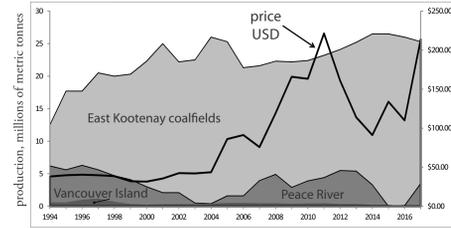


Context



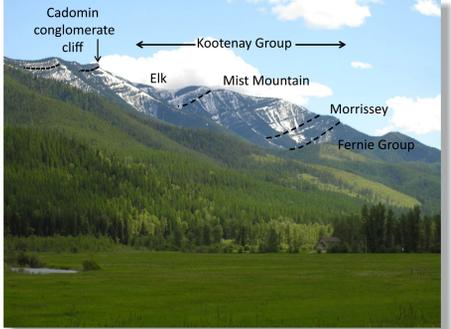
The East Kootenay is one of several coal regions in British Columbia, including the Groundhog and Peace fields in the north, those on Vancouver Island, and small fields in the Interior. Extending along the northwest-southwest structural grain of the Rocky Mountain Front Ranges in southern British Columbia, the East Kootenay coalfields include three fields: Flathead, Crowsnest, and Elk River.



In the past 25 years, the East Kootenay fields have produced more coal than the rest of British Columbia's coalfields combined.

Stratigraphic setting

The East Kootenay fields produce coal from multiple seams in the Mist Mountain Formation, a 100 to 700m thick unit of sandstone, siltstone, shale and mudstone in the middle part of the Kootenay Group.



Kootenay Group rocks formed in a Jurassic-Cretaceous coast plain. Deltaic and inter-deltaic deposits in the lower part of the section transition upward to fluvial deposits.

Group	Formation	Lithology
Lower Cretaceous	Blairmore Group	Cadomin Formation: sandstone, conglomerate
	Kootenay Group	Elk Formation: sandstone, siltstone, shale, mudstone, chert-pebble conglomerate; minor coal seams
Mist Mountain Formation: sandstone, siltstone, shale, mudstone, thick coal seams		
Morrissey Formation: medium- to coarse-grained quartz-rich sandstone		
Jurassic	Ferne Formation: shale, siltstone, fine-grained sandstone	

The Mist Mountain Formation contains from 4 to 30 coal seams, depending on location. Seams can have cumulative thicknesses of greater than 70m. Thicker seams are more abundant lower in the section, but coal beds occur throughout the unit. Seams are locally thickened by repetition along thrust faults.



Multiple seams are mined from the Mist Mountain Formation.

Coal quality

The Kootenay coalfields produce from multiple seams within the Mist Mountain Formation. Coal seams are typically medium-volatile bituminous in rank, with some high volatile-A bituminous coals near the top of the section. Locally, low-volatile bituminous coals occur in basal portions of the section. East Kootenay coals have low sulphur contents. Hard coking coal (HCC) is the predominant product at the four active mines. Coals that lack coking quality due to their volatile content, ash content, or oxidation are produced in minor quantities at Fording River, Line Creek, and Greenhills, and are marketed as PCI or thermal coal.

East Kootenay coking coals generally produce cokes with favourable characteristics. Cokes have good to excellent coal strength after reaction (CSR) values, low coke oven pressure, high coke stability, low to moderate base/acid ratios, and excellent blending characteristics, despite having low Giesler plasticity and dilatation.



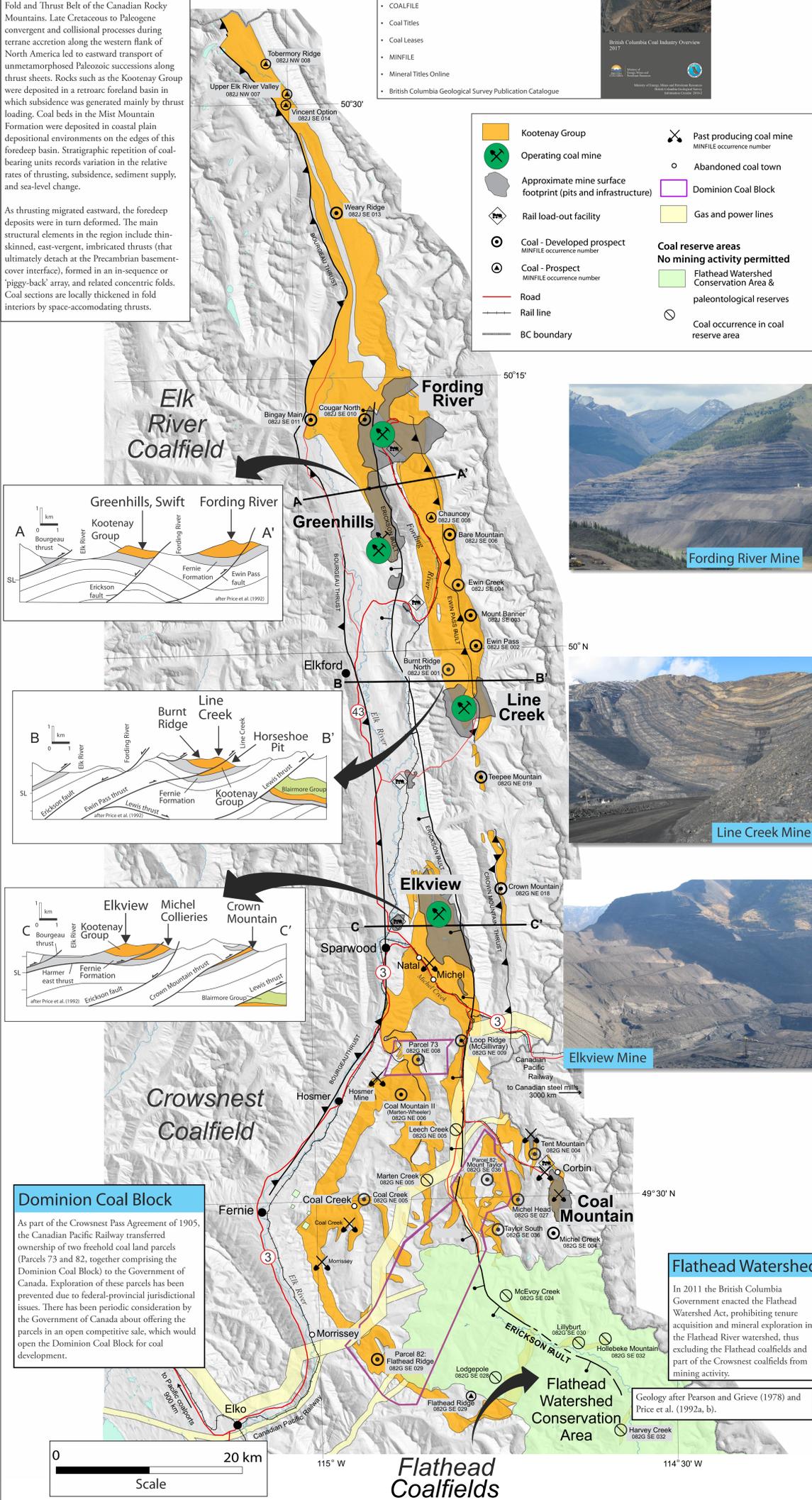
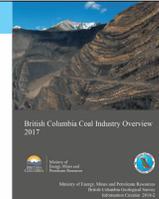
Geology

The East Kootenay Coalfields are in the Foreland Fold and Thrust Belt of the Canadian Rocky Mountains. Late Cretaceous to Paleogene convergent and collisional processes during terrane accretion along the western flank of North America led to eastward transport of unmetamorphosed Paleozoic successions along thrust sheets. Rocks such as the Kootenay Group were deposited in a retroarc foreland basin in which subsidence was generated mainly by thrust loading. Coal beds in the Mist Mountain Formation were deposited in coastal plain depositional environments on the edges of this foredeep basin. Stratigraphic repetition of coal-bearing units records variation in the relative rates of thrusting, subsidence, sediment supply, and sea-level change.

As thrusting migrated eastward, the foredeep deposits were in turn deformed. The main structural elements in the region include thin-skinned, east-vergent, imbricated thrusts (that ultimately detach at the Precambrian basement-cover interface), formed in an in-sequence or 'piggy-back' array, and related concentric folds. Coal sections are locally thickened in fold interiors by space-accommodating thrusts.

For further information

- Visit the British Columbia Geological Survey coal website to access
 - COALFILE
 - Coal Titles
 - Coal Leases
 - MINFILE
 - Mineral Titles Online
- British Columbia Geological Survey Publication Catalogue



Dominion Coal Block

As part of the Crowsnest Pass Agreement of 1905, the Canadian Pacific Railway transferred ownership of two freehold coal land parcels (Parcels 73 and 82, together comprising the Dominion Coal Block) to the Government of Canada. Exploration of these parcels has been prevented due to federal-provincial jurisdictional issues. There has been periodic consideration by the Government of Canada about offering the parcels in an open competitive sale, which would open the Dominion Coal Block for coal development.

Flathead Watershed

In 2011 the British Columbia Government enacted the Flathead Watershed Act, prohibiting tenure acquisition and mineral exploration in the Flathead River watershed, thus excluding the Flathead coalfields and part of the Crowsnest coalfields from mining activity.

Geology after Pearson and Grievé (1978) and Price et al. (1992a, b).

History

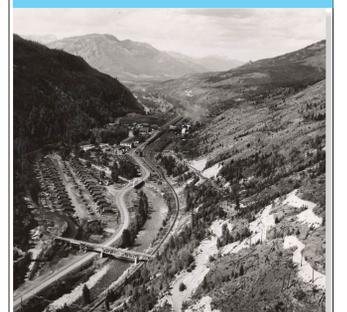
Prospectors discovered coal in the East Kootenays in the middle 1800s. By 1885, following George Mercer Dawson's report on the geology of southeast British Columbia, the coal wealth of the region was well known, but infrastructure to bring the coal to market was lacking. In 1896 the Government of Canada and Canadian Pacific Railway signed an agreement to build a rail line through Crowsnest Pass.

Coal Creek mine, 1950s



The turn of the century saw underground mines open and small settlements established adjacent to the Crowsnest Pass route at Morrissey Creek, Coal Creek, Michel, Natal, Middletown, Hosmer, and Corbin. Between 1898 and 1902 the town of Fernie was built at the confluence of Coal Creek and the rail route along the Elk River. The town accommodated increasing numbers of miners and their families. Hundreds of coke ovens were built at Fernie, Morrissey, and Michel to produce coke for smelters in the Kootenay and Boundary areas.

Town of Michel, 1950s; view west toward Sparwood



The first surface operations in the Province opened near the town of Michel in 1947 (Erickson) and 1949 (Baldy Mountain). Mining continued at Coal Creek and Michel-Natal through World War II and into the 1950s. The industry began to go into decline in the late 1950s, mainly because oil products were being substituted as fuels for transportation and heating. In the 1960s the Government of British Columbia ordered that Michel residents be relocated to Sparwood and old mine buildings demolished. The towns were vacated by 1971; today, very little remains of Michel, Middletown, and Natal.

In the 1960s, rapid expansion of manufacturing in Japan led to increased global coal prices, and renewed interest in the high-quality coking coals of the Canadian Rockies. The Balmer mine north of Michel (now part of the Elkview mine) was converted to a modern mechanized operation. In 1972, Fording Coal began production at the Fording River mine in the Elk Valley coalfield. In 1974, the Corbin mine was reopened as Byron Creek Collieries and began producing thermal coal for power generation in Ontario. In 1982, Shell Canada opened the Line Creek mine, and Westar Mining opened Greenhills, Line Creek Collieries was renamed Coal Mountain in 1994. Collectively, Fording River, Greenhills, Line Creek, Elkview (including Balmer and Baldy Mountain) and Coal Mountain have produced 20-30 million tonnes per year since the 1980s. All five mines consolidated as the Elk Valley Coal Partnership in 2004. Since 2008, Teck Coal Limited has been the operator of all of the active mines in the East Kootenays.

Historical production

Mine	Production	Active years	Mine type
Coal Creek	18 Mt	1898-1958	underground
Michel Colliery	69 Mt	1899-1911 1948-1979	underground
Morrissey	0.4 Mt	1902-1909	underground
Corbin Renamed Byron 1974	3.4 Mt	1908-1935 1943-1948 1974-1994	underground
Tent Mountain	2.7 Mt	1950-1980	Open pit
Coal Mountain	55.5 Mt	1995-2018	Open pit

Since 1898, more than 830 million tonnes, mainly of metallurgical coal, have been produced from the Crowsnest of Elk River coalfields.

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Present day production and exploration

Mine	Coal products	Annual production capacity	Estimated remaining mine life (from 2017)	Years of operation Source: MINFILE	Reserves (Proven + Probable) (as of Dec 31, 2016) Clean coal	Resources (Measured + Indicated) (as of Dec 31, 2016) Raw coal
Fording River	HCC*	~9 Mt	45 years	1972 - present	HCC 390 Mt	HCC 1433 Mt
Greenhills	HCC	~6.0 Mt	31 years	1993 - present	HCC 173 Mt	HCC 490 Mt PCI 11 Mt
Line Creek	HCC Thermal	~3.5 Mt	18 years	1972 - present	HCC 65 Mt Thermal 10.7 Mt	HCC 740 Mt Thermal 8.8 Mt
Elkview	HCC	~7.0	42 years	1980 - present	HCC 266 Mt	HCC 590 Mt

