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BYRON CREEK COLLIERIES

AN OVERVIEW

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Bob Fawn? sp

BYRON CREEK COLLIERIES

CORBIN PROPERTY

INTRODUCTION

Byron Creek Collieries, a unit of Esso Resources Canada Limited, operates the Coal Mountain Mine located at Corbin in southeastern British Columbia. The mine currently produces 1.8 million tonnes of clean coal per year for sale in both domestic (40%) and export (60%) markets. This medium volatile bituminous coal is produced as either a thermal coal product (15% ash) for use primarily in power generation, cement kilns and smelter operations or as a weak coking coal product (11% ash) for use in steel making.

Coal Mountain has been the site of various mining operations since the early 1900's. In all, the mountain has supported six underground mines and a glory hole surface operation prior to the current open pit operation. At one time the adjacent village of Corbin had a population of 2,000: it presently constitutes less than a dozen people.

Modern open pit operations were begun in the mid-1970's by Byron Creek Collieries Limited, a private company. By 1978 a jig plant, rail loadout and 19 kilometer rail spur were built. Esso Resources purchased the property in 1981 and has since constructed (1985-86) a new coal preparation plant, thermal dryer and heavy equipment maintenance facilities at a cost of $50M as well as updating and expanding the mobile mining equipment fleet. A modern office building was finally added in late 1989.

raw
113 total
15-20

Current production is based on a continuous operations schedule of two 12 hour shifts per day, 7 days a week. The workforce of approximately 320 employees is comprised of 70 staff and 250 wage earners, the latter being members of the United Mine Workers of America. Employees are bussed to the minesite from Fernie and Sparwood in B.C. and from various communities which comprise the Municipality of Crowsnest Pass in Alberta.

$18 per tonne

2.6 tonnes raw 1990

900,000

1) Ontario Hydro
350,000 tonne next year, tonnes fixed $ not fixed.

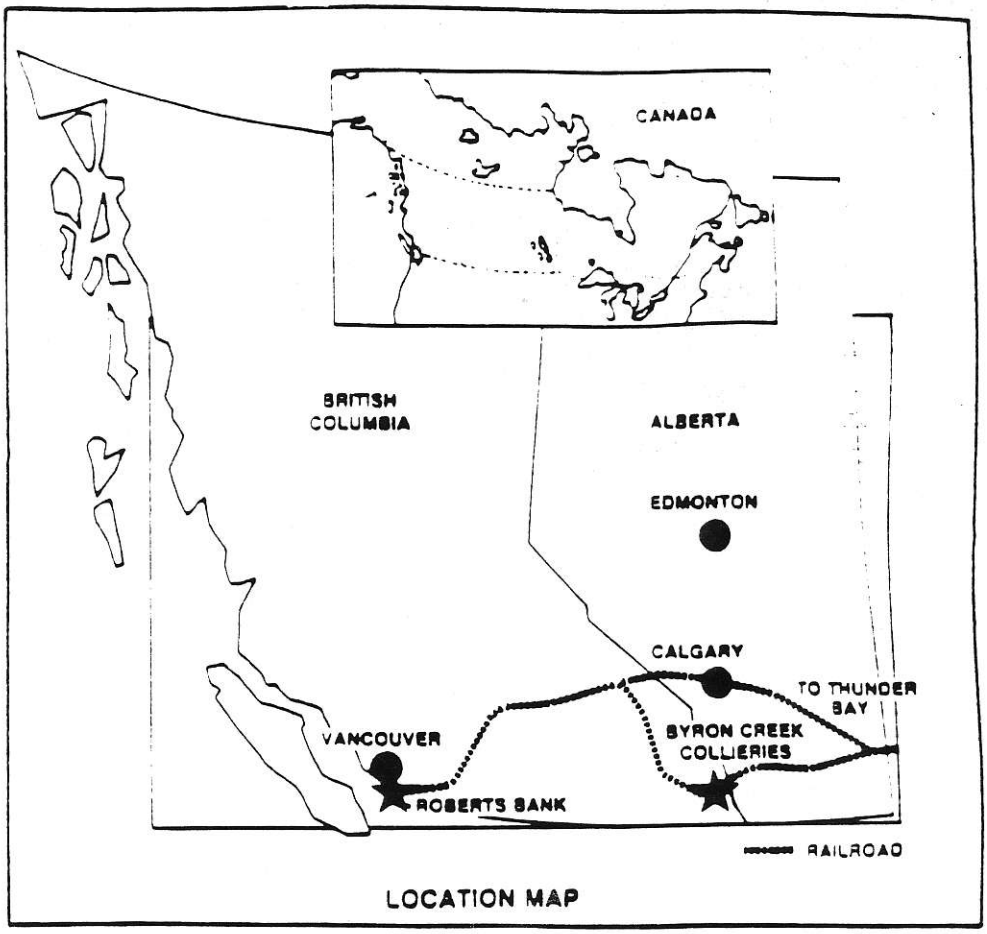
current optimum production 1.1 m

2) Line Creek
Mauk - agreement

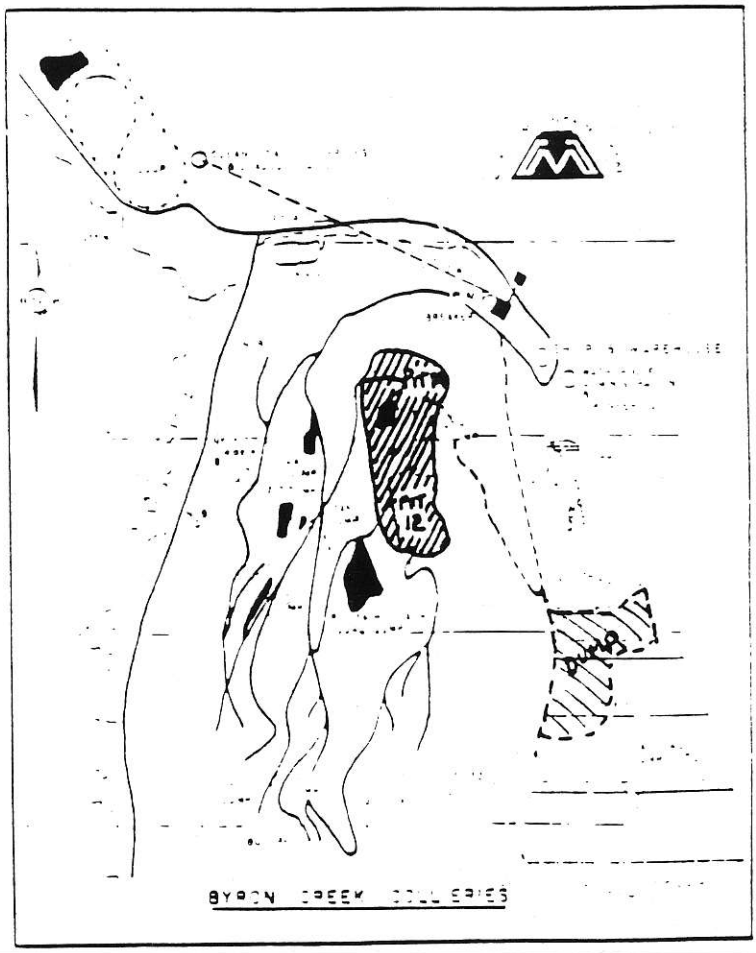
3) Hudson Bay small amount

600,000 - 1993 next year

Funding picked up some of Byron Creek's sales to Hydro - cost feature?



LOCATION MAP



HISTORY

1905 - 1935

Development of the area began on July 30, 1905, when D.C. Corbin, a prominent businessman from the northwestern U.S., and his associate F.J. Roberts, first visited the site of Coal Mountain on horseback. Coal was in great demand by railways and other industrial users, so the Corbin Coal and Coke Co., after acquiring 15,000 acres of land in the area, began to develop a mine. A 14-mile (22 km) rail spur, the Eastern British Columbia Railway, was constructed to join the mine to the CPR main line at the McGillivray Loop. Rail access to the mine and its developing community, Corbin, was completed in September 1908, the same year that the first underground mine began production.

The Corbin Coal and Coke Co. operated six mines on Coal Mountain; production from 1908 to 1930 inclusive totalled 2,337,800 tons (2119k tonnes). No. 3, 4 and 6 mines were operated intermittently from 1931 to 1935. The No. 3 mine, or "Big Showing" was the most impressive of the old mine developments. The "Mammoth" seam, with an exposure of up to 400 feet (120m), was mined using a Bucyrus-Erie steam shovel loading into rail cars once the rail spur from the tipple to the 6000-foot (1825m) elevation was completed in 1913 .

The mining community of Corbin was not without its troubles: a fire destroyed the colliery in 1928 (a replacement was constructed immediately); mine fires closed or limited operations in some of the underground mines (No. 1, 4 and 6) and labour disputes in 1911, 1917, 1919, 1922 and 1924 disrupted operations. A protracted strike in 1935 finally forced the Corbin Coal and Coke Co. to suspend its operations; the rail and plant equipment were removed in 1938 and sold.

1943 - 1948

The area was idle until 1943, when Consolidated Mining and Smelting Co. Ltd. (now Cominco) obtained a lease from the Corbin interests. Coal from the No. 3 and No. 6 mines was removed by surface mining techniques, screened in a makeshift plant and hauled by truck to the McGillivray Loop some 14 miles (22 km) to the north. CM & S used the coal in its smelters at Kimberley and Trail, B.C. Mining continued using contractors until 1948, when the site was abandoned once more. A total of 408,000 tons (370k tonnes) of coal was mined from Coal Mountain in the 1940's.

1972 - Present

In 1972 Byron Creek Collieries Limited acquired control of the last two square miles of coal land which had been retained by the Corbin Coal and Coke Co., and also the Eastern British Columbia Railway right-of-way which joined the old Corbin minesite to the CPR main line at McGillivray. Coal production commenced in 1975 and has been continuous since then.

Operations at Byron Creek for the most part have been limited to 5 days a week, 24 hours a day. However in 1986 extremely poor export market prices necessitated a forced reduction in the workforce (50%) which left the plant operating 16 hours/day and the pit operating on a single shift. In August 1988 the operation rebounded to a full 5 day x 3 shift schedule. Further strengthening of export coal demand and prices resulted in the decision to expand to a 7 day continuous operation in August 1989.

GEOLOGY

Structure

Coal Mountain, a steep-sided ridge, is a structural outlier on the eastern edge of the Crowsnest Coalfield . The coal-bearing sequence, of Jura-Cretaceous age, was deposited approximately 150 million years ago. Tectonism during the formation of the Rocky Mountains has produced severe folding and faulting of the coal seam and rock strata.

The structural trend on Coal Mountain is almost due north-south. The No. 6 Fault, with dip displacement in the order of hundreds of metres, runs most of the length of the mountain and forms a distinct break in structural style between the western and eastern blocks. The western block contains the largest portion of the coal resources. All the active and inactive pit areas are within this block. The eastern block is relatively unfaulted by comparison to the western block.

Coal Mountain coal comes essentially from one seam, the lowest seam in the stratigraphic section. Generally designated the No. 1 Seam but historically named the Mammoth Seam, it is thought to be the stratigraphic equivalent of the Balmer Seam occurring near Sparwood, B.C.

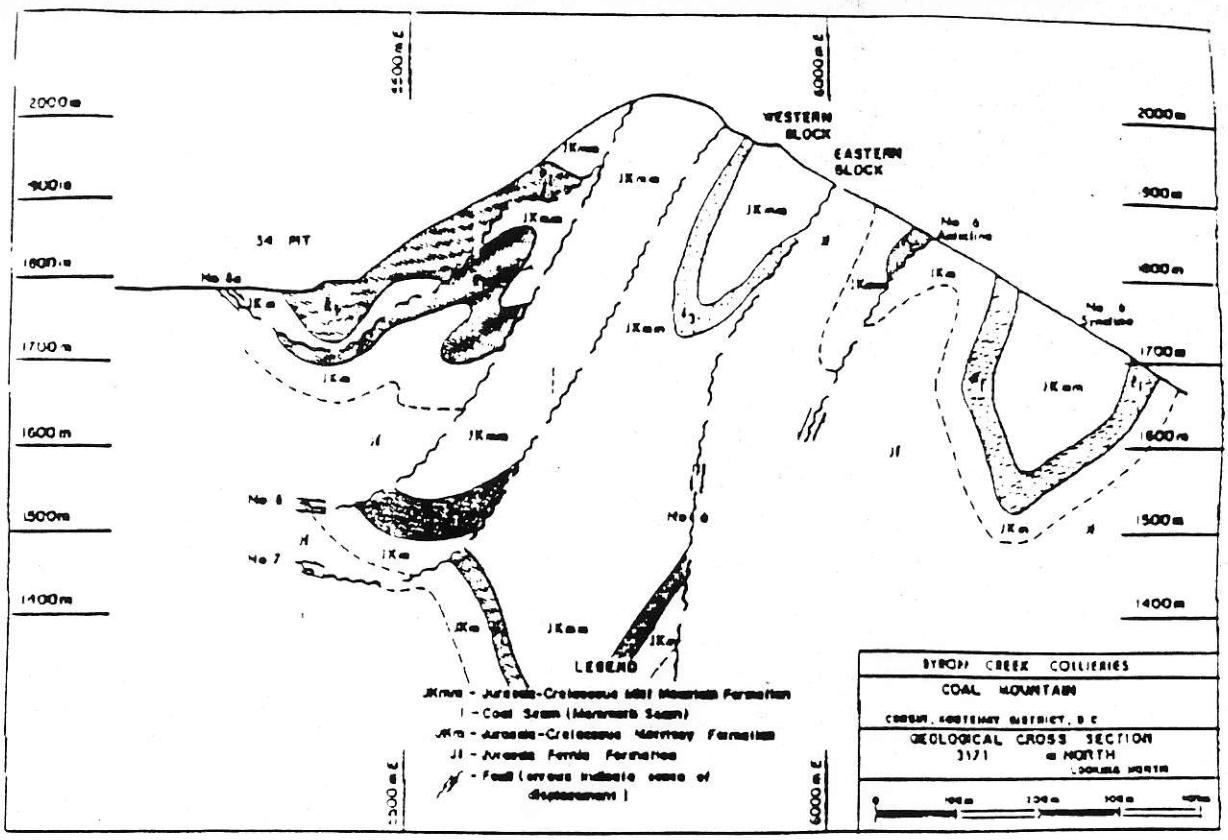
Coal Delineation

Since 1972, over 700 exploration holes totalling 110,000 meters have been drilled on Coal Mountain to delineate the coal resources estimated to amount to 170 million tonnes. Only 14% of the holes have been cored due to extremely poor core recoveries in the highly friable coal. Most of the drilling has been by dual-tube, reverse-circulation, rotary methods. Where possible, all holes were geophysically logged with a suite of natural gamma, neutron, density, caliper and deviation surveys. This information is used to define seam contacts and to help delineate coal quality.

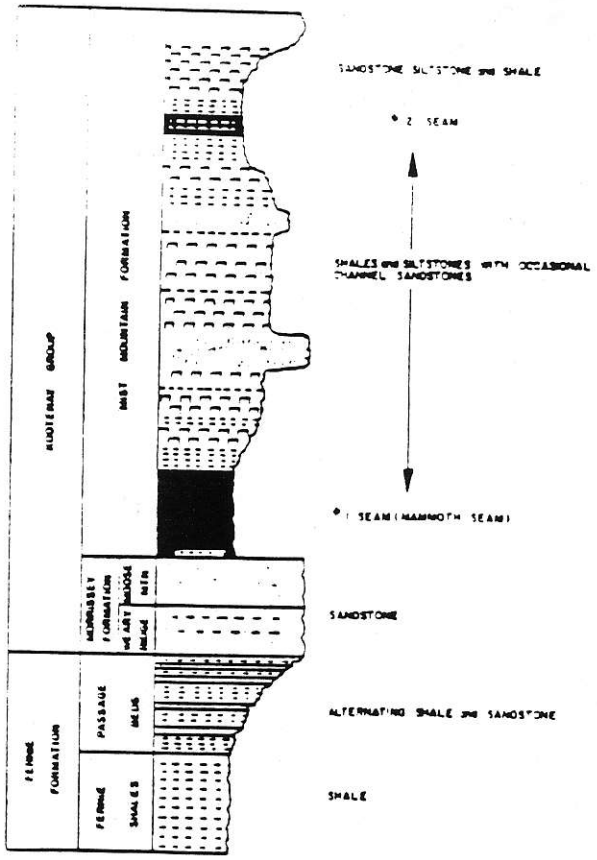
Quality Control

Coal quality management is a major challenge at Byron Creek Collieries. The original depositional environment of the coal seam has produced three semi-distinct zones across the thickness of the seam characterized by differences in coal quality. Complex faulting and folding has further complicated the situation. Interpretation, measurement and production control is achieved through a program whereby coal is classified into five distinct raw ash ranges (ash is the non-combustible portion):
0-16% (very low ash); 16-22% (low ash); 22-30% (medium ash); 30-40% (high ash); 40-50% (very high ash)

The geology team conducts in-pit, close-spaced drilling programs to define coal contacts and quality. 30-60m deep vertical reverse-circulation holes are typically drilled on approximately a 10x15m grid; samples are taken every 10m to represent the coal quality of a mining bench. Maps are prepared for short-range planning and pit operations guidance.



GENERALIZED STRATIGRAPHIC COLUMN — COAL MOUNTAIN



PIT OPERATIONS

Production is currently centered in two separate pit areas on the north end of the mountain . Pit 14 has developed to 1700m elevation; Pit 12 is at 1750m. Two pits provide opportunities for flexibility and coal blending. Planning for development of the next major pit, the south mine extension, is proceeding to enable production by 1991. Planned stripping ratio for 1990 is 4.0:1 (bcm waste:clean tonne coal). Ultimate pit dimensions for the recovery of 60Mt clean coal are approximately 4km x 1km x 0.5km deep.

Coal is dug from the face by front-end loader and then trucked from the pits to the raw coal stockpile or rotary breaker at 1580m elevation. All waste rock is drilled and blasted. To date the majority of waste rock has been dumped on the west side of the mountain. The recently initiated 300 million cubic meter capacity East Waste Dump will hold the bulk of all future waste materials.

All haul roads are generally designed at 30m width and 8% grade. Bench height is 10m. Typical drill, blast, load and haul cycles are performed in the pits. Current equipment capacity is approximately 30,000 bank cubic meters (bcm) of total material per day. A list of all mobile production equipment is provided in Table 1.

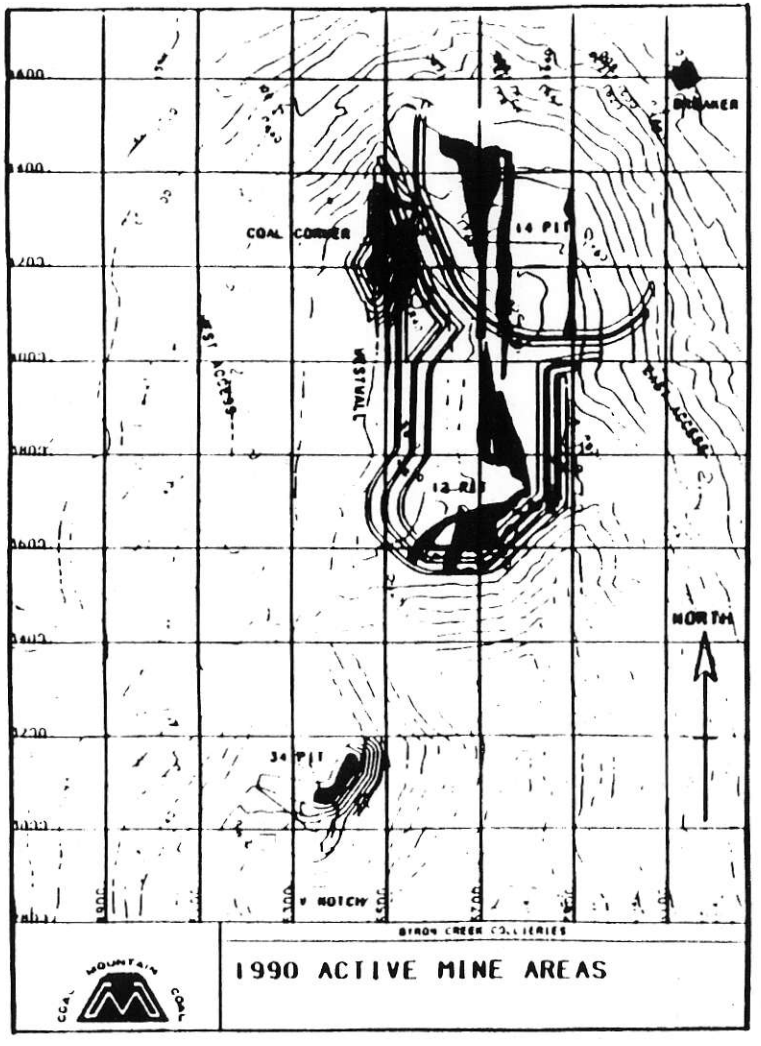
TABLE 1
MOBILE EQUIPMENT LIST

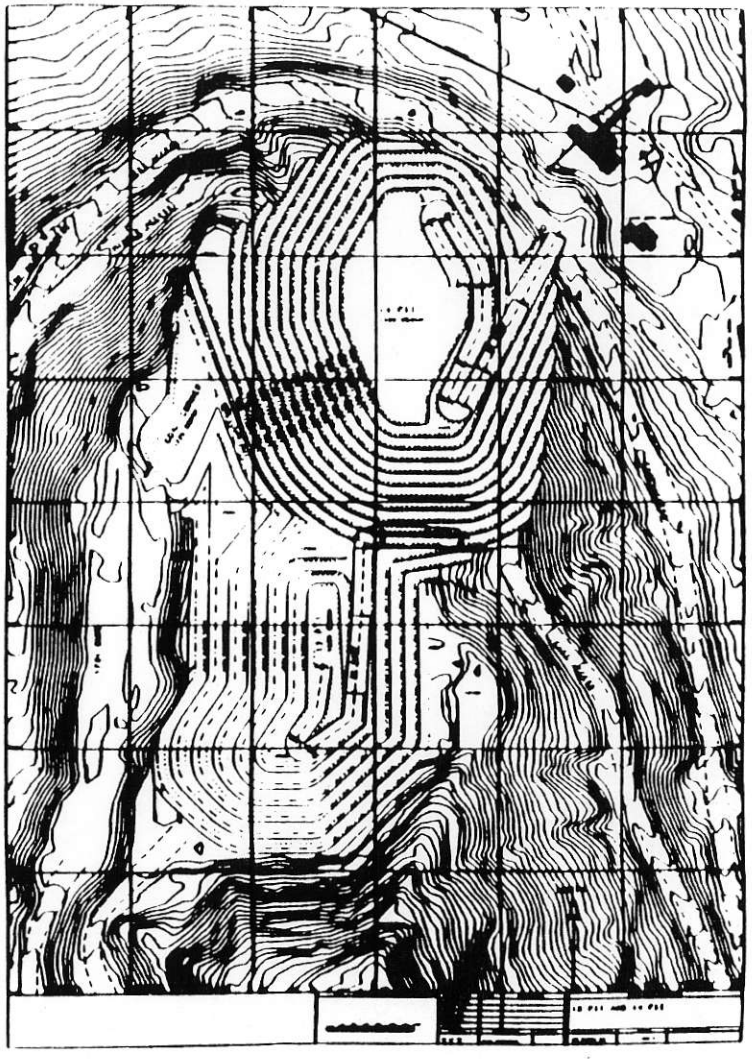
Pit Operations

1	14.5m^3 hydraulic shovel (Demag H-241)
4	9m^3 front-end wheeled loader (Caterpillar 992c highlift)
4	120 tonne mechanical-drive rear-dump truck (Caterpillar 785)
6	77 tonne mechanical-drive rear-dump truck (Caterpillar 777)
5	109 tonne electric wheel drive rear-dump truck (Unit Rig MK-30)
2	312mm wheeled production drill (Driltech D80k)
1	250mm tracked production drill (Joy RR-105)
1	D10 bulldozer (Caterpillar)
2	D9L bulldozers (Caterpillar)
1	D9N bulldozer (Caterpillar)
1	D8K bulldozer (Caterpillar)
3	16G road graders (Caterpillar)
1	637D scraper/water boy (Caterpillar)
1	245 backhoe (Caterpillar)

Plant Operations

1	16.5m^3 front-end wheeled loader (Caterpillar 992c)
1	16.6m^3 front-end wheeled loader (Caterpillar 992c)
1	D9N bulldozer (Caterpillar)
1	40 tonne refuse haul truck (Pacific P12)





Final Pit Design: Pits 12 & 14

PLANT OPERATIONS

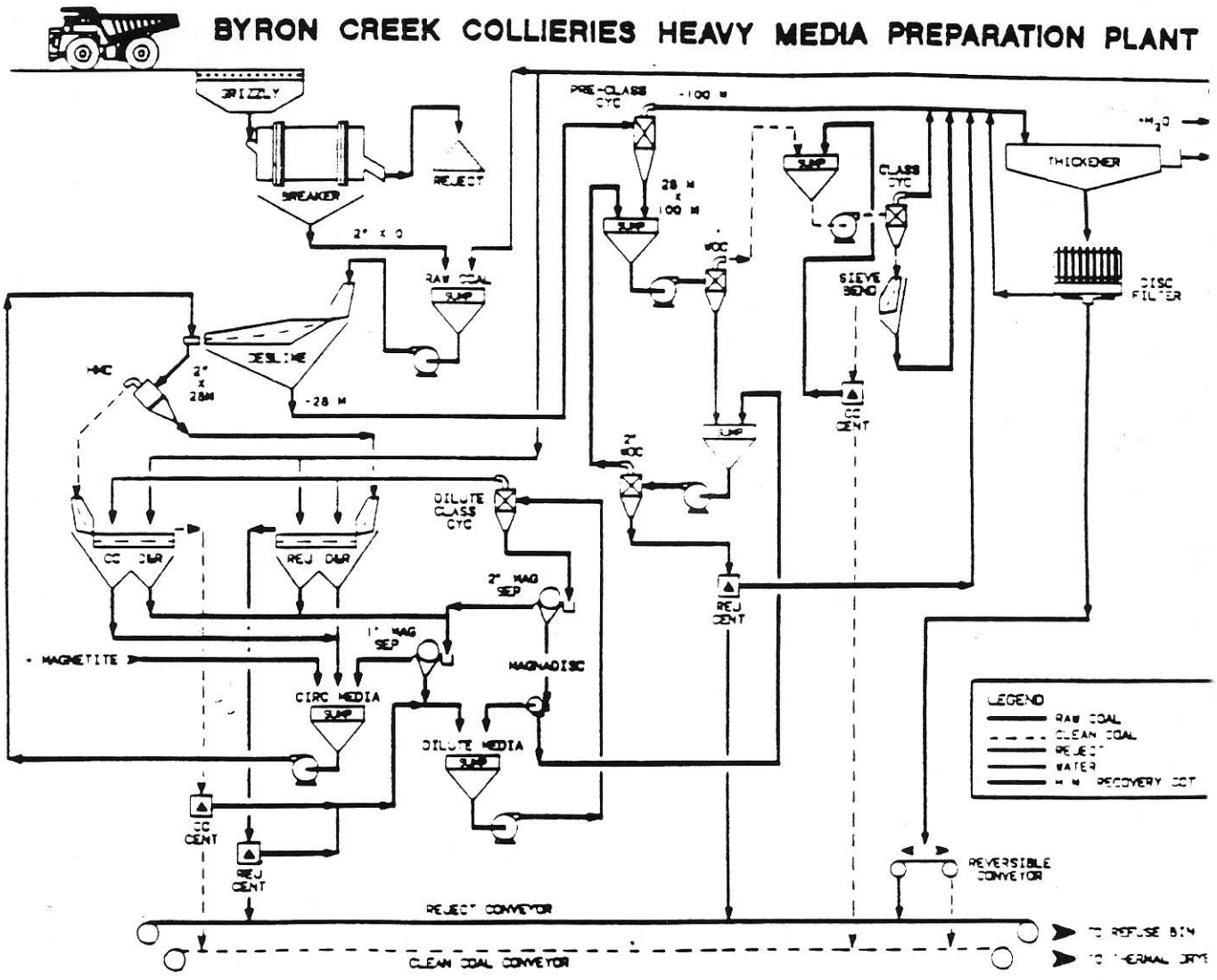
Raw coal is fed over a 60cm x 60cm grizzly into the rotary breaker either directly by end-dump trucks or from the stockpile by a large front-end loader. Coal is sized to minus 50mm in the rotary breaker then conveyed to the plant on an inclined conveyor; oversize material rejected out the end of the breaker is hauled to the refuse dump. Control room operators can select from five processing options which include combinations of washing in the jig plant, washing in the heavy media plant, by-passing the plants and drying in the thermal dryer.

Most coal is directed to the new heavy media plant where it is slurried on the ground floor (1,550m elev.) then pumped to the top floor (1,586m elev.); gravity flow then is largely utilized. Design capacity of the plant is 480 raw tonnes per hour. Raw coal is sized on vibrating screens and cleaned in heavy media cyclones and a series of water-only cyclones. Dewatering of the coarse and fine coal occurs in centrifuges. Very fine coal is settled in a thickener and dewatered by disc filters. A natural gas-fired thermal dryer reduces clean coal moisture to approximately 8%. Depending on product type and feed quality, plant yield varies generally in the range 65-75%. After being sampled by an automatic sampler the clean coal is carried by a 1.6km overland conveyor to the 100 kt capacity, two product clean coal stockpile at the loadout. 105 to 111 car unit trains of 10,000 tonnes are loaded in less than six hours by bulldozers pushing coal to a reclaim grizzly which feeds the 200 ton loadout weigh bin. Trains are loaded with computer assistance and then sprayed with a chemical which forms a surface crust on the coal to minimize coal dusting and losses.

Quality control is managed by in-plant laboratory personnel on a round-the-clock basis. Clean coal analyses are provided to the control room operator on an hourly basis. The laboratory is equipped to provide ash, moisture, calorific value, FSI and sink-float analyses. Typical coal quality specifications are listed below in Table 2.

TABLE 2
COAL QUALITY

	THERMAL COAL	WEAK COKING COAL
Total Moisture:	8.0%	8.0%
Inherent Moisture:	1.5%	1.5%
Ash:	15.1% (as shipped)	11.0% ±0.5% (air dried)
Heating Value:	6370 kcal/kg	N/A
Volatiles:	22.6% (as shipped)	23.7% (air dried)
Total Sulphur:	0.3%	0.3%
F.S.I.:	N/A	3-5
Fixed Carbon:	54.3% (as shipped)	63.3% (air dried)
Size Consist:	50 mm X 0	50 mm X 0



Process Flow Diagram

MARKETING

Byron Creek's marketing policy is to selectively develop long term offshore sales opportunities and to develop and enhance domestic sales opportunities.

From the Byron Creek mine site, Coal Mountain coal is shipped via CP Rail. Eastern shipments are sent both to Thunder Bay Terminals for delivery by lake vessel to Ontario Hydro's Nanticoke Generating Station on Lake Erie and to Flin Flon, Manitoba (transferred to CN Rail) for use by HBM&S. International markets are supplied through Westshore Terminals at the Port of Roberts Bank where ships of up to 250,000 tonnes capacity are loaded for world-wide distribution.

Ontario Hydro has been Byron Creek's major customer receiving 590,000 tonnes of product annually. Other long-term customers include Hudson Bay Mining and Smelting, Cominco, Japanese Steel Industry companies and thermal power plants in Japan and Korea. A record of domestic and export sales in recent years is shown in Table 3.

An aggressive marketing campaign is continuing in order to introduce Byron Creek to all world markets with the expectation that customers will commit to long term contracts. Current operations capacity should be able to provide over 2 million tonnes of product annually once suitable contracts are established. To achieve the mine's ultimate capacity of 3.6 million tonnes of clean coal per year will require significant investment in plant and mobile equipment; an investment of this level must be supported by long-term commitments.

TABLE 3
SALES RECORD (kt)

	'84	'85	'86	'87	'88	'89	'90
DOMESTIC							
Ontario Hydro	716	591	487	507	426	593	590
HBMS/other	120	116	108	64	48	106	150
EXPORT							
JAPAN	268	210	119	204	317	679	510
Other	270	110	226	-	221	237	540
TOTAL	1,374	1,027	940	775	1,012	1,615	1,790

ENVIRONMENT

By its very nature, open pit mining has an effect on the local environment, but Byron Creek Collieries is taking extensive steps to minimize damage and ensure the Coal Mountain area is reclaimed to an acceptable level. The life of the Byron Creek mine is estimated at 20 years or more and, as mining operations continue, on-going environmental control procedures will serve to mitigate any impacts. Included in this long-term environmental strategy are two main components: reclamation of the minesite for both erosion control and visual impact purposes; and an environmental protection program including both air and water monitoring and control.

Reclamation: As overburden is removed from the coal-bearing areas it is deposited along the flanks of the mountain in waste dumps. Final dump slopes are contoured and the area seeded both for aesthetic reasons and to prevent erosion and earth movement. Post-mining landscape will be restored to a stable, natural environment suitable as a wildlife habitat.

Environmental: Earthen dikes and a runoff collection system have been constructed to prevent surface water from the mine and plant areas from entering natural water courses. This runoff water is collected in sedimentation ponds where impurities settle out and the cleaned water is diverted into the local creek.
Continuous air quality monitoring is carried out at the mine site through a network of monitoring stations. Dust generated by traffic on mine roads is controlled through application of water and/or non-hazardous waste oil.

The diligent efforts of the operation with respect to environmental focus were rewarded in 1986 when the mine received the British Columbia Mine Reclamation Award. A further highlight occurred in 1987 when The Canadian Land Reclamation Association presented Byron Creek with the Dr. Edward M. Watkin Award of Merit "for outstanding contribution to the betterment of land reclamation".

SAFETY

Safety is a top priority with all employees at Bryon Creek. Programs have been initiated to educate employees on how to work safely without injury to their backs (Back Power Program); on proper use of hearing protection; on the WHMIS Program - Workplace Hazardous Materials Information System. Standard St. John Ambulance, CPR and Mine Rescue training is made available to all employees. In addition there are a Safety Awards Program, monthly safety meetings and safety tours to promote a safe working environment for everyone.

Byron Creek is proud of the efforts and successes of its Mine Rescue teams. Our teams participate in the annual Surface Mine Rescue Competition, sponsored by the Ministry of Energy, Mines and Petroleum Resources, and have captured the East Kootenay title in 1983, 1985 and 1989.

One of our most significant achievements in the field of safety was the recognition of Byron Creek Collieries in 1986 as "the safest mine in British Columbia". The year was highlighted by the fact that there was only one lost time accident.

MANAGEMENT

As a wholly-owned subsidiary of Esso Resources Canada Limited (ERCL), Byron Creek Collieries has access to information, research, expertise and facilities of the world-wide Exxon network. In addition, the Coal Division of ERCL, located in Calgary, provides on-going support in various areas.

ERCL's guiding principles are one of the foundations of our organization:

People	People are the company. Their health, safety and personal growth are of prime importance to our success.
Integrity	Pursuit of the highest standards of business ethics.
Excellence	Business excellence through innovation, technical and managerial leadership, and efficient operations.

In addition, a guiding philosophy for BCC itself was developed in the context of a ***Statement of Purpose.*** Issued in 1985 through the joint efforts of the U.M.W.A. and Management it states:

> *Our purpose is to create a work environment that is safe, fair, satisfying, consultative and enduring, giving all employees the opportunity and training to exercise their maximum job skills. This will result in an efficient and competitive coal company, making us more valuable to our customer.*

Currently Byron Creek is undergoing a significant transformation of its organization based on the philosophy of ***high involvement management***. The overall objective is to provide all employees with the training, information and authority to enable them to manage their jobs to the best of their ability. A result will be a higher productive work force and lower unit costs of production. One of the first steps has been to dramatically reduce the number of levels of management by the elimination of all operating superintendent and some department head positions. The alternative to the traditional management pyramid has been the formation of "teams" to manage the various departments. The role of the traditional foreman/supervisor has changed - they are now "Team Leaders". Group decision-making is stressed resulting in reduced report writing and paperwork and increased commitment. Recent expansions were handled with team hiring: equipment operators, tradesmen and staff were involved with the screening, interviewing and selection of new employees.

Efforts are being focussed on providing employees with the tools and information they need to maximize their efficiency. To date a high degree of computer penetration has been achieved in the staff group. Tradesmen were one of the first to benefit from expanded computer capabilities when terminals were installed on the shop floor to facilitate parts search and ordering. Currently all facilities are interconnected through a computerized, state-of-the-art, fibre optics based *local area network*.

The combination of applied technology and involved workforce will result in informed and empowered employees. They will ultimately make the best decisions which will result in a highly efficient and competitive company.