COAL INVESTIGATIONS

CROWSNEST COALFIELD

By David E. Pearson and D. A. Grieve

INTRODUCTION

Systematic 1:7000 scale mapping of Crowsnest Coalfield was concluded during the 1978 field season when the 100 square kilometres remaining from the two previous field seasons was mapped. The area covered by this mapping project is indicated on Figure 18. Preliminary maps to be published during the year on this project will cover (1) Morrissey Ridge from Coal Creek to Morrissey Creek, (2) the northern portion of the Southern Dominion Coal Block, and (3) Flathead and McLatchie Ridges. These preliminary maps will contain both measured sections and petrographic data for each seam over 1 metre thick.

(a) Morrissey Creek

Mapping along Morrissey Ridge was completed and the key area of Morrissey Creek was examined in detail. All coals in this creek section are of low volatile rank and possess vitrinite reflectance values greater than 1.51 per cent. The highest rank coal exposed in the whole coalfield was located here (1.85 per cent $\bar{R}_o$).

A number of large folds which affect only the lower portion of the coal measures can be traced across the south crop of the coalfield from the pipeline section on Flathead Ridge to Morrissey Creek.

Coalification is more advanced in Morrissey Creek than anywhere else in the coalfield. Because of this, the lower coal seams, which have inherently high inertinite maceral contents (Cameron, 1972; Pearson and Grieve, 1978 and in preparation) will produce very poor quality coke and they should properly be considered thermal (steam) coals. The upper seams, however, with inherently high reactive maceral contents and ranks of 1.4 to 1.5 per cent, will probably produce the finest quality metallurgical coal in the whole coalfield. The uppermost two seams on the Southern Dominion Coal Block have ranks of $\simeq$1.4 per cent with inert contents of about 25 per cent and in quality are similar to 'A' seam in the Michel Creek section.

Excellently preserved casts of a bipedal carnivorous dinosaur, probably a Coelurosaur (Currie, personal communication) were found in a sandstone overlying the upper seam on the coal block.

Figure 19 is a true scale cross-section of the north side of Morrissey Creek. It shows how the amplitude of the large folds decreases with elevation. The figure confirms the story first described from Michel Creek and Coal Creek, that the rank of coal seams *increases down dip.* For example, a

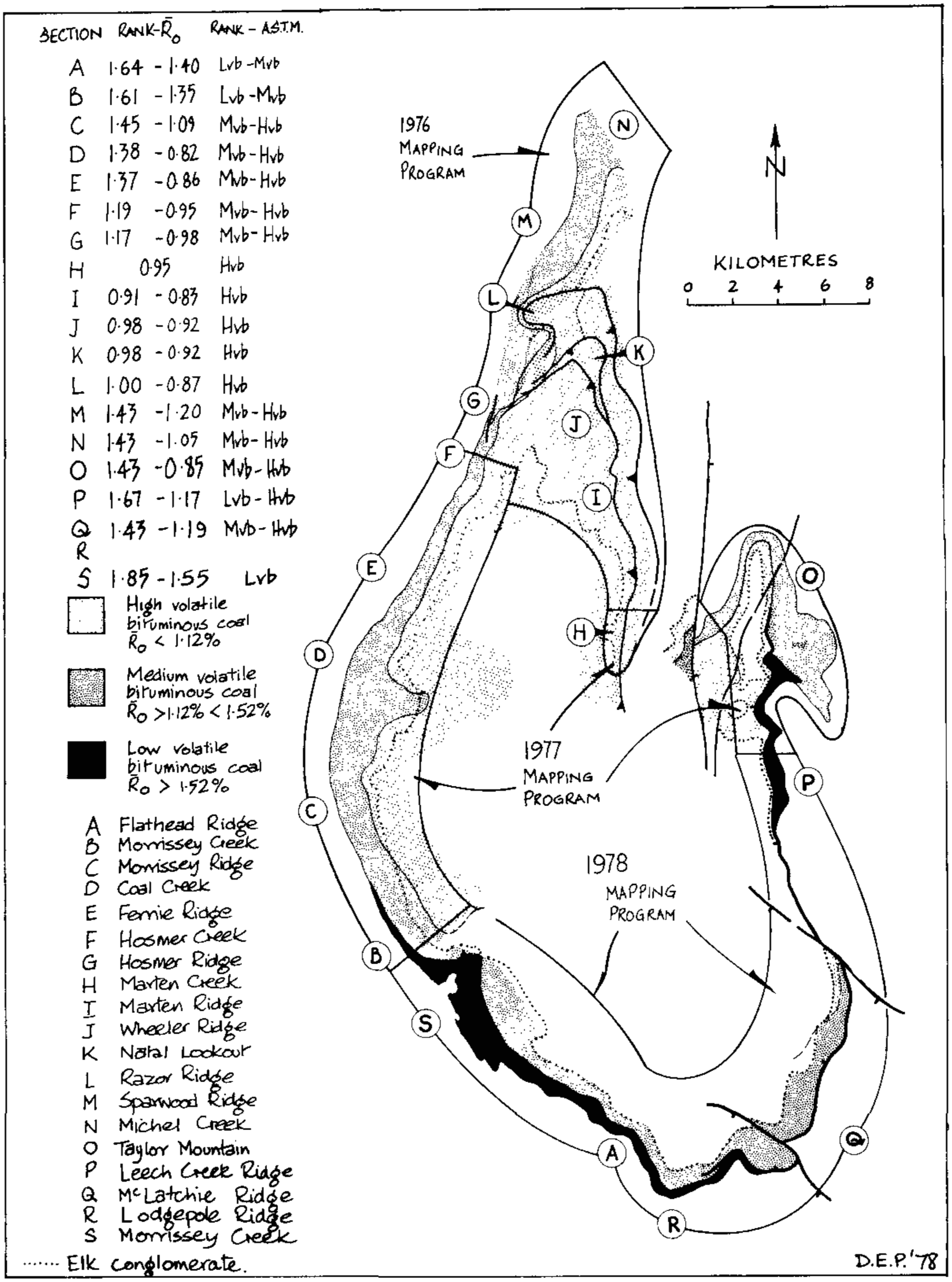

Figure 18. Distribution of low, medium, and high-volatile bituminous coals over Crowsnest Coalfield. Ranges in vitrinite reflectance data at specific locations represent coals overlying basal sandstone and underlying the Elk conglomerate.

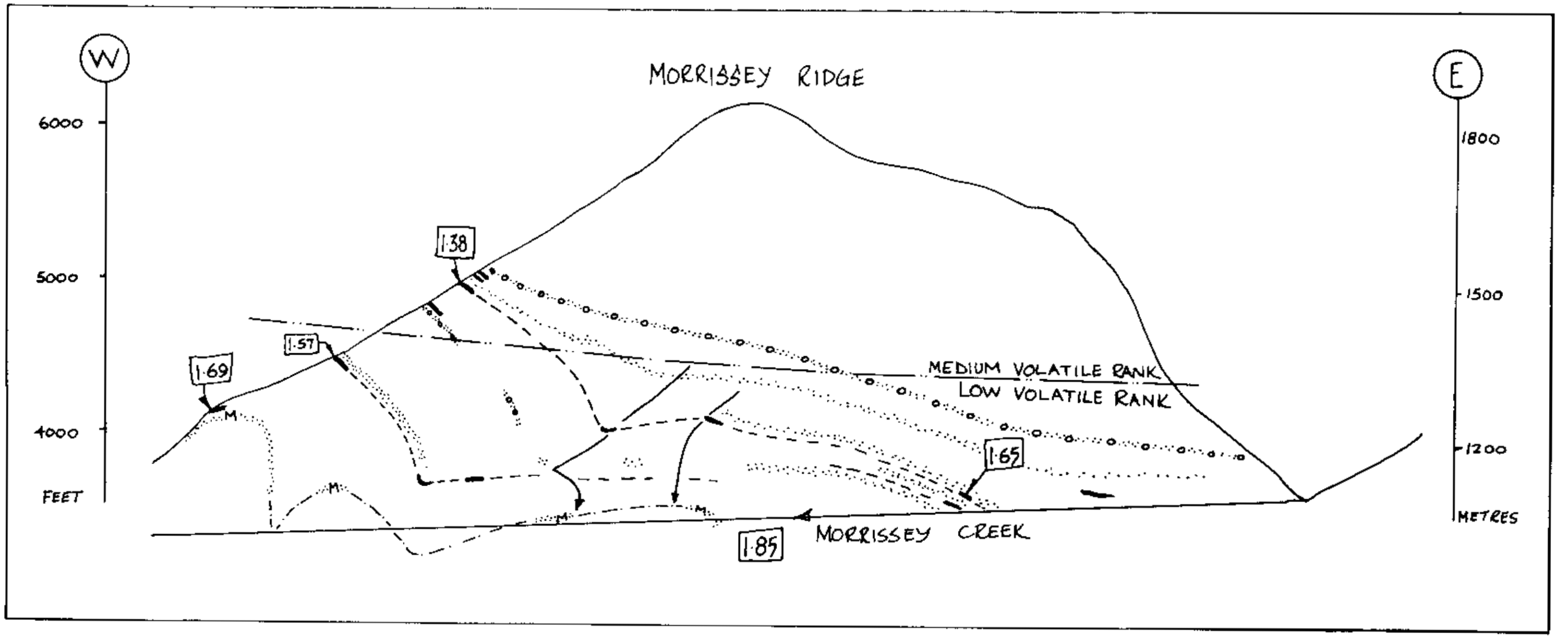

Figure 19. Side-view of Morrissey Ridge looking north from Morrissey Creek, showing vitrinite reflectance data for five localities. Iso-reflectance line separating medium from low-volatile coals dips shallower than the bedding and thus coal rank increases eastwards in all seams.

coal under the Elk conglomerate above Morrissey Creek has a rank of 1.38 per cent, yet the same coal in the valley has a rank of 1.65 per cent. Similarly, the Moose-rider seam, which rests directly on the basal Kootenay sandstone has a rank on the ridge of 1.69 per cent but in the valley this has risen to 1.85 per cent. This means that the Moose-rider seam will obtain a rank of semi-anthracite (rank $\bar{R}_o$ $\geq$1.92 per cent) 100 metres beneath the valley of Morrissey Creek, and the upper seams could obtain that rank with a further decrease in elevation of 300 metres.

(b) Lodgepole–McLatchie Area

A prominent sandstone which forms the apparent base to the coal measures is exposed high upon the ridge adjacent to McLatchie Creek. At two localities along this ridge however, vitrinite-bearing mudstone (carbargillites) have been sampled *beneath* this sandstone yet above the obvious shales of the underlying Fernie Formation.

Mapping south of Michel Head last year revealed the presence of an important lag fault (low angle gravity fault), which juxtaposes high volatile coal-bearing sequences directly on low volatile ($\bar{R}_o$ = 1.67 per cent) coal-bearing sequences. At the time we concluded that this was the Flathead fault (Price, 1965).

Immediately west of Lodgepole Creek a normal fault is exposed, which, when traced toward the creek, rapidly cuts obliquely down through the succession. The fault is a low angle gravity fault (lag) and evidently is the southern extremity of that which we presumed to be the Flathead fault in 1977.

Thus, the east crop of Crowsnest Coalfield is marked by the lag fault here referred to as the East Crop fault. This important structure can be followed for about 25 kilometres from Lodgepole Creek to Taylor Mountain.

The age of this structure relative to coalification is evident from Figure 18. Ranks change rapidly on either side of the structure and it is clearly post-coalification in age. Constrictional structures (folds) intimately associated with the fault suggest however that the fault moved more than once.

(c) Eagle Mountain, Elk Valley Coalfield

Upon completion of the mapping of Crowsnest Coalfield, detailed work started in the latter part of the field season on Eagle Mountain, Fording Coal's property in Elk Valley Coalfield. This work will continue in future field seasons.

RAPID PREDICTION OF COKE STRENGTH

During laboratory studies on collected coals a rapid method of semi-quantitative prediction of coke strength was discovered (Pearson, in preparation). Figure 20 shows actual ASTM 25-millimetre Tumbler stability factors for 113 British Columbia cokes as a function of free swelling index and volatile matter (d.a.f.) basis. Crosses indicate values that conform with the plotted contours; open circles are data which do

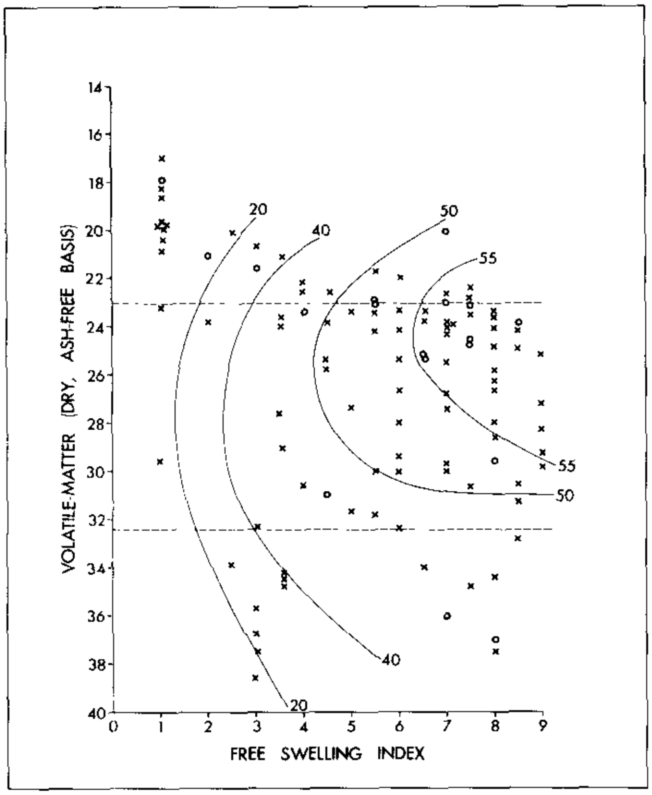

Figure 20. Diagram showing how the 25-mm ASTM Tumbler stability is a function of volatile matter yield (dry, ash-free basis) and free swelling index.

not conform with the contours. Eighty-six per cent of the carbonized coals conform to the contoured stability values shown.

ACKNOWLEDGMENTS

It is a pleasure to record our thanks to Mickey Welder and Peter Mustard, our co-workers during the field season. Phil Currie of the Provincial Museum of Alberta is thanked for his information on the dinosaur tracks.

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