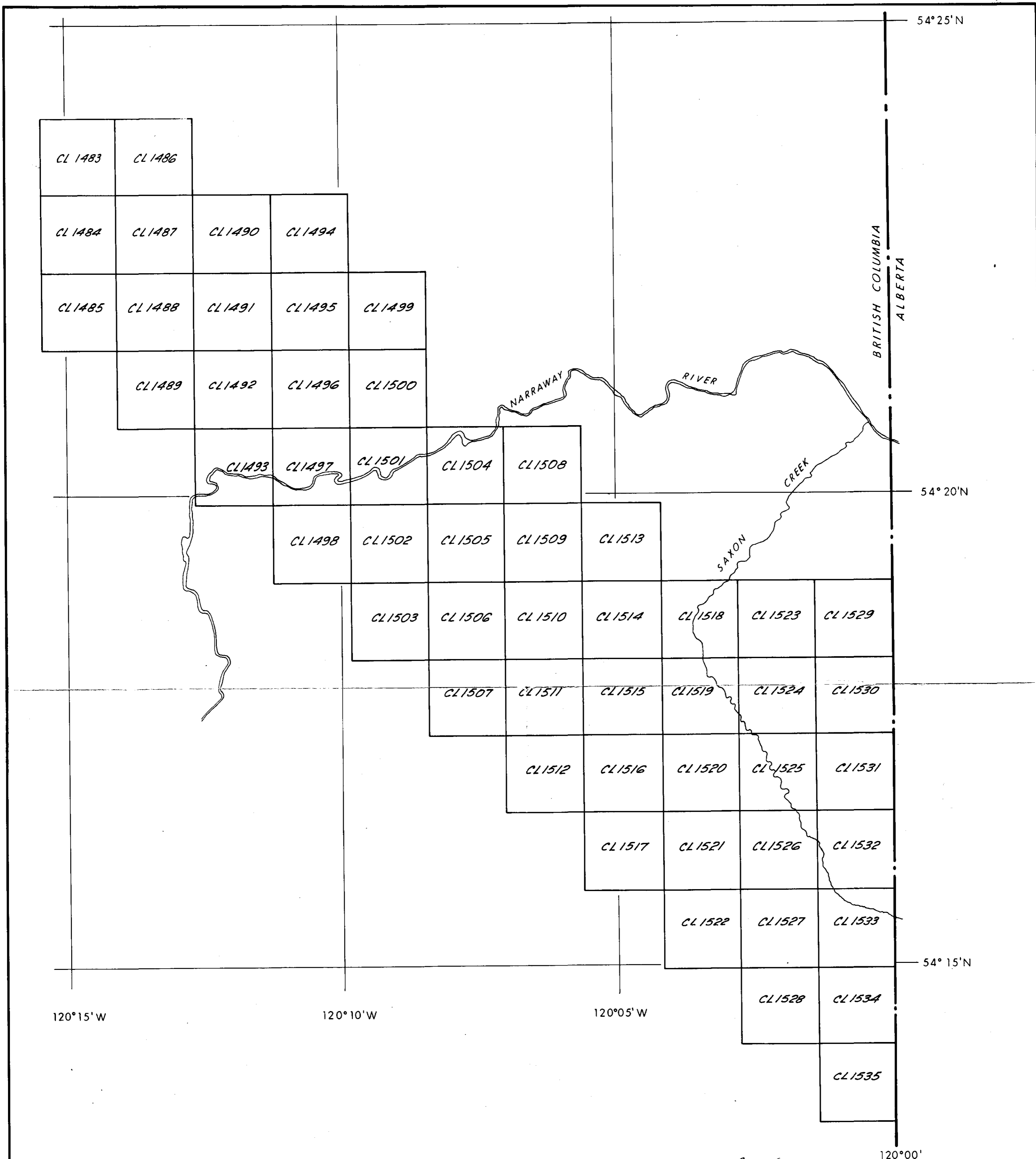


PR-SAXON 72(2)A 1/4

GEOLOGICAL BRANCH
ASSESSMENT REPORT

00 624



120°00'

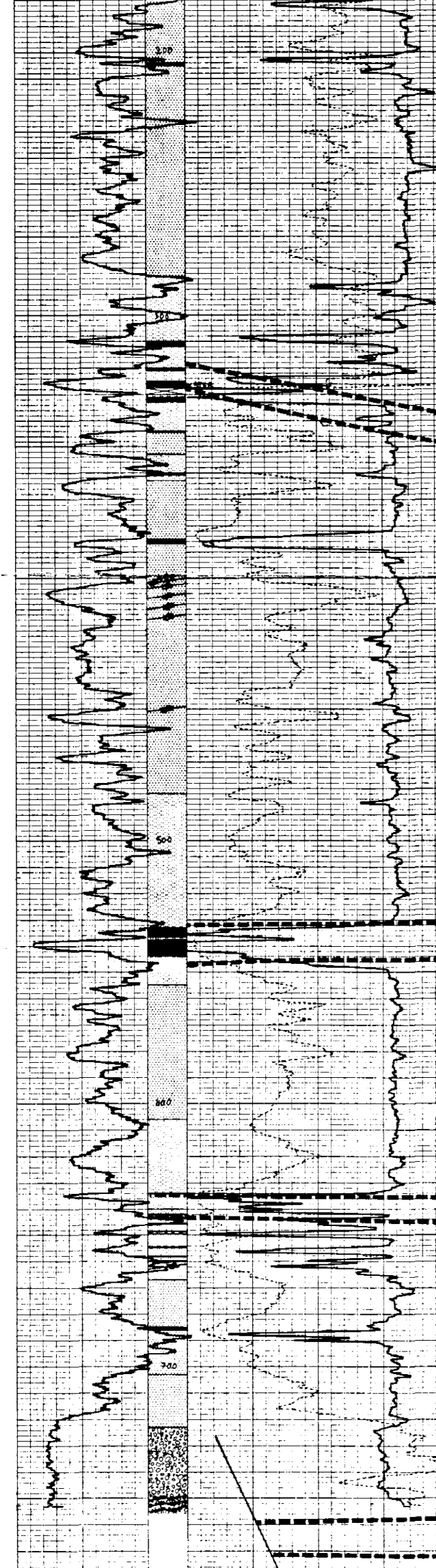
PR-SAXON 72(2)A.

DENISON MINES LIMITED <small>(COAL DIVISION)</small>			
<small>CALGARY</small>	<small>ALBERTA</small>	①	
SAXON COAL LICENSES			
<small>DRAWN BY:</small> E. Toth	<small>DATE:</small> Dec. '71	<small>SCALE:</small> 1 : 50,000	
<small>APPROVED BY:</small>	<small>DRAWING NO:</small> SXON 71 - 0254 - R01		

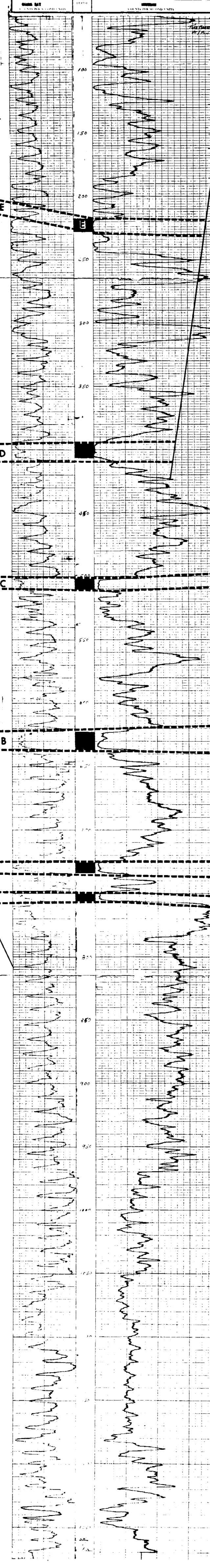
624 1/4

GENERAL INFORMATION Well Name: _____ Location: _____ Date: _____ Scale: _____	
LOGGING DATA Log No.: _____ Log Type: _____ Log Interval: _____ Log Depth: _____	
FORMATION AND STRATA Formation: _____ Stratum: _____ Lithology: _____ Thickness: _____	

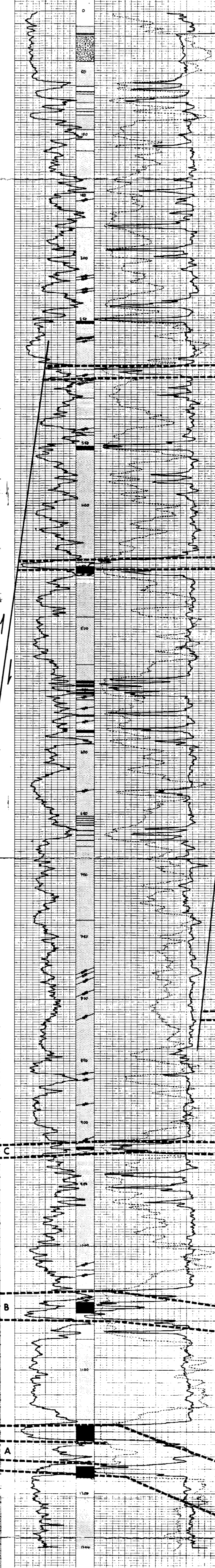
FORMATION AND STRATA Formation: _____ Stratum: _____ Lithology: _____ Thickness: _____	
LOGGING DATA Log No.: _____ Log Type: _____ Log Interval: _____ Log Depth: _____	



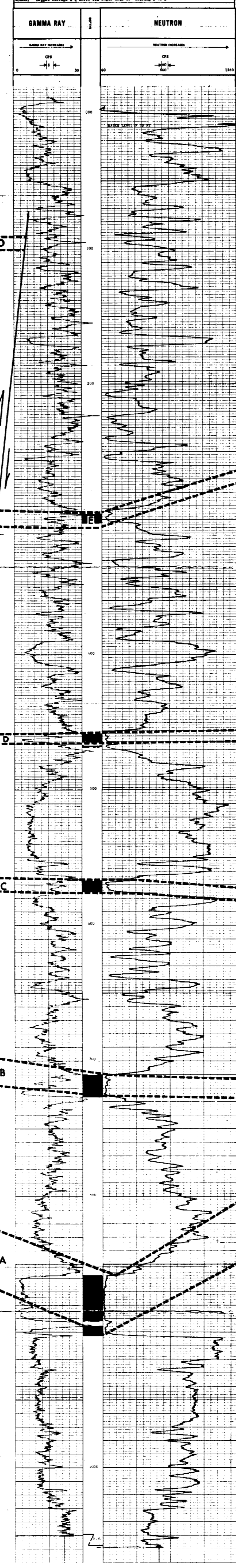
FORMATION AND STRATA Formation: _____ Stratum: _____ Lithology: _____ Thickness: _____	
LOGGING DATA Log No.: _____ Log Type: _____ Log Interval: _____ Log Depth: _____	



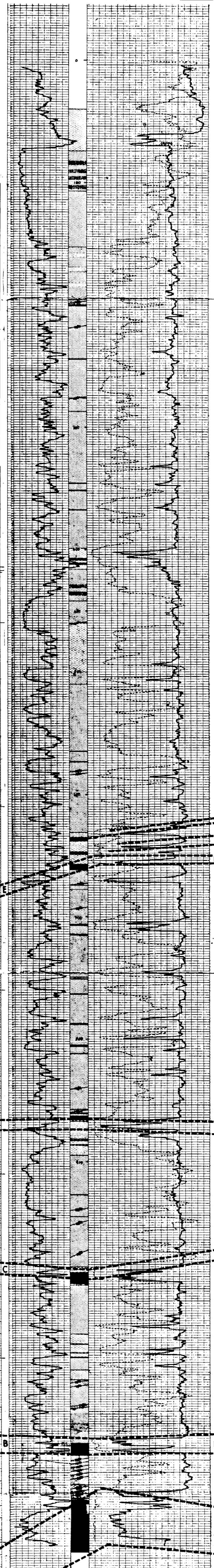
GENERAL INFORMATION Well Name: _____ Location: _____ Date: _____ Scale: _____	
LOGGING DATA Log No.: _____ Log Type: _____ Log Interval: _____ Log Depth: _____	
FORMATION AND STRATA Formation: _____ Stratum: _____ Lithology: _____ Thickness: _____	



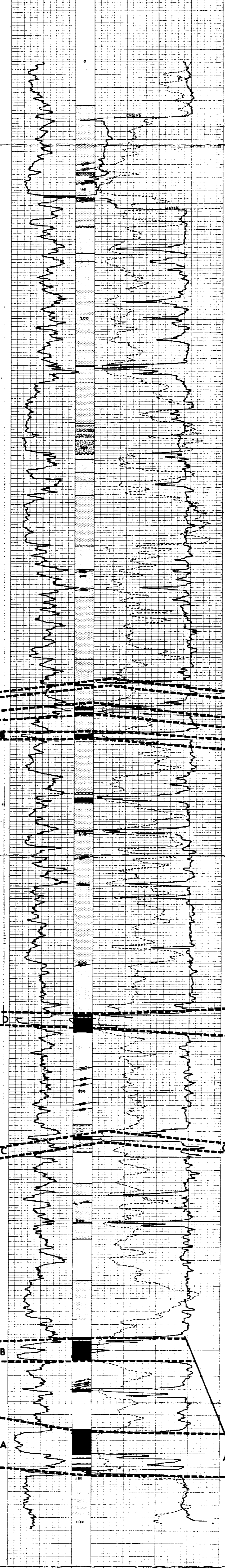
GENERAL INFORMATION Well Name: _____ Location: _____ Date: _____ Scale: _____	
LOGGING DATA Log No.: _____ Log Type: _____ Log Interval: _____ Log Depth: _____	
FORMATION AND STRATA Formation: _____ Stratum: _____ Lithology: _____ Thickness: _____	



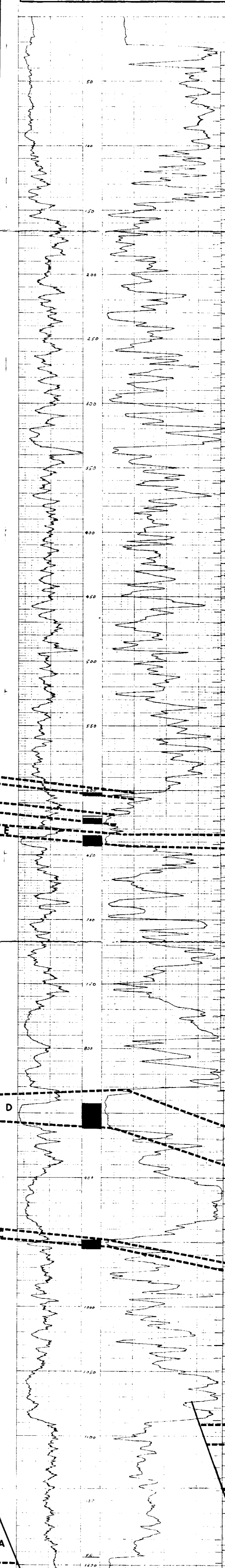
GENERAL INFORMATION Well Name: _____ Location: _____ Date: _____ Scale: _____	
LOGGING DATA Log No.: _____ Log Type: _____ Log Interval: _____ Log Depth: _____	
FORMATION AND STRATA Formation: _____ Stratum: _____ Lithology: _____ Thickness: _____	



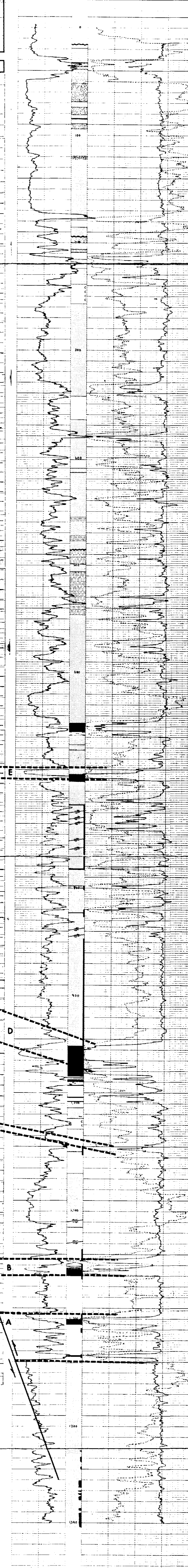
GENERAL INFORMATION Well Name: _____ Location: _____ Date: _____ Scale: _____	
LOGGING DATA Log No.: _____ Log Type: _____ Log Interval: _____ Log Depth: _____	
FORMATION AND STRATA Formation: _____ Stratum: _____ Lithology: _____ Thickness: _____	



GENERAL INFORMATION Well Name: _____ Location: _____ Date: _____ Scale: _____	
LOGGING DATA Log No.: _____ Log Type: _____ Log Interval: _____ Log Depth: _____	
FORMATION AND STRATA Formation: _____ Stratum: _____ Lithology: _____ Thickness: _____	



GENERAL INFORMATION Well Name: _____ Location: _____ Date: _____ Scale: _____	
LOGGING DATA Log No.: _____ Log Type: _____ Log Interval: _____ Log Depth: _____	
FORMATION AND STRATA Formation: _____ Stratum: _____ Lithology: _____ Thickness: _____	



- LEGEND**
- SANDSTONE
 - SILTSTONE
 - SHALE
 - SILTY, MUDSTONE
 - CONGLOMERATE
 - COAL
 - CARBONIFEROUS SHALE
 - MUDSTONE

624

PR-SX72(2)A

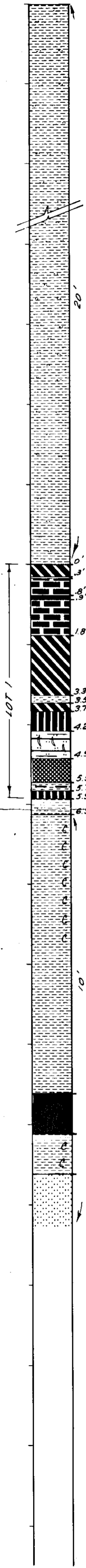
DENISON MINES LIMITED
 (COAL DIVISION)
 CALGARY ALBERTA

SAXON CORRELATION CHART

DRAWN BY: E.T.G.R.	DATE: APR. 72	SCALE: 1" = 50'
APPROVED BY:	DRAWING NO: SXON 72-0295 - R02	

SEAM SECTION

SCALE: 1" = 2'



LEGEND

- VITRAIN
- CLARAIN
- CLARDURAIN
- DURAIN
- FUSAIN
- BONY COAL
- SANDSTONE
- SILTSTONE
- SHALE
- MUDSTONE
- CONGLOMERATE
- MITSUI SYSTEM (Estimated coal ash)
- CA 0 - 10 %
- CB 11 - 20 %
- CC 21 - 30 %
- CD 29 - 35 %

ADIT INFORMATION

ADIT LENGTH 65'
 STARTED 29 JAN '72
 COMPLETED 4 FEB '72
 SAMPLED 5 FEB '72

CROSSCUTS

LOCATION	LENGTH

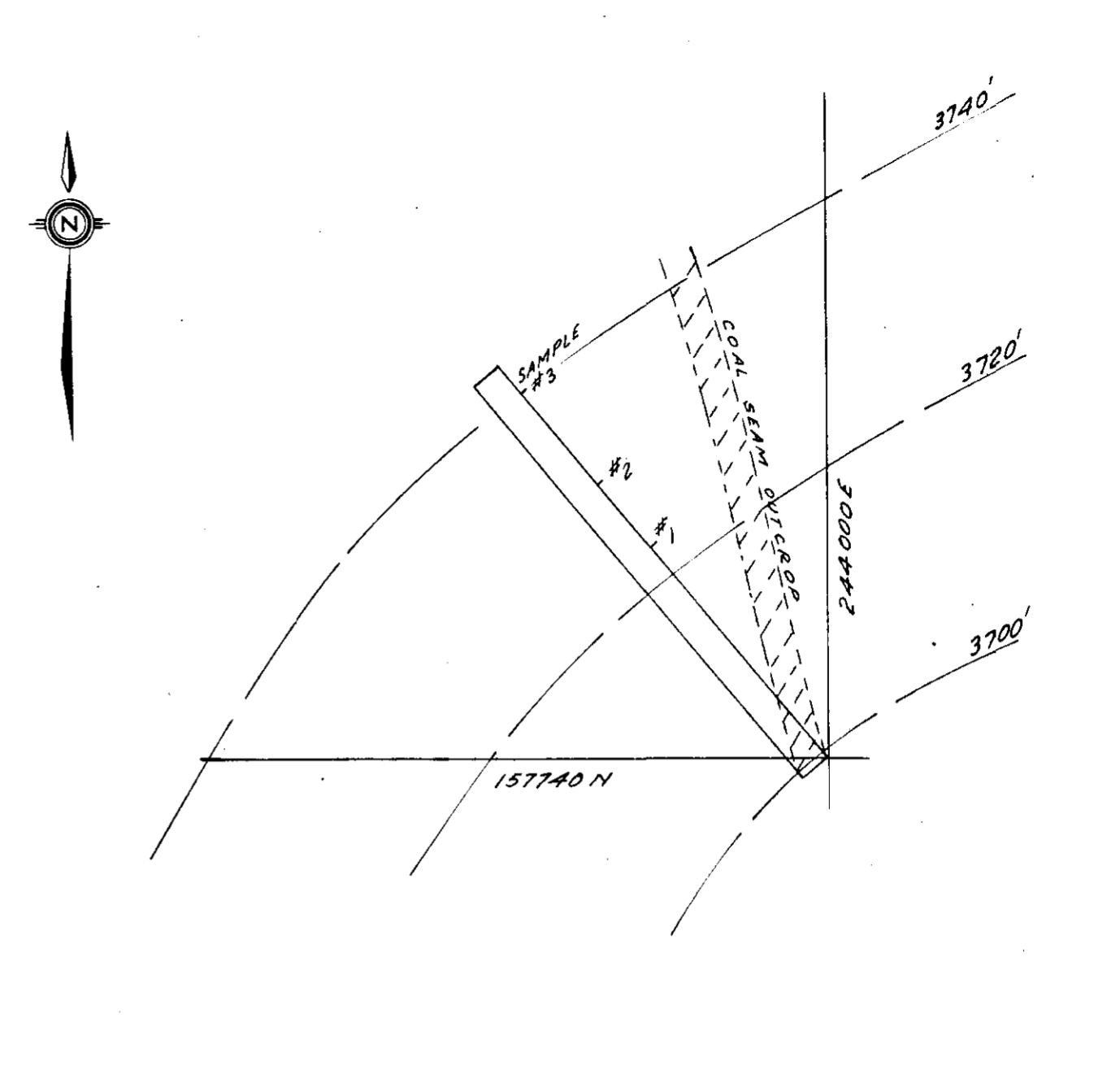
SAMPLES

No.	FSI	ASH
1	8	
2	9	
3	9	

ADIT DIP 45° S
 ADIT BEARING 142°
 MISCELLANEOUS
COVER AT SAMPLE POINT 40'

LOCATION PLAN

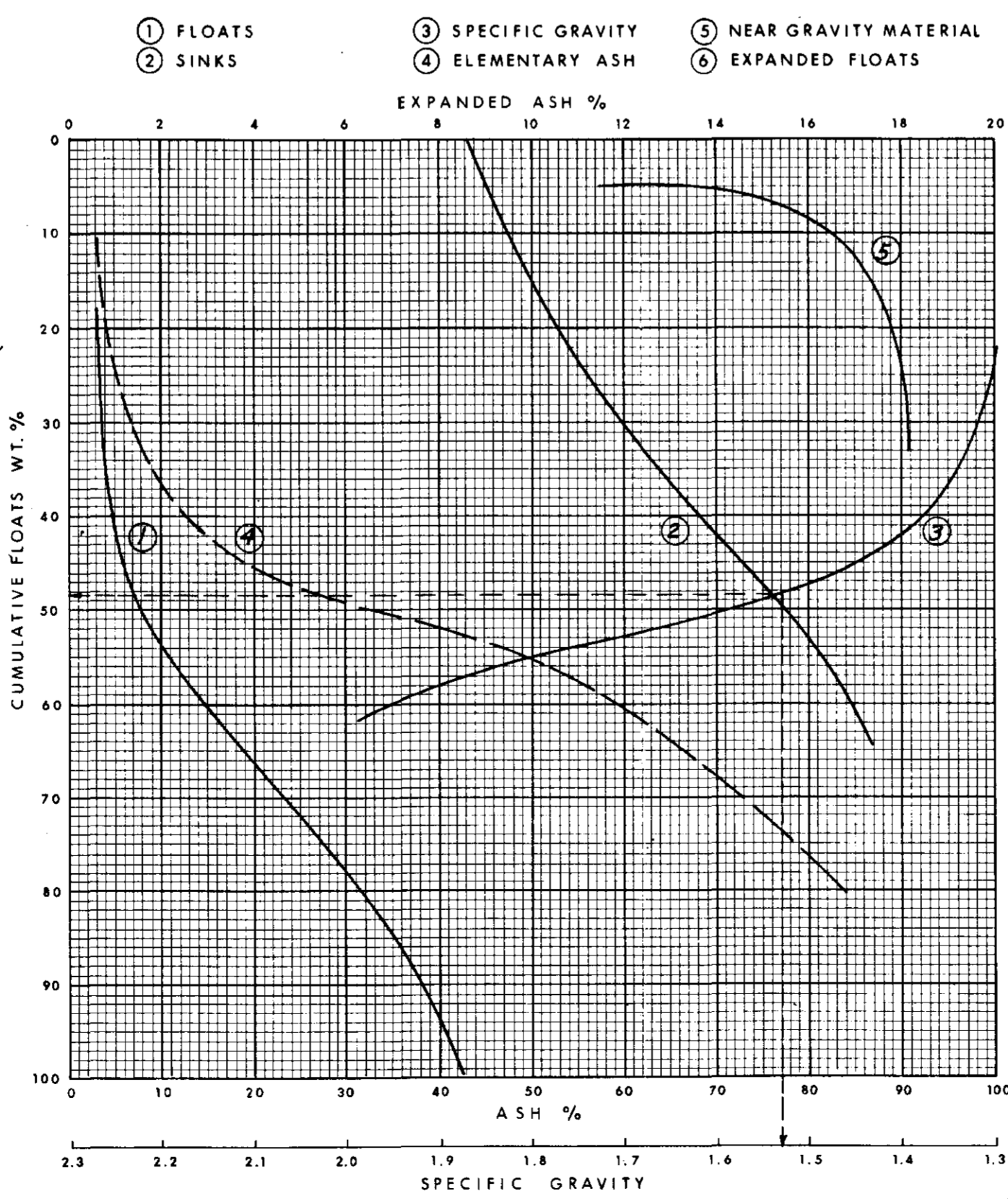
SCALE: 1" = 20'



PRODUCT QUALITY ANALYSIS

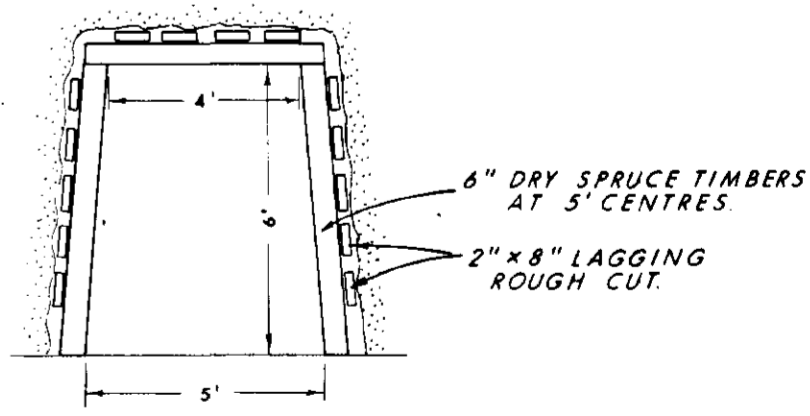
	S A M P L E S				FROTH FLOTATION	
	LOT 1 +100 MESH	LOT 2	LOT 3	LOT 4	28x100 MESH (LOT 1)	-100 MESH (LOT 1)
RESIDUAL MOISTURE	0.72%				0.63%	0.61%
ASH %	7.00%				7.30%	8.50%
VOLATILE MATTER	22.90%				22.34%	23.01%
FIXED CARBON	69.38%				69.73%	67.88%
FSI	9+				9+	9+
SULPHUR					0.90%	0.99%
PERCENTAGE OF SAMPLE	96.98%				8.76%	3.02%
Sp.Gr. OF SEPARATION	1.53%					
NEAR GRAVITY MATERIAL	7.00%					
YIELD	48.00%				62.16%	76.21%
BTU PER POUND						

WASHABILITY CURVES



TYPICAL ADIT SUPPORTS

SCALE: 1" = 4'



ROOF SECTION TAKEN AT D7004
 SEAM SECTION TAKEN AT 65' ADIT A
 FLOOR SECTION TAKEN AT D7004

PR-SX 72(2)A

DENISON MINES LIMITED
 (COAL DIVISION)
 CALGARY ALBERTA

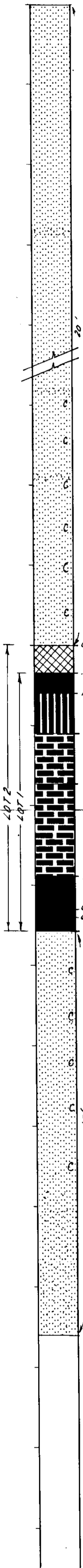
DATA SUMMARY SHEET
 ADIT NO: 4 SAXON (3)

624

DRAWN BY: E. TOFF DATE: Apr. '72 SCALE: 1/4
 APPROVED BY: _____ DRAWING NO: SXON 72-0293-R01

SEAM SECTION

SCALE: 1" = 2'



OCC. SANDSTONE BEDS
COMPETENT MATERIAL
5' UNBROKEN CORE
OVER SEAM.

SLICKENSIDED

BANDED .1' DUR. & .01' CLAR.

CORE LIKE TEXTURE

SOFT PLATY

DIRT NODULES

COMPETENT MATERIAL
BECOMING SANDY DARK
GRAY VF-F GRAIN
SANDSTONE BEDS.

ROOF SECTION TAKEN AT D7102
SEAM SECTION TAKEN AT 107 ADIT 3
FLOOR SECTION TAKEN AT D7102

LEGEND

- VITRAIN
- CLARAIN
- CLARODURAIN
- DURAIN
- FUSAIN
- BONY COAL
- SANDSTONE
- SILTSTONE
- SHALE
- MUDSTONE
- CONGLOMERATE
- MITSUI SYSTEM
(Estimated coal ash)
- CA 0 - 10 %
- CB 11 - 20 %
- CC 21 - 30 %
- CD 29 - 35 %

ADIT INFORMATION

ADIT LENGTH 108'
STARTED 29 DEC '71
COMPLETED 7 JAN. '71
SAMPLED _____

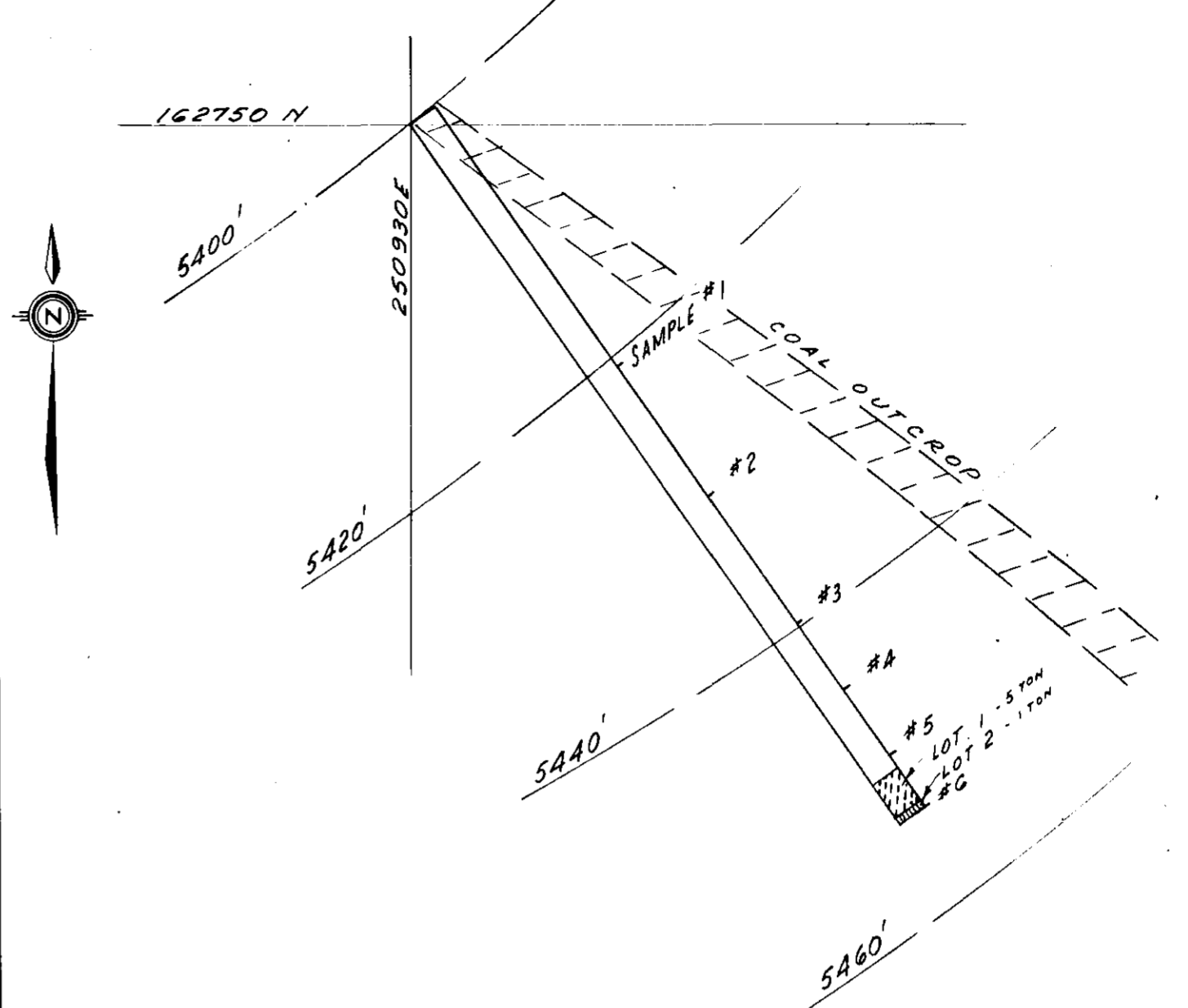
CROSSCUTS	
LOCATION	LENGTH

SAMPLES		
No.	FSI	ASH
1	1	
2	2	
3	2 1/2	
4	3	
5	4 1/2	
6	7	

ADIT DIP 45° S
ADIT BEARING 143°
MISCELLANEOUS _____

LOCATION PLAN

SCALE: 1" = 20'

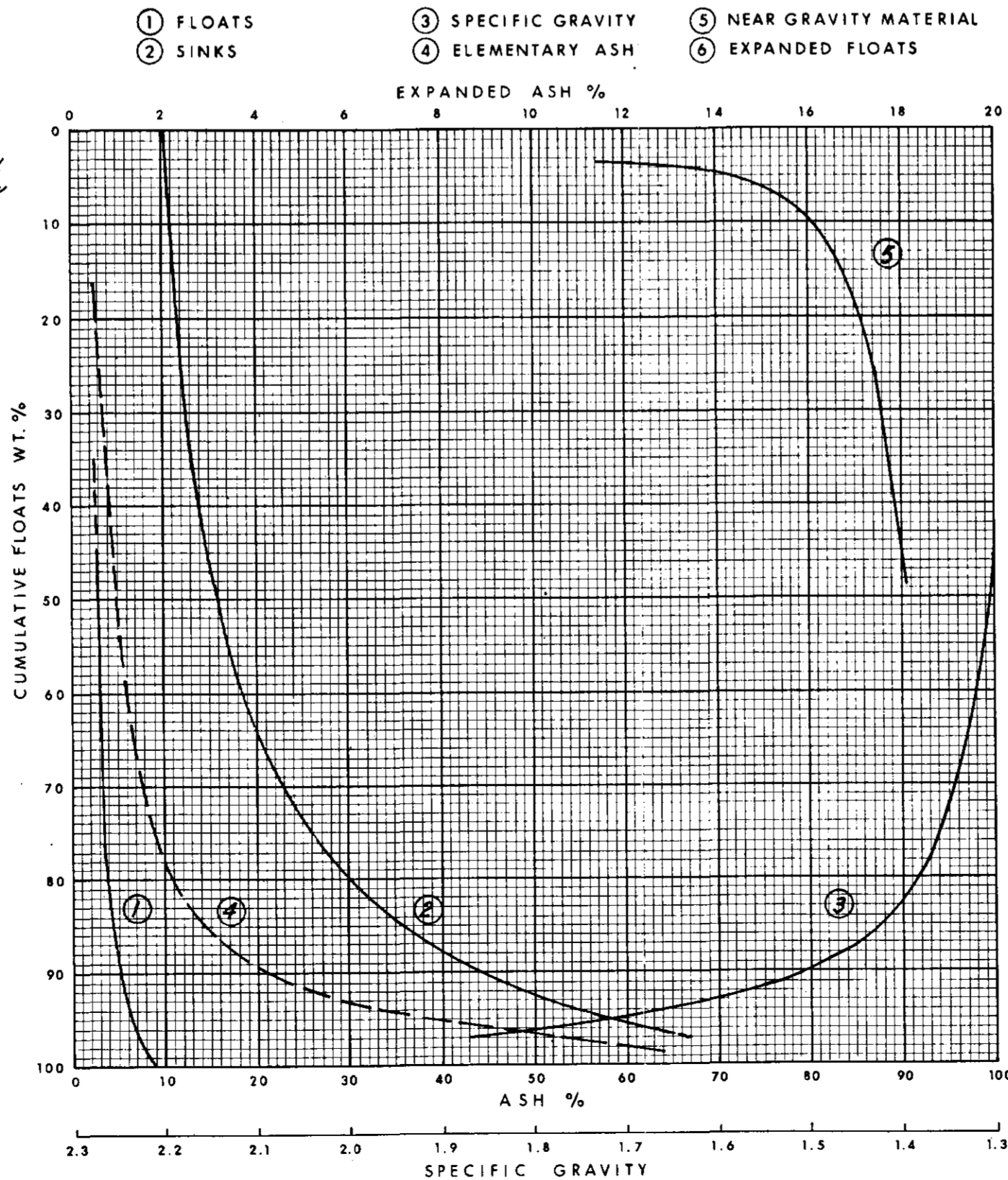


PRODUCT QUALITY ANALYSIS

	S A M P L E S				FROTH FLOTATION	
	LOT 1 *100 MESH	LOT 1*	LOT 2	LOT 4	28x100 MESH (LOT 1)	-100 MESH (LOT 1)
RESIDUAL MOISTURE	0.68%	0.40%	0.67%		0.53%	0.65%
ASH %	7.00%	5.42%	27.67%		5.02%	5.62%
VOLATILE MATTER	22.13%	22.75%	18.58%		23.20%	23.15%
FIXED CARBON	70.19%	71.43%	53.18%		71.25%	70.58%
FSI	7 1/2	7 1/2	4 1/2		8 1/2	7 1/2
SULPHUR		0.46%			0.35	0.35
PERCENTAGE OF SAMPLE	95.28%				11.33%	4.72%
Sp. Gr. OF SEPARATION	1.80%					
NEAR GRAVITY MATERIAL	3.00%					
YIELD	96.00%	85.00%			89.17%	94.22%
BTU PER POUND		14,680				

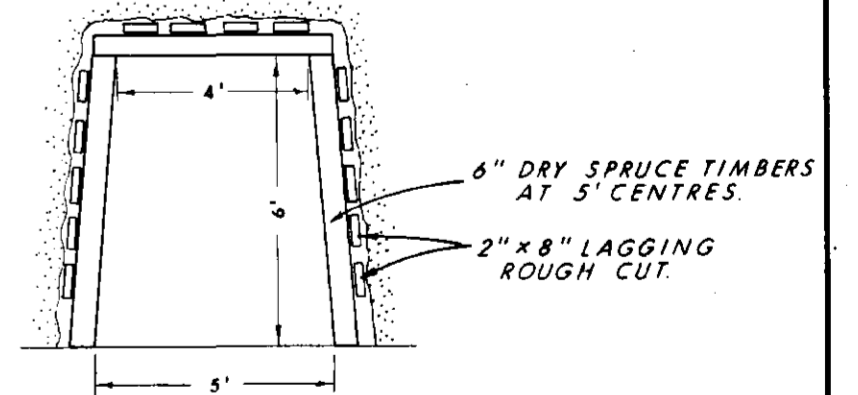
* CRUSHED TO - 3/4" AND WASHED IN COMPOSITE WATER CYCLONE, H.M. AND FLOTATION CELL CIRCUIT: ACTUAL PRODUCT.

WASHABILITY CURVES



TYPICAL ADIT SUPPORTS

SCALE: 1" = 4'



RS-SX 72(2)A

DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

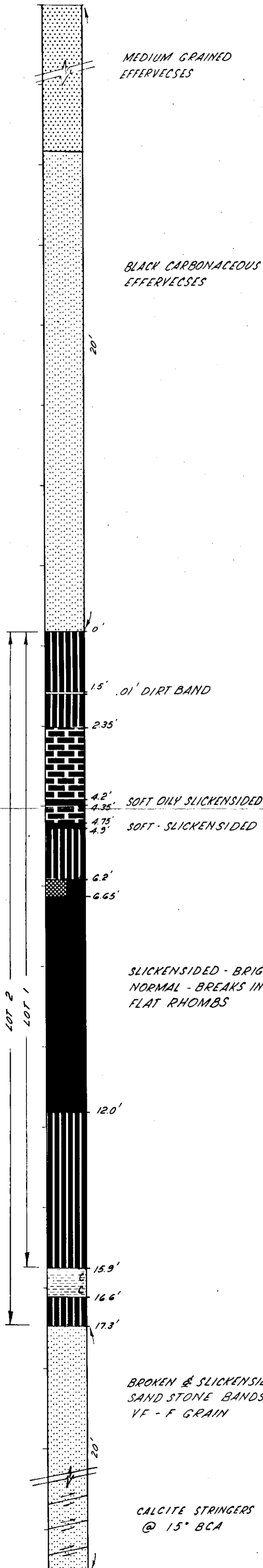
DATA SUMMARY SHEET
ADIT NO: 3 SAXON

DRAWN BY: E.TOTH DATE: Apr. '72 SCALE: _____
APPROVED BY: _____ DRAWING NO: SXON 72 - 0293 - R01

624 1/4

SEAM SECTION

SCALE: 1" = 2'



LEGEND

- VITRAIN
- CLARAIN
- CLARODURAIN
- DURAIN
- FUSAIN
- BONY COAL
- SANDSTONE
- SILTSTONE
- SHALE
- MUDSTONE
- CONGLOMERATE

- MITSUI SYSTEM**
(Estimated coal ash)
- CA 0 - 10 %
 - CB 11 - 20 %
 - CC 21 - 30 %
 - CD 29 - 35 %

ADIT INFORMATION

ADIT LENGTH 123 FT
 STARTED 11 DEC '71
 COMPLETED 22 DEC '71
 SAMPLED 28 DEC '71

CROSSCUTS

LOCATION	LENGTH
<u>22' 26'</u>	<u>20' HOR.</u>

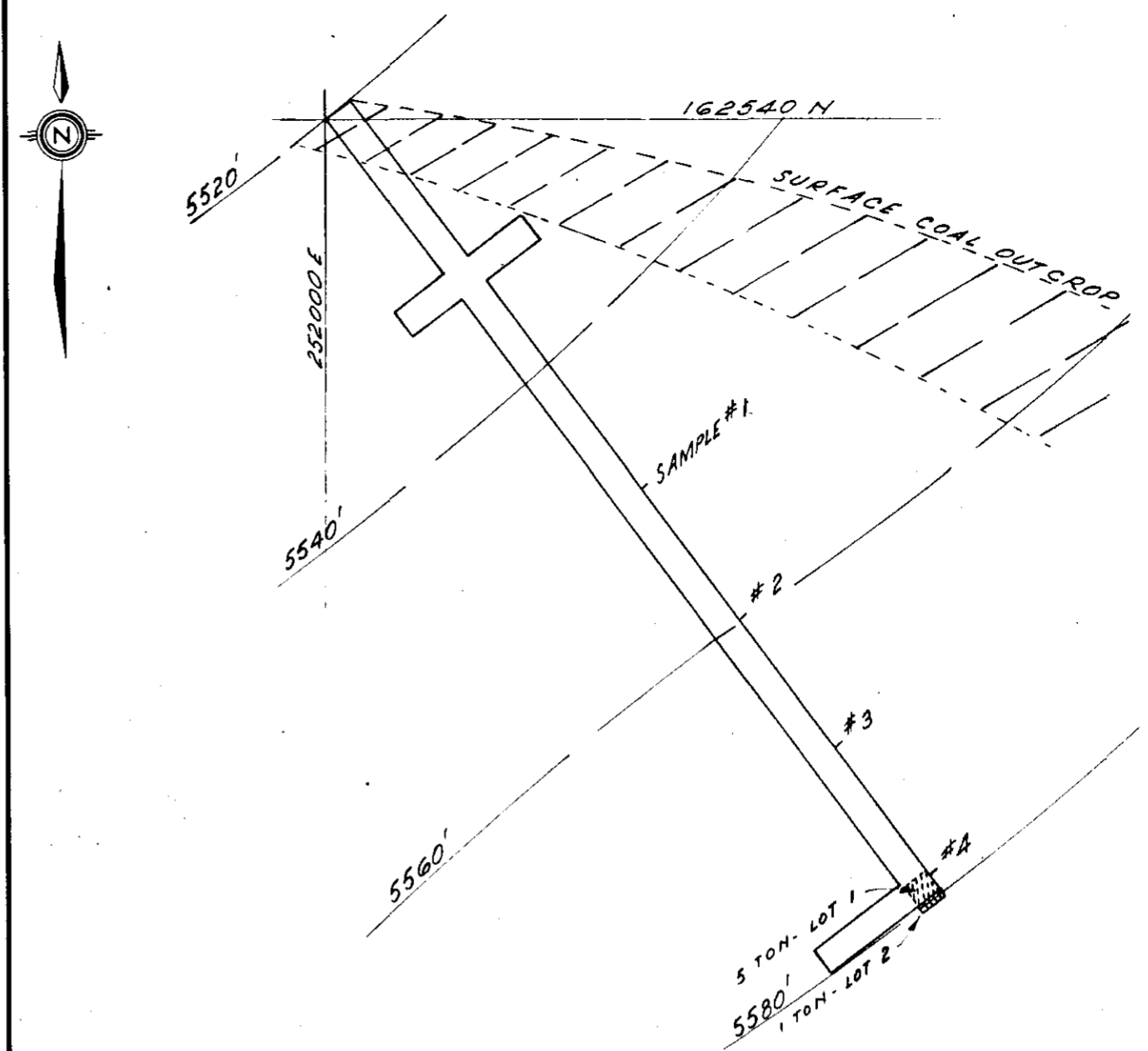
SAMPLES

No.	FSI	ASH
<u>1</u>	<u>2 1/2</u>	
<u>2</u>	<u>5</u>	
<u>3</u>	<u>4</u>	
<u>4</u>	<u>7</u>	

ADIT DIP 45° S
 ADIT BEARING 140°
 MISCELLANEOUS
SAMPLE COVER 60 FT.

LOCATION PLAN

SCALE: 1" = 20'

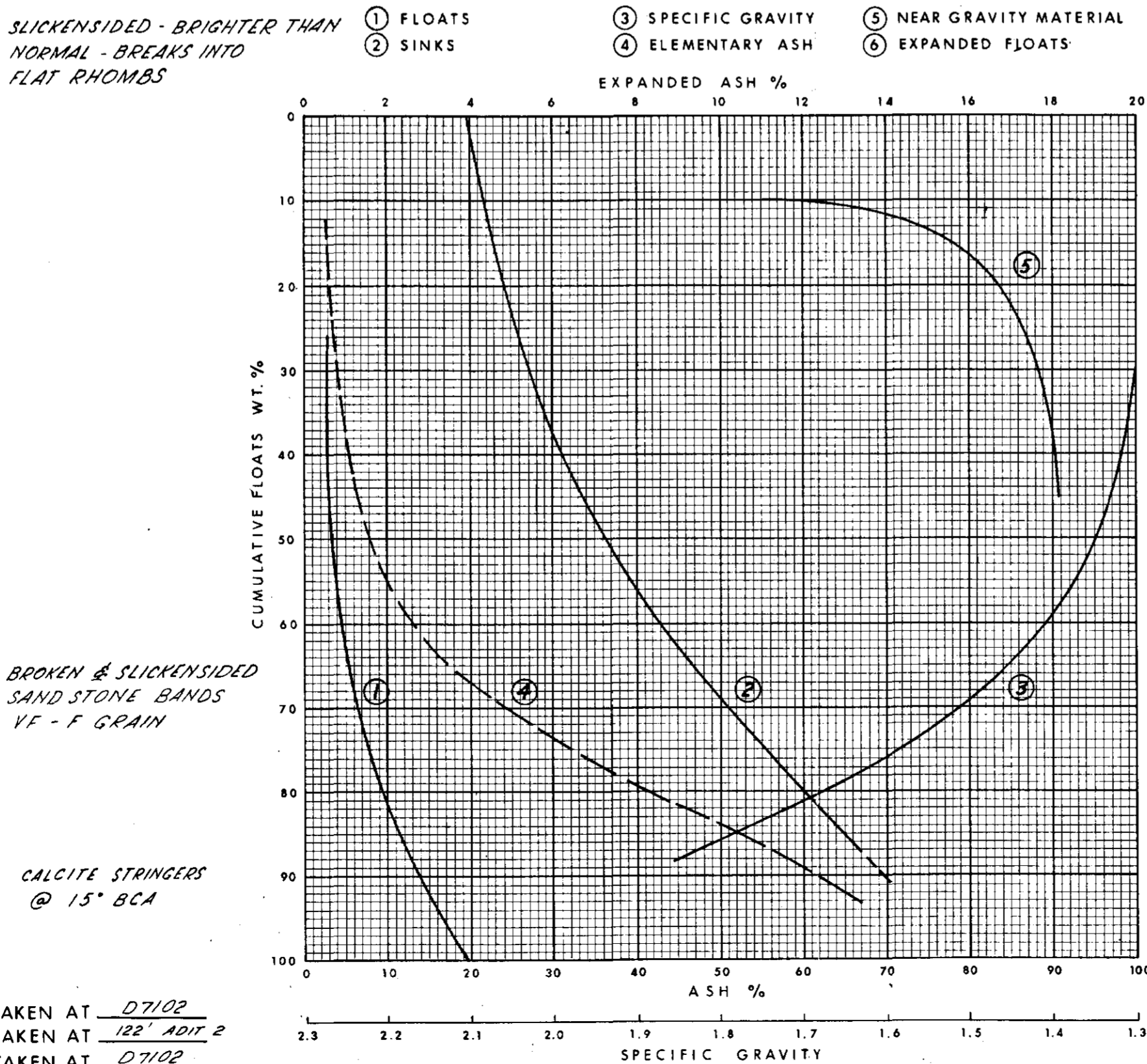


PRODUCT QUALITY ANALYSIS

	S A M P L E S				FROTH FLOATATION	
	LOT 1 100 MESH	LOT 1*	LOT 2	LOT 4	28x100 MESH (LOT 1)	100 MESH (LOT 1)
RESIDUAL MOISTURE	0.50%	0.62%	0.79%		0.63%	0.59%
ASH %	7.00%	6.99%	30.00%		6.38%	8.74%
VOLATILE MATTER	21.12%	21.35%	16.90%		21.82%	20.59%
FIXED CARBON	71.38%	71.04%	52.19%		71.17%	70.08%
FSI	8 1/2	8	5		9	8 1/2
SULPHUR	0.28%	0.28%			0.38%	0.36%
PERCENTAGE OF SAMPLE	95.84%				10.35%	4.16%
Sp Gr. OF SEPARATION	1.55%					
NEAR GRAVITY MATERIAL	14.00%					
YIELD	73.00%	68.00%			63.86%	78.92%
BTU PER POUND	14,280	14,280				

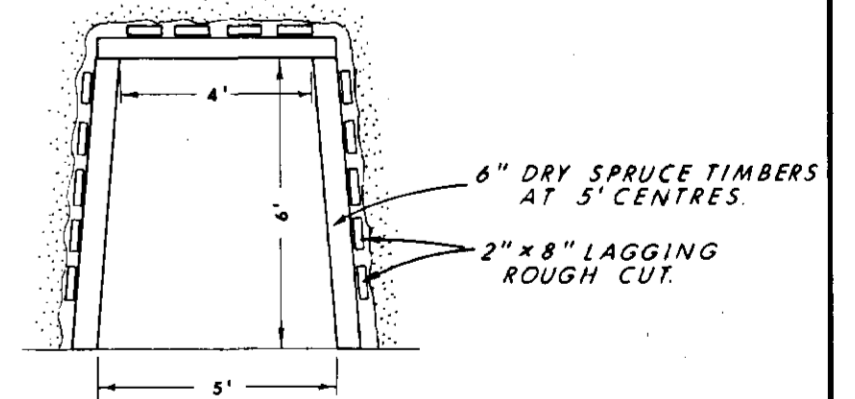
* CRUSHED TO -34" AND WASHED IN COMPOSITE WATER CYCLONE, H.M. AND FLOATATION CELL CIRCUIT: ACTUAL PRODUCT

WASHABILITY CURVES



TYPICAL ADIT SUPPORTS

SCALE: 1" = 4'



PR-SX-72(2)A

DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

DATA SUMMARY SHEET
ADIT NO: 2 SAXON (5)

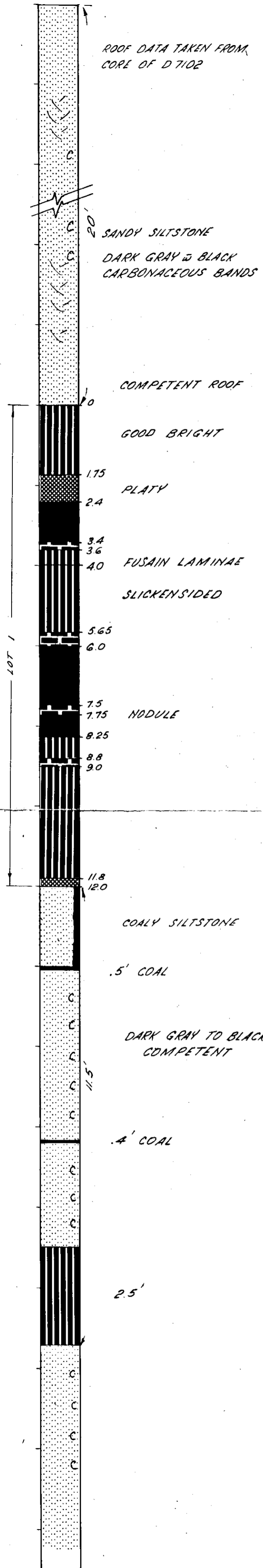
DRAWN BY: E. J. O'F. DATE: Apr. '72 SCALE: 1/4
 APPROVED BY: DRAWING NO: SXON 72-0293-R01

624

ROOF SECTION TAKEN AT D7102
 SEAM SECTION TAKEN AT 122' ADIT 2
 FLOOR SECTION TAKEN AT D7102

SEAM SECTION

SCALE: 1" = 2'



ROOF DATA TAKEN FROM CORE OF D7102

SANDY SILTSTONE
DARK GRAY to BLACK CARBONACEOUS BANDS

COMPETENT ROOF

GOOD BRIGHT

PLATY

FUSAIN LAMINAE

SLICKENSIDED

NODULE

COALY SILTSTONE

5' COAL

DARK GRAY TO BLACK COMPETENT

4' COAL

2.5'

ROOF SECTION TAKEN AT D7102
SEAM SECTION TAKEN AT 107' ADIT 1
FLOOR SECTION TAKEN AT D7102

LEGEND

- VITRAIN
- CLAIRAIN
- CLARODURAIN
- DURAIN
- FUSAIN
- BONY COAL
- SANDSTONE
- SILTSTONE
- SHALE
- MUDSTONE
- CONGLOMERATE

MITSUI SYSTEM (Estimated coal ash)

- CA 0 - 10 %
- CB 11 - 20 %
- CC 21 - 30 %
- CD 29 - 35 %

ADIT INFORMATION

ADIT LENGTH 107.6'
STARTED 2 DEC. 71
COMPLETED 8 DEC. 71
SAMPLED 21 DEC. 71

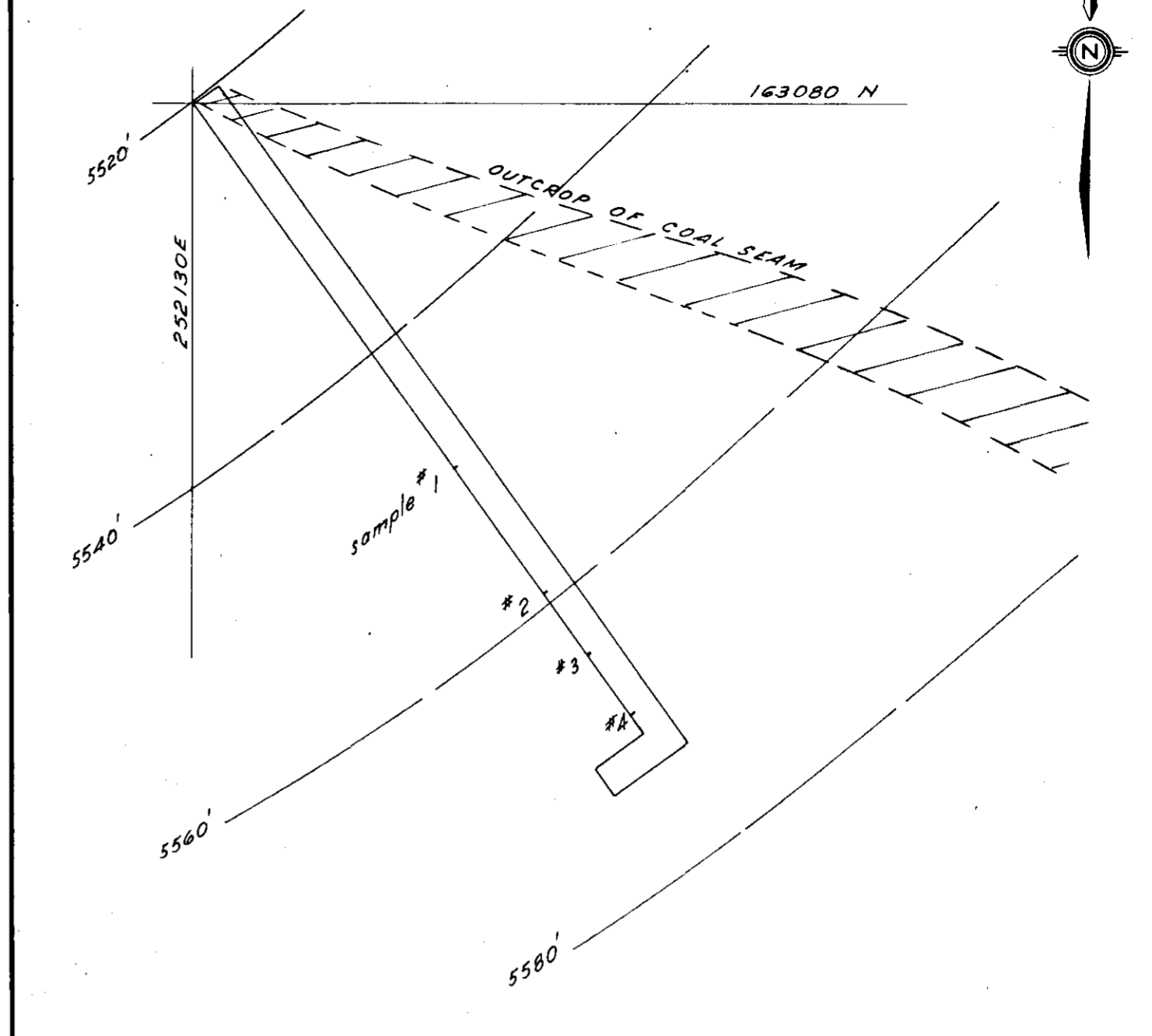
CROSSCUTS
LOCATION 107.6' LENGTH 11.8'

SAMPLES		
No.	FSI	ASH
1	5 1/2	
2	40	
3	6 1/2	
4	7	

ADIT DIP 43° 5'
ADIT BEARING 142°
MISCELLANEOUS SAMPLE COVER 50'

LOCATION PLAN

SCALE: 1" = 20'

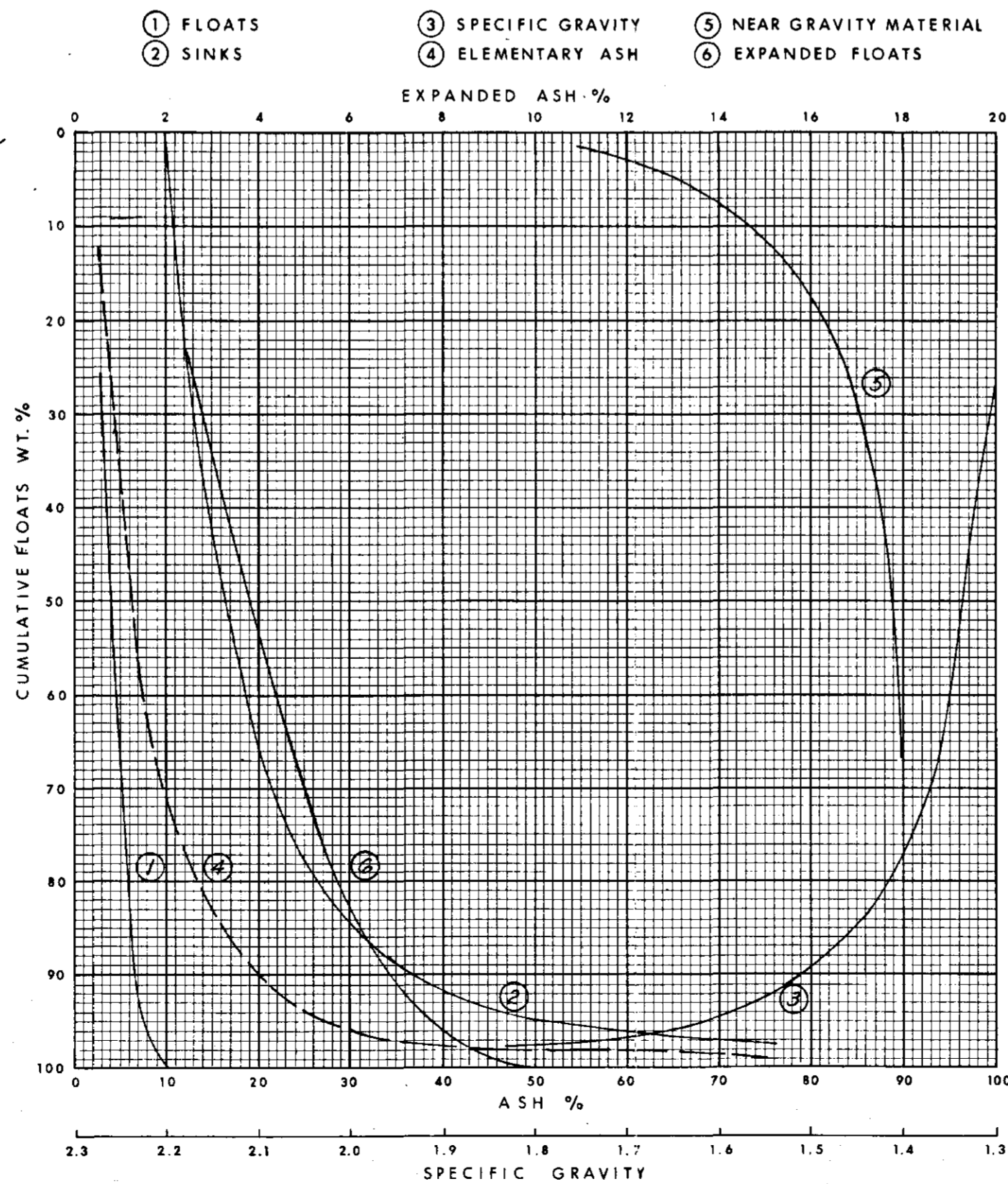


PRODUCT QUALITY ANALYSIS

	S A M P L E S				FROTH FLOTATION	
	LOT 1 +100 MESH	LOT 1*	LOT 3	LOT 4	28 x 100 MESH (LOT 1)	-100 MESH (LOT 1)
RESIDUAL MOISTURE	0.57 %	0.54 %			0.35 %	0.62 %
ASH %	7.00 %	6.97 %			5.80 %	7.32 %
VOLATILE MATTER	20.70 %	21.78 %			21.65 %	20.59 %
FIXED CARBON	71.73 %	70.71 %			72.20 %	71.47 %
FSI	8	8			8 1/2	8
SULPHUR	0.27 %	0.27 %			0.29 %	0.37 %
PERCENTAGE OF SAMPLE	94.59 %				10.64 %	5.41 %
Sp. Gr. OF SEPARATION	1.51					
NEAR GRAVITY MATERIAL	11.00 %					
YIELD	90.00 %	~ 90 %			91.76 %	97.16 %
BTU PER POUND		14,390				

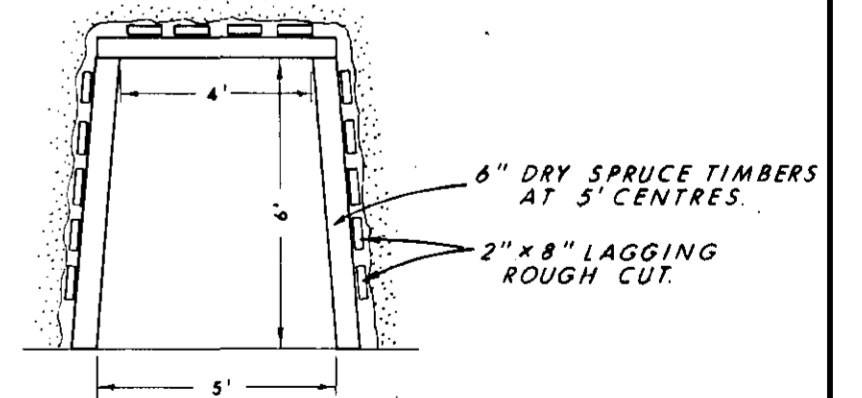
* CRUSHED TO -3/4" AND WASHED IN COMPOSITE WATER CYCLONE, H.M. AND FLOTATION CELL CIRCUIT ACTUAL PRODUCT

WASHABILITY CURVES



TYPICAL ADIT SUPPORTS

SCALE: 1" = 4'



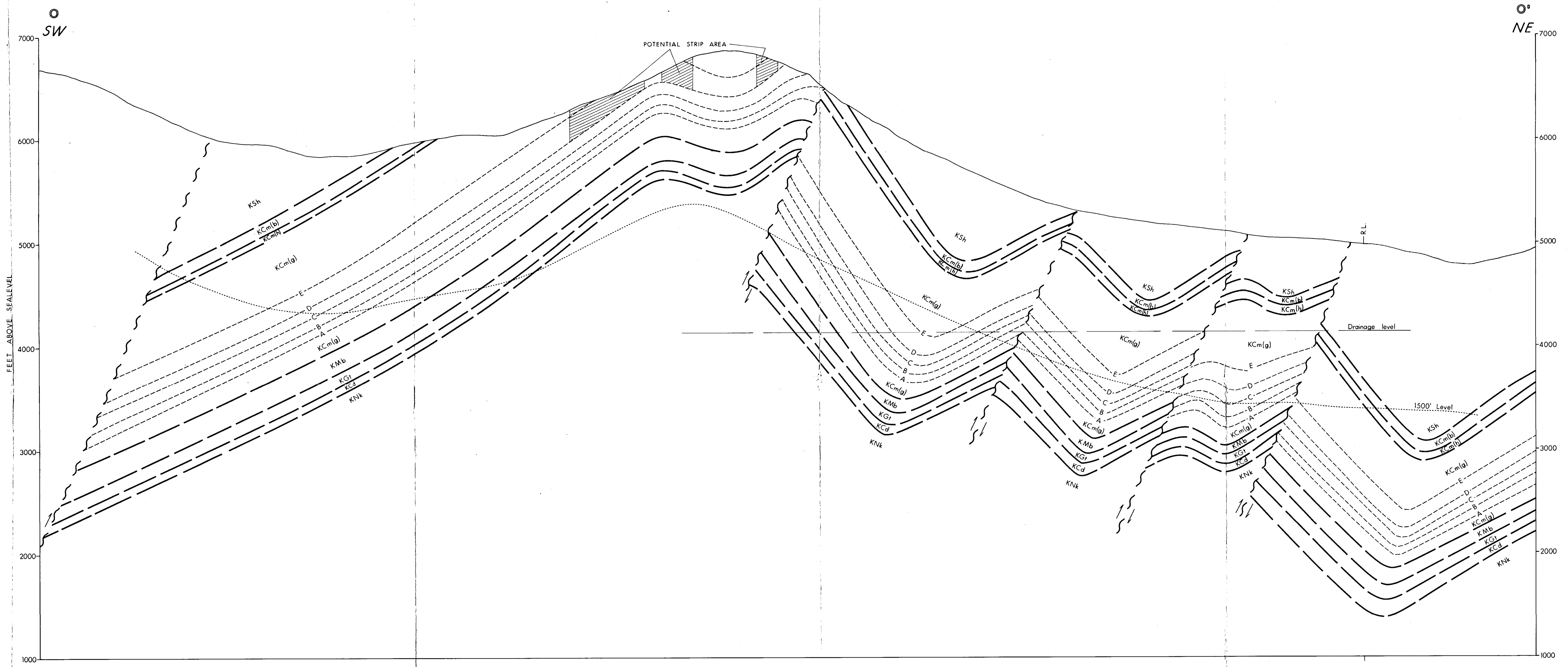
PR-SX-72(2)A

DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

DATA SUMMARY SHEET
ADIT NO: 1 SAXON (6)

DRAWN BY: E. TOFFR DATE: Apr. '72 SCALE: 1/4
APPROVED BY: DRAWING NO: SXON 72-0293-R01

624



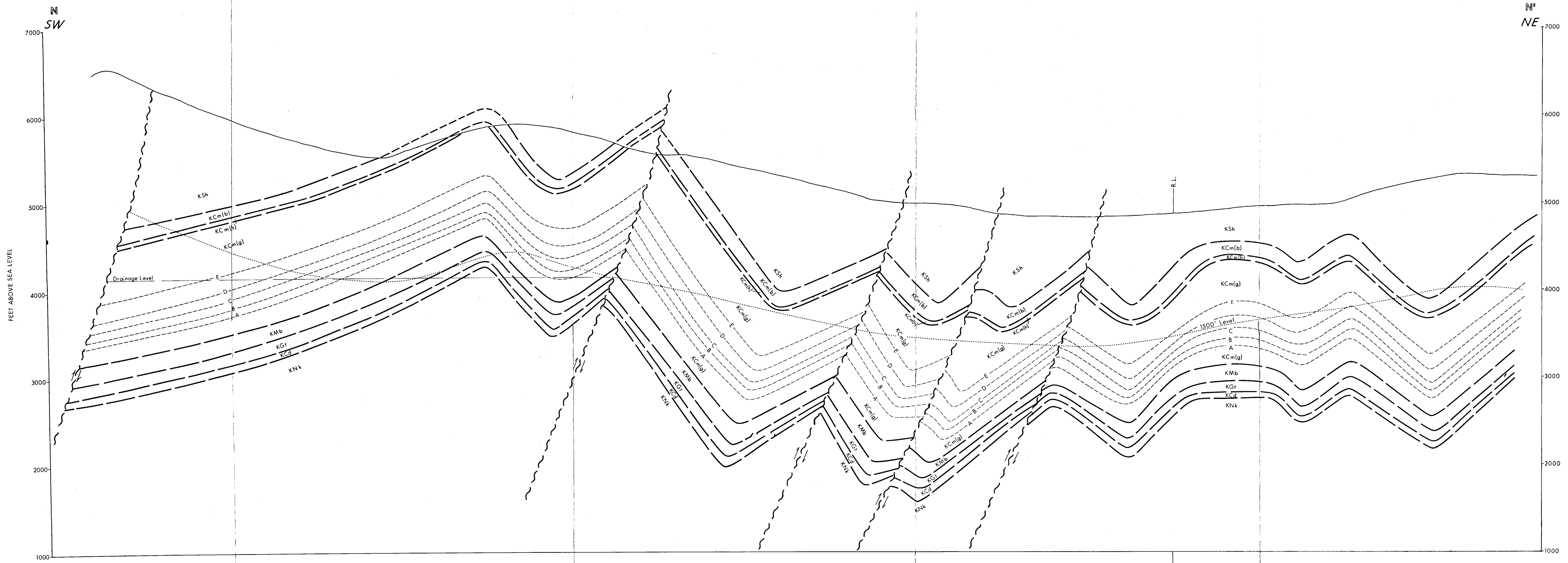
624 1/4

YR-SAXON 72 (2) A

DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

SAXON CROSS-SECTION O-O'

DRAWN BY:	DATE: May '72	SCALE: 1" = 400'
APPROVED BY:	DRAWING NO: SXON 72-0320-R01	

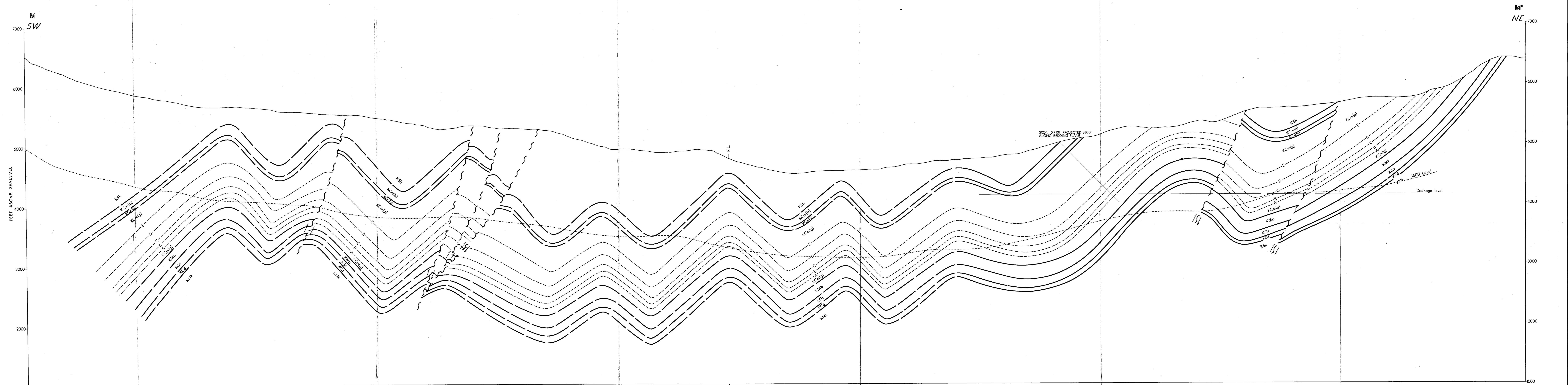


PR-Saxon 72 (2)A
DENISON MINES LIMITED
 (GOAL DIVISION)
 CALGARY ALBERTA

SAXON CROSS-SECTION N-N'

DRAWN BY:	DATE: May, '72	SCALE: 1" = 400'
APPROVED BY:	DRAWING NO: SXON 72-0320-R01	

624 1/4



72-SAXIN 72 (21A)

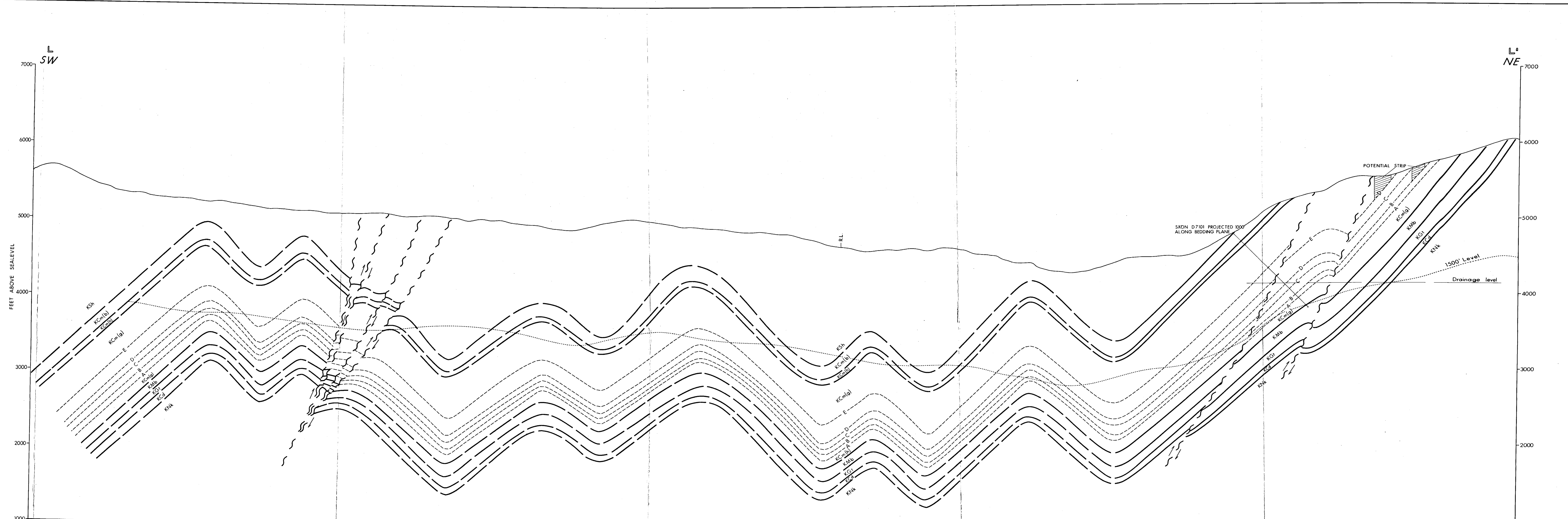
DENISON MINES LIMITED
 (COAL DIVISION)
 CALGARY ALBERTA

SAXON CROSS-SECTION M-M'

9

DRAWN BY:	DATE: May '72	SCALE: 1" = 400'
APPROVED BY:	DRAWING NO: SXON 72-0320-ROI	

624/4



PE-SAXON 72 (2) A

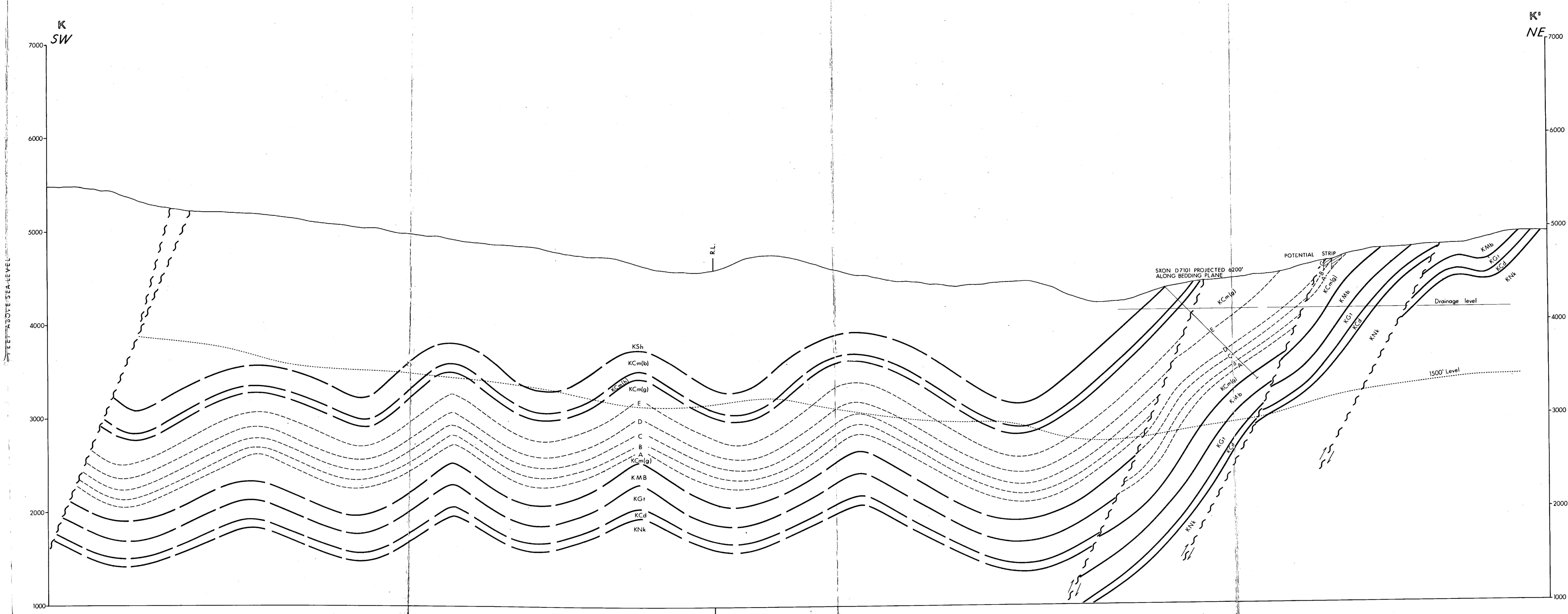
DENISON MINES LIMITED
(COAL DIVISION)
 CALGARY ALBERTA

SAXON CROSS-SECTION L-L'

10

DRAWN BY:	DATE: May '72	SCALE: 1" = 400'
APPROVED BY:	DRAWING NO: SXON 72-0320-R01	

624 1/4



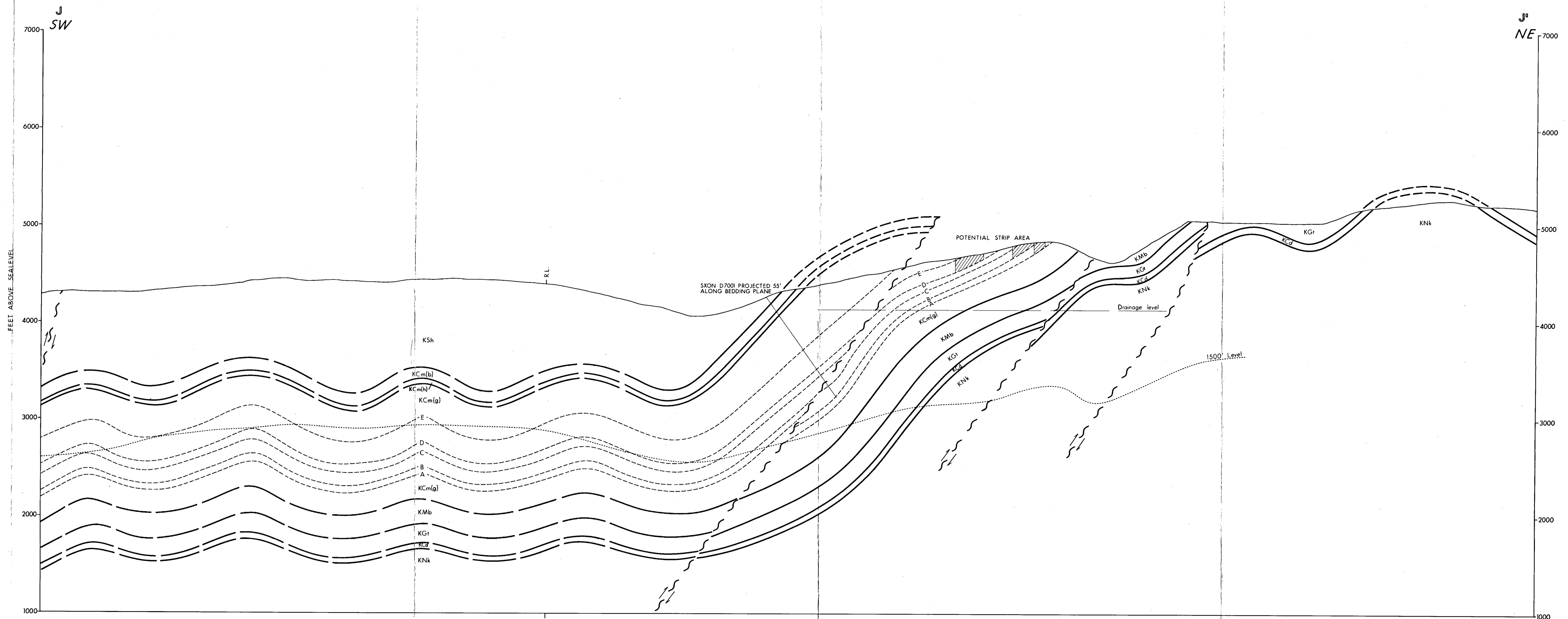
PR-SAXON 72 (2)A

DENISON MINES LIMITED
 (COAL DIVISION)
 CALGARY ALBERTA

SAXON CROSS-SECTION K-K'
 (11)

DRAWN BY:	DATE: May '72	SCALE: 1" = 400'
APPROVED BY:	DRAWING NO: SXON 72-0320-R01	

624 1/4



624 1/4

PR-SAXON 72(2)A

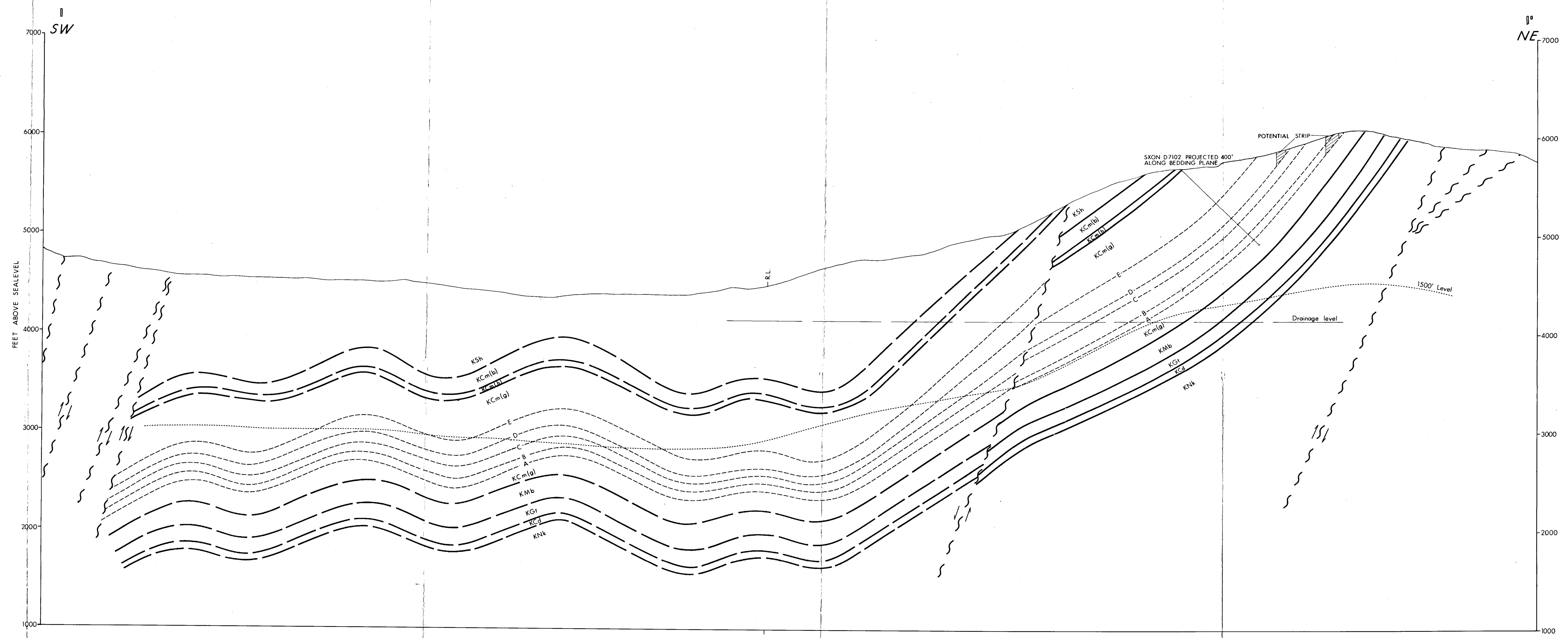
DENISON MINES LIMITED
(COAL DIVISION)

CALGARY ALBERTA

SAXON CROSS-SECTION J-J'

DRAWN BY: DATE: May, '72 SCALE: 1" = 400'

APPROVED BY: DRAWING NO: SXON 72-0320-RO1



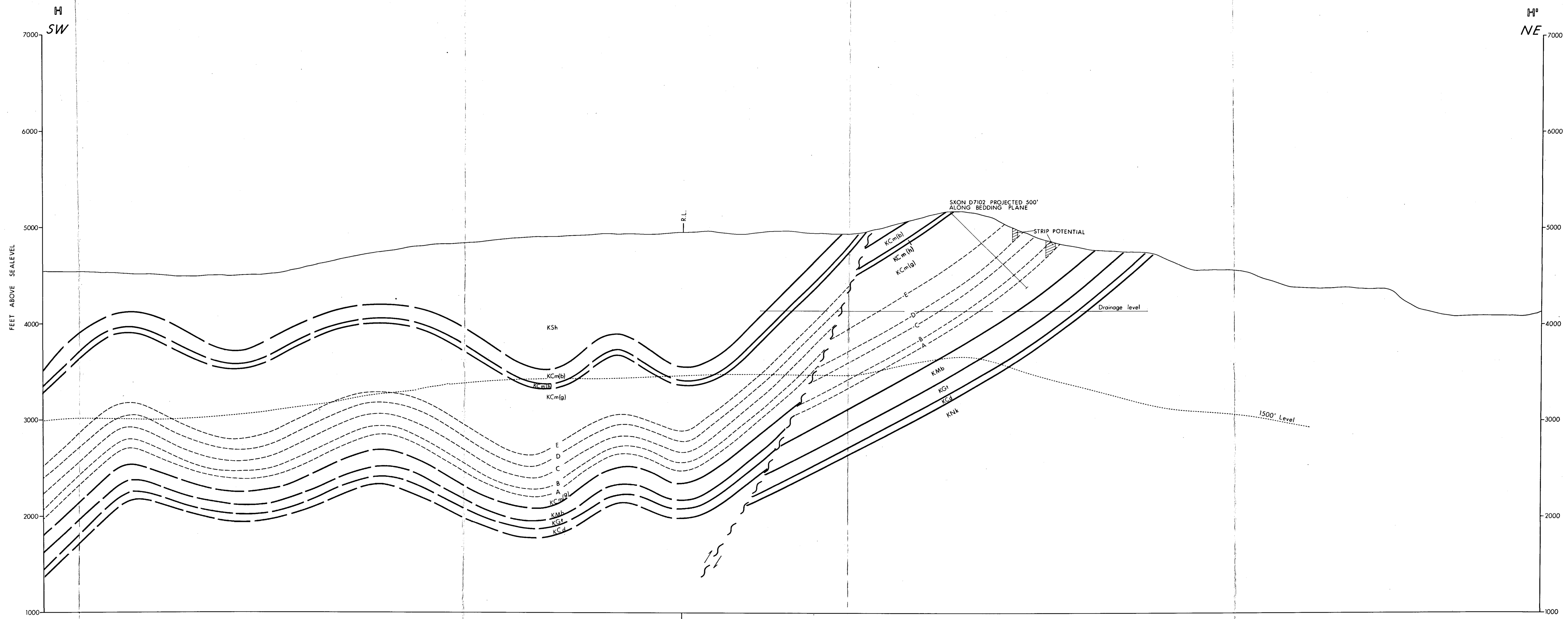
12 - Saxon 72 (a) 4

DENISON MINES LIMITED
(COAL DIVISION)
 CALGARY ALBERTA

SAXON CROSS-SECTION 1-1'
 (13)

<small>DRAWN BY:</small>	<small>DATE:</small> May '72	<small>SCALE:</small> 1" = 400'
<small>APPROVED BY:</small>	<small>DRAWING NO:</small> SXON 72-0320-R01	

624 1/4



PR - SAXON 72 (2) A

DENISON MINES LIMITED
(COAL DIVISION)

CALGARY ALBERTA

SAXON CROSS-SECTION HH'
 (14)

DRAWN BY:	DATE: May '72	SCALE: 1" = 400'
APPROVED BY:	DRAWING NO: SKON 72-0320-R01	

624 1/4



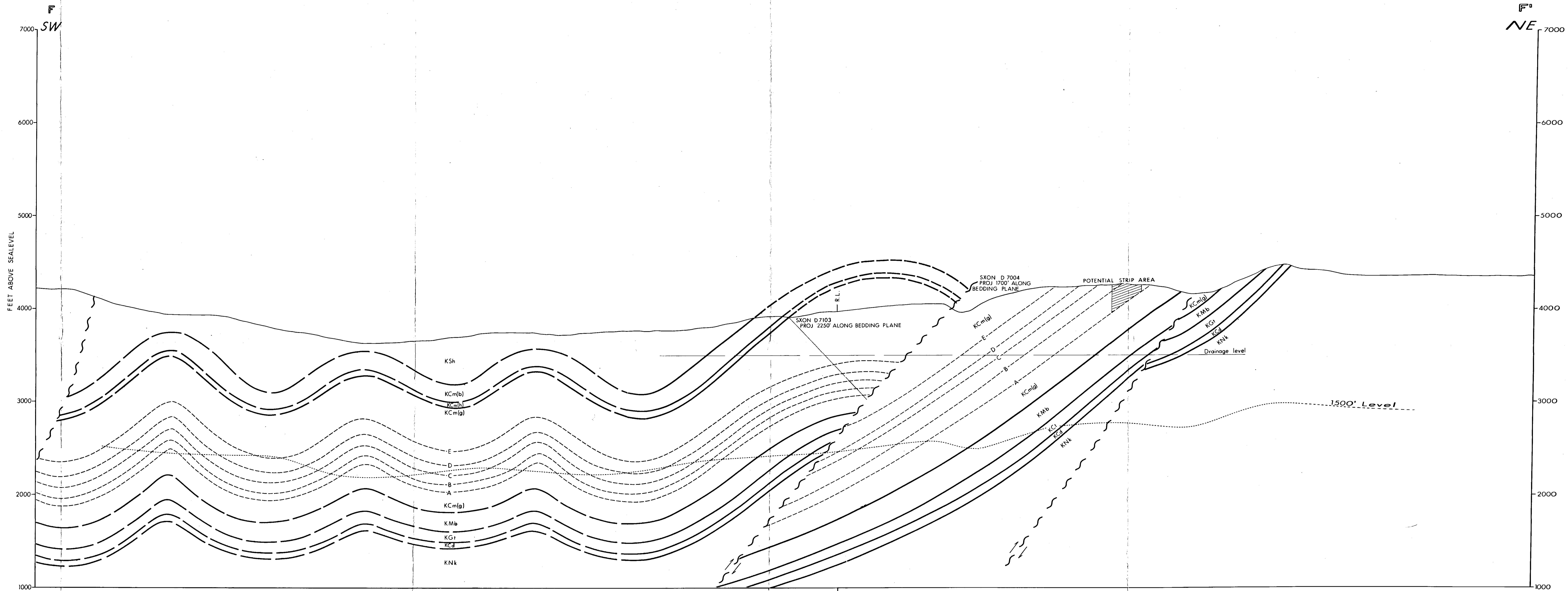
624/4

PR-50XON 72 (2)A

DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

SAXON CROSS-SECTION G-G'
15

DRAWN BY:	DATE: May '72	SCALE: 1" = 400'
APPROVED BY:	DRAWING NO: SXON 72-0320-R01	



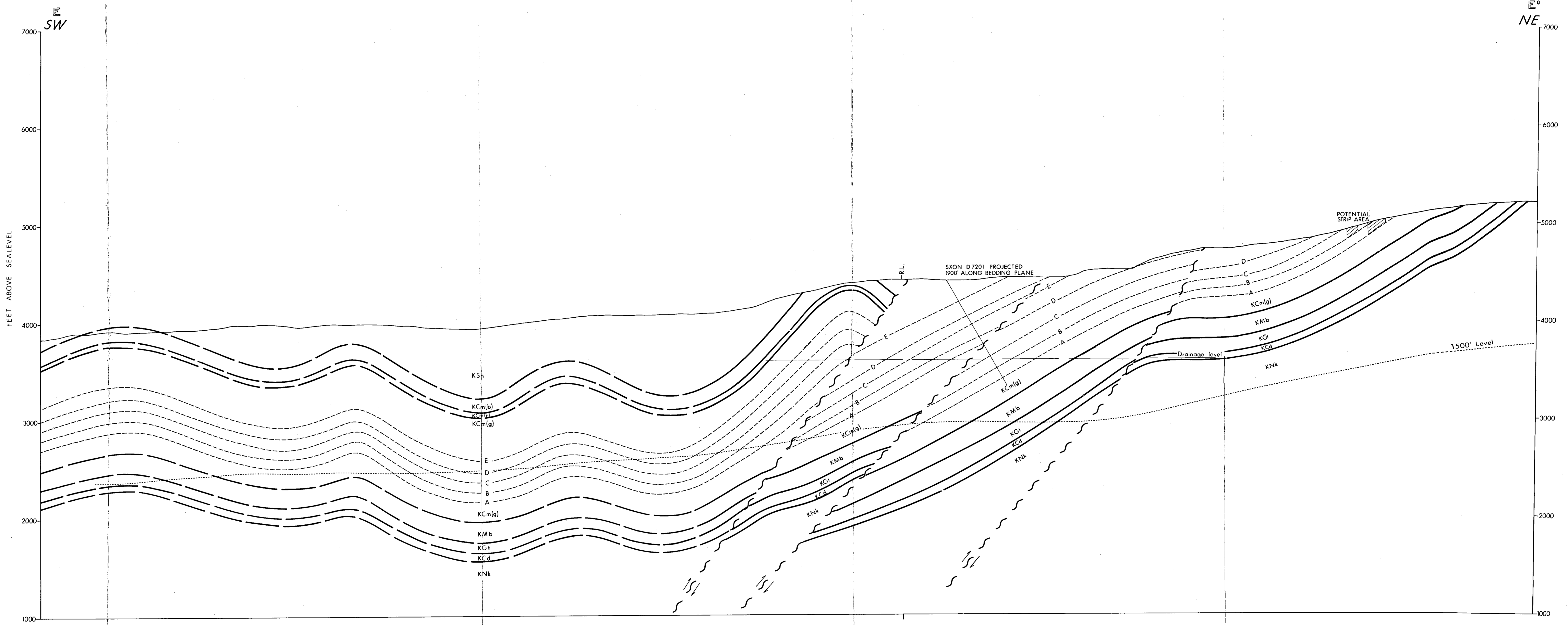
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DENISON MINES LIMITED
 (COAL DIVISION)
 CALGARY ALBERTA

SAXON CROSS-SECTION F-F'
 16

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APPROVED BY:	DRAWING NO: SXON 72-0320-RO1	

624/A



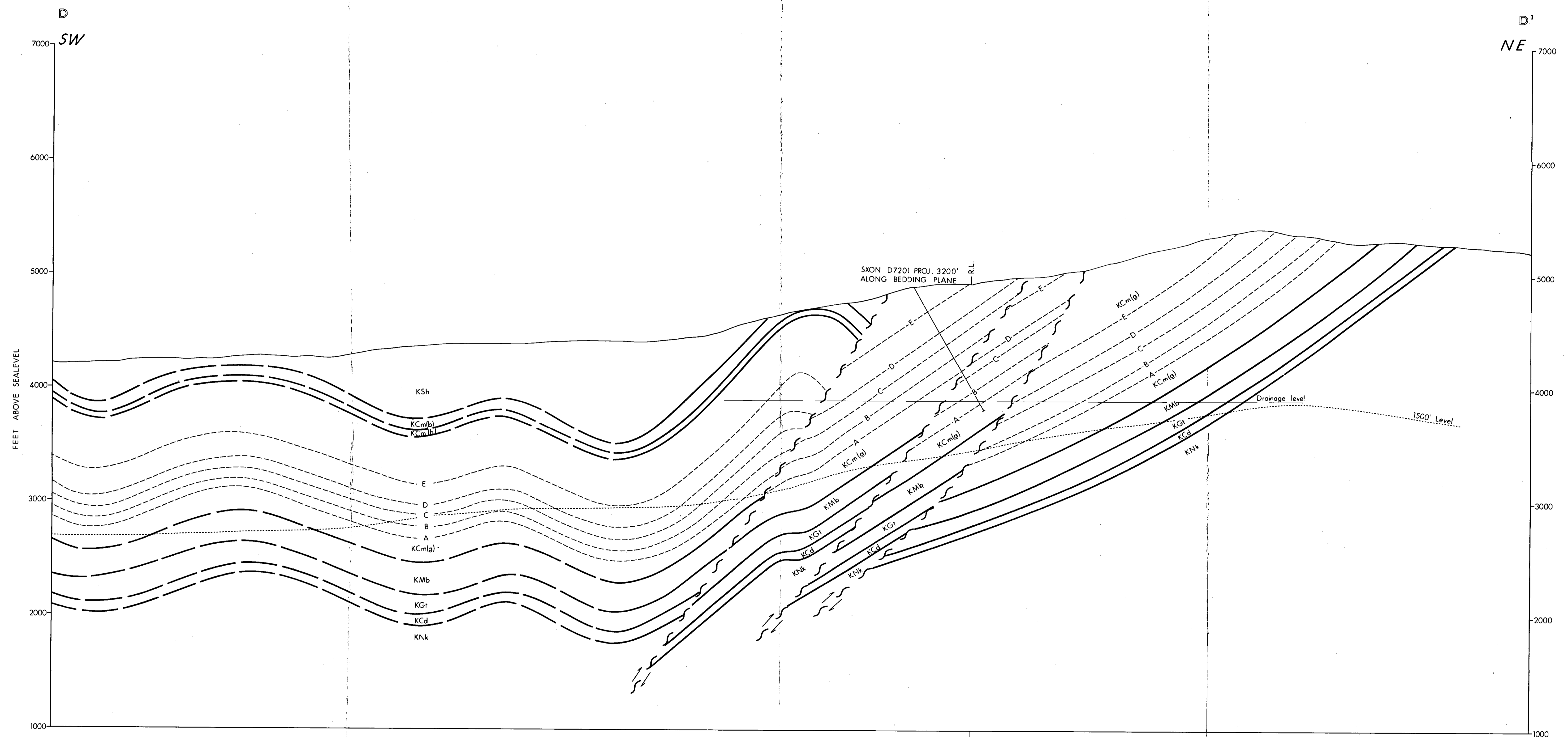
PR-SAXON 72(2)A.

DENISON MINES LIMITED
(COAL DIVISION)
 CALGARY ALBERTA

SAXON CROSS - SECTION E-E'
 (17)

DRAWN BY:	DATE: May '72	SCALE: 1" = 400'
APPROVED BY:	DRAWING NO: SXON 72-0320-R01	

624 1/4



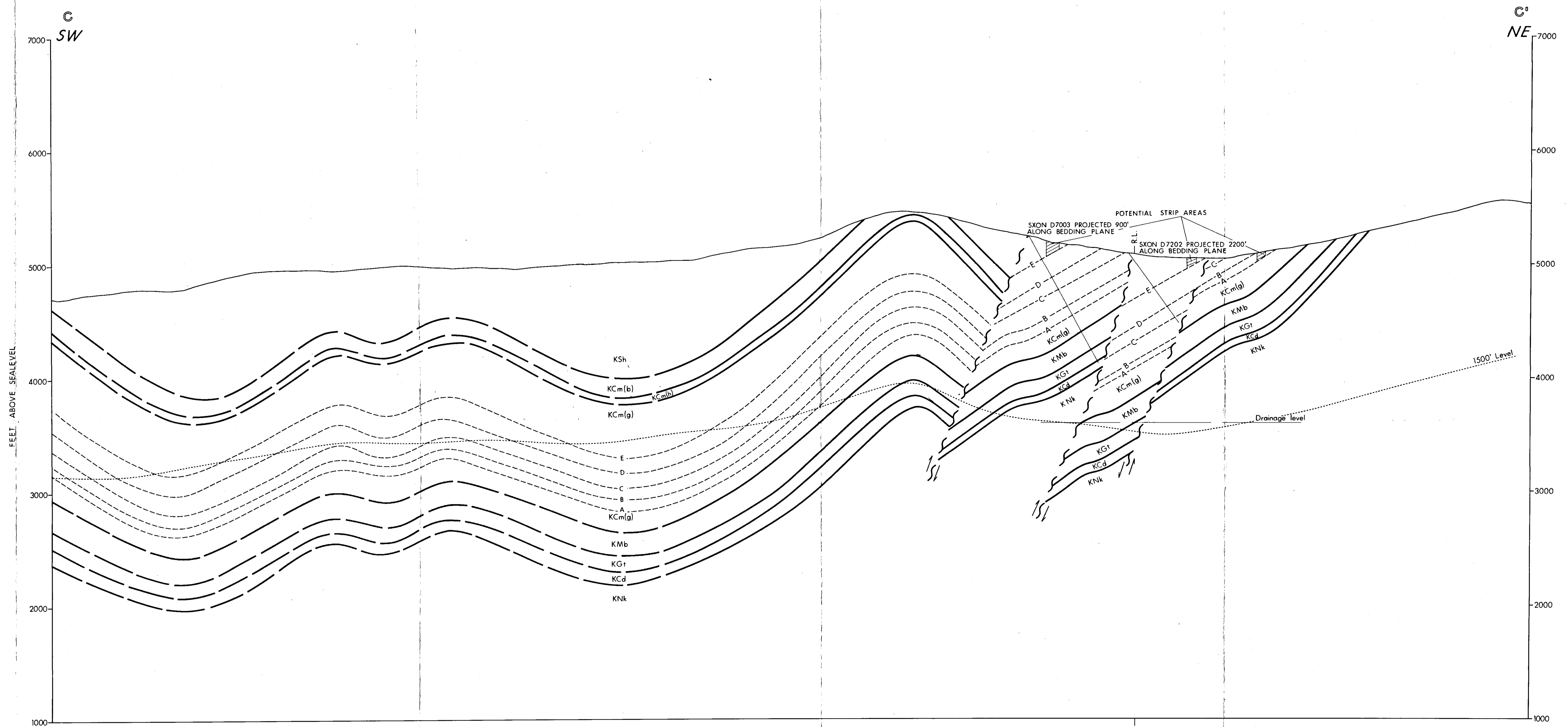
624

PR-SAXON 72 (2) A.

DENISON MINES LIMITED
(COAL DIVISION)
 CALGARY ALBERTA

SAXON CROSS-SECTION D-D'
 (18)

DRAWN BY:	DATE: May '72	SCALE: 1" = 400'
APPROVED BY:	DRAWING NO: SKON 72-0320-RO1	



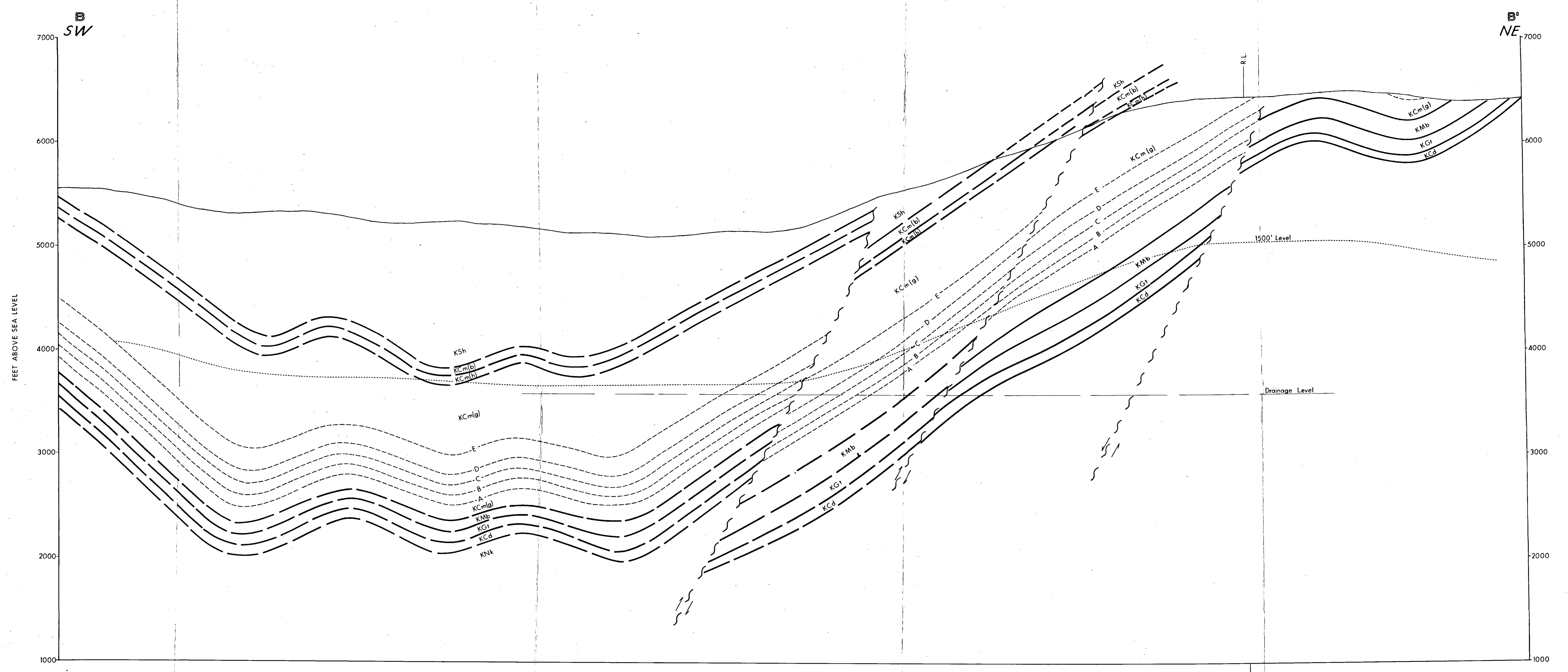
624

PR-SAXON 72(2)A

DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

SAXON CROSS-SECTION C-C'
19

DRAWN BY:	DATE: May '72	SCALE: 1" = 400'
APPROVED BY:	DRAWING NO: SXON 72-0320-R01	



624

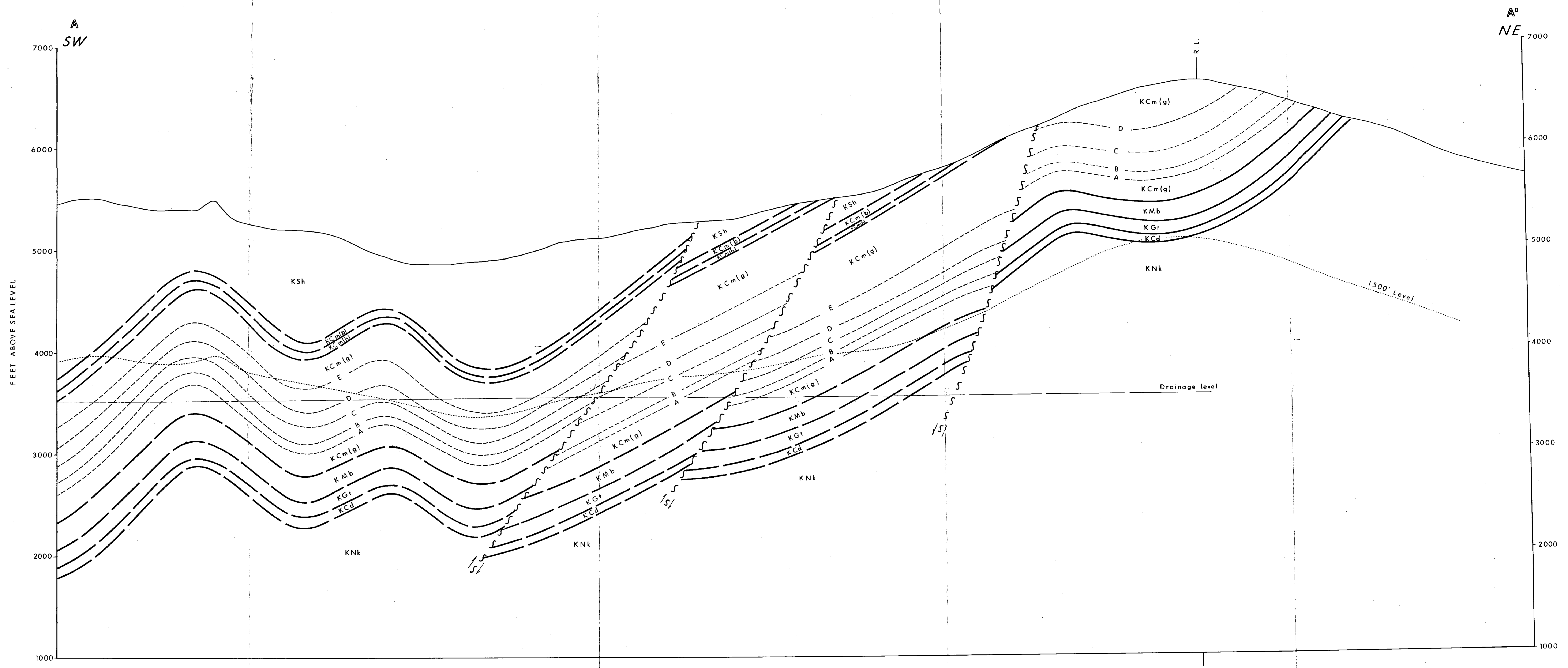
CE-SAXON 72(C)1A

DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

SAXON CROSS-SECTION B-B'

20

DRAWN BY:	DATE: May '72	SCALE: 1"=400'
APPROVED BY:	DRAWING NO: SXON 72-0320-R01	



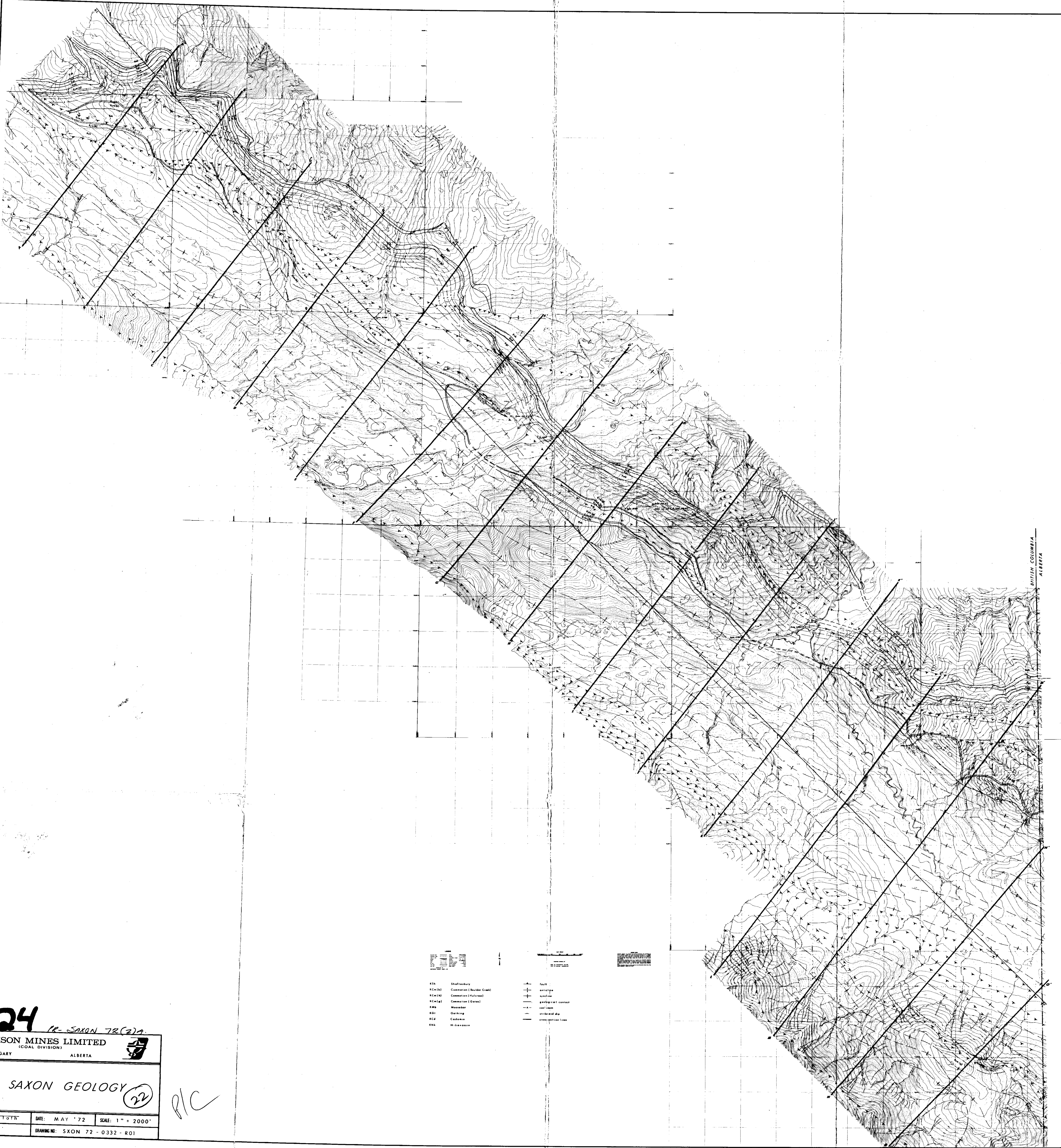
624

12 - SAXON 72 (2) A

DENISON MINES LIMITED
(COAL DIVISION)
 CALGARY ALBERTA

SAXON CROSS-SECTION A-A'

DRAWN BY: E. T. H. DATE: May '72 SCALE: 1"=400'
 APPROVED BY: DRAWING NO: SXON 72-0320-R01



BRITISH COLUMBIA
ALBERTA

<ul style="list-style-type: none"> KSa Shafterbury KCa (h) Comoxian (Hudson Creek) KCa (M) Comoxian (Mudflow) KCa (g) Comoxian (Gates) KMa Massawa KDl Gorking KCd Cadoma KNs Nisensau 	<ul style="list-style-type: none"> — fault — anticline — syncline — geological contact — section line — strike and dip — cross section line
--	--

624 *12- SAXON 72(2)A*

DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

SAXON GEOLOGY *(22)* *R/C*

DRAWN BY: E. L. GTR	DATE: MAY '72	SCALE: 1" = 2000'
APPROVED BY:	DRAWING NO: SXON 72 - 0332 - R01	

PR- SAXON 72 (4)A-2

EXPLORATION RESULTS: SAXON COAL
LICENSES
1483 - 1535 incl

NOVEMBER 1, 1971 - SEPTEMBER 30, 1972

APPENDIX II

REPORTS ON WASHABILITY & CLEANING
FROM SAXON ADITS 1 - 4

624

2/4

REPORT ON
WASHABILITY CHARACTERISTICS
OF
COKING COAL
FOR
DENISON MINES LTD.

SAXON ADIT #1

~~CONFIDENTIAL~~

Submitted by
CYCLONE ENGINEERING SALES LTD.
EDMONTON, ALBERTA, CANADA

Report No.: RI-72.02
Job No.: SI-84
Date: January 25, 1972.

REPORT ON
WASHABILITY CHARACTERISTICS
OF
COKING COAL
FOR
DENISON MINES LTD.
SAXON ADIT #1

SUMMARY:

The data presented in this report refer to the Washability Characteristics of Denison Mines Sample Saxon Adit #1.

The coal is of medium volatile bituminous rank. It has very low ash, i.e. 10% and excellent coking characteristic (F.S.I. of $6\frac{1}{2}$).

The Cleaning Characteristics are very good and the coal will easily clean to 7% ash with a yield of 90% at a cut point of 1.50.

Froth flotation of fines indicates high recoveries at low ash and high F.S.I. values.

T A B L E O F C O N T E N T S

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Introduction

Conclusions

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INTRODUCTION:

A 1-Ton sample of Saxon Adit #1 was air dried prior to analyses and the following work was done on it.

1. A size analysis at 1", 1/4", 28 m. and 100 m.
2. A proximate analysis on all size fractions.
3. A float-sink analysis on all size fractions, except -100 mesh, at 1.30, 1.35, 1.40, 1.45, 1.50, 1.60, 1.70 and 1.80.
4. Ash, volatile matter and free swelling index determinations on all specific gravity fractions.
5. Washability curves for all size fractions, except -100 m.
6. Washability curves for + 100 mesh fraction of the raw sample by re-constituting the data in 5.
7. Froth flotation tests on 28 m. x 100 m. and 100 m. x 0 fractions.

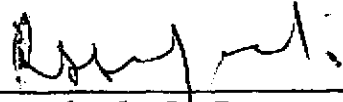
CONCLUSIONS:

From the data it is evident the coal is of very good quality, both from coking and cleaning points of view.

Respectfully submitted,

CYCLONE ENGINEERING SALES LTD.

Per: _____


R.S. Sehgal, P. Eng.,
Laboratory Manager.

T A B L E 1. SAXON ADIT #1

Classification by Rank

Ash	9.82%
Volatile Matter	20.93%
Residual Moisture	0.53%
Fixed Carbon	68.72%
Sulphur	0.25%
B.T.U./lb.	13,840
F.S.I.	6½
Rank	m vb

T A B L E 2. SAXON ADIT #1

Analysis of Size Fraction

Size Fraction	Wt. %	Ash %	V.M. %	R.M. %	F.C. %	S. %	F.S.I.
+ 1"	18.90	12.79	23.53	0.42	63.29	0.24	5
1" x 1/4"	31.46	9.81	20.36	0.39	69.44	0.21	5
1/4" x 28 m.	33.59	8.83	19.94	0.76	70.47	0.24	6½
28 x 100 m.	10.64	7.90	21.36	0.36	70.38	0.32	8
- 100 m.	5.41	9.35	20.52	0.66	69.47	0.39	7
Total	100.00	9.82	20.93	0.53	68.72	0.25	6½

T A B L E 3. - SAXON ADIT #1

Weight % and Ash % Distribution vs. Size and Specific Gravity

(Figures in brackets show the ash content of individual fractions)

Size \ Sp. Gr.	1.30	1.35	1.40	1.45	1.50	1.60	1.70	1.80	Total	
+ 1"	2.65 (3.38)	5.85 (5.96)	3.31 (9.75)	0.95 (13.46)	1.42 (16.86)	2.97 (20.29)	1.34 (25.19)	0.11 (31.97)	0.30 (78.46)	18.90 (12.36)
1" x 1/4"	6.12 (2.84)	12.68 (5.56)	6.52 (9.45)	2.43 (14.62)	1.02 (19.27)	1.02 (21.67)	0.43 (27.43)	0.13 (35.84)	1.11 (75.11)	31.46 (10.38)
1/4" x 28 m.	11.99 (2.52)	10.08 (6.89)	5.76 (9.56)	2.38 (14.62)	1.48 (19.02)	0.75 (23.99)	0.24 (29.86)	0.17 (38.59)	0.74 (71.72)	33.59 (9.01)
28m. x 100m.	4.30 (1.90)	2.73 (3.92)	1.68 (8.50)	0.71 (13.60)	0.49 (18.31)	0.34 (23.86)	0.08 (33.46)	0.05 (41.73)	0.26 (70.52)	10.64 (7.81)
Total	25.06 (2.58)	31.34 (5.92)	17.27 (9.45)	6.47 (14.34)	4.41 (18.30)	5.08 (21.35)	2.09 (26.50)	0.46 (36.57)	2.41 (73.99)	94.59 (10.00)
- 100 mesh	This fraction forms 5.41% of the total sample and has an ash content of 9.35%, thus giving a total sample ash value of 9.96%.									

T A B L E 4. SAXON ADIT #1

Weight % & Volatile Matter % Distribution vs. Size and Specific Gravity

(Figures in brackets show the Volatile Matter Content of Individual Fractions)

Sp. Gr. Size	1.30	1.35	1.40	1.45	1.50	1.60	1.70	1.80	Total	
+ 1"	2.65 (22.69)	5.85 (21.20)	3.31 (20.57)	0.95 (23.32)	1.42 (26.56)	2.97 (28.39)	1.34 (30.00)	0.11 (27.41)	0.30 (9.30)	18.90 (23.41)
1" x 1/4"	6.12 (22.50)	12.68 (20.66)	6.52 (18.61)	2.43 (17.74)	1.02 (20.00)	1.02 (25.40)	0.43 (27.06)	0.13 (26.01)	1.11 (9.62)	31.46 (20.22)
1/4" x 28 m.	11.99 (22.63)	10.08 (18.95)	5.76 (17.78)	2.38 (17.60)	1.48 (16.91)	0.75 (20.17)	0.24 (23.30)	0.17 (21.18)	0.74 (10.79)	33.59 (19.77)
28 x 100 m.	4.30 (23.59)	2.73 (22.04)	1.68 (20.88)	0.71 (17.79)	0.49 (16.82)	0.34 (15.90)	0.08 (17.81)	0.05 (17.89)	0.26 (14.39)	10.64 (21.52)
Total	25.06 (22.77)	31.34 (20.33)	17.27 (18.93)	6.47 (18.51)	4.41 (20.72)	5.08 (25.74)	2.09 (28.16)	0.46 (23.68)	2.41 (10.45)	94.59 (20.84)
- 100 m.	This fraction forms 5.41% of the total sample and has a volatile matter content of 20.52% thus giving a total sample volatile matter value of 20.83%.									

T A B L E 5. SAXON ADIT #1

Cumulative F.S.I. and Cumulative Weight % vs. Size and Specific Gravity

(Figures in brackets show the Cumulative F.S.I. of Cumulative Fractions)

Size \ Sp. Gr.	- 1.30	- 1.35	- 1.40	- 1.45	- 1.50	- 1.60	- 1.70	- 1.80	Raw
+ 1"	2.65 (9+)	8.50 (9)	11.81 (8)	12.76 (7½)	14.18 (7½)	17.15 (6½)	18.49 (5½)	18.60 (5½)	18.90 (5)
1" x 1/4"	6.12 (9+)	18.80 (8½)	25.32 (7½)	27.75 (6½)	28.77 (6)	29.79 (5½)	30.22 (5½)	30.35 (5½)	31.46 (5)
1/4" x 28 m.	11.99 (9+)	22.07 (9+)	27.83 (8½)	30.21 (8)	31.69 (7½)	32.44 (7)	32.68 (7)	32.85 (7)	33.59 (6½)
28 x 100 m.	4.30 (9+)	7.03 (9+)	8.71 (9)	9.42 (9)	9.91 (8½)	10.25 (8½)	10.33 (8½)	10.38 (8½)	10.64 (8)
Total	25.06	56.40	73.67	80.14	84.55	89.63	91.72	92.18	94.59
- 100 mesh	Weight % of this fraction is 5.41 and has a F.S.I. of 7								

T A B L E 6. SAXON ADIT #1

Washability Data: +100 m. - 94.59% of total Sample
(Reconstituted from Size Fractions)

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	26.49	2.58	26.49	2.58	100.00	10.00	13.24	2.58
1.30 - 1.35	33.13	5.92	59.62	4.44	73.51	12.68	43.06	5.92
1.35 - 1.40	18.26	9.45	77.88	5.61	40.38	18.22	68.75	9.45
1.40 - 1.45	6.84	14.34	84.72	6.32	22.12	25.46	81.30	14.34
1.45 - 1.50	4.66	18.30	89.38	6.94	15.28	30.44	87.05	18.30
1.50 - 1.60	5.37	21.35	94.75	7.76	10.62	35.76	92.06	21.35
1.60 - 1.70	2.21	26.50	96.96	8.18	5.25	50.51	95.86	26.50
1.70 - 1.80	0.49	36.57	97.45	8.33	3.04	67.96	97.20	36.57
+ 1.80	2.55	73.99	100.00	10.00	2.55	73.99	98.73	73.99
Total	100.00	10.00						

T A B L E 7. SAXON ADIT #1

Cumulative Volatile Matter for +100 m.: 94.59% of Total Sample
(Reconstituted from Size Fractions)

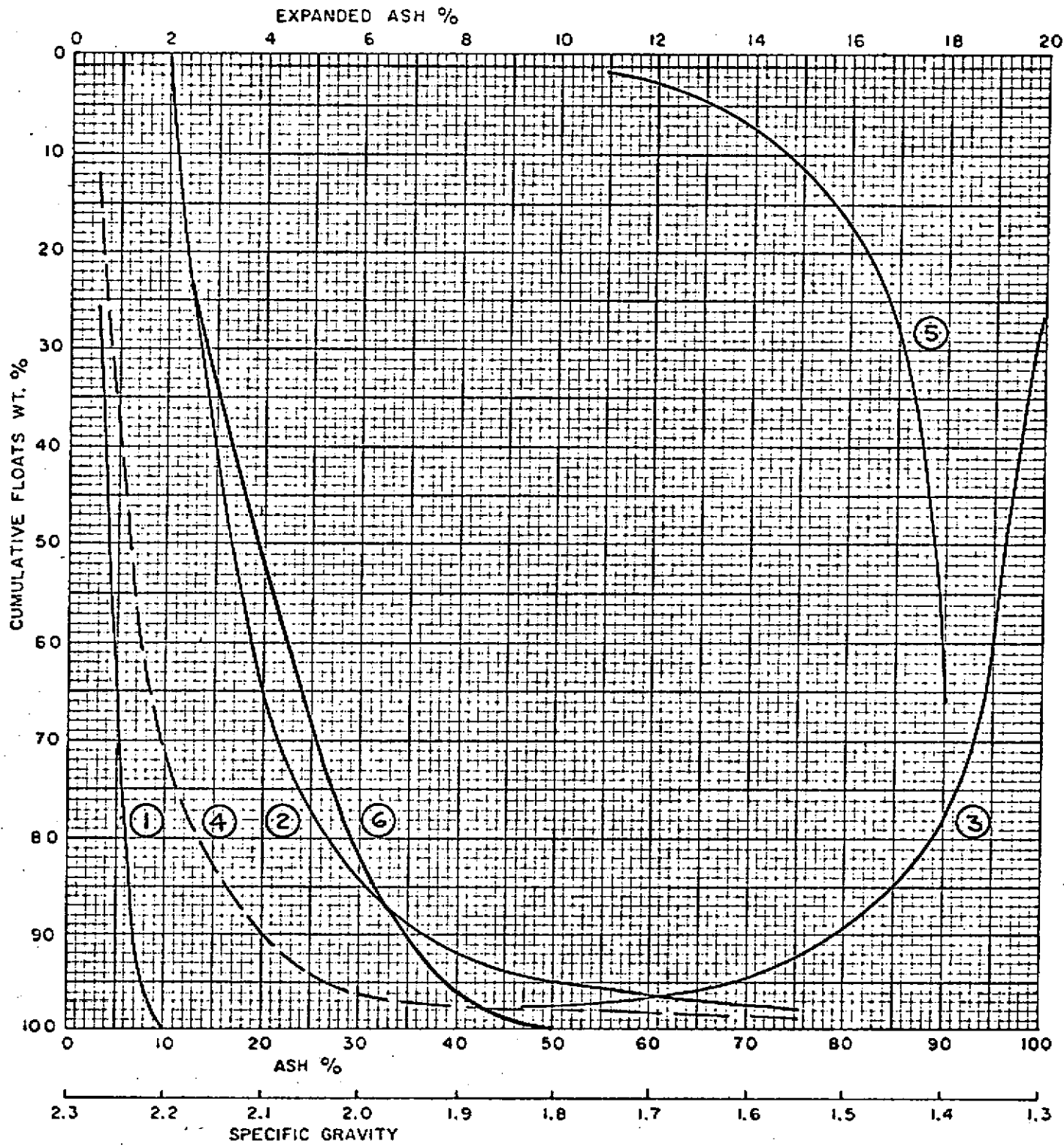
Specific Gravity	Fractional		Cumulative			
	Wt. %	V.M. %	Floats		Sinks	
			Wt. %	V.M. %	Wt. %	V.M. %
- 1.30	26.49	22.77	26.49	22.77	100.00	20.84
1.30 - 1.35	33.13	20.33	59.62	21.41	73.51	20.14
1.35 - 1.40	18.26	18.93	77.88	20.83	40.38	20.00
1.40 - 1.45	6.84	18.51	84.72	20.64	22.12	20.88
1.45 - 1.50	4.66	20.72	89.38	20.65	15.28	21.94
1.50 - 1.60	5.37	25.74	94.75	20.94	10.62	22.48
1.60 - 1.70	2.21	28.16	96.96	21.10	5.25	19.14
1.70 - 1.80	0.49	23.68	97.45	21.11	3.04	12.58
+ 1.80	2.55	10.45	100.00	20.84	2.55	10.45
Total	100.00	20.84				

FIGURE: 1

COMPANY : DENISON MINES LTD.
 SAMPLE : SAXON ADIT #1
 SIZE : + 100 Mesh (Reconstituted from Size Fractions)

- CURVE LEGEND
- 1 - FLOATS
 - 2 - SINKS
 - 3 - SPECIFIC GRAVITY
 - 4 - ELEMENTARY ASH
 - 5 - NEAR GRAVITY MATERIAL
 - 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : January 25, 1972

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

T A B L E 8. SAXON ADIT #1

7% Ash of Clean Coal

Yield:	90.00%
Floats Gravity:	1.51
Near Gravity Material:	11.00%
Ash:	7.00%
Volatile Matter:	20.70%
Residual Moisture:	0.57%
Fixed Carbon:	71.73%
F.S.I.	7½

T A B L E 9. SAXON ADIT #1

+ 1" : 19.80% of total Sample

Ash, Volatile Matter & Cumulative F.S.I.

Specific Gravity	Weight %	Ash %	V.M.%	Cum. Weight %	Cum. F.S.I.
- 1.30	14.04	3.38	22.69	14.04	9+
1.30 - 1.35	30.99	5.96	21.20	45.03	9
1.35 - 1.40	17.49	9.75	20.57	62.52	8
1.40 - 1.45	5.00	13.46	23.32	67.52	7½
1.45 - 1.50	7.54	16.86	26.56	75.06	7½
1.50 - 1.55	8.45	18.71	21.79	83.51	6½
1.55 - 1.60	7.23	22.14	29.10	90.74	6
1.60 - 1.70	7.09	25.19	30.00	97.83	5½
1.70 - 1.80	0.60	31.97	27.41	98.43	5½
+ 1.80	1.57	78.46	9.30	100.00	5
Total	100.00	12.36	23.41		

T A B L E 10. SAXON ADIT #1

Washability data: + 1"

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	14.04	3.38	14.04	3.38	100.00	12.36	7.02	3.38
1.30 - 1.35	30.99	5.96	45.03	5.16	85.96	13.83	29.54	5.96
1.35 - 1.40	17.49	9.75	62.52	6.44	54.97	18.27	53.78	9.75
1.40 - 1.45	5.00	13.46	67.52	6.96	37.48	22.24	65.02	13.46
1.45 - 1.50	7.54	16.86	75.06	7.96	32.48	23.59	71.29	16.86
1.50 - 1.55	8.45	18.71	83.51	9.04	24.94	25.63	79.28	18.71
1.55 - 1.60	7.23	22.14	90.74	10.09	16.49	29.17	87.12	22.14
1.60 - 1.70	7.09	25.19	97.83	11.18	9.26	34.66	94.28	25.19
1.70 - 1.80	0.60	31.97	98.43	11.31	2.17	65.61	98.13	31.97
+ 1.80	1.57	78.46	100.00	12.36	1.57	78.46	99.21	78.46
Total	100.00	12.36						

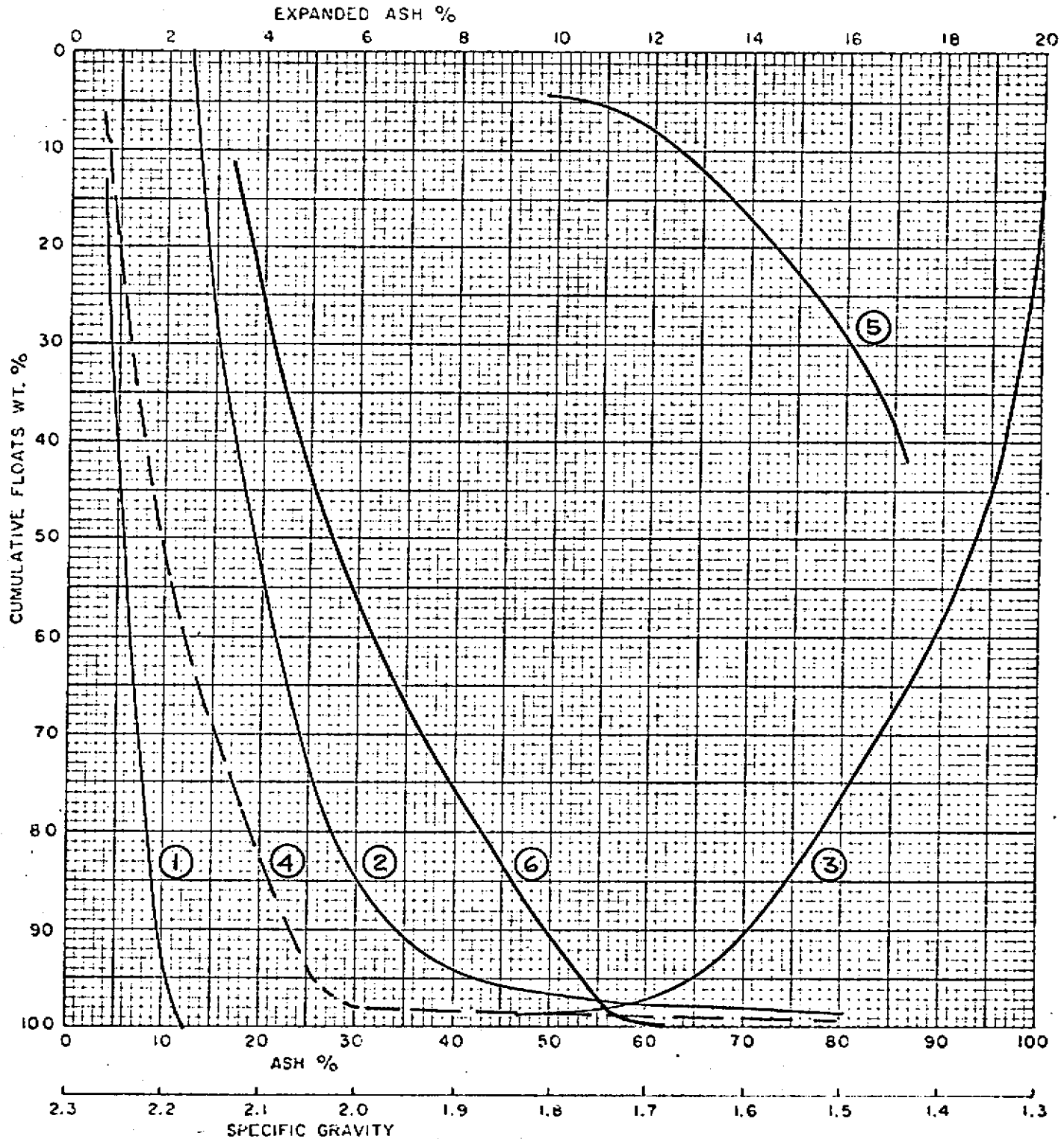
FIGURE: 2

COMPANY : DENISON MINES LTD.
SAMPLE : SAXON ADIT #1
SIZE : + 1"

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : January 25, 1972

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

T A B L E 11. SAXON ADIT #1

1" x 1/4" : 31.46% of total Sample

Ash, Volatile Matter & Cumulative F.S.I.

Specific Gravity	Weight %	Ash %	V.M.%	Cum. Weight %	Cum. F.S.I.
- 1.30	19.45	2.84	22.50	19.45	9+
1.30 - 1.35	40.31	5.56	20.66	59.76	8½
1.35 - 1.40	20.72	9.45	18.61	80.48	7½
1.40 - 1.45	7.72	14.62	17.74	88.20	6½
1.45 - 1.50	3.25	19.27	20.00	91.45	6
1.50 - 1.60	3.24	21.67	25.40	94.69	5½
1.60 - 1.70	1.37	27.43	27.06	96.06	5½
1.70 - 1.80	0.41	35.84	26.01	96.47	5½
+ 1.80	3.53	75.11	9.62	100.00	5
Total	100.00	10.38	20.22		

T A B L E 12. SAXON ADIT #1

Washability Data: 1" x 1/4"

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	19.45	2.84	19.45	2.84	100.00	10.38	9.73	2.84
1.30 - 1.35	40.31	5.56	59.76	4.67	80.55	12.20	39.61	5.56
1.35 - 1.40	20.72	9.45	80.48	5.90	40.24	18.86	70.12	9.45
1.40 - 1.45	7.72	14.62	88.20	6.67	19.52	28.85	84.34	14.62
1.45 - 1.50	3.25	19.27	91.45	7.11	11.80	38.16	89.82	19.27
1.50 - 1.60	3.24	21.67	94.69	7.61	8.55	45.34	93.07	21.67
1.60 - 1.70	1.37	27.43	96.06	7.90	5.31	59.78	95.37	27.43
1.70 - 1.80	0.41	35.84	96.47	8.01	3.94	71.02	96.26	35.84
+ 1.80	3.53	75.11	100.00	10.38	3.53	75.11	98.23	75.11
Total	100.00	10.38						

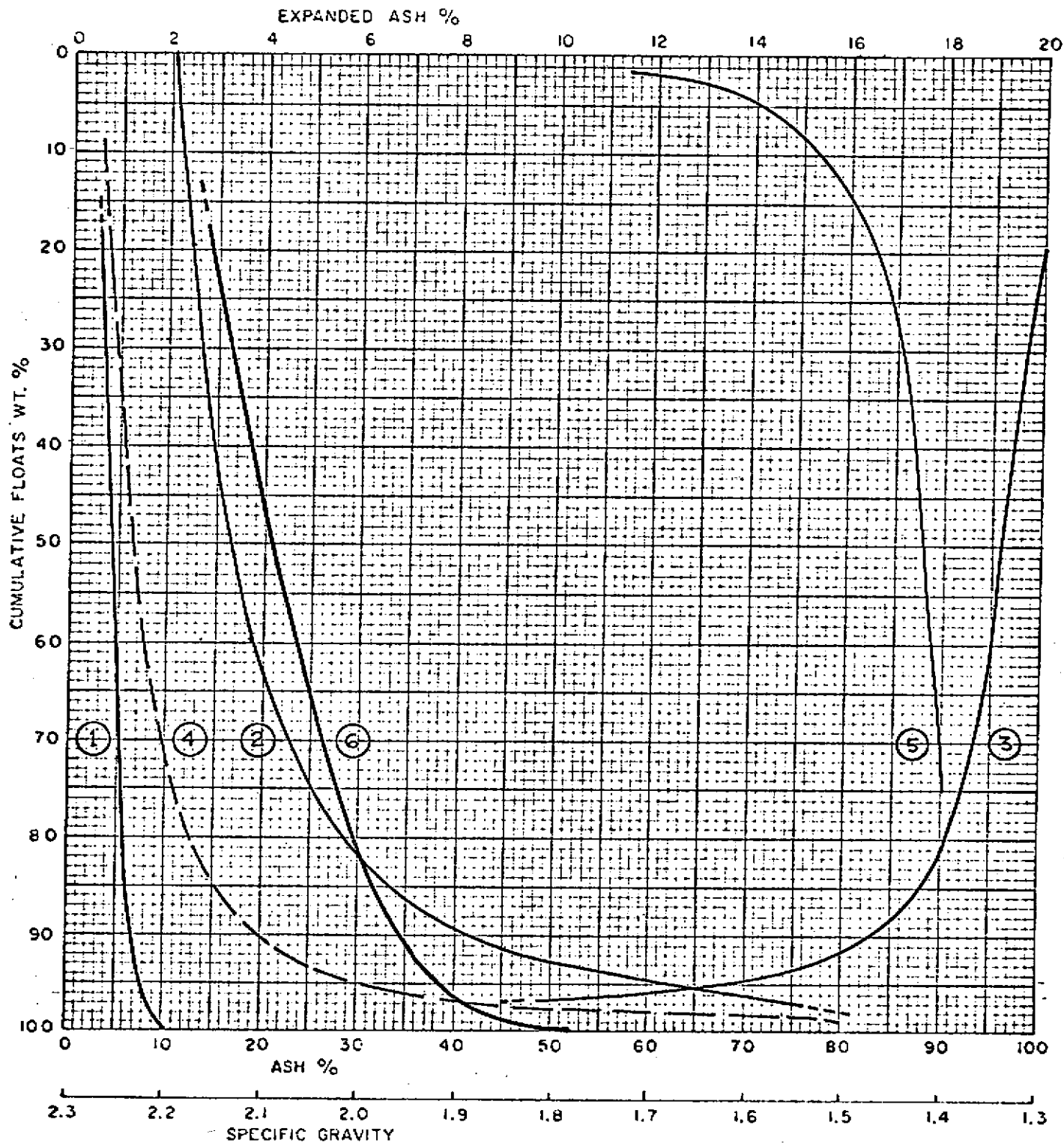
FIGURE: 3

COMPANY : DENISON MINES LTD.
 SAMPLE : SAXON ADIT #1
 SIZE : 1" x 1/4"

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE: January 25, 1972

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

T A B L E 13. SAXON ADIT #1

1/4" x 28 m.: 33.59% of Sample

Ash, Volatile Matter and Cumulative F.S.I.

Specific Gravity	Weight %	Ash %	V.M.%	Cum. Weight %	Cum. F.S.I.
- 1.30	35.71	2.52	22.63	35.71	9+
1.30 - 1.35	30.01	6.89	18.95	65.72	9+
1.35 - 1.40	17.14	9.56	17.78	82.86	8½
1.40 - 1.45	7.08	14.62	17.60	89.94	8
1.45 - 1.50	4.41	19.02	16.91	94.35	7½
1.50 - 1.60	2.22	23.99	20.17	96.57	7
1.60 - 1.70	0.72	29.86	23.30	97.29	7
1.70 - 1.80	0.50	38.59	21.18	97.79	7
+ 1.80	2.21	71.72	10.79	100.00	6½
Total	100.00	9.01	19.77		

T A B L E 14. SAXON ADIT #1

Washability Data: 1/4" x 28 m.

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	35.71	2.52	35.71	2.52	100.00	9.01	17.86	2.52
1.30 - 1.35	30.01	6.89	65.72	4.52	64.29	12.61	50.72	6.89
1.35 - 1.40	17.14	9.56	82.86	5.56	34.28	17.61	74.29	9.56
1.40 - 1.45	7.08	14.62	89.94	6.27	17.14	25.67	86.40	14.62
1.45 - 1.50	4.41	19.02	94.35	6.87	10.06	33.44	92.15	19.02
1.50 - 1.60	2.22	23.99	96.57	7.26	5.65	44.70	95.46	23.99
1.60 - 1.70	0.72	29.86	97.29	7.43	3.43	58.10	96.93	29.86
1.70 - 1.80	0.50	38.59	97.79	7.59	2.71	65.61	97.54	38.59
+ 1.80	2.21	71.72	100.00	9.01	2.21	71.72	98.90	71.72
Total	100.00	9.01						

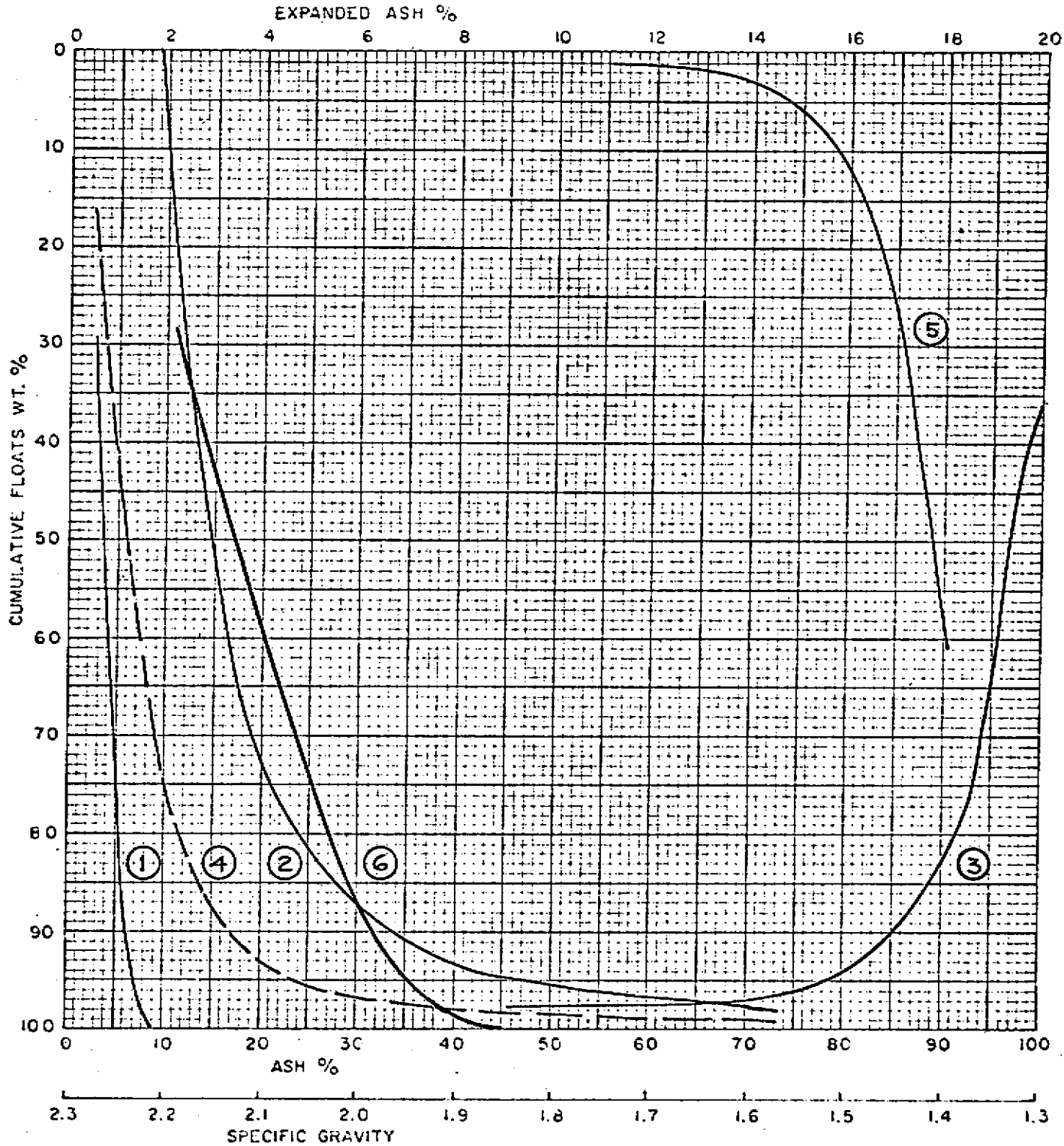
FIGURE : 4

COMPANY : DENISON MINES LTD.
 SAMPLE : SAXON ADIT #1
 SIZE : 1/4" x 28 Mesh

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : January 25, 1972

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

T A B L E 15. SAXON ADIT #1

28 x 100 m.: 10.64% of Sample

Ash, Volatile Matter and Cumulative F.S.I.

Specific Gravity	Weight %	Ash %	V.M. %	Cum. Weight %	Cum. F.S.I.
- 1.30	40.43	1.90	23.59	40.43	9+
1.30 - 1.35	25.67	3.92	22.04	66.10	9+
1.35 - 1.40	15.76	8.50	20.88	81.86	9
1.40 - 1.45	6.73	13.60	17.79	88.59	9
1.45 - 1.50	4.57	18.31	16.82	93.16	8½
1.50 - 1.60	3.16	23.86	15.90	96.32	8½
1.60 - 1.70	0.75	33.46	17.81	97.07	8½
1.70 - 1.80	0.44	41.73	17.89	97.51	8½
+ 1.80	2.49	70.52	14.39	100.00	8
Total	100.00	7.81	21.52		

T A B L E 16. SAXON ADIT #1

Washability Data: 28 x 100 m.

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	40.43	1.90	40.43	1.90	100.00	7.81	20.22	1.90
1.30 - 1.35	25.67	3.92	66.10	2.68	59.57	11.82	53.27	3.92
1.35 - 1.40	15.76	8.50	81.86	3.80	33.90	17.81	73.98	8.50
1.40 - 1.45	6.73	13.60	88.59	4.55	18.14	25.89	85.23	13.60
1.45 - 1.50	4.57	18.31	93.16	5.22	11.41	33.14	90.88	18.31
1.50 - 1.60	3.16	23.86	96.32	5.83	6.84	43.05	94.74	23.86
1.60 - 1.70	0.75	33.46	97.07	6.05	3.68	59.52	96.69	33.46
1.70 - 1.80	0.44	41.73	97.51	6.21	2.93	66.20	97.29	41.73
+ 1.80	2.49	70.52	100.00	7.81	2.49	70.52	97.75	70.52
Total	100.00	7.81						

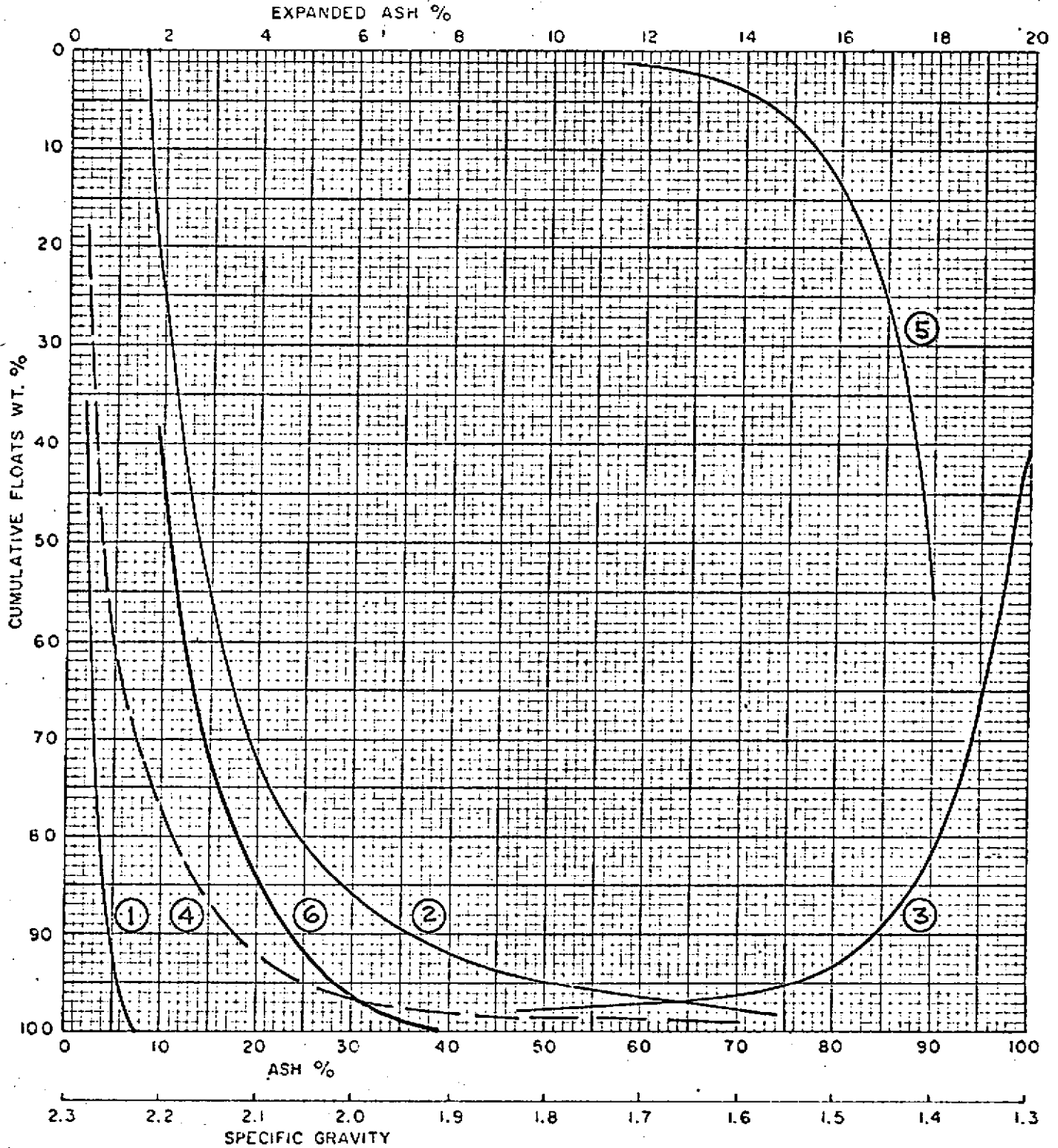
FIGURE: 5

CURVE LEGEND

COMPANY : DENISON MINES LTD.
 SAMPLE : SAXON ADIE #1
 SIZE : 28 x 100 Mesh

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : January 25, 1972

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

T A B L E 17. SAXON ADIT #1

FROTH FLOTATION TESTS

28 x 100 Mesh: 10.64% of the Sample

Solids, by weight in Slurry	8%
Time of Flotation	1.5 minutes
Flotation Recovery	91.76%
Reagents	MIBC and Kerosene

Analyses of the Products

	<u>Floats</u>	<u>Tailings</u>
Ash, %	5.80%	27.90%
Volatile Matter, %	21.65	17.58
Residual Moisture, %	0.35	0.55
Fixed Carbon, %	72.20	53.97
Sulphur, %	0.29	0.50
Free Swelling Index	8½	1

T A B L E 18. SAXON ADIT #1

FROTH FLOTATION TEST

- 100 Mesh: 5.41% of Sample

Solids, by weight in Slurry	8%
Time of Flotation	1.5 minutes
Flotation Recovery	97.16%
Reagents	MIBC and Kerosene

Analyses of the Products

	<u>Floats</u>	<u>Tailings</u>
Ash, %	7.32	69.76
Volatile Matter, %	20.59	18.13
Residual Moisture, %	0.62	0.90
Fixed Carbon, %	71.47	11.21
Sulphur, %	0.37	0.93
Free Swelling Index	8	N.A.*

* Non-agglomerating.

REPORT ON
WASHABILITY CHARACTERISTICS AND CLEANING
OF COKING COAL
FOR
DENISON MINES LTD.

SAXON ADIT #1

Submitted by,
CYCLONE ENGINEERING SALES LTD.
Edmonton, Alberta, Canada.

Report No.: RI-72.06
Job. No.: S1-84
Date: February 22, 1972.

REPORT ON
WASHABILITY CHARACTERISTICS AND
CLEANING OF COKING COAL
FOR
DENISON MINES LTD.
SAXON ADIT #1

SUMMARY:

The data presented in this report refer to washability characteristics and the washing of a 5-ton sample from Adit Saxon #1.

The coal was cleaned in a two stage water cyclone system. The fines from the middlings and the refuse were sent to froth flotation cells. Coarse middlings were recirculated.

The coarse refuse was rewashed in the heavy medium cyclone, but very little additional coal was obtained. A flow diagram of the washing circuit is included.

A yield of about 90% was obtained.

Proximate analysis of the coal shipped is as follows:

	<u>Air Dried Basis</u>	<u>As Shipped Basis</u>
Surface Moisture	"	6.00
Residual Moisture	0.54	0.51
Ash	6.97	6.55
Volatile Matter	21.78	20.47
Fixed Carbon	70.71	66.47
F.S.I.	8	8
B.T.U./lb.	14,390	13,527
Sulphur	0.27%	0.25%

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INTRODUCTION:

Approximately a 5-ton sample of the coal was used for washability studies and production of clean coal.

The coal was air dried, crushed to $-3/4$ " and homogenized. A representative sample of about 500 lb. was taken for washability and flotation tests and the remaining portion was used for preliminary testing and production of the clean coal.

The washing circuit employed is shown in Figure 1, Section 2, of this report.

Yours very truly,

CYCLONE ENGINEERING SALES LTD.

Per


R. S. Sehgal, P. Eng.,
Laboratory Manager.

SECTION 1

WASHABILITY DATA AND FLOTATION TESTS

SAXON ADIT #1

T A B L E 1 - SAXON ADIT #1

Head Sample Analysis

Ash	10.19%
Volatile Matter	20.90%
Residual Moisture	0.56%
Fixed Carbon	68.35%
F.S.I.	6½
B.T.U./lb.	13,850
Sulphur	0.28%

T A B L E 2 - SAXON ADIT #1

Size Analysis

	<u>Weight %</u>
3/4" x 28 Mesh	86.41
28 Mesh x 0	<u>13.59</u>
Total	<u>100.00</u>

T A B L E 3 - SAXON ADIT #1

Incremental Float-Sink Analysis of 3/4" x 28 m.

Sp. Gr.	Wt. %	Ash %	V.M. %	R.M. %	F.C. %
- 1.30	28.41	2.50	23.92	0.61	72.97
1.30 - 1.35	32.62	5.25	19.83	0.60	74.32
1.35 - 1.40	17.62	9.33	19.01	0.58	71.08
1.40 - 1.45	6.34	13.47	18.41	0.54	67.58
1.45 - 1.50	3.33	17.36	20.52	0.52	61.60
1.50 - 1.60	3.68	21.10	23.63	0.53	54.74
1.60 - 1.70	2.72	26.72	25.88	0.56	46.84
1.70 - 1.80	1.00	32.72	27.73	0.57	38.98
+ 1.80	4.28	70.63	11.55	0.60	17.22
Total	100.00	10.35	20.81	0.59	68.25

T A B L E 4 - SAXON ADIT #1

Cumulative Float-Sink Analysis of 3/4" x 28 m.

Sp. Gr.	Wt. %	Ash %	V.M. %	R.M. %	F.C. %	F.S.I.*
- 1.30	28.41	2.50	23.92	0.61	72.97	9+
- 1.35	61.03	3.97	21.73	0.60	73.70	8½
- 1.40	78.65	5.17	21.12	0.60	73.11	7
- 1.45	84.99	5.78	20.92	0.59	72.71	7
- 1.50	88.32	6.22	20.91	0.59	72.28	6½
- 1.60	92.00	6.82	21.01	0.59	71.58	6½
- 1.70	94.72	7.39	21.15	0.59	70.87	6½
- 1.80	95.72	7.65	21.22	0.59	70.54	6½
Total	100.00	10.35	20.81	0.59	68.25	6½

T A B L E 5 - SAXON ADIT #1

Washability Data for 3/4" x 28 m.

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	28.41	2.50	28.41	2.50	100.00	10.35	14.20	2.50
1.30 - 1.35	32.62	5.25	61.03	3.97	71.59	13.46	44.72	5.25
1.35 - 1.40	17.62	9.33	78.65	5.17	38.97	20.34	69.84	9.33
1.40 - 1.45	6.34	13.47	84.99	5.78	21.35	29.44	81.82	13.47
1.45 - 1.50	3.33	17.36	88.32	6.22	15.01	36.18	86.65	17.36
1.50 - 1.60	3.68	21.10	92.00	6.82	11.68	41.55	90.16	21.10
1.60 - 1.70	2.72	26.72	94.72	7.39	8.00	50.96	93.36	26.72
1.70 - 1.80	1.00	32.72	95.72	7.65	5.28	63.45	95.22	32.72
+ 1.80	4.28	70.63	100.00	10.35	4.28	70.63	97.86	70.63
Total	100.00	10.35						

- 7 -

FIG. DENISON MINES LTD. - ADIT # 1 (SAXON)

WASHABILITY CURVES FOR 3/4" x 28 m.

CUM.
WT. %

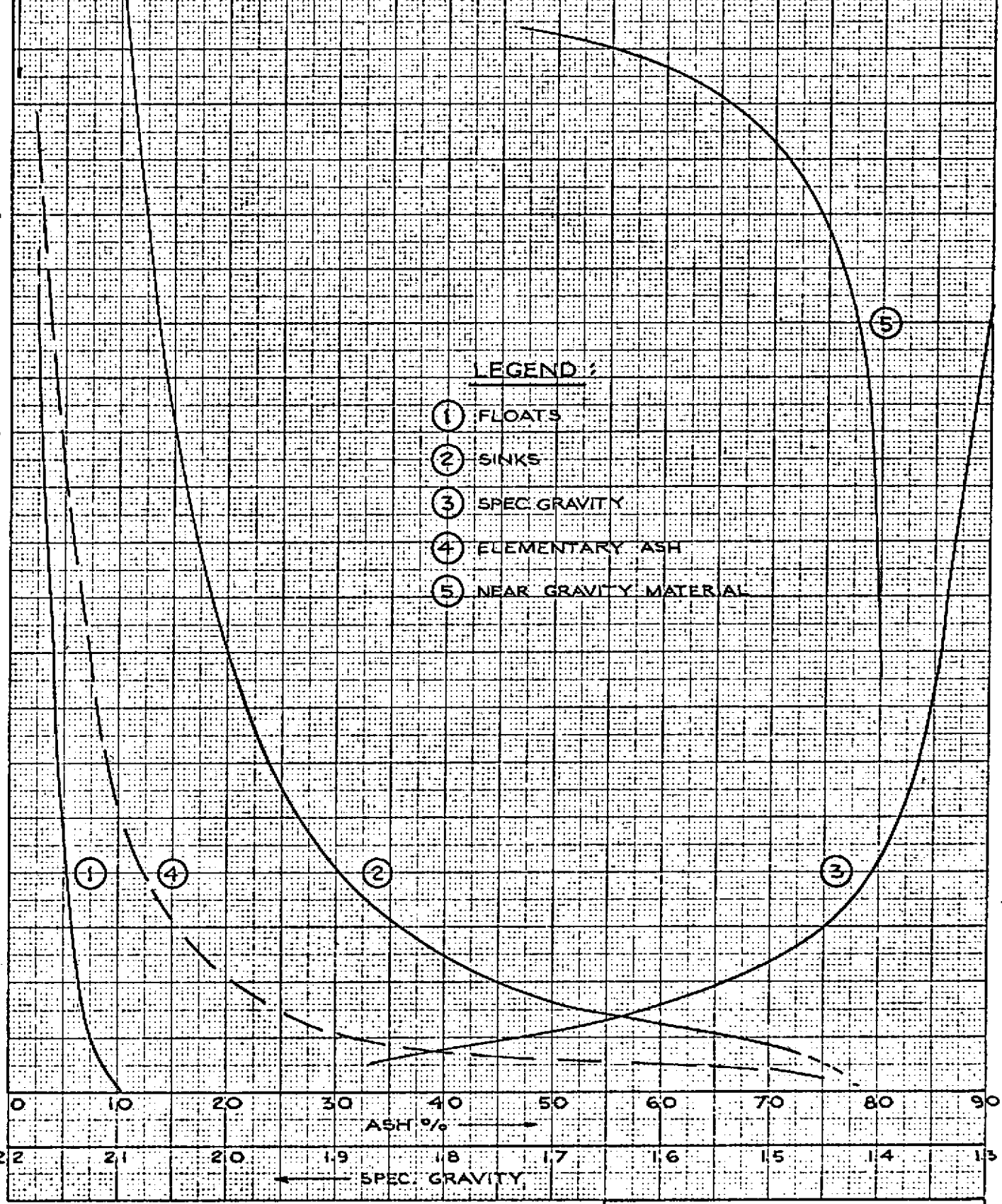
0
10
20
30
40
50
60
70
80
90
100

- LEGEND :**
- ① FLOATS
 - ② SINKS
 - ③ SPEC GRAVITY
 - ④ ELEMENTARY ASH
 - ⑤ NEAR GRAVITY MATERIAL

ASH %

SPEC. GRAVITY

2.2 2.1 2.0 1.9 1.8 1.7 1.6 1.5 1.4 1.3



K&E TO X 10 TO THE CENTIMETER 46 1512 MADE IN U.S.A. NEUFFEL & ESSER CO.

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

T A B L E 6 - SAXON ADIT #1

Froth Flotation Test of 28 Mesh x 0

Solids, by weight in Slurry	8%
Time	1.5 minutes
Reagents	MIBC & Kerosene

	<u>Floats</u>	<u>Tailings</u>
Yield	87.71%	12.29%
Ash	5.85%	30.16%
Volatile Matter	21.84%	17.51%
Residual Moisture	0.32%	0.33%
Fixed Carbon	71.99%	52.00%
F.S.I.	9	1
Sulphur	0.37%	0.65%

SECTION 2

WASHING TESTS AND ANALYSIS OF PRODUCTS

SAXON ADIT #1

T A B L E 1 - SAXON ADIT #1

Distribution of Products

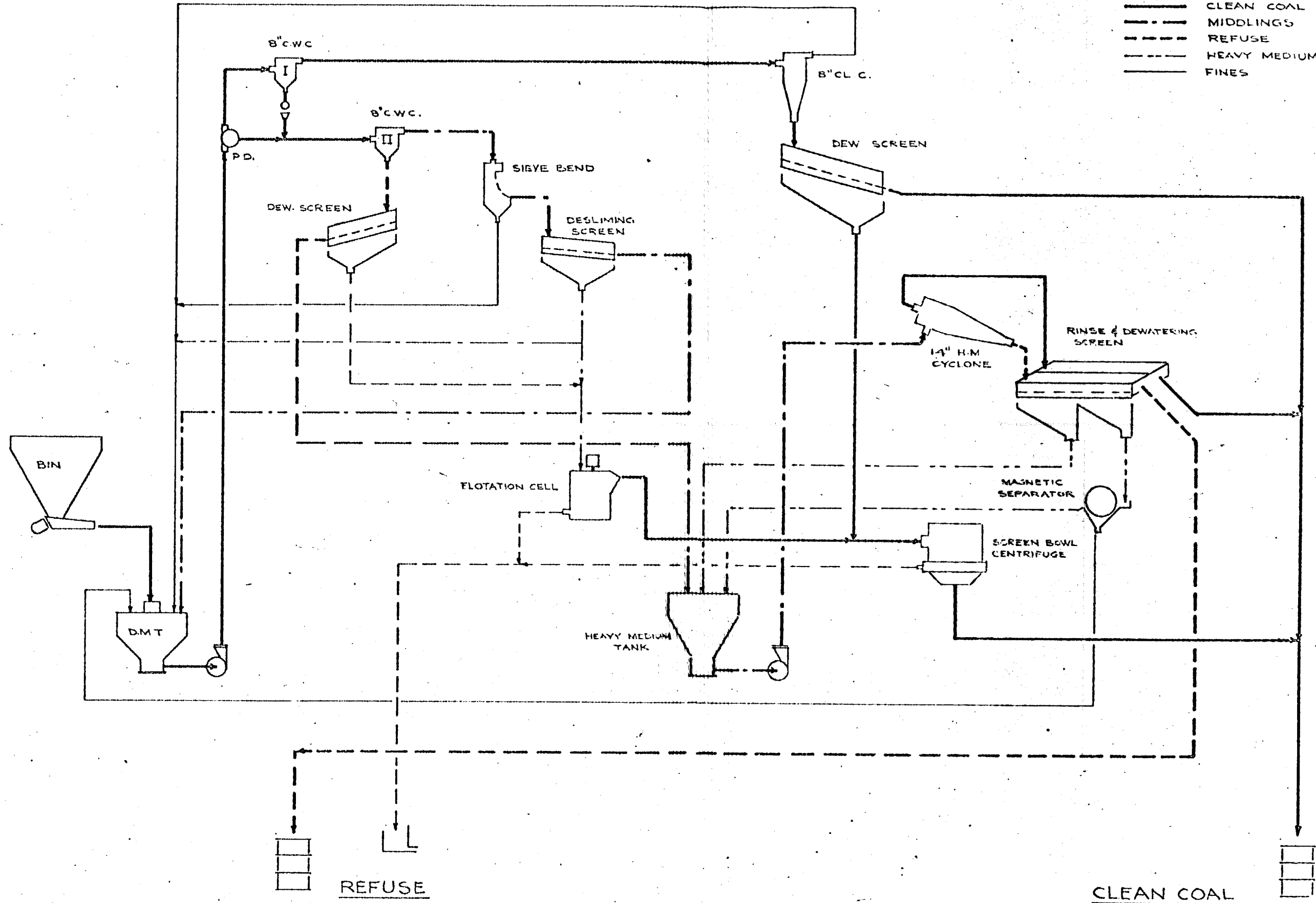
<u>Product</u>	<u>Wt. %</u>	<u>Ash %</u>
Clean Coal	90.00	7.00
Flotation Refuse	1.00	30.00
Coarse Refuse	<u>9.00</u>	<u>42.00</u>
Total	<u>100.00</u>	<u>10.38</u>

FIG. 1

WASHING CIRCUIT FOR SAXON - ADIT # 1

LEGEND :

- CLEAN COAL
- - - MIDDINGS
- - - REFUSE
- - - HEAVY MEDIUM
- FINES



T A B L E 2 - SAXON ADIT #1

Proximate Analysis of Clean Coal

Ash	6.97%
Volatile Matter	21.78%
Residual Moisture	0.54%
Fixed Carbon	70.71%
F.S.I.	8, 8, 8
B.T.U./lb.	14,390
Sulphur	0.27%

T A B L E 3 - SAXON ADIT #1

Ultimate Analysis

Ash	6.97%
Carbon	83.03%
Hydrogen	4.40%
Nitrogen	0.87%
Oxygen	4.46%
Sulphur	0.27%

T A B L E 4 - SAXON ADIT #1

CHARACTERISTICS OF THE ASH

Mineral Analysis of Ash

SiO ₂	51.23
Al ₂ O ₃	24.44
Fe ₂ O ₃	3.70
TiO ₂	1.09
P ₂ O ₅	1.81
CaO	6.31
MgO	1.34
Na ₂ O	1.26
K ₂ O	0.21
SO ₃	3.89

Ash Fusibility

	<u>Reducing Atmosphere</u>	<u>Oxidizing Atmosphere</u>
Initial Deformation Temperature	2370°F.	2415°F.
Spherical Temperature	2425°F.	2480°F.
Hemispherical Temperature	2505°F.	2550°F.
Fluid Temperature	2640°F.	2640°F.

T A B L E 5 - SAXON ADIT #1

Analysis of Coarse Reject

Ash	41.35%
Residual Moisture	0.52%
Volatile Matter	16.39%
Fixed Carbon	41.74%
F.S.I.	N.A.
Sulphur	0.41%

T A B L E 6 - SAXON ADIT #1

Flotation Reject

Ash	31.35%
Residual Moisture	0.41%
Volatile Matter	17.21%
Fixed Carbon	51.03%
F.S.I.	N.A.
Sulphur	0.62%

REPORT ON
WASHABILITY CHARACTERISTICS
OF
COKING COAL
FOR
DENISON MINES LTD.
SAXON ADIT #2

Submitted by
CYCLONE ENGINEERING SALES LTD.
Edmonton, Alberta, Canada.

Report No.: RI-72.02(a)
Job No.: S1-84
Date: February 4, 1972.

REPORT ON
WASHABILITY CHARACTERISTICS
OF
COKING COAL
FOR
DENISON MINES LTD.
SAXON ADIT #2

SUMMARY:

The data presented in this report refers to the washability characteristics of Denison Mines Sample of Saxon Adit #2.

The coal is of medium volatile bituminous rank. It has fairly high ash of 20%. But most of this ash is extraneous in nature as evidenced by the large amount of + 1.80 specific gravity material. The F.S.I. of the coal is 7 and is indicative of good coking properties.

The coal can be cleaned to 7% ash with a yield of 73% and an F.S.I. of $8\frac{1}{2}$. The cut point for such cleaning is 1.55. The amount of near gravity material at this value is 14%.

Froth flotation test on fines indicates recoveries of about 75% with an F.S.I. of $8\frac{1}{2}$.

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FIGURES

1. & 1A.	Washability Curves for +100 m.: 95.84% of Sample	9 & 9A
2. & 2A.	Washability Curve for +1"	12 & 12A
3. & 3A.	Washability Curve for 1" x 1/4"	14 & 14a
4. & 4A.	Washability Curve for 1/4" x 28 Mesh	16 & 16a
5. & 5A.	Washability Curve for 28 x 100 Mesh	18 & 18a

INTRODUCTION:

A 1-ton sample of Saxon Adit #2 was air dired prior to analyses and the following work was done on it:

1. A size analysis at 1", 1/4", 28 m. and 100 m.
2. A proximate analysis on all size fractions.
3. A float-sink analysis on all size fractions, except - 100 mesh, at 1.30, 1.35, 1.40, 1.45, 1.50, 1.55, 1.60, 1.70 and 1.80.
4. Ash, volatile matter and free swelling index determinations on all specific gravity fractions.
5. Washability curves for all size fractions, except - 100 m.
6. Washability curves for + 100 mesh fraction of the raw sample by re-constituting the data in 5.
7. Froth flotation tests on 28 m. x 100 m. and 100 m. x 0 fractions.

CONCLUSIONS:

From the data it is evident the coal is of very good quality, both from coking and cleaning points of view.

Respectfully submitted,

CYCLONE ENGINEERING SALES LTD.

Per: _____

R.S. Sehgal, P. Eng.,
Laboratory Manager.

T A B L E 1. SAXON ADIT #2

Classification by Rank

Ash	19.67%
Volatile Matter	18.74%
Residual Moisture	0.59%
Fixed Carbon	61.00%
Sulphur	0.30%
B.T.U./lb.	12,640
F.S.I.	7
Rank	mvb

T A B L E 2. SAXON ADIT #2

Analysis of Size Fraction

Size Fraction	Wt. %	Ash%	V.M.%	R.M.%	F.C.%	S.%	F.S.I.
+ 1"	16.19	18.42	18.91	0.64	62.03	0.23	7½
1" x 1/4"	34.11	21.61	18.33	0.60	59.46	0.26	5
1/4" x 28 m.	35.19	19.76	18.74	0.54	60.94	0.34	6
28 x 100 m.	10.35	15.84	19.64	0.62	63.90	0.36	8½
= 100 m.	4.16	17.44	19.12	0.63	62.81	0.39	7
Total	100.00	19.67	18.74	0.59	61.00	0.30	7

T A B L E 3. SAXON ADIT #2

Weight % and Ash % Distribution vs. Size and Specific Gravity

(Figures in brackets show the ash content of individual fractions)

Size \ sp. Gr.	sp. Gr.										Total
	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.70	1.80		
+ 1"	6.05 (3.12)	3.48 (6.10)	1.25 (10.22)	0.80 (15.04)	0.43 (19.21)	0.33 (25.83)	0.28 (27.17)	0.44 (38.84)	0.49 (49.41)	2.64 (66.30)	16.19 (18.89)
1" x 1/4"	6.17 (2.48)	9.38 (4.79)	3.70 (8.82)	1.97 (14.51)	1.49 (19.78)	1.43 (25.12)	1.17 (31.26)	1.61 (39.58)	2.43 (51.01)	4.76 (67.67)	34.11 (21.50)
1/4" x 28m.	12.44 (2.38)	5.23 (5.54)	2.66 (10.28)	1.94 (15.75)	1.43 (20.85)	1.49 (25.76)	1.16 (30.35)	2.26 (36.78)	1.44 (45.69)	5.14 (63.54)	35.19 (19.77)
28 x 100 m.	3.39 (1.88)	2.40 (3.27)	0.91 (8.09)	0.61 (13.36)	0.45 (18.88)	0.31 (22.75)	0.32 (27.91)	0.41 (34.72)	0.28 (42.67)	1.27 (65.04)	10.35 (15.75)
Total	28.05 (2.50)	20.49 (5.03)	8.52 (9.40)	5.32 (14.91)	3.80 (20.01)	3.56 (25.25)	2.93 (30.14)	4.72 (37.75)	4.64 (48.69)	13.81 (65.63)	95.84 (19.80)
-100 mesh	This fraction forms 4.16% of the total sample and has an ash content of 17.44%, thus giving a total sample ash value of 19.70%.										

T A B L E 4. SAXON ADIT #2

Weight % & Volatile Matter % Distribution vs. Size and Specific Gravity

(Figures in brackets show the Volatile Matter Content of Individual Fractions)

Sp. Gr. Size	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.70	1.80	Total	
+ 1"	6.05 (22.17)	3.48 (20.65)	1.25 (20.21)	0.80 (19.12)	0.43 (18.15)	0.33 (17.31)	0.28 (16.52)	0.44 (15.10)	0.49 (13.10)	2.64 (11.97)	16.19 (19.10)
1" x 1/4"	6.17 (22.54)	9.38 (21.56)	3.70 (19.20)	1.97 (18.63)	1.49 (17.73)	1.43 (16.89)	1.17 (16.24)	1.61 (14.25)	2.43 (12.80)	4.76 (11.98)	34.11 (18.46)
1/4" x 28m.	12.44 (23.14)	5.23 (22.07)	2.66 (18.92)	1.94 (17.53)	1.43 (17.27)	1.49 (16.44)	1.16 (15.55)	2.26 (14.65)	1.44 (14.14)	5.14 (11.44)	35.19 (18.96)
28 x 100m.	3.39 (23.71)	2.40 (22.45)	0.91 (20.30)	0.61 (18.23)	0.45 (17.31)	0.31 (16.14)	0.32 (15.75)	0.41 (14.81)	0.28 (13.92)	1.27 (10.88)	10.35 (19.85)
Total	28.05 (22.87)	20.49 (21.64)	8.52 (19.38)	5.32 (18.26)	3.80 (17.55)	3.56 (16.68)	2.93 (15.94)	4.72 (14.57)	4.64 (13.32)	13.81 (11.68)	95.84 (18.90)
- 100 m.	This fraction forms 4.16% of the total sample and has a volatile matter content of 19.12%, thus giving a total sample volatile matter value of 18.91%.										

T A B L E 5. SAXON ADIT #2

Cumulative F.S.I. and Cumulative Weight % vs. Size and Specific Gravity

(Figures in brackets show the Cumulative F.S.I. of Cumulative Fractions)

Sp. Gr. Size	- 1.30	-1.35	- 1.40	- 1.45	- 1.50	- 1.55	- 1.60	- 1.70	-1.80	Raw
+1"	6.05 (9+)	9.53 (9)	10.78 (8½)	11.58 (8½)	12.01 (8½)	12.34 (8½)	12.62 (8)	13.06 (8)	13.55 (8)	16.19 (7½)
1" x 1/4"	6.17 (9+)	15.55 (9)	19.25 (9)	21.22 (8½)	22.71 (8½)	24.14 (8)	25.31 (8)	26.92 (7)	29.35 (6)	34.11 (5)
1/4" x 28m.	12.44 (9+)	17.67 (9+)	20.33 (9)	22.27 (9)	23.70 (8½)	25.19 (8½)	26.35 (8)	28.61 (8)	30.05 (8)	35.19 (6)
28 x 100m.	3.39 (9+)	5.79 (9+)	6.70 (9)	7.31 (9)	7.76 (9)	8.07 (8½)	8.39 (8½)	8.80 (8½)	9.08 (8½)	10.35 (8½)
Total	28.05	48.54	57.06	62.38	66.18	69.74	72.67	77.39	82.03	95.84
- 100 mesh	Weight % of this fraction is 4.16 and has a F.S.I. of 7									

T A B L E 6. SAXON ADIT #2

Washability Data: +100m.: 95.84% of Sample
(Reconstituted from Size Fractions)

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	29.27	2.50	29.27	2.50	100.00	19.80	14.63	2.50
1.30 - 1.35	21.38	5.03	50.65	3.57	70.73	26.95	39.96	5.03
1.35 - 1.40	8.89	9.40	59.54	4.44	49.35	36.45	55.10	9.40
1.40 - 1.45	5.56	14.91	65.10	5.33	40.46	42.39	62.32	14.91
1.45 - 1.50	3.96	20.01	69.06	6.17	34.90	46.77	67.08	20.01
1.50 - 1.55	3.71	25.25	72.77	7.15	30.94	50.19	70.91	25.25
1.55 - 1.60	3.06	30.14	75.83	8.08	27.23	53.59	74.30	30.14
1.60 - 1.70	4.92	37.75	80.75	9.88	24.17	56.56	78.29	37.75
1.70 - 1.80	4.84	48.69	85.59	12.08	19.25	61.37	83.17	48.69
+ 1.80	14.41	65.63	100.00	19.80	14.41	65.63	92.80	65.63
Total	100.00	19.80						

T A B L E 7. SAXON ADIT #2

Cumulative Volatile Matter for +100 m.: 95.84 of Total Sample
(Reconstituted from Size Fractions)

Specific Gravity	Fractional		Cumulative			
	Wt. %	V.M. %	Flocs		Sinks	
			Wt. %	V.M. %	Wt. %	V.M. %
- 1.30	29.27	22.87	29.27	22.87	100.00	18.90
1.30 - 1.35	21.38	21.64	50.65	22.35	70.73	17.26
1.35 - 1.40	8.89	19.38	59.54	21.91	49.35	15.37
1.40 - 1.45	5.56	18.26	65.10	21.60	40.46	14.49
1.45 - 1.50	3.96	17.55	69.06	21.36	34.90	13.89
1.50 - 1.55	3.71	16.68	72.77	21.12	30.94	13.42
1.55 - 1.60	3.06	15.94	75.83	20.92	27.23	12.97
1.60 - 1.70	4.92	14.57	80.75	20.53	24.17	12.60
1.70 - 1.80	4.84	13.32	85.59	20.12	19.25	12.09
+ 1.80	14.41	11.68	100.00	18.90	14.41	11.68
Total	100.00	18.90				

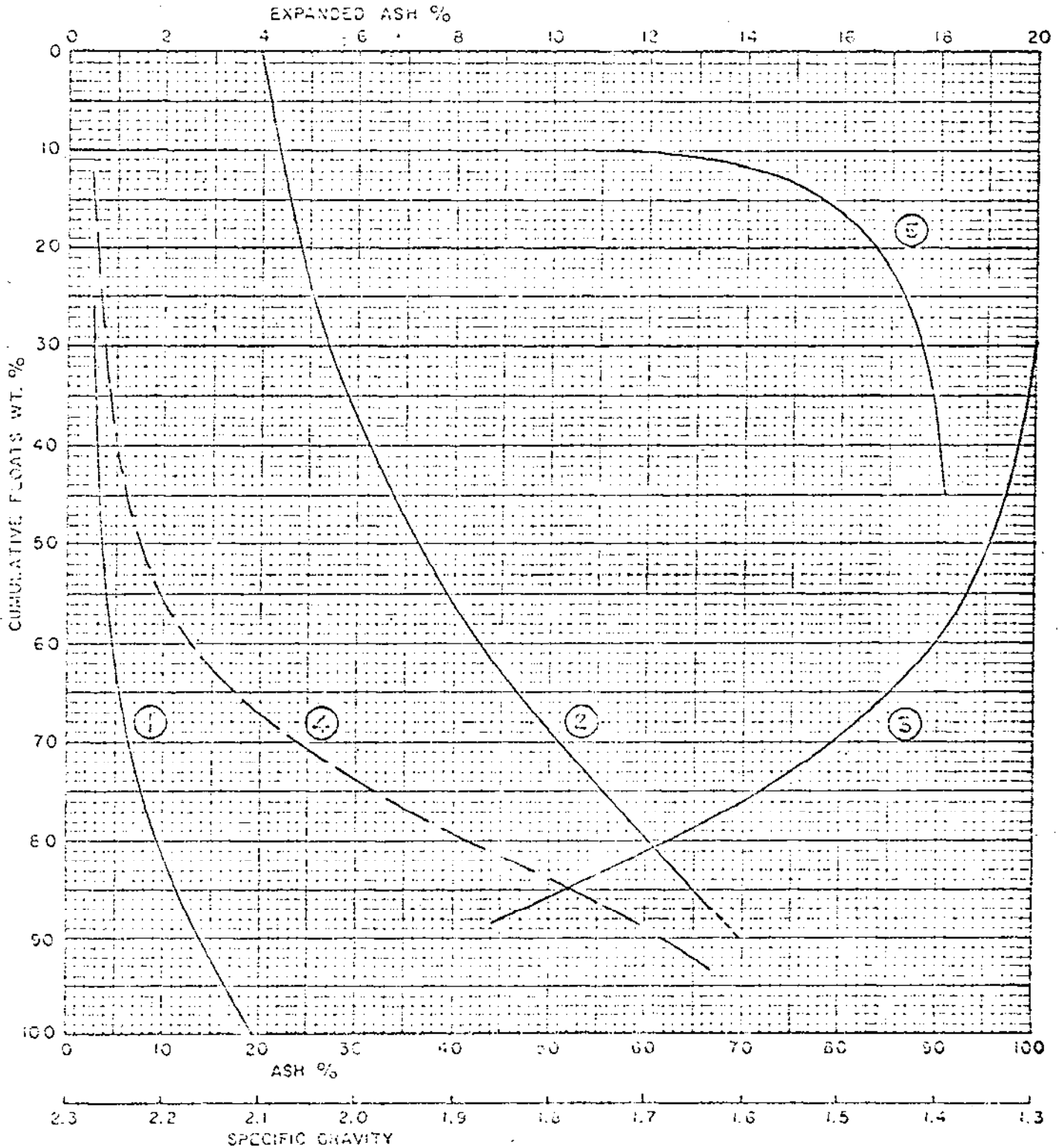
1
8
1

FIGURE 1

COMPANY : Denison Mines Ltd.
SAMPLE : Saxon Adit #2
SIZE : +100 m. Reconstituted

- CURVE LEGEND
- 1 - FLOATS
 - 2 - SINKS
 - 3 - SPECIFIC GRAVITY
 - 4 - ELEMENTARY ASH
 - 5 - NEAR GRAVITY MATERIAL
 - 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : February 4, 1972.

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

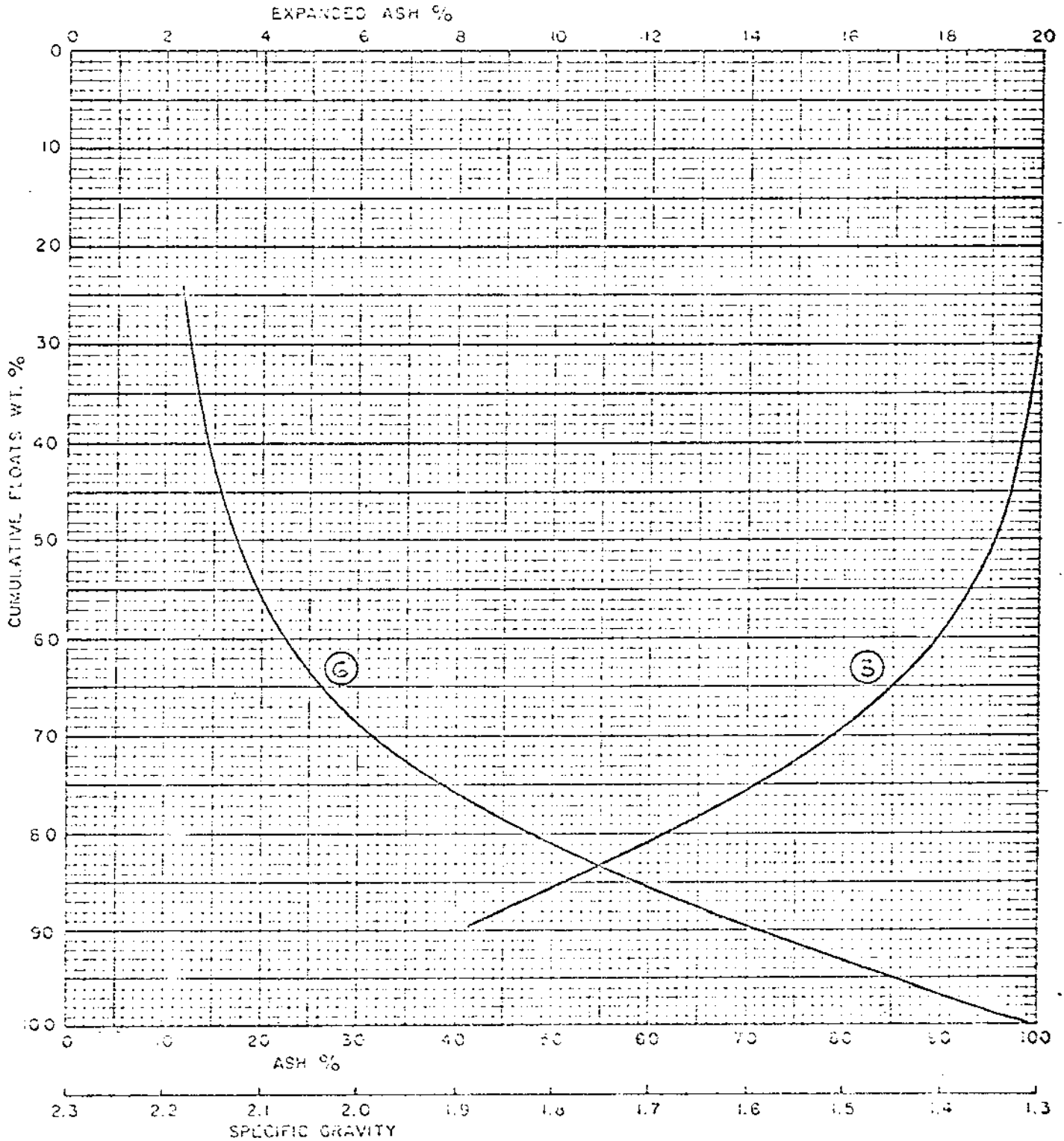
FIGURE 1A

COMPANY : Denison Mines Ltd.
 SAMPLE : Saxon Adit #2
 SIZE : +100 m. Reconstituted

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : February 4, 1972.

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

T A B L E 8. SAXON ADIT #2

7% Ash of Clean Coal

Yield:	73.00%
Floats Gravity:	1.55
Near Gravity Material:	14.00%
Ash:	7.00%
Volatile Matter:	21.12%
Residual Moisture:	0.50%
Fixed Carbon:	71.38%
F.S.I.	8½

T A B L E 9. SAXON ADIT #2

+1" : 16.19% of Sample

Ash, Volatile Matter and Cumulative F.S.I.

Specific Gravity	Weight %	Ash %	V.M. %	Cum. Weight %	Cum. F.S.I.
- 1.30	37.38	3.12	22.17	37.38	9+
1.30 - 1.35	21.49	6.10	20.65	58.87	9
1.35 - 1.40	7.71	10.22	20.21	66.58	8½
1.40 - 1.45	4.92	15.04	19.12	71.50	8½
1.45 - 1.50	2.64	19.21	18.15	74.14	8½
1.50 - 1.55	2.04	25.83	17.31	76.18	8½
1.55 - 1.60	1.75	27.17	16.52	77.93	8
1.60 - 1.70	2.71	38.84	15.10	80.64	8
1.70 - 1.80	3.03	49.41	13.10	83.67	8
+ 1.80	16.33	66.30	11.97	100.00	7½
Total	100.00	18.89	19.10		

T A B L E 10. SAXON ADIT #2

Washability Data: +1"

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	37.38	3.12	37.38	3.12	100.00	18.89	18.69	3.12
1.30 - 1.35	21.49	6.10	58.87	4.21	62.62	28.31	48.12	6.10
1.35 - 1.40	7.71	10.22	66.58	4.90	41.13	39.91	62.73	10.22
1.40 - 1.45	4.92	15.04	71.50	5.60	33.42	46.76	69.04	15.04
1.45 - 1.50	2.64	19.21	74.14	6.09	28.50	52.23	72.82	19.21
1.50 - 1.55	2.04	25.83	76.18	6.61	25.86	55.60	75.16	25.83
1.55 - 1.60	1.75	27.17	77.93	7.08	23.82	58.15	77.05	27.17
1.60 - 1.70	2.71	38.84	80.64	8.14	22.07	60.61	79.29	38.84
1.70 - 1.80	3.03	49.41	83.67	9.64	19.36	63.66	82.15	49.41
+ 1.80	16.33	66.30	100.00	18.89	16.33	66.30	91.84	66.30
Total	100.00	18.89						

COMPANY: Denison Mines Ltd.

SAMPLE: Saxon Adit #2

SIZE: +1"

1 - FLOATS

2 - SINKS

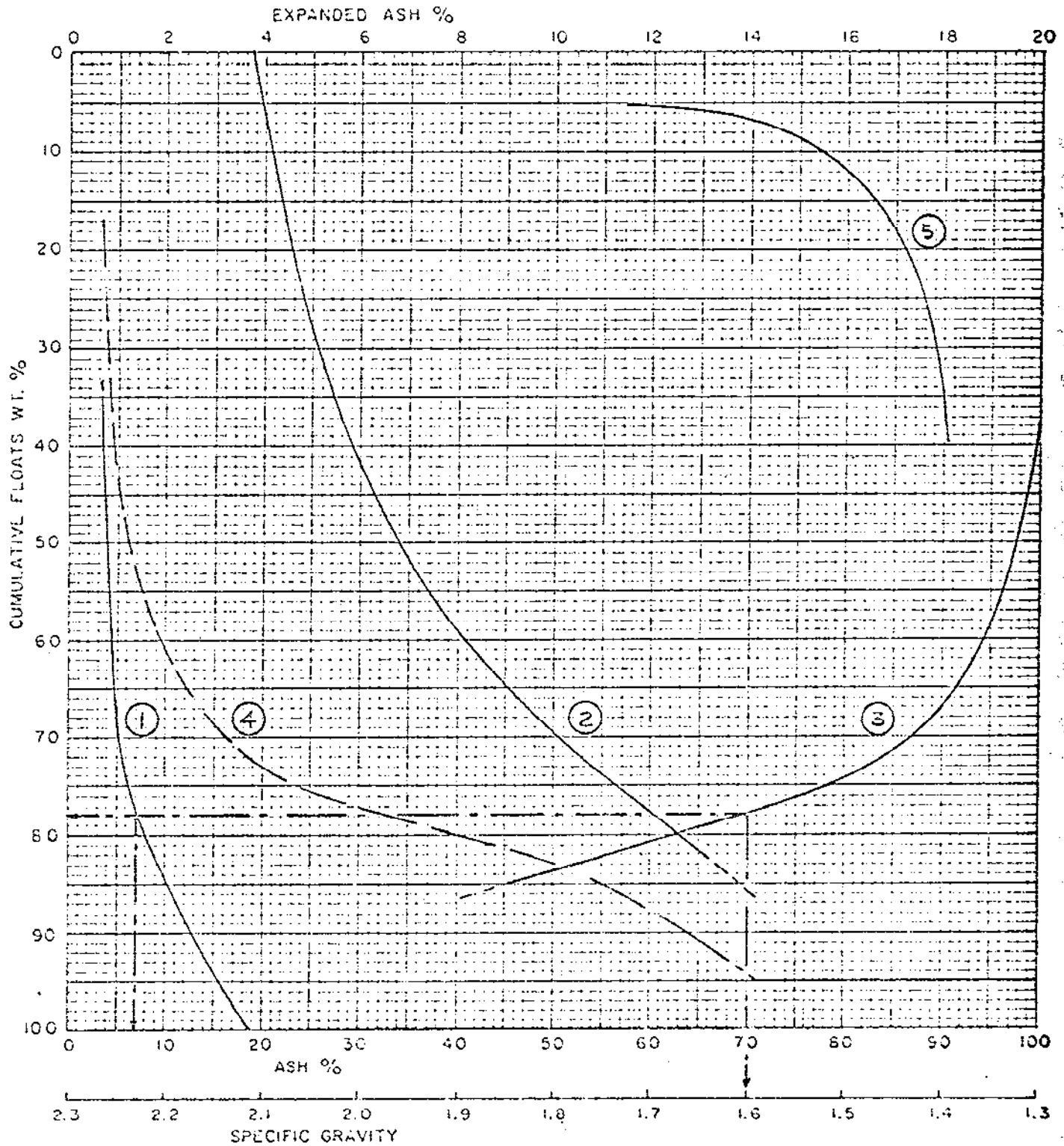
3 - SPECIFIC GRAVITY

4 - ELEMENTARY ASH

5 - NEAR GRAVITY MATERIAL

6 - EXPANDED FLOATS

WASHABILITY CURVES

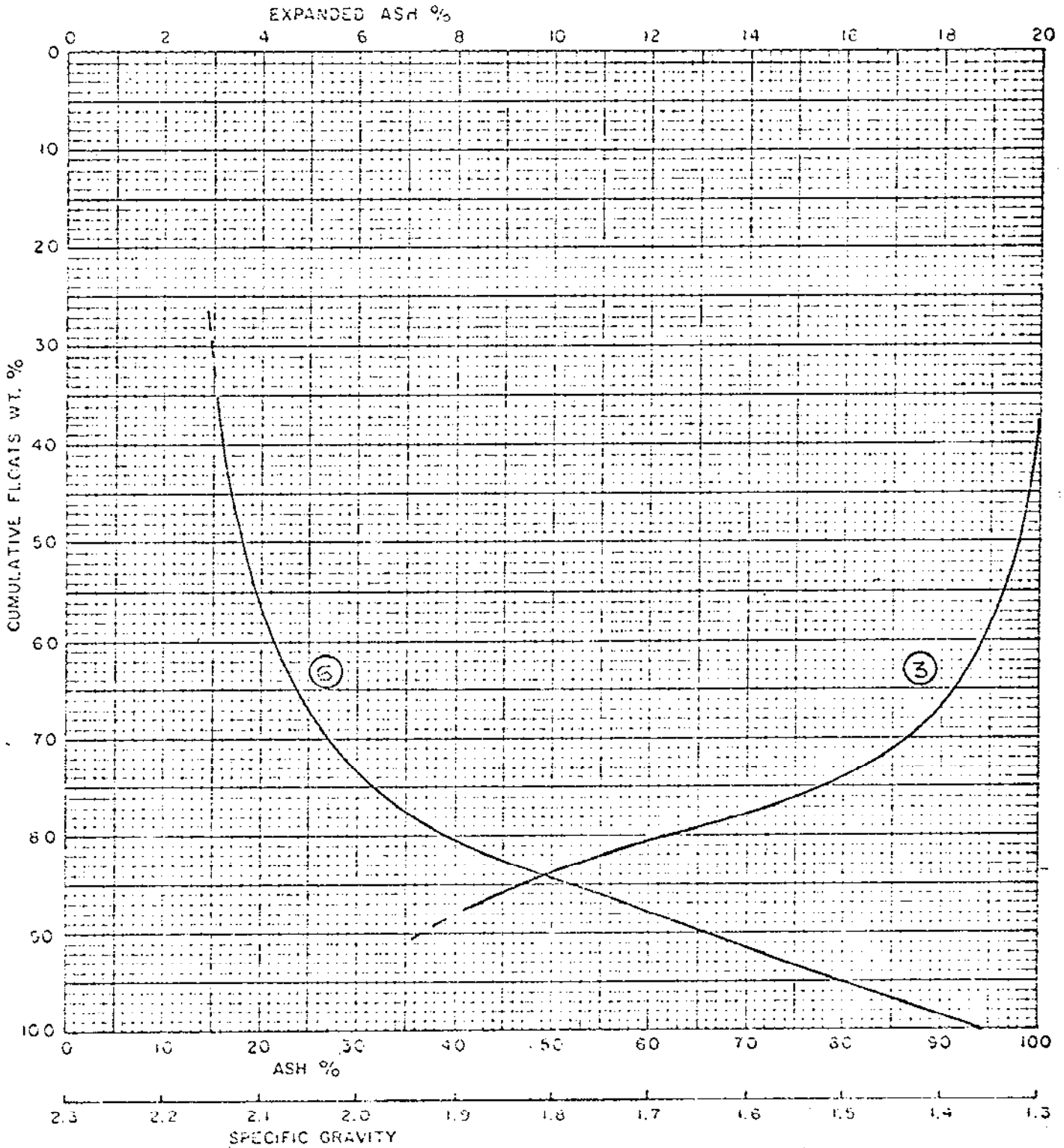


DATE: February 3, 1972.

COMPANY : Denison Mines Limited
SAMPLE : Saxon Adit #2
SIZE : + 1"

- 1 - FLOATS
- 2 - SPKKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



T A B L E 11. SAXON ADIT #2

1" x 1/4" : 34.11% of the Sample

Ash, Volatile Matter and Cumulative F. S. I.

Specific Gravity	Weight %	Ash %	V.M.%	Cum. Weight %	Cum. F.S.I.
- 1.30	18.09	2.48	22.54	18.09	9+
1.30 - 1.35	27.49	4.79	21.56	45.58	9
1.35 - 1.40	10.84	8.82	19.20	56.42	9
1.40 - 1.45	5.77	14.51	18.63	62.19	8½
1.45 - 1.50	4.37	19.78	17.73	66.56	8½
1.50 - 1.55	4.20	25.12	16.89	70.76	8
1.55 - 1.60	3.44	31.26	16.24	74.20	8
1.60 - 1.70	4.72	39.58	14.25	78.92	7
1.70 - 1.80	7.13	51.01	12.80	86.05	6
+ 1.80	13.95	67.67	11.98	100.00	5
Total	100.00	21.50	18.46		

T A B L E 12. SAXON ADIT #2

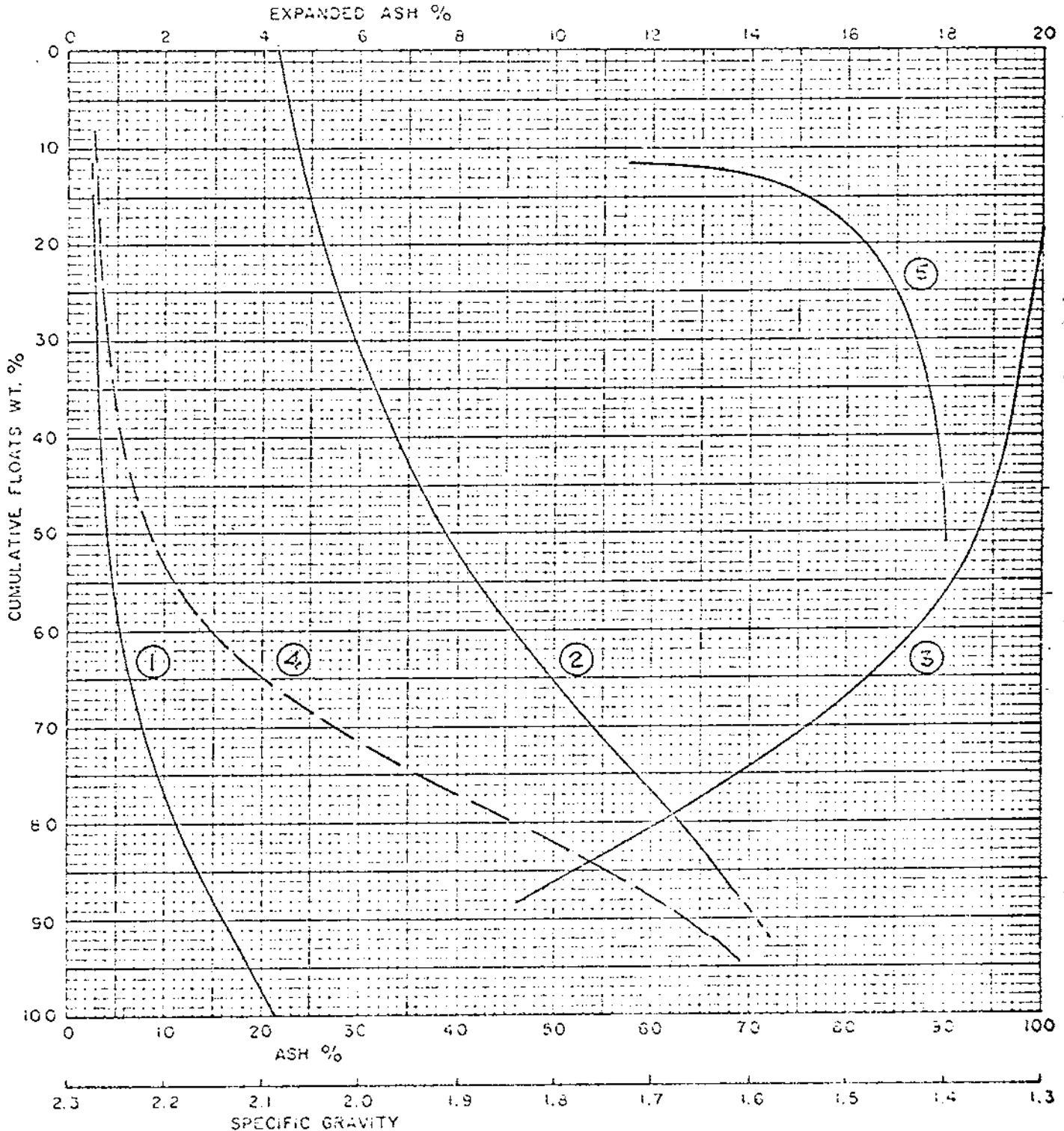
Washability Data: 1" x 1/4"

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	18.09	2.48	18.09	2.48	100.00	21.50	9.04	2.48
1.30 - 1.35	27.49	4.79	45.58	3.87	81.91	25.70	31.84	4.79
1.35 - 1.40	10.84	8.82	56.42	4.82	54.42	36.26	51.00	8.82
1.40 - 1.45	5.77	14.51	62.19	5.72	43.58	43.09	59.30	14.51
1.45 - 1.50	4.37	19.78	66.56	6.65	37.81	47.45	64.38	19.78
1.50 - 1.55	4.20	25.12	70.76	7.74	33.44	51.06	68.66	25.12
1.55 - 1.60	3.44	31.26	74.20	8.83	29.24	54.79	72.48	31.26
1.60 - 1.70	4.72	39.58	78.92	10.67	25.30	57.93	76.56	39.58
1.70 - 1.80	7.13	51.01	86.05	14.01	21.08	62.04	82.48	51.01
+ 1.80	13.95	67.67	100.00	21.50	13.95	67.67	93.03	67.67
Total	100.00	21.50						

COMPANY : Donison Mines Ltd.
 SAMPLE : Saxon Adit #2
 SIZE : 1" x 1/4"

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : February 3, 1972.

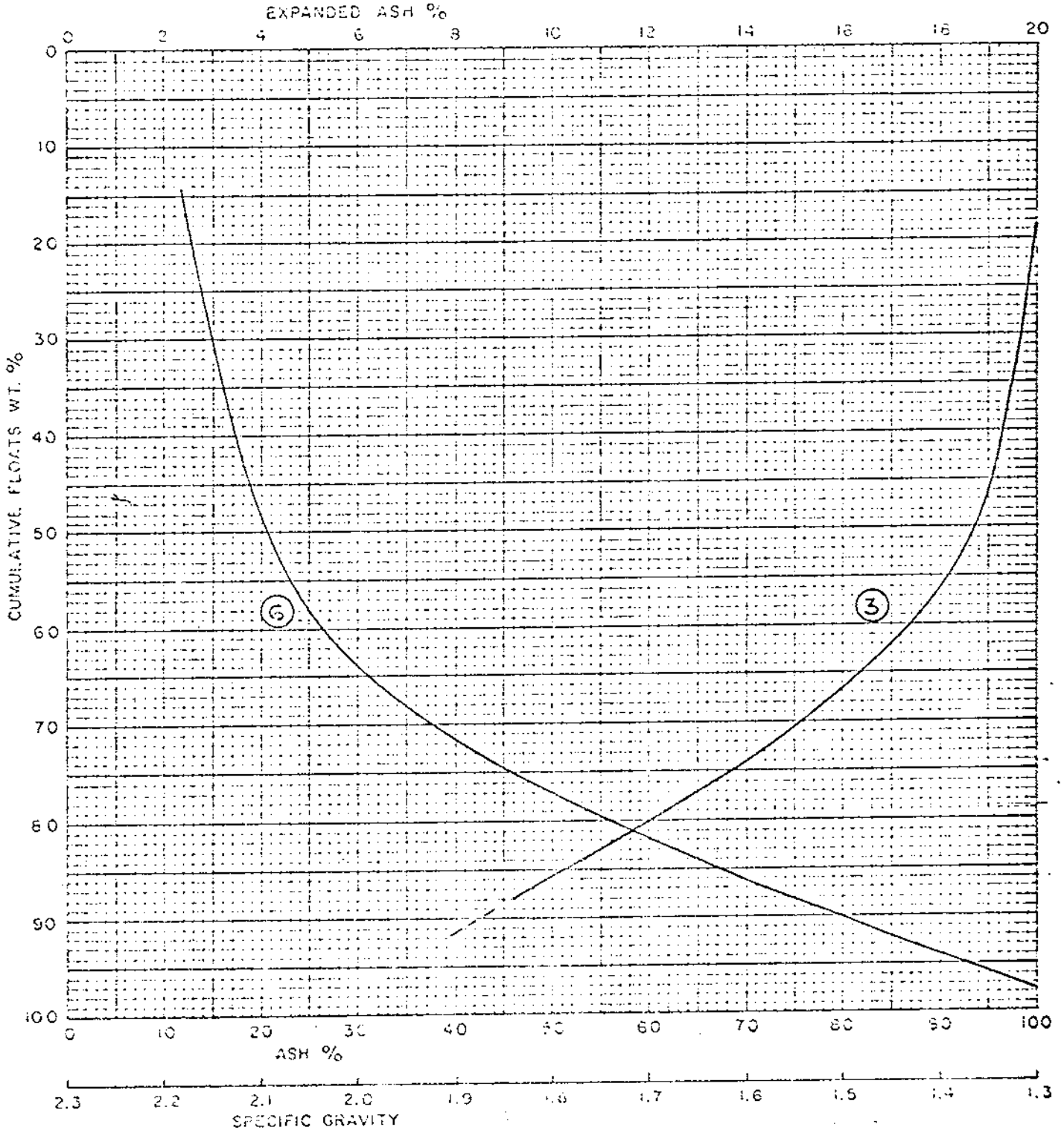
CYCLONE ENGINEERING SALES LTD.
 EDMONTON ALBERTA CANADA

CURVE LEGEND

COMPANY: Denison Mines Ltd.
SAMPLE: Saxon Adit #2
SIZE: 1" x 1/4"

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE: February 3, 1972.

CYCLONE ENGINEERING SALES LTD.
EDMONTON, ALBERTA CANADA

T A B L E 13. SAXON ADIT #2

1/4" x 28m. : 35.19% of Sample

Ash, Volatile Matter and Cumulative F.S.I.

Specific Gravity	Weight %	Ash %	V.M. %	Cum. Weight %	Cum. F.S.I.
- 1.30	35.34	2.38	23.14	35.34	9+
1.30 - 1.35	14.86	5.54	22.07	50.20	9+
1.35 - 1.40	7.57	10.28	18.92	57.77	9
1.40 - 1.45	5.51	15.75	17.53	63.28	9
1.45 - 1.50	4.06	20.85	17.27	67.34	8½
1.50 - 1.55	4.24	25.76	16.44	71.58	8½
1.55 - 1.60	3.29	30.35	15.55	74.87	8
1.60 - 1.70	6.42	36.78	14.65	81.29	8
1.70 - 1.80	4.09	45.69	14.14	85.38	8
+ 1.80	14.62	63.54	11.44	100.00	6
Total	100.00	19.77	18.96		

T A B L E 14. SAXON ADIT #2

Washability Data: 1/4" x 28 m.

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	35.34	2.38	35.34	2.38	100.00	19.77	17.67	2.38
1.30 - 1.35	14.86	5.54	50.20	3.32	64.66	29.27	42.77	5.54
1.35 - 1.40	7.57	10.28	57.77	4.23	49.80	36.35	53.99	10.28
1.40 - 1.45	5.51	15.75	63.28	5.23	42.23	41.02	60.52	15.75
1.45 - 1.50	4.06	20.85	67.34	6.17	36.72	44.82	65.31	20.85
1.50 - 1.55	4.24	25.76	71.58	7.33	32.66	47.80	69.46	25.76
1.55 - 1.60	3.29	30.35	74.87	8.34	28.42	51.08	73.23	30.35
1.60 - 1.70	6.42	36.78	81.29	10.59	25.13	53.80	78.08	36.78
1.70 - 1.80	4.09	45.69	85.38	12.27	18.71	59.64	83.33	45.69
+ 1.80	14.62	63.54	100.00	19.77	14.62	63.54	92.69	63.54
Total	100.00	19.77						

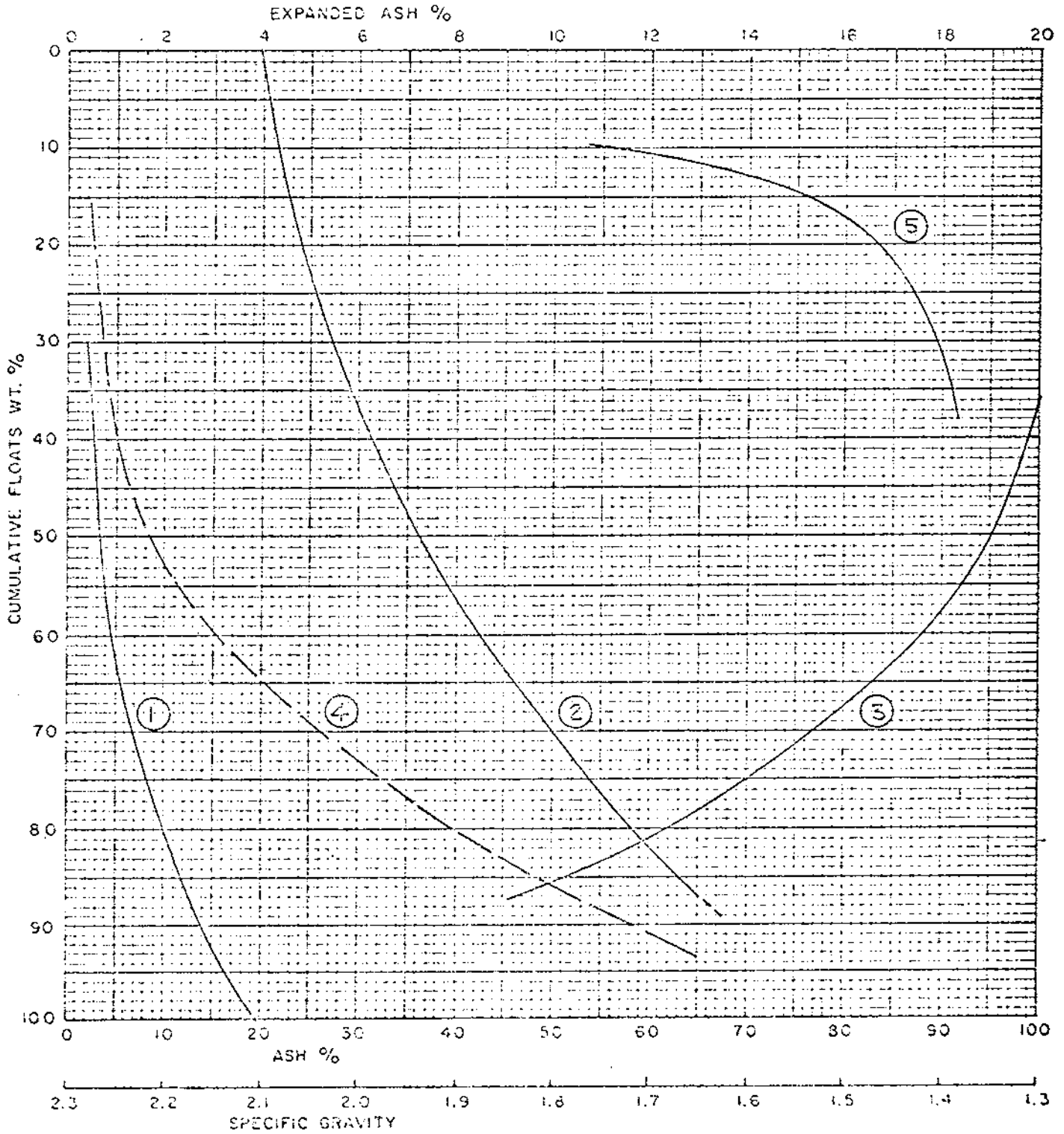
FIGURE 4

COMPANY : Denison Mines Ltd.
 SAMPLE : Saxon Adit #2
 SIZE : 1/4" x 28 m.

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : February 2, 1972.

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

FIGURE 4A

COMPANY Denison Mines Ltd.

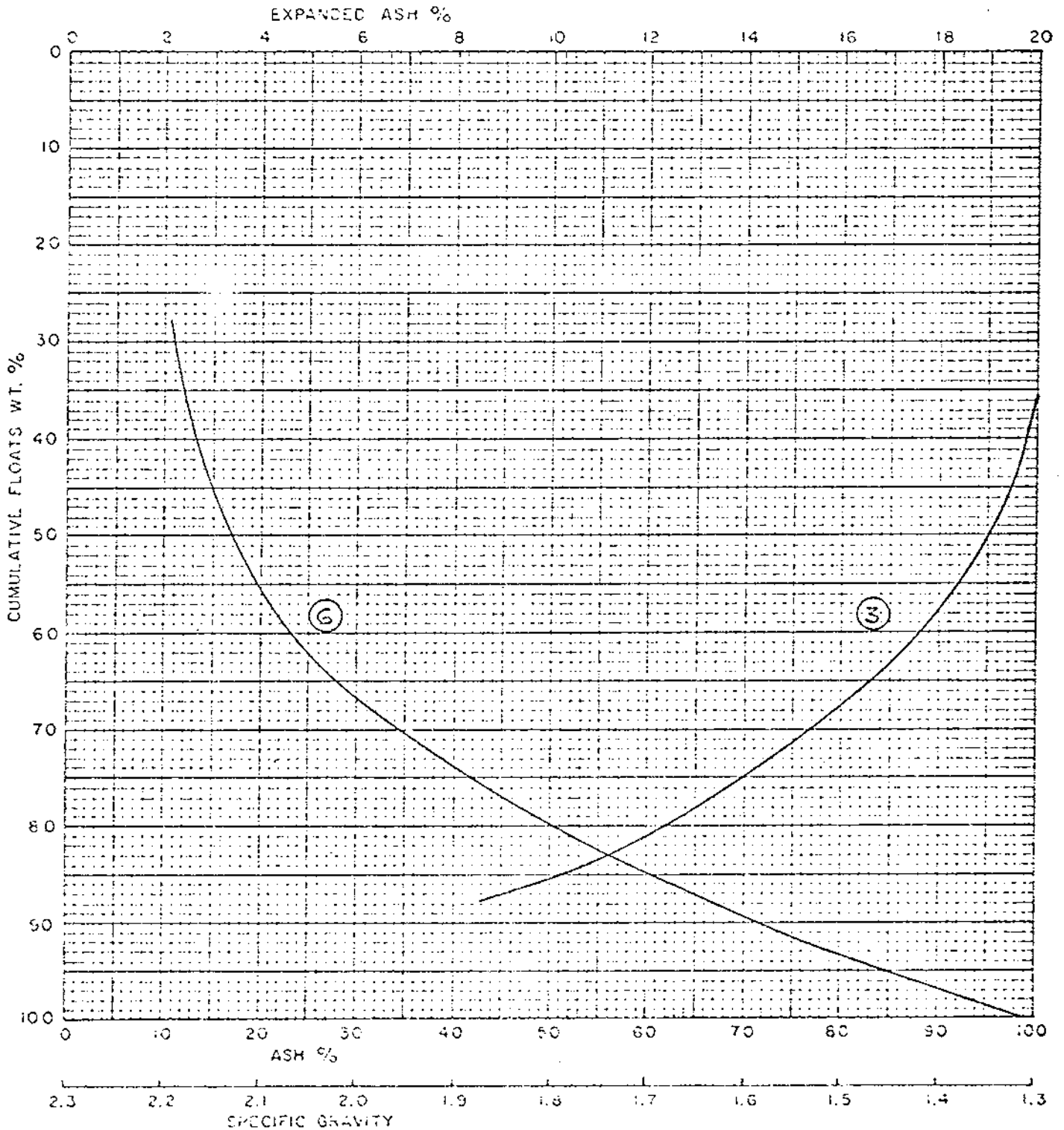
SAMPLE Saxon Adit #2

SIDE 1/4" x 28 m.

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : February 2, 1972.

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

T A B L E 15. SAXON ADIT #2

28 x 100m.: 10.35% of Sample

Ash, Volatile Matter and Cumulative F.S.I.

Specific Gravity	Weight%	Ash%	V.M.%	Cum. Weight %	Cum. F.S.I.
- 1.30	32.75	1.88	23.71	32.75	9+
1.30 - 1.35	23.17	3.27	22.45	55.92	9+
1.35 - 1.40	8.76	8.09	20.30	64.68	9
1.40 - 1.45	5.88	13.36	18.23	70.56	9
1.45 - 1.50	4.40	18.88	17.31	74.96	9
1.50 - 1.55	3.03	22.75	16.14	77.99	8½
1.55 - 1.60	3.09	27.91	15.75	81.08	8½
1.60 - 1.70	4.00	34.72	14.81	85.08	8½
1.70 - 1.80	2.67	42.67	13.92	87.75	8½
+ 1.80	12.25	65.04	10.88	100.00	8½
Total	100.00	15.75	19.85		

T A B L E 16. SAXON ADIT #2

Washability Data: 28 x 100 m.

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	32.75	1.88	32.75	1.88	100.00	15.75	16.38	1.88
1.30 - 1.35	23.17	3.27	55.92	2.46	67.25	22.50	44.33	3.27
1.35 - 1.40	8.76	8.09	64.68	3.22	44.08	32.60	60.30	8.09
1.40 - 1.45	5.88	13.36	70.56	4.06	35.32	38.68	67.62	13.36
1.45 - 1.50	4.40	18.88	74.96	4.93	29.44	43.74	72.76	18.88
1.50 - 1.55	3.03	22.75	77.99	5.63	25.04	48.11	76.48	22.75
1.55 - 1.60	3.09	27.91	81.08	6.48	22.01	51.60	79.53	27.91
1.60 - 1.70	4.00	34.72	85.08	7.80	18.92	55.47	83.08	34.72
1.70 - 1.80	2.67	42.67	87.75	8.86	14.92	61.04	86.42	42.67
+ 1.80	12.25	65.04	100.00	15.75	12.25	65.04	93.87	65.04
Total	100.00	15.75						

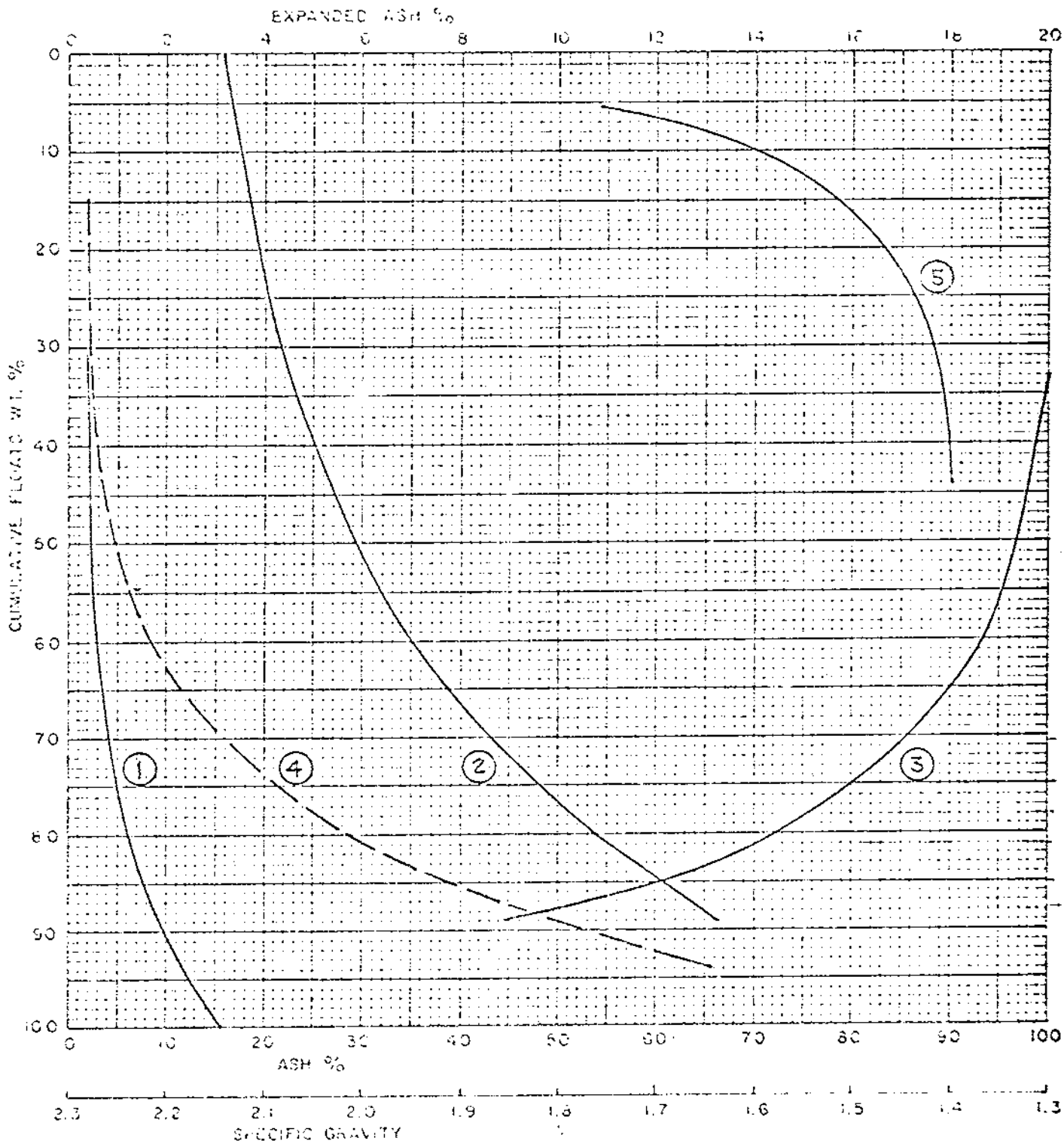
FIGURE 5

COMPANY Denison Mines Ltd.
SAMPLE Saxon Adit #2
SIZE 28m. x 100m.

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - HEAVY GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE February 2, 1972.

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

F 3 A2 5A

COMPANY Denison Mines Ltd.

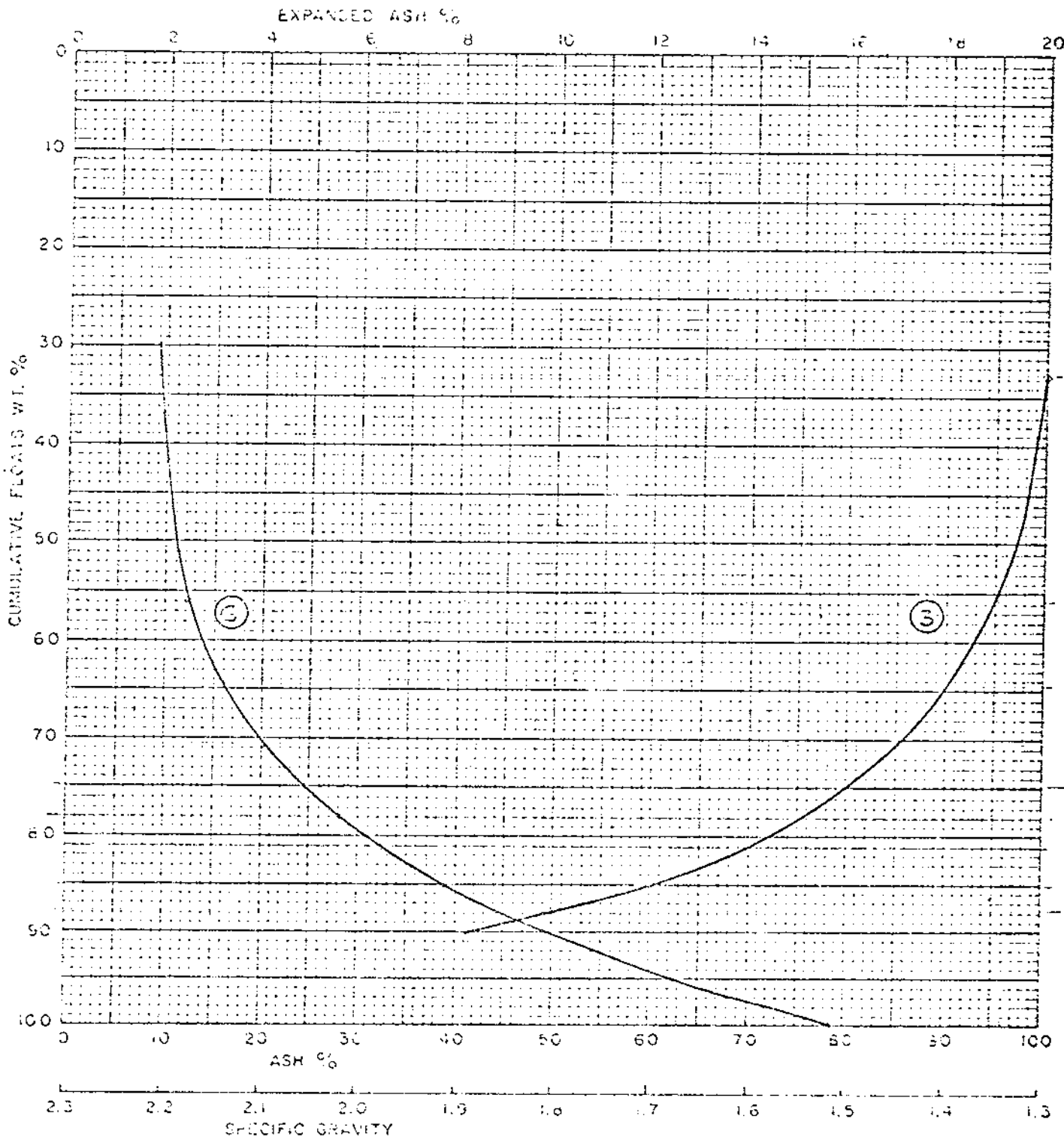
SAMPLE Saxon Adit #2

SIZE 28m. x 100m.

CURVE LEGEND

- 1 - FLOATS
- 2 - SPIKE
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - HEAVY GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : February 2, 1972.

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

TABLE 17. SANON ADIT #2

FROTH FLOTATION TESTS

28 x 100 Mesh: 10.35 % of the Sample

Solids, by weight in Slurry	8%
Time of Flotation	1.5 minutes
Flotation Recovery	63.86%
Reagents	MIBC & Kerosene

Analyses of the Products

	<u>Floats</u>	<u>Tailings</u>
Ash, %	6.38	32.70
Volatile Matter, %	21.82	15.64
Residual Moisture, %	0.63	0.38
Fixed Carbon, %	71.17	51.28
Sulphur, %	0.38	0.33
Free Swelling Index.	9	2½

T A B L E 18. SANON ADIT #2

FROTH FLOTATION TESTS

-100 Mesh: 4.16 % of Sample

Solids, by weight in Slurry	8%
Time of Flotation	1.5 minutes
Flotation Recovery	78.92
Reagents	MIBC & Kerosene

Analyses of the Products

	<u>Floats</u>	<u>Tailings</u>
Ash, %	8.74	50.62
Volatile Matter, %	20.59	14.31
Residual Moisture, %	0.59	0.66
Fixed Carbon, %	70.08	34.41
Sulphur, %	0.36	0.55
Free Swelling Index	8½	½

REPORT ON
WASHABILITY CHARACTERISTICS AND CLEANING
OF COKING COAL
FOR
DENISON MINES LTD.
SAXON ADIT #2

Submitted by,
CYCLONE ENGINEERING SALES LTD.
Edmonton, Alberta, Canada.

v Report No.: RI-72.07
Job No.: S1-84
Date: February 22, 1972.

REPORT ON
WASHABILITY CHARACTERISTICS AND CLEANING
OF COKING COAL
FOR
DENISON MINES LTD.
SAXON ADIT #2

SUMMARY:

The data presented in this report refer to washability characteristics and the washing of a 5-ton sample from Saxon Adit #2.

The sample was washed in the two-stage water cyclone system followed by after cleaning of fines by froth flotation cells. Both the middlings and the refuse from the water cyclones were cleaned in heavy medium cyclone circuit. An over all yield of 68% of clean coal was obtained.

Proximate analysis of the coal shipped is as follows:

	<u>Air Dried Basis</u>	<u>As Shipped Basis</u>
Surface Moisture, %	-	6.00
Residual Moisture, %	0.62	0.58
Ash, %	6.99	6.57
Volatile Matter, %	21.35	20.07
Fixed Carbon, %	71.04	66.78
F.S.I.	8	8
B.T.U./lb.	14,280	13,423
Sulphur, %	0.28	0.26

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INTRODUCTION:

Approximately a 5-ton sample of the coal was used for washability studies and production of clean coal.

The coal was air dried, crushed to - 3/4" and homogenized. A representative sample of about 500 lb. was taken for washability and flotation tests and the remaining portion was used for preliminary testing and production of the clean coal.

The washing circuit employed is shown in Figure 1, Section 2, of this report.

Yours very truly,

CYCLONE ENGINEERING SALES LTD.

Per: 

R.S. Sehgal, P. Eng.
Laboratory Manager

SECTION 1

WASHABILITY DATE & FLOTATION TESTS

SAXON ADIT #2

T A B L E 1 - SAXON ADIT #2

Head Sample Analysis

Ash	18.55%
Volatile Matter	19.54%
Residual Moisture	0.97%
Fixed Carbon	61.94%
F.S.I.	7½
B.T.U./lb.	12,640
Sulphur	0.32%

T A B L E 2 - SAXON ADIT #2

Size Analysis

	<u>Weight %</u>
3/4" x 28 Mesh	80.25
- 28 Mesh	<u>19.75</u>
Total	<u>100.00</u>

T A B L E 3 - SAXON ADIT #2

Incremental Float-Sink Analysis of 3/4" x 28 m.

Sp. Gr.	Wt. %	Ash %	V.M. %	R.M. %	F.C. %
- 1.30	31.94	2.38	23.83	0.95	72.84
1.30 - 1.35	20.96	5.57	21.56	0.98	71.89
1.35 - 1.40	7.85	10.20	18.58	0.81	70.41
1.40 - 1.45	5.28	15.97	17.92	0.86	65.25
1.45 - 1.50	2.95	22.59	17.29	0.92	59.20
1.50 - 1.60	6.48	29.18	16.52	0.90	53.40
1.60 - 1.70	5.14	38.23	14.75	0.97	46.05
1.70 - 1.80	4.45	47.41	12.82	0.94	38.83
+ 1.80	14.95	64.12	10.72	0.99	24.17
Total	100.00	19.79	19.05	0.94	60.22

T A B L E 4 - SAXON ADIT #2

Cumulative Float-Sink Analysis of 3/4" x 28 m.

Sp. Gr.	Wt. %	Ash %	V.M. %	R.M. %	F.C. %	F.S.I.*
- 1.30	31.94	2.38	23.83	0.95	72.84	9+
- 1.35	52.90	3.64	22.93	0.96	72.47	9
- 1.40	60.75	4.49	22.37	0.94	72.20	9
- 1.45	66.03	5.41	22.01	0.94	71.64	8½
- 1.50	68.98	6.14	21.81	0.94	71.11	8½
- 1.60	75.46	8.12	21.36	0.93	69.59	8
- 1.70	80.60	10.04	20.94	0.93	68.09	8
- 1.80	85.05	12.00	20.51	0.93	66.56	8
Total	100.00	19.79	19.05	0.94	60.22	7½

T A B L E 5 - SAXON ADIT #2

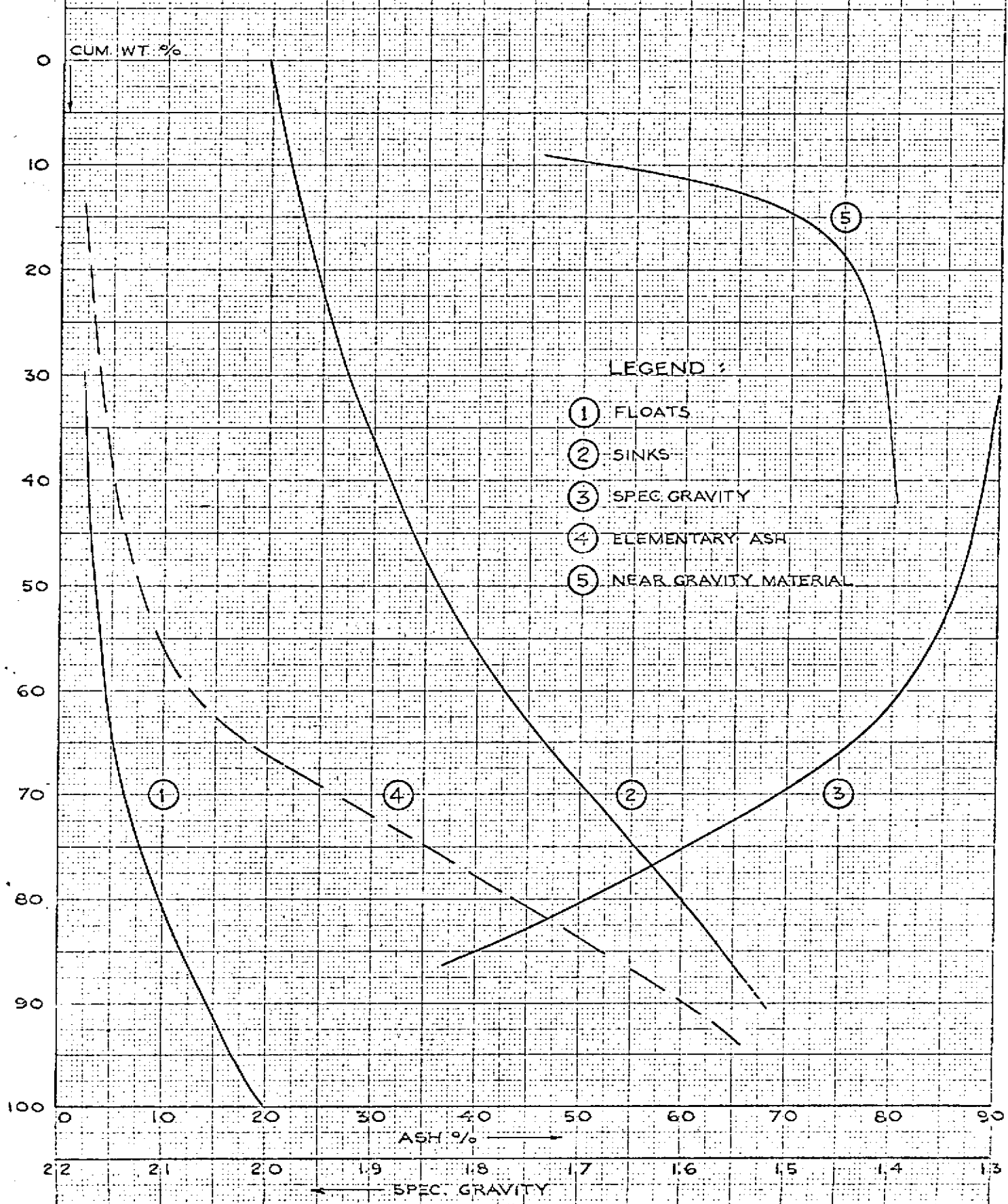
Washability Data for 3/4" x 28 m.

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	31.94	2.38	31.94	2.38	100.00	19.79	15.97	2.38
1.30 - 1.35	20.96	5.57	52.90	3.64	68.06	27.96	42.42	5.57
1.35 - 1.40	7.85	10.20	60.75	4.49	47.10	37.92	56.83	10.20
1.40 - 1.45	5.28	15.97	66.03	5.41	39.25	43.47	63.39	15.97
1.45 - 1.50	2.95	22.59	68.98	6.14	33.97	47.74	67.50	22.59
1.50 - 1.60	6.48	29.18	75.46	8.12	31.02	50.13	72.22	29.18
1.60 - 1.70	5.14	38.23	80.60	10.04	24.54	55.67	78.03	38.23
1.70 - 1.80	4.45	47.41	85.05	12.00	19.40	60.29	82.82	47.41
+ 1.80	14.95	64.12	100.00	19.79	14.95	64.12	92.52	64.12
Total	100.00	19.79						

K1-72.07 - Feb. 22/72.

FIG. DENISON MINES LTD. - ADIT #2 (SAXON)

WASHABILITY CURVES FOR 3/4" x 28m



10 X 10 TO THE CENTIMETER 46 1512
10 X 25 CM.
KLUFFEL & ESSER CO.

T A B L E 6 - SAXON ADIT #2

Froth Flotation Test of 28m x 0

Solids, by weight in Slurry	8%
Time	1.5 minutes
Reagents	MIBC & Kerosene

	<u>Floats</u>	<u>Tailings</u>
Yield	68.25%	31.75%
Ash	5.97%	37.79%
Volatile Matter	21.37%	15.01%
Residual Moisture	0.32%	0.55%
Fixed Carbon	72.34%	46.65%
F.S.I.	9	2
Sulphur	0.34%	0.50%

SECTION 2

WASHING TESTS AND ANALYSIS OF PRODUCTS

SAXON ADIT #2

TABLE 1 - SAXON ADIT #2

Distribution of Products

<u>Product</u>	<u>Wt. %</u>	<u>Ash %</u>
Clean Coal	68.00	7.00
Coarse Refuse	22.00	48.00
Flotation Refuse	<u>10.00</u>	<u>36.00</u>
Total	<u>100.00</u>	<u>18.90</u>

FIG. 1

WASHING CIRCUIT FOR SAXON - ADIT # 2

LEGEND :

- CLEAN COAL
- - - - MIDDINGS
- REFUSE
- HEAVY MEDIUM
- FINES

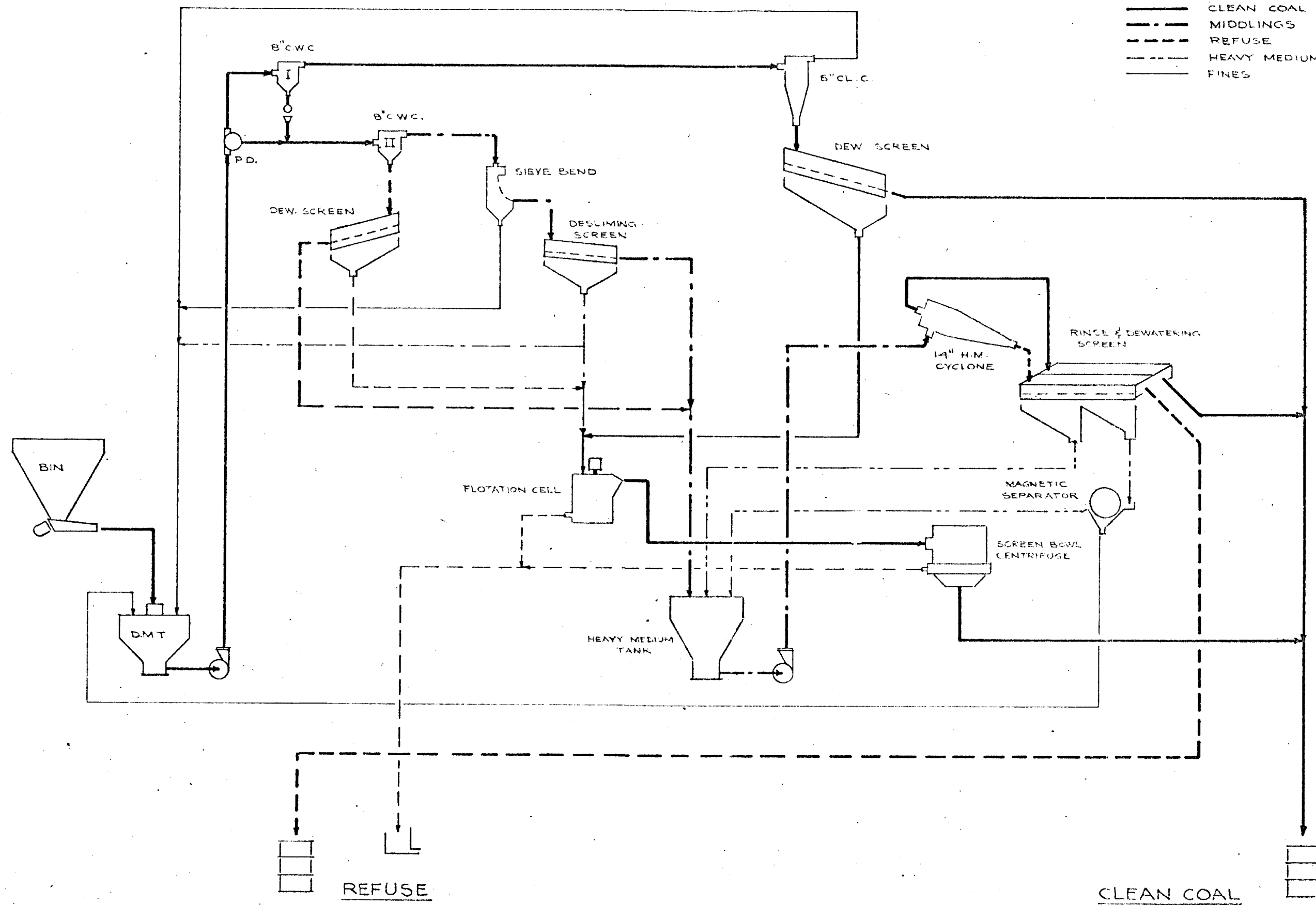


TABLE 2 - SAXON ADIT #2

Proximate Analysis of Clean Coal

Ash	6.99%
Volatile Matter	21.35%
Residual Moisture	0.62%
Fixed Carbon	71.04%
F.S.I.	8, 8, 8
B.T.U./lb.	14,280
Sulphur	0.28%

TABLE 3 - SAXON ADIT #2

Ultimate Analysis

Ash	6.99%
Carbon	82.81%
Hydrogen	4.56
Nitrogen	0.87%
Oxygen	4.45%
Sulphur	0.32%

T A B L E 4 - SAXON ADIT #2

CHARACTERISTICS OF THE ASH

Mineral Analysis of Ash

SiO ₂	58.00
Al ₂ O ₃	26.16
Fe ₂ O ₃	2.88
TiO ₂	1.15
P ₂ O ₅	1.14
CaO	3.08
MgO	1.10
Na ₂ O	0.55
K ₂ O	0.94
SO ₃	2.98

Ash Fusibility

	<u>Reducing Atmosphere</u>	<u>Oxidizing Atmosphere</u>
Initial Deformation Temperature	2515 ⁰ F.	2560 ⁰ F.
Spherical Temperature	2640 ⁺	2640 ⁺
Hemispherical Temperature	2640 ⁺	2640 ⁺
Fluid Temperature	2640 ⁺	2640 ⁺

T A B L E 5 - SAXON ADIT #2

Analysis of Coarse Reject

Ash	48.96%
Volatile Matter	13.74%
Residual Moisture	0.65%
Fixed Carbon	36.65%
F.S.I.	1
Sulphur	0.35%

T A B L E 6 - SAXON ADIT #2

Flotation Reject

Ash	35.28%
Volatile Matter	14.47%
Residual Moisture	0.55%
Fixed Carbon	49.70%
F.S.I.	2
Sulphur	0.48%

REPORT ON
WASHABILITY CHARACTERISTICS
OF
COKING COAL
FOR
DENISON MINES LTD.
SAXON ADIT #3

Submitted by,
CYCLONE ENGINEERING SALES LTD.
Edmonton, Alberta, Canada.

Report No. : RI-72.08
Job. No. : S1-84
Date: February 24, 1972.

REPORT ON
WASHABILITY CHARACTERISTICS
OF
COKING COAL
FOR
DENISON MINES LTD.
SAXON ADIT #3

SUMMARY:

The data presented in this report refer to the Washability Characteristics of Denison Mines Sample Saxon Adit #3.

The coal is of medium volatile bituminous rank. It has a very low ash content of 9%. The F.S.I. is $6\frac{1}{2}$ and indicates good coking properties.

The coal can be cleaned to 7% ash, with a yield of 96% and an F.S.I. of $7\frac{1}{2}$. The cutpoint for such cleaning is 1.80. The amount of Near Gravity Material at this cutpoint is very low, i.e. less than 3%.

The Froth Flotation Tests on fines indicates recoveries of about 90% and an F.S.I. of 8.

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INTRODUCTION:

A 1-Ton sample of Saxon Adit #3 was air dried prior to analyses and the following work was done on it:

1. A size analysis at 1", 1/4", 28 m. and 100 m.
2. A proximate analysis on all size fractions.
3. A float-sink analysis on all size fractions, except - 100 mesh, at 1.30, 1.35, 1.40, 1.45, 1.50, 1.60, 1.70 and 1.80.
4. Ash, volatile matter and free swelling index determinations on all specific gravity fractions.
5. Washability curves for all size fractions, except - 100 mesh.
6. Washability curves for + 100 mesh fraction of the raw sample by re-constituting the data in 5.
7. Froth flotation tests on 28 m. x 100 m. and 100 m. x 0 fractions.

CONCLUSIONS:

The coal is of very high coking quality and can be marketed with a minimal amount of cleaning.

Respectfully submitted,

CYCLONE ENGINEERING SALES LTD.

Per: 

R.S. Sehgal, P. Eng.
Laboratory Manager

TABLE 1. SAXON ADIT #3

Classification by Rank

Ash	9.16%
Volatile Matter	21.84%
Residual Moisture	0.71%
Fixed Carbon	68.29%
Sulphur	0.38%
B.T.U./lb.	13,100
F.S.I.	6½
Rank	mvb.

TABLE 2. SAXON ADIT #3

Analysis of Size Fraction

Size Fraction	Wt. %	Ash %	V.M. %	R.M. %	F.C. %	S. %	F.S.I.
+1"	17.53	9.62	22.46	0.64	67.28	0.37	5½
1" x 1/4"	30.69	9.91	21.52	0.76	67.81	0.35	5½
1/4" x 28 m.	35.73	8.75	21.69	0.75	68.81	0.40	7
28m. x 100m.	11.33	7.76	21.95	0.64	69.65	0.41	8
-100 mesh	4.72	8.99	22.45	0.53	68.03	0.40	7½
Total	100.00	9.16	21.84	0.71	68.29	0.38	6½

T A B L E 3. SAXON ADIT #3

Weight % and Ash % Distribution vs. Size and Specific Gravity

(Figures in brackets show the ash content of individual fractions)

Size -----	Sp. Gr.										Total
	1.30	1.35	1.40	1.45	1.50	1.60	1.70	1.80			
+1"	5.90 (3.19)	6.24 (5.54)	2.18 (10.85)	1.32 (15.70)	0.67 (17.58)	0.35 (21.53)	0.27 (35.59)	0.18 (46.14)	0.42 (61.18)	17.53 (9.18)	
1" x 1/4"	10.83 (3.04)	11.21 (4.80)	3.16 (10.06)	1.31 (15.54)	0.77 (19.80)	1.06 (25.52)	0.65 (36.94)	0.59 (47.25)	1.11 (65.44)	30.69 (9.94)	
1/4" x 28m.	20.38 (2.34)	6.93 (5.19)	2.50 (9.54)	1.19 (14.69)	0.69 (19.43)	1.05 (26.01)	0.80 (34.89)	0.59 (43.69)	1.60 (62.86)	35.73 (8.96)	
28m. x 100m.	6.18 (1.76)	2.48 (3.98)	1.04 (7.25)	0.42 (13.02)	0.22 (19.17)	0.26 (27.32)	0.16 (35.76)	0.12 (43.46)	0.45 (61.98)	11.33 (7.39)	
Total	43.29 (2.55)	26.86 (5.00)	8.88 (9.78)	4.24 (15.10)	2.35 (18.99)	2.72 (25.37)	1.88 (35.77)	1.48 (45.39)	3.58 (63.35)	95.28 (9.13)	
- 100 Mesh	This fraction forms 4.72% of the total sample and has an ash content of 8.99%, thus giving a total sample ash value of 9.12%.										

T A B L E 4. SAXON ADIT #3

Weight % & Volatile Matter % Distribution vs. Size and Specific Gravity

(Figures in brackets show the Volatile Matter Content of Individual Fractions)

Sp. Gr.										
Size	1.30	1.35	1.40	1.45	1.50	1.60	1.70	1.80		Total
+1"	5.90 (23.09)	6.24 (20.92)	2.18 (22.29)	1.32 (24.60)	0.67 (25.24)	0.35 (25.37)	0.27 (19.36)	0.18 (16.20)	0.42 (14.02)	17.53 (22.11)
1" x 1/4"	10.83 (23.12)	11.21 (21.21)	3.16 (19.70)	1.31 (21.08)	0.77 (22.18)	1.06 (21.39)	0.65 (18.09)	0.59 (16.32)	1.11 (12.79)	30.69 (21.29)
1/4" x 28 m.	20.38 (24.13)	6.93 (20.37)	2.50 (18.85)	1.19 (19.17)	0.69 (19.61)	1.05 (18.83)	0.80 (17.40)	0.59 (17.29)	1.60 (15.02)	35.73 (21.95)
28m. x 100m.	6.18 (24.63)	2.48 (21.60)	1.04 (20.38)	0.42 (18.61)	0.22 (18.13)	0.26 (17.98)	0.16 (17.70)	0.12 (16.65)	0.45 (15.32)	11.33 (22.52)
Total	43.29 (23.81)	26.86 (20.96)	8.88 (20.18)	4.24 (21.40)	2.35 (21.92)	2.72 (20.59)	1.88 (17.94)	1.48 (16.72)	3.58 (14.25)	95.28 (21.83)
- 100 Mesh	This fraction forms 4.72% of the total sample and has a volatile matter content of 22.45% thus giving a total sample volatile matter value of 21.86%.									

T A B L E 5. SAXON ADIT #3

Cumulative F.S.I. and Cumulative Weight % vs. Size and Specific Gravity

(Figures in brackets show the Cumulative F.S.I. of Cumulative Fractions)

Size \ Sp. Gr.	- 1.30	- 1.35	- 1.40	- 1.45	- 1.50	- 1.60	- 1.70	- 1.80	Raw
+1"	5.90 (8½)	12.14 (8)	14.32 (7½)	15.64 (7½)	16.31 (7)	16.66 (7)	16.93 (6½)	17.11 (6)	17.53 (5½)
1" x 1/4"	10.83 (8)	22.04 (7½)	25.20 (7½)	26.51 (7½)	27.28 (7)	28.34 (7)	28.99 (6½)	29.58 (6)	30.69 (5½)
1/4" x 28m.	20.38 (9+)	27.31 (9)	29.81 (8½)	31.00 (8)	31.69 (8)	32.74 (8)	33.54 (7½)	34.13 (7)	35.73 (7)
28m. x 100m.	6.18 (9+)	8.66 (9+)	9.70 (9)	10.12 (9)	10.34 (9)	10.60 (9)	10.76 (8½)	10.88 (8)	11.33 (8)
Total	43.29	70.15	79.03	83.27	85.62	88.34	90.22	91.70	95.28
- 100 Mesh	Weight % of this fraction is 4.72 and has a F.S.I. of 7½								

T A B L E 6. SAXON ADIT #3

Washability Data: +100m. - 95.28% of the Sample
(Reconstituted from Size Fractions)

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	45.44	2.55	45.44	2.55	100.00	9.13	22.72	2.55
1.30 - 1.35	28.19	5.00	73.63	3.49	54.56	14.62	56.54	5.00
1.35 - 1.40	9.32	9.78	82.95	4.19	26.37	24.90	78.29	9.78
1.40 - 1.45	4.45	15.10	87.40	4.75	17.05	33.16	85.17	15.10
1.45 - 1.50	2.47	18.99	89.87	5.14	12.60	39.54	88.64	18.99
1.50 - 1.60	2.85	25.37	92.72	5.76	10.13	44.55	91.29	25.37
1.60 - 1.70	1.97	35.77	94.69	6.39	7.28	52.06	93.71	35.77
1.70 - 1.80	1.55	45.39	96.24	7.02	5.31	58.11	95.47	45.39
+ 1.80	3.76	63.35	100.00	9.13	3.76	63.35	98.12	63.35
Total	100.00	9.13						

T A B L E 7. SAXON ADIT #3

Cumulative Volatile Matter for +100m.: 95.28% of Total Sample
(Reconstituted from Size Fractions)

Specific Gravity	Fractional		Cumulative			
	Wt. %	V.M. %	Floats		Sinks	
			Wt. %	V.M. %	Wt. %	V.M. %
- 1.30	45.44	23.81	45.44	23.81	100.00	21.83
1.30 - 1.35	28.19	20.96	73.63	22.72	54.56	20.19
1.35 - 1.40	9.32	20.18	82.95	22.43	26.37	19.38
1.40 - 1.45	4.45	21.40	87.40	22.38	17.05	18.94
1.45 - 1.50	2.47	21.92	89.87	22.37	12.60	18.07
1.50 - 1.60	2.85	20.59	92.72	22.31	10.13	17.13
1.60 - 1.70	1.97	17.94	94.69	22.22	7.28	15.77
1.70 - 1.80	1.55	16.72	96.24	22.13	5.31	14.97
+ 1.80	3.76	14.25	100.00	21.83	3.76	14.25
Total	100.00	21.83				

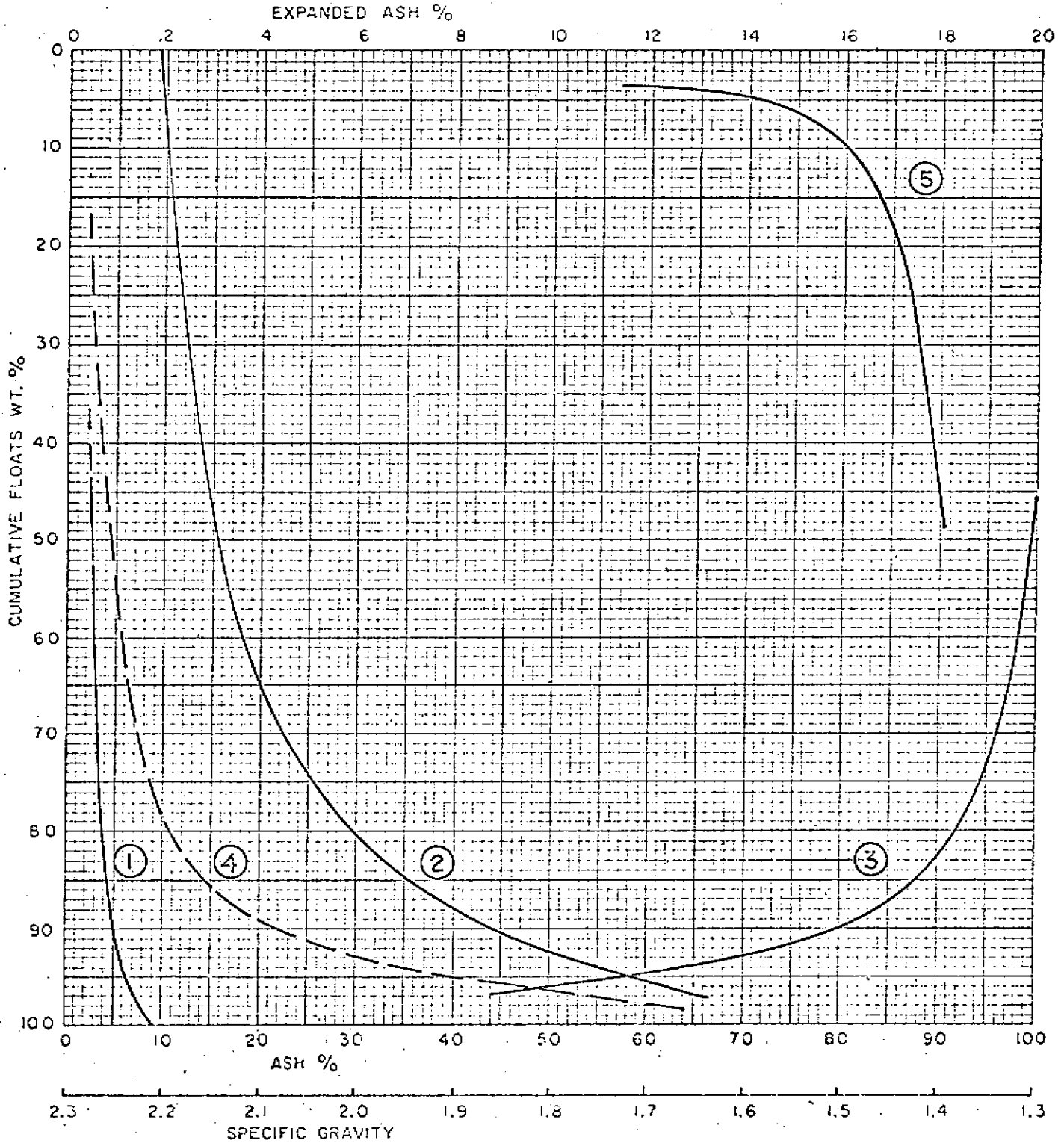
FIGURE: 1

COMPANY : Denison Mines Ltd.
SAMPLE : Saxon Adit #3
SIZE : +100 Mesh (Reconstituted)

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : February 24, 1972.

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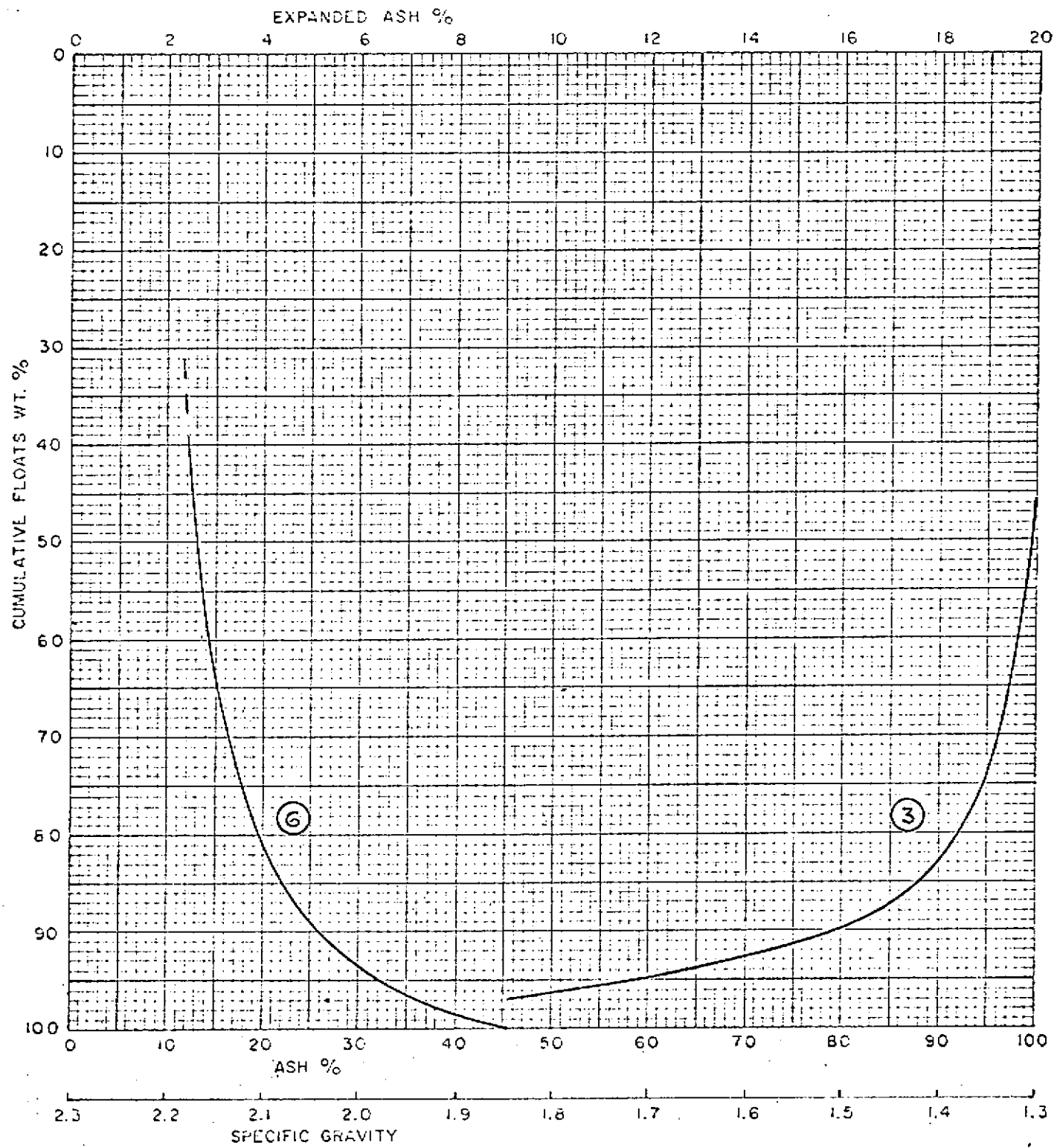
FIGURE: 1A

COMPANY : Denison Mines Ltd.
SAMPLE : Saxon Adit #3
SIZE : +100 Mesh (Reconstituted)

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : February 24, 1972.

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T A B L E 8. SAXON ADIT #3

7% Ash of Clean Coal

Yield:	96.00%
Floats Gravity:	1.80
Near Gravity Material:	3.00%
Ash:	7.00%
Volatile Matter:	22.13%
Residual Moisture:	0.68%
Fixed Carbon	70.19%
F.S.I.	7½

T A B L E 9. SAXON ADIT #3

+1" : 17.53% of Sample

Ash, Volatile Matter and Cumulative F.S.I.

Specific Gravity	Weight %	Ash %	V.M.%	Cum. Weight %	Cum. F.S.I.
- 1.30	33.68	3.19	23.09	33.68	8½
1.30 - 1.35	35.57	5.54	20.92	69.25	8
1.35 - 1.40	12.44	10.85	22.29	81.69	7½
1.40 - 1.45	7.51	15.70	24.60	89.20	7½
1.45 - 1.50	3.80	17.58	25.24	93.00	7
1.50 - 1.60	1.99	21.53	25.37	94.99	7
1.60 - 1.70	1.55	35.59	19.36	96.54	6½
1.70 - 1.80	1.04	46.14	16.20	97.58	6
+ 1.80	2.42	61.18	14.02	100.00	5½
Total	100.00	9.18	22.11		

T A B L E 10. SAXON ADIT #3

Washability Data: +1"

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	33.68	3.19	33.68	3.19	100.00	9.18	16.84	3.19
1.30 - 1.35	35.57	5.54	69.25	4.40	66.32	12.23	51.47	5.54
1.35 - 1.40	12.44	10.85	81.69	5.38	30.75	19.96	75.47	10.85
1.40 - 1.45	7.51	15.70	89.20	6.25	18.31	26.15	85.44	15.70
1.45 - 1.50	3.80	17.58	93.00	6.71	10.80	33.41	91.10	17.58
1.50 - 1.60	1.99	21.53	94.99	7.02	7.00	42.01	94.00	21.53
1.60 - 1.70	1.55	35.59	96.54	7.48	5.01	50.14	95.76	35.59
1.70 - 1.80	1.04	46.14	97.58	7.89	3.46	56.66	97.06	46.14
+ 1.80	2.42	61.18	100.00	9.18	2.42	61.18	98.79	61.18
Total	100.00	9.18						

FIGURE 2

COMPANY : Denison Mines Ltd.

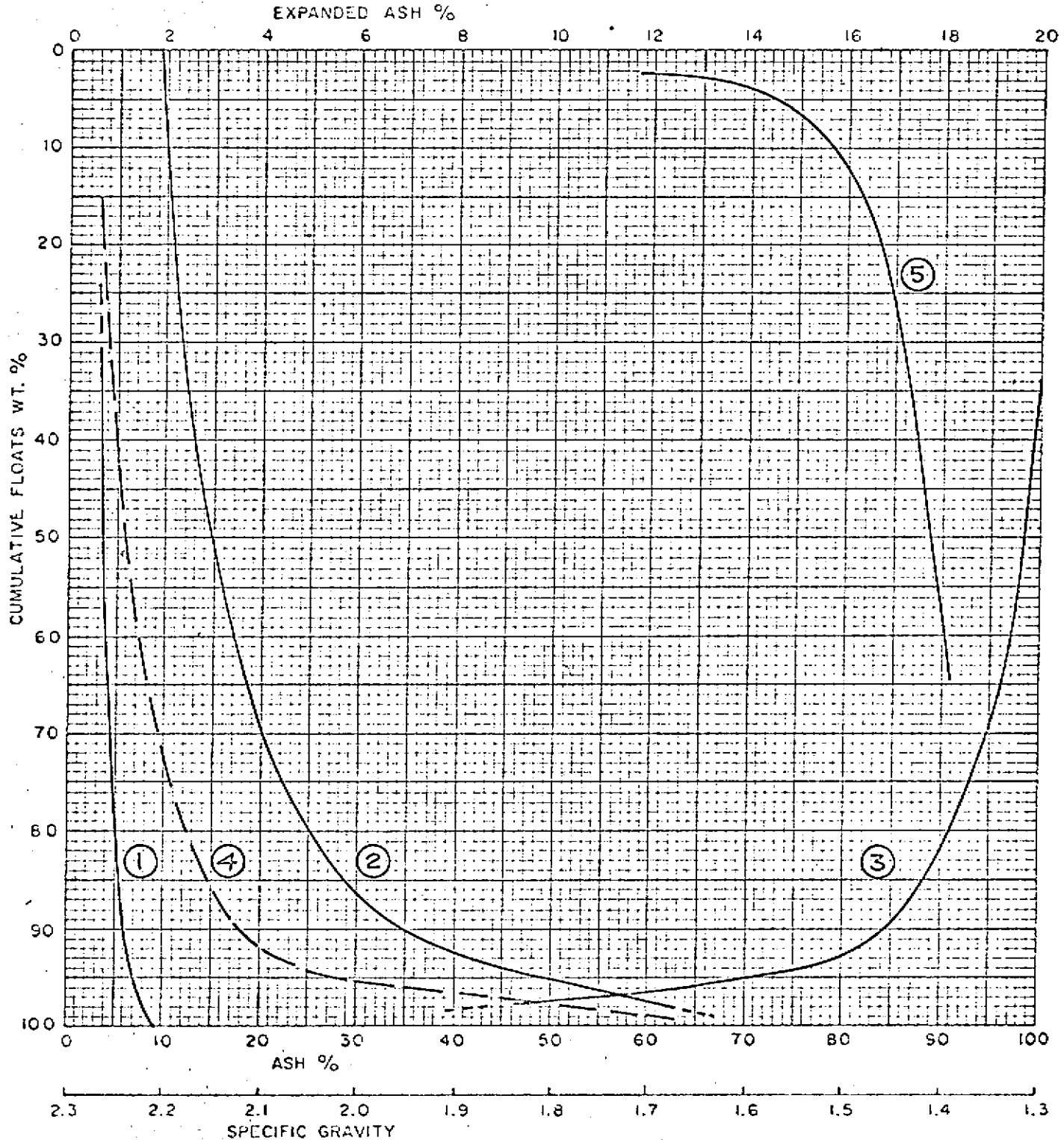
SAMPLE : Saxon Adit #3

SIZE : +1"

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : February 24, 1972.

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

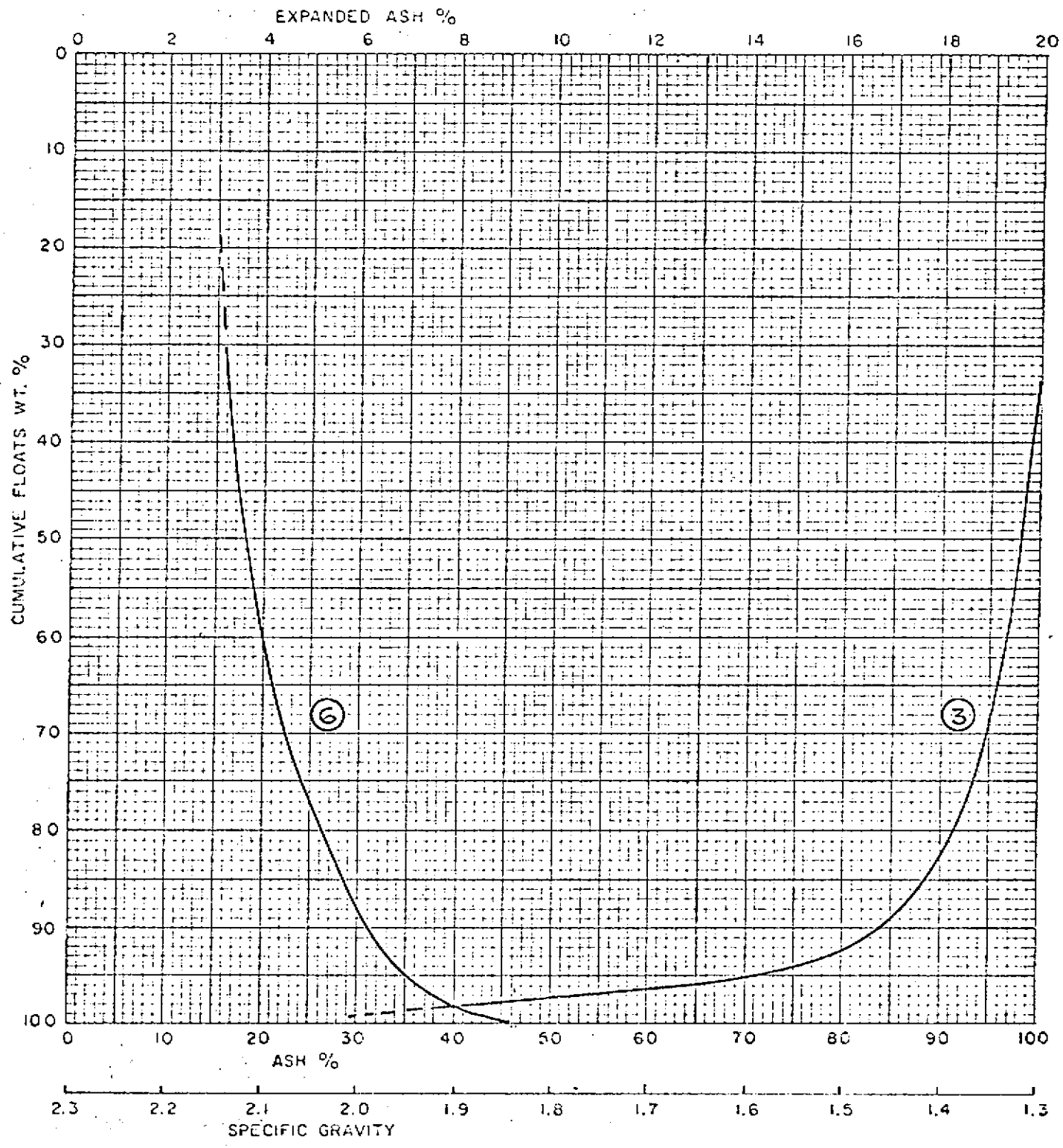
FIGURE: 2A

COMPANY : Denison Mines Ltd.
SAMPLE : Saxon Adit #3
SIZE : +1"

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : February 24 , 1972.

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T A B L E 11. SAXON ADIT #3

1" x 1/4": 30.69 %of Sample

Ash, Volatile Matter and Cumulative F.S.I.

Specific Gravity	Weight %	Ash %	V.M.%	Cum. Weight %	Cum. F.S.I.
- 1.30	35.29	3.04	23.12	35.29	8
1.30 - 1.35	36.54	4.80	21.21	71.83	7½
1.35 - 1.40	10.31	10.06	19.70	82.14	7½
1.40 - 1.45	4.28	15.54	21.08	86.42	7½
1.45 - 1.50	2.52	19.80	22.18	88.94	7
1.50 - 1.60	3.45	25.52	21.39	92.39	7
1.60 - 1.70	2.09	36.94	18.09	94.48	6½
1.70 - 1.80	1.91	47.25	16.32	96.39	6
+ 1.80	3.61	65.44	12.79	100.00	5½
Total	100.00	9.94	21.29		

T A B L E 12. SAXON ADIT #3

Washability Data: 1" x 1/4"

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt.%	Ash %	Floats		Sinks		Wt.%	Ash %
			Wt.%	Ash %	Wt.%	Ash %		
- 1.30	35.29	3.04	35.29	3.04	100.00	9.94	17.64	3.04
1.30 - 1.35	36.54	4.80	71.83	3.94	64.71	13.71	53.56	4.80
1.35 - 1.40	10.31	10.06	82.14	4.70	28.17	25.27	76.98	10.06
1.40 - 1.45	4.28	15.54	86.42	5.24	17.86	34.05	84.28	15.54
1.45 - 1.50	2.52	19.80	88.94	5.65	13.58	39.88	87.68	19.80
1.50 - 1.60	3.45	25.52	92.39	6.40	11.06	44.46	90.67	25.52
1.60 - 1.70	2.09	36.94	94.48	7.07	7.61	53.05	93.43	36.94
1.70 - 1.80	1.91	47.25	96.39	7.87	5.52	59.15	95.44	47.25
+ 1.80	3.61	65.44	100.00	9.94	3.61	65.44	98.19	65.44
Total	100.00	9.94						

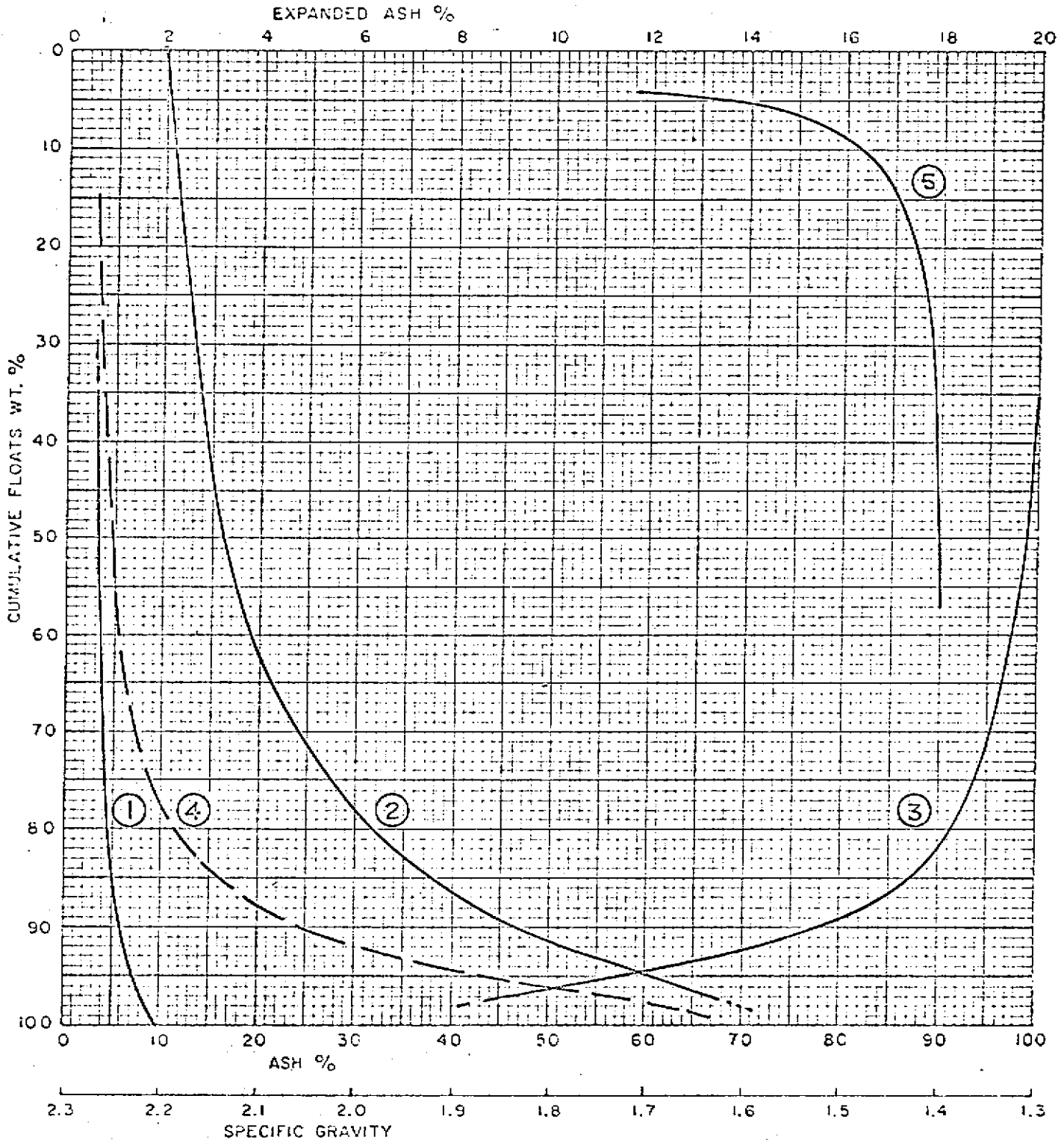
FIGURE : 3

COMPANY : Denison Mines Ltd.
SAMPLE : Saxon Adit #3
SIZE : 1" x 1/4"

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : February 24, 1972.

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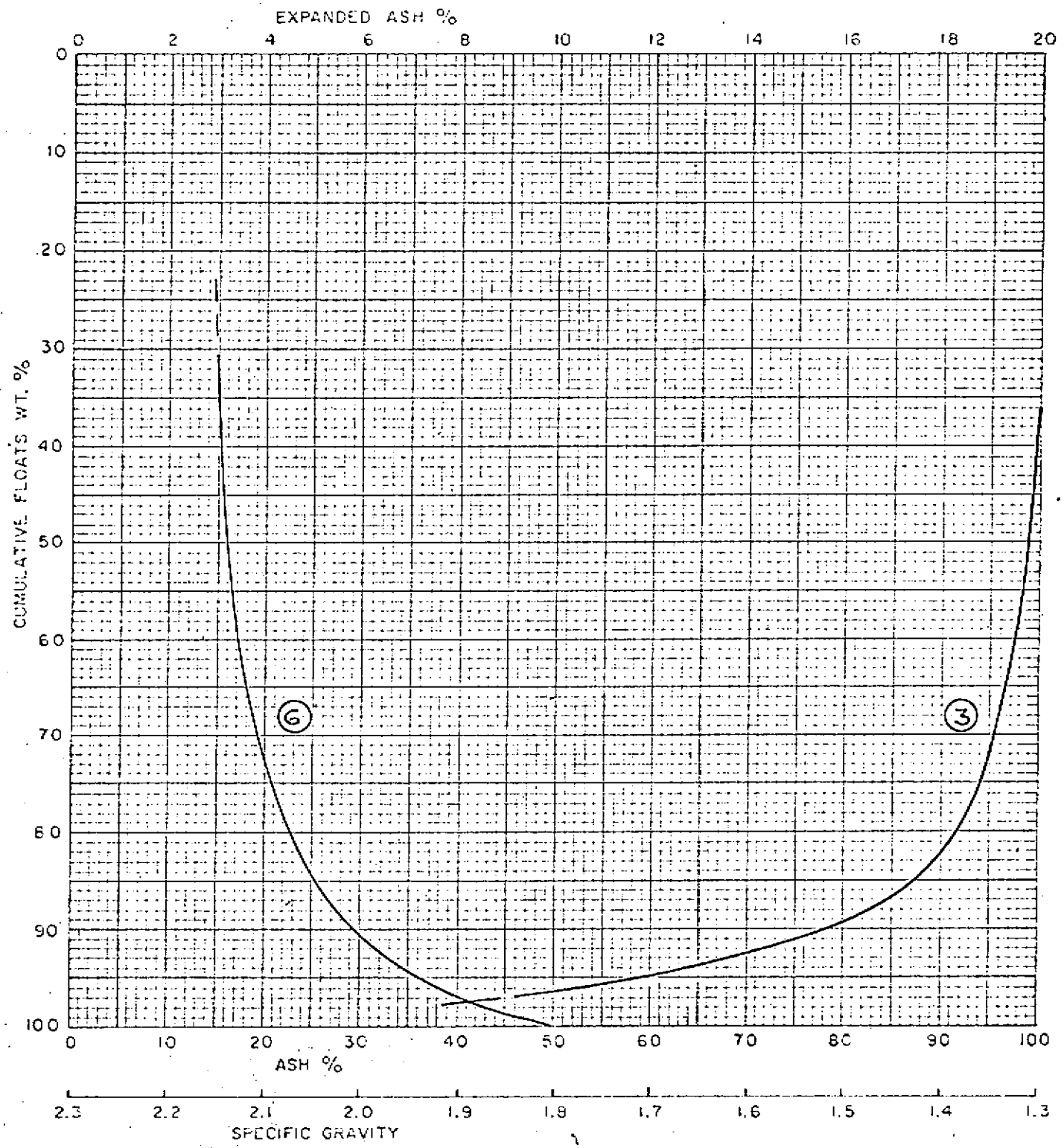
FIGURE : 3A

COMPANY : Denison Mines Ltd.
 SAMPLE : Saxon Adit #3
 SIZE : 1" x 1/4"

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : February 24, 1972.

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

T A B L E 13. SAXON ADIT #3

1/4" x 28m. : 35.73 % of Sample

Ash, Volatile Matter and Cumulative F.S.I.

Specific Gravity	Weight %	Ash %	V.M.%	Cum. Weight %	Cum. F.S.I.
- 1.30	57.03	2.34	24.13	57.03	9+
1.30 - 1.35	19.39	5.19	20.37	76.42	9
1.35 - 1.40	6.99	9.54	18.85	83.41	8½
1.40 - 1.45	3.34	14.69	19.17	86.75	8
1.45 - 1.50	1.94	19.43	19.61	88.69	8
1.50 - 1.60	2.93	26.01	18.83	91.62	8
1.60 - 1.70	2.23	34.89	17.40	93.85	7½
1.70 - 1.80	1.67	43.69	17.29	95.52	7
+ 1.80	4.48	62.86	15.02	100.00	7
Total	100.00	8.96	21.95		

T A B L E 14. SAXON ADIT #3

Washability Data: 1/4" x 28 m.

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	57.03	2.34	57.03	2.34	100.00	8.96	28.51	2.34
1.30 - 1.35	19.39	5.19	76.42	3.06	42.97	17.75	66.73	5.19
1.35 - 1.40	6.99	9.54	83.41	3.61	23.58	28.08	79.91	9.54
1.40 - 1.45	3.34	14.69	86.75	4.03	16.59	35.89	85.03	14.69
1.45 - 1.50	1.94	19.43	88.69	4.37	13.25	41.23	87.72	19.43
1.50 - 1.60	2.93	26.01	91.62	5.06	11.31	44.97	90.15	26.01
1.60 - 1.70	2.23	34.89	93.85	5.77	8.38	51.60	92.74	34.89
1.70 - 1.80	1.67	43.69	95.52	6.43	6.15	57.65	94.68	43.69
+ 1.80	4.48	62.86	100.00	8.96	4.48	62.86	97.76	62.86
Total	100.00	8.96						

FIGURE: 4

COMPANY: Denison Mines-Ltd.

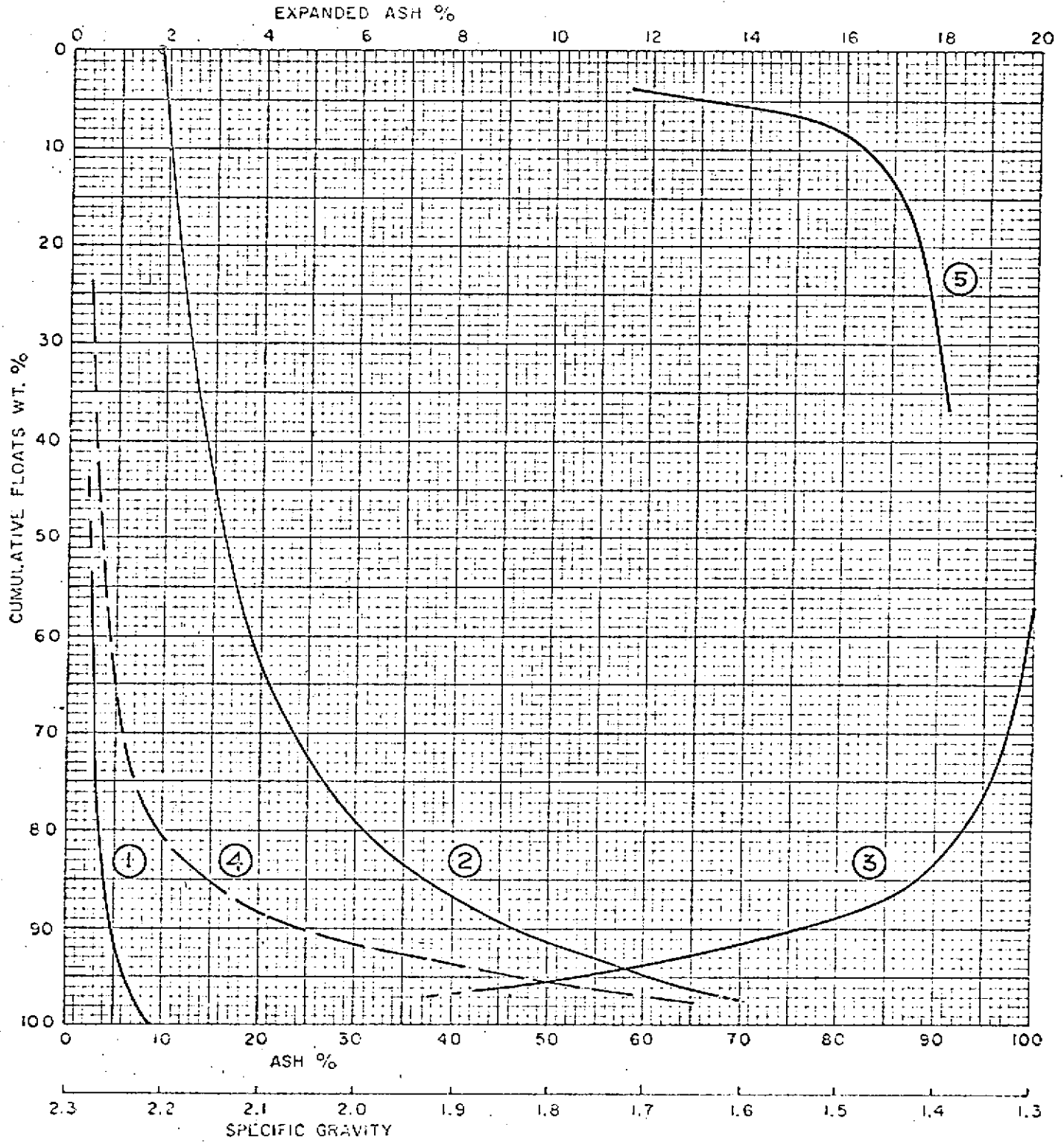
SAMPLE: Saxon Adit #3

SIZE: 1/4" x 28m.

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE: February 24, 1972.

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FIGURE: 4A

COMPANY : Denison Mines Ltd.

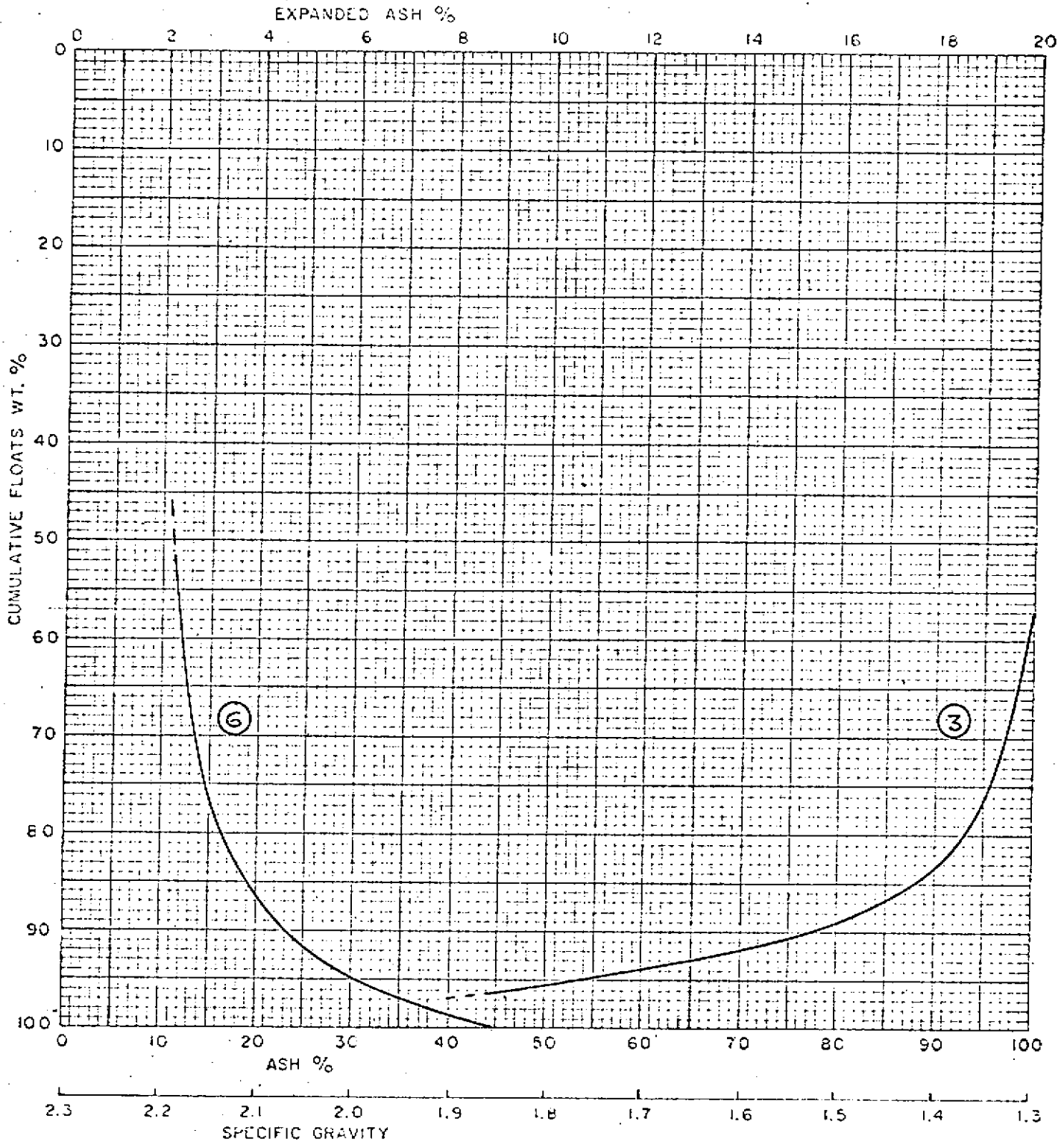
SAMPLE : Saxon Adit #3

SIZE : 1/4" x 28m.

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : February 24, 1972.

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T A B L E 15. SAXON ADIT #3

28m. x 100m.: 11.33 % of Sample

Ash, Volatile Matter and Cumulative F.S.I.

Specific Gravity	Weight %	Ash %	V.M. %	Cum. Weight %	Cum. F.S.I.
- 1.30	54.53	1.76	24.63	54.53	9+
1.30 - 1.35	21.90	3.98	21.60	76.43	9+
1.35 - 1.40	9.19	7.25	20.38	85.62	9
1.40 - 1.45	3.70	13.02	18.61	89.32	9
1.45 - 1.50	1.97	19.17	18.13	91.29	9
1.50 - 1.60	2.30	27.32	17.98	93.59	9
1.60 - 1.70	1.41	35.76	17.70	95.00	8½
1.70 - 1.80	1.05	43.46	16.65	96.05	8
+ 1.80	3.95	61.98	15.32	100.00	8
Total	100.00	7.39	22.52		

T A B L E 16. SAXON ADIT #3

Washability Data: 28m x 100 m.

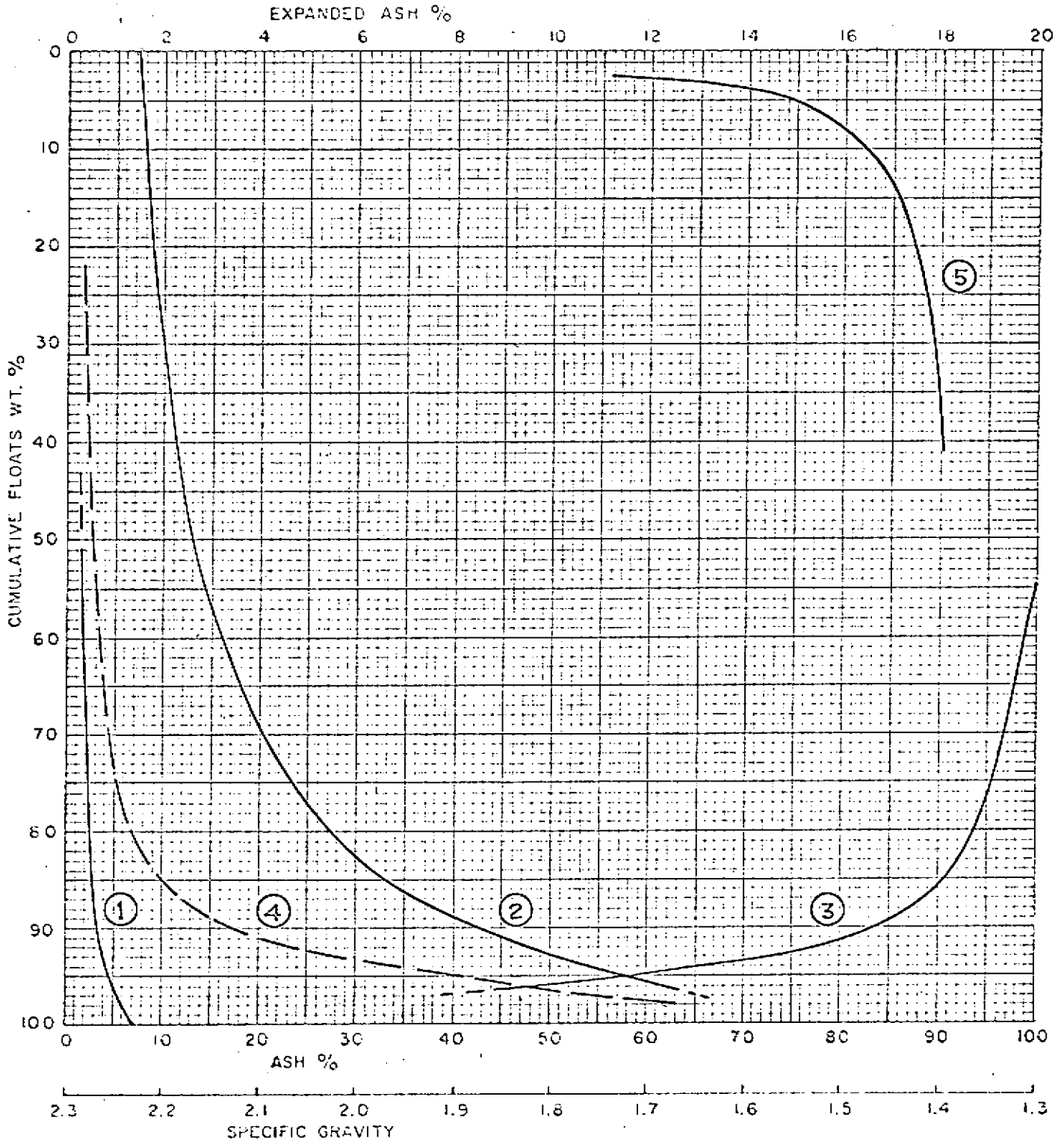
Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	54.53	1.76	54.53	1.76	100.00	7.39	27.26	1.76
1.30 - 1.35	21.90	3.98	76.43	2.40	45.47	14.15	65.48	3.98
1.35 - 1.40	9.19	7.25	85.62	2.92	23.57	23.60	81.03	7.25
1.40 - 1.45	3.70	13.02	89.32	3.34	14.38	34.05	87.47	13.02
1.45 - 1.50	1.97	19.17	91.29	3.68	10.68	41.34	90.30	19.17
1.50 - 1.60	2.30	27.32	93.59	4.26	8.71	46.35	92.44	27.32
1.60 - 1.70	1.41	35.76	95.00	4.73	6.41	53.18	94.29	35.76
1.70 - 1.80	1.05	43.46	96.05	5.15	5.00	58.09	95.53	43.46
+ 1.80	3.95	61.98	100.00	7.39	3.95	61.98	98.03	61.98
Total	100.00	7.39						

COMPANY : Denison Mines Ltd.
 SAMPLE : Saxon Adit #3
 SIZE : 28m x 100 m.

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : February 24, 1972.

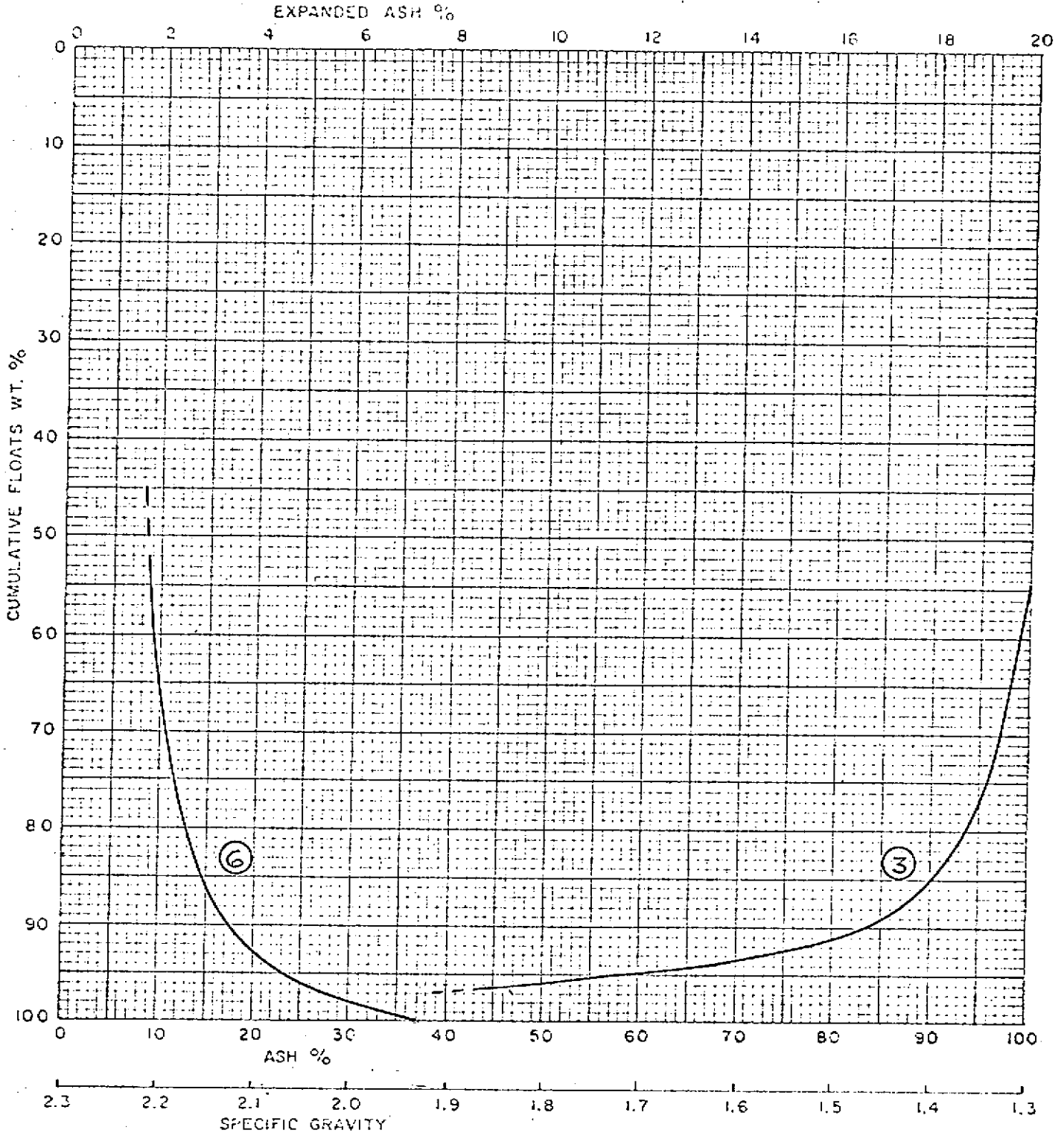
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FIGURE: 5A

COMPANY : Denison Mines Ltd.
SAMPLE : Saxon Adit #3
SIZE : 28m. x 100 m

- CURVE LEGEND
- 1 - FLOATS
 - 2 - SINKS
 - 3 - SPECIFIC GRAVITY
 - 4 - ELEMENTARY ASH
 - 5 - NEAR GRAVITY MATERIAL
 - 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : February 24, 1972.

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T A B L E 17. SAXON ADIT #3

FROTH FLOTATION TESTS

28m. x 100 Mesh: 11.33% of Sample

Solids, by weight in Slurry	8%
Time of Flotation	1.5 minutes
Flotation Recovery	89.17%
Reagents	MIBC & Kerosene

Analyses of the Products

	<u>Concentrate</u>	<u>Tailings</u>
Ash, %	5.02	27.99
Volatile Matter, %	23.20	19.42
Residual Moisture, %	0.53	0.57
Fixed Carbon, %	71.25	52.02
F.S.I.	8½	3
Sulphur, %	0.35	0.49

T A B L E 18. SAXON ADIT #3

FROTH FLOTATION TESTS

- 100 Mesh: 4.72% of Sample

Solids, by weight in Slurry	8%
Time of Flotation	1.5 minutes
Flotation Recovery	94.22%
Reagents	MIBC & Kerosene

Analyses of the Products

	<u>Concentrate</u>	<u>Tailings</u>
Ash, %	5.62	55.28
Volatile Matter, %	23.15	22.46
Residual Moisture, %	0.65	0.56
Fixed Carbon, %	70.58	21.70
F.S.I.	7½	N.A.
Sulphur, %	0.35	0.97

REPORT ON
WASHABILITY CHARACTERISTICS AND CLEANING
OF COKING COAL
FOR
DENISON MINES LTD.

SAXON ADIT #3

Submitted by,
CYCLONE ENGINEERING SALES LTD.
Edmonton, Alberta, Canada.

Report No. : Ri-72.11
Job. No. : SI-84
Date: March 30, 1972.

REPORT ON
WASHABILITY CHARACTERISTICS AND CLEANING
OF COXING COAL
FOR
DENISON MINES LTD.
SAXON ADIT #3

SUMMARY:

The data presented in this report refer to washability characteristics and the washing of a 5-Ton sample of Saxon Adit #3.

The coal was cleaned in a 2-Stage Compound Water Cyclone System.

Yield of 85% was obtained. The analysis of the clean coal is as follows:

	<u>Air Dried Basis</u>	<u>As Shipped Basis</u>
Surface Moisture, %	-	6.00
Residual Moisture, %	0.40	0.38
Ash, %	5.42	5.09
Volatile Matter, %	22.75%	21.39%
Fixed Carbon, %	71.43	67.14
F.S.I.	7½	7½
B.T.U./lb.	14,680	13,799
Sulphur, %	0.46	0.43

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INTRODUCTION:

Approximately a 5-ton sample of the coal was used for washability studies and production of clean coal.

The coal was air dried, crushed to $-3/4''$ and homogenized. A representative sample of about 500 lb. was taken for washability and flotation tests and the remaining portion was used for preliminary testing and production of clean coal.

The washing circuit employed is shown in Figure 1, Section 2, of this report.

Respectfully submitted,

CYCLONE ENGINEERING SALES LTD.

Per: _____
R.S. Sehgal, P. Eng.,
Laboratory Manager.

SECTION I

WASHABILITY DATA & FLOTATION TESTS

SAXON ADIT #3

T A B L E 1 - SAXON ADIT #3

Head Sample Analysis

Ash	8.55%
Volatile Matter	22.44%
Residual Moisture	0.59%
Fixed Carbon	68.42%
Free Swelling Index	6½
B.F.U./lb.	13,100
Sulphur	0.36%

T A B L E 2 - SAXON ADIT #3

Size Analysis

	<u>Weight %</u>
3/4" x 28 m.	82.09
-28 Mesh	<u>17.91</u>
Total	<u>100.00</u>

T A B L E 3 - SAXON ADIT #3

Incremental Float-Sink Analysis of 3/4" x 28 Mesh

Sp. Gr.	Wt. %	Ash %	V.M. %	R.M. %	F.C. %
- 1.30	45.24	2.79	24.86	0.50	71.85
1.30 - 1.35	29.58	5.53	20.88	0.49	73.10
1.35 - 1.40	9.14	10.39	19.63	0.56	69.42
1.40 - 1.45	3.89	14.68	20.17	0.56	64.59
1.45 - 1.50	2.19	18.70	21.72	0.54	59.04
1.50 - 1.60	3.20	24.82	21.88	0.55	52.75
1.60 - 1.70	2.01	35.05	20.06	0.49	44.40
1.70 - 1.80	1.27	44.10	17.15	0.56	38.19
+ 1.80	3.48	60.78	14.78	0.53	23.91
Total	100.00	9.00	22.31	0.51	68.18

T A B L E 4 - SAXON ADIT #3

Cumulative Float-Sink Analysis of 3/4" x 28 Mesh

Sp. Gr.	Wt. %	Ash %	V.M. %	R.M. %	F.C. %	F.S.I.*
- 1.30	45.24	2.79	24.86	0.50	71.85	9
- 1.35	74.82	3.87	23.29	0.50	72.34	8
- 1.40	83.96	4.58	22.89	0.50	72.03	7½
- 1.45	87.85	5.03	22.77	0.51	71.69	7½
- 1.50	90.04	5.36	22.74	0.51	71.39	7
- 1.60	93.24	6.03	22.71	0.51	70.75	7
- 1.70	95.25	6.64	22.66	0.51	70.19	6½
- 1.80	96.52	7.14	22.58	0.51	69.77	6½
Total	100.00	9.00	22.31	0.51	68.18	6

*F.S.I. by actual determination.

T A B L E 5 - SAXON ADIT #3

Washability Data for 3/4" x 28 Mesh

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
-1.30	45.24	2.79	45.24	2.79	100.00	9.00	22.62	2.79
1.30 - 1.35	29.58	5.53	74.82	3.87	57.76	14.13	60.03	5.53
1.35 - 1.40	9.14	10.39	83.96	4.58	25.18	24.24	79.39	10.39
1.40 - 1.45	3.89	14.68	87.85	5.03	16.04	32.14	85.91	14.68
1.45 - 1.50	2.19	18.70	90.04	5.36	12.15	37.72	88.94	18.70
1.50 - 1.60	3.20	24.82	93.24	6.03	9.96	41.91	91.64	24.82
1.60 - 1.70	2.01	35.05	95.25	6.64	6.76	50.00	94.25	35.05
1.70 - 1.80	1.27	44.10	96.52	7.14	4.75	56.32	95.88	44.10
+ 1.80	3.48	60.78	100.00	9.00	3.48	60.78	98.26	60.78
Total	100.00	9.00						

- 7 -

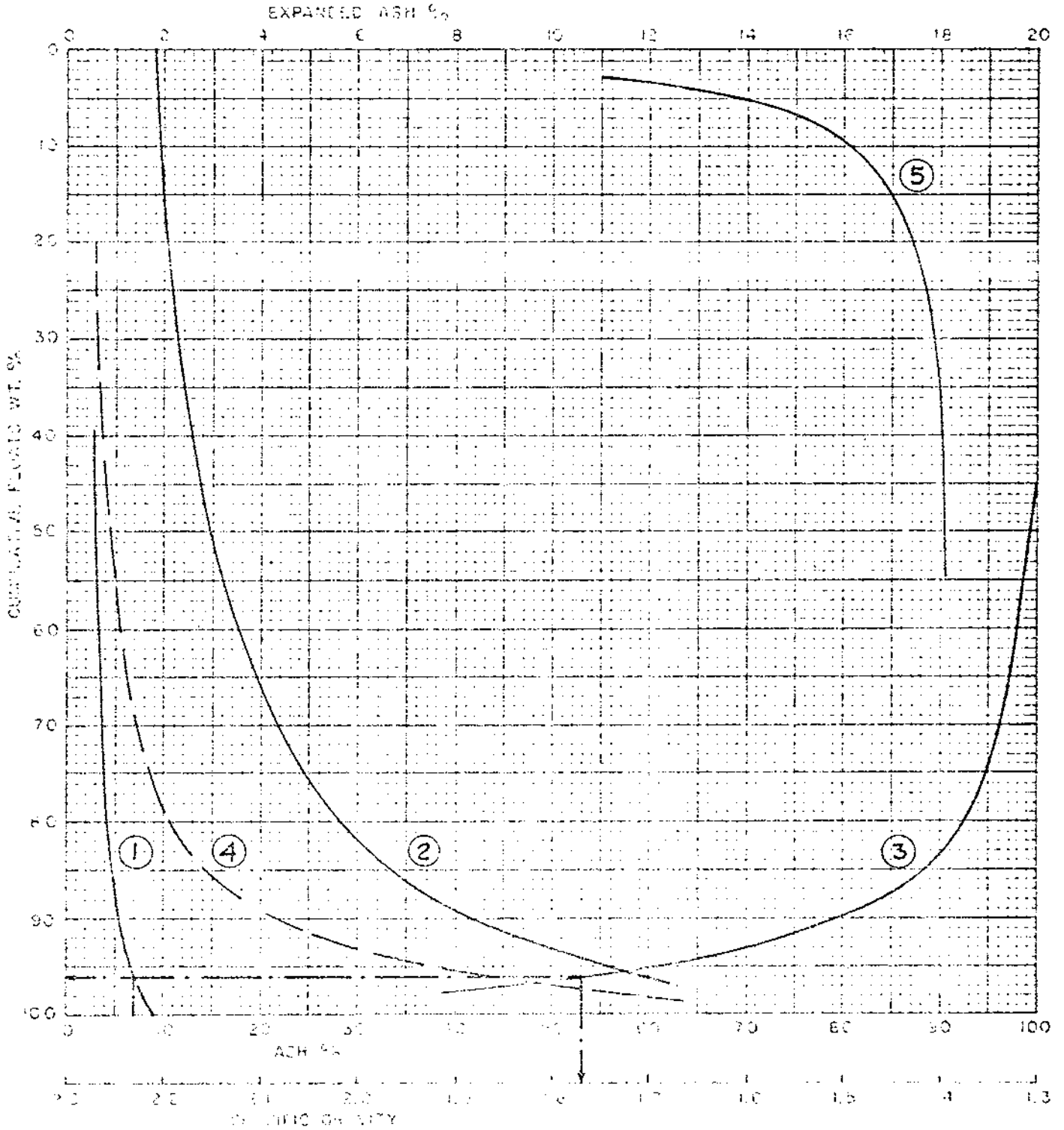
FIG. 103

COMPANY Denison Mines Ltd.
 D. #3 Saxon Adit #3
 SIZE 3/4" x 28 Mesh - 500 lb. Split

CURVE NO. 10

- 1 - FLOATS
- 2 - STKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - HEAVY GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE: March 29, 1972.

CYRIL W. McLENNAN SALES LTD.
EDMONTON ALBERTA CANADA

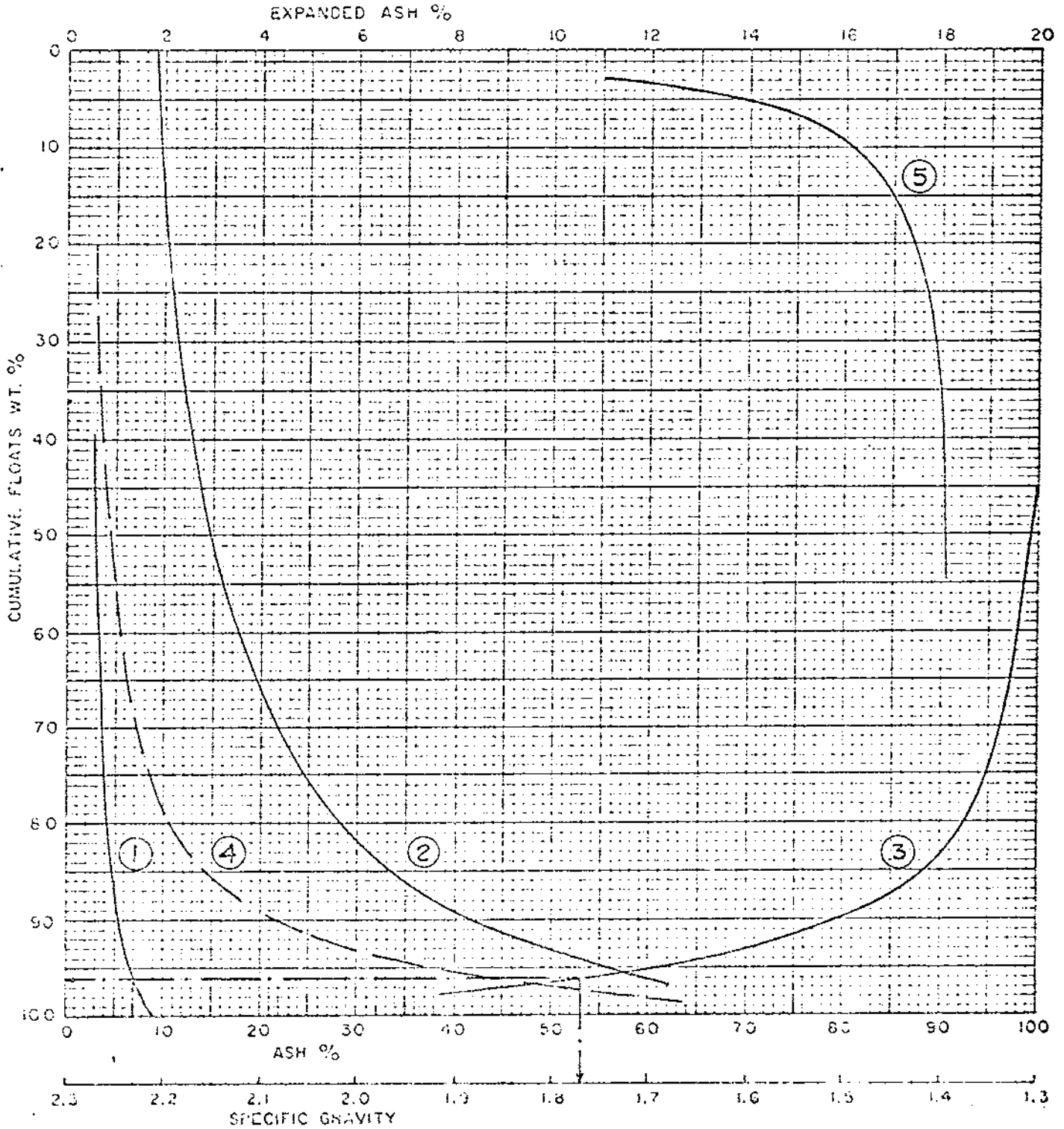
FIGURE :

CURVE LEGEND

COMPANY : Denison Mines Ltd.
SAMPLE : Saxon Adit #3
SIZE : 3/4" x 28 Mesh - 500 lb. Split

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : March 29, 1972.

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

T A B L E 6 - SAXON ADIT #3

Froth Flotation Test of 28m x 0

Solids, by weight in Slurry	8%
Time of Flotation	1.5 minutes
Reagents	MIBC & Kerosene

	<u>Concentrate</u>	<u>Tailings</u>
Yield	71.38%	28.62%
Ash	4.31%	17.20%
Volatile Matter	22.46%	21.78%
Residual Moisture	0.53%	0.53%
Fixed Carbon	72.70%	60.49%
F.S.I.	8½	4
Sulphur	0.35%	0.51%

SECTION 2

WASHING TESTS AND ANALYSIS OF PRODUCTS

SAXON ADIT #3

T A B L E 1 - SAXON ADIT #3

Distribution of Products

<u>Product</u>	<u>Wt. %</u>	<u>Ash %</u>
Clean Coal	85.00	5.40
Refuse	<u>15.00</u>	<u>26.00</u>
Total	<u>100.00</u>	<u>8.46</u>

T A B L E 2 - SAXON ADIT #3

Proximate Analysis of Clean Coal

Ash	5.42%
Volatile Matter	22.75%
Residual Moisture	0.40%
Fixed Carbon	71.43%
F.S.I.	7½
B.T.U./lb.	14,680
Sulphur	0.46%

T A B L E 3 - SAXON ADIT #3

Ultimate Analysis

Ash	5.42%
Carbon	84.51%
Hydrogen	4.61%
Nitrogen	1.01%
Oxygen	3.99%
Sulphur	0.46%

T A B L E 4 - SAXON ADIT #3

Characteristics of the Ash

Mineral Analysis of Ash

SiO ₂	56.17
Al ₂ O ₃	22.93
Fe ₂ O ₃	4.56
TiO ₂	0.94
P ₂ O ₅	1.62
CaO	4.26
MgO	1.14
Na ₂ O	0.26
K ₂ O	0.33
SO ₃	4.12

Ash Fusibility

	<u>Reducing Atmosphere</u>	<u>Oxidizing Atmosphere</u>
Initial Deofrmation Temperature	2325°F.	2370°F.
Spherical Temperature	2415°F.	2470°F.
Hemispherical Temperature	2500°F.	2545°F.
Fluid Temperature	2640°F	2640 ⁺

T A B L E 5 - ADIF #G-5

Analysis of CWC Reject

Ash	26.34%
Volatile Matter	19.08%
Residual Moisture	0.27%
Fixed Carbon	54.31%
F.S.I.	1
B.T.U./lb.	9,840
Sulphur	0.30%

REPORT ON
WASHABILITY CHARACTERISTICS
OF
COKING COAL
FOR
DENISON MINES LTD.
SAXON ADIT #4

Submitted by

CYCLONE ENGINEERING SALES LTD.
Edmonton, Alberta, Canada

Report No. : RI-72.13
Job No. : S1 - 84
Dated: April 16, 1972

REPORT ON
WASHABILITY CHARACTERISTICS
OF
COKING COAL
FOR
DENISON MINES LTD.
SAXON ADIT #4

SUMMARY:

The data in this report refer to the washability characteristics of Denison Mines sample of Saxon Adit #4.

The coal is of medium volatile bituminous rank. Ash of the sample is very high, i.e. 42% but is mostly extraneous in character and can be removed easily. The F.S.I. of the raw coal, inspite of the high ash, is 6.

The coal can be cleaned to 7% ash at a cut point of 1.53 with a yield of 48% and an F.S.I. of 9.

Froth flotation tests on fines indicate recoveries of 65% at an ash of 8% and F.S.I. of 9+.

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5 & 5A	Washability Curves for 28 x 100 m.	18 & 18a

INTRODUCTION:

A 1-Ton Sample of Saxon Adit #4 was air dried prior to analyses and the following work was done on it.

1. A size analysis at 1", 1/4", 28m. and 100m.
2. A proximate analysis on all size fractions.
3. A float-sink analysis on all size fractions, except -100 mesh, at 1.30, 1.35, 1.40, 1.45, 1.50, 1.60, 1.70 and 1.80.
4. Ash, volatile matter and free swelling index determinations on all specific gravity fractions.
5. Washability curves for all size fractions, except -100 mesh.
6. Washability curves for +100 mesh fraction of the raw sample by re-constituting the data in 5.
7. Froth flotation tests on 28 x 100 m. and 100m. x 0 fractions.

CONCLUSIONS:

The F.S.I. of the clean coal at a cut point of 1.80, with an ash of 11% is 8½. It is suggested that this coal can be advantageously blended with other coals of low ash and low F.S.I.

Respectfully submitted,

CYCLONE ENGINEERING SALES LTD.

Per: 

R.S. Sehgal, P. Eng.,
Laboratory Manager.

T A B L E 1 - SAXON ADIT #4

Classification by Rank

Ash	42.33%
Volatile Matter	16.44%
Residual Moisture	0.65%
Fixed Carbon	40.58%
Sulphur	0.74%
B.T.U./lb.	8,340
F.S.I.	6
Rank	mvb

T A B L E 2 - SAXON ADIT #4

Analysis of Size Fraction

Size Fraction	Wt. %	Ash%	V.M. %	R.M. %	F.C. %	S. %	F.S.I.
+1"	13.69	54.99	13.70	0.83	30.48	0.69	3½
1" x 1/4"	38.05	48.88	15.28	0.69	35.15	0.72	4½
1/4" x 28 m.	36.48	36.76	17.57	0.58	45.09	0.73	8
28 x 100 m.	8.76	24.41	19.40	0.57	55.62	0.79	8½
-100 mesh	3.02	21.78	21.21	0.54	56.47	1.16	8½
Total	100.00	42.33	16.44	0.65	40.58	0.74	6

T A B L E. 3 - SAXON ADIT #4

Weight % and Ash % Distribution vs. Size and Specific Gravity

(Figures in brackets show the ash content of individual fractions)

Size \ Sp. Gr	Sp. Gr									Total
	1.30	1.35	1.40	1.45	1.50	1.60	1.70	1.80		
+1"	1.27 (3.37)	2.37 (6.16)	0.76 (12.04)	0.29 (15.75)	0.16 (21.55)	0.13 (28.49)	0.27 (36.97)	0.15 (38.13)	8.29 (82.58)	13.69 (54.06)
1" x 1/4"	5.07 (2.97)	5.59 (5.98)	2.15 (10.04)	1.23 (15.98)	0.70 (23.31)	1.01 (30.43)	1.06 (40.27)	0.87 (46.30)	20.37 (80.87)	38.05 (49.07)
1/4" x 28 m.	12.37 (3.20)	3.85 (8.47)	1.95 (13.14)	1.25 (17.82)	0.74 (20.84)	1.22 (29.48)	1.01 (40.23)	0.93 (47.48)	13.16 (81.03)	36.48 (36.26)
28 x 100 m.	2.95 (2.48)	1.43 (5.34)	1.04 (9.17)	0.34 (13.20)	0.29 (17.43)	0.39 (24.99)	0.25 (35.53)	0.17 (46.12)	1.90 (79.69)	8.76 (24.19)
Total	21.66 (3.06)	13.24 (6.67)	5.90 (11.17)	3.11 (16.39)	1.89 (21.29)	2.75 (29.15)	2.59 (39.45)	2.12 (46.23)	43.72 (81.19)	96.98 (42.71)
-100 Mesh	This fraction forms 3.02% of the total sample and has an ash content of 21.78%, thus giving a total sample ash value of 42.07%.									

T A B L E 4 - SAXON ADIT #4

Weight % & Volatile Matter % Distribution vs. Size and Specific Gravity

(Figures in brackets show the Volatile Matter Content of Individual Fractions)

Sp. Gr. Size	1.30	1.35	1.40	1.45	1.50	1.60	1.70	1.80	Total	
+1"	1.27 (22.73)	2.37 (21.40)	0.76 (20.91)	0.29 (20.73)	0.16 (20.44)	0.13 (19.70)	0.27 (18.52)	0.15 (16.01)	8.29 (8.38)	13.69 (13.45)
1" x 1/4"	5.07 (23.66)	5.59 (23.26)	2.15 (21.85)	1.23 (20.63)	0.70 (19.98)	1.01 (18.64)	1.06 (16.52)	0.87 (15.96)	20.37 (8.97)	38.05 (14.96)
1/4" x 28m.	12.37 (24.69)	3.85 (23.15)	1.95 (22.37)	1.25 (20.85)	0.74 (19.49)	1.22 (17.40)	1.01 (16.36)	0.93 (15.60)	13.16 (9.66)	36.48 (18.03)
28 x 100 m.	2.95 (23.71)	1.43 (22.87)	1.04 (21.98)	0.34 (20.69)	0.29 (19.81)	0.39 (19.00)	0.25 (17.41)	0.17 (15.72)	1.90 (10.33)	8.76 (19.67)
Total	21.66 (24.20)	13.24 (22.85)	5.90 (21.92)	3.11 (20.73)	1.89 (19.80)	2.75 (18.19)	2.59 (16.75)	2.12 (15.79)	43.72 (9.12)	96.98 (16.33)
-100 Mesh	This fraction forms 3.02% of the total sample and has a volatile matter content of 21.21% thus giving a total sample volatile matter value of 16.47%									

T A B L E 5 - SAXON ADIT #4

Cumulative F.S.I. and Cumulative Weight % vs. Size and Specific Gravity

(Figures in brackets show the Cumulative F.S.I. of Cumulative Fractions)

Sp. Gr. Size	- 1.30	- 1.35	- 1.40	- 1.45	- 1.50	- 1.60	- 1.70	- 1.80	Raw
+1"	1.27 (9+)	3.64 (9+)	4.40 (9+)	4.69 (9)	4.85 (9)	4.98 (9)	5.25 (9)	5.40 (8½)	13.69 (3½)
1" x 1/4"	5.07 (9+)	10.66 (9+)	12.81 (9+)	14.04 (9)	14.74 (9)	15.75 (9)	16.81 (9)	17.68 (8½)	38.05 (4½)
1/4" x 28m.	12.37 (9+)	16.22 (9+)	18.17 (9+)	19.42 (9+)	20.16 (9+)	21.38 (9)	22.39 (9)	23.32 (8½)	36.48 (8)
28 x 100 m.	2.95 (9+)	4.38 (9+)	5.42 (9+)	5.76 (9+)	6.05 (9+)	6.44 (9)	6.69 (9)	6.86 (8½)	8.76 (8½)
Total	21.66	34.90	40.80	43.91	45.80	48.55	51.14	53.26	96.98
-100 Mesh	Weight % of this fraction is 3.02 and has a F.S.I. of 8½								

T A B L E 6 - SAXON ADIT #4

Washability Data: +100m. : 96.98% of Total Sample
(Reconstituted from Size Fractions)

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	22.33	3.06	22.33	3.06	100.00	42.71	11.17	3.06
1.30 - 1.35	13.65	6.67	35.98	4.43	77.67	54.11	29.15	6.67
1.35 - 1.40	6.08	11.17	42.06	5.40	64.02	64.22	39.02	11.17
1.40 - 1.45	3.21	16.39	45.27	6.18	57.94	69.79	43.67	16.39
1.45 - 1.50	1.95	21.29	47.22	6.81	54.73	72.92	46.25	21.29
1.50 - 1.60	2.84	29.15	50.06	8.07	52.78	74.83	48.64	29.15
1.60 - 1.70	2.67	39.45	52.73	9.66	49.94	77.43	51.39	39.45
1.70 - 1.80	2.19	46.23	54.92	11.12	47.27	79.57	53.83	46.23
+ 1.80	45.08	81.19	100.00	42.71	45.08	81.19	77.46	81.19
Total	100.00	42.71						

T A B L E 7 - SAXON ADIT #4

Cumulative Volatile Matter for +100 m.: 96.98% of Total Sample
(Reconstituted from Size Fractions)

Specific Gravity	Fractional		Cumulative			
	Wt. %	V.M. %	Floats		Sinks	
			Wt. %	V.M. %	Wt. %	V.M. %
- 1.30	22.33	24.20	22.33	24.20	100.00	16.33
1.30 - 1.35	13.65	22.85	35.98	23.69	77.67	14.06
1.35 - 1.40	6.08	21.92	42.06	23.43	64.02	12.19
1.40 - 1.45	3.21	20.73	45.27	23.24	57.94	11.17
1.45 - 1.50	1.95	19.80	47.22	23.10	54.73	10.61
1.50 - 1.60	2.84	18.19	50.06	22.82	52.78	10.27
1.60 - 1.70	2.67	16.75	52.73	22.51	49.94	9.82
1.70 - 1.80	2.19	15.79	54.92	22.24	47.27	9.43
+ 1.80	45.08	9.12	100.00	16.33	45.08	9.12
Total	100.00	16.33				

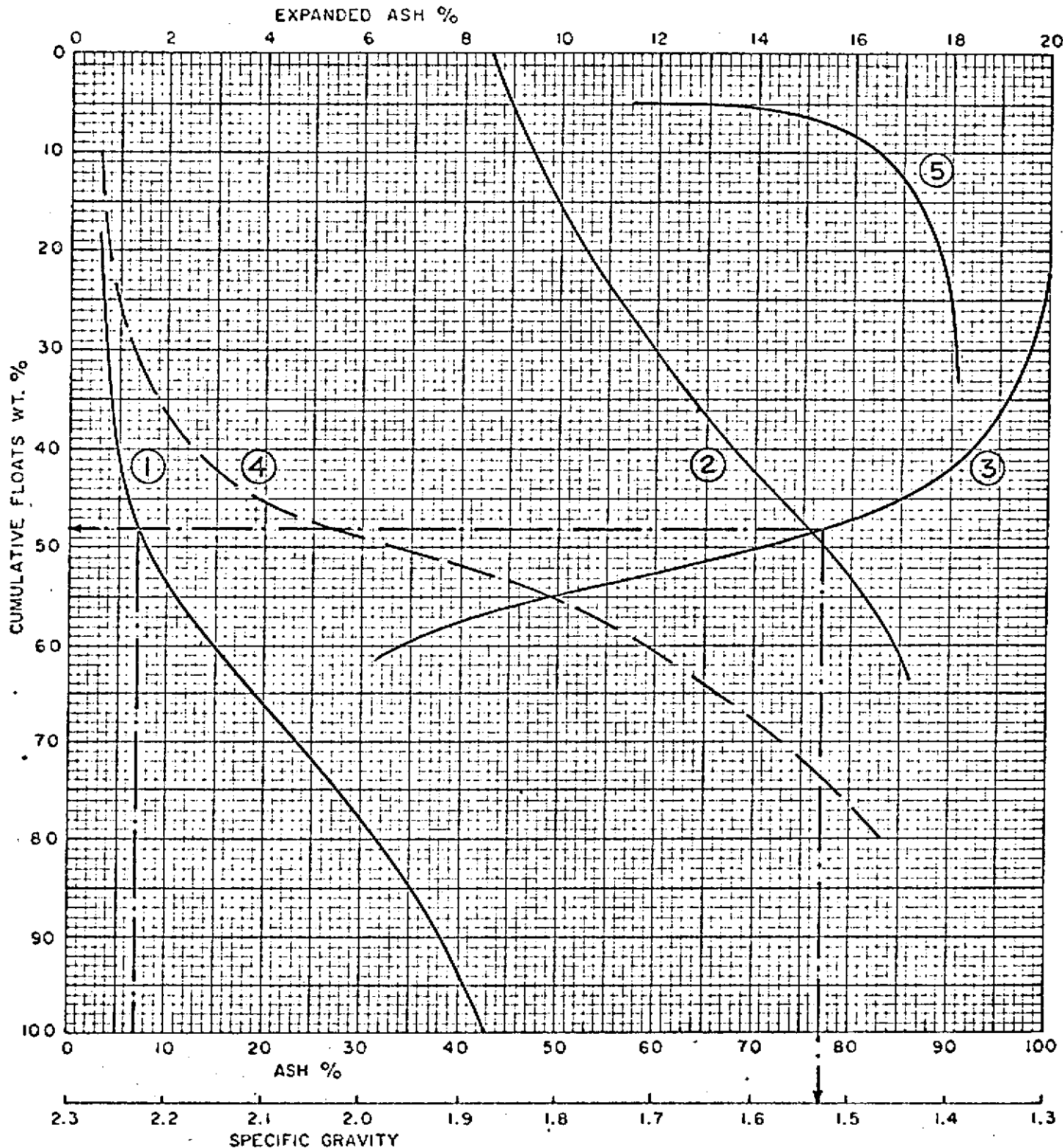
FIGURE: 1

COMPANY : Denison Mines Ltd.
SAMPLE : SAXON ADIT #4
SIZE : +100 Mesh (Reconstituted from
Size Fractions)

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : April 12, 1972.

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

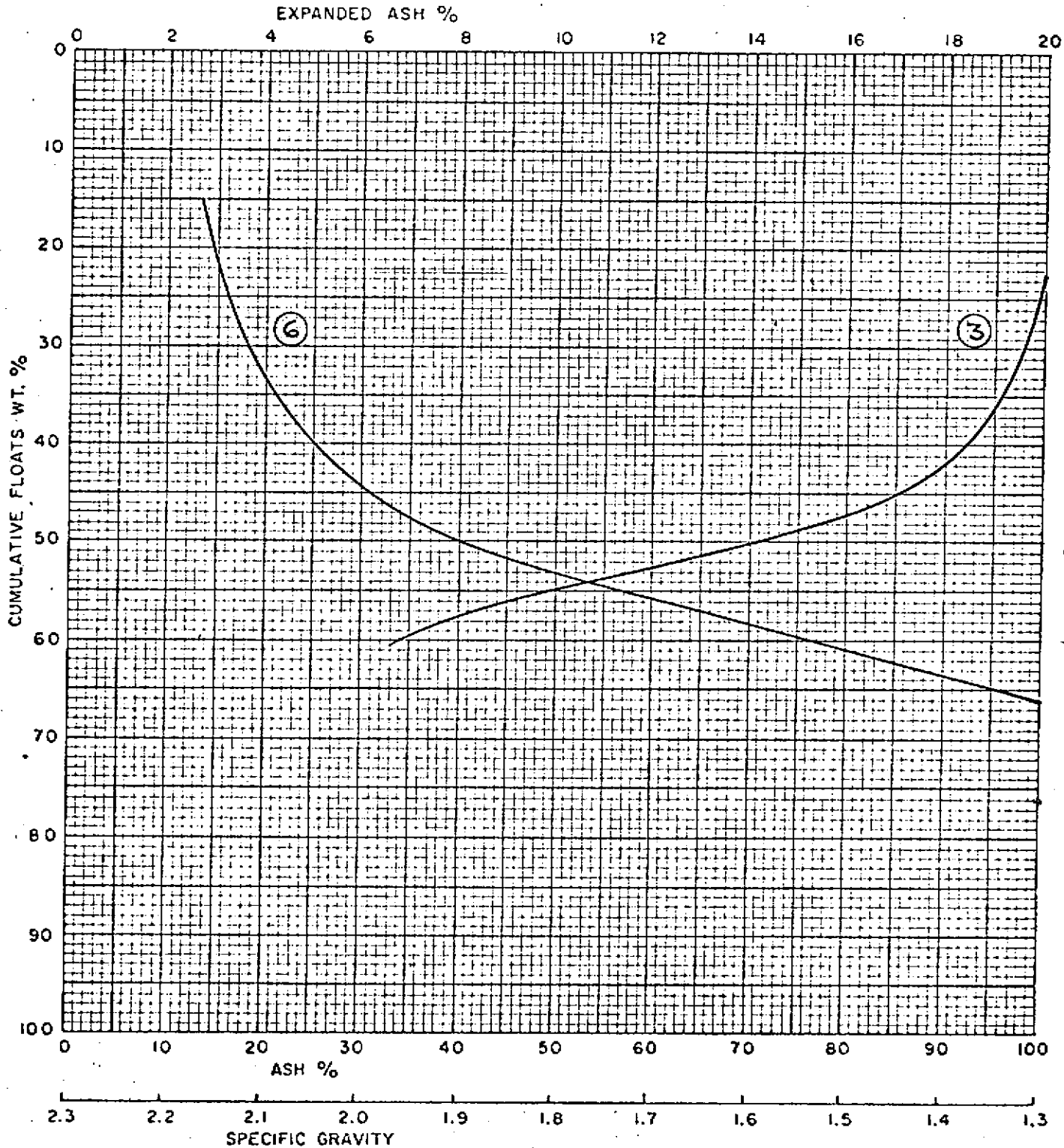
FIGURE: 1A

COMPANY : Denison Mines Ltd.
 SAMPLE : SAXON ADIT #4
 SIZE : +100 Mesh (Reconstituted from
 Size Fractions)

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : April 12, 1972.

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

T A B L E 8 - SAXON ADIT #4

7% Ash of Clean Coal

Yield	48.00%
Floats Gravity	1.53
Near Gravity Material	7.00%
Ash	7.00%
Volatile Matter	22.90%
Residual Moisture	0.72%
Fixed Carbon	69.38%
F.S.I.	9+

T A B L E 9 - SAXON ADIT #4

+1": 13.69% of total Sample

Ash, Volatile Matter & Cumulative F.S.I.

Specific Gravity	Weight %	Ash %	V.M. %	Cum. Weight %	Cum. F.S.I.
- 1.30	9.25	3.37	22.73	9.25	9+
1.30 - 1.35	17.36	6.16	21.40	26.61	9+
1.35 - 1.40	5.53	12.04	20.91	32.14	9+
1.40 - 1.45	2.15	15.75	20.73	34.29	9
1.45 - 1.50	1.15	21.55	20.44	35.44	9
1.50 - 1.60	0.98	28.49	19.70	36.42	9
1.60 - 1.70	1.94	36.97	18.52	38.36	9
1.70 - 1.80	1.07	38.13	16.01	39.43	8½
+ 1.80	60.57	82.58	8.38	100.00	3½
Total	100.00	54.06	13.45		

T A B L E 10 - SAXON ADIT #4

Washability Date: +1"

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	9.25	3.37	9.25	3.37	100.00	54.06	4.64	3.37
1.30 - 1.35	17.36	6.16	26.61	5.19	90.75	59.22	17.93	6.16
1.35 - 1.40	5.53	12.04	32.14	6.37	73.39	71.77	29.38	12.04
1.40 - 1.45	2.15	15.75	34.29	6.96	67.86	76.64	33.22	15.75
1.45 - 1.50	1.15	21.55	35.44	7.43	65.71	78.63	34.86	21.55
1.50 - 1.60	0.98	28.49	36.42	8.00	64.56	79.65	35.93	28.49
1.60 - 1.70	1.94	36.97	38.36	9.46	63.58	80.44	37.39	36.97
1.70 - 1.80	1.07	38.13	39.43	10.24	61.64	81.81	38.90	38.13
+ 1.80	60.57	82.58	100.00	54.06	60.57	82.58	69.71	82.58
Total	100.00	54.06						

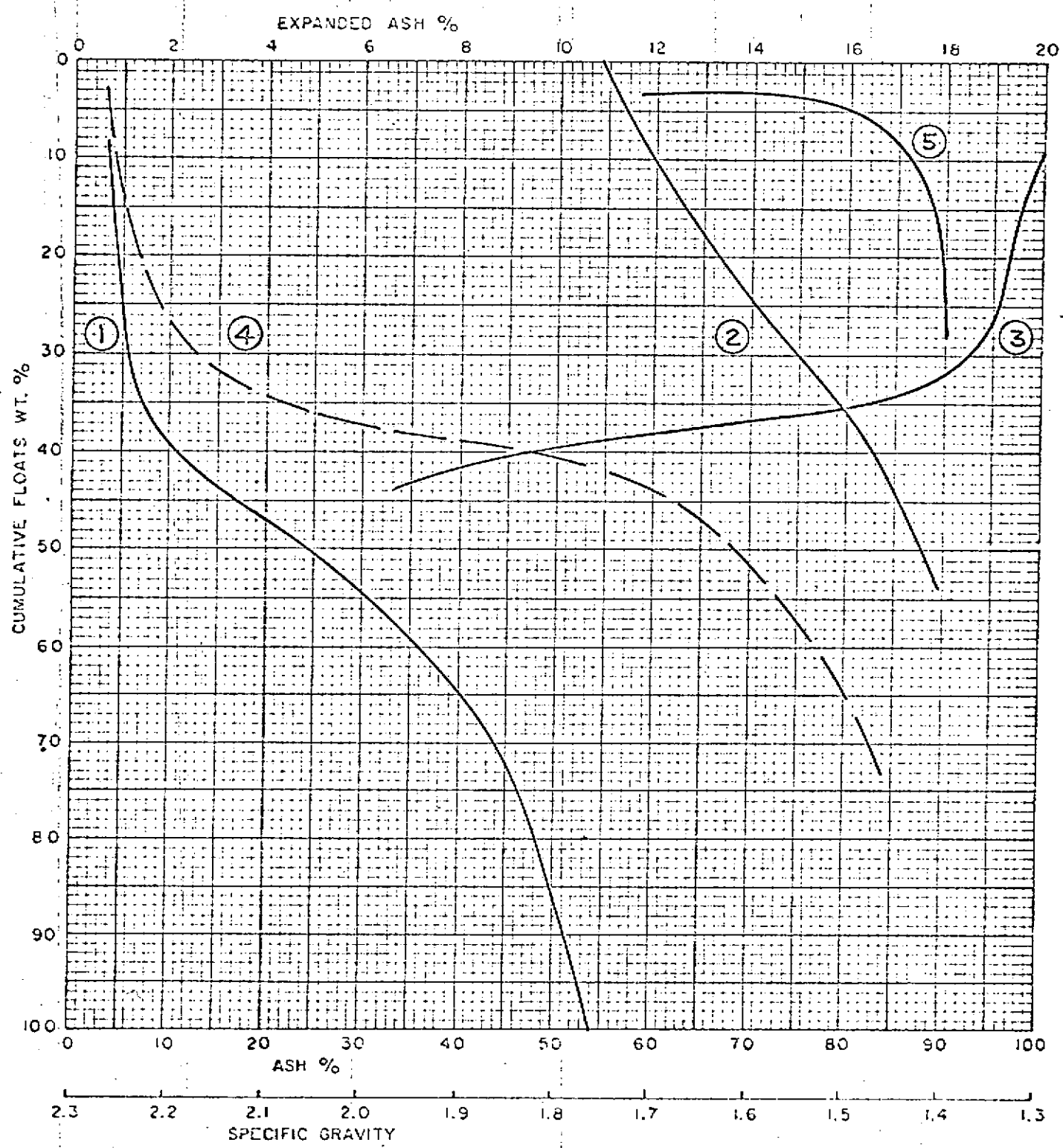
FIGURE: 2

COMPANY Denison Mines Ltd.
 SAMPLE SAXON ADIT #4
 SIZE +1"

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : April 10, 1972.

CYCLONE ENGINEERING SALES LTD.
 EDMONTON ALBERTA CANADA

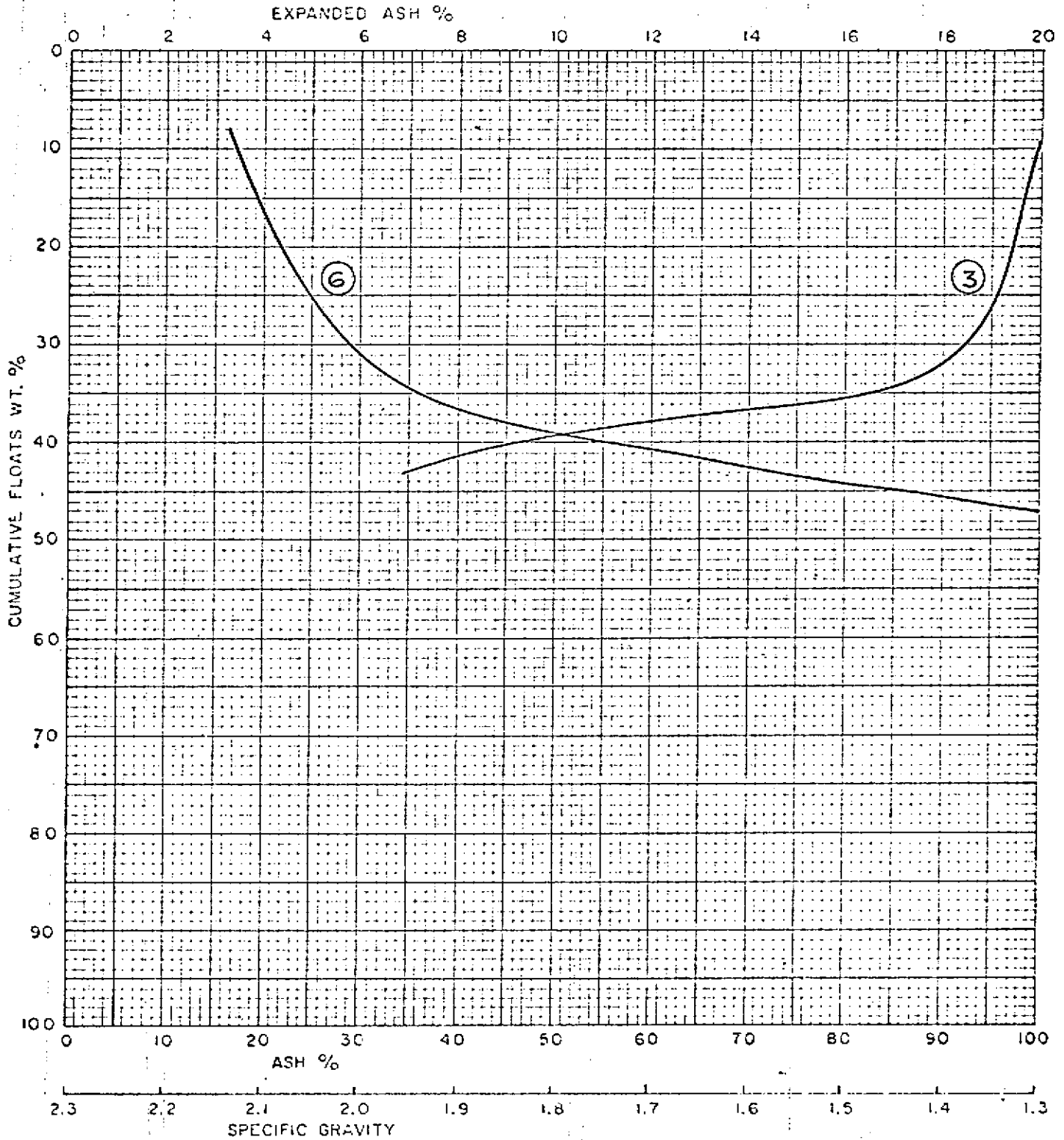
FIGURE: 2A

COMPANY : Denison Mines Ltd.
SAMPLE : SAXON ADIT #4
SIZE : +1"

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED ASH

WASHABILITY CURVES



DATE : April 10, 1972.

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

T A B L E 11 - SAXON ADIT #4

1" x 1/4": 38.05% of total Sample

Ash, Volatile Matter & Cumulative F.S.I.

Specific Gravity	Weight %	Ash %	V.M.%	Cum. Weight %	Cum. F.S.I.
- 1.30	13.32	2.97	23.66	13.32	9+
1.30 - 1.35	14.69	5.98	23.26	28.01	9+
1.35 - 1.40	5.66	10.04	21.85	33.67	9+
1.40 - 1.45	3.24	15.98	20.63	36.91	9
1.45 - 1.50	1.83	23.31	19.98	38.74	9
1.50 - 1.60	2.65	30.43	18.64	41.39	9
1.60 - 1.70	2.78	40.27	16.52	44.17	9
1.70 - 1.80	2.29	46.30	15.96	46.46	8½
+ 1.80	53.54	80.87	8.97	100.00	4½
Total	100.00	49.07	14.96		

T A B L E 12 - SAXON ADIT #4

Washability Data: 1" x 1/4"

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash %	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash %	Wt. %	Ash %		
- 1.30	13.32	2.97	13.32	2.97	100.00	49.07	6.66	2.97
1.30 - 1.35	14.69	5.98	28.01	4.55	86.68	56.15	20.67	5.98
1.35 - 1.40	5.66	10.04	33.67	5.47	71.99	66.39	30.84	10.04
1.40 - 1.45	3.24	15.98	36.91	6.39	66.33	71.20	35.29	15.98
1.45 - 1.50	1.83	23.31	38.74	7.19	63.09	74.04	37.82	23.31
1.50 - 1.60	2.65	30.43	41.39	8.68	61.26	75.55	40.07	30.43
1.60 - 1.70	2.78	40.27	44.17	10.67	58.61	77.59	42.78	40.27
1.70 - 1.80	2.29	46.30	46.46	12.43	55.83	79.45	45.31	46.30
+ 1.80	53.54	80.87	100.00	49.07	53.54	80.87	73.23	80.87
Total	100.00	49.07						

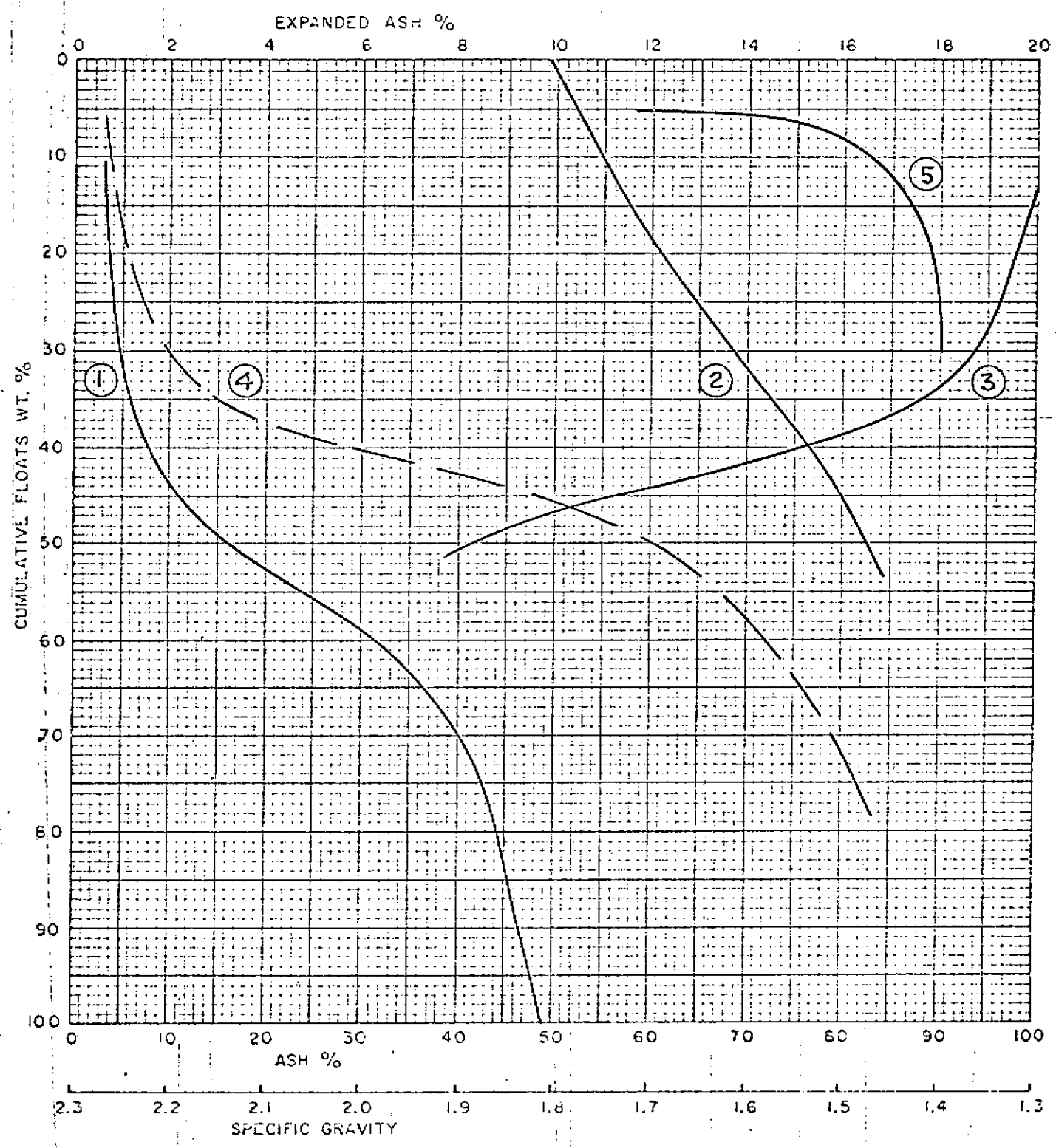
FIGURE 3

COMPANY : Denison Mines Ltd.
 SAMPLE : SAXON ADIT #4
 SIZE : 1" x 1/4"

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : April 10, 1972.

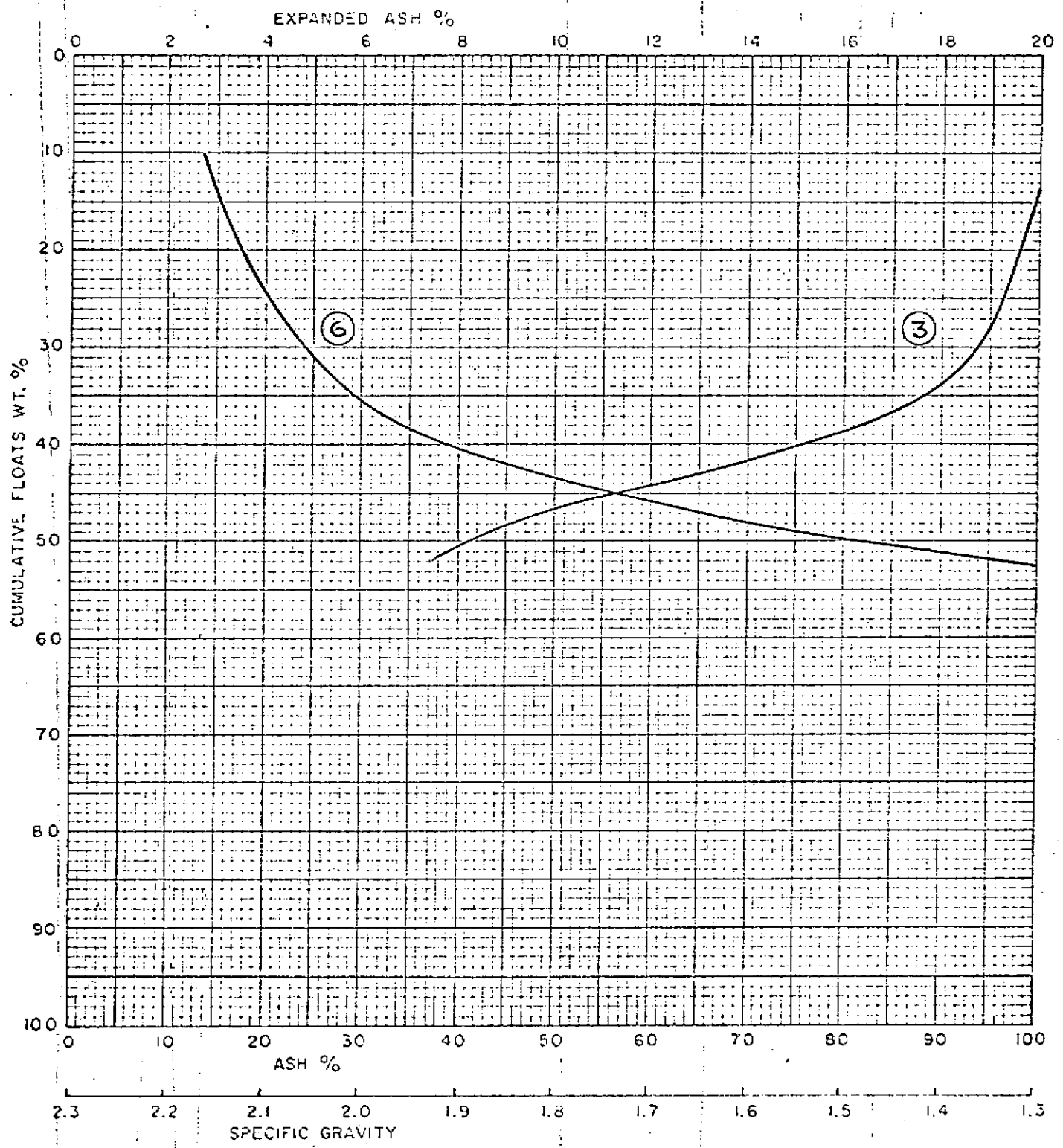
CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

FIGURE: 3A

COMPANY: Denison Mines Ltd.
SAMPLE: SAXON ADIT #4
SIZE: 1"x1/4"

- CURVE LEGEND
- 1 - FLOATS
 - 2 - SINKS
 - 3 - SPECIFIC GRAVITY
 - 4 - ELEMENTARY ASH
 - 5 - NEAR GRAVITY MATERIAL
 - 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE: April 10, 1972.

CYCLONE ENGINEERING SALES LTD.
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T A B L E 13 - SAXON ADIT #4

1/4" x 28m.: 36.48% of Sample

Ash, Volatile Matter and Cumulative F.S.I.

Specific Gravity	Weight %	Ash %	V.M.%	Cum. Weight %	Cum. F.S.I.
- 1.30	33.91	3.20	24.69	33.91	9+
1.30 - 1.35	10.57	8.47	23.15	44.80	9+
1.35 - 1.40	5.34	13.14	22.37	49.82	9+
1.40 - 1.45	3.42	17.82	20.85	53.24	9+
1.45 - 1.50	2.02	20.84	19.49	55.26	9+
1.50 - 1.60	3.34	29.48	17.40	58.60	9
1.60 - 1.70	2.76	40.23	16.36	61.36	9
1.70 - 1.80	2.56	47.48	15.60	63.92	8½
+ 1.80	36.08	81.03	9.66	100.00	8
Total	100.00	36.26	18.03		

T A B L E 14 - SAXON ADIT #4

Washability Data: 1/4" x 28 m.

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash%	Floats		Sinks		Wt. %	Ash%
			Wt. %	Ash%	Wt. %	Ash%		
- 1.30	33.91	3.20	33.91	3.20	100.00	36.26	16.95	3.20
1.30 - 1.35	10.57	8.47	44.80	4.45	66.09	53.22	39.20	8.47
1.35 - 1.40	5.34	13.14	49.82	5.38	55.52	61.74	47.47	13.14
1.40 - 1.45	3.42	17.82	53.24	6.18	50.18	66.91	51.53	17.82
1.45 - 1.50	2.02	20.84	55.26	6.72	46.76	70.50	54.25	20.84
1.50 - 1.60	3.34	29.48	58.60	8.02	44.74	72.74	56.93	29.48
1.60 - 1.70	2.76	40.23	61.36	9.46	41.40	76.24	59.98	40.23
1.70 - 1.80	2.56	47.48	63.92	10.99	38.64	78.81	62.64	47.48
+ 1.80	36.08	81.03	100.00	36.26	36.08	81.03	81.96	81.03
Total	100.00	36.26						

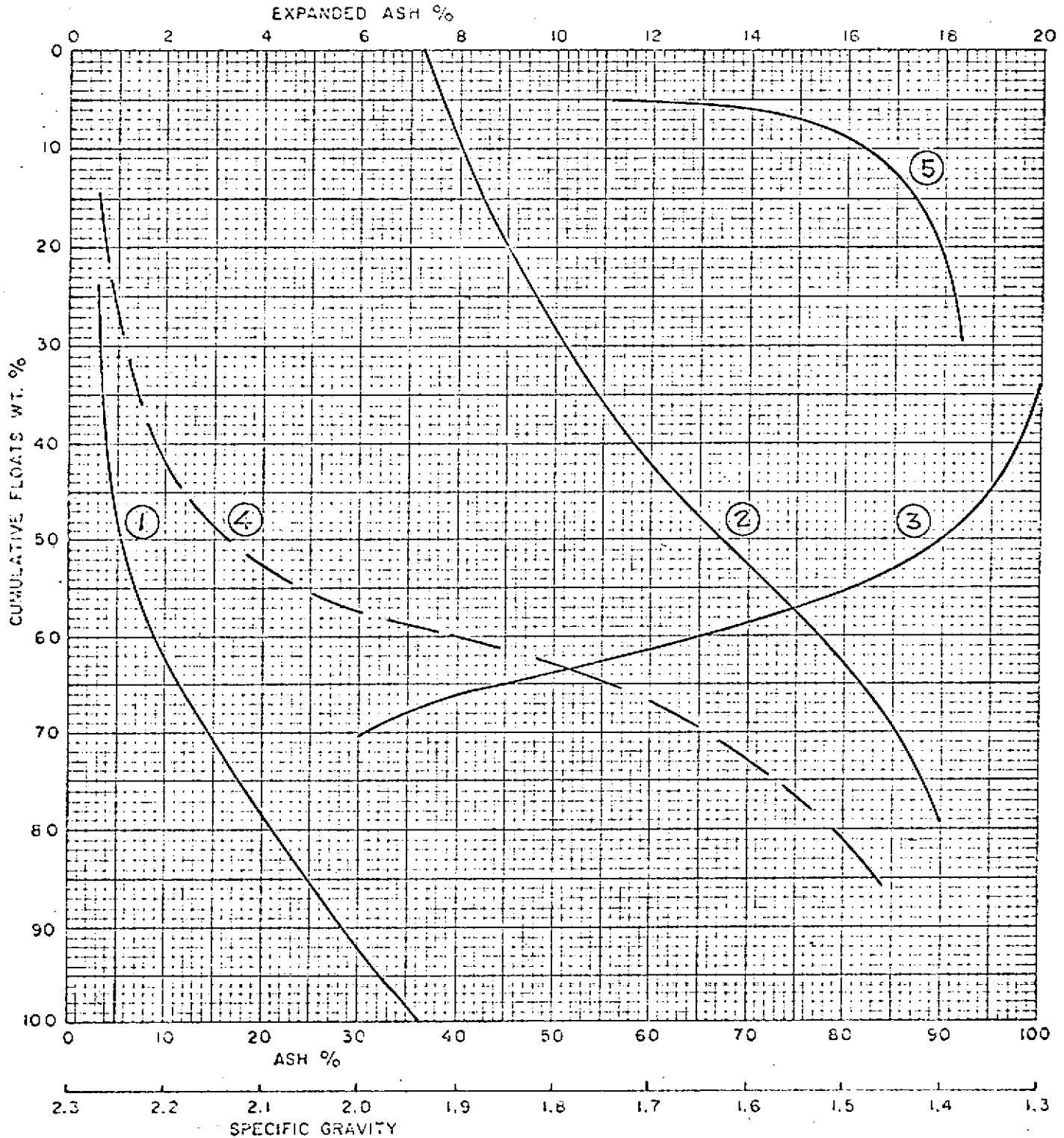
FIGURE: 4

COMPANY : Denison Mines Ltd.
 SAMPLE : SAXON ADIT #4
 SIZE : 1/4" x 28 m.

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : April 10, 1972.

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

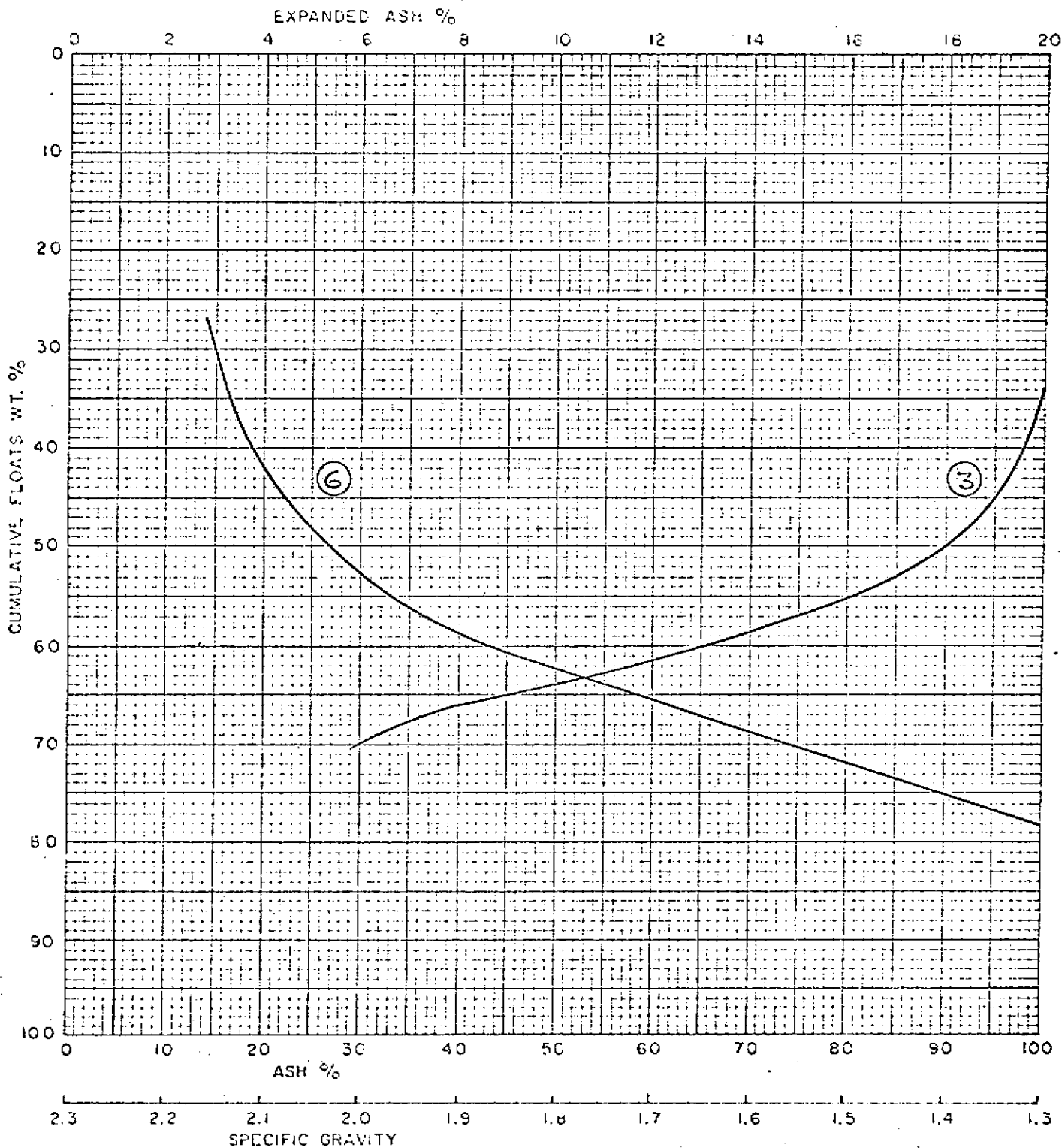
FIGURE 4A

COMPANY : Denison Mines Ltd.
SAMPLE : SAXON ADIT #4
SIZE : 1/4" x 28 m.

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : April 10, 1972.

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

T A B L E 15 - SAXON ADIT #4

28m. x 100m.: 8.76% of Sample

Ash, Volatile Matter and Cumulative F.S.I.

Specific Gravity	Weight %	Ash %	V.M. %	Cum. Weight %	Cum. F.S.I.
- 1.30	33.70	2.48	23.71	33.70	9+
1.30 - 1.35	16.36	5.34	22.87	50.06	9+
1.35 - 1.40	11.86	9.17	21.98	61.92	9+
1.40 - 1.45	3.83	13.20	20.69	65.75	9+
1.45 - 1.50	3.35	17.43	19.81	69.10	9+
1.50 - 1.60	4.43	24.99	19.00	73.53	9
1.60 - 1.70	2.83	35.53	17.41	76.36	9
1.70 - 1.80	1.90	46.12	15.72	78.26	8½
+ 1.80	21.74	79.69	10.33	100.00	8½
Total	100.00	24.19	19.67		

T A B L E 16 - SAXON ADIT #4

Washability Date: 28m. x 100 m.

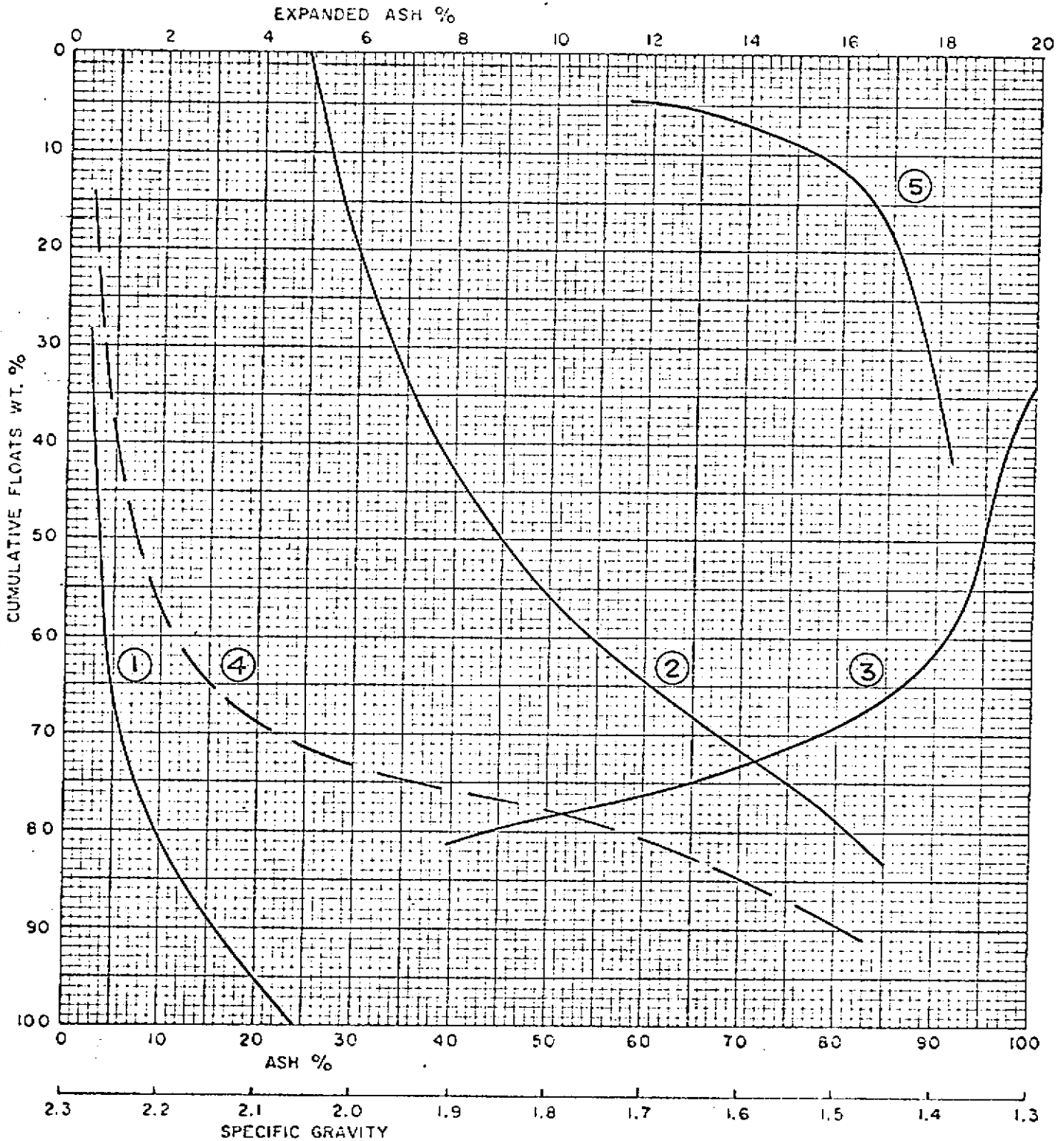
Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash%	Floats		Sinks		Wt. %	Ash%
			Wt. %	Ash%	Wt. %	Ash%		
- 1.30	33.70	2.48	33.70	2.48	100.00	24.19	16.85	2.48
1.30 - 1.35	16.36	5.34	50.06	3.41	66.30	35.24	41.88	5.34
1.35 - 1.40	11.86	9.17	61.92	4.52	49.94	45.03	55.99	9.17
1.40 - 1.45	3.83	13.20	65.75	5.02	38.08	56.21	63.84	13.20
1.45 - 1.50	3.35	17.43	69.10	5.62	34.25	61.01	67.42	17.43
1.50 - 1.60	4.43	24.99	73.53	6.79	30.90	65.74	71.32	24.99
1.60 - 1.70	2.83	35.53	76.36	7.86	26.47	72.56	74.94	35.53
1.70 - 1.80	1.90	46.12	78.26	8.79	23.64	76.99	77.31	46.12
+ 1.80	21.74	79.69	100.00	24.19	21.74	79.69	89.13	79.69
Total	100.00	24.19						

COMPANY : Denison Mines Ltd.
 SAMPLE : SAXON ADIT #4
 SIZE : 28m. x 100 m.

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : April 10, 1972.

CYCLONE ENGINEERING SALES LTD.
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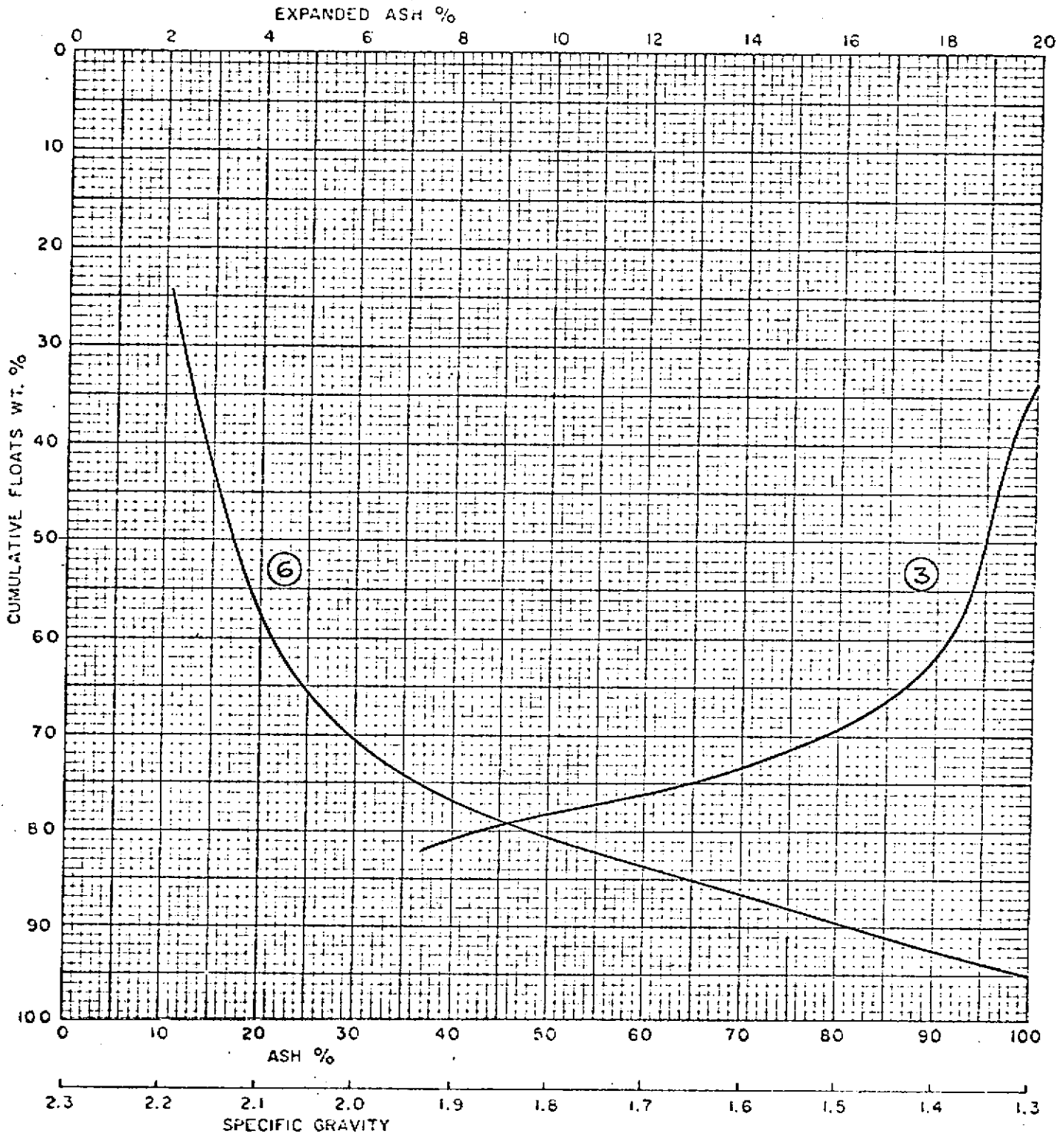
FIGURE: 5A

COMPANY: Denison Mines Ltd.
 SAMPLE: SAXON ADIT #4
 SIZE: 28m. x 100m.

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE: April 10, 1972.

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

T A B L E 17 - SAXON ADIT #4

FROTH FLOTATION TESTS

28 x 100 Mesh: 8.76% of the Sample

Solids, by weight in Slurry	8%
Time of Flotation	1.5 minutes
Flotation Recovery	62.16%
Reagents	MIBC & Kerosene

Analyses of the Products

	<u>Floats</u>	<u>Tailings</u>
Ash, %	7.80	50.15
Volatile Matter, %	22.34	15.25
Residual Moisture, %	0.63	0.50
Fixed Carbon, %	69.73	34.10
Sulphur, %	0.90	0.78
F.S.I.	9+	4

T A B L E 18 - SAXON ADIT #4

FROTH FLOTATION TESTS

-100 Mesh: 3.02% of Sample

Solids, by weight in Slurry	8%
Time of Flotation	1.5 minutes
Flotation Recovery	76.21%
Reagents	MIBC & Kerosene

Analyses of the Products

	<u>Floats</u>	<u>Tailings</u>
Ash, %	8.50	63.45
Volatile Matter, %	23.01	13.83
Residual Moisture, %	0.61	0.49
Fixed Carbon, %	67.88	22.23
F.S.I.	9+	1½
Sulphur, %	0.99	1.35

REPORT ON
WASHABILITY CHARACTERISTICS AND CLEANING
OF COKING COAL
FOR
DENISON MINES LTD.
SAXON ADIT #4

Submitted by
CYCLONE ENGINEERING SALES LTD.
Edmonton, Alberta, Canada.

Report No. RI-72.21
Job. No.: S1-84
Date: May 18, 1972.

REPORT ON
WASHABILITY CHARACTERISTICS AND CLEANING
OF COKING COAL
FOR
DENISON MINES LTD.
SAXON ADIT #4

SUMMARY:

The data presented in this report refer to washability characteristics and the washing of a five ton sample from Saxon Adit #4.

The coal was cleaned in a two-stage water cyclone system. The fines in the clean coal were further washed using flotation cells.

Because of the very high ash content - about 41% - a low yield of 45% was obtained.

The proximate analysis of the clean coal is as follows.

	<u>Air Dried Basis</u>	<u>As Shipped Basis</u>
Surface Moisture, %	-	6.00
Residual Moisture, %	0.72	0.68
Ash, %	8.16	7.67
Volatile Matter, %	22.34	20.99
Fixed Carbon, %	68.78	64.66
F.S.I.	9	9
B.T.U./lb.	14,320	13,460
Sulphur, %	0.66	0.62

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INTRODUCTION:

Approximately a 5-ton sample of the coal was used for washability studies and production of clean coal.

The coal was air dried, crushed to - 3/4" and homogenized. A representative sample of about 500 lb. was taken for washability and flotation tests and the remaining portion was used for preliminary testing and production of the clean coal.

The washing circuit employed is shown in Figure 1, Section 2 of this report.

Yours very truly,

CYCLONE ENGINEERING SALES LTD.

Per: _____

R.S. Sehgal, P. Eng.
Laboratory Manager

SECTION 1

WASHABILITY DATA & FLOTATION TESTS

SAXON ADIT #4

T A B L E 1: SAXON ADIT #4

Head Sample Analysis

Ash	40.77%
Volatile Matter	16.36%
Residual Moisture	0.66%
Fixed Carbon	42.21%
F.S.I.	6½
B.T.U./lb.	8,290
Sulphur	0.65%

T A B L E 2: SAXON ADIT #4

Size Analysis

	<u>Weight %</u>
3/4" x 28 mesh	83.92
-28 mesh	<u>16.08</u>
Total	<u>100.00</u>

T A B L E 3: SAXON ADIT #4

Incremental Float-Sink Analysis of 3/4" x 28 Mesh

Sp. Gr.	Wt. %	Ash%	V.M. %	R.M. %	F.C. %
- 1.30	25.66	3.33	22.94	0.68	73.05
1.30 - 1.35	8.96	7.39	21.80	0.65	70.16
1.35 - 1.40	5.27	11.87	21.32	0.64	66.17
1.40 - 1.45	2.74	17.28	20.35	0.64	61.73
1.45 - 1.50	1.69	23.03	18.78	0.63	57.56
1.50 - 1.60	2.45	29.95	18.34	0.65	51.06
1.60 - 1.70	2.61	37.03	17.00	0.60	45.37
1.70 - 1.80	1.74	44.42	15.93	0.64	39.01
+ 1.80	48.88	79.94	9.39	0.63	10.02
Total	100.00	44.55	15.60	0.65	39.20

T A B L E 4: SAXON ADIT #4

Cumulative Float-Sink Analysis of 3/4" x 28 M.

Sp. Gr.	Wt. %	Ash%	V.M. %	R.M. %	F.C. %	F.S.I.*
- 1.30	25.66	3.33	22.94	0.68	73.05	9+
- 1.35	34.62	4.38	22.64	0.67	72.31	9+
- 1.40	39.89	5.37	22.47	0.67	71.49	9+
- 1.45	42.63	6.14	22.33	0.67	70.86	9
- 1.50	44.32	6.78	22.20	0.66	70.36	9
- 1.60	46.77	7.99	21.99	0.66	69.36	9
- 1.70	49.38	9.53	21.73	0.66	68.08	9
- 1.80	51.12	10.72	21.53	0.65	67.10	9
Total	100.00	44.55	15.60	0.65	39.20	6

* F.S.I. by actual determination.

T A B L E 5: SAXON ADIT #4

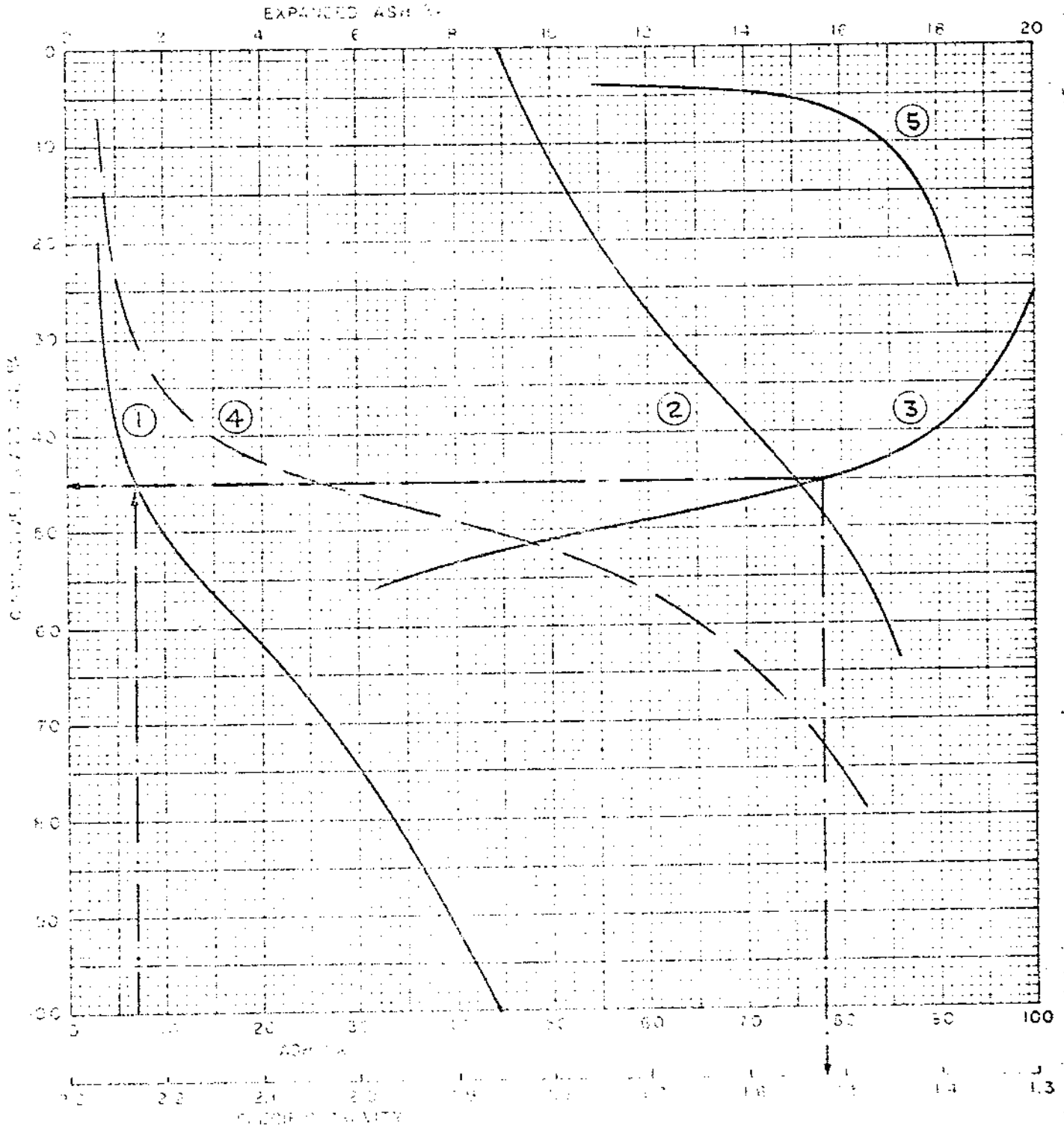
Washability Data for 3/4' x 28 Mesh

Specific Gravity	Fractional		Cumulative				Elementary Ash	
	Wt. %	Ash%	Floats		Sinks		Wt. %	Ash %
			Wt. %	Ash%	Wt. %	Ash%		
- 1.30	25.66	3.33	25.66	3.33	100.00	44.55	12.83	3.33
1.30 - 1.35	8.96	7.39	34.62	4.38	74.34	58.78	30.14	7.39
1.35 - 1.40	5.27	11.87	39.89	5.37	65.38	65.82	37.25	11.87
1.40 - 1.45	2.74	17.28	42.63	6.14	60.11	70.55	41.26	17.28
1.45 - 1.50	1.69	23.03	44.32	6.78	57.37	73.10	43.48	23.03
1.50 - 1.60	2.45	29.95	46.77	7.99	55.68	74.62	45.54	29.95
1.60 - 1.70	2.61	37.03	49.38	9.53	53.23	76.67	48.07	37.03
1.70 - 1.80	1.74	44.42	51.12	10.72	50.62	78.72	50.25	44.42
+ 1.80	48.88	79.94	100.00	44.55	48.88	79.94	75.56	79.95
Total	100.00	44.55						

COMPANY Denison Mines Ltd.
 ADIT # SAXON ADIT #4
 SIZE 3/4" x 28 m. (500 lb. Split)

- 1 - FLOTATION
 2 - FLOTATION
 3 - FLOTATION
 4 - FLOTATION
 5 - FLOTATION
 6 - EXPANDED FLOATS

WASHABILITY CURVES



May 18, 1972.

Denison Mines Ltd. Montreal, Quebec, Canada

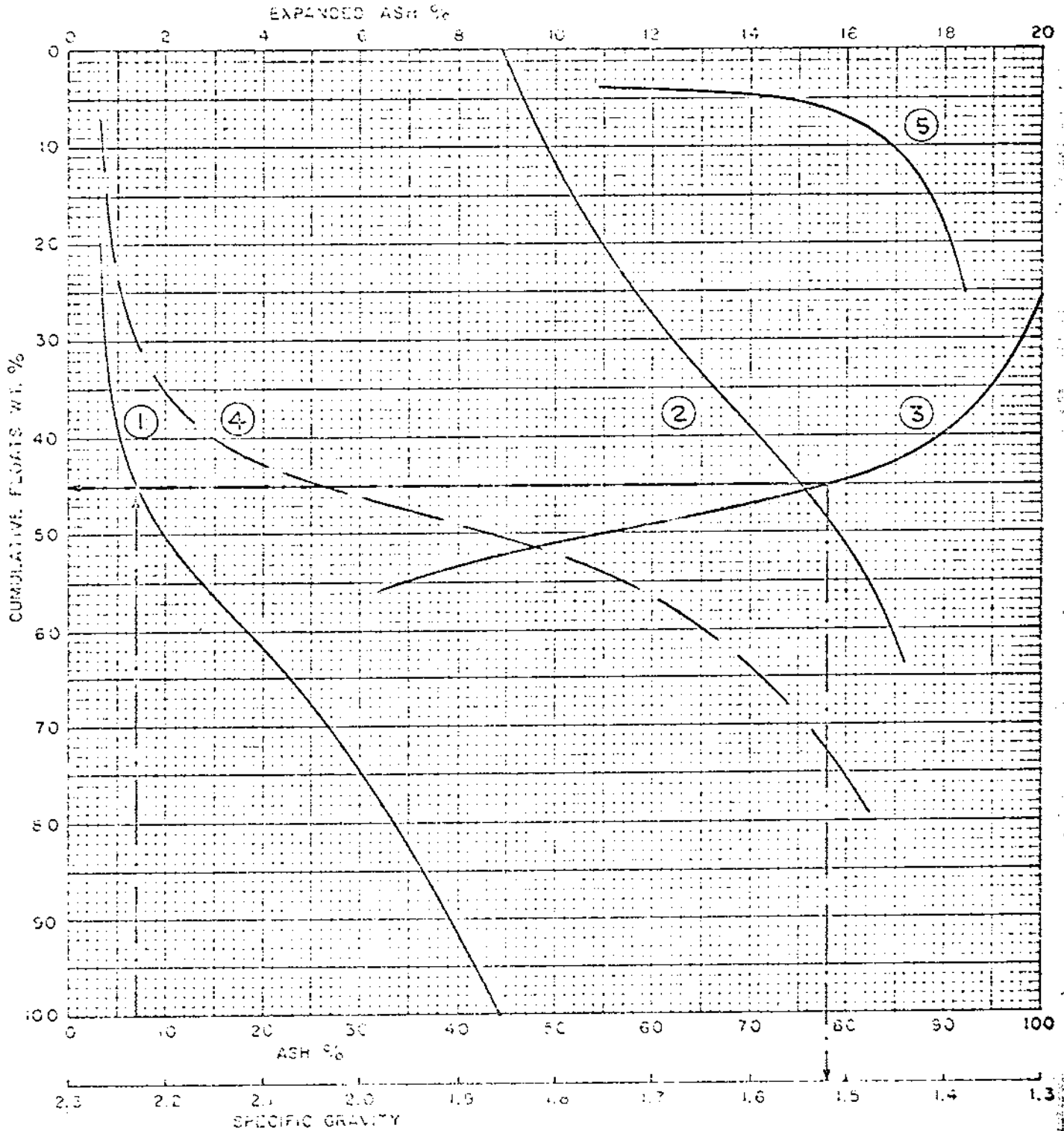
FIGURE 1

COMPANY Denison Mines Ltd.
 SAMPLE SAXON ADIT #4
 SIZE 3/4" x 28 m. (500 lb. Split)

CURVE LEGEND

- 1 - FLOATS
- 2 - SINKS
- 3 - SPECIFIC GRAVITY
- 4 - ELEMENTARY ASH
- 5 - NEAR GRAVITY MATERIAL
- 6 - EXPANDED FLOATS

WASHABILITY CURVES



DATE : May 13, 1972.

CYCLONE ENGINEERING SALES LTD.
EDMONTON ALBERTA CANADA

T A B L E 6: SAXON ADIT #4

Froth Flotation Test of 28m x 0

Solids, by weight in Slurry	8%
Time of Flotation	1.5 minutes
Reagents	MIBC & Kerosene

	<u>Concentrate</u>	<u>Tailings</u>
Yield	51.39%	48.61%
Ash	6.10%	40.38%
Volatile Matter	22.62%	16.84%
Residual Moisture	0.56%	0.50%
Fixed Carbon	70.72%	42.28%
F.S.I.	9+	6
Sulphur	1.02%	0.86%

SECTION 2

WASHING TESTS & ANALYSIS OF PRODUCTS

SAXON ADIT #4

TABLE 1 - SAXON ADIT #4

Approximate Distribution of Products

<u>Product</u>	<u>Wt. %</u>	<u>Ash %</u>
Clean Coal	45.00	8.20
Compound Water Cyclone Refuse	47.00	72.80
Flotation Refuse	<u>8.00</u>	<u>30.3</u>
Total	100.00	40.30

T A B L E 2 - SAXON ADIT #4

Proximate Analysis of Clean Coal

Ash	8.16%
Volatile Matter	22.34%
Residual Moisture	0.72%
Fixed Carbon	68.78%
F.S.I.	9
B.T.U./lb.	14,320
Sulphur	0.66%

T A B L E 3 - SAXON ADIT #4

Ultimate Analysis

Ash	8.16%
Carbon	80.92%
Hydrogen	4.62%
Nitrogen	1.62%
Oxygen	4.00%
Sulphur	0.68%

TABLE 4 - SAMPON ADIT #4

Characteristics of the Ash

Mineral Analysis of Ash

SiO ₂	62.10
Al ₂ O ₃	25.44
Fe ₂ O ₃	2.88
TiO ₂	0.82
P ₂ O ₅	0.50
CaO	1.06
MgO	1.18
Na ₂ O	0.10
K ₂ O	2.16
SO ₃	1.53

Ash Fusibility

	<u>Reducing Atmosphere °F.</u>	<u>Oxidizing Atmosphere °F.</u>
Initial Deformation Temperature	2640+	2640+
Spherical Temperature	2640+	2640+
Hemispherical Temperature	2640+	2640+
Fluid Temperature	2640+	2640+

T A B L E 5 - SAXON ADIT #4

Analysis of C.W.C. Reject

Ash	72.84%
Volatile Matter	15.43%
Residual Moisture	0.86%
Fixed Carbon	10.87%
F.S.I.	N.A.
B.T.U./lb.	2,090
Sulphur	0.84%

Flotation Refuse

Ash	30.33%
Volatile Matter	17.41%
Residual Moisture	1.10%
Fixed Carbon	51.16%
F.S.I.	3
B.T.U./lb.	9,540
Sulphur	0.88%