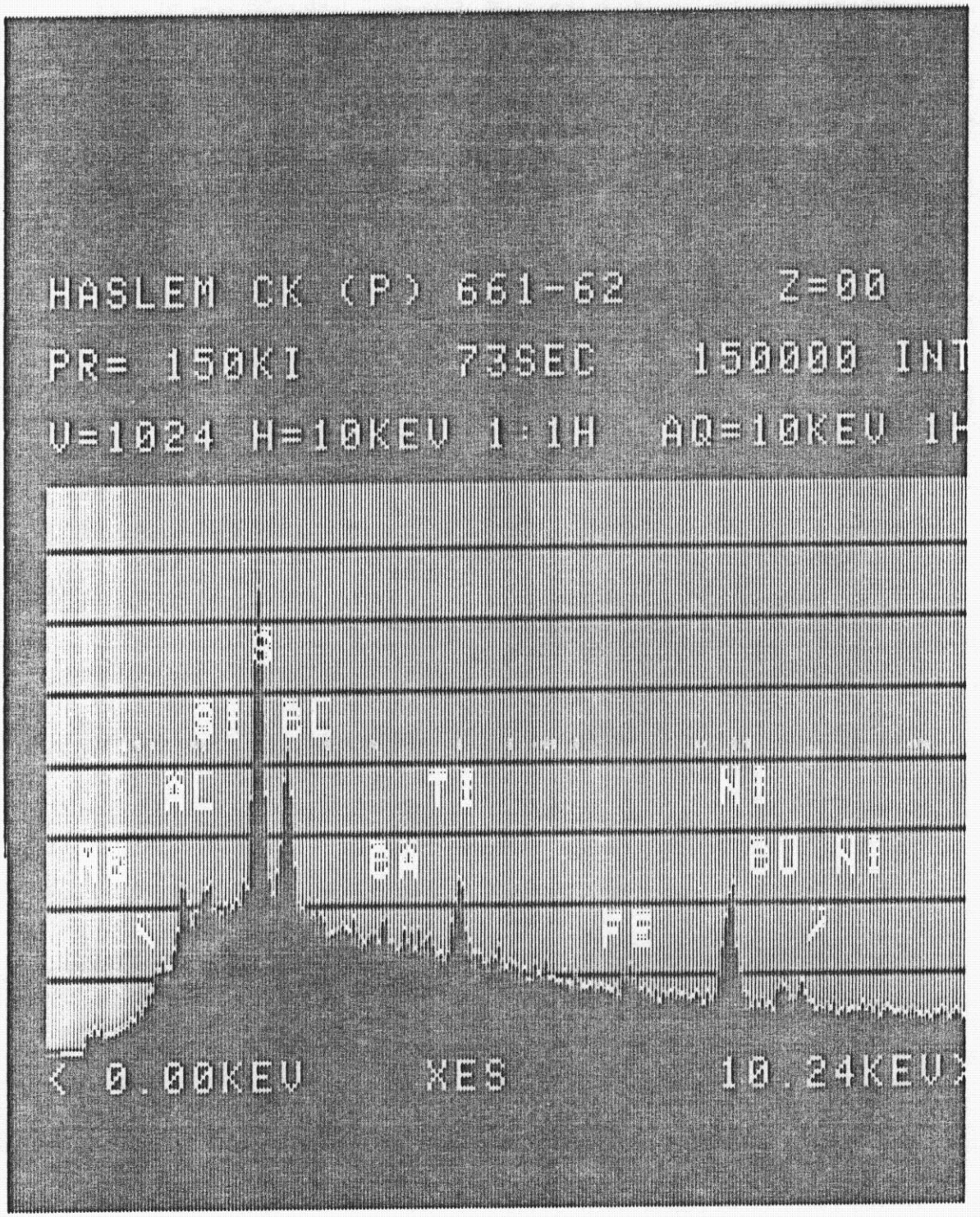

HASLEM CK (P) 638-39 Z=00
PR= 150KI 69SEC 150000 INT
V=1024 H=10KEV 1:1H A0=10KEV 1H
SI
CL
AL
TI
NI
MG
BA
BO NI
FE
< 0.00KEV XES 10.24KEV>

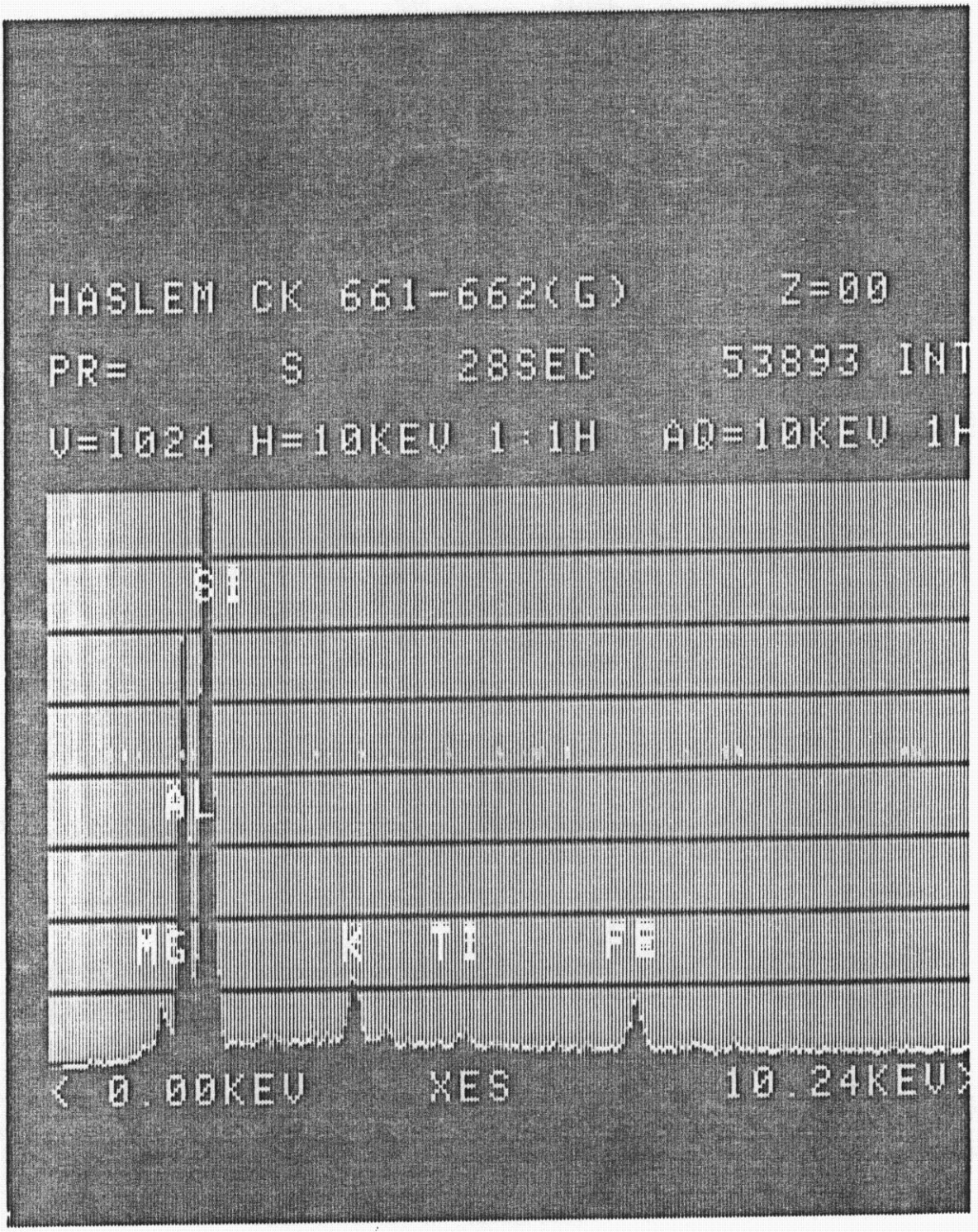

HASLEM CK 642-643(G) Z=00
PR= S 55SEC 96993 INT
V=1024 H=10KEV 1:1H AQ=10KEV 1H
SI
AL
FE NI
CA
MG S K TI FE
CU
0.00KEV XES 10.24KEV

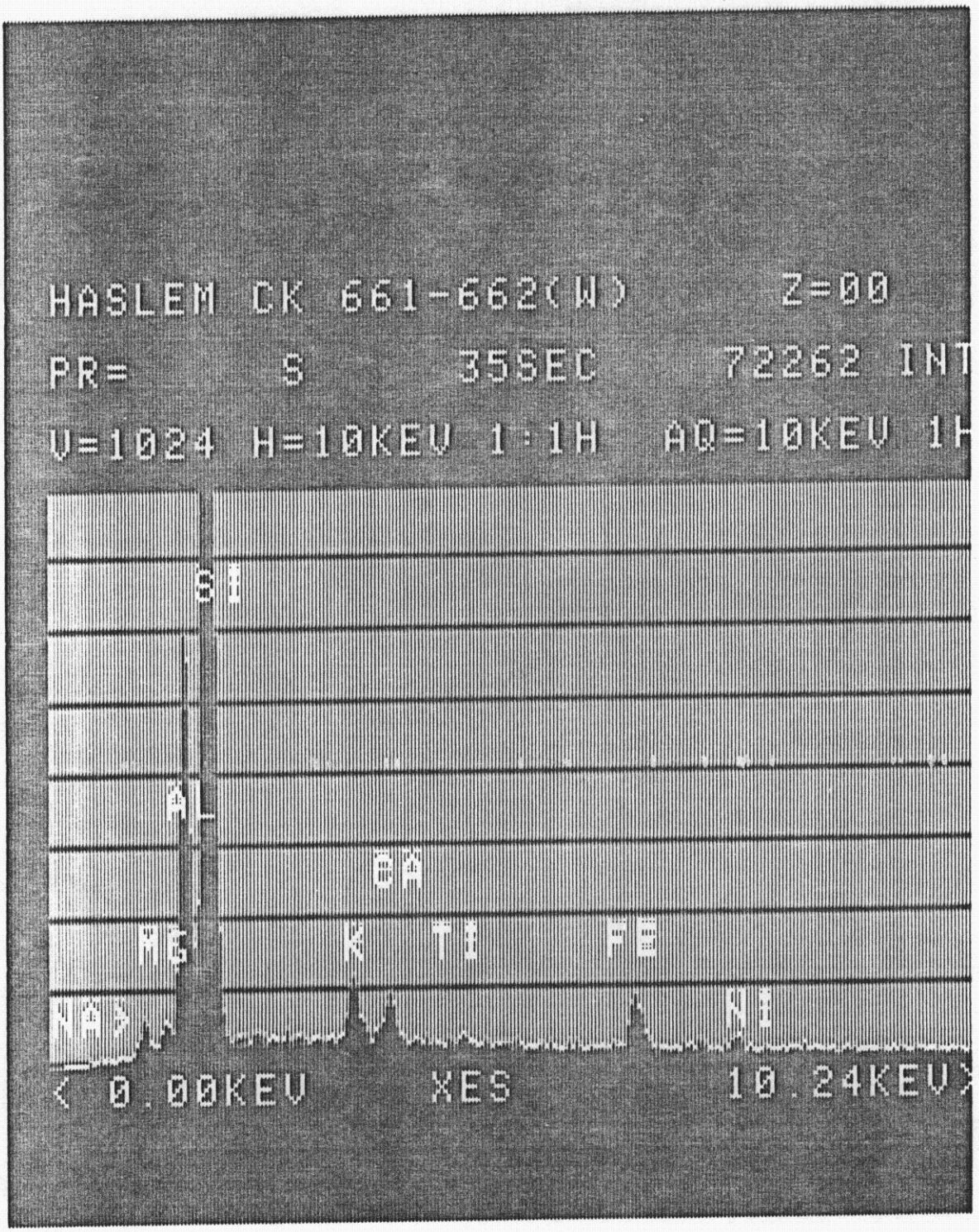

HASLEM CK 642-643(W) Z=00
PR= S 52SEC 91572 INT
V=1024 H=10KEV 1·1H AQ=10KEV 1H
SI
S
AL
CL
BA
FE NI
MG
K TI
BO
< 0.00KEV XES 10.24KEV>

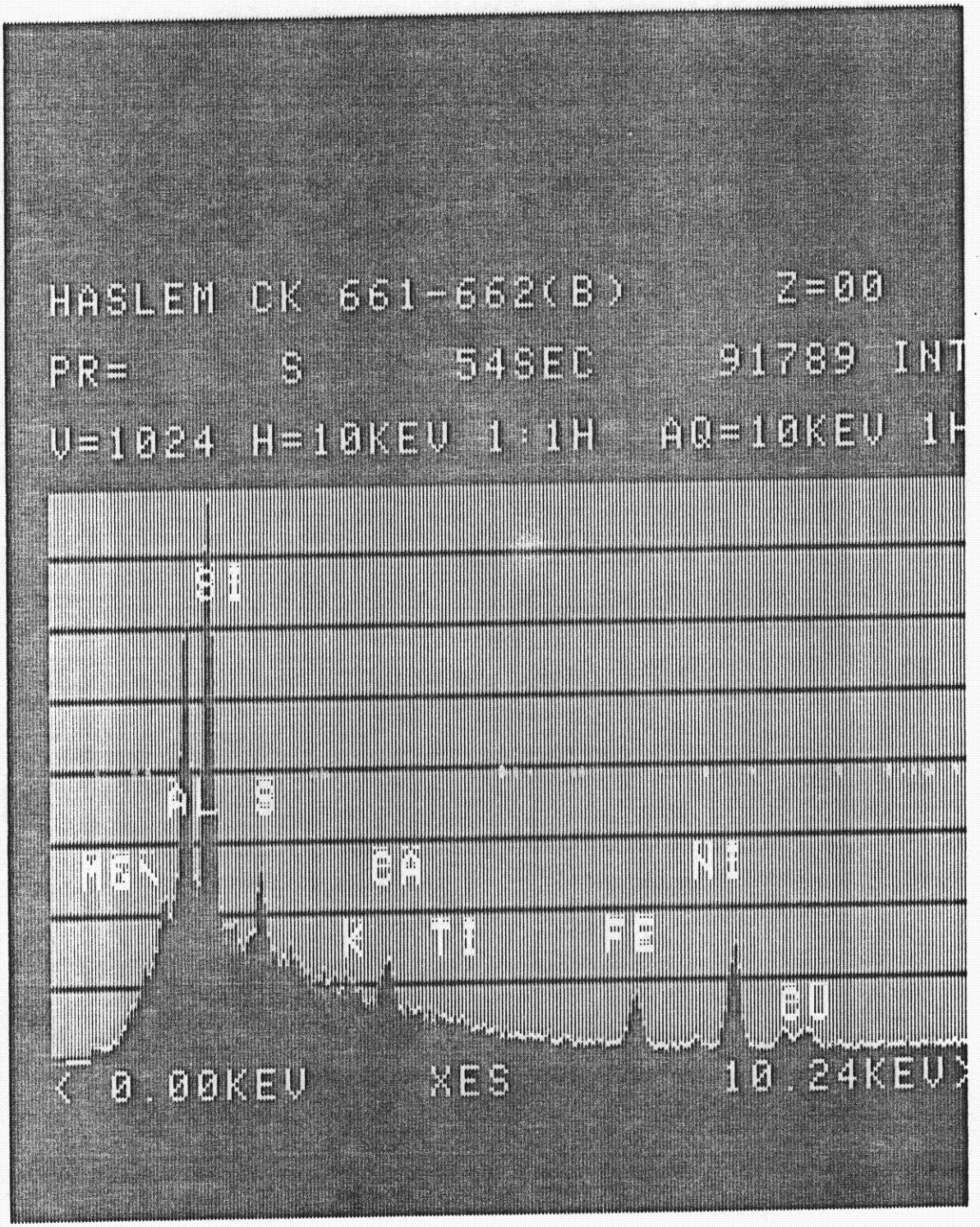

HASLEM CK 642-643(B) Z=00
PR= S 34SEC 107095 INT
V=1024 H=10KEV 1:1H AQ=10KEV 1H
SI
O
AL
CL
CA
NI
MG
K
FE
CO
< 0.00KEV XES 10.24KEV>


HASLEM CK (P) 642-43 Z=00
PR= 150KI 71SEC 150000 INT
V=1024 H=10KEV 1:1H AQ=10KEV 1H
< 0.00KEV XES 10.24KEV>

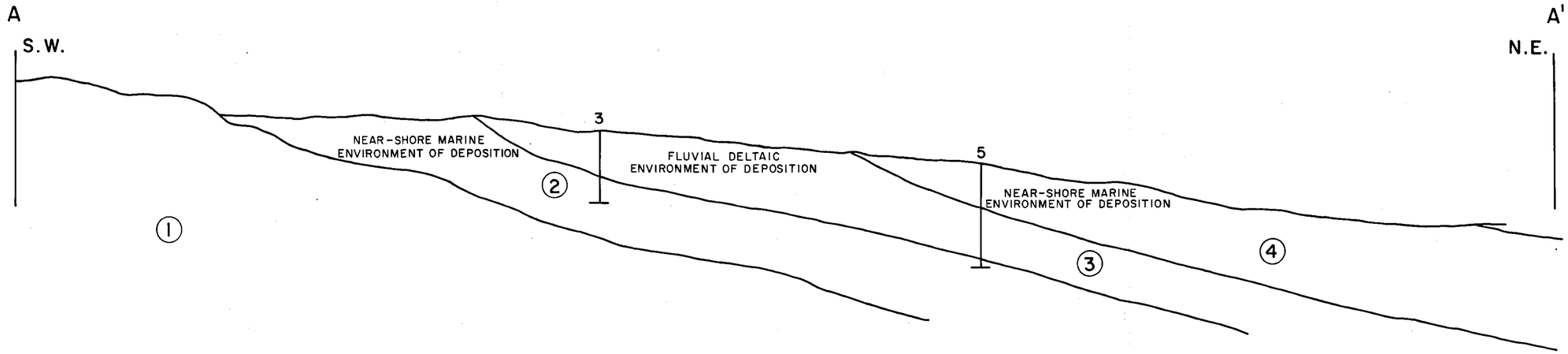

HASLEM CK (P) 661-62 Z=00
PR= 150KI 73SEC 150000 INT
V=1024 H=10KEV 1:1H AQ=10KEV 1H
< 0.00KEV XES 10.24KEV>


HASLEM CK 661-662(G) Z=00
PR= S 28SEC 53893 INT
V=1024 H=10KEV 1:1H AQ=10KEV 1H
SI
AL
MG
K
TI
FE
< 0.00KEV XES 10.24KEV>


HASLEM CK 661-662(W) Z=00
PR= S 35SEC 72262 INT
V=1024 H=10KEV 1:1H AQ=10KEV 1H
SI
AL
CA
MG K TI FE
NA
NI
< 0.00KEV XES 10.24KEV>


HASLEM CK 661-662(B) Z=00
PR= S 54SEC 91789 INT
V=1024 H=10KEV 1:1H AQ=10KEV 1H
CA
AL
MN
BA
NI
K
TI
FE
BR
0.00KEV
XES
10.24KEV

APPENDIX 3



N-Haslam Creek 80(2)*A *1

M1

ESSO MINERALS CANADA
COAL DEPARTMENT

HASLAM CREEK

SCHEMATIC GEOLOGICAL CROSS SECTION

SCALE 1:10,000

DEC. 1981

92 G-4

124°15'
49°15'
10'
05'
124°00'
10'
05'
49° 00'
124°15'
10'
05'
124°00'

Brannen Lake

NORTHFIELD MINE

WENDE EAST WELLINGTON MINE

OLD EAST WELLINGTON SHAFT

NANAIMO

JINGLEPOT MINE

WAKEL MINE

DOI

BASELINE RD

HARE MI

EXTEN PROSPE

WELLINGTON MINE

NANAIMO RIVER

WHITE RAPIDS MINE

No. 8 WELLINGTON MINE

HASLA

NANAIMO LAKES

NANAIMO RIVER

JUMP LAKE

M2A

HASLAM CREEK 92G-4

124°00' 55' 50' 123°45' 49°15'

STRAIT OF GEORGIA

NORTHFIELD MINE

WENDE EAST WELLINGTON MINE

OLD EAST WELLINGTON SHAFT

SHAFT

NANAIMO

JINGLEPOT MINE

NEWCASTLE ISLAND

No.1 MINE

WAKELEM MINE

DOUGLAS MINE

HAREWOOD MINE

No.3 MINE

RESERVE MINE

EXTENSION PROSPECT MINE

No.5 MINE

SOUTHFIELD MINE

MORDEN MINE

No.10 MINES

WELLINGTON MINE

EXTENSION COLLIERIES No.4 MINE

ADIT

CASSIDY MINE

WHITE RAPIDS MINE

No.8 WELLINGTON MINE

PROSPECT

BRIGHT MINE

SHAFT

GABRIOLA ISLAND

SECTION 7

SECTION 6

SECTION 5

SECTION 4

SECTION 3

SECTION 2

SECTION 1

MUDGE ISLAND

DUKE POINT

NANAIMO RIVER

HASLAM CREEK

BASELINE A

BASELINE B

Quennell Lake

Michael Lake

LADYSMITH HARBOUR

NANAIMO COALFIED

COAL SEAMS	FORMATION & THICKNESS
	GABRIOLA ±1400'
	NORTHUMBERLAND ± 2000'
	DE COURCY ±900'
	CEDAR DISTRICT ±750'
	PROTECTION ±650'
DOUGLAS SEAM NEWCASTLE SEAM	NEWCASTLE ±175'
	CRANBERRY ±400'
UPPER WELLINGTON WELLINGTON	EXTENSION ±600'
	HASLAM ±600'
BLACKJACK SEAM	BENSON ±100'

ESSO LICENCE APPLICATIONS

COMPETITORS LICENCES

83 EXISTING DRILL HOLE

DIP, DIP DIRECTION

DIP, DIP DIRECTION AND OUTCROP NUMBER FROM ESSO FIELD RECONNAISANCE

SYNCLINE, ANTICLINE

FORMATION CONTACT

COAL SEAM OUTCROP

FAULT

0.5 0 1 2 Miles

0.5 0 1 2 3 km

NANAIMO COAL FIELD
VANCOUVER ISLAND B.C.

HASLAM CREEK PROPERTY

GEOLOGICAL MAP
MINED OUT AREAS

92G-4

172 (92F)

HASLAM CREEK

12

10

8

3

5

28

15

10–20

12–15

A

A'

LEGEND

- DRILL HOLE
- INFERRED CONTACT
- INFERRED FAULT
- ANTICLINE
- SYNCLINE
- 8 BEDDING ORIENTATION AND DEGREE OF DIP

4 CEDAR DISTRICT FORMATION

3 EXTENSION–PROTECTION FORMATION

2 HASLAM FORMATION

1 SAANICH INTRUSIVES

SCALE 1:10,000

ESSO MINERALS CANADA
COAL DEPARTMENT

HASLAM CREEK
GEOLOGY MAP

M3

DEC., 1981

172

92 G-4

N-Haslam Creek 80(2)A *1