

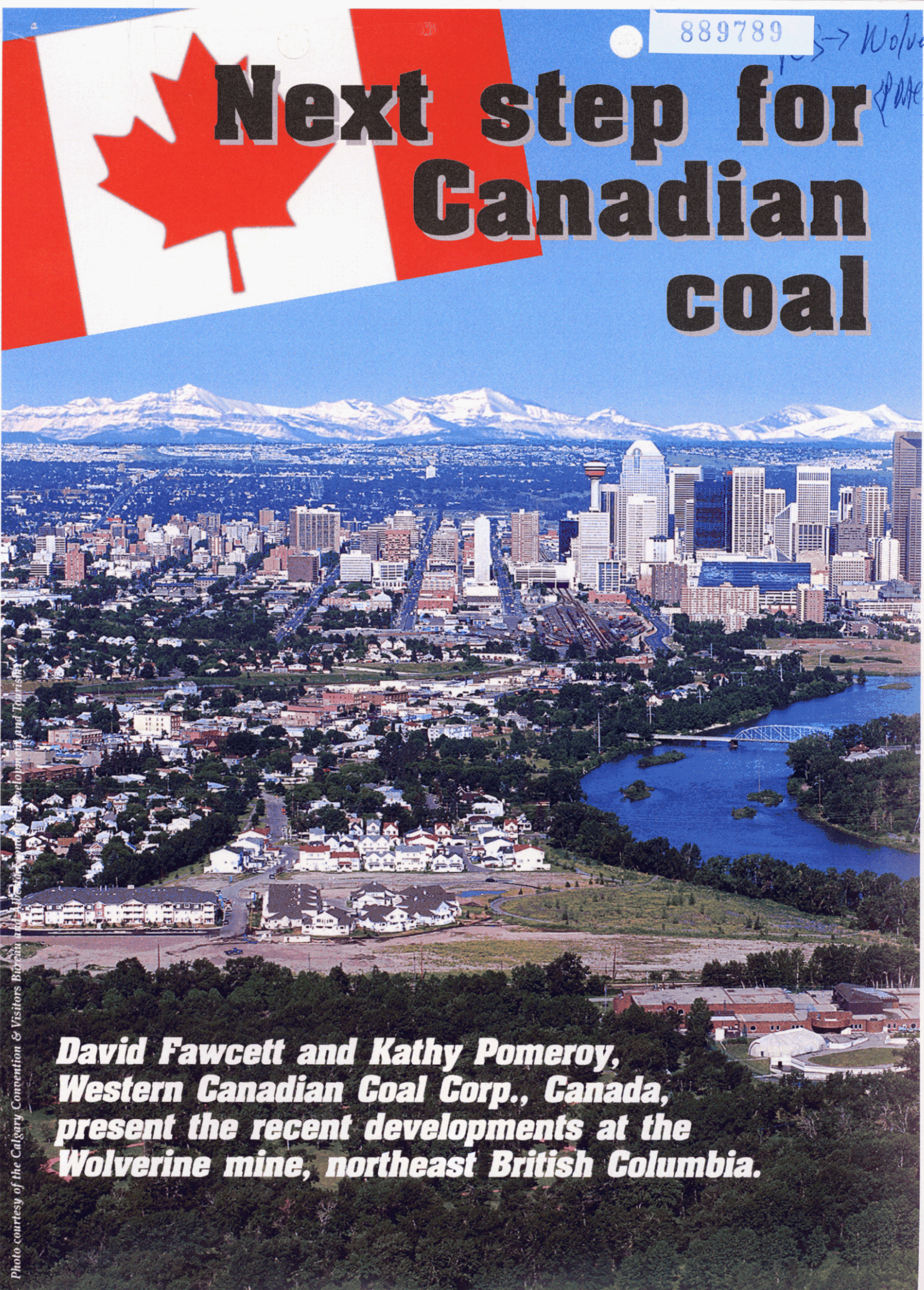
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→ Wolverine  
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# Next step for Canadian coal

Photo courtesy of the Calgary Convention & Visitors Bureau and the Tourism Development and Tourism

***David Fawcett and Kathy Pomeroy,  
Western Canadian Coal Corp., Canada,  
present the recent developments at the  
Wolverine mine, northeast British Columbia.***





Western Canadian Coal Corp. (Western) is on the verge of a production decision regarding the development of Canada's next metallurgical coal mine, which is to be located in the Rocky Mountain Foothills of northeast British Columbia. The Wolverine mine, situated near Tumbler Ridge in the Peace River region, is scheduled for ground-breaking later this year. The mine has a significant role as the cornerstone of Western's corporate strategy to develop diversified multi-mine operations in the area. More importantly, it will be the first of the next generation of coal mines, which will re-establish northeast British Columbia as a vital and significant player in world coal markets.

### Wolverine property potential

In 2002, the Wolverine Group of properties emerged from Western's extensive coal property portfolio as the best option for an early start-up project to kickstart the renewal of coal mining in northeast British Columbia. The Group encompasses three known deposits (Perry Creek, Mt. Spieker-EB and Hermann), situated near the BC Rail line on the coal trend between the Bullmoose and Quintette mine sites. Norwest Corporation, a mine engineering/consulting firm, completed studies on the Wolverine Group in 2002, thereby helping Western to establish open pit and underground tonnage in excess of 60 million t of coking coals.

### Recent project advancements

The scope of the studies undertaken included geology, resource estimates, surface and underground mine plans, process design, coal handling, infrastructure and costing. The 2002 Norwest

Wolverine Project feasibility level engineering and cost study demonstrated a viable project based primarily on underground development at Perry Creek with a small open pit.

As optimisation work proceeded, Western conducted a drilling programme and successfully demonstrated additional open pit tonnage for Perry Creek east and west of the underground mine proposed earlier. The new drilling included 19 holes, bringing total property drilling to 7649 m in 58 drill holes. With this new information, Western now estimates Perry Creek product tonnages of approximately 20 million t of clean coal. This includes 8 million t still recoverable by underground mining, representing an effective tonnage increase of approximately 80%.

Several milestones were achieved during the work at Perry Creek, including:

- Completion of drilling programme, demonstrating an increase in tonnage amenable to mining.
- Definition of favourable geological structure.
- Favourable coal quality results.
- Improved economics with shift to Perry Creek open pit.
- Progress regarding contract operations.
- Completion of Stage 1 of the environmental/regulatory process.

### Project plan

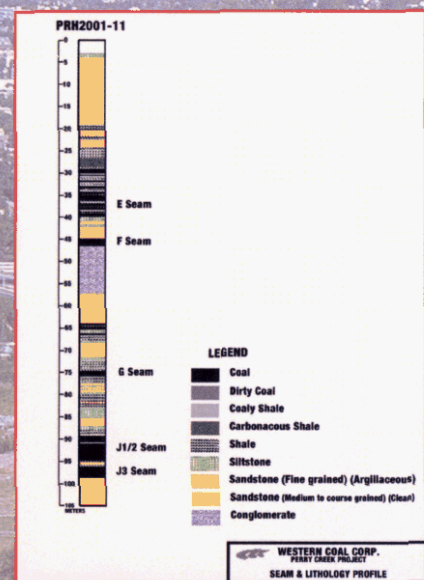
The resulting project plan sets targets of 1.6 million tpa of clean coal production for 12 years from open pits in the Perry Creek and Mt. Spieker/EB deposits. A plant site will be located in the Wolverine Valley, adjacent to the rail line. Average plant yield for the Perry Creek deposit is projected at 71% (dry basis), based on recovering the two major seams and taking into account out-of-seam dilution.

Key project targets are:

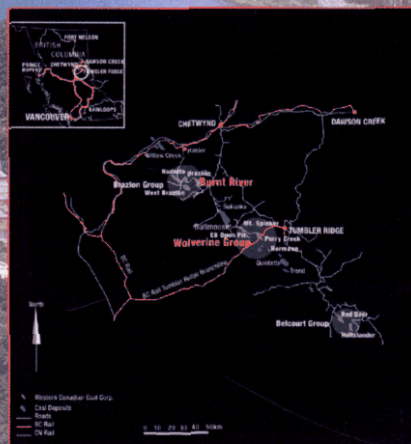
- 'Project development document': Q1 2003.
- Contract agreements: Q2 2003.
- Construction start: Q4 2003.
- Production start: Q4 2004.
- Expansion to 3 million t within three to five years.



Drilling at Perry Creek, Autumn 2002.



Perry Creek seam and lithology profile.



Map indicating Western's coal deposits.

Table 1. Raw coal quality summary: bulk sample J seam

Sample type	Seam	RM (%)	Ash (%)	VM (%)	FC (%)	S (%)	FSI
Bulk sample	J1/J2	0.22	11.84	22.92	65.02	0.48	8
Bulk sample	J3	0.36	9.79	20.65	69.20	0.42	7.5

Table 2. Clean coal quality summary: bulk sample J seam

Sample type	Seam	RM (%)	Ash (%)	VM (%)	FC (%)	FSI	Fluidity (ddpm)
Bulk sample	J1/J2	0.53	6.98	23.02	69.47	8	300
Bulk sample	J3	0.52	7.40	21.90	70.18	7.5	75





The BC Rail branch line links to CN Rail at Prince George, providing access to the under-utilised Ridley Island Port, Prince Rupert.

Western has evaluated project economics based on employing a contractor to build and operate the wash plant and coal handling facilities, and a mine contractor to develop and operate the pit. The overall project has a comparatively low total capital cost of US\$ 95 million. With contractors sharing in the capitalisation, Western's capital component is estimated at less than US\$ 30 million. On this basis, the project generates attractive cash flows and positive return for all participants. As a result, Western is experiencing significant interest from major contractors.

Western's objective is to commence production in Q4 2004. Initial site preparation and construction are planned to start following receipt of the necessary regulatory approvals in late 2003.

### Strategic advantages

Any new coal project in northeast British Columbia can take advantage of the US\$ 1.5 billion of infrastructure investments in rail, port, town and other facilities, made to support coalfield development in the early 1980s. The existing infrastructure is particularly well positioned for the Wolverine properties:

- In-place rail line: the properties are located on the BC Rail branch line, which services the Bullmoose coal mine and which serviced Quintette prior to closure. This line links to CN Rail at Prince George, providing direct access to the under-utilised Ridley Island Port, Prince Rupert.
- Established road network: primary road access is via Highway 29, a paved highway connecting the towns of Tumbler Ridge and Chetwynd. Approximately 8 km from Tumbler Ridge an all-weather Forest Service Road accesses the property from Highway 29.
- Nearby power line: the main power line to the Tumbler Ridge area runs

11 km east of the site, allowing power service to be extended to the plant site from a conveniently located sub-station at minimal cost.

- Favourable community setting: Tumbler Ridge and Chetwynd, located only 23 km and 100 km away respectively, are well-established regional mine service centres. Following the recent shutdown of the Quintette mine and pending closure of Bullmoose, Tumbler Ridge offers workforce housing and a ready supply of trained mine workers.

A long history of coal mining and resource development means that the local communities welcome coal mining as an important contributor to a diversified and sustainable regional economy. All key stakeholders, including Governments and rail and port owners, encourage additional development to better use existing facilities.

### Wolverine property geology

The economically significant coal seams in the Rocky Mountain foothills region of northeast British Columbia are located in the lower Cretaceous gates and Gething formations. Northwest trending fold systems and southwesterly dipping thrust faults are prevalent in the region, and have brought coal-bearing strata close to surface in some areas. Resource potential in Perry Creek is contained in the Gates Formation within the Perry Creek syncline. The open fold bounded by tighter folds to the southwest and northeast and generally plunges gently to the southeast. Dips on the west limb of the fold are generally less than 15°, with dips of up to 30° on the northeast limb.

### Coal seam development

At Perry Creek, the seams of current economic thickness are F and J seams. J seam

ranges from 7 - 7.5 m in thickness; F seam ranges from 1.3 - 1.5 m. Minor seams include the G seam, which averages 1 m in thickness, and E seam, interpreted as a 2.5 - 3 m zone of coal plies and partings. Average aggregate seam thickness in the Perry Creek pit is 12 m, including E seam. Additional drilling is planned to evaluate potential for coal recovery from E and G seams.

In the EB area, coal seams are designated using a different nomenclature, which was established for the Bullmoose mine. Using this system, EB pit design is based on mining of B, C and D seams. Aggregate seam thickness at EB is approximately 12 m.

### Coal characteristics

Perry Creek coal quality summaries based on raw and clean coal analyses from the J seam bulk sample are provided in Tables 1 and 2.

Perry Creek J1/J2 and J3 seams have low raw ash contents that compare favourably with the low to moderate raw ash contents of J seam coals regionally, reflecting low amounts of bone coal and carbonaceous partings. In-seam ash for J seam varies from 11.5% to 13.7%, indicating good potential to provide a clean coal product of less than 9% ash.

Volatile matter contents indicate a rank of medium volatile bituminous (mvb) for J seam coals. Sulphur contents are <0.50% on a clean coal basis, typical of low-sulphur gates formation coals. High free swelling index (FSI) values indicate strong coking coal potential. Fluidity values are in the range of 100 - 200 ddpmm and considered moderate to good for western Canadian metallurgical coals.

F seam, also characterised as a coking coal, will be blended with J seam and will form approximately 15% of Perry Creek's total production. Coals from EB are of similar rank as Perry Creek, but with higher in-seam ash contents than J seam.

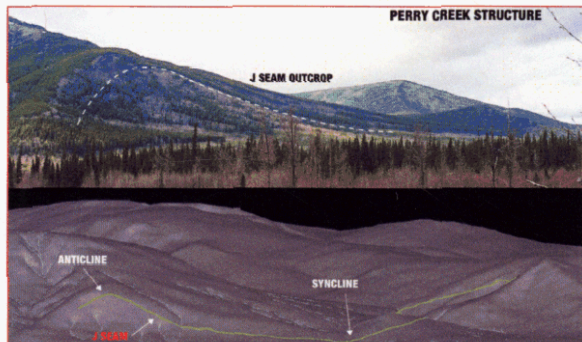


### Well defined deposits

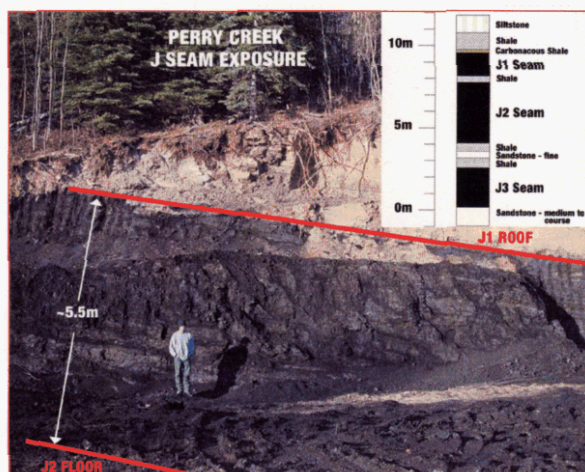
Wolverine Project planning has benefited from exploration work completed by prior tenure holders. More than US\$ 3 million was previously invested in the Mt. Spieker/EB property, providing data from seven adits, 55 trenches and 40 drill holes (>8000 m of drilling). In addition, 25 holes had been drilled on Perry Creek and 167 holes on the Hermann property. Western has completed an additional 56 exploration holes on Perry Creek and EB, as well as a bulk sample programme that provided a 4 t sample of J seam coal for coal quality tests and customer requirements.



J seam bulk sample core (150 mm), December 2002.



View of the Perry Creek structure.



J seam exposure.

The current drilling density is sufficient to classify an indicated resource in a moderate geology setting, and supports feasibility level design and reserve classification.

### Mine plan

The Wolverine Project mine plan is based on annual production requirements of at least 1.6 million t of product at 6% moisture, requiring mining of approximately 2.3 million t of ROM (dry basis), or 2.4 million t of plant feed (4% moisture basis).

Perry Creek pit design is based on mining the F and J seams to a cut-off strip ratio of approximately 11.5:1 bank m<sup>3</sup>:t ROM. This offers total resource recovery of 16.5 million t of ROM at an average strip ratio of 7.4 bank m<sup>3</sup>:t ROM coal, corresponding to a clean coal ratio of 10.5 bank m<sup>3</sup>:t product at the indicated plant yield of 70.7%. At EB pit, the design is based on mining the B, C and D seams to a cut-off strip ratio of approximately 7:1 bank m<sup>3</sup>:t ROM, yielding approximately 8 million t of ROM coal (dry basis) at an average ratio of 5:1 bank m<sup>3</sup>:t ROM.

Analysis of resource recovery at Perry Creek for a range of ROM ratios indicates a fairly linear relationship, suggesting that

topographic or geologic features do not control the ultimate location of the pit wall. This is reflective of the relatively simple geology and structure of the Perry Creek resource area, which features shallow dipping bedding over a large resource base.

The resulting mining situation is more predictable and more favourable than the conditions faced by the nearby Quintette mine, where complex folding and faulting have complicated both resource definition and mine planning. By contrast, the simple structural features at Perry Creek allow for a high confidence in the reliability of tonnage estimates; and offer favourable mining conditions, both in terms of supporting the efficient use of large equipment in surface mining, and

allowing simple room-and-pillar mining methods to be viably and safely employed in the underground mine.

The Perry Creek and EB pits are designed with large benches and a 15 m bench height. All waste will be drilled and blasted. Primary mining equipment includes two drills, a 30 m shovel excavator, a 15 m loader and eight 240 t waste and coal haul trucks. Support equipment will include a grader, water truck/sander, dozers and a backhoe for cleaning coal. As operations are completed at Perry Creek, equipment will shift to EB.

### Regulatory environment

The current regulatory environment in British Columbia is favourable for early approval of the Wolverine Project, and work is well advanced towards a construction start in late 2003. The mine only requires standard environmental management programmes typical of coal mines in western Canada, and no major regulatory hurdles are anticipated.

### Western's longer term strategy

Western controls an extensive portfolio of coal properties in northeast and southeast British Columbia, with in excess of 250 million t of coal in 12 northeast deposits amenable to open-pit and underground mining. Whereas Western's current focus is on developing its first high-quality, low-cost metallurgical deposit, ground-breaking for the 1.6 million tpa Perry Creek pit is only the first step in a longer term strategy. Production increases from 1.6 million tpa to 3 million tpa from the Wolverine Project are targeted within three to five years, with demonstrated ability to fund incremental capital costs from cash flow. The Hermann deposit (27 million t raw) and the Perry Creek underground mine represent two options for production expansion and/or mine life extension.

The next goal is to increase total north-east production levels from 3 million tpa to the 5 million tpa level within five years. Given its large resource holdings, Western expects to be able to sustain production at 5 million tpa levels into the 2020s and beyond, provided market demand and prices are at current levels or higher.

Western's candidate deposits for longer-term expansion are in its Brazion and Belcourt Group properties, as described below. Strategic field programmes and evaluations by and for



Western have confirmed key resources characterised by others, and establish the basis for Western's long-term viability in the region.

### Brazion Group

Once the Wolverine Project is successfully launched, Western expects to turn its attention to the Brazion Group of properties, located approximately 40 km south of Chetwynd. This Group includes four properties, of which Burnt River is the most advanced in exploration, mine planning and regulatory approvals. Western has identified product coals on Burnt River that are well suited to the low-volatile, pulverised coal injection (PCI) market, based on high carbon and energy contents. A 750,000 tpa product surface mine operation with a minimum 10 year mine life has been defined for the Burnt River deposit, which is estimated to contain 23 million t of coal resources. Plans are supported by extensive early exploration work by Teck Corporation and 51 new drill holes completed by Western.

### Belcourt Group

The Belcourt Group represents significant future development potential for Western. Located approximately 85 km south of Tumbler Ridge, these properties feature gates formation metallurgical coals in favourable open-pit mining situations. The coals are classified as hard coking coals with low-ash, sulphur and phosphorus contents and excellent coking characteristics. Extensive early exploration and feasibility work by Denison Mines Ltd has been supplemented by a preliminary feasibility study completed by Norwest Corporation for Western in 2000. The latter study defined a coal resource of 141 million t in two deposits, and proposed a mine plan to produce 44.3 million t of ROM coal at an average strip ratio of 5.8:1 bank m<sup>3</sup>:t ROM coal. The Belcourt project is currently deferred in favour of advancing the more strategically located Wolverine and Brazion projects.

### Lillyburt

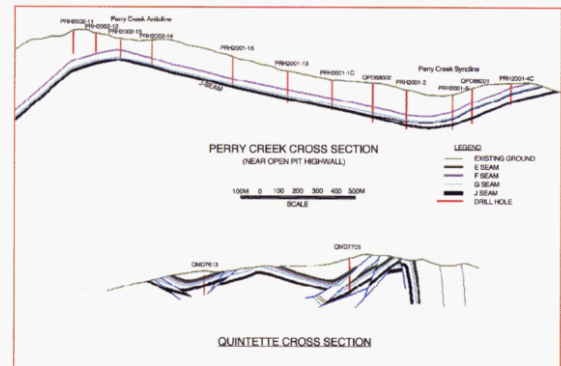
Lillyburt is located south of Fording Coal's Coal Mountain mine in southeast British Columbia. The coal, previously classified as thermal, has coking characteristics that could potentially support semi-soft coking products. Early tonnage estimates by Crowsnest Resources suggest 133 million t of indicated coal

resources in the east block of the property, and geological in-place reserves of 24.8 million t with an overburden ratio of 3.8 m<sup>3</sup> rock:1 t coal.

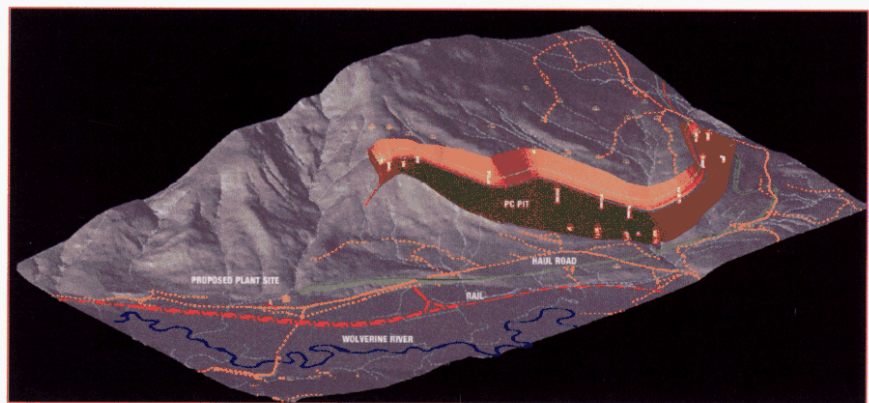
### Conclusion

Over the last five years, Western has attracted a strong core management and project team with a depth of experience in managing development planning and mining operations for coal mines in western Canada. Western's core staff team of ten, supported by engineering and environmental consultants, is now dedicated to the Wolverine

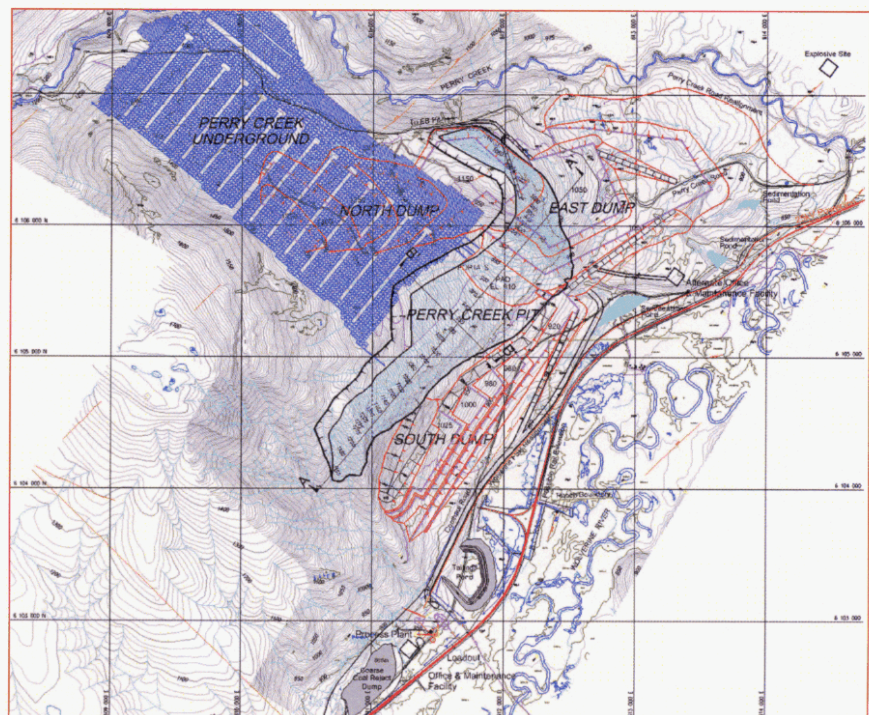
Project's production section aims, and to transporting Western from a successful exploration company to an efficient coal production and export company. ■



Comparison of the Perry Creek and Quintette structures.



Perry Creek drill hole location and ultimate open pit.



Perry Creek mine plan.