SECOND INTERIM REPORT

BABCOCK AREA

MAY 1973

VOLUME I

SUMMARY

Prepared by the

Quintette Joint Venture

Denison Mines Limited
Coal Division
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CANADA

World Resources Company
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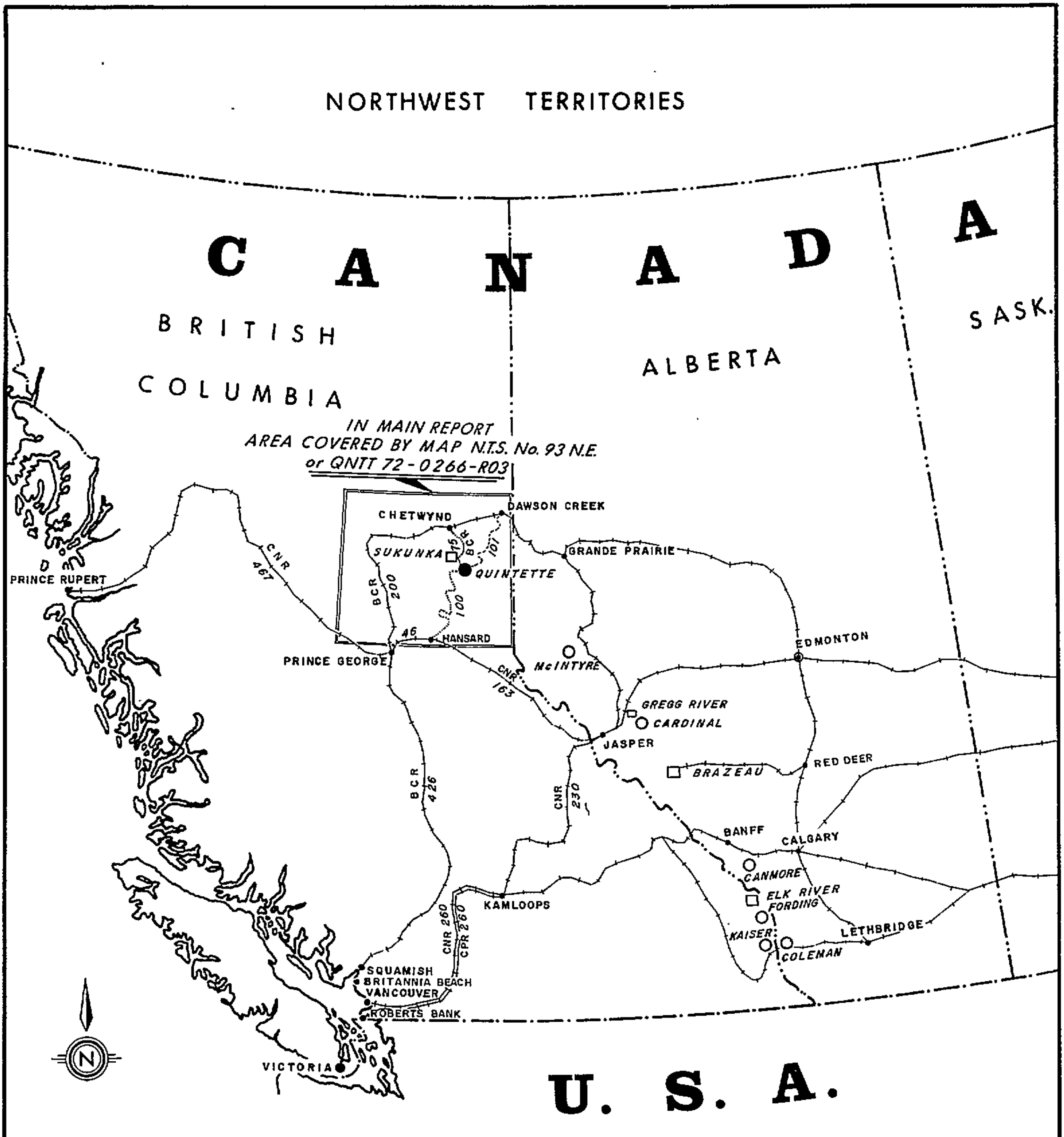


LEGEND

●—+—+—●	EXISTING RAILWAY (MILEAGE)
– – – – –	PROPOSED PERMANENT ROAD (MILEAGE)
....	PROPOSED RAILWAY (MILEAGE)
□	PROPERTIES BEING DEVELOPED
○	PROPERTIES IN PRODUCTION

PREPARED BY:
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

ALCO STANDARD CORPORATION
JOINT VENTURE - QUINTETTE PROJECT

LOCATION MAP

DRAWN BY: E. Toth	DATE: April '73	SCALE: 1" = 130 mi ±
APPROVED BY:	DRAWING NO.: MISC 73-0423-R02	

INTRODUCTION

The Quintette Joint Venture (QJV) is pleased to present this overall summary as Volume I of the report on the Babcock area of the Quintette coal licences. This information has been extracted and summarized from the data embodied in Volumes II and III of this Second Interim Report.

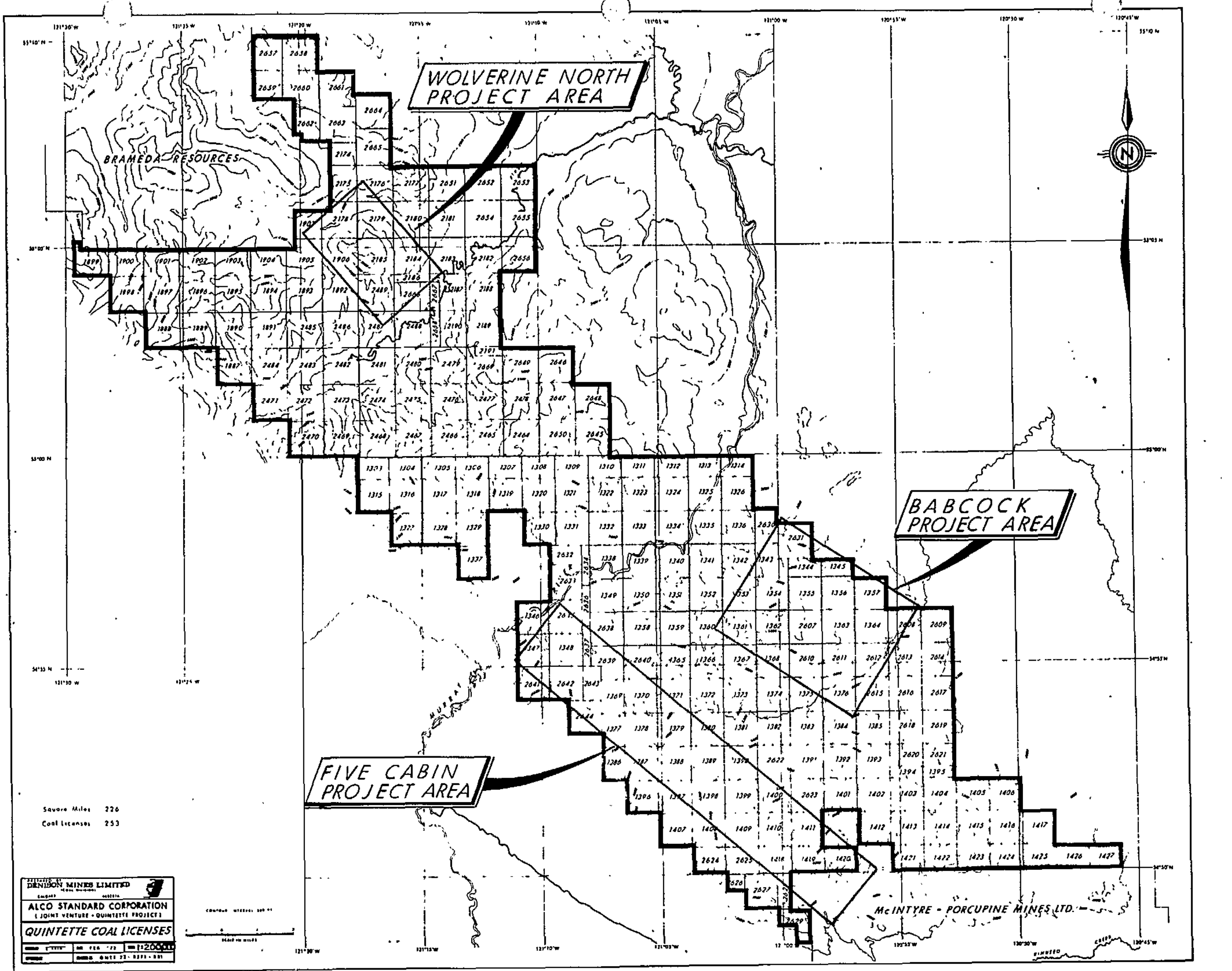
The Quintette property consists of 253 British Columbia coal licences encompassing 226 square miles. The First Interim Report, for the most part, provided an outline of the geology and first approximation of the coal reserves and quality in the Babcock portion of the licences. Almost the same amount of work has been done since the First Interim Report was written.

Some of the more important events in the progress of the Quintette project are:

Acquisition of Licences (October 1970 - November 1971)
Completion of Quintette Joint Venture Agreement (March 1971)
Exploration Program (February 1971 - May 1972)
Presentation to N.K.K. & Kobe Steel (January 1972)
Completion of First Interim Report (December 1971)
Completion of John T. Boyd Study (August 1972)
Japanese Steel Industry Delegation at Quintette (September 1972)
Bulk Samples to Japanese Steel Industry (July 1972)
Completion of Second Interim Report (May 1973)

GEOLOGY and RESERVES

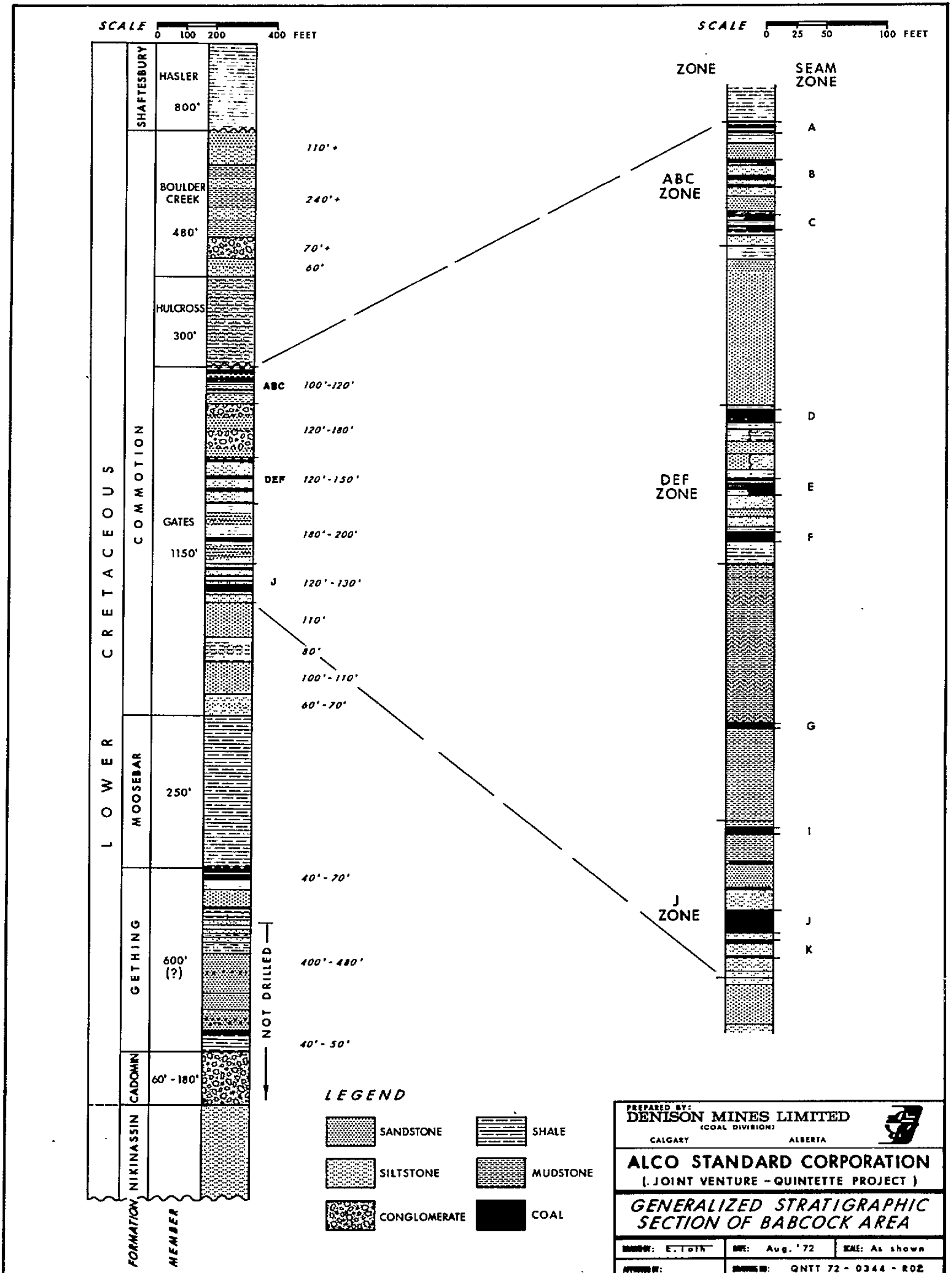
SECTION


WOLVERINE NORTH PROJECT AREA
BABCOCK PROJECT AREA
FIVE CABIN PROJECT AREA
BRAMEDA RESOURCES
McINTYRE - PORCUPINE MINES LTD.
Square Miles 226
Coal Licenses 253
DENISON MINES LIMITED
ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)
QUINTETTE COAL LICENSES
1:200000

GEOLOGY

Within the Quintette licences, coal deposits with economic potential have been delineated in Lower Cretaceous rocks of the Gething Formation and in the Gates Member of the Commotion Formation. The distribution of these seams in the Gates Member is shown in the following generalized stratigraphic section for the Babcock area. Of the ten seams or seam zones which have been encountered in the Babcock area, six have economic importance and five of these outcrop at the northwest end of the structure. There is every indication that these seams have a high degree of continuity and that there are no abrupt changes in thickness or significant signs of shearing within the seams. This apparent lack of shearing within the Gates Formation is believed to be due to the more competent nature of the younger strata.

The Babcock reserve area is a fairly flat lying monocline plunging slightly to the southeast. It lies within the Rocky Mountain folded belt or foothills and was formed by late Cretaceous tectonic activity. As is common within the foothills belt, the structure is terminated on the east side by a zone of thrust faulting and folding. However, Babcock Mountain is different from most foothills structures in that the strata are gently inclined and there is no evidence of major faulting within the main reserve area. Beds are steeply dipping on the westerly side where they form the east limb of the Waterfall syncline. It is this westerly limb that contains coal reserves believed to be amenable to hydraulic mining.


SCALE 0 100 200 400 FEET
SCALE 0 25 50 100 FEET
LOWER CRETACEOUS
SHAFTESBURY
HASLER
800'
COMMOTION
BOULDER CREEK
480'
110'+
240'+
70'+
60'
HULCROSS
300'
GATES
1150'
ABC
100'-120'
120'-180'
DEF
120'-150'
180'-200'
J
120'-130'
110'
80'
100'-110'
60'-70'
MOOSEBAR
250'
GETHING
600' (?)
40'-70'
400'-480'
40'-50'
NOT DRILLED
CADOMIN
60'-180'
NIKINASSIN
FORMATION
MEMBER
ZONE
SEAM ZONE
A
B
C
ABC ZONE
D
DEF ZONE
E
F
G
I
J ZONE
J
K
LEGEND
SANDSTONE
SHALE
SILTSTONE
MUDSTONE
CONGLOMERATE
COAL
PREPARED BY: DENISON MINES LIMITED (COAL DIVISION)
CALGARY ALBERTA
ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)
GENERALIZED STRATIGRAPHIC SECTION OF BABCOCK AREA
E. Toth
Aug. '72
As shown
QNTT 72 - 0344 - R02

RESERVES

Description

The relatively flat Babcock area contains 309 million short tons of proven coal in six seams of economic significance (designated as seams D, E, F, G, I and J). Present concepts of mining in this area indicate that seams G and I will be abandoned. Seam G, which contains 3.1 million tons, is too limited in extent and contains excessive amounts of near-gravity material. Seam I is too close to seam J in the southeastern end of the Babcock area and recoveries, as indicated by sink-float data, are too sporadic in the remainder of the area. Omitting these seams, approximately 254 million tons of coal reserves remain to be mined. It may also be necessary to omit the southwestern half of seam E from the mining plan, further reducing the reserves in place by 15 million tons. On a net clean basis, at either 1.60 Sp. Gr. or 7% ash, approximately 120 million tons of coal are available. Omitting seams G and I, this reduces to 100 million clean tons and a further 10 million clean tons may be lost if part of seam E is left in the ground.

The foregoing reserve figures include in-seam dilution. Yield estimates are based on full-height analyses over the entire mining section. No dilution by any floor material has been computed, but 53 million tons of potential out-of-seam (roof) dilution is associated with the basic reserve of 302 million tons of coal in place. Of this amount, 22.1 million tons could be expected to accompany the removal of 132 million tons of raw coal from seams D, E, F, and J.

Coal Washability and Yield

While most of this report is based on the assumption that the product coal from the Babcock area will be prepared at 7% ash and/or at approximately a cleaning specific gravity of 1.60, other plans could be considered. For example, it may be possible to prepare a premium quality coal from seams F and J while mining a more average quality coal from seams D and E.

Regardless of the ultimate plan which will be chosen, a very respectable product can be expected on the basis of a seam blend in approximately the proportion: 20% D, 20% E, 20% F, and 40% J. The weighted production yields are expected to range between 65 and 75%, depending on the amount of out-of-seam dilution and the proportion of each seam in the feed. Plan cut-points will probably range from 1.55 to 1.60 for this coal mix.

Data have been prepared to show quality variation in each seam with a fixed cut-point of 1.60. Although there is a relatively wide range of ash indicated for the cleaned product for each seam when washed at a constant specific gravity, the resulting range should be much narrower when seams are mined concurrently.

It is apparent that cleaning with water only at a relatively high specific gravity will yield an acceptable 7 to 8 percent (%) ash product. However, it should be kept in mind that an improved product may be available if there is sufficient economic advantage in preparing it.

The 6 pages of this report following this page contain coal quality data, and remain confidential under the terms of the *Coal Act Regulation*, Section 2(1). They have been removed from the public version.

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/10_251_2004

MINING AND COAL TREATMENT

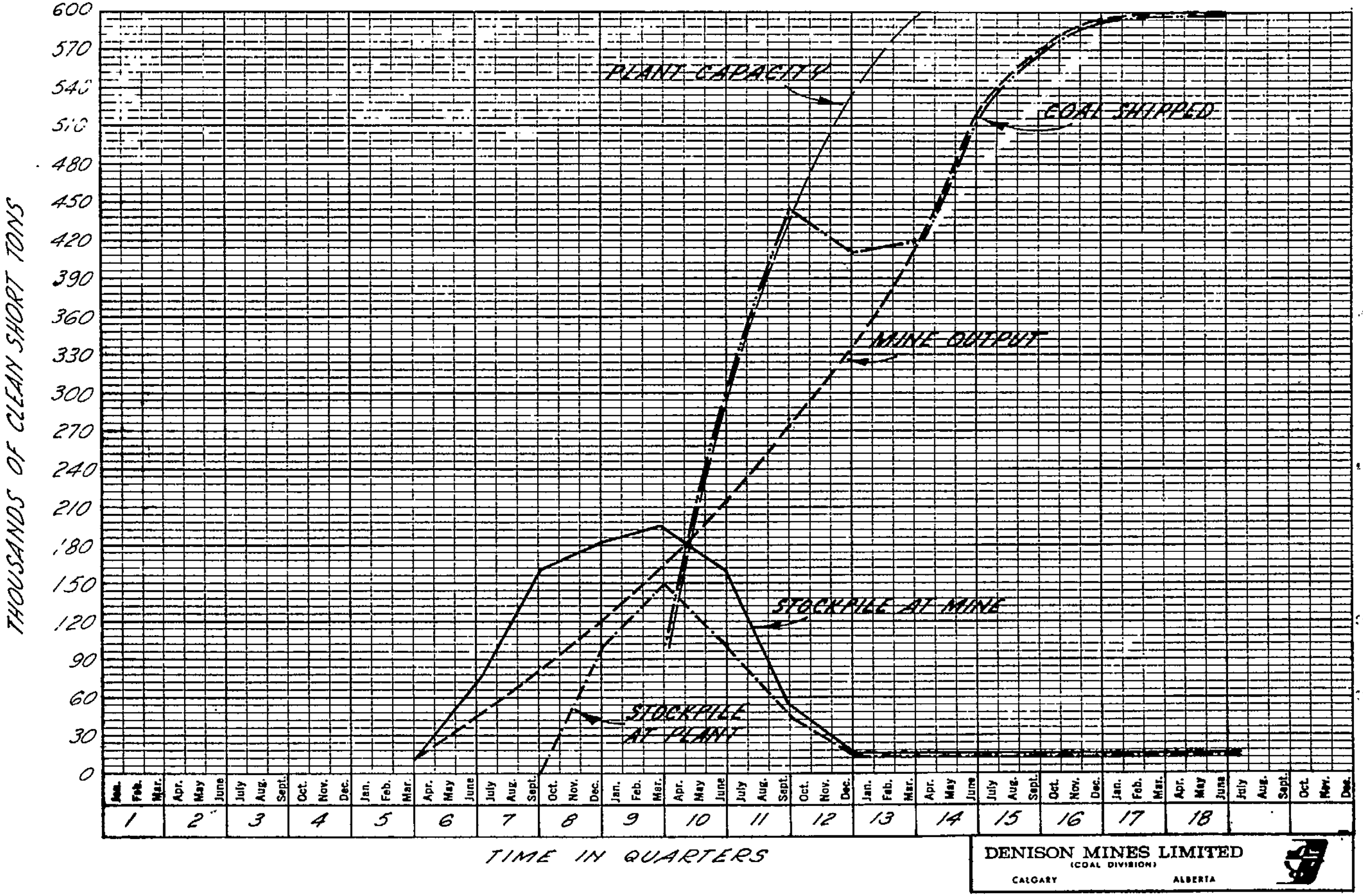
Detailed studies of alternative methods of extraction of the proven coal reserves in the Babcock area indicate that the best methods are as follows.

Employ continuous miners in D and F seams. In E seam, a system using blasting with load-haul-dump machines will be used in order to minimize fine grinding of the dirt seam that will be mined with the coal. In the thick J seam, most of the area will be mined in 20-foot high rooms using load-haul-dump units; in the area to the northwest where it is advisable to mine the bottom leaf of the coal only, continuous miners will be used on shortwall faces up to 185 feet long.

In general, seams will be worked from the top down; D, E and F are planned to provide about 20% each of the blended coal; J will produce 40%.

Main roads in each of the coal seams will be commenced at the northern outcrops and driven down dip vertically beneath each other. Subsequent workings will be developed towards the rise in order to minimize any water problems. Highly inclined ventilation slopes will be driven on each flank and at a point on the main road about 3-1/4 miles down the area. Water and methane are expected to be encountered, and adequate dewatering pumps and ventilating systems are required.

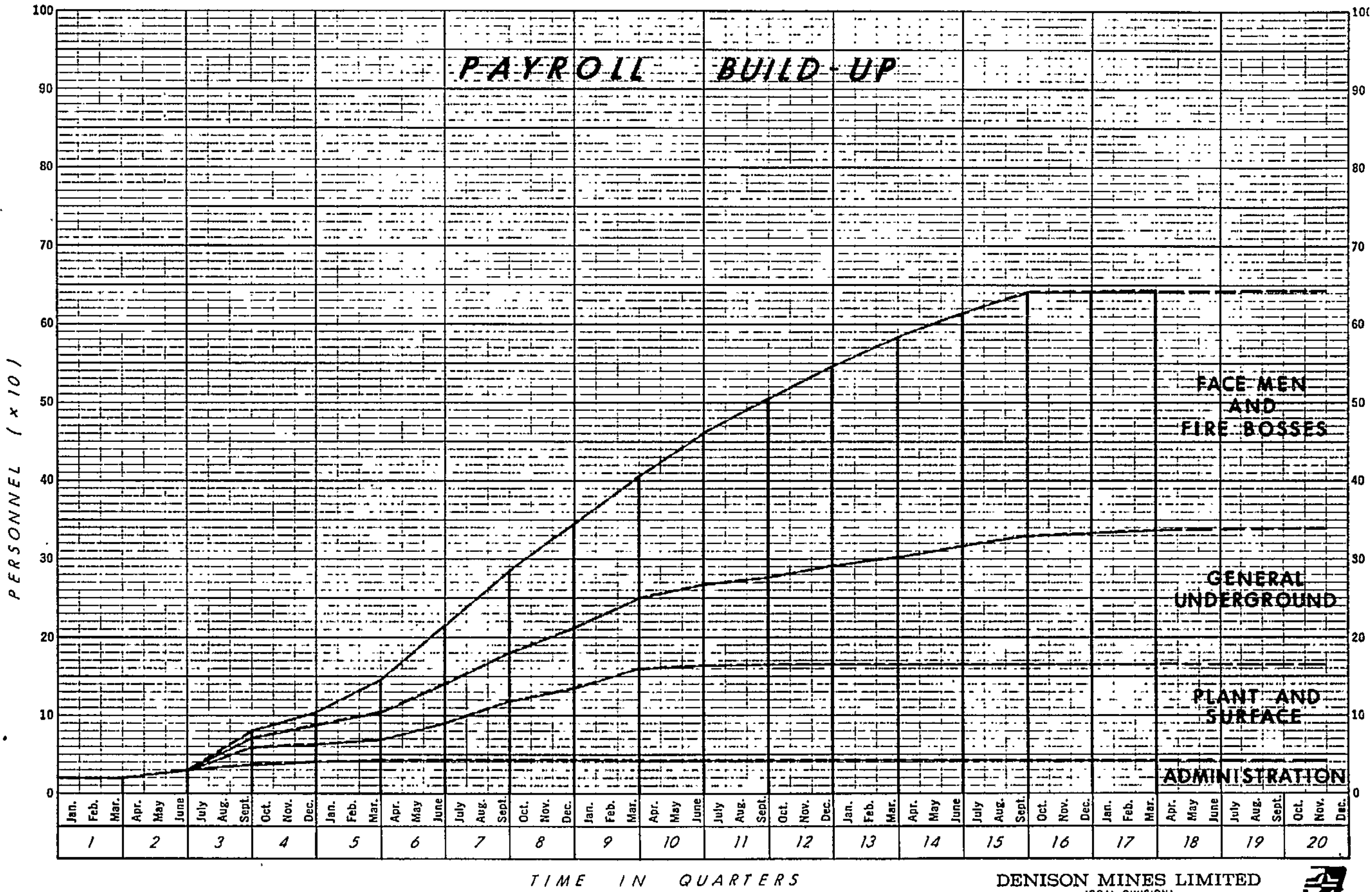
Coal will be transported from each section by conveyors along the main roads, and by a 14,000-foot long 42 inch wide cable belt down the northern slope of the mountain to the coal preparation plant located close to the Murray River. Stockpiles of 20,000 tons per seam are planned near the entrance to each seam for use when necessary. Additional storage of 100,000 raw tons and 120,000 clean tons will be available at the plant.



COAL OUTPUT, STOCKS & COAL SHIPPED

DATE: MAY '73

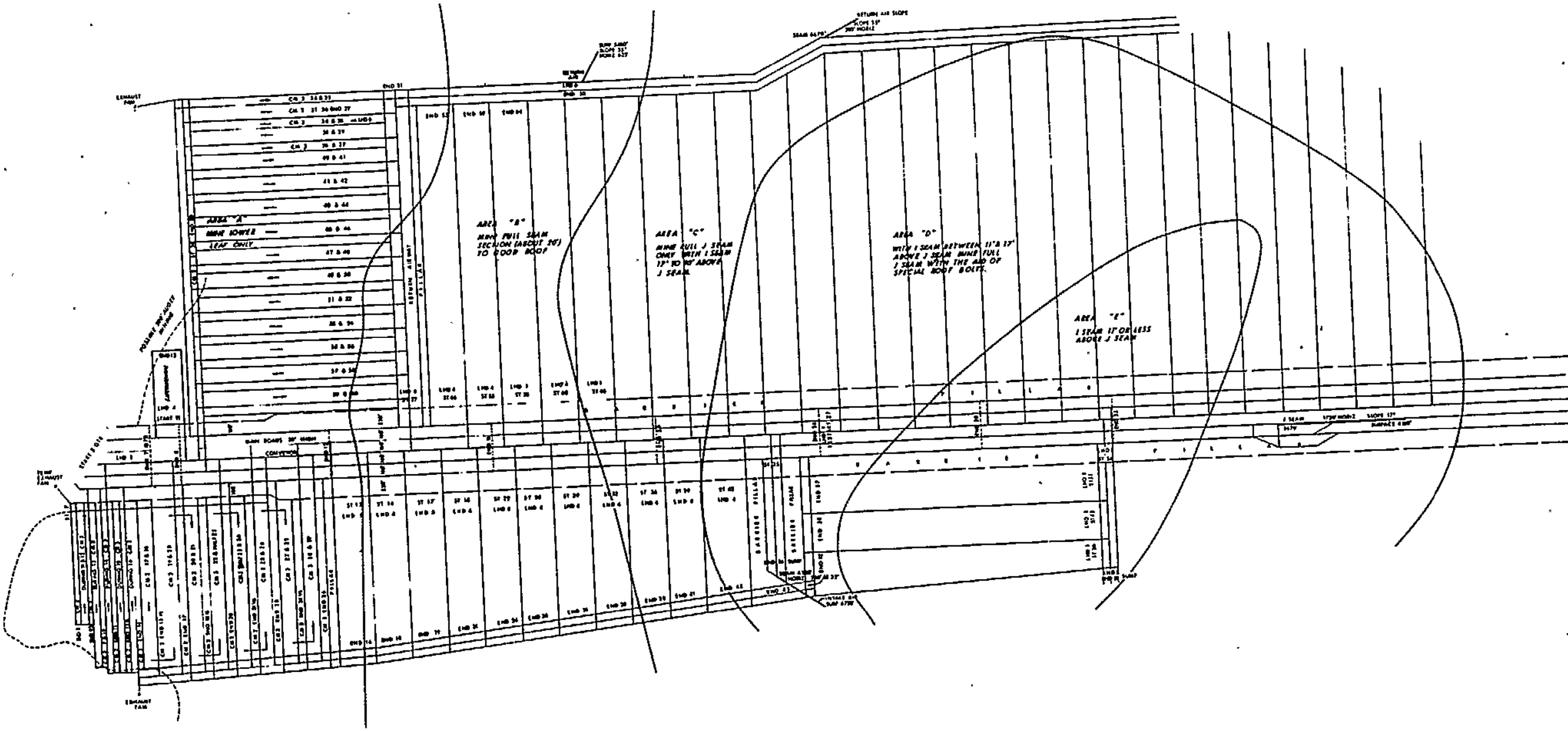
DRAWING NUMBER: BBCK 73-0385-R02



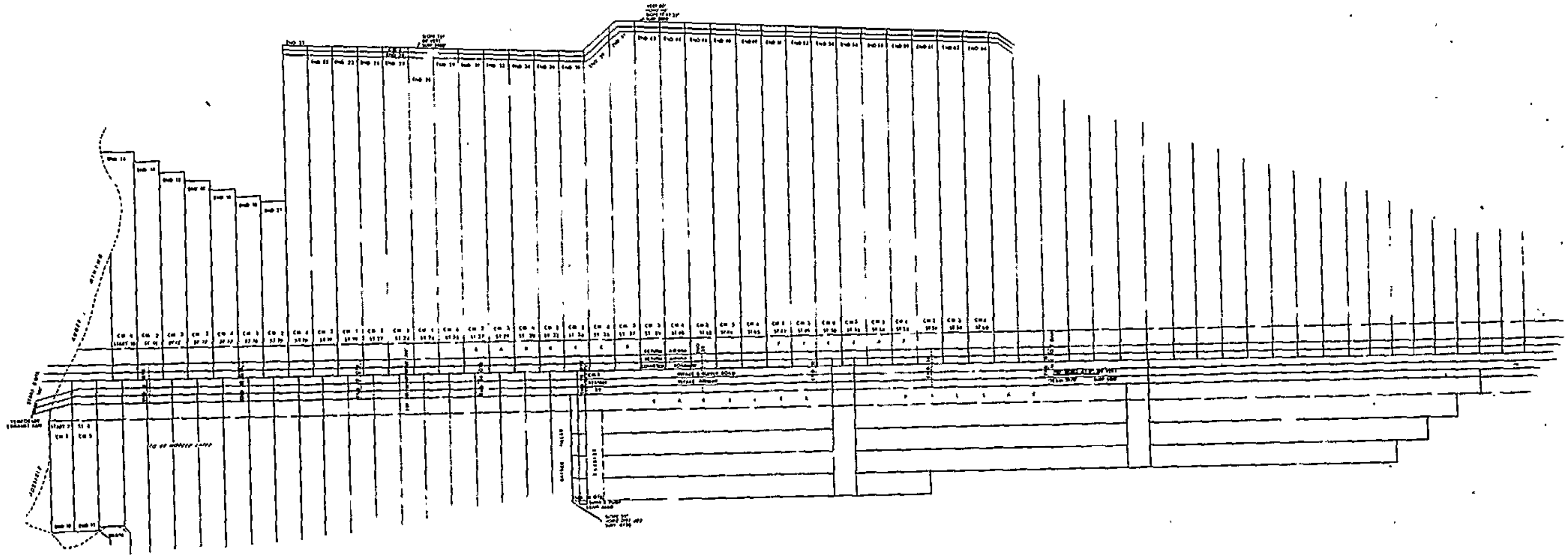
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

The page of this report following this page contains coal quality data, and remains confidential under the terms of the *Coal Act Regulation*, Section 2(1). It has been removed from the public version.

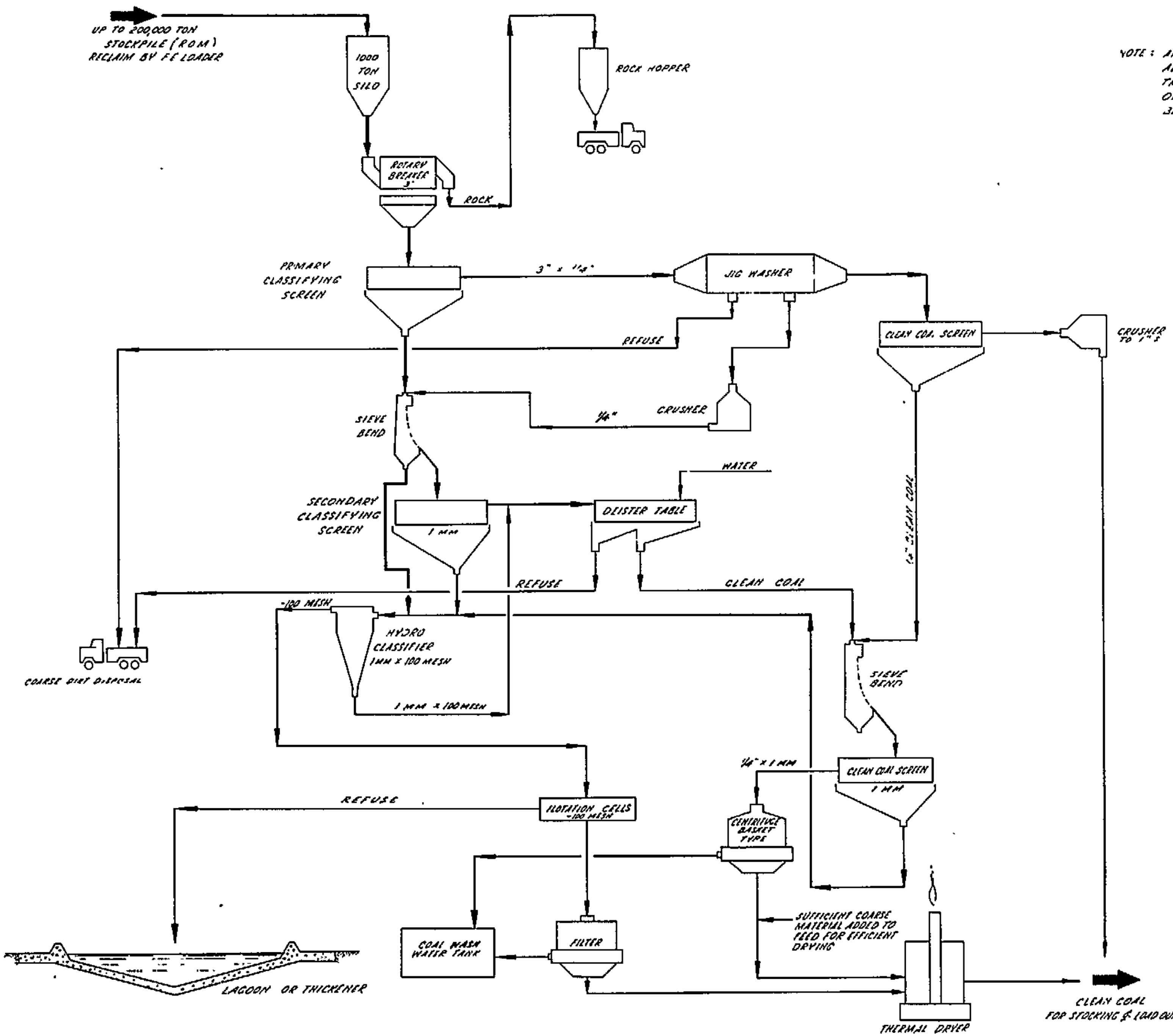
http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/10_251_2004



J SEAM-COMBINATION LAYOUT
LOAD-HAUL-DUMP IN THICK COAL
CONTINUOUS MINERS ON SHORTWALLS
IN THIN COAL SEAMS



SEAM D - STANDARD CONTINUOUS MINER LAYOUT



NOTE : AT LEAST TWO PARALLEL CIRCUITS WILL BE ADOPTED WITH PROVISION MADE TO EASILY TRANSFER FROM ONE SECTION TO THE OTHER AS NECESSARY. THIS TO BE EFFECTIVE BETWEEN FEED BELTS & THERMAL DRYER.

PREPARED BY: DENISON MINES LIMITED (COAL DIVISION) CALGARY ALBERTA

ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)

BABCOCK MTN.
PROPOSED WASHERY FLOWSHEET

DRAWN	[illegible]	DATE	JAN '73	SCALE	—
APPROVED		DRAWING NO.	BBCK 73-0387-803		

SERVICES SECTION

SERVICES

Roads

Access from Dawson Creek, B.C. (121 miles) and Grande Prairie, Alberta (115 miles) is via secondary and dry weather roads. Due to expanding logging and gas exploration activities, additional access routes are being developed. The Quintette Joint Venture favours completion and improvement of a route from Dawson Creek to Babcock along a route developed by a logging company. This 101-mile long route would be a permanent high speed, all-weather road for the movement of personnel and equipment. The cost is estimated at $6,000,000 part of which would be met by the provincial government.

Railways

At least six routes from Babcock to existing rail are technically possible. The indicated rates and terms of the two most attractive alternatives follow.

	Monkman Pass Route	Chetwynd Route
Railway	Can. National	Br. Columbia
New rail needed - miles	92 - 105	70 - 75
Distance - to Vancouver area port	750	715
- to Prince Rupert	610	740
Minimum annual tons required	4.0 MMST	2.0 MMST
Rates to Vancouver area (incl. Gondolas)	$6.30/ST	$4.50-$4.60/ST
Handling charges	$0.75/ST	$0.75/ST

The B. C. Railways proposal is the more attractive, although the rate depends upon the development of the Sukunka deposit. A port location has not been selected by the federal and provincial governments. The B. C.

government favours Brittania Beach. It is assumed that escalation rates will be comparable to those recently negotiated in Japan by the C.N. and C.P. railways.

Pipelines

Slurry pipelining of coking coal to existing railroads or to deep sea ports could provide a number of advantages over coal movement entirely by rail, but at the moment, the concept is too speculative to be considered in the Quintette Joint Venture's development plans. It appears that pipelines are most competitive where they result in much shorter transportation distances compared to rail, or if hydraulic transportation of coal underground is employed.

The shortest distance from Babcock to Sukunka's proposed railroad car loading facilities is 30 miles; the shortest distance to a point on deep sea such as Bella Coola, is about 380 miles.

Power

Natural gas is available from wells within 17 miles of Babcock and is considered the best suited source of energy for power and heat. Natural gas driven turbines involve a relatively low capital cost compared to hydroelectric power lines, provide flexibility of use, and comparable or lower unit cost than hydroelectric power.

About 12 megawatts of power will be required. Capital costs for turbines will be $2,000,000 to $2,300,000; annual fuel costs will be 0.3 to 0.5 cents (¢) per KWH, depending upon the price of gas at the time it is required; annual repair and maintenance costs will be $65,000.

Labour

The labour and production figures for Western Canada's metallurgical coal industry follow.

Company and Location	Clean Coal Sold (Tons)	Est. No. Employees	Union
Canmore Mines Ltd. Canmore, Alberta	306,000 (1971)	230 (1971)	UMWA
Coleman Colleries Ltd. Vicary Creek, B. C.	838,446	500	UMWA
Kaiser Resources Ltd. Sparwood, B. C.	4,646,159	1,200	UMWA
Cardinal River Coals Ltd. Luscar, Alberta	1,125,196	150	UMWA
McIntyre Porcupine Mines Ltd. Grande Cache, Alberta	1,576,785	550	USW
Fording Coal Ltd. Elk River, B. C.	1,300,000	450	USW
TOTALS -	9,792,586	3,080	

$$\frac{\text{Clean tons per year}}{\text{employee}} = 3,179$$

1972 figures except Canmore (1971) and Fording (estimated twelve-month period ending March 1973).

Employees at Babcock will come from existing coal mining operations in Western and Eastern Canada, oil fields, metal mining, agriculture, and other domestic industries, plus workers imported from outside Canada. For example, there are an estimated 200 trainable farm workers in the Dawson Creek area.

The following are basic salaries paid in British Columbia and Alberta for selected occupations considered to require comparable skills.

		Range $/Hr.
1.	Coal Mining (CM operator - labourer)	5.00 - 3.90
2.	Forestry (grapple operator - labourer)	5.61 - 4.45
3.	Construction (crane operator - labourer)	6.37 - 5.24
4.	Oil well drilling (driller - floor labourer)	6.00 - 4.20

Average additional labour costs, expressed as a percentage of base wages and depending on the types of subsidies, etc. that may be involved, range from 30.4 to 64.4%.

It is the Joint Venture's view that:

1. training programs at Babcock must commence at an early date;

2. wages in coal mining will become more competitive with other industries;

3. annual labour costs will increase at about 5% even if wage and price control measures are enacted by the Canadian government;

4. employees, particularly in underdeveloped areas such as Babcock, must make, or at least be given the opportunity to make, above average incomes in order to maintain a stable work force. This might be done through the introduction of production incentives, profit sharing or non-taxable benefits.

Housing and Personnel Transportation

The closest significant population centres via any new all-weather road to Babcock are:

Chetwynd, B.C.	Population	1,300 --	75 miles from Babcock
Dawson Creek, B.C.	Population	12,500 --	95 miles from Babcock
Grande Prairie, Alberta	Population	14,000 --	115 miles from Babcock
Prince George, B.C.	Population	40,000 --	140 miles from Babcock

In order to accommodate the workers required at Babcock, several schemes have been considered. Of these, the best system is to commute from an established centre at 4, 7, or 10 day intervals. The most attractive community in which to base a work force appears to be Dawson Creek. Dawson Creek has excellent recreational facilities, excess hospital and school facilities and over 500 fully serviced building lots.

In order to commute from Dawson Creek, an all-weather, high-speed road and a single status camp with recreational facilities would be built. Such a camp would cost some $1,500.00 per man for the mine construction phase at which time it would be upgraded at an additional cost of $500.00 per man.

Various modes of highway transportation have been examined and it appears that on an annual basis, station wagons are most economical.

Environmental Protection

The Quintette licences are in an attractive underdeveloped recreational area, and protection of the environment will be an important consideration in planning. At the moment, the Quintette Joint Venture works closely with the B.C. Department of Forestry and Mining in this regard. Because Babcock is to be a deep mine, problems of runoff and waste disposal will be minimized.

HYDRAULIC MINING DISCUSSION

HYDRAULIC MINING DISCUSSION

There are probable reserves of 18 million clean long tons of coal occurring in J seam on the west flank of Babcock at an inclination of 45 degrees to 60 degrees. Hydraulic mining techniques have been considered for this 20-foot thick seam. As these reserves are not proven, their development was not considered in the mining plans preceding. However, a tentative plan for their exploitation follows for the purpose of information, if and when drilling substantiates present structural and reserve estimates. Please refer to the drawing which follows.

Three hydraulic mining sections can be developed from a point in Waterfall Creek near the plant. A locomotive road rising slightly to the southeast will be driven to permit development of the updip coal, including coal in the flat areas of Babcock. Coal from the northern part of Babcock will be transported in a flume set primarily in the floor of J seam.

Eighty-five percent (85%) of production will be from J seam in early years. The Babcock proven reserves will be exploited with two continuous miners in D seam and two load-haul-dump units working largely in thick portions of J seam. Productivity will be 19.6 clean short tons per man-shift.

Production output from a hydraulic mine would reach full rate in 3-1/2 years, and the quality will be approximately:

Total Moisture	6.0%
Ash	7.0 - 7.5%
Volatile Matter	21.0 - 21.8%
Fixed Carbon	64.7 - 66.0%
Sulphur	0.25- 0.35%
F.S.I.	6½ - 7
Fluidity	130 - 150 dd/m

The Quintette Joint Venture believes hydraulic mining could result in lower cost operations, a smaller labour force, and earlier production than offered by more conventional methods.

INTERPRETATION OF FAULTING IN THIS AREA INCOMPLETE
PROPOSED MAIN CONVEYOR ROADWAY
J SEAM OUTCROP
THIN COAL
THICK COAL
WORKINGS IN J SEAM
L.H.D. PRODUCTION PANEL
15% CUT OFF
25% CUT OFF
1500' CUT OFF
CONVEYOR FROM BABCOCK PORTALS
NO INTERPRETATION LACK OF SUFFICIENT CONTROL
WATERFALL CREEK
LEGEND:
MON - MONITOR
19th - 19th QUARTER
END 19th - END OF 19th QTR. AFTER SIGNING CONTRACT
ST - START
NOTES:
CONTOURS IN J SEAM.
SHADED AREA CONTAINS THE HYDRAULIC MINING RESERVES.
PREPARED BY: DENISON MINES LIMITED (COAL DIVISION)
CALGARY ALBERTA
ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)
HYDRAULIC & L.H.D./SLUSHER MINING SCHEDULE ON BABCOCK MOUNTAIN
DATE: Mar '73
1:20,000
BBCK 73 - 0415 - 801

602

PR-QUINTETTE 72(3)r

PREPARED BY: DENISON MINES LIMITED (COAL DIVISION) CALGARY ALBERTA		
ALCO STANDARD CORPORATION (JOINT VENTURE - QUINTETTE PROJECT)		
BABCOCK MOUNTAIN LONGITUDINAL CROSS-SECTIONS A & B		
DRAWN BY E. Toth	DATE Nov. '72	SCALE 1" = 400'
APPROVED BY	DRAWING NO QNTT 72 - 0360 - R02	

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(COAL DIVISION)
CALGARY ALBERTA

ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)

BABCOCK MOUNTAIN
LONGITUDINAL CROSS-SECTIONS
C & D

DRAWN BY E. Toth	DATE Nov. '72	SCALE 1" = 400'
APPROVED BY	DRAWING NO QNTT 72 - 0360 - R02	

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PR-QUINTETTE 72(2)A

PREPARED BY:
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(COAL DIVISION)
CALGARY ALBERTA

ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)

BABCOCK MOUNTAIN LONGITUDINAL CROSS-SECTIONS E & F

DRAWN BY E Toth	DATE Nov. '72	SCALE 1" = 400'
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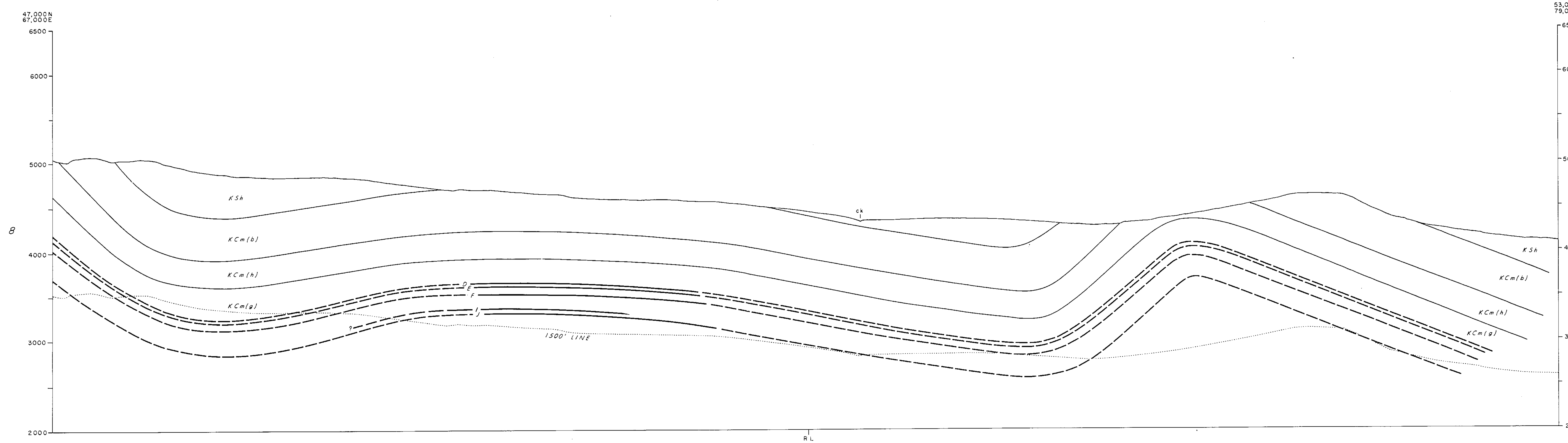

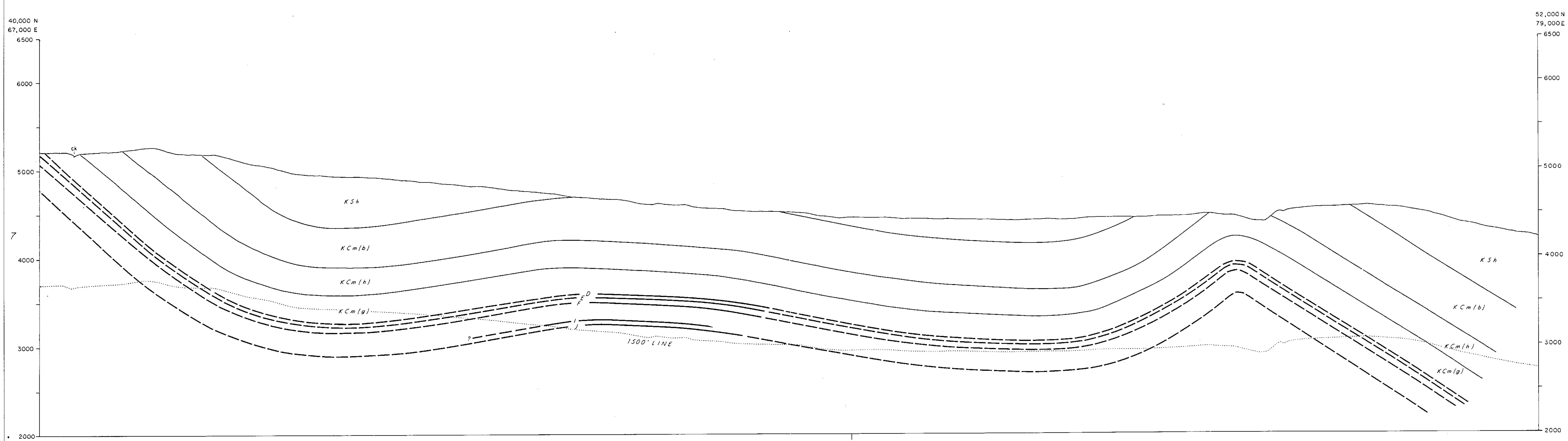

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DENISON MINES LIMITED

BABCOCK MTN.
CROSS-SECTION 7 & 8

DRAWN BY E. Toth	DATE Mar '72	SCALE 1" = 1000'
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PR - QUINTETTE 72(2)C

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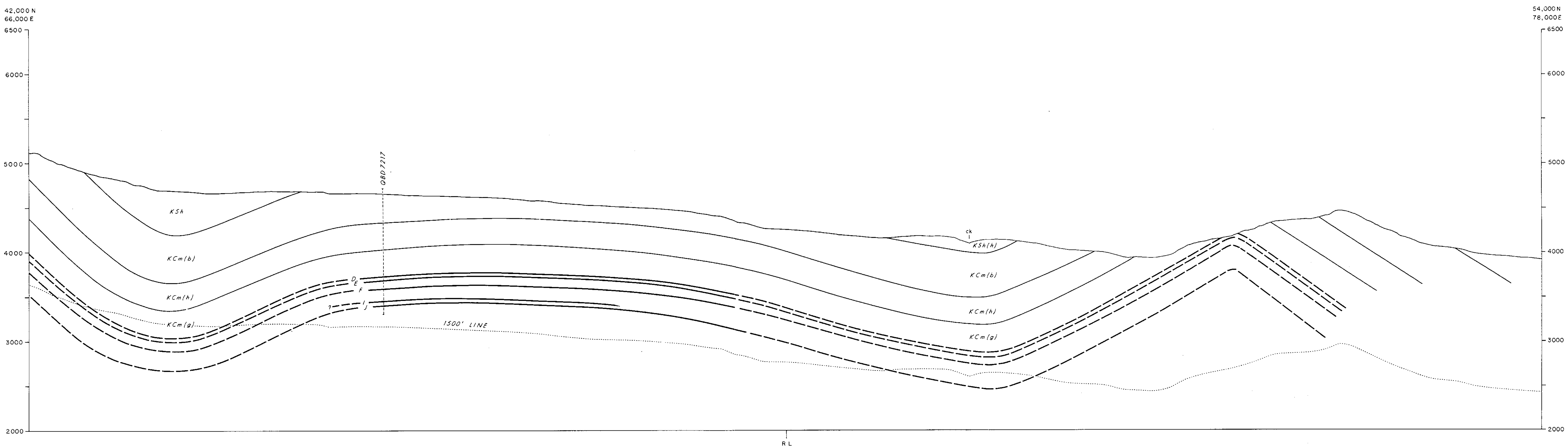

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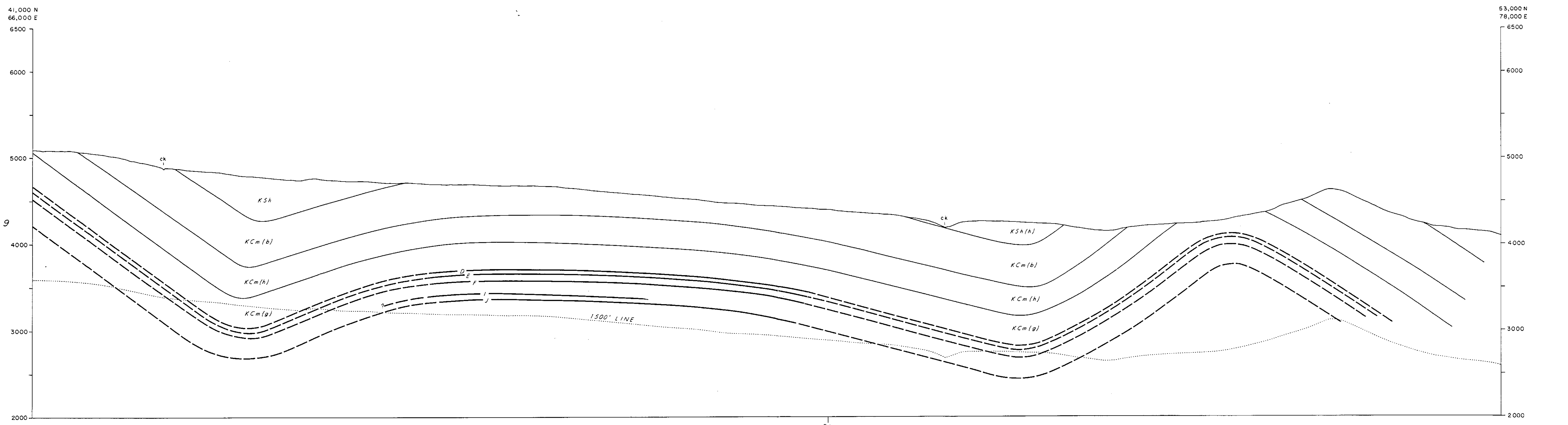

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DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

BABCOCK MTN.
CROSS·SECTION 9 & 10

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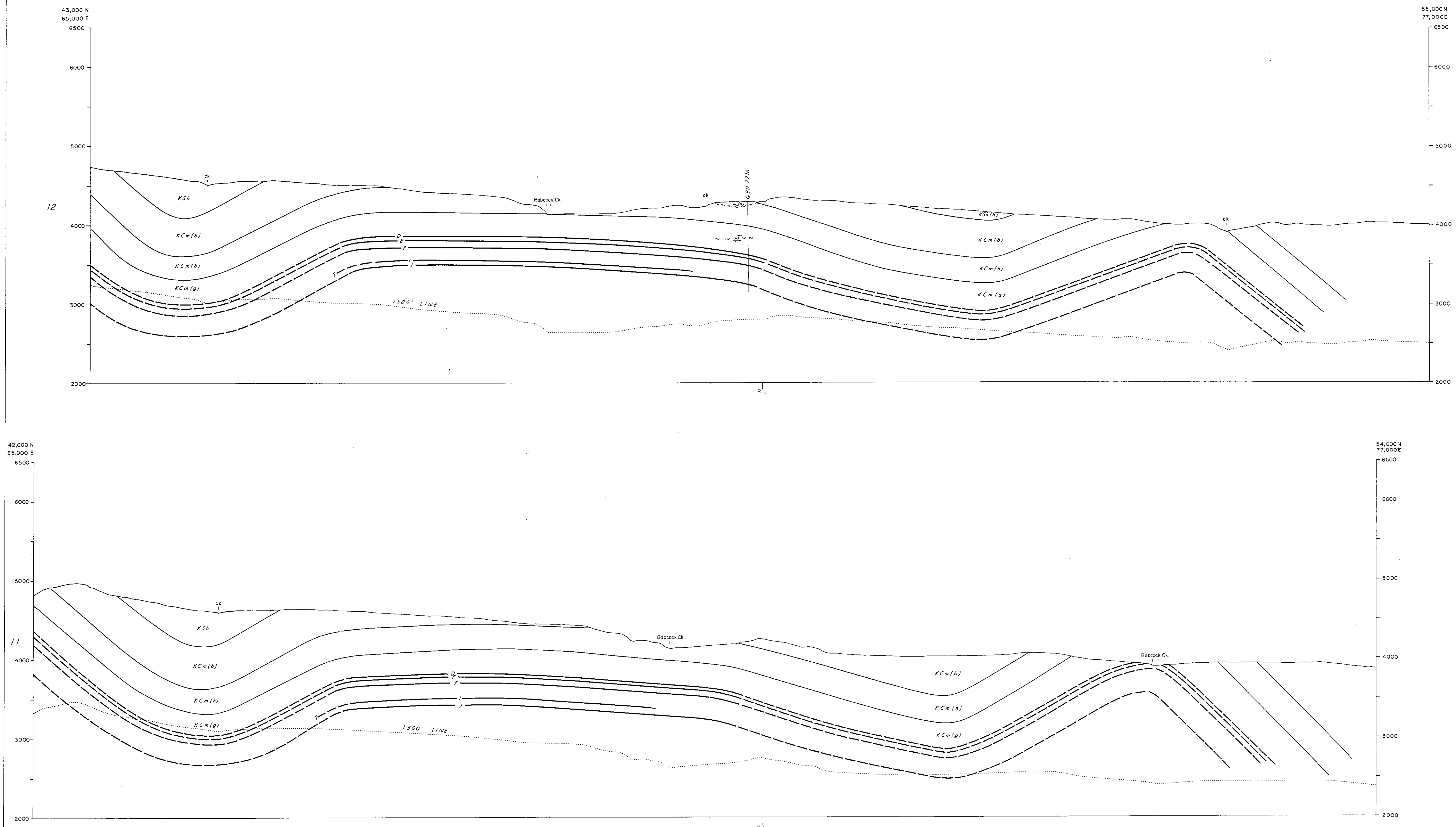
PR-QUINTETTE 72(2)C



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DENISON MINES LIMITED COAL DIVISION CALGARY ALBERTA	
BABCOCK MTN. CROSS-SECTION 11 & 12	
DRAWN BY E. Toth	DATE Mar. '72 — SCALE 1" = 1000'
APPROVED BY	DRAWING NO. QNTT 72-0285-R02

PR-QUINTETTE 72(2)C

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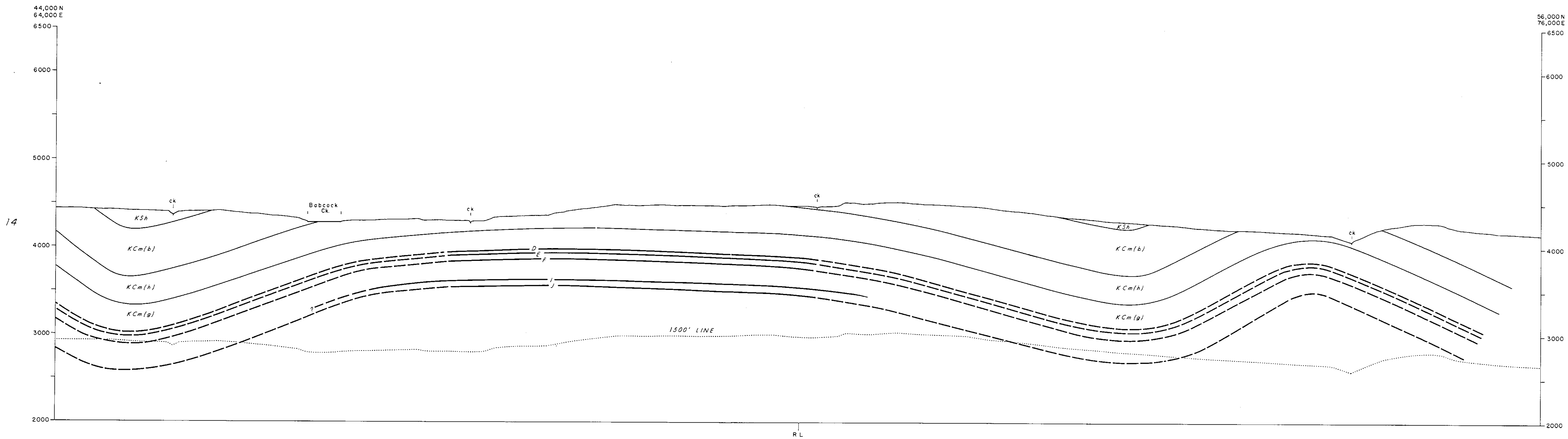

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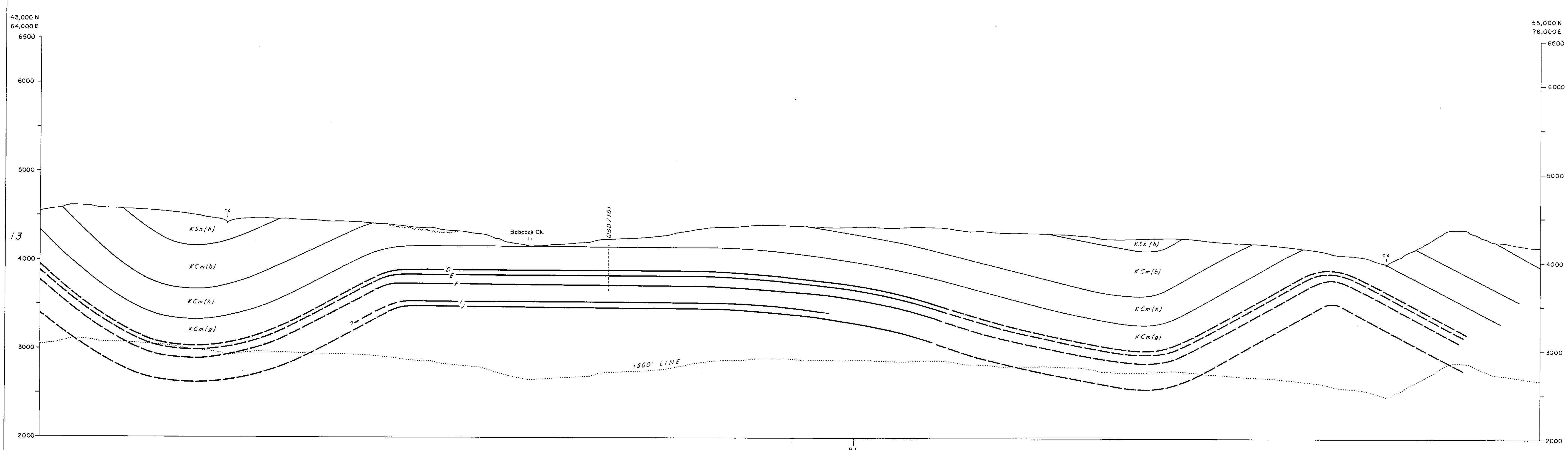

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PR- QUINTETTE 72(2)C.

DENISON MINES LIMITED (COAL DIVISION) CALGARY ALBERTA		
BABCOCK MTN. CROSS-SECTION 13 & 14		
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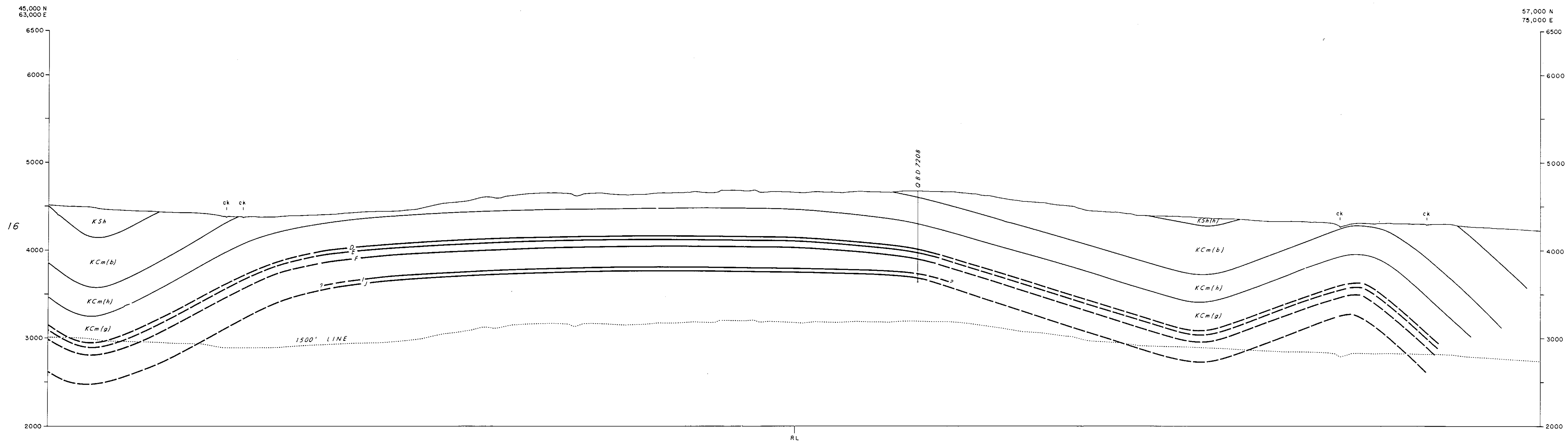

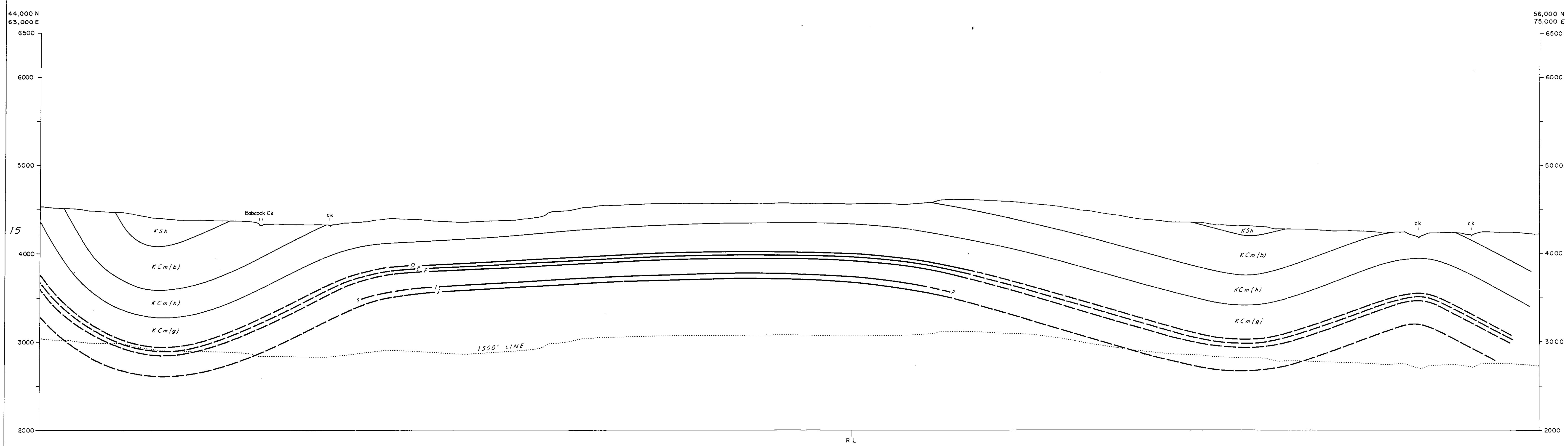

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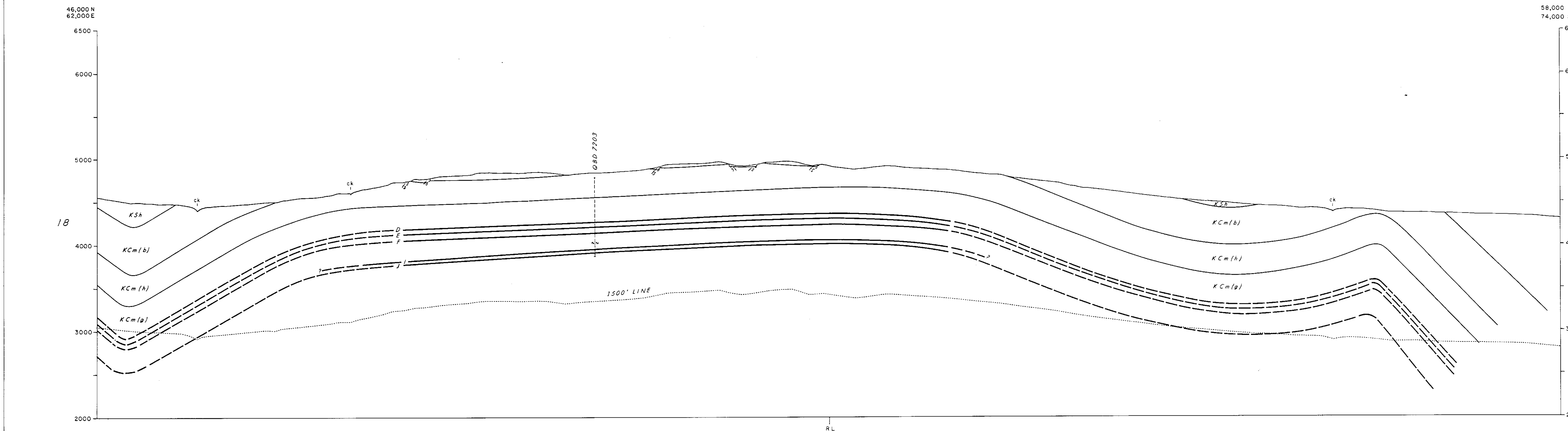
DENISON MINES LIMITED

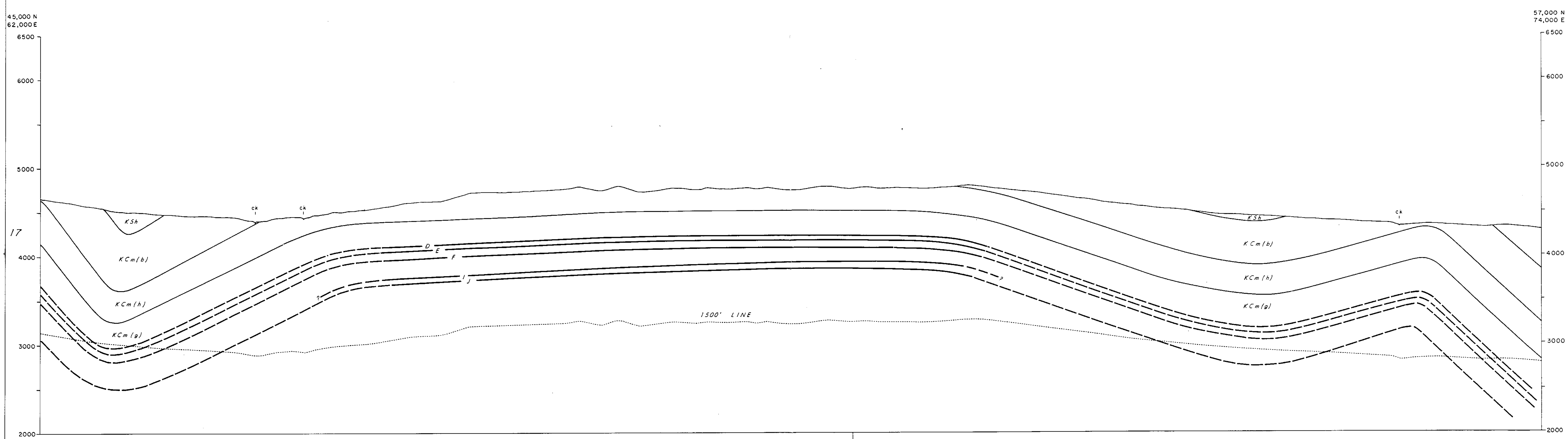
CALGARY ALBERTA

BABCOCK MTN.
CROSS-SECTION 15 & 16

DRAWN BY E. Toth	DATE Mar. '72	SCALE 1" = 1000'
APPROVED BY	DRAWING No. QNTT 72-0285-R02	

PR - QUINTETTE 72(2)C





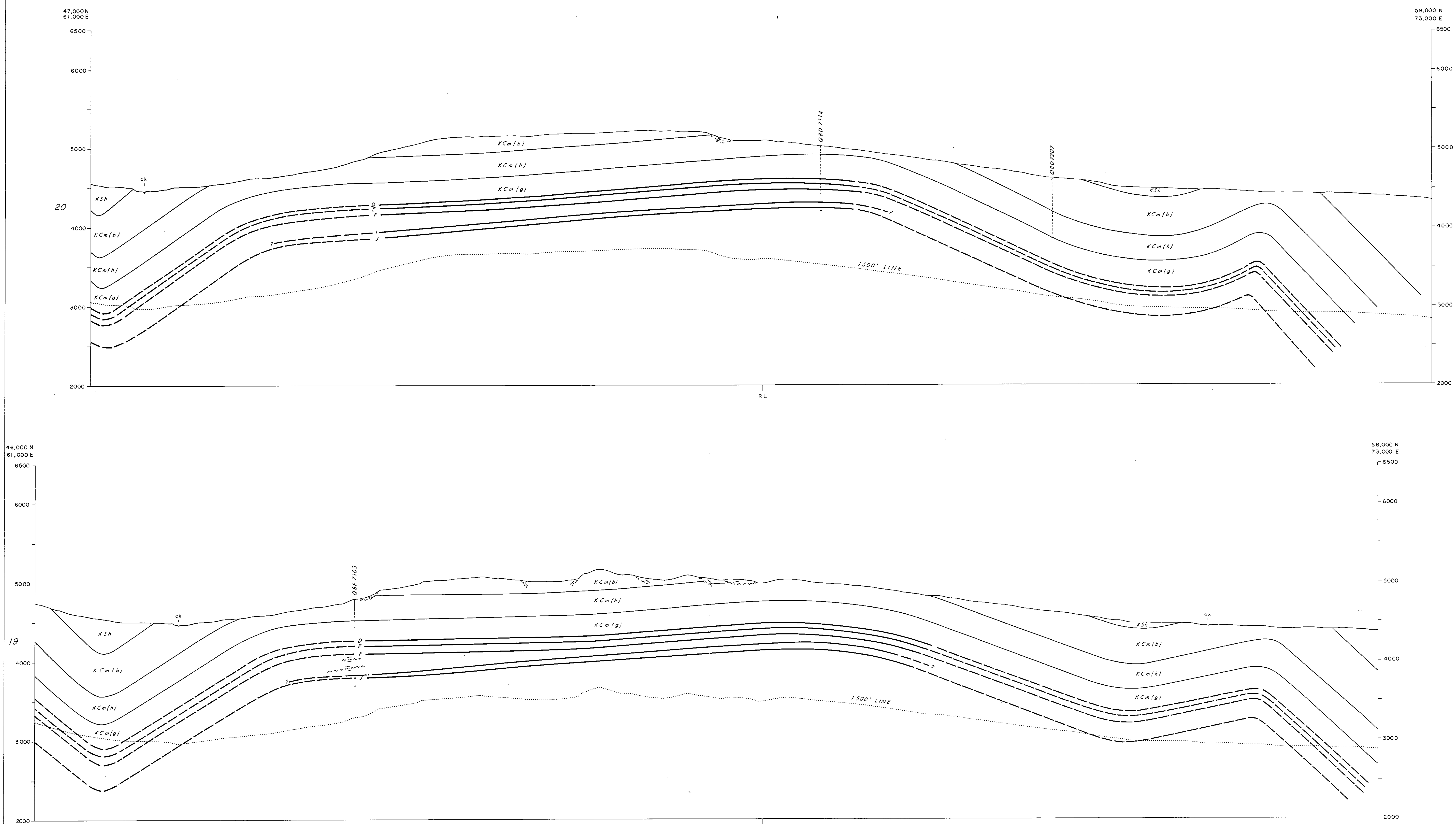
602

PR - QUINTETTE 72(?)

DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

BABCOCK MTN.
CROSS-SECTION 17 & 18

DRAWN BY E. Toth	DATE Mar. '72	SCALE 1" = 1000'
APPROVED BY	DRAWING NO QNTT 72 - 0285 - R02	



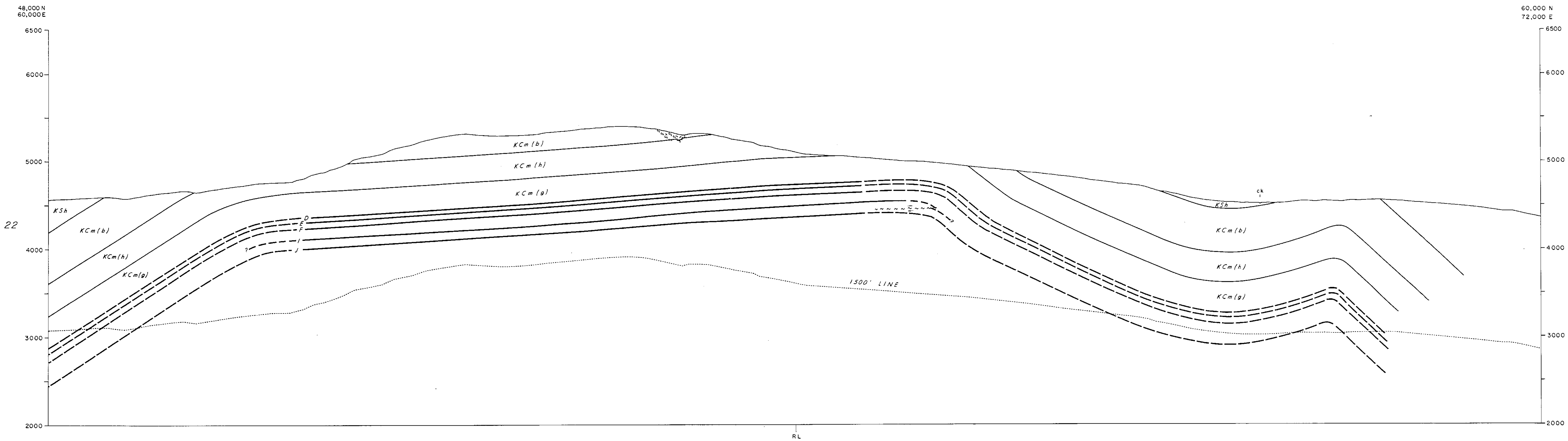
602

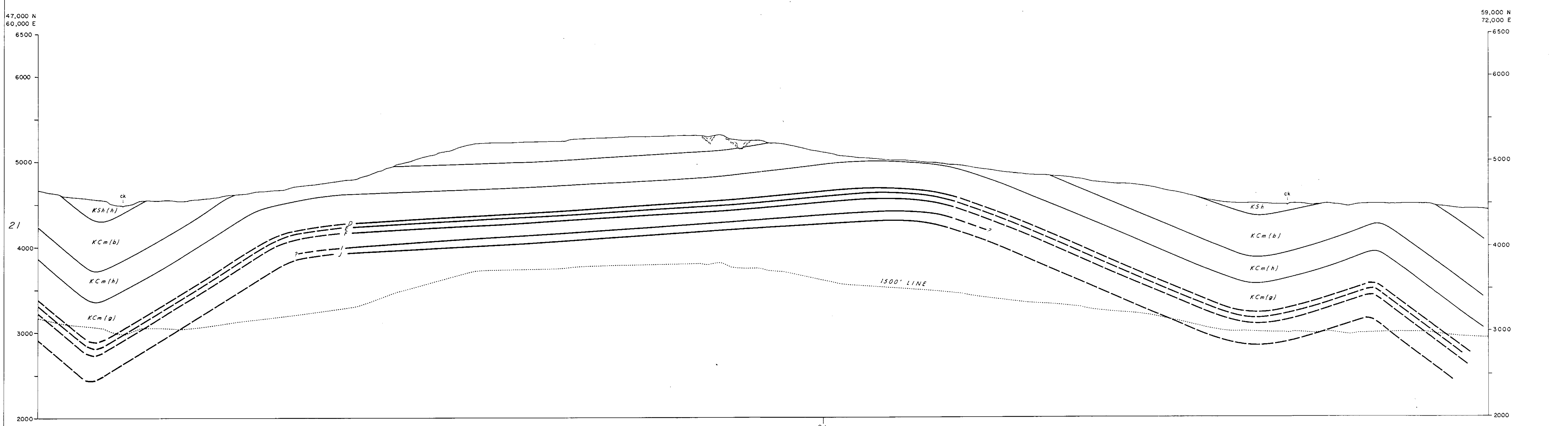
DENISON MINES LIMITED

BABCOCK MTN.
CROSS-SECTION 19 & 20

DRAWN BY E. Toth	DATE Mar. '72	SCALE 1" = 1000'
APPROVED BY	DRAWING NO. QNTT72-0285-R02	

PR - QUINTETTE 72(3)C





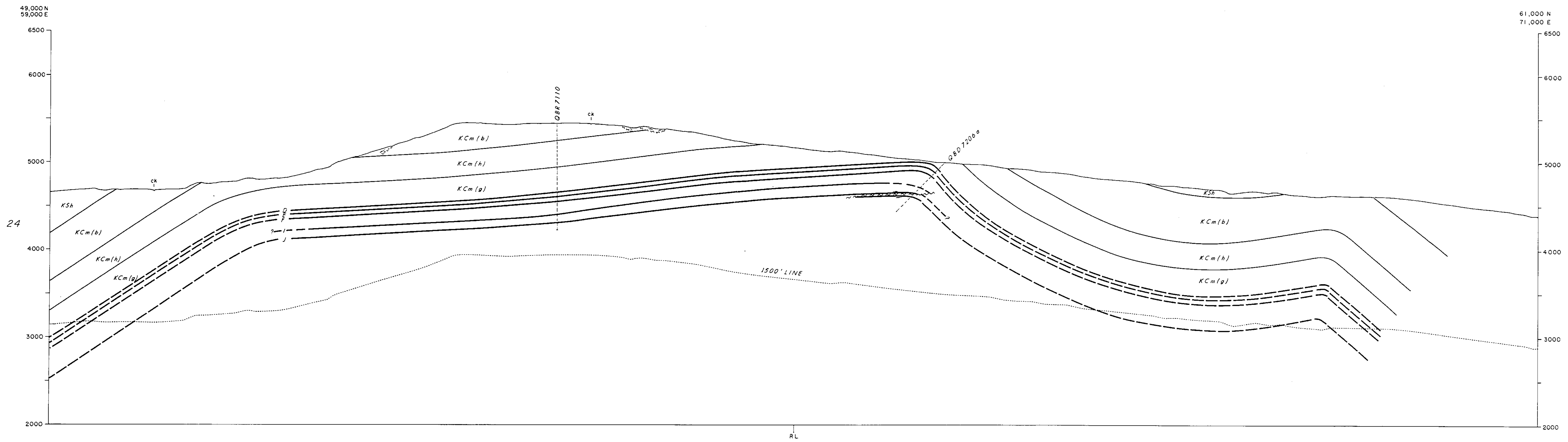
602

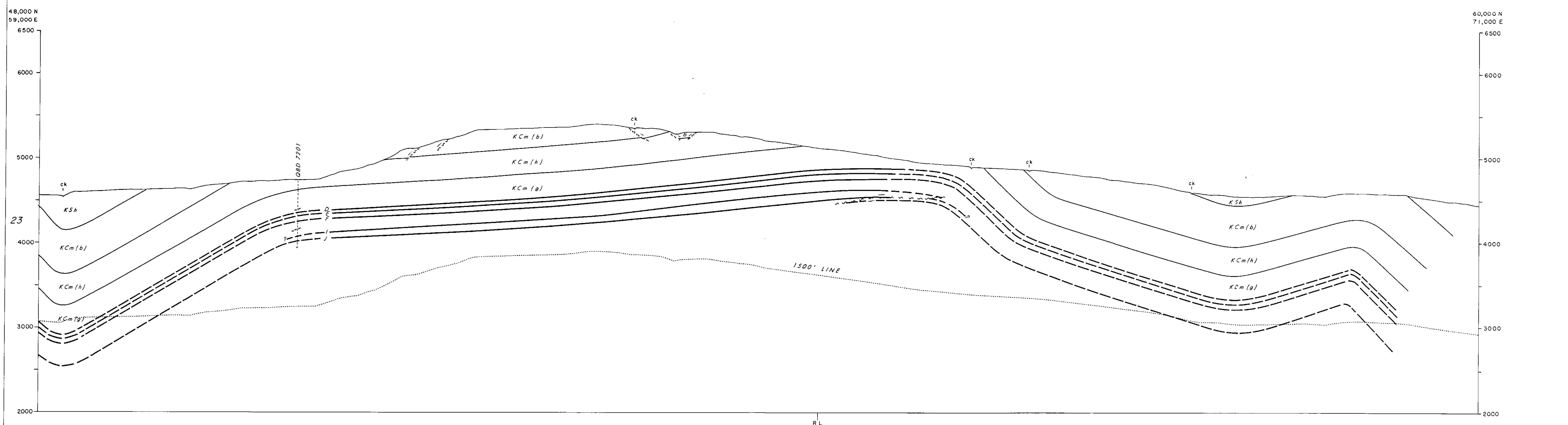
PR- QUINTETTE 72(2)C

DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

BABCOCK MTN.
CROSS-SECTION 21 & 22

DRAWN BY E. Toth	DATE Mar.'72	SCALE 1" = 1000'
APPROVED BY	DRAWING NO. QNTT 72-0285-R02	





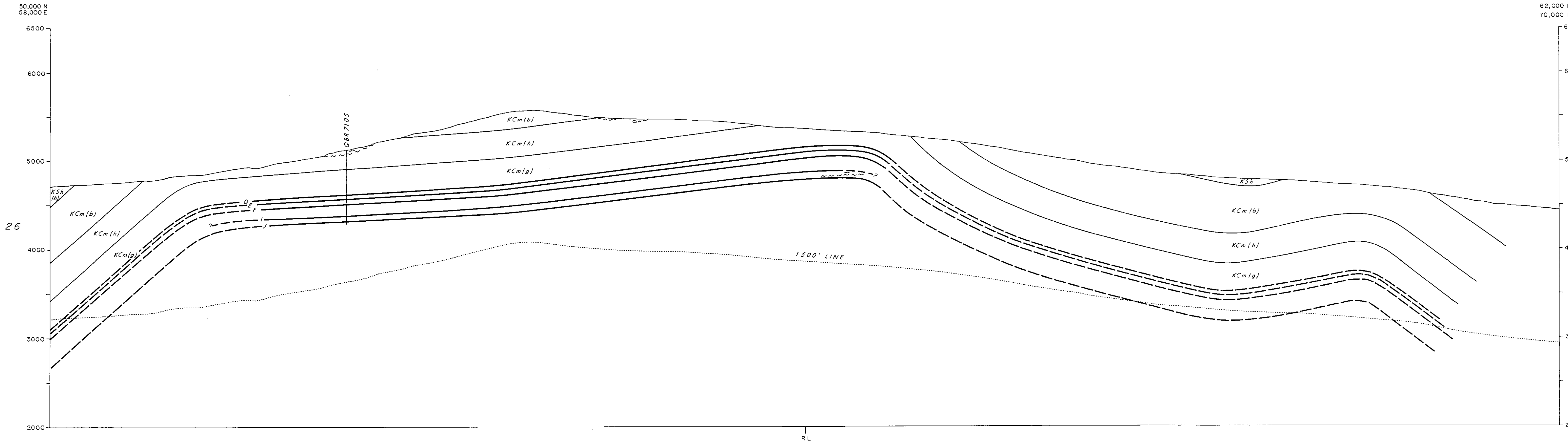
602

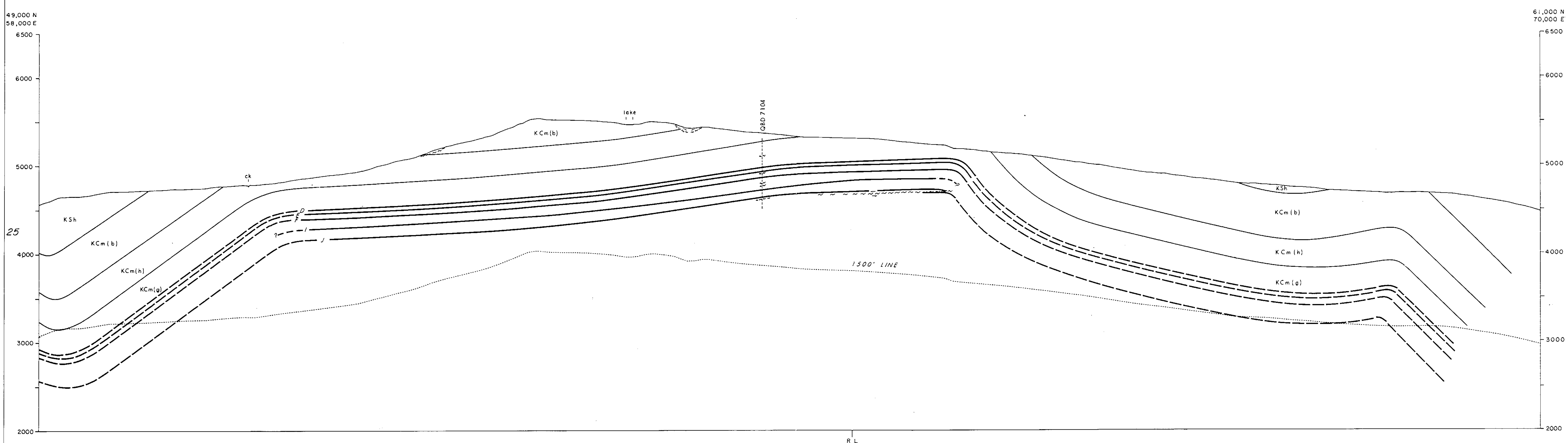
PR- QUINTETTE 72(2)a

DENISON MINES LIMITED

BABCOCK MTN.
CROSS-SECTION 23 & 24

DRAWN BY E. Toth	DATE Mar '72	SCALE 1" = 1000'
APPROVED BY	DRAWING NO QNTT 72-0285-R02	





602

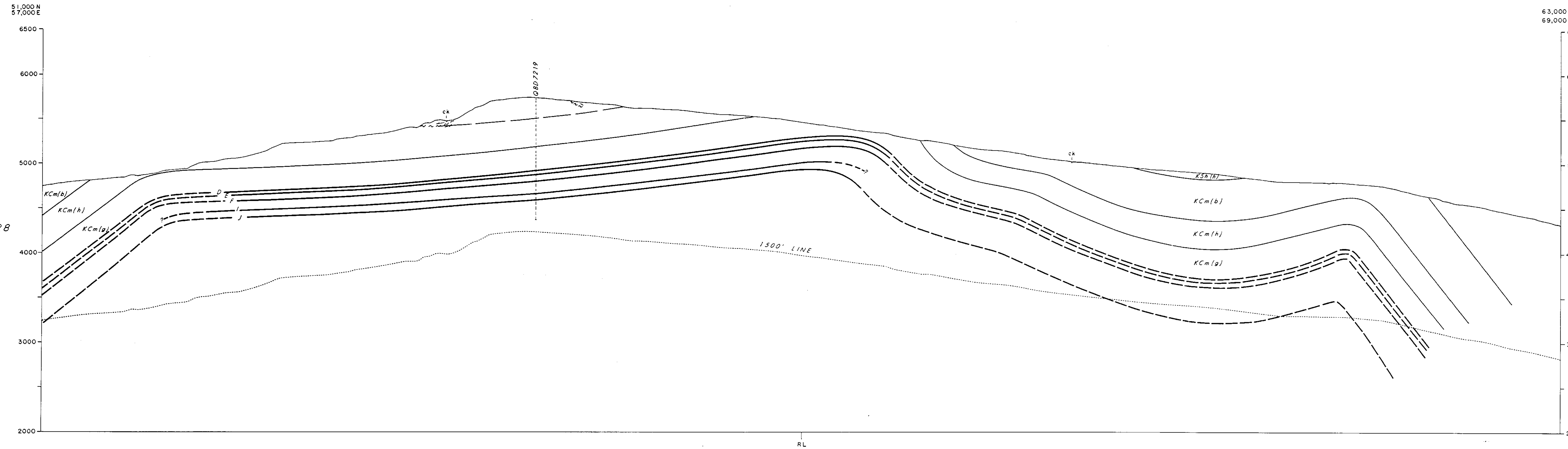
PR- QUINTETTE 72(2)C.

DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

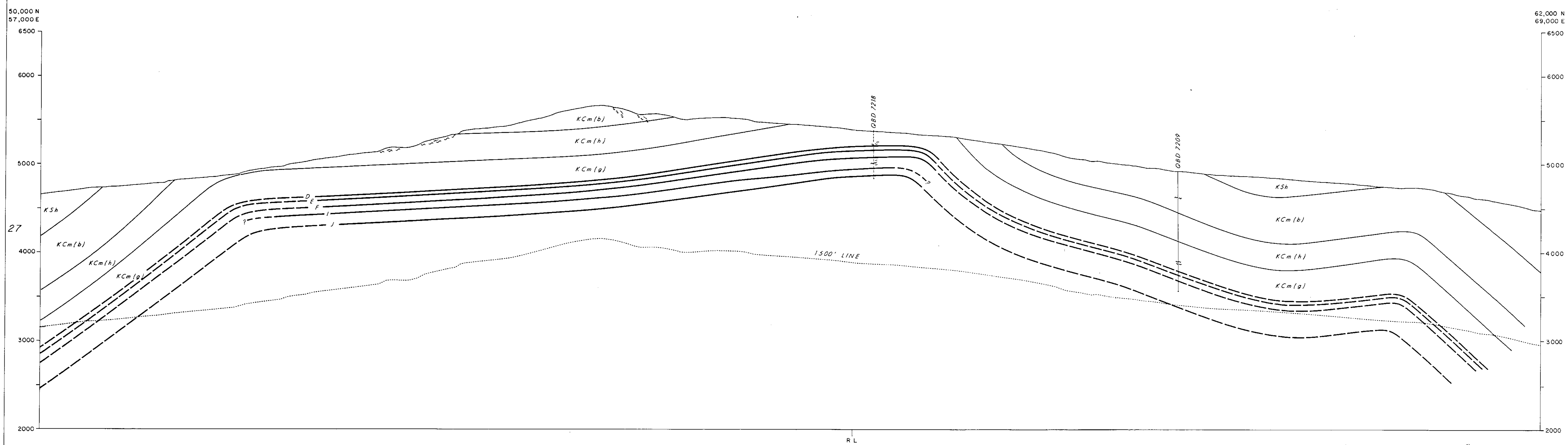
BABCOCK MTN.
CROSS-SECTION 25 & 26

DRAWN BY E.To Fh	DATE Mar. '72	SCALE 1" = 1000'
APPROVED BY	DRAWING NO QNTT72-0285-R02	

28



27



PR-QUINTETTE 72(2)R.

602

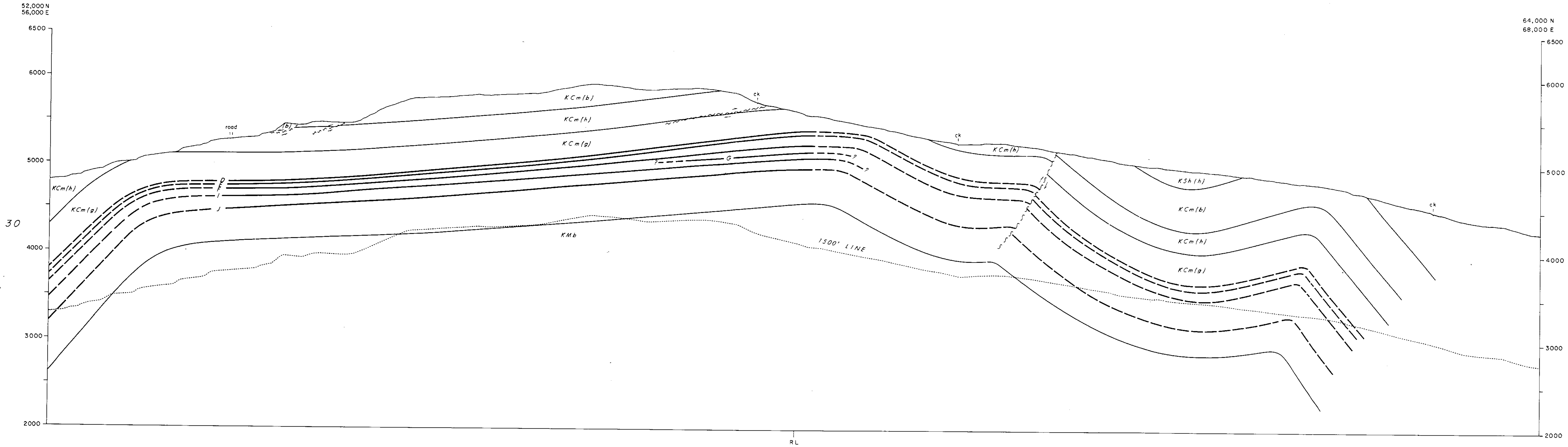
DENISON MINES LIMITED

CALGARY ALBERTA

BABCOCK MTN.
CROSS-SECTION 27 & 28

DRAWN BY E. Toth	DATE Mar. '72	SCALE 1" = 1000'
APPROVED BY	DRAWING NO. QNTT 72-0285-R02	

30



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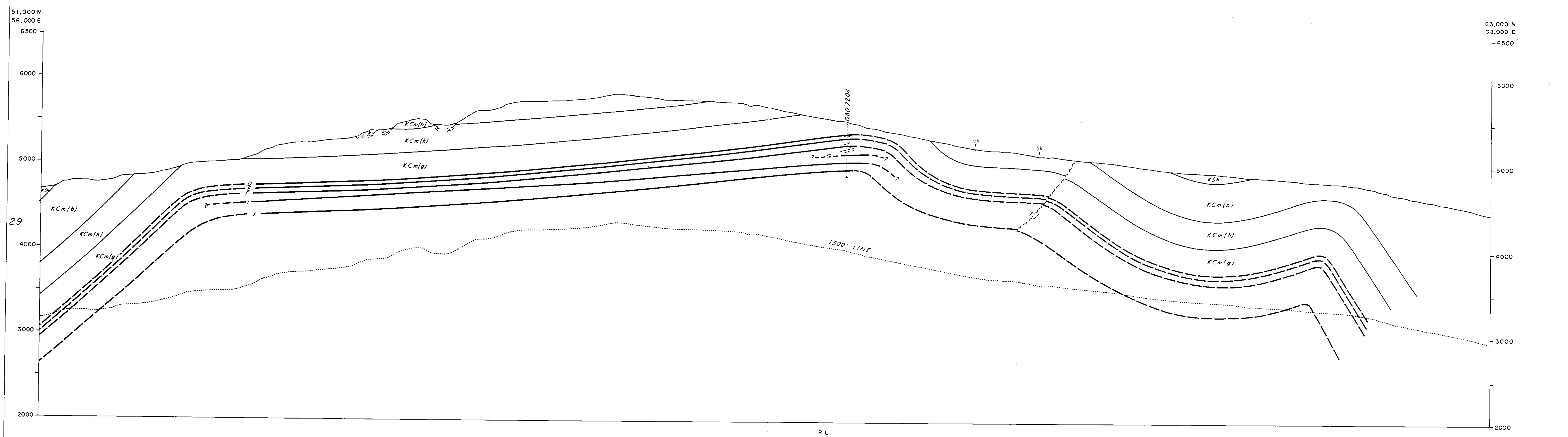


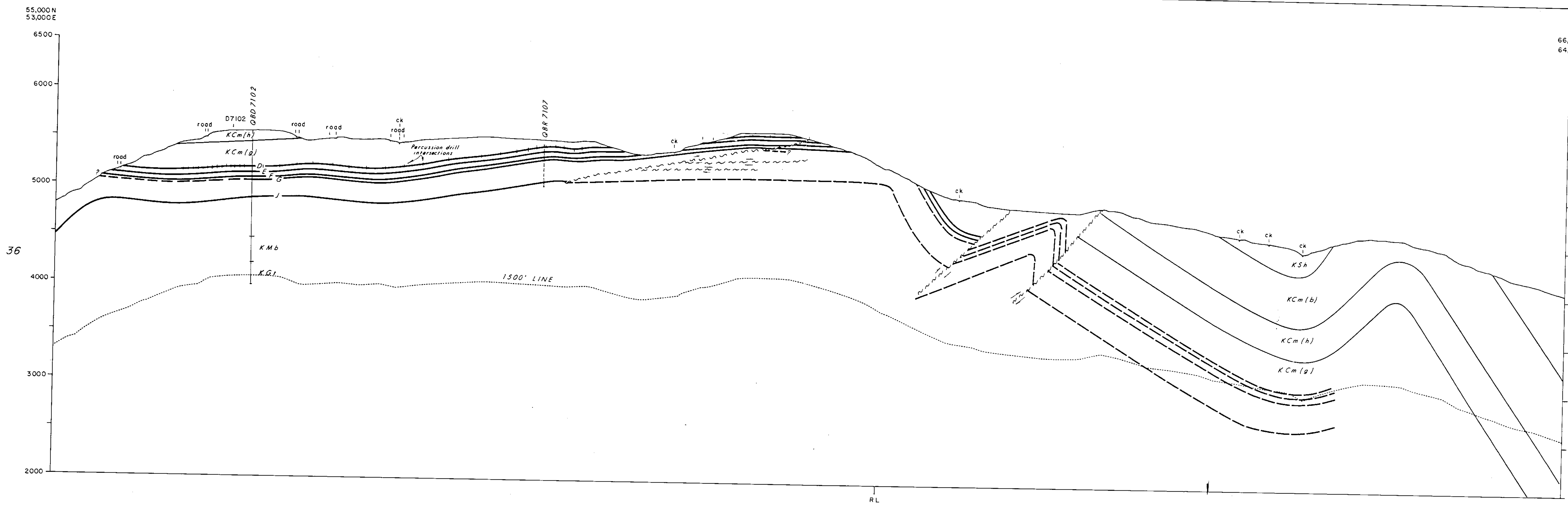
PR-QUINTETTE 72(2)C.

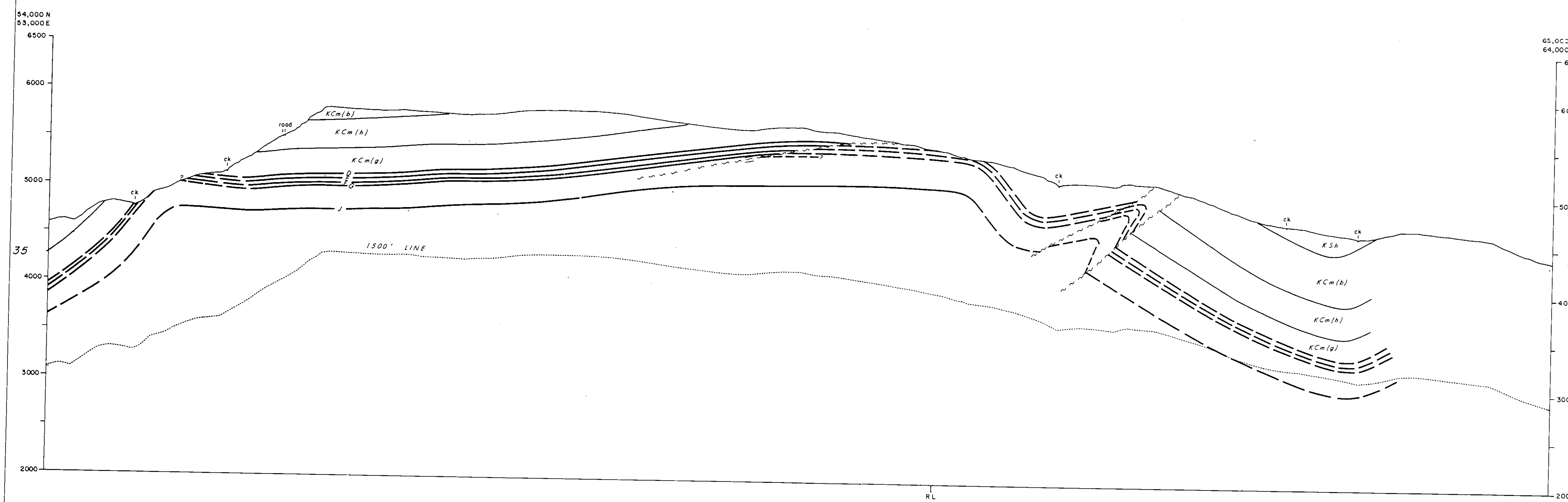
602

DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

BABCOCK MTN.
CROSS·SECTION 29 & 30

DRAWN BY E. Toth	DATE Mar. '72	SCALE 1" = 1000'
APPROVED BY	DRAWING NO QNTT72-0285-R02	





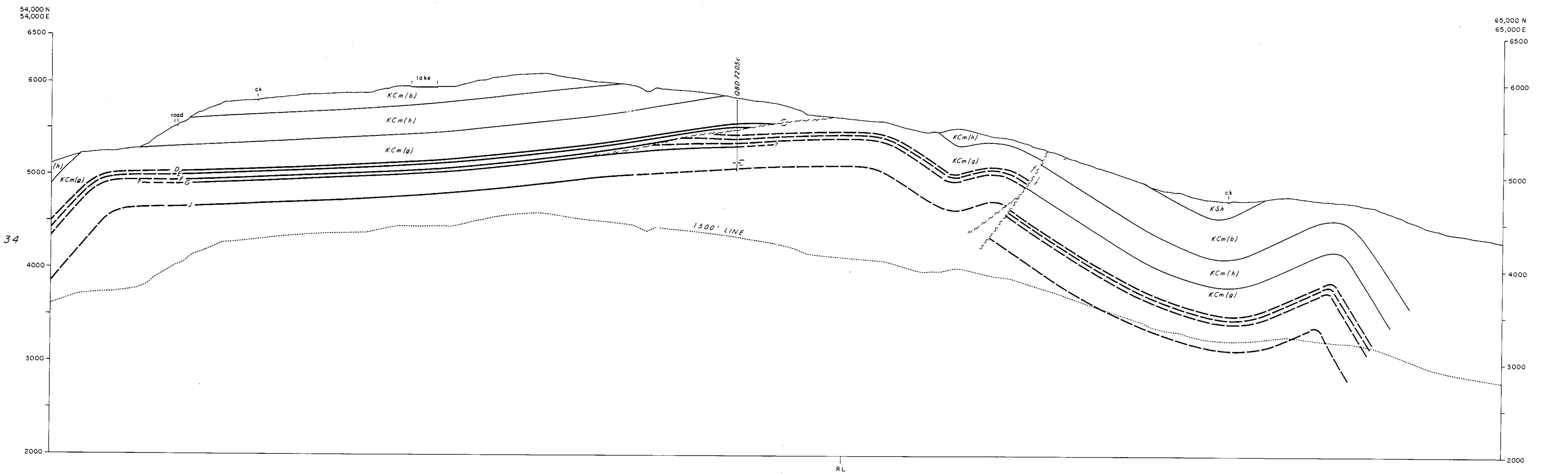
PR-QUINTETTE 72(2)C.

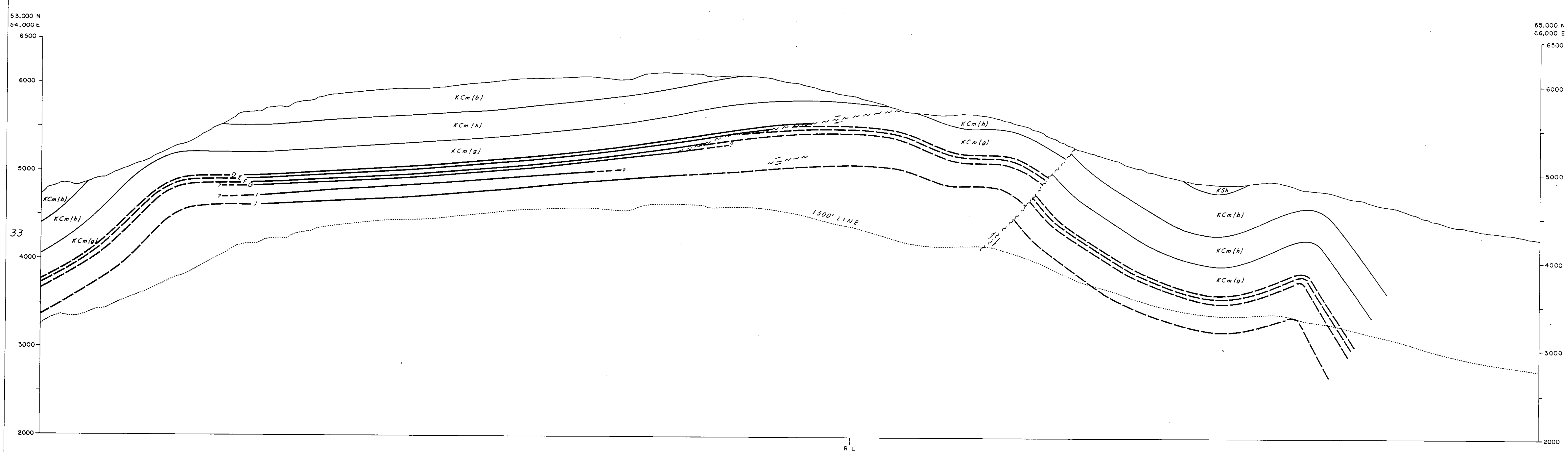
602

DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

BABCOCK MTN.
CROSS-SECTION 35 & 36

DRAWN BY E. TATE	DATE Mar. '72	SCALE 1" = 1000'
APPROVED BY	DRAWING NO. QNTT 72-0285-R02	





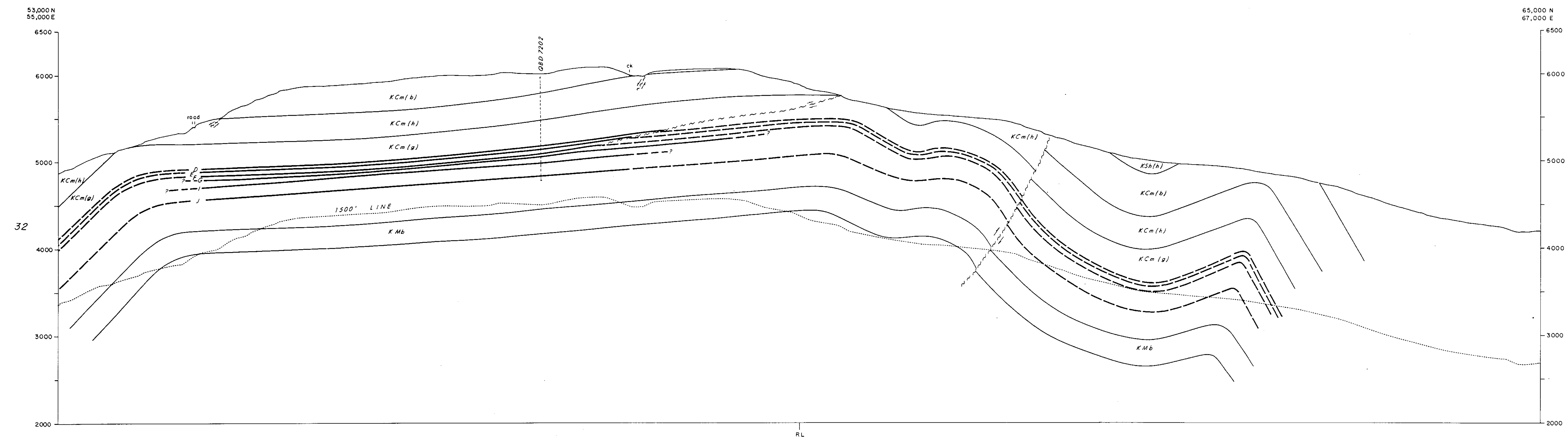
PR-QUINTETTE 72(2)C.

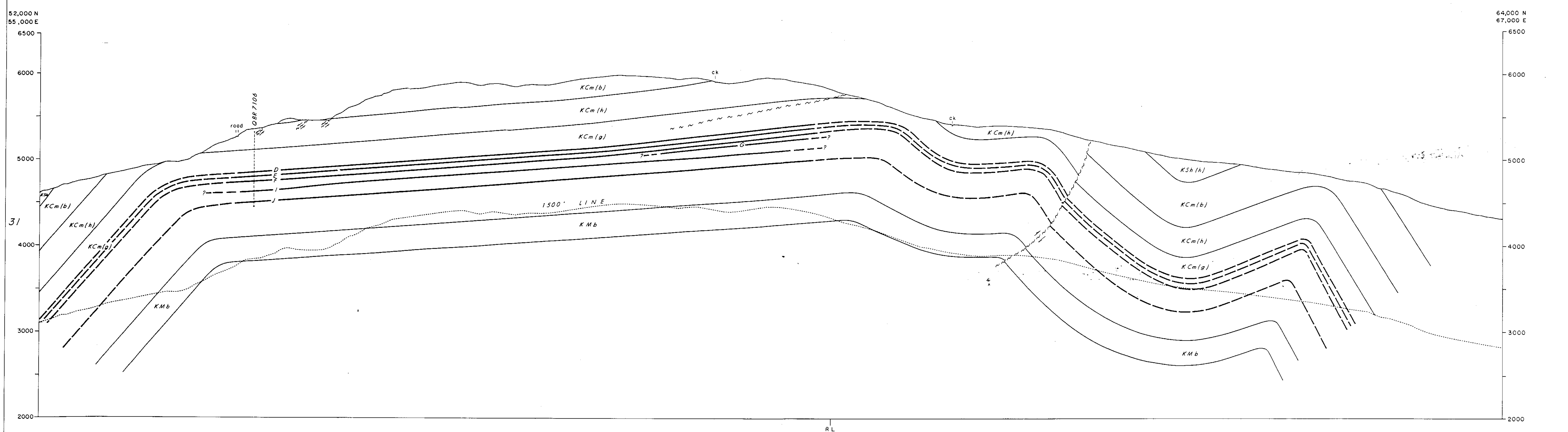
602

DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

BABCOCK MTN.
CROSS-SECTION 33 & 34

DRAWN BY E. Toth	DATE Mar. '72	SCALE 1" = 1000'
APPROVED BY	DRAWING NO QNTT 72-0285-R02	





PR-QUINTETTE 72(2)C.

602

DENISON MINES LIMITED COAL DIVISION CALGARY ALBERTA		
BABCOCK MTN. CROSS-SECTION 31 & 32		
DRAWN BY E. Toth	DATE Mar '72	SCALE 1"=1000'
APPROVED BY	DRAWING NO QNTT 72-0285-R02	

602

PREPARED BY:
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)

"D" ROOF & SEAM FACIES

NOTE:

SUBJECTIVE INTERPRETATION OF FACIES CHANGES BASED ON BOREHOLE CORE LITHOLOGIES, AND SEDIMENTARY STRUCTURES AND TRENDS THEREIN. LITHOLOGICAL THICKNESSES TRUE ONLY WHERE BOREHOLES ARE ON SECTION; THICKNESSES ELSEWHERE CONTROLLED BY SCALE OF DRAWING.

LEGEND:

DILUTION HEIGHT (THICKNESS) OF ZONE

RESERVE HEIGHT (THICKNESS)

DRAWN BY E Toth	DATE NOV. '72	SCALE 10' VERT. 1000' HORIZ.
APPROVED BY	DRAWING NO. QNTT 72-0358 - R02	

602

NOTE:

SUBJECTIVE INTERPRETATION OF FACIES CHANGES BASED ON BOREHOLE CORE LITHOLOGIES, AND SEDIMENTARY STRUCTURES AND TRENDS THEREIN LITHOLOGICAL THICKNESSES TRUE ONLY WHERE BOREHOLES ARE ON SECTION; THICKNESSES ELSEWHERE CONTROLLED BY SCALE OF DRAWING.

LEGEND:

DILUTION HEIGHT (THICKNESS) OF ZONE

RESERVE HEIGHT (THICKNESS)

PREPARED BY:
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)

"E" ROOF & SEAM FACIES

DRAWN BY: E. Toth	DATE: DEC. '72	SCALE: 5' VERT. 500' HORIZ.
APPROVED BY:	DRAWING NO: QNTT 72-0369 - R02	

602

NOTE:

SUBJECTIVE INTERPRETATION OF FACIES CHANGES BASED ON BOREHOLE CORE LITHOLOGIES, AND SEDIMENTARY STRUCTURES AND TRENDS THEREIN. LITHOLOGICAL THICKNESSES TRUE ONLY WHERE BOREHOLES ARE ON SECTION, THICKNESSES ELSEWHERE CONTROLLED BY SCALE OF DRAWING

LEGEND:

DILUTION HEIGHT (THICKNESS) OF ZONE

RESERVE HEIGHT (THICKNESS)

PREPARED BY:
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

ALCO STANDARD CORPORATION
(JOINT VENTURE – QUINTETTE PROJECT)

"F" ROOF & SEAM FACIES

DRAWN BY E Toth	DATE NOV. '72	SCALE 10'V, 1000'H
APPROVED BY	DRAWING NO QNTT 72-0357 - R02	

602

NOTE:

SUBJECTIVE INTERPRETATION OF FACIES CHANGES BASED ON BOREHOLE CORE LITHOLOGIES, AND SEDIMENTARY STRUCTURES AND TRENDS THEREIN. LITHOLOGICAL THICKNESSES TRUE ONLY WHERE BOREHOLES ARE ON SECTION; THICKNESSES ELSEWHERE CONTROLLED BY SCALE OF DRAWING.

LEGEND:

DILUTION HEIGHT (THICKNESS) OF ZONE

RESERVE HEIGHT (THICKNESS)

PREPARED BY:
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)

"G" ROOF & SEAM FACIES

DRAWN BY: E. Toth	DATE: NOV '72	SCALE: 10' Vert. 1000' Horiz.
APPROVED BY:	DRAWING NO.: QNTT 72 - 0359 - R02	

602

NOTE:

SUBJECTIVE INTERPRETATION OF FACIES CHANGES BASED ON BOREHOLE CORE LITHOLOGIES, AND SEDIMENTARY STRUCTURES AND TRENDS THEREIN. LITHOLOGICAL THICKNESSES TRUE ONLY WHERE BOREHOLES ARE ON SECTION; THICKNESSES ELSEWHERE CONTROLLED BY SCALE OF DRAWING.

LEGEND:

DILUTION HEIGHT (THICKNESS) OF ZONE

RESERVE HEIGHT (THICKNESS)

PREPARED BY:
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)

"I-J" ROOF & SEAM FACIES

DRAWN BY: E. Toth	DATE: DEC '72	SCALE: 20' VERT. 1000' HORIZ.
APPROVED BY:	DRAWING NO: QNTT 72-0367-R02	

602

NOTE:

SUBJECTIVE INTERPRETATION OF FACIES CHANGES BASED ON BOREHOLE CORE LITHOLOGIES, AND SEDIMENTARY STRUCTURES AND TRENDS THEREIN. LITHOLOGICAL THICKNESSES TRUE ONLY WHERE BOREHOLES ARE ON SECTION; THICKNESSES ELSEWHERE CONTROLLED BY SCALE OF DRAWING.

LEGEND:

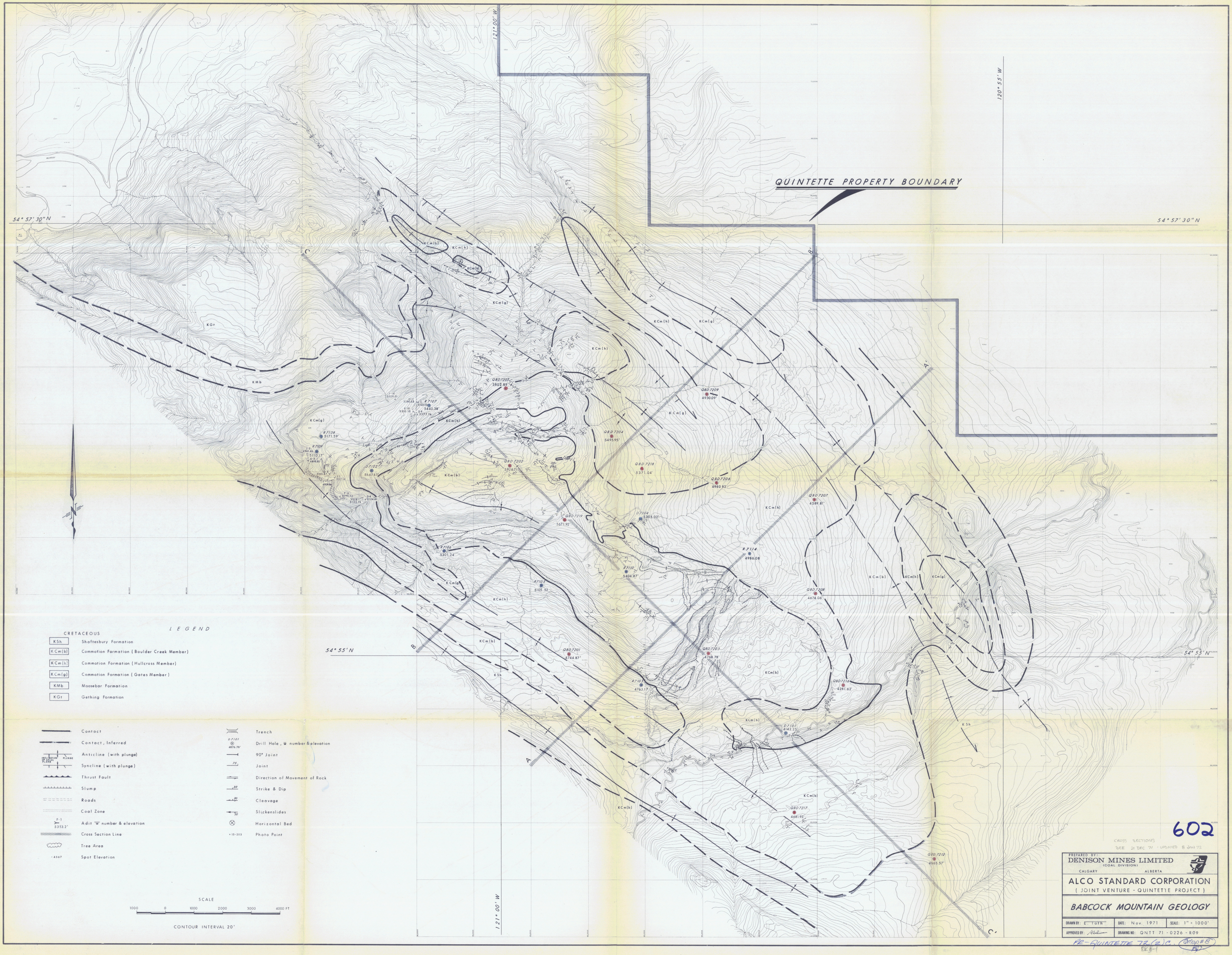
- DILUTION HEIGHT (THICKNESS) OF ZONE
- RESERVE HEIGHT (THICKNESS)

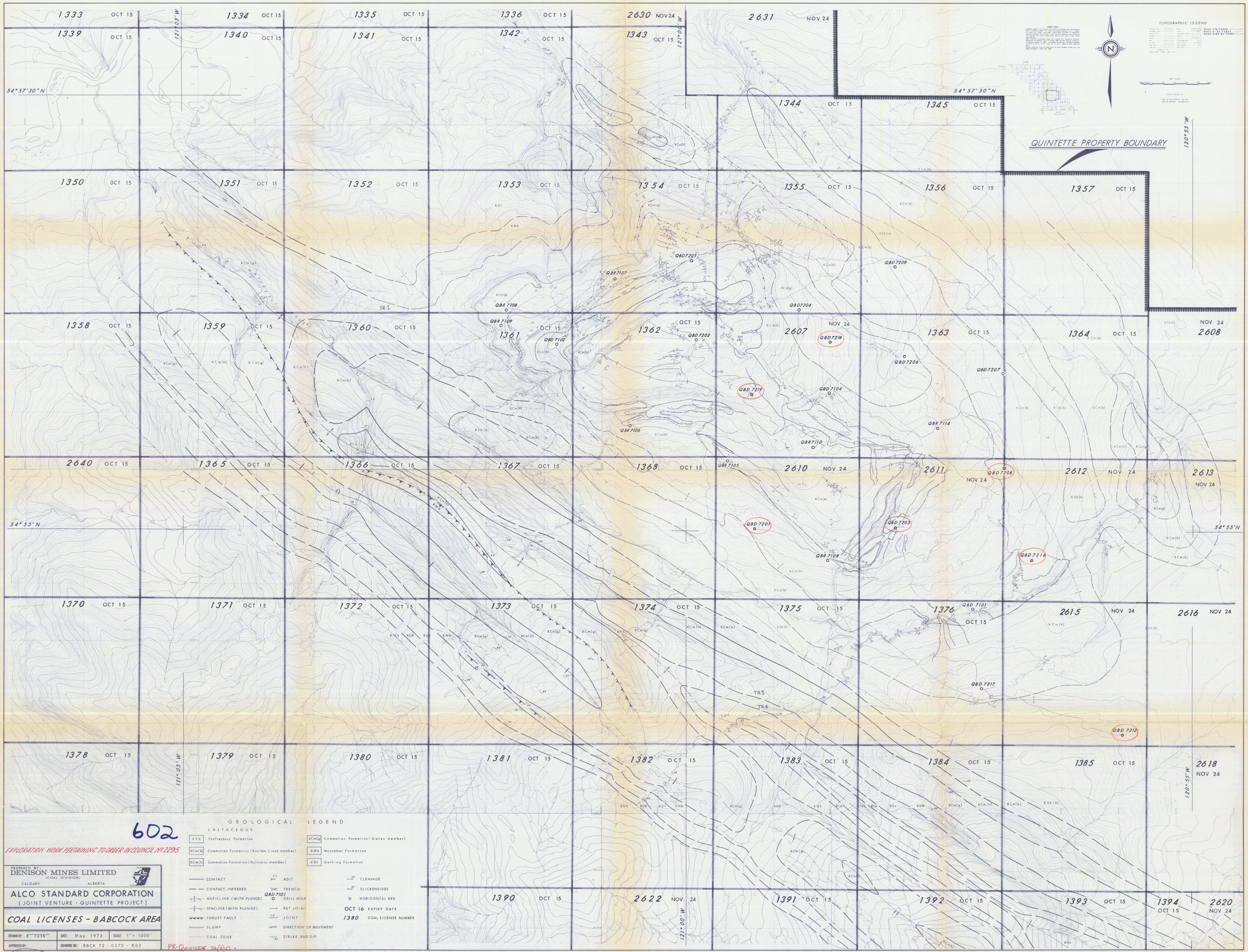
PREPARED BY.:
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)

"J" ROOF & SEAM FACIES

DRAWN BY: E. Toth	DATE: DEC '72	SCALE: 20' VERT. 1000' HORIZ.
APPROVED BY:	DRAWING NO: QNTT 72-0368 - R02	


QUINTETTE PROPERTY BOUNDARY
54° 57' 30" N
54° 55' N
121° 00' W
120° 55' W
KGt
KMb
KCm(g)
KCm(h)
KCm(b)
KSh
LEGEND
CRETACEOUS
KSh Shaftesbury Formation
KCm(b) Commotion Formation (Boulder Creek Member)
KCm(h) Commotion Formation (Hullcross Member)
KCm(g) Commotion Formation (Gates Member)
KMb Moosebar Formation
KGt Gething Formation
Contact
Contact, Inferred
Anticline (with plunge)
INCLINATION OF AXIAL PLANE
PLUNGE
Syncline (with plunge)
Thrust Fault
Slump
Roads
Coal Zone
F-1 5353.2'
Adit w number & elevation
Cross Section Line
Tree Area
·4567
Spot Elevation
Trench
D7101 4876.78'
Drill Hole, w number & elevation
90° Joint
Joint
Direction of Movement of Rock
Strike & Dip
Cleavage
Slickenslides
Horizontal Bed
+15-203
Photo Point
SCALE
1000 0 1000 2000 3000 4000 FT
CONTOUR INTERVAL 20'
602
CROSS SECTIONS
SEE 21 DEC 71 : UPDATED 8 JAN 72
PREPARED BY:
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA
ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)
BABCOCK MOUNTAIN GEOLOGY
DRAWN BY: E. Toth
DATE: Nov. 1971
SCALE: 1" = 1000'
APPROVED BY:
DRAWING NO: QNTT 71 - 0226 - R09
PR-QUINTETTE 72(2)C.
QMap #8


QUINTETTE PROPERTY BOUNDARY
54°57'30"N
54°55'N
121°05'W
121°00'W
120°55'W
602
EXPLORATION WORK PERTAINING TO ORDER IN COUNCIL Nº 2295
GEOLOGICAL LEGEND
CRETACEOUS
KSh Shaftesbury Formation
KCm(b) Commotion Formation (Boulder Creek member)
KCm(h) Commotion Formation (Hulcross member)
KCm(g) Commotion Formation (Gates member)
KMb Moosebar Formation
KGt Gething Formation
CONTACT
CONTACT, INFERRED
ANTICLINE (WITH PLUNGE)
SYNCLINE (WITH PLUNGE)
THRUST FAULT
SLUMP
COAL ZONE
ADIT
TRENCH
QBD 7101 DRILL HOLE
90° JOINT
JOINT
DIRECTION OF MOVEMENT
STRIKE AND DIP
CLEAVAGE
SLICKENSIDES
HORIZONTAL BED
OCT 16 EXPIRY DATE
1380 COAL LICENSE NUMBER
PREPARED BY:
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA
ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)
COAL LICENSES - BABCOCK AREA
DRAWN BY: E. Toth
DATE: May 1973
SCALE: 1" = 1000'
APPROVED BY:
DRAWING NO: BBCK 72 - 0270 - R.03
PR-Quintette 72(2)C.
(Book B-2)
Map #9

GEOLOGICAL LEGEND

CRETACEOUS

KSh	Shaftesbury Formation
KCm(b)	Commotion Formation (Boulder Creek member)
KCm(h)	Commotion Formation (Hulcross member)
KCm(g)	Commotion Formation (Gates member)
KMb	Moosebar Formation
KGt	Gething Formation

- CONTACT
- CONTACT, INFERRED
- ANTICLINE (WITH PLUNGE)
- SYNCLINE (WITH PLUNGE)
- THRUST FAULT
- SLUMP
- COAL ZONE
- ADIT
- TRENCH
- DRILL HOLE
- 90° JOINT
- JOINT
- DIRECTION OF MOVEMENT
- STRIKE AND DIP
- CLEAVAGE
- SLICKENSIDES
- HORIZONTAL BED

PR-QUINTETTE 72(2)C. 602

PREPARED BY:
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

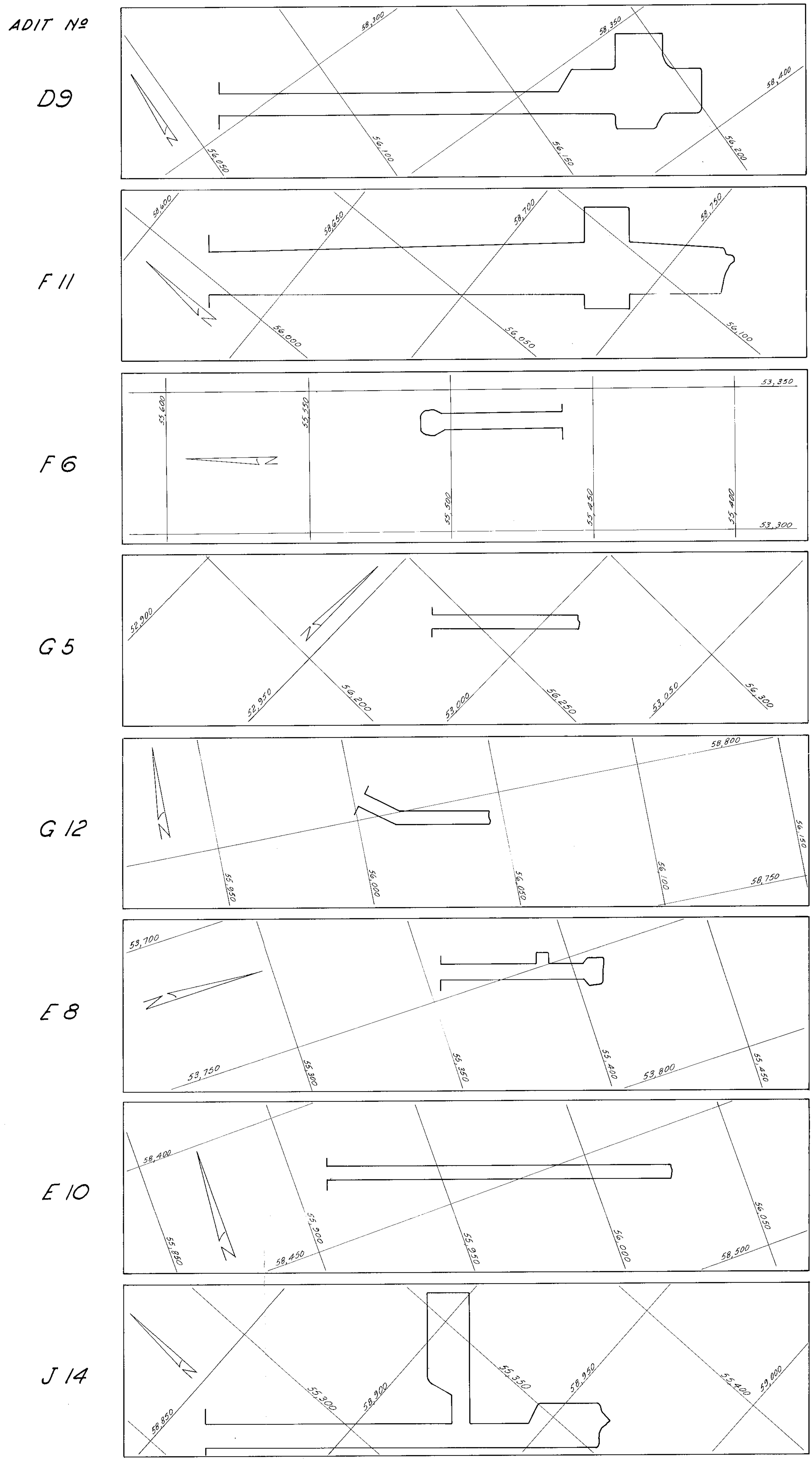
ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)

BABCOCK MOUNTAIN GEOLOGY

DRAWN BY: E. Toth	DATE: May 1973	SCALE: 1" = 1000'
APPROVED BY:	DRAWING NO: BBCK 71-0226-R12	

Map # 10 B
BK-B2

121°30'W
121°15'
121°00'
120°45'W
55°05'N
55°00'
54°55'
54°50'
54°50'N
WOLVERINE NORTH
93P3C
WOLVERINE SOUTH
93P3B
93I14J
BABCOCK
93I14i
93I15L
FIVE CABIN
SYNCLINE
93I14H
QUINTETTE
93I15E
CONTACT KCd & KGr
LINE REPRESENTING 1500' ISOPACH (DEPTH OF COVER)
LENGTH OF CALCULATION INFLUENCE
CROSS-SECTION & CALCULATION NUMBER
COAL TONNAGE IN PLACE
REFER TO ECONOMIC GEOLOGY IN REPORT, FOR EXPLANATION.
IA COAL CLASS
LEGEND
CRETACEOUS
KSh Shaftesbury formation
KCm(b) Commotion formation (Boulder Creek member)
KCm(h) Commotion formation (Hullcross member)
KCm(g) Commotion formation (Gates member)
KMb Moosebar formation
KGr Gething formation
KCd Cadomin formation
KNk Nikanassin formation
Existing drillhole
Proposed drillhole
Adit
Coal outcrop
Coal seam observed
Coal seam projected on basis of float and recessive weathering
Coal seam, estimated position of zone
Road, trail
Cross-section lines
Property boundary, Denison Mines staked 1970
Property boundary, Denison Mines staked 1971
Faults: unknown, reverse, normal
Strike & dip, top known
Strike & dip, top known, overturned
Strike & dip, top unknown
Vertical bedding
Horizontal bedding
Slaty cleavage w/dip
Slickenslides, trace and plunge
Overturned anticline
Overturned syncline
Syncline
Anticline
Fish scales and teeth
Fish scales
Fish scales
PR- QUINTETTE 72 (2) C. 602
PREPARED BY:
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA
ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)
QUINTETTE GEOLOGY
COAL IN PLACE - GETHING FORMATION
Drawn by: E. Toth
Date: Oct. '71
Scale: 1:50,000
Approved by: GG
Drawing No: QNTT 71-0206-R01
PLATE VI
QMap #11
Bx B-2



PR - QUINTETTE 72 (2) C.

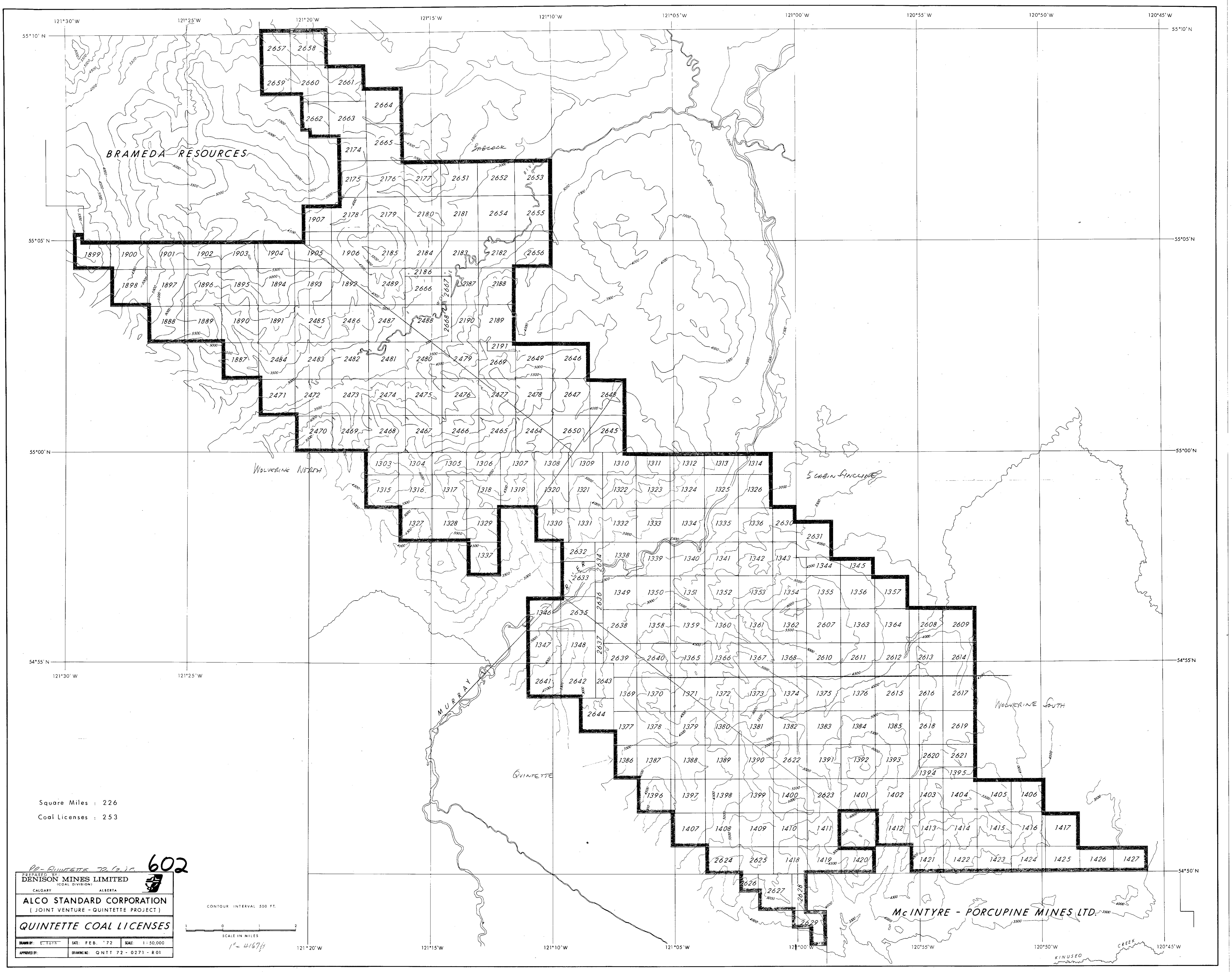
PREPARED BY:
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)

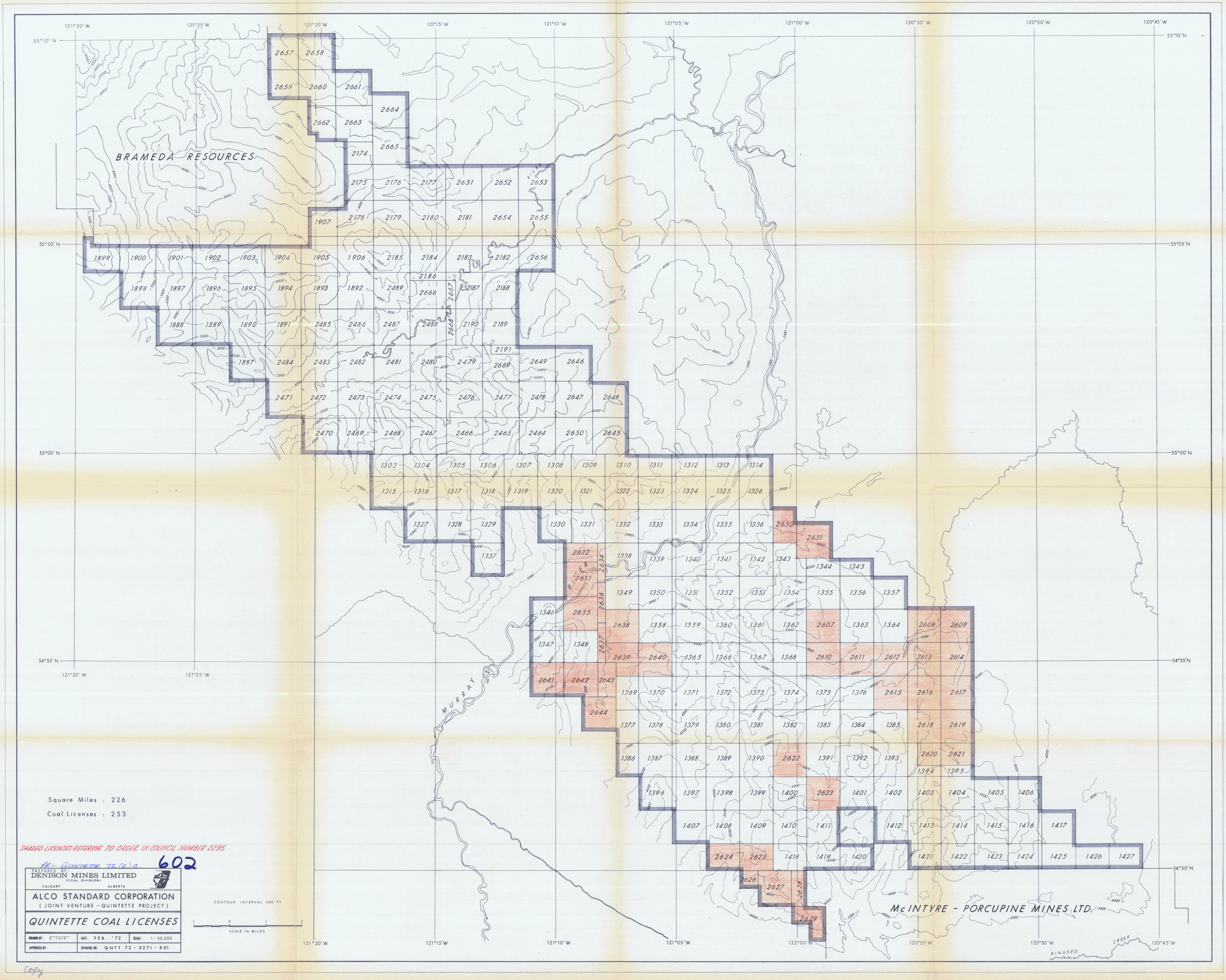
PLAN VIEW OF ADITS

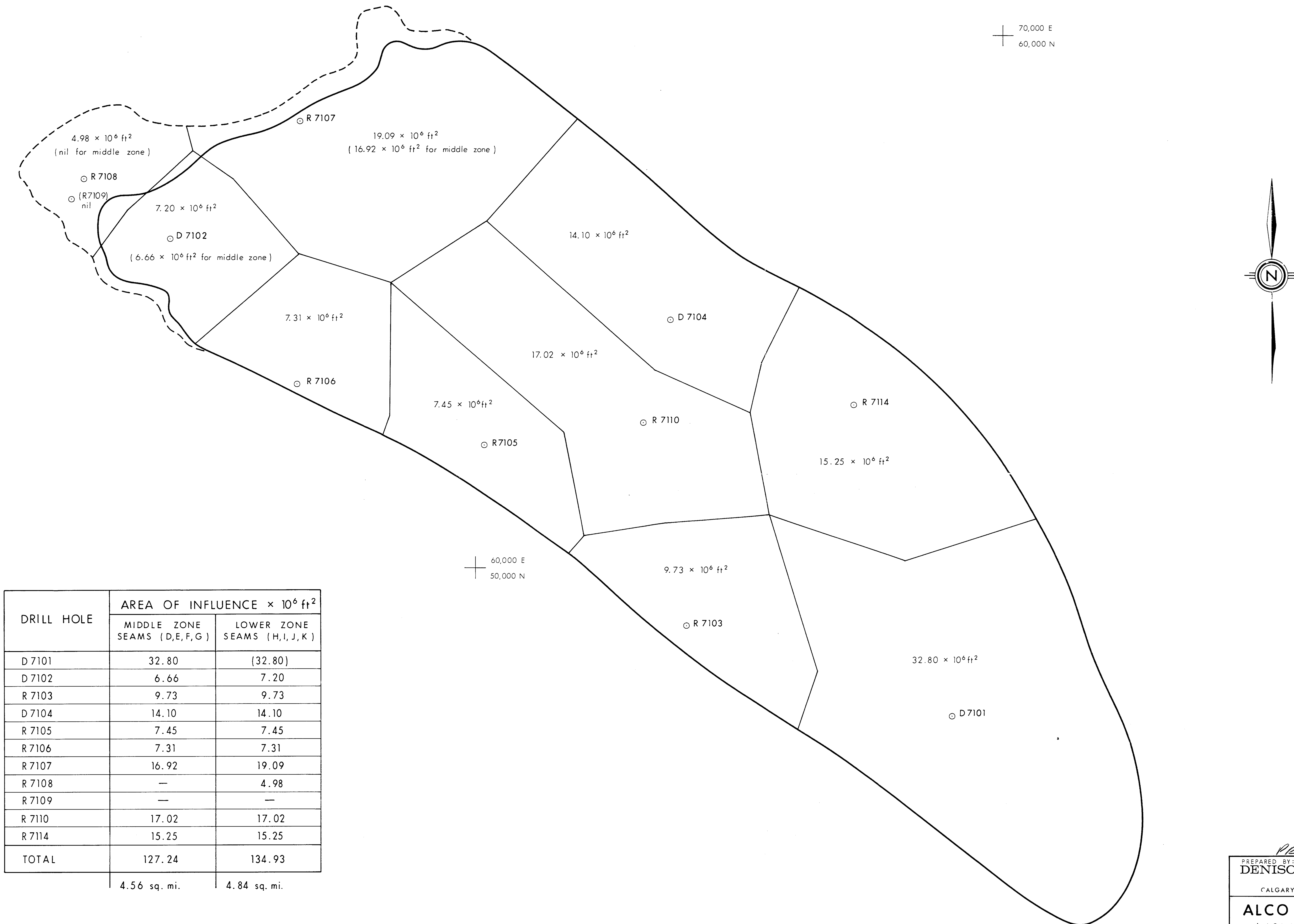
DRAWN BY: E. Toth	DATE: Oct. '72	SCALE: 1" = 20'
APPROVED BY:	DRAWING NO: QNTT 72 - 0353 - R01	

602



BRAMEDA RESOURCES
McINTYRE - PORCUPINE MINES LTD.
MURRAY
RIVER
KINUSEO CREEK
Wolverine North
Wolverine South
Quintette
5 Cabin Syncline
121°30'W
121°25'W
121°20'W
121°15'W
121°10'W
121°05'W
121°00'W
120°55'W
120°50'W
120°45'W
55°10'N
55°05'N
55°00'N
54°55'N
54°50'N
Square Miles : 226
Coal Licenses : 253
CONTOUR INTERVAL 500 FT.
SCALE IN MILES
1" = 4167 ft
602
PREPARED BY: DENISON MINES LIMITED (COAL DIVISION) CALGARY ALBERTA
ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)
QUINTETTE COAL LICENSES
DRAWN BY: E. Toth
DATE: FEB. '72
SCALE: 1 : 50,000
APPROVED BY:
DRAWING NO.: QNTT 72 - 0271 - R01


BRAMEDA RESOURCES
MURRAY
RIVER
McINTYRE - PORCUPINE MINES LTD.
KINUSEO CREEK
121°30'W
121°25'W
121°20'W
121°15'W
121°10'W
121°05'W
121°00'W
120°55'W
120°50'W
120°45'W
55°10'N
55°05'N
55°00'N
54°55'N
54°50'N
Square Miles : 226
Coal Licenses : 253
SHADED LICENSES REFERING TO ORDER IN COUNCIL NUMBER 2295
PR- QUINTETTE 72 (2) C.
602
PREPARED BY:
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA
ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)
QUINTETTE COAL LICENSES
DRAWN BY: E. Toth
DATE: FEB. '72
SCALE: 1 : 50,000
APPROVED BY:
DRAWING NO: QNTT 72 - 0271 - R01
CONTOUR INTERVAL 500 FT.
SCALE IN MILES
Copy



DRILL HOLE	AREA OF INFLUENCE × 10^6 ft²	
	MIDDLE ZONE SEAMS (D, E, F, G)	LOWER ZONE SEAMS (H, I, J, K)
D 7101	32.80	(32.80)
D 7102	6.66	7.20
R 7103	9.73	9.73
D 7104	14.10	14.10
R 7105	7.45	7.45
R 7106	7.31	7.31
R 7107	16.92	19.09
R 7108	—	4.98
R 7109	—	—
R 7110	17.02	17.02
R 7114	15.25	15.25
TOTAL	127.24	134.93
	4.56 sq. mi.	4.84 sq. mi.

602

PR - QUINTETTE 72 (2) C.

PREPARED BY:
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)

BABCOCK AREA
AREA OF INFLUENCE OF DRILL HOLES

DRAWN BY: E. TOTH	DATE: Dec. 1971	SCALE: 1" - 1000'
APPROVED BY: [signature]	DRAWING NO: QNTT 71 - 0261 - R02	

KCm(b) - Commotion (boulder creek)
KCm(h) - Commotion (hulcross)
KCm(g) - Commotion (gates)

Down hole representations make no compensation for angled holes or angle of dip.

Zone V - Seams A, B, C
Zone W - Seams D, E, F, G
Zone X - Seams I, J, K
Thrust fault

PR-Q 72(2)C

602

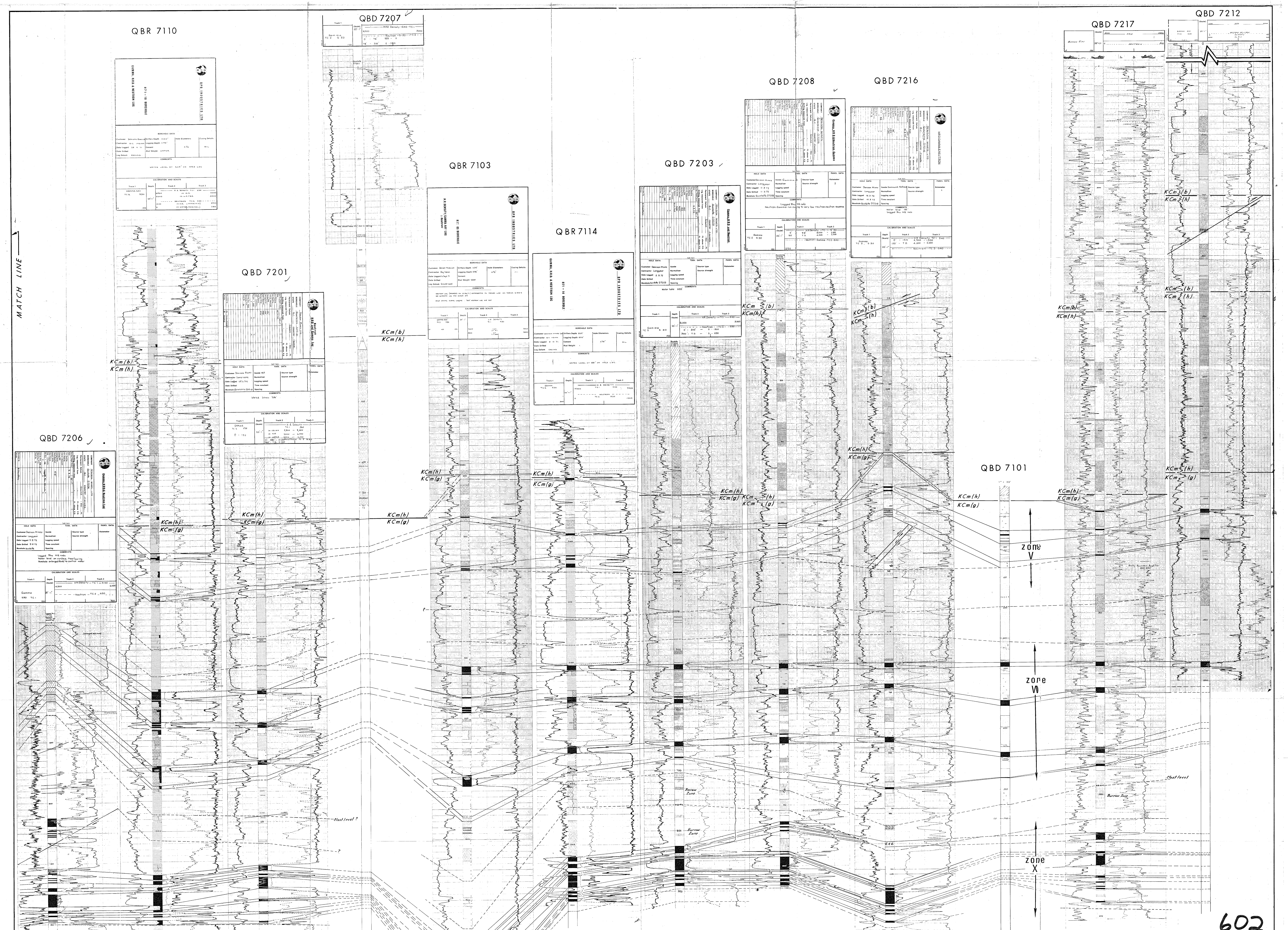
PR-QUINTETTE 72(2)C.

PREPARED BY:
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)

BABCOCK MOUNTAIN
CORRELATION CHART "A"

DRAWN BY: E. Toth	DATE: Sept. '72	SCALE: 1" = 50'
APPROVED BY:	DRAWING NO: QNTT 71- 204 A - R06	



602

PREPARED BY:
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ALCO STANDARD CORPORATION
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BABCOCK MOUNTAIN
CORRELATION CHART "B"

DRAWN BY: E. Toth	DATE: Sept. '72	SCALE: 1" = 50'
APPROVED BY:	DRAWING NO: QNTT 71-204B-R06	

PR-Q 72(2)C
BKB4


PR-QUINTETTE 72(2)C
602
PREPARED BY
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA
ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)
SECTION ALONG PROPOSED CONVEYOR ROUTE FROM BABCOCK MTN to WATERFALL CK.
DRAWN BY: E. Toth
DATE: Dec '72
SCALE: 1" = 400'
APPROVED BY: D.H.P.
DRAWING NO: QNTT 72 0361 - R01
MINE PORTALS ON BABCOCK MTN.
18°30'
12°
13°
16°
28°30'
14°30'
28°
20°
PLANT SITE AT WATERFALL CREEK
FEET ABOVE SEA LEVEL
5000
4000
3000
2000
EAST
WEST

PR-QUINTETTE 72(4)C.

SECOND INTERIM REPORT

BABCOCK AREA

May 1973

VOLUME III

MINING, PREPARATION AND SERVICES

Prepared by the

Quintette Joint Venture

Denison Mines Limited
Coal Division
#1660, 540 - 5th Avenue S.W.
Calgary, Alberta T2P OM2
CANADA

World Resources Company
355 Lancaster Avenue
Haverford, Pennsylvania 19041

SUMMARY

This mining study is based on a production output of 2,000,000 clean long tons of coal per year from the Babcock area of Quintette. Ample reserves are proven and available. Expansion of production is possible. In addition, a projection has been made for a combination of hydraulic mining in the indicated reserves on the flank of Babcock and room and pillar mining in the flat area of Babcock.

It is planned to mine the four major seams, D, E, F and J, sequentially and concurrently. Approximately 20% of the clean coal will be provided from each of the D, E, and F seams and 40% from the J seam.

Continuous miners (C.M.) are planned to operate in seams D and F. Seam E, because of its dirt bands, will be worked by load-haul-dump units (L.H.D.). The area of J seam where the bottom leaf only is taken will be worked by continuous miners on a shortwall system. The thick part of J seam will be worked by load-haul-dump units in the full height of about 20 ft.

The total payroll required is 641 officials and men. When full production is reached 4 years from the signing of a contract, assuming earlier engineering work has been done, productivity will be 15.2 short tons per man shift. (all tons except main contract are short tons of 2,000 lbs)

Coal preparation is planned using jigs for coarse coal and Deister tables for granular coal, both working at a cut-point near 1.60 specific gravity. Fines below 100 mesh will be treated by froth flotation.

The quality of coal to be produced from the 800 short ton per hour feed to the plant, followed by thermal drying is:

Total	Moisture	6.0		
	Ash	6.6	-	7.6
	V.M.	21.4	-	23.4
	F.C.	63.0	-	66.0
	Sulphur	.31	-	.51
	F.S.I.	6	-	7
	Fluidity	100	-	120 ddpm

As described in the services section, a road should be built from Dawson Creek where most men will live. A camp will be used at the mine to house the men on a short work week rotation basis. The British Columbia Railway is most likely to haul the coal to a new port at Britannia Beach 15 miles north of West Vancouver.

Labour will come from local farms, other coal mines, and metal mines from within and outside Canada. Personnel will have to be attracted by higher wages and first class training schemes.

If reserves can be upgraded to the proven category on the flank of Babcock, the combination of hydraulic mining in this steep area and mining by L.H.D. units, mostly in the flat area of J seam, the productivity would improve to 19.6 short tons per man shift. Full output would come six months earlier and the quality, being mostly from J seam would improve slightly within the range:

Moisture	6.0		
Ash	7.0	-	7.5
V.M.	21.0	-	21.8
Sulphur	0.25	-	0.35
F.S.I.	6.5	-	7.0
Fluidity	130	-	150 dd/m

COAL QUALITY AND COAL PREPARATION

Assessment

An examination of the Summary Sheet in the reserves section, together with all the washability data, indicates that for practical considerations, a wash plant with a washing gravity of about 1.60 will give near optimum results from most of the coal expected to be mined.

On the basis of this information, it has been decided that the following areas would not be mined:

1. Seam G, which has very low reserves and about 25% near gravity material at a gravity of 1.45;
2. Seam I, which lies about 20 feet above seam J for about 75% of the area. The remaining area is difficult of access and would interfere with the sequence of mining the other seams. It may be possible to mine some of I seam, but this eventuality is not included in the mining plan;
3. The part of seam E lying to the southwest of the main roads, which has a low recovery of 53% at 7% ash, will not be mined at present.

The balance of the coals are thought to be mineable and would wash at a gravity of about 1.60 with near gravity material near 7%. By examination of the curves for probable error computed for one adit in each seam, it can be seen that the probable error at a specific gravity of 1.60 is extremely low, indicating that water-only systems of cleaning are practical. Accordingly, the plant is designed around water-only systems in the following three size fractions:

	Equipment
(a) 3" - 1/4"	Jig type of washer with middlings product for crushing to 1/4"
(b) 1/4" - 100 mesh	Deister Tables
(c) Minus 100 mesh	Froth Floatation

The main considerations in selecting the systems above are:

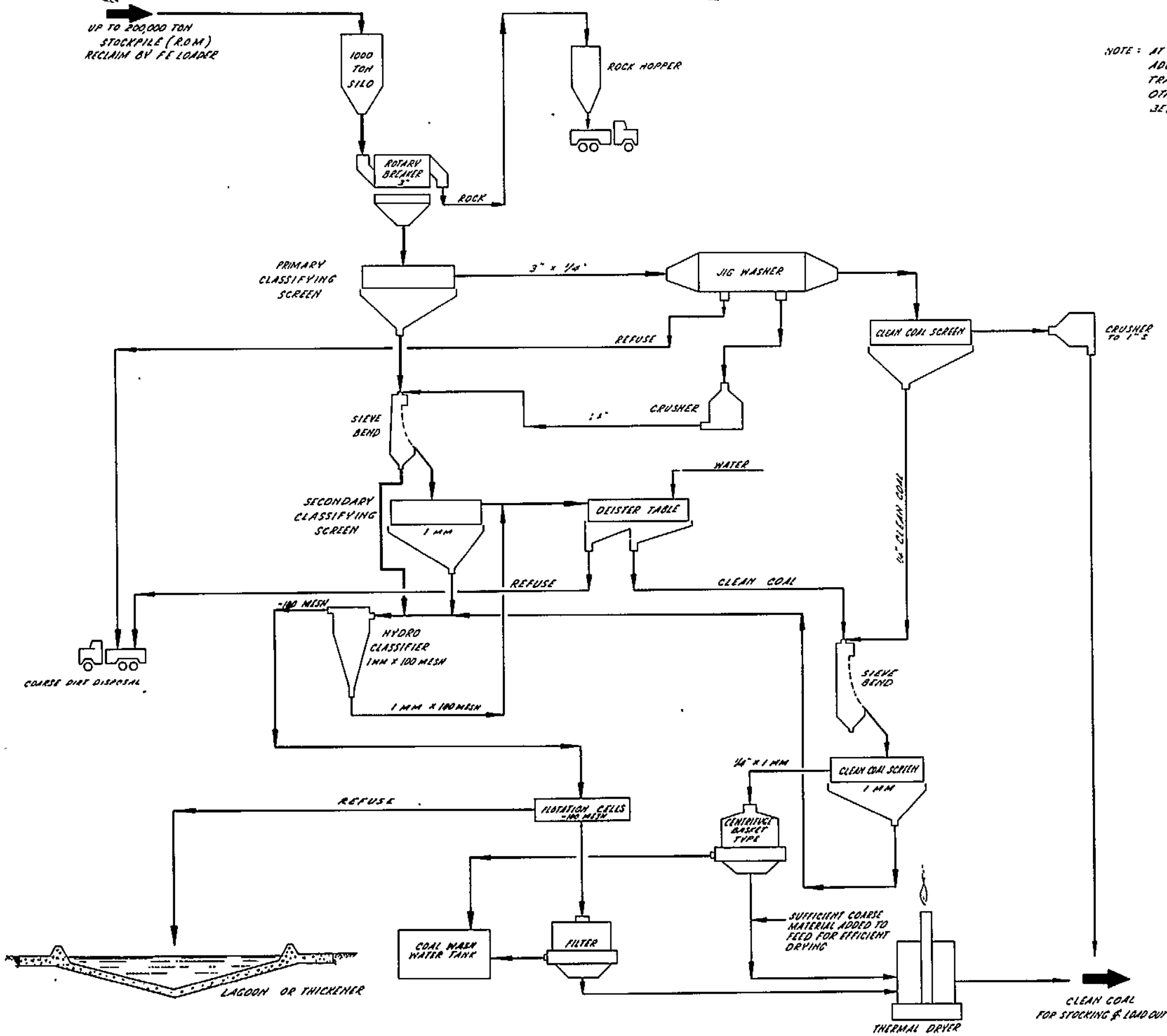
1. simplicity
2. minimum coal breakage
3. no magnetite problems and losses
4. easier understanding by new operators
5. sufficient flexibility to optimize performance
6. smallest possible amount cleaned in the expensive floatation system.

The flow sheet is shown, diagramatically only at this stage, on drawing number BBCK-73-0387.

The expected quality has been calculated using the existing coal intersections in boreholes and adits, averaged on a mathematical basis only. The fines in diamond drill holes have been calculated to form 30% of the product. Information from rotary holes has been used in the size fractions found in the samples. In addition, the analyses taken in the top half of J seam have been ignored in the area where it is not planned to mine the upper leaf. In E seam, the analyses in the part not mined have been ignored. The calculated averages, therefore, will not be the same as in the geological section. However, their accuracy is within the accuraciesof sampling, analyzing, mining, thickness, dilution and washing process, and can therefore be used as a good indication of quality.

The theoretical yield has been used as a basis for recovery calculations. The probable error curves indicate a loss of from 1-1/2 to 4 percentage points in the range of r = 0.10. To be conservative, all results have

NOTE: AT LEAST TWO PARALLEL CIRCUITS WILL BE ADOPTED WITH PROVISION MADE TO EASILY TRANSFER FROM ONE SECTION TO THE OTHER AS NECESSARY. THIS TO BE EFFECTIVE BETWEEN FEED BELTS & THERMAL DRYER.



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BABCOCK MTN.
PROPOSED WASHERY FLOWSHEET

DATE JAN '73

used the figure of 4 percent (4%). The results are shown on Tables XXIII to XXVII.

Two sheets of guaranteed results from the manufacturer of the Deister Tables are included in order to indicate that for the adit samples, results above the average quoted are attainable in every case. The guarantees were given following examination by them of our complete adit washability information.

No detailed plans have been prepared for the wash plant. This work will be done later in order to check the circuit, the number of units, the necessary middlings circuits, water requirements, etc. At that time, the whole process can be optimized. Optimization does not necessarily mean producing the lowest ash product.

GUARANTEED PERFORMANCE FIGURES FROM

DEI-CON WESTERN, FORT WAYNE, INDIANA

(Makers of Deister Tables)

Seam D, Adit No. D4, Lot 3 - ¼" x 100 Mesh at 1.60 Sp. Gr.

Product	% Wt.	% Ash
¼" x 100 Mesh Washed Coal	79.80	6.50
¼" x 100 Mesh Refuse	20.20	56.82
¼" x 100 Mesh Feed	100.00	16.66

Organic Cleaning Efficiency ---------------------------- 98.5%

As mentioned earlier, the sequence of mining takes into account the higher sulphur percentage in certain areas of D seam. By use of the overlays, it is possible to match the mining plan with the lines of equal sulphur percentage and to see that the high areas are avoided in the early quarters as far as possible. This early period is when a larger proportion of D seam must be mined to allow the workings in this seam to keep ahead of E seam. Most of the Sulphur occurs in the top two feet of adit D9, but the full height of seam will have to be taken for practical reasons of thickness limitation and difficulty in supporting the friable coal.

Having worked out the mining schedule, a quality check has been made to show the approximate percentage of clean coal from each seam and the expected quality to be shipped. This has been done using the quality data from the borehole in whose area of influence the mining is scheduled. This information is presented on Table XX. The ash is a little higher in three quarters when a higher proportion of D is mined in the early period. The gravity can be adjusted to reduce this ash during this period but a lower recovery will result. However, within the blend, there is some variation due to inherent seam quality differences. In general, the seams tend to be a little poorer at the northwest corner, particularly D, E, and J seams. This accounts for the higher ash which shows up in the mining schedule qualities in the early years. But the range is not excessive even if there is a severance of production in one complete seam. In addition, the surface layout can deal with a requirement to wash each seam separately, store it separately when washed, and load it as a planned blend when necessary.

A comparison has been made between the ranges and average quality expected from mathematical averaging of seam quality, based on 20% of output from D, E and F seam and 40% J seam, and from the qualities derived from areas of influence according to the mining programme.

The 104 pages of this report following this page contain coal quality data, and remain confidential under the terms of the *Coal Act Regulation*, Section 2(1). They have been removed from the public version.

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/10_251_2004

APPENDIX C

DELINEATION OF AREAS OF INFLUENCE

APPENDIX C

DELINEATION OF AREAS OF INFLUENCE

(Note: Hole = drill hole, adit, trench or other similar data point)

1. Select the 5 closest holes to each hole (A_n).

2. Join each hole (A_n) to the nearest hole (B_n). (Note A_1 may be B_2 etc.).

3. i) Now join each hole to its next nearest hole (C_n) which is greater than 90^0 from the lines (A_nB_n). If no hole is 90^0 from line AB, join A to the hole (of the remaining 4 holes) which has the greatest angular displacement from AB. (Do not cross any lines).

   ii) If A_nB_n has already been joined, proceed to the next point.

   iii) If at any time a quadrangle forms, immediately join the two closest opposing corners.

4. i) Select a hole D_n from the 3 (or fewer) remaining holes such that the rays AB, AC, and AD will have the best angular distribution possible and, if possible, so that triangle BCD will enclose A (do not cross any previously drawn lines).

   ii) If A_nD_n has already been joined from another step in the point selection, do not choose another point as D_n, proceed instead to the next point $A_n + 1$.

5. If any polygons remain, join all opposing corners of each polygon starting with the shortest distance first. (Do not cross any lines).

6. Find the mid point of each line and, for all triangles which are not obtuse triangles with the obtuse angle subtended by an outside fringe line (or edge or reserve line(, join each mid point to its corresponding apex to determine the area - mid point of each triangle. If an obtuse triangle has two sides which are fringe sides, treat it as an acute triangle.

7. Join the triangular mid points (secondary points) so found and the mid points (tertiary points) of the sides to form an area of influence around each hole (primary point).

8. For obtuse triangles with the obtuse angle subtended by an outside fringe line, extend the right bisectrix of the two internal sides of the triangle until they meet and use these lines to form the boundary of the areas of influence. The right bisectrix of the fringe line side may be used to extend the area of influence beyond this point of intersection.

9. Where the drilled area is bounded by the side of an acute triangle, the right bisectrix of this side is extended to the reserve boundary to define the areas of influence.