Western Canadian Coal Corp.

Developing British Columbia's Next Generation of Coal Mines

Reprinted from World Coal

Increasing Potential

David Fawcett, Western Canadian Coal, reviews the development history and geology of Canada's Peace River coalfield, describes the present activity and presents the case for further development.

The Peace River Coalfield, located in northeast British Columbia, Canada (Figure 1), has a number of well-defined coal deposits suitable for development and operation, with economics that make them competitive in world coal markets.

The coal deposits

Coal deposits of major economic significance occur in two geological formations – the Lower Cretaceous Gates and Gething formations. Economic resources in the Gates Formation occur in the southern part of the field while those in the Gething Formation occur in the northern part of the field.

The deposits are accessed and served by major infrastructure and facilities established in the early eighties to develop the Peace River Coalfield. The railway distance from the existing mines to the Ridley Terminals at Prince Rupert is about 990km.

History

The occurrence of coal in northeast British Columbia was first reported by Alexander MacKenzie in 1793 from observations along the Peace River north of Chetwynd.

Small scale mining occurred from 1923 until 1963 in the Peace Canyon, Pine Pass and Hasler Creek areas, but ended when the railways switched from coal to diesel in the 1950s. Interest was renewed when the coking coal markets expanded. During the seventies and early eighties a number of deposits were explored intensively and development options considered. Total expenditures on exploration, feasibility, and environmental baseline during this time was well in excess of CDN$100m. The significant deposits are shown in Figure 1 and listed in Table 1.

In the late 1970s, it was decided to proceed with the development of the Quintette and Bullmoose properties. Massive infrastructure development culminated in production start-up in 1983. The infrastructure included:

- The Tumbler Ridge branchline by BC Rail.
- Upgrade of the CN Rail line from Prince George to Prince Rupert.
- Coal terminal (Ridley Terminals) at Prince Rupert.
- Powerline.
- New town of Tumbler Ridge.
- New access highways to Tumbler Ridge.

Table 1. Significant Peace River Coalfield deposits

Gates Formation	Gething Formation
Bullmoose	Carbon Creek
Mount Speiker	Peace River
Quintette	Pine Pass
Monkman	Willow Creek
Belcourt	Goodrich
Saxon East	Burnt River
Saxon South	Sukunka

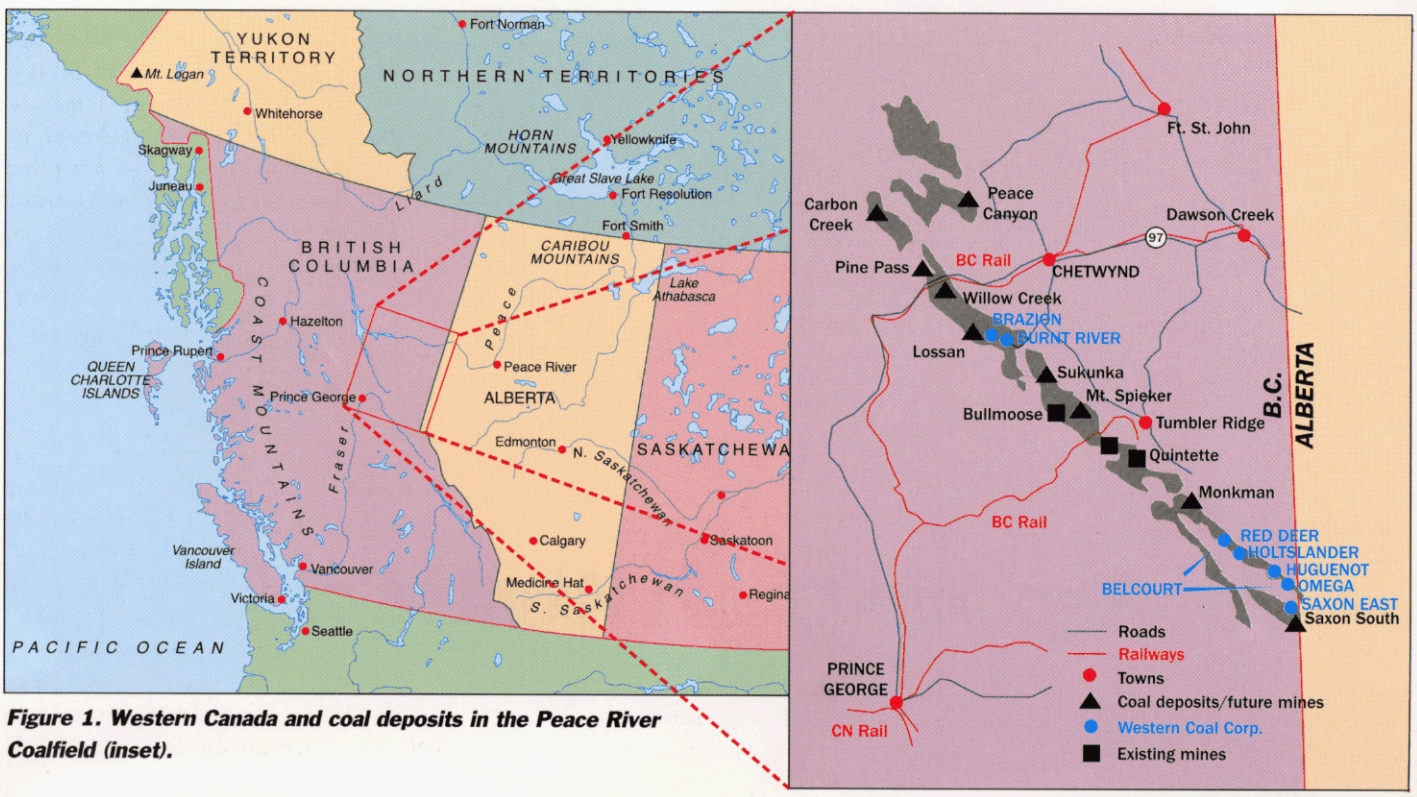


Figure 1. Western Canada and coal deposits in the Peace River Coalfield (inset).

Table 2. Coal resources of immediate interest, Peace River Coalfield, regional divisions of the whole coalfield

Region	Measured (t x 10^6)	Indicated (t x 10^6)	Inferred (t x 10^6)
Peace River	10	70	510
Carbon Creek	50	30	35
Pine River	65	125	395
Bullmoose–Sukunka	245	155	370
Mount Spieker	30	5	85
Quintette	150	50	2100
Monkman	400	800	1480
Belcourt	40	800	220
Saxon	25	250	250
Total	1015	–	–

Table 3. Coal reserves by property, northeast British Columbia

Property	Reserve base (t x 10^6)	Coal type	Mining method
Carbon Creek	60.5	Thermal	Mostly underground
Pine Pass	25	Thermal + met	Surface
Goodrich	460	Thermal + met	Surface
Burnt River	23	Thermal/PCI	Surface
Sukunka	180	Coking	Underground
Monkman	70	Coking	Surface
Belcourt	179	Coking	Surface
Saxon	426	Coking	Surface and underground

The total cost of this infrastructure was in excess of CDN$2bn. It was designed to handle approximately 12 million tpa of coal, with the expectation that additional mines (Monkman, Sukunka, Belcourt) would be developed. The Quintette and Bullmoose mines had a combined annual production capacity of approximately 8 million t.

Since start-up in 1983, the Quintette and Bullmoose mines have produced in excess of 90 million t. With the shift to world market prices and downsizing of operations, present production is approximately 3 million tpa. With these mines reportedly nearing the end of their economic lives, however, there are opportunities to reactivate several of the dormant properties to maintain and better utilise the available infrastructure.

Just as the Bullmoose and Quintette mines began production, coal market and price outlooks changed; exploration on other deposits slowed and essentially halted around 1985. Oil and gas companies, who had been major participants in coal exploration, began to drop property and exit from the coal industry, abandoning the coal lands that they had acquired. With the restructuring of Quintette Coal in 1991, Denison Mines, the lead developer of Quintette and a major land holder in the region, ceased involvement in coal and relinquished its coal holdings. As a result, many excellent, well-explored properties became available.

Geology

The general stratigraphic relationship between the main coal-bearing formations is illustrated by the stratigraphic column in Figure 2.

The Gates Formation is a major coal-bearing unit. Up to 11 coal zones have been reported with seam thicknesses ranging to approximately 10m. The Gates coals are generally medium-volatile bituminous in rank and have good coking characteristics. The deposits tend to be relatively large – capable of supporting medium to large scale mines with production in excess of 2 million tpa. The Bullmoose mine is generally considered to be on the northern edge of the economic Gates deposits.

The Gething Formation thickens toward the north with the major exploration targets occurring between Sukunka River and Peace River. The coals vary in rank from semi-anthracite in the lower portion of the formation to medium-volatile in the upper portion. Generally the coals have low in-seam ash contents and excellent washabilities.

The mineable deposits in the Gething tend to be smaller than those in the Gates Formation, constrained as they are by geology, topography and economics, and are suited to smaller-scale development (less than ca. 1 million tpa), with potential for multi-mine development utilising centralised coal processing and handling facilities.

Resources

The coal resources of the Peace River Coalfield have been summarised in a paper by Dr. Barry Ryan, British Columbia Ministry of Energy and Mines, entitled *Coal and Coalbed Methane in British Columbia* (April 1996); Tables 2 and 3 have been excerpted from Dr. Ryan's paper. The estimates are based on reports prepared in the early eighties and filed with the provincial government. The tables do not include Willow Creek nor several of the lesser-explored properties. Although the reserve/resource tonnages quoted in the tables would not meet today's classification standards for defining reserves and resources, the tables do demonstrate that there are a number of properties with resources suited to development; even with a reduction in the economic reserves, many of these properties merit new assessments. With recent developments in coal utilisation, coal types could be refined further to include semi-soft, semi-hard and PCI categories.

Producers

Teck Corporation (Teck) controls the two existing mines, Quintette and Bullmoose. Both of these operations have sold exclusively to the Japanese steel industry and are now into 5-year extensions to their initial 15-year contracts. Downsizing and restructuring of these operations continue as they adjust to market price following the period of premium contract prices enjoyed during the initial contracts.

Teck has not reported any new projects to extend the life of either operation. It is known that substantial reserves remain at Quintette that could be developed by underground methods. There are other deposits on the property that could provide plant feed for a number of years. Process/handling facilities are in-place, therefore opportunities for new development and mine life extension are good.*

New ventures

Pine Valley Coal

The first new activity in the coalfield occurred in 1993 when Globaltex Industries acquired the Willow Creek coal property and reactivated the project. The coal land holdings were expanded substantially with adjacent lands, including portions of the former Pine Pass and Goodrich coal blocks, previously explored by other companies. In 1996, a joint venture was formed with BCR

Rationale for new mine development

The rationale supporting new mine development can be summarised as follows:

- Availability of known deposits with resources capable of supporting several new mines with competitive cost structures.
- Existing, modern, but underused infrastructure.
- Support of existing infrastructure and service facilities to ensure continued benefits from the investment made in the early 1980s.
- Reserve depletion and declining output from existing mines.
- Availability of trained personnel.
- Modest investments in rail line and power line extensions.
- For the province and taxpayer, low investment per job maintained and created.
- Potential for small mine-site power plants using by-product coal.
- Improvements in rail and port costs.
- Improvement in overall production economics giving potential to extend the life of existing mines.
- Deposits suited to low capital cost development.
- Deposits suited to supply the growing market for semi-hard coking, and low ash, high carbon PCI coals.
- Application of less conventional mining systems to achieve competitive costs.
- Benefits from market diversification.
- Benefits to stakeholders involved in the northeast.

Ventures (a subsidiary of BC Rail) and Mitsui Matsushima to advance the project, with Pine Valley Coal set up as the operator. Feasibility studies have been completed and the major regulatory approvals obtained.

Based on the feasibility study, initial production is targeted at 600,000tpa, to be phased up to 900,000tpa over a three-year period, based on production of two products – semi-hard coking and PCI. The mine's life, based on currently defined reserves and planned production, is 14 years; at full production the mine is expected to have a workforce of 115 to 120. The capital cost for full-scale development is less than CDN$25m. Development is supported by good existing infrastructure and favourable waste-to-coal strip ratios. Capital costs equivalent to CDN$28 per annual tonne of capacity (US$19/t) compare favourably with any new project in the world.

Development based on the feasibility plan is stalled by the present coal market. Pine Valley is considering an initial smaller development based on production of a low-volatile direct-shipping coal from a reserve in a relatively flat-lying, low-ratio structure. A trial cargo project is being planned for mid-2000.

The Willow Creek deposits are in the Gething Formation. Development would result in the first significant commercial coal mine in this formation. A detailed project description, entitled *Developing Canadian Coal*, was published in the March 1999 issue of *World Coal*.

Western Canadian Coal

In 1997, Western Coal, a wholly owned subsidiary of Western Canadian Coal (both referred to as Western), was formed and began acquiring coal lands. Western now holds Coal Licenses covering a number of the previously explored properties, including Belcourt and Saxon East in the Gates Formation and the Burnt River and Brazion deposits in the Gething Formation.

In April 1999, Western completed an Initial Public Offering to finance new work on the Belcourt project, at which time it became a public company; it trades on the new Canadian Venture Exchange (WTN:CDNX).

Belcourt

The Belcourt property, located approximately 75km south of Quintette (Figure 1), comprises four deposits within the same coal trend for which the resources and topography are favourable to surface mining. The property was explored extensively in the late seventies and early eighties by Denison Mines, culminating in a full feasibility study on the Red Deer deposit in 1982. Total expenditures on Belcourt amounted to approximately CDN$10m.

In 1997/98 conceptual design work was done to re-locate pit boundaries to meet lower strip ratio objectives. The redesigns demonstrated that substantial surface mineable resources could be developed at low strip ratios. A mine development based on the Belcourt deposits could be in

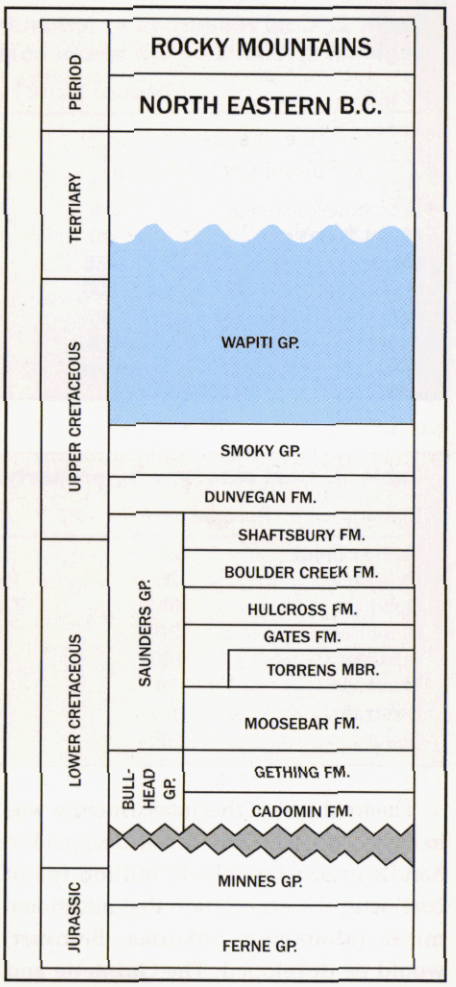


Figure 2. Stratigraphic relationship.

the 2-4 million tpa level. The coal from the Belcourt deposits is classified as hard coking, with low ash, sulphur, and phosphorus contents, and with excellent coking characteristics.

Western has completed two small field programmes and has initiated a preliminary feasibility study (conducted by Norwest Mine Services), which is targeted for completion in early 2000. Western wishes to advance the project through feasibility and regulatory processes, such that a construction decision could be made by 2001, and full production could be achieved by 2003/2004.

Burnt River

The Burnt River property, located approximately 50km by road south of Chetwynd, British Columbia (Figure 1), is accessed by good all-weather roads. The coal belongs to the Gething Formation. The deposit was extensively explored by Teck Corporation from 1977 through 1985. At the time Teck identified a resource of 23 million t of coal at a low waste-to-coal ratio. The geological plans indicate additional coal measures for which resource estimates have not been

quantified.

Western has acquired the original exploration documentation and has carried out initial database development. The previous work contributes a substantial value to the project, and permits new work to start at an advanced stage.

Burnt River has favourable mining conditions with favourable structure and topography. Two of the three seams being considered for initial mining are semi-anthracite, and the third seam is low-volatile; together with the low in-seam ash contents, the products appear well-suited to production of a direct-shipping product, or with a minimum wash plant, to the production of low-ash products.

Western is considering highwall mining for a portion of this deposit. The combination of geological structure, seam character, and topography provide favourable conditions for this method to compliment a small surface mine and help to achieve a competitive cost structure. Highwall mining would allow economic recovery beyond the limits of surface mining with substantially less surface disturbance.

Preliminary capital cost estimates for developing Burnt River at 500,000 to 750,000tpa, assuming contract mining or leasing major mobile equipment, show costs of less than CDN$10m due to minimal mine development and coal cleaning requirements.

Other coal tenure and potential projects

Monkman

Monkman, located approximately 40km south of Quintette, is one of the larger and more advanced properties. The property is owned by Smoky River Coal and there is a joint venture agreement with Sumisho Coal Canada. It has been dormant since the mid-eighties. The property could support an independent operation, but has good potential for development with production based on shipment of raw coal to the Quintette facility for processing and train loading. It offers a near-term solution to the current decline of the existing mines.

Sukunka

The Sukunka property, located approximately 60km south of Chetwynd, is held by Talisman Energy. The property is well advanced in terms of exploration and evaluation. It has a large resource of coking coal, mineable by underground methods. The property has been for sale for some time, but the current coal market and the underground aspect appear to be deterrents to a sale and further development.

Lossan

The Lossan property, located approximately 45km south of the Pine River at Hasler, is a small deposit within the former Goodrich block on which significant exploration and feasibility work was completed. The coal tenure is still maintained, but there are no reported plans for new work.

Conclusion

It seems clear that maintaining and increasing Canadian coal exports will require a combination of innovation and creativity in addition to quality resources and strong economics. The Peace River coal deposits and the new generation of developer now active in the region provide this mix and now see increased potential for new mine development with costs competitive with mines in other exporting countries.■

*Correct at time of writing. Teck has since announced the closure of Quintette mine (see this month's Coal News).

Coking coal in Canada

Peter Maher, Western Canadian Coal Corp., Canada, examines how changes in the availability of high-quality coking coal for the seaborne trade is assisting in a revival of coal mines in northeast British Columbia.

Interest in the coking coal resources of northeast British Columbia (BC), Canada's bordering province with the Pacific Ocean, has been revived by tightening supplies of high-quality coking coal to the seaborne market and a consolidation of ownership among top international coal exporters.

The coalfields, centred on the Peace River area, were the focus of major development in the 1980s. Billions of Canadian dollars and Japanese yen were invested in road, rail and shipping facilities and in townships, giant coal mines and washeries, as pressures to open up BC's remote northeast coincided with an overly pessimistic outlook for world coal supplies and an overly optimistic view of future coal prices.

Following last year's closure of the Quintette mine and the anticipated closure of Teck Corp's Bullmoose mine next year, the long decline of the pioneering northeast mines from their peak production levels in the early 1990s will be complete.

When at full production, the mines of northeast BC earned Canada a 25% share of the high demand for metallurgical coal from Japanese steel mills, then the world's dominant and high growth importers of coking coal to fuel their fast-growing steel-making industry.

This share has since fallen to 16%. Coal mines in the southeast of BC and neighbouring Alberta have taken up the slack from the decline of the Peace River mines. Canada maintains its metallurgical coal production at its early 1990s level of approximately 28 million tpa and, while the miners have not been able to keep their share of the Japanese market, they have diversified their export business to include the US and the now faster growing Asian steel mills in Taiwan, South Korea and China.

Existing opportunities

The closure of the large, pioneering Peace River mines will leave in place an infrastructure that has the potential to provide a substantial competitive advantage to new coal mines in the northeast of the province of BC, by making the region price competitive in the international seaborne trade in coking coal.

Opportunistic small companies, with Western Canadian Coal Corp. in a lead role, have built up coal property holdings in the northeast through the past decade of restrained coal prices and slow growth in world steel production. They are looking to capitalise on the under-investment that has brought supply and demand, particularly for hard coking coal, into a close balance in international markets.

Western Canadian's portfolio of coking coal resources is estimated to exceed 250 million t in three groups of deposits. The Wolverine deposits sit astride the BC Rail line, 20 km west of Tumbler Ridge, which is a half deserted, still modern township bui to house workers at the defunct Quintette mine. The Brazion deposits are 30 km south of Hasler, a possible load-out point on BC Rail's network. The good quality, hard coking coal Belcourt deposits are 85 km south of Tumbler Ridge and need a rail or road extension to be in contention for short-term, competitive cost development.

Achieving objectives

Western Canadian's aim is to achieve a production rate of 4 million tpa of coking coal over the next five years. It is well advanced on feasibility studies to develop three deposits: the Burnt River property at Brazion and the Perry Creek and EB Pit deposits in the Wolverine group. Other coal deposits at Brazion and Wolverine offer prospects of short-term expansions, but Belcourt is a medium to longer-term proposition.

Burnt River is a shallow deposit of low volatile, high energy coal with a calorific value of approximately 8000 kcal/kg (approximately 14,400 British thermal units/lb). It is the type of coal that steel mills are increasingly using in their pulverised coal injection systems to reduce requirements for top quality, hard coking coal.

For Western Canadian, there have been minimal exploration costs in outlining the Burnt River coal resource. In the rush for coal, driven by the energy crises of the 1970s, Canadian and US mining and oil majors flocked to the northeast BC coalfields. Their ambitions faded in a virtual mirror image of the Japanese steel mills' diminishing urge to subsidise potential competition against their dominant Australian suppliers.

Teck Corp, which took over and later dropped Burnt River, and its predecessors drilled almost 14,000 m of corehole into the Burnt River deposit. It sent 43,000 t of bulk sample to potential customers in Asia as a thermal coal and came up with a resource estimate in excess of 30 million t of coal.

Western Canadian has focused on proving 8 million t of near surface coal with a strip ratio of 3 t of dirt to 1 t of coal, within the resource outlined by Teck and others. Its drilling campaign, part of an overall feasibility study of producing 750,000 tpa for international markets from Burnt River starting in 2003, has been successful. It has confirmed, depending on the scheduling of open pits for the mining operations, that the ash content of the Burnt River coal is low enough to provide direct shipping coal for the first five years of production without the capital cost of a washing plant.

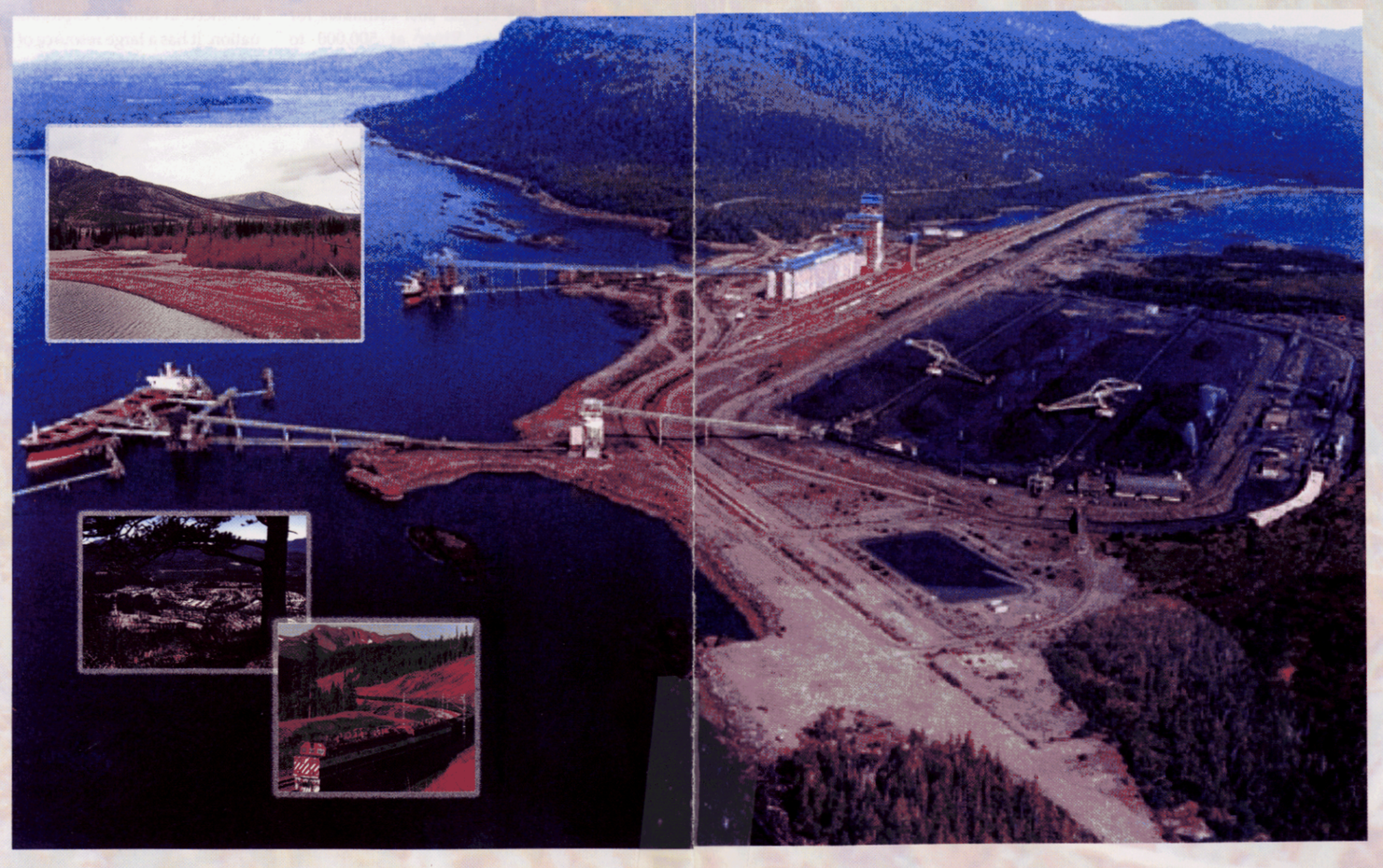
Similarly, Western Canadian's investigation of the Wolverine group of deposits has been made easy by previous leaseholders. Its work indicated a resource of 139 million t of coal on the property. Western Canadian is concentrating on three of the deposits: the Perry Creek underground mining proposition and the open cut EB Pit and Hermann deposits.

Recent drilling has confirmed the geological models developed by previous operators, but there has been a pleasant surprise in that the Hermann deposit is now estimated to have a resource of 27 million t, higher than estimated in the past.

Western Canadian's drilling at Wolverine has been undertaken as part of a feasibility study into producing 1.3 million t of marketable coal initially, starting in 2004. The coal here, after washing, has an ash content of less than 9%, moisture of 9%, low sulphur of less than 0.6% and a free swelling index of 6 - 8. These products will normally go to the coking coal market.

The initial production rates at Burnt River and Wolverine are base numbers. Western Canadian is in the early stages of investigating a central washery to process the diverse range of coking coals on the Brazion property. The Wolverine property has potential for increased coal production once markets have been established.

Belcourt is a sleeper. Slightly beyond the range of existing transport facilities, its resources are estimated at 44 million t. Western Canadian has carried out enough pre-feasibility work on Belcourt to show that there are resources at Brazion and Wolverine, together with Belcourt, to support BC's northeast coal province as a long-term supplier of metallurgical coal to the



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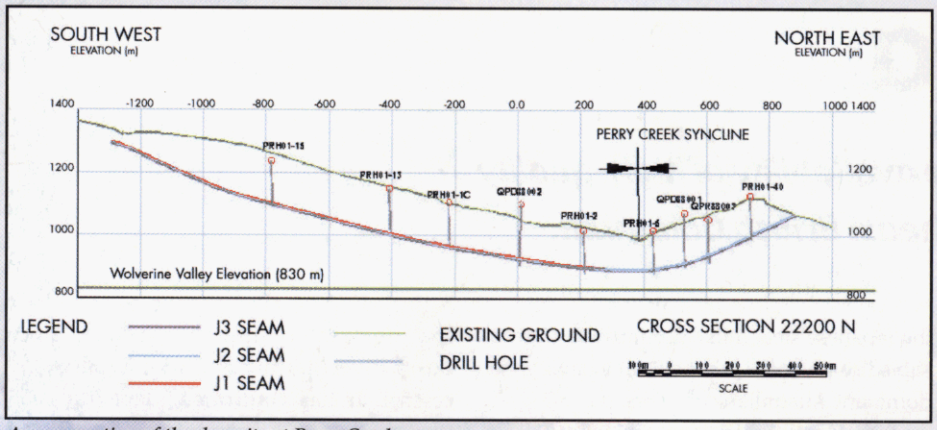
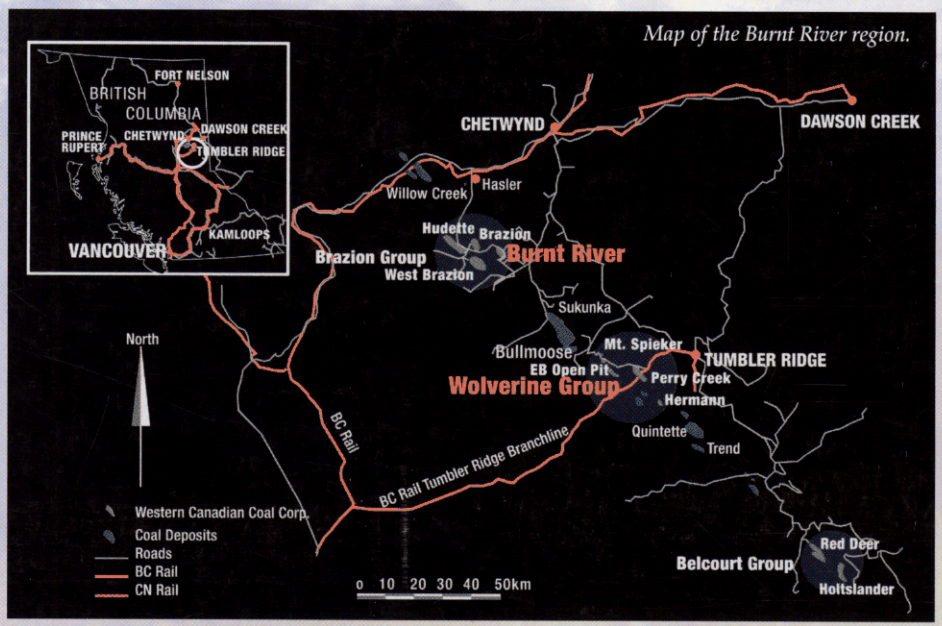


A cross-section of the deposits at Perry Creek.



Map of the Burnt River region.

international market.

Lower capital costs

In addition to the low cost of acquiring access to the coal resources and detailed geological reports on the leases discarded by the bigger companies, Western Canadian and other hopefuls in northeast BC could have significant capital cost advantages over the establishment of new mines in other parts of the world.

Rio, for instance, has given the go-ahead for development of the Hail Creek coking coal deposit in Queensland, Australia, at an expected capital cost of AU$ 500 million (US$ 285 million). Hail Creek's proposed 5 million tpa production will partly replace declining production at other mines. BHP Billiton is looking at a similar capital cost/tpa at its proposed Mt Arthur North development in New South Wales.

Preliminary assessments by Western Canadian indicate that the capital cost of achieving its ambition to produce 4 million tpa of coal will be approximately US$ 138 million, a capital cost/tpa of US$ 1.80 compared with the Australian projections of US$ 5.70.

The major reason for the difference is the existence of under-utilised infrastructure in the northeast of the province. BC Rail and Canadian National Rail service the area, offering a choice of Vancouver ports or the Ridley Terminals coal loader at Prince Rupert. Ridley Terminals was designed to load 16 million tpa of coal from the northeast into large ships, but will be lucky to handle 2 million t this year. The rail facilities were also matched to this grand expectation.

The region is also well serviced, with electricity, townships, service industries and former coal miners still hoping that the northeast coal mines will be revived.

Transport and handling costs hold the key to this prospect. They make up a major component of costs, which will determine whether the smaller, more diverse mines planned for the northeast will be able to deliver coal competitively to the major Asian, European and American markets.

Certainly, the Japanese steel mills will not pay the same prices they have in the past (up to US$ 80/t in the 1980s) simply to foster diversity of supply and leverage against what was perceived as Australian dominance of the seaborne trade in the Asian region.

Hard coking coal prices have already risen, with some forecasters predicting an excess of demand over supply in the medium term. While thermal, soft coking and low volatile coal producers have accepted price cuts this year, hard coking coal producers are holding out for an increase.

Japanese steel mills were at loggerheads in mid-June in negotiations with their main Australian suppliers to set prices to apply from the beginning of April. In the seaborne trade in metallurgical coal, the Australia-Japan price is the benchmark price for international trading of coking coal.

The Australians have taken the unusual step of negotiating a 7.5% price increase to approximately US$ 48/t with European steel mills, prior to settling with the Japanese mills. This break with a 30 year tradition by the Australians shows a new sense of confidence and a reduced reliance by the Australians on the Japanese mills as demand for coking coal grows elsewhere in Asia.

This action might also reflect a power shift. Previously, the mills have negotiated as one entity and have dealt with a diversity of suppliers. However, there is now a situation where four companies control approximately 80% of the international, seaborne trade in coking coal. Japanese coal negotiators call them the BEAR (BHP Billiton; Enex, sold by Glencore to Xstrata; Anglo American and RioTinto).

Conclusion

Japanese mills are not showing any of the concern they did in the 1980s regarding diversity of supply. The formal message from the May meetings of the Japan-Canada business co-operative was that Canadian miners should consult more closely with mills to produce coal qualities that are in demand and that the mills deal on competitively priced coal.

This effectively puts the ball back into the Canadians' court. Their resources look good, Japanese mills have been willing to take test samples from Western Canadian and others, however, what happens from here will depend on the northeast's ability to deliver coal into ships at internationally competitive prices. ■