The southeast corner of the province, often referred to as the East Kootenay region, contains three separate coalfields known respectively as Crowsnest, Elk Valley and Flathead. Since 1898, these coalfields have produced over 500 million tonnes of mainly coking coal and presently host five active mines.

Coal occurs in the Mist Mountain Formation of the Jurassic-Cretaceous Kootenay Group. The formation averages 500 to 600 metres in thickness and contains from 4 to 30 plus seams; cumulative coal thickness ranges up to over 60 metres. Seams range in rank from high to low-volatile bituminous.

Coalbed gas resource assessments for the East Kootenay coalfields indicate potential for more than 14 Tcf.
Elk Valley Coalfield

Coal

- The coal resource to a depth of 1500 metres in the Elk Valley Coalfield is estimated to be 19 billion tonnes (Johnson and Smith, 1991).

- There are three mines in the Elk Valley Coalfield. In the south, the Line Creek mine produces medium-volatile hard coking coal and lesser amounts of thermal coal. In the northern part of the coalfield, the Greenhills and Fording River mines produce medium and high-volatile coking coal from a large number of seams through a thick Mist Mountain Formation section.

- The coalfield contains two north-trending synclines separated by a major normal fault. The Bourgeau Thrust defines the west edge of the coalfield.

- Seams are folded and thrust faulted in both synclines. Thicker seams are developed low in the section but tend to host major thrusts, consequently some are extensively sheared.

Coalbed Gas

- There is an estimated coalbed potential gas resource of 7.7 Tcf in the Elk Valley Coalfield (Johnson and Smith, 1991).

<table>
<thead>
<tr>
<th>Coal Seams</th>
<th>1A</th>
<th>1B</th>
<th>7</th>
<th>10</th>
<th>10A-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adsorption Temperature (°C)</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Ash Content (%)</td>
<td>12.06</td>
<td>23.26</td>
<td>7.26</td>
<td>3.69</td>
<td>10.75</td>
</tr>
<tr>
<td>Equilibrium Moisture Content (%)</td>
<td>1.5</td>
<td>1.8</td>
<td>2.1</td>
<td>2.9</td>
<td>1.35</td>
</tr>
<tr>
<td>Langmuir Volume (cm³/g) (ash corrected)</td>
<td>17.39</td>
<td>11.42</td>
<td>19.51</td>
<td>23.43</td>
<td>15.43</td>
</tr>
<tr>
<td>Langmuir Volume (cm³/g)</td>
<td>19.78</td>
<td>14.88</td>
<td>21.03</td>
<td>24.33</td>
<td>17.28</td>
</tr>
<tr>
<td>Langmuir Pressure (kPa)</td>
<td>1880</td>
<td>1582</td>
<td>1838</td>
<td>2018</td>
<td>1540</td>
</tr>
<tr>
<td>Rmax (%)</td>
<td>1.2</td>
<td>1.2</td>
<td>1.16</td>
<td>1.14</td>
<td>1.39</td>
</tr>
</tbody>
</table>

Note: Seams 1A, 10A-3 and 1B are stratigraphically equivalent.
Map of Elk Valley Coalfield

PDF files of Regional Coalbed Gas Maps available at: www.em.gov.bc.ca/subwebs/oilandgas/resource/cbg/maps.htm
In 1981, CANMET desorbed samples from three holes over a depth range of 0 to 400 metres (Feng et al., 1981). They found that seams above 200 metres contained less than 2 cm$^3$/g of gas but below 200 metres gas contents ranged from 5 to 11 cm$^3$/g (as-received basis).

In 1991-92, Norcen drilled four holes and a limited production test well in the northern part of the Elk Valley Coalfield. The holes were located on the east limb of a syncline where the Mist Mountain Formation is 650 metres thick and contains nineteen seams with a cumulative thickness of 54 metres. Gas contents averaged 13.25 cm$^3$/g (air-dried basis) for coals deeper than 250 metres. There were indications of moderate CO$_2$ contents in the gas desorbed from some samples.

Suncor drilled a single hole in the core of the Alexander Creek Syncline south of the Greenhills mine in 1998. Some of the seams had high CO$_2$ concentrations and the company did not follow up on the exploration.

Fording Coal Limited drilled a single hole on the mine site in 1993. This 533-metre deep hole intersected 44 cumulative metres of coal between 300 to 520 metres depth. Gas contents ranged from about 3 to 12.6 cm$^3$/g on an air-dried basis, ash varied from 4 to 60 per cent. Generally, measurements indicated permeability in the range of 1 to 6 mD for the seams (Dawson et al., 2000).

Since 2001, Encana has drilled seventeen holes in the Elk Valley Coalfield and is presently pumping on two pilots. Data will start to become public in 2004.

**Crowsnest Coalfield**

**Coal**

The Crowsnest Coalfield has a coal resource of over 25 billion tonnes and includes the Elkview and Coal Mountain mines (Ryan, 2003). The coalfield extends from the town of Sparwood to 20 kilometres south of the town of Fernie. This 600 square kilometre area is underlain by the Jura-Cretaceous Mist Mountain Formation, which contains from 30 to 60 cumulative metres of high to low-volatile bituminous coal.

<table>
<thead>
<tr>
<th>Typical Analyses Of The East Kootenay Coalfields</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product coal dry basis</td>
</tr>
<tr>
<td>Volatile matter (%)</td>
</tr>
<tr>
<td>Fixed carbon (%)</td>
</tr>
<tr>
<td>Ash (%)</td>
</tr>
<tr>
<td>Sulfur (%)</td>
</tr>
<tr>
<td>Btu/lb</td>
</tr>
<tr>
<td>Mj/kg</td>
</tr>
<tr>
<td>Hardgrove Index</td>
</tr>
<tr>
<td>Rmax%</td>
</tr>
</tbody>
</table>
PDF files of Regional Coalbed Gas Maps available at: www.em.gov.bc.ca/subwebs/oilandgas/resource/cbg/maps.htm
The structure is a large basin cored by the younger Elk Formation and rimmed by the older Mist Mountain Formation. Coal rank varies around the perimeter of the coalfield and downdip into the basin.

The Coal Mountain mine, located in an eastern outlier of the coalfield, produces high-volatile A bituminous weak coking coal; most of the coal comes from a single seam near the base of the Mist Mountain Formation. The Elkview mine, located in the northern end of the coalfield, produces medium-volatile hard coking coal, mainly from the bottom four seams in the formation.

Coalbed Gas

The Crowsnest Coalfield has a potential coalbed gas resource of over 6 Tcf (Ryan, 2003).

In 1990-91, three companies drilled a total of seven holes in the field. These holes, drilled in the southern part of the coalfield, were drilled to test coal thicknesses and gas contents and did not test for production.

Mobil/Chevron drilled two holes, one of which penetrated 491 metres of Mist Mountain Formation and intersected seven major coal zones with a cumulative coal thickness of 54 metres. Dawson et al. (2000) reported that the coal is fragmented or sheared. Gas contents ranged from 1.36 to 16.56 cm³/g. Based on comparison of measured gas contents on a dry ash free basis to adsorption isotherm results, samples were saturated to between 25 and 63 per cent of maximum gas capacity. Permeability appeared to be low to moderate.

Gulf Canada drilled two holes. Results were not encouraging mainly because the holes were drilled too close to coal subcrop. Saskoil drilled three holes. Two holes when combined intersected about 500 metres of the Mist Mountain Formation with about 63 metres of coal. The coal was moderately gassy with gas contents ranging from 0.4 to 11.9 cm³/g (air-dried basis).

Mobil/Chevron drilled three holes in 2003/2004. Data will remain confidential for 3 years.

Flathead Coalfield

Coal

Coal occurs in a number of outliers of the Mist Mountain Formation, the largest of which is Sage Creek near the US border.

The Mist Mountain Formation ranges from 198 to 259 metres in thickness; coal occurs in five horizons having an aggregate thickness of approximately 30 metres.
The coal resource available for coalbed gas exploration in the Flathead Coalfield is about 1 billion tonnes (Ryan, 2003).

**Coalbed Gas**

- The coal resource available for coalbed gas exploration is about 1 billion tonnes with a potential coalbed gas resource of 0.4 Tcf (Ryan, 2003).

**Key References** (see Appendix I, References)


Stratigraphic column - Mist Mountain Formation, Greenhills mine, Elk Valley Coalfield (Dawson, 1995).