SECOND INTERIM REPORT

BABCOCK AREA

MAY 1973

V O L U M E I

SUMMARY

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
U. S. A.

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TABLE OF CONTENTS

LIST OF TABLES & ILLUSTRATIONS

LEGEND

- EXISTING RAILWAY (MILEAGE)
- PROPOSED PERMANENT ROAD (MILEAGE)
- PROPOSED RAILWAY (MILEAGE)
- PROPERTIES BEING DEVELOPED
- PROPERTIES IN PRODUCTION

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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" = 130mi ±
APPROVED BY	DRAWING NO: MISC 73-0423-R02	

INTRODUCTION

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.

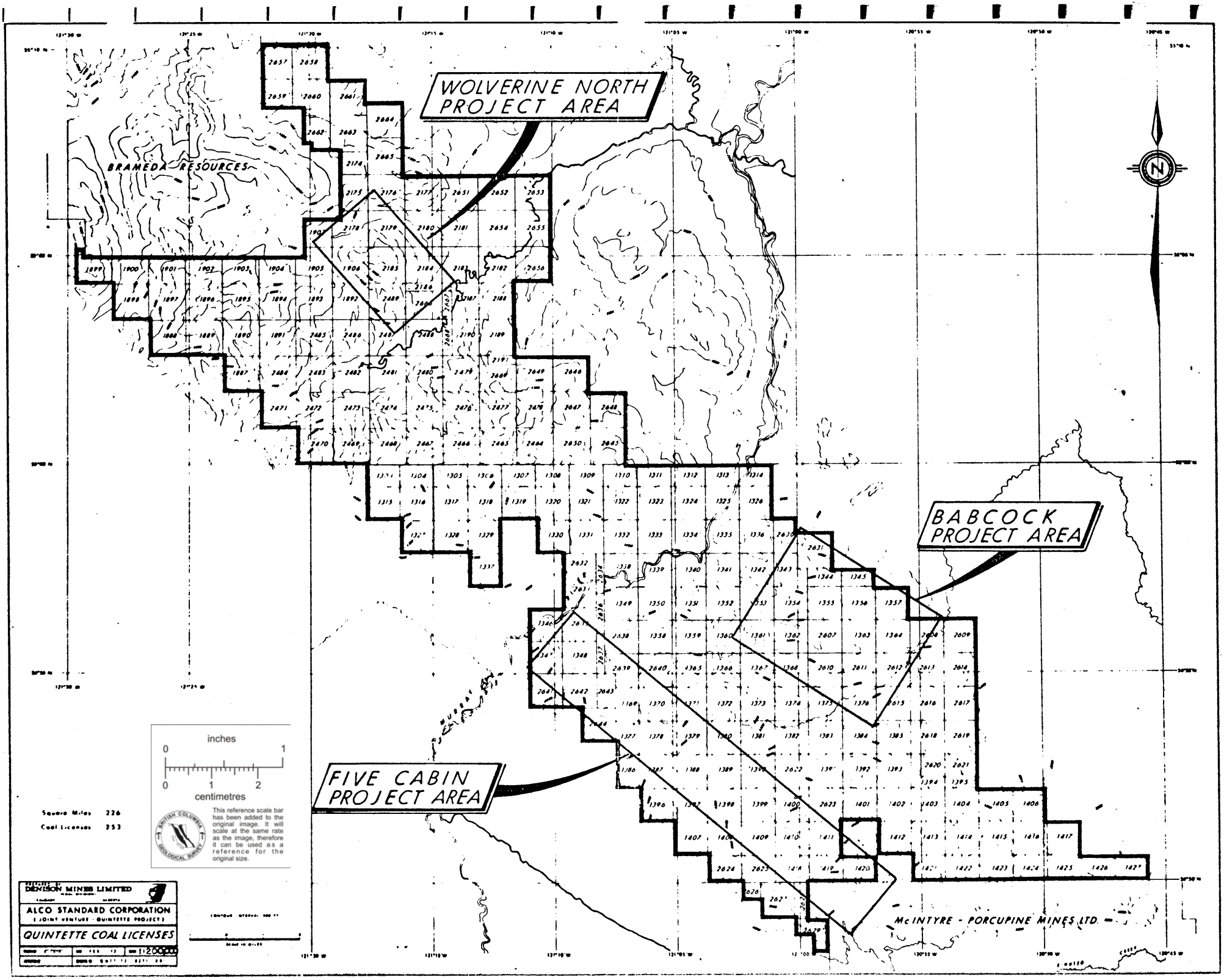
The Quintette property consists of 253 British Columbia coal licences encompassing 226 square miles. The First Interim Report, for the most part, provided an outline of the geology and first approximation of the coal reserves and quality in the Babcock portion of the licences. Almost the same amount 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
BRAMEDA RESOURCES
BABCOCK PROJECT AREA
FIVE CABIN PROJECT AREA
McINTYRE - PORCUPINE MINES LTD.
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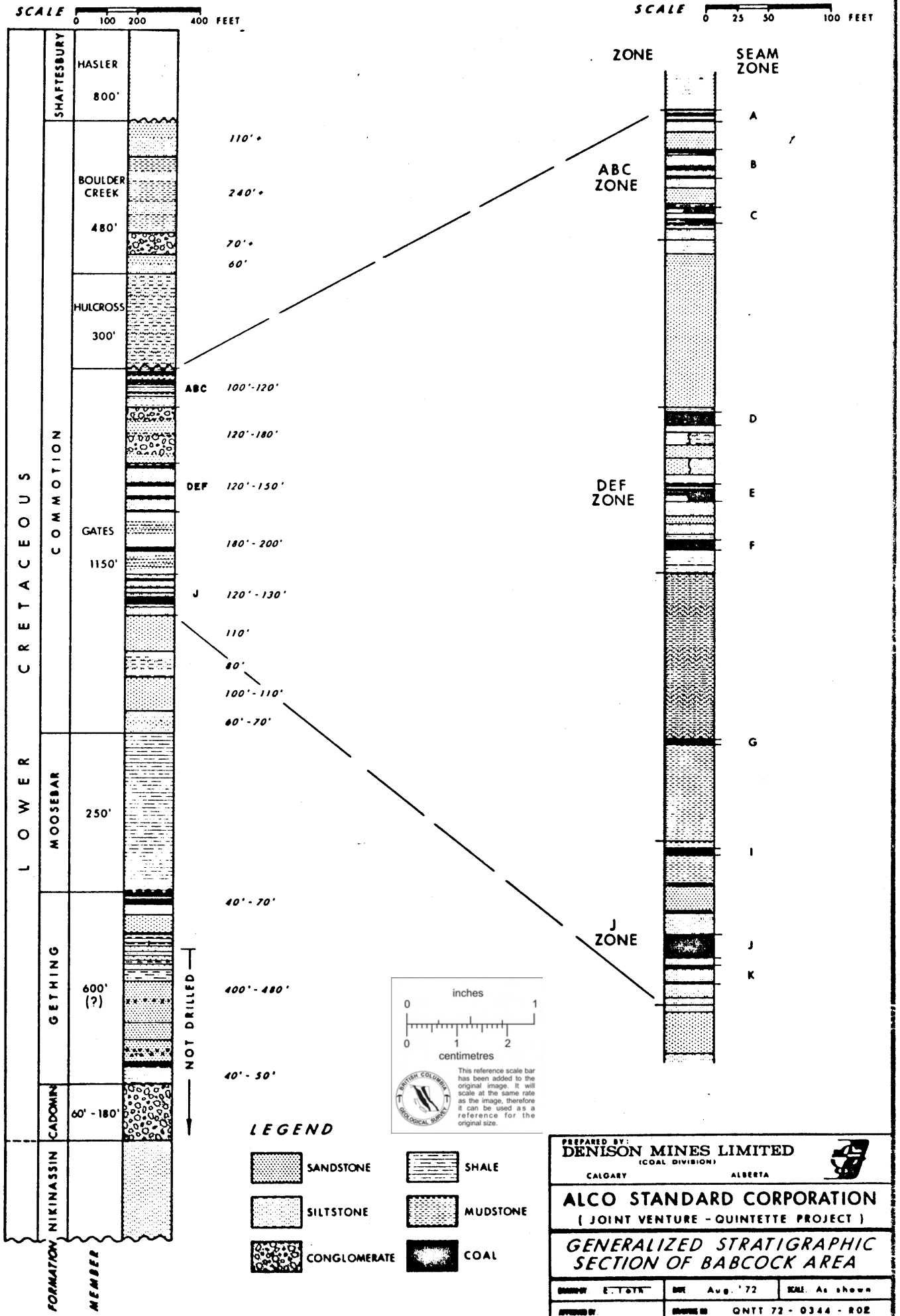
Square Miles 226
Coal Licenses 253
DENISON MINES LIMITED
ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)
QUINTETTE COAL LICENSES
1:200000

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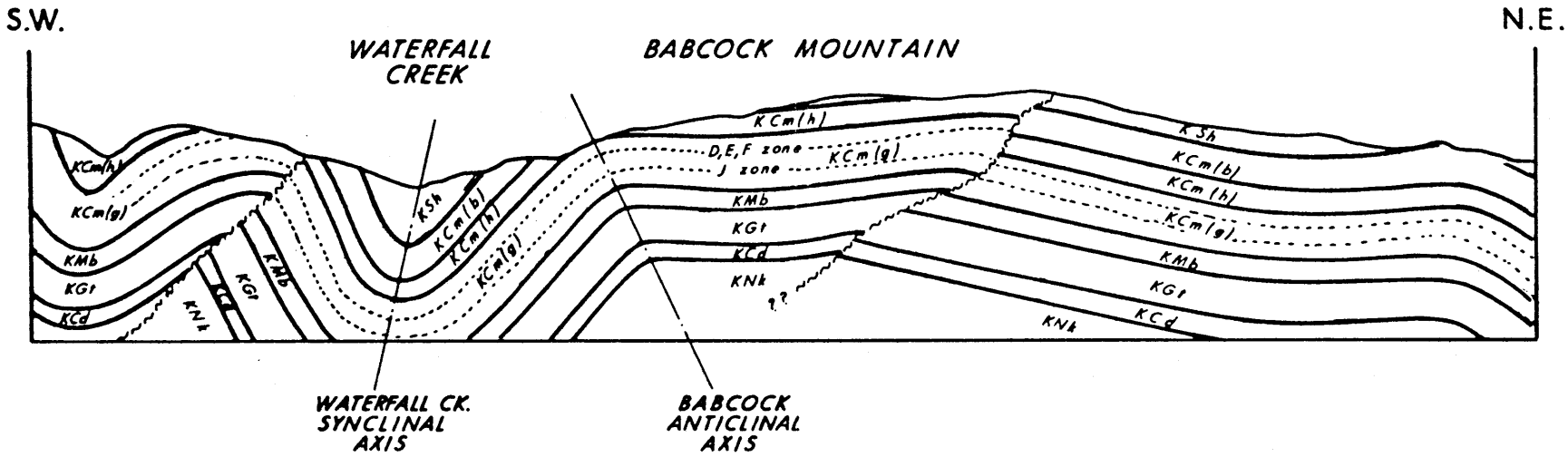
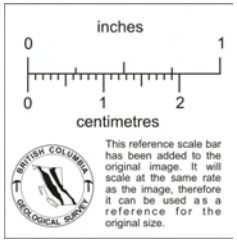
LEGEND
SANDSTONE
SILTSTONE
CONGLOMERATE
SHALE
MUDSTONE
COAL
PREPARED BY:
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA
ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)
GENERALIZED STRATIGRAPHIC SECTION OF BABCOCK AREA
E. Toth
Aug. '72
As shown
QNTT 72 - 0344 - R02



CRETACEOUS

KSh	SHAFTESBURY FORMATION	
KCm(b)	COMMOTION "	(BOULDER CK. MEMBER)
KCm(h)	" "	(HULLCROSS MEMBER)
KCm(g)	" "	(GATES MEMBER)
KMb	MOOSEBAR "	
KGt	GETHING "	
KCd	CADOMIN "	
KNk	NIKANASSIN "	



SCHEMATIC REPRESENTATION OF BABCOCK AREA STRUCTURE

Scale: 2" = 1 mile

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.

SUMMARY

RESERVES IN PLACE

TABLE II-A

(Weighted Averages Where Applicable)

Seam	Reserve Thickness (Feet)	Raw Coal Ash %	Raw Coal Specific Gravity[1]	Total Probable Dilution (Feet)[2]	Area of Influence $Ft.^2 \times 10^6$	In Place Reserves Less 10% Geological Factors[3] Raw Coal 10^6 S. Tons	In Place Reserves Less 10% Geological Factors[3] Probable Dilution Tons 10^6	Estimated Mining Recovery	Total Probable Dilution Mined 10^6 S. Tons	Raw Coal Mined 10^6 S. Tons	Comments
											Equivalent lbs. raw coal per cubic foot
D	7.80	18.56	1.45	1.09	154.216	49.036	11.215	57%	6.401	28.008	90.5
E	6.65	24.45	1.51	0.84	156.193	45.528	8.773	65%	5.703	29.593	97.4
F	8.4	18.72	1.46	1.30	155.452	59.118	14.770	55%	8.123	32.514	91.1
G	6.86	17.87	1.44	1.67	11.769	3.120	1.313	60%	.787	1.873	89.9
I	9.45	18.87	1.45	1.05	114.700	44.136	8.013	65%	5.209	28.690	90.5
J	16.60	16.51	1.43	1.42	151.980	101.359	7.367	41.18%	1.921	41.736	89.3
TOTALS					744.310	302.297	51.451	53.72%	29.144	162.414	

Total coal in place 302.297 million short tons.
Weighted average recovery of coal 53.72%.
Net raw coal mined 162.414 million short tons.

(1) The specific gravity of raw coal in place is obtained from the equation : Spa = .010069 x % Ash +1.262.

(2) Total probable dilution assumes room and pillar extraction with continuous miners, and therefore may, in effect, be considered a maximum.

(3) Ten percent deduction for undefined faults, folds, washouts, etc. This is in addition to the deletion of reserves assigned to the area pf influence of hole 7205 (an additional 4%).

RESERVE SUMMARY
NOMINAL 7% ASH PRODUCT - ANALYSES BY SEAM

Weighted Averages Based on Actual Analyses of Combined +28 and -28 Mesh Products

TABLE II-B

Seam	Plant Product Theor. Yield: (+28,-28 M.) Less 4%	As Received Proximate Analysis of Product Ash	Vol.	T.M.	F.C.	S.	F.S.I.	Tons x 10^6 Raw Tons Mined (Allowing 10% Geol. Deduction)	Total Probable Dilution (Contin. Mining)	Total Tons Mined & Probable Dilution	Net Clean Tons (Theor. Yield x Raw Tons)	Probable Yield Assuming Total Dilution*	Comments
D	76.90	7.07	24.42	5%	63.60	.65	5½	28.008	6.401	34.409	21.539	62.59	
										YIELD - NO DILUTION:		76.90	
E	64.36	7.06	23.50	5%	64.47	.24	7	29.593	5.703	35.296	19.165	54.29	
										YIELD - NO DILUTION:		64.76	
F	78.40	6.80	20.84	5%	65.13	.23	7½	32.514	8.123	40.637	25.493	62.73	
										YIELD - NO DILUTION:		78.40	
G	59.02	7.74	22.74	5%	64.49	.42	7½	1.872	.787	2.659	1.105	41.55	Not used in Interim Report #2 Mining Plan
										YIELD - NO DILUTION:		59.02	
I	68.30	7.04	21.10	5%	66.82	.27	7½	28.690	5.208	33.898	19.598	57.81	Not used in Interim Report #2 Mining Plan
										YIELD - NO DILUTION:		68.30	
J	74.59	6.80	21.14	5%	66.95	.21	7	41.736	2.921	44.657	31.133	69.71	
										YIELD - NO DILUTION:		74.59	
TOTAL PRODUCT								162.413			118.033		Yield 72.67 (No dilution)
TOTAL (EXCLUDING G, I)								131.851	23.148	154.999	97.330		Yield 73.81 (No dilution) Yield 62.79 (With dilution)

RESERVE SUMMARY

PRODUCT AT 1.60 SPECIFIC GRAVITY - ANALYSES BY SEAM

TABLE II-E

Weighted Averages Based on Mathematically Combined Actual Analyses of +28 and -28 Mesh Products

Seam	Plant Product Theor. Yield: (+28, -28 M.) Less 4%	Dry Basis Proximate Analysis of Product						Tons x 10^6					Comments
		Ash	Vol.	R.M.	F.C.	S.	F.S.I.	Raw Tons Mined (Allowing 10% Geol. Deduction)	Total Probable Dilution (Contin. Mining)	Total Tons Mined & Probable Dilution	Net Clean Tons (Theor. Yield x Raw Tons)	Probable Yield Assuming Total Dilution*	
D	76.77	7.22	25.12	.82	66.81	.71	5	28.008	6.401	34.409	21.513	62.52	
										YIELD - NO DILUTION:		76.81	
E	67.70	7.68	24.46	.84	66.69	.25	7	29.593	5.703	35.296	20.037	56.76	
										YIELD - NO DILUTION:		67.70	
F	73.16	5.02	25.06	.89	69.37	.30	8	32.514	8.123	40.637	23.784	58.53	
										YIELD - NO DILUTION:		73.16	
G	75.32	10.97	22.34	.78	65.87	.49	6	1.872	.787	2.659	1.410	53.02	Not used in Interim Report #2 Mining Plan
										YIELD - NO DILUTION:		75.32	
I	75.30	9.06	21.44	.98	68.46	.31	7½	28.690	5.208	33.898	21.605	63.73	Not used in Interim Report #2 Mining Plan
										YIELD - NO DILUTION:		75.30	
J	78.69	7.66	21.95	.85	69.53	.22	7	41.736	2.921	44.657	32.846	73.55	
										YIELD - NO DILUTION:		78.69	
TOTAL PRODUCT								162.413			121.195		Yield 74.62 (No dilution)
TOTAL (EXCLUDING G, I)								131.851	23.148	154.999	98.180		Yield 74.46 (No dilution) Yield 63.34 (With dilution)

Coking Properties

Data is available from various coking tests performed in Ottawa and Japan. Brief comments on the results follow.

Stability

Most of the seams considered to be mineable have average stabilities over 55. Seam D stabilities were 35.3 and 44.0. The sample giving the 35.3 figure is suspect and retesting is contemplated.

Japanese Tumbler Tests

A summary of results follows.*

Seam	Average Retained on +15 mm	Range
D	92.8	91.4 - 94.4
F	93.5	91.3 - 94.4
J Upper	93.5	91.6 - 94.9
J Lower	93.4	91.1 - 94.8

* Tests done in Japan only

Petrographic Analyses

From petrographic analyses in Ottawa and by Mitsui Mining, it would appear that seam F has the highest proportion of total reactives (68.4 - 71.4%, average 70.6%), followed by seams E and J at 65% each; seam D full seam 64%, and D lower bench (Mitsui Mining) at 54.9%. In general, petrographic work supports the conclusion that a strong, coherent coke can be expected from all the Babcock coals.

Gieseler Plasticity

Average of Japanese and Canadian tests provide a good indication of the fluidity of the Babcock coals.

Maximum dd/m

Seam	Average Canadian Measurement	Average Japanese Measurement (Six Samples)	Log of the Japanese Average
D	55	223	2.34
E	126	-	(2.10) Canadian
F	230	484	2.68
J Main	139	113	2.05
J Upper	101	92.5	1.96

Babcock Coal Blends

Babcock coals tested in blends with low and high volatile coals in Canada and Japan, outperformed the standards in terms of J.I.S. drum indexes, and performed as well as or better than comparable Canadian coals.

In conclusion, coking tests, petrographic investigations and all analyses to date clearly indicate that coke derived from seams E, F and J will be as high in quality or better than competitive Canadian coals. Seam D coal also performs well but its stability is slightly lower than other Babcock products.

MINING SECTION

MINING SECTION

MINING AND COAL TREATMENT

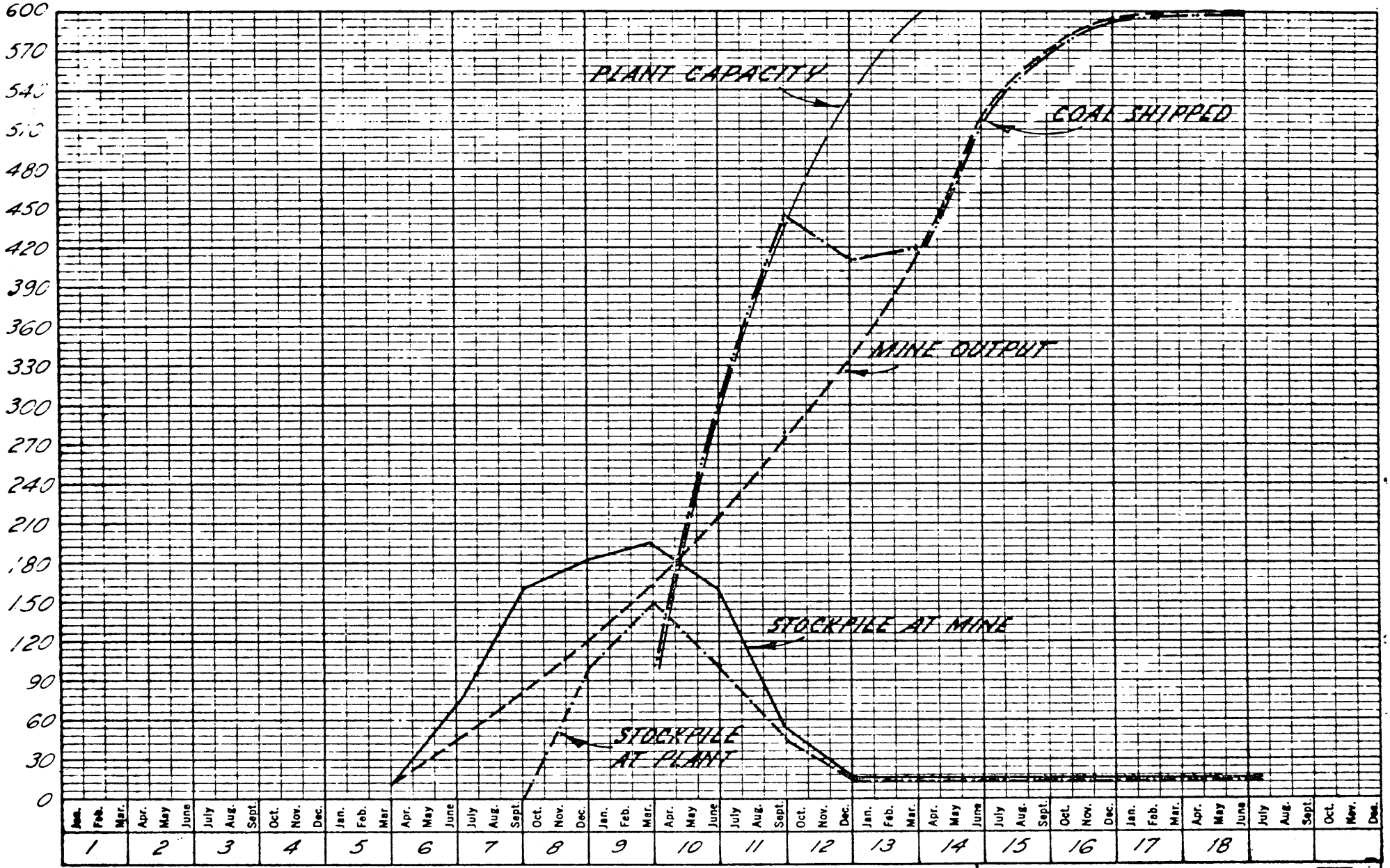
Detailed studies of alternative methods of extraction of the proven coal reserves in the Babcock area indicate that the best methods are as follows.

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%.

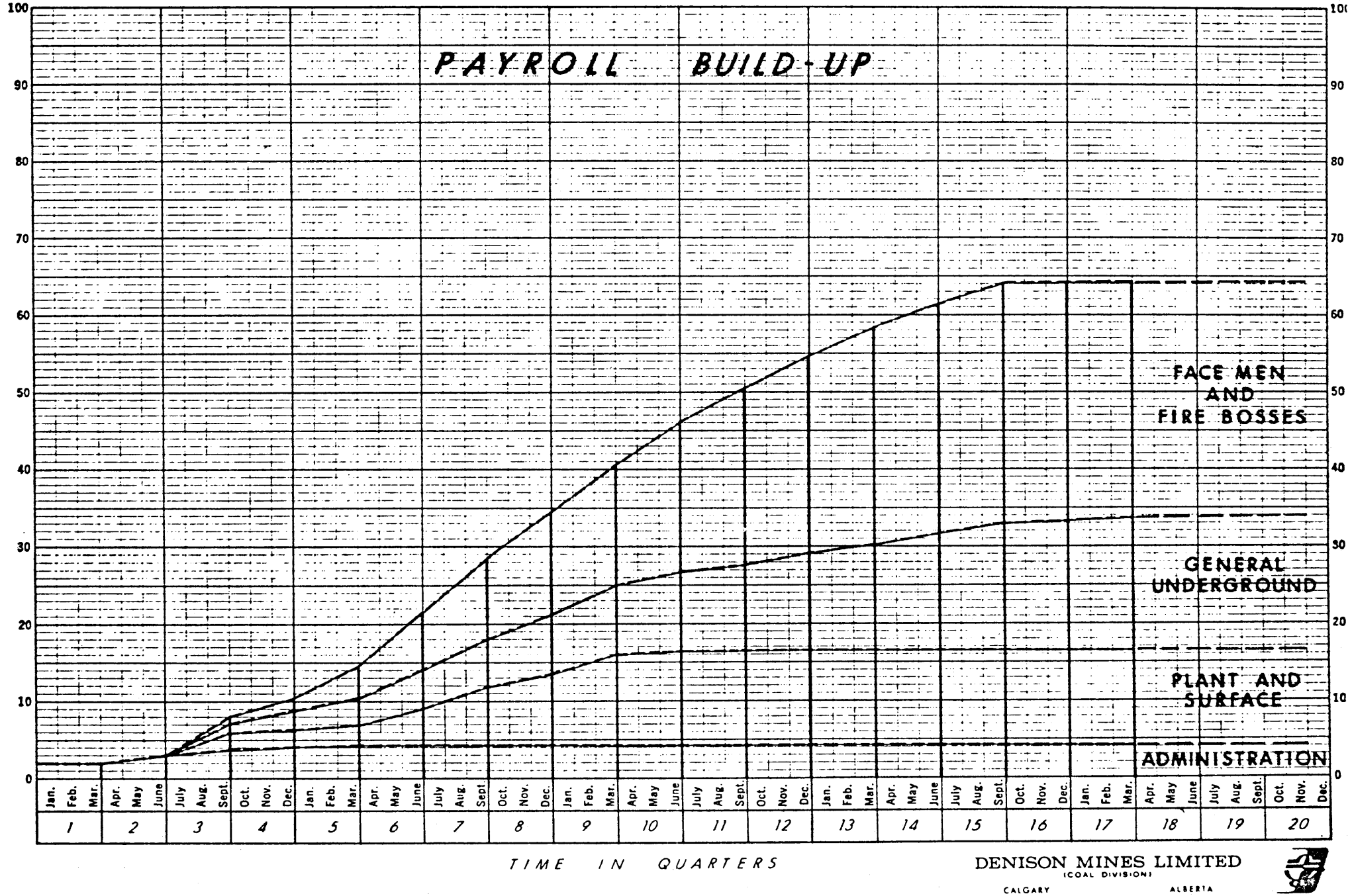
Main roads in each of the coal seams will be commenced at the northern outcrops and driven down dip vertically beneath each other. Subsequent workings will be developed towards the rise in order to minimize any water problems. Highly inclined ventilation slopes will be driven on each flank and at a point 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.



DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

COAL OUTPUT, STOCKS & COAL SHIPPED
DATE: MAY '73
DRAWING NUMBER: BBCK 73-0385-R02


PAYROLL BUILD-UP
PERSONNEL (x 10)
100
90
80
70
60
50
40
30
20
10
0
FACE MEN AND FIRE BOSSES
GENERAL UNDERGROUND
PLANT AND SURFACE
ADMINISTRATION
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
TIME IN QUARTERS
DENISON MINES LIMITED
(COAL DIVISION)
CALGARY ALBERTA

The full output of the mine will be 2,000,000 clean long tons per year. Engineering work will be completed by the contract signing date and full output is to be reached four years thereafter. In calculating the production buildup, a limit of three new face crews (about 25 men) per quarter was maintained.

Overall productivity expected is 15.2 clean short tons per man-shift, with a face productivity of 38.2 clean short tons per man-shift.

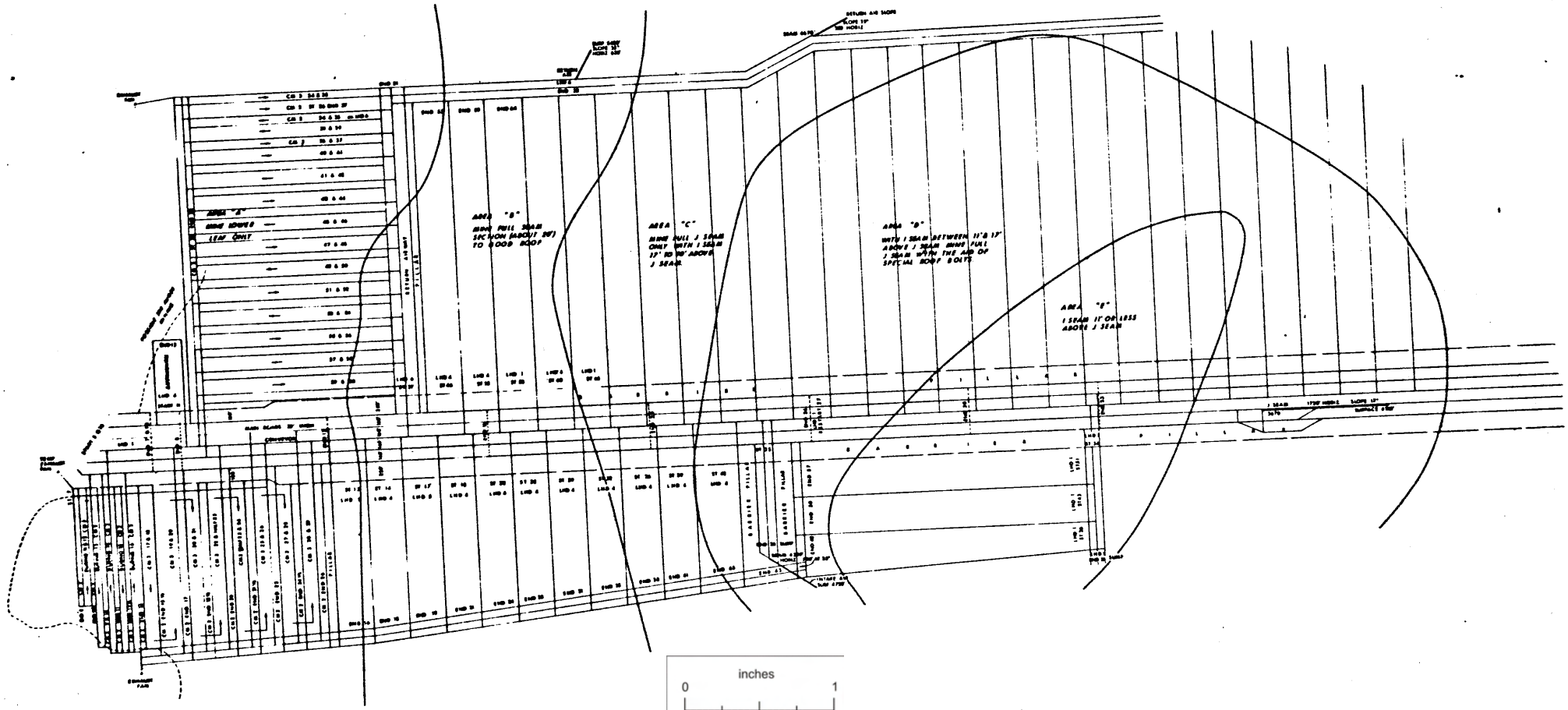
The D and J seam mining plans are presented as examples to illustrate the principals proposed and to show the general reserve area. The structure contours shown for J seam on the Hydraulic and L.H.D./Slusher Mining Schedule illustrate the typical seam topography.

PRODUCT QUALITY AND TREATMENT

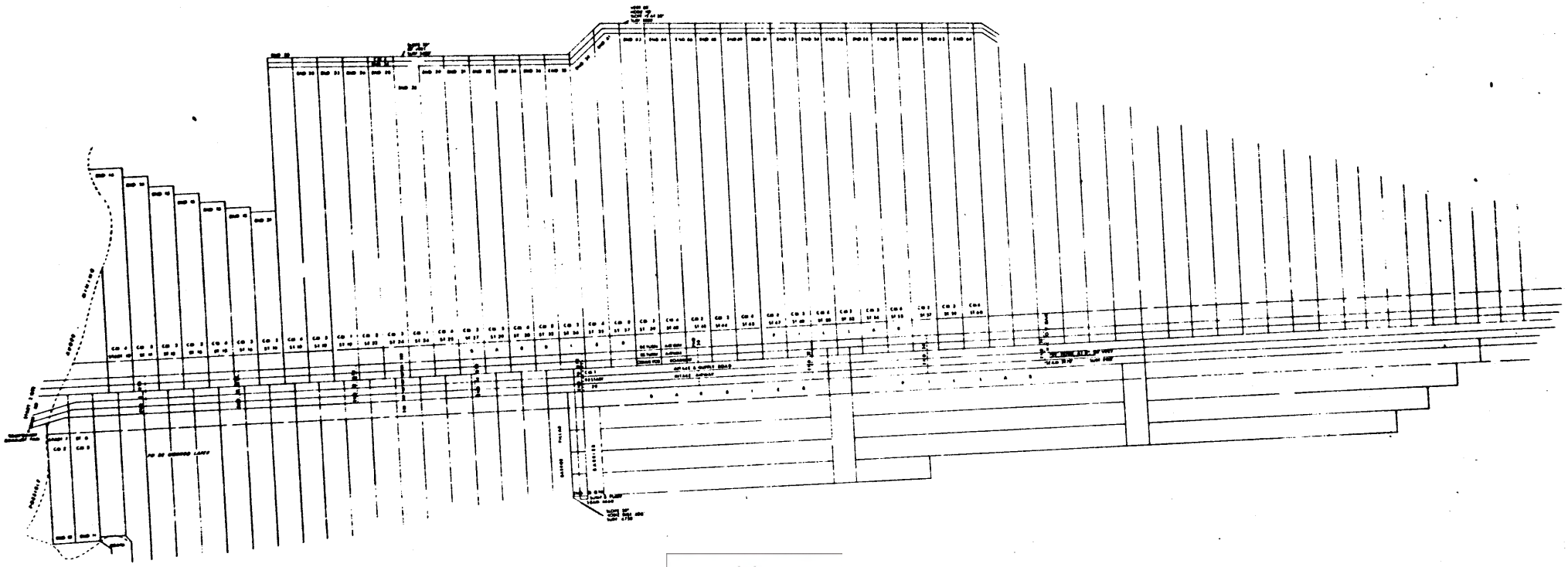
The coal preparation plant will consist of a jig to wash the coal down to 1/4 inch size at about 1.60 specific gravity. Deister tables will be used to clean 1/4 inch x 100 mesh coal. Froth floatation will be utilized for the small amount of 100 mesh by zero material. Two parallel circuits, each with a feed capacity of 400 short tons per hour, plus twin thermal driers, will be used. Details of the plant are shown on the diagram following.

The quality of the product when shipped will be:

	Weighted Average	Range
Total Moisture	6.0%	-
Ash	7.03%	6.6 - 7.6%
Volatile Matter	22.09%	21.4 - 23.4%
Fixed Carbon	64.49%	63.0 - 66.0%
Sulphur	0.39%	0.31- 0.51
F.S.I.	6 - 6½	6 - 7
Fluidity	Over 100 dd/m	



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



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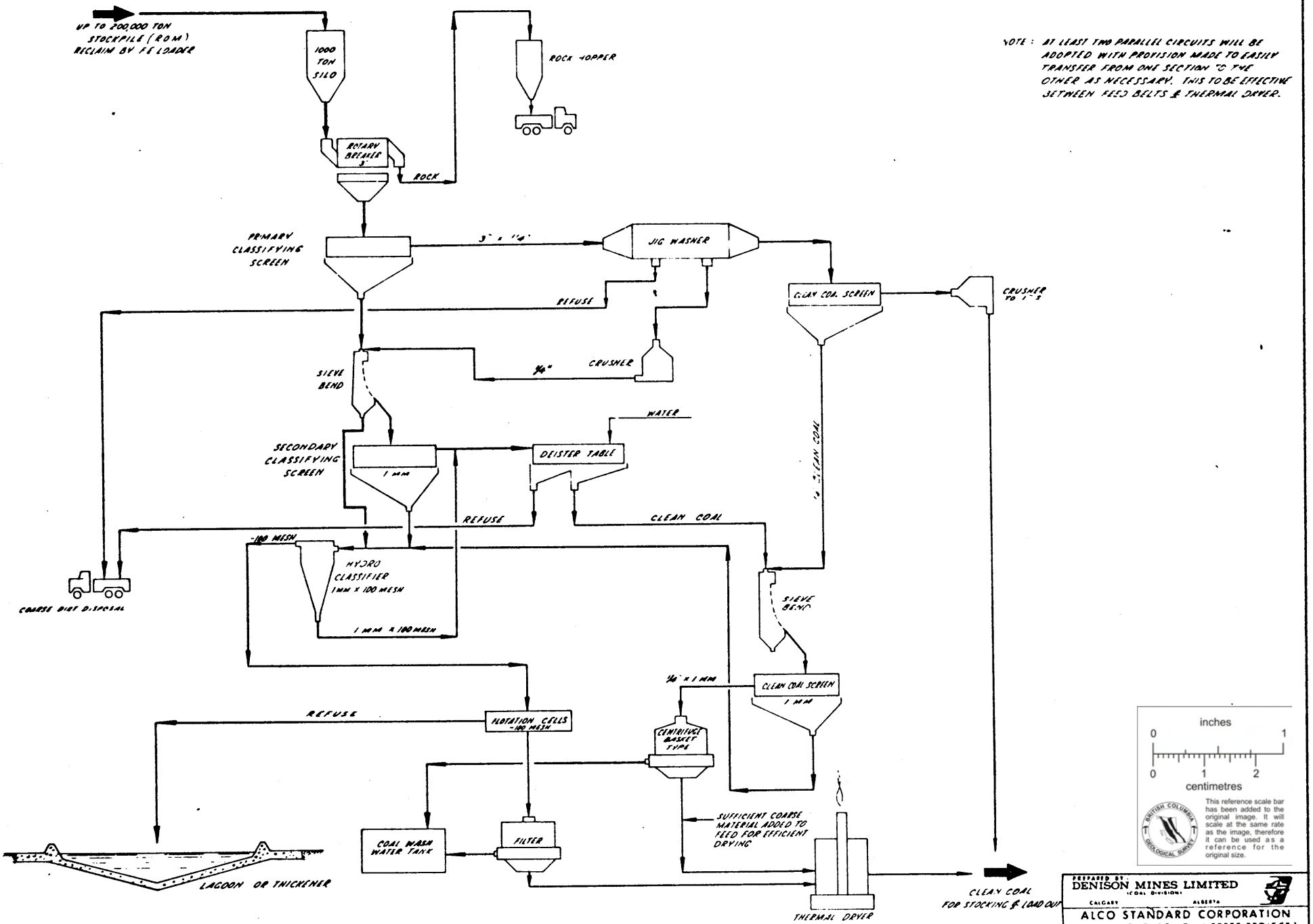
SCALE 0 - STANDARD CONTINUOUS SEWER LAYOUT



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.

inches
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centimetres

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

ALCO STANDARD CORPORATION
(JOINT VENTURE - QUINTETTE PROJECT)

BABCOCK MTN.
PROPOSED WASHERY FLOWSHEET

DRAWN BY [illegible]	DATE JAN '73	SCALE ——
APPROVED BY	DRAWING NO. BBCK 73-0367-003	

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 Collieries 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

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.