The northern Inner Foothills Belt, called the Peace River Coalfield, extends 400 kilometres from the Kakwa to the Sikanni rivers in northeastern British Columbia. The coalfield contains a number of coal-bearing units that dip to the east into the Western Canadian Sedimentary Basin. In order of decreasing age these are the Jura-Cretaceous Minnes Group and Lower Cretaceous Gething and Gates formations.

The coal resource in the Peace River Coalfield to a depth of 2000 metres is estimated to be more than 160 billion tonnes of medium and low-volatile bituminous coal. This is mainly divided between the Gates (10 billion tonnes plus) and Gething formations (120 billion tonnes plus). To date, two major mines (Quintette and Bullmoose) were developed in the Gates but have recently closed.

Coalbed gas potential in the area is largely restricted to the Gething and the Gates formations but potential also exists in the Minnes Group and Upper Cretaceous strata. A conservative estimate of gas content in the coalfield is 60 Tcf. Pipeline infrastructure is already well-developed in this area, the heartland of province’s oil and gas industry.
Map of Peace River Coalfield

PDF files of Regional Coalbed Gas Maps available at: www.em.gov.bc.ca/subwebs/oilandgas/resource/cbg/maps.htm
Coal

- The lower Gething Formation contains coal over an extensive area, though the best development is in the area between the Sukunka and Pine rivers. The formation is enclosed by the underlying Cadomin conglomerate and the overlying Bluesky conglomerate, above which is the marine Moosebar Formation. This formation is overlain by the coal-bearing Gates Formation, which contains coal from the Sukunka River southeast to the Alberta border. The deformed belt of the coalfield (Inner Foothills), which trends northwest, is defined by the outcrop of the Gething Formation on the west and a number of major thrusts on the east; the main one being the Gwillam Lake Thrust. East of the thrusts, Cretaceous beds dip into the trough of the Western Canadian Sedimentary Basin and are in places too deep to be of interest for coalbed gas development. Fold style is generally chevron with well-developed flat limbs and shorter steep dipping limbs. Regional thrusts are west dipping, though at least at Willow Creek reverse faults and axial planes dip steeply to the east.

![](diagram.png)
Gates

- The Gates Formation contains coal from the Sukunka River south to the Saxon property near the Alberta border, although thicknesses appear to thin to the east at depth in the equivalent formation (Falher Formation).

- The formation is mainly medium-volatile bituminous but ranks on the western margin of the coalfield are lower.

- The formation is up to 280 metres thick and contains four or five laterally extensive seams ranging in thickness from 5 to 10 metres that have an aggregate thickness of up to 46 metres.

- Two major mines (Quintette and Bullmoose) in the formation were established by the early 1980s and several other properties have reached advanced stages of exploration. Quintette closed in 2000 and Bullmoose in 2003. Western Canadian Coal Corporation is applying for a mining lease on a property near the Quintette Mine called Perry Creek.
### Shipped Coal
Gates Formation (Bullmoose Mine)

<table>
<thead>
<tr>
<th></th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture (shipped)</td>
<td>8.0</td>
</tr>
<tr>
<td>Ash (db)</td>
<td>8.5</td>
</tr>
<tr>
<td>Volatile matter (db)</td>
<td>26.6</td>
</tr>
<tr>
<td>Fixed carbon (db)</td>
<td>56.9</td>
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<tr>
<td>Sulphur (db)</td>
<td>0.4</td>
</tr>
<tr>
<td>Btu/lb</td>
<td>13,800</td>
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<tr>
<td>Mj/kg (adb net)</td>
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<tr>
<td>FSI</td>
<td>5.5 - 7</td>
</tr>
<tr>
<td>Hardgrove Index</td>
<td>70 - 80</td>
</tr>
<tr>
<td>Rmax (%) (average)</td>
<td>1.1</td>
</tr>
</tbody>
</table>

(Ryan, 2002)

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### Gething

- The Gething Formation is up to 1036 metres thick and contains more than 100 coal beds ranging in thickness from a few centimetres to 4.3 metres. The formation underlies a large area of the Peace River Coalfield.

- The best coal development is between Williston Lake and Sukunka River to the south though the formation also contains coal at depth to the east towards Dawson Creek. South of Sukunka River the formation is thin and contains only a few seams.

- Coal rank is generally medium-volatile bituminous but decreases to the north and northeast toward Williston Lake. West and north of Sukunka River, rank increases to low-volatile bituminous.

- There has been limited mining in the Gething Formation despite the fact that it hosts the first coal to be discovered in British Columbia in 1793. More recently the Pine Valley Mining Corporation has obtained permits for a mine in the Willow Creek area.

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### Minnes

- Strata of the Minnes Group occupy a large area of surface bedrock of the Foothills Belt and is equivalent to the Nikanassin and Mist Mountain formations to the south.

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### Coalbed Gas

- The coalbed gas potential for the Peace River Coalfield is enormous and has variously been calculated to be between 60 and 200 Tcf. This is an estimate based on coal quantities and preliminary data and should be treated with caution.

- Existing coalbed gas exploration in the Peace River Coalfield falls into a number of phases:
  - Estimates were made of desorbed gas contents of samples collected from shallow holes during coal exploration from 1975 to 1985. These data were
Representative stratigraphic column of the Gething Formation at Willow Creek, simplified from Kevin James (personal communication).
Adsorption and desorption data collected as part of the appraisal of the underground coal mining potential of a number of properties. The data generally indicate low gas contents, but the data are old and were collected at shallow depths and may have little relevance to coalbed gas resource evaluation.

In 1996, Phillips Petroleum drilled four holes in the Monkman area (Gates Formation) and the data are summarized in Dawson et al. (2000). The holes intersected cumulative coal thicknesses averaging 20 metres at depths ranging from 1200 to 1550 metres. Gas contents ranged from 6 to 26 cm³/g on an as received basis. Comparisons of desorption and adsorption data indicate that the seams are close to saturated. Low permeabilities were encountered. Four adsorption isotherms from samples from one of the Phillips wells gave Langmuir volumes ranging from 19.8 to 25 cm³/g on an as-received basis.

- Adsorption work done on samples from Gates coals (Lamberson and Bustin, 1992) and Gething Formation (Ryan and Lane, 2002) confirmed the high adsorption capacity of coals from these formations and documents the changes in capacity related to varying maceral compositions.

- A number of exploration holes have been drilled in the last few years. Most of the data from these holes are still confidential but will start to become public by 2004.

- Potential for coalbed gas exists in the older Minnes Group but little research has been done on its coal measures.
**Key References** (see Appendix I, References)


