GEOLOGY OF THE WEST CARBON CREEK AREA
(930/15)

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INTRODUCTION

The West Carbon Creek area is located 40 kilometres west of the W.A.C. Bennett Dam in northeastern British Columbia (Fig. 77). Fieldwork in 1984 was directed toward compilation of the geology of a major syncline which contains up to 1 200 metres of coal measures. Previous work includes that of Matthews (1947), Stott and Gibson (1980), Legun (1983), Stott (1983), and personnel of Utah Mines Ltd. and Gulf Canada Resources Inc. (1980-1983 assessment reports). The area includes the West Carbon Creek licences of Utah Mines and the former Whiterabbit licence block of Gulf Canada.

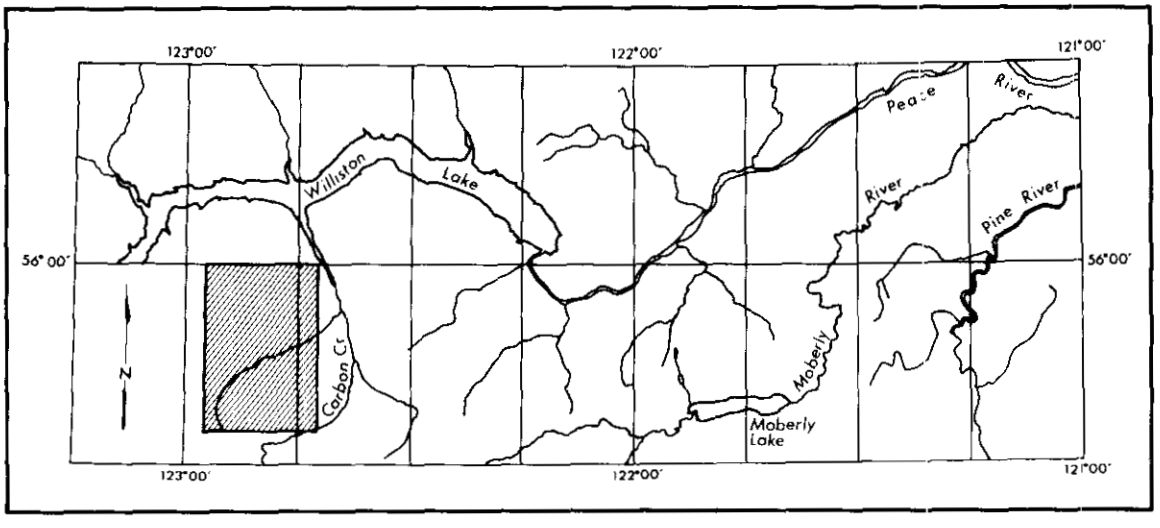

Figure 77. Location of the West Carbon Creek map-area.

Previous work has not resolved either the geology or the stratigraphy of the area. Maps of Utah Mines, Gulf Canada, and the Geological Survey of Canada conflict in the position, thickness, and boundaries of the Cadomin, Bickford, and Monach Formations. For a time the coal measures themselves were assigned to the Bickford Formation (Stott and Gibson, 1980) but have since been reassigned to the Gething Formation. In the north Utah Mines reported more than 1 000 metres of coal measures, while to the south Gulf Canada considered only a few hundred metres to be

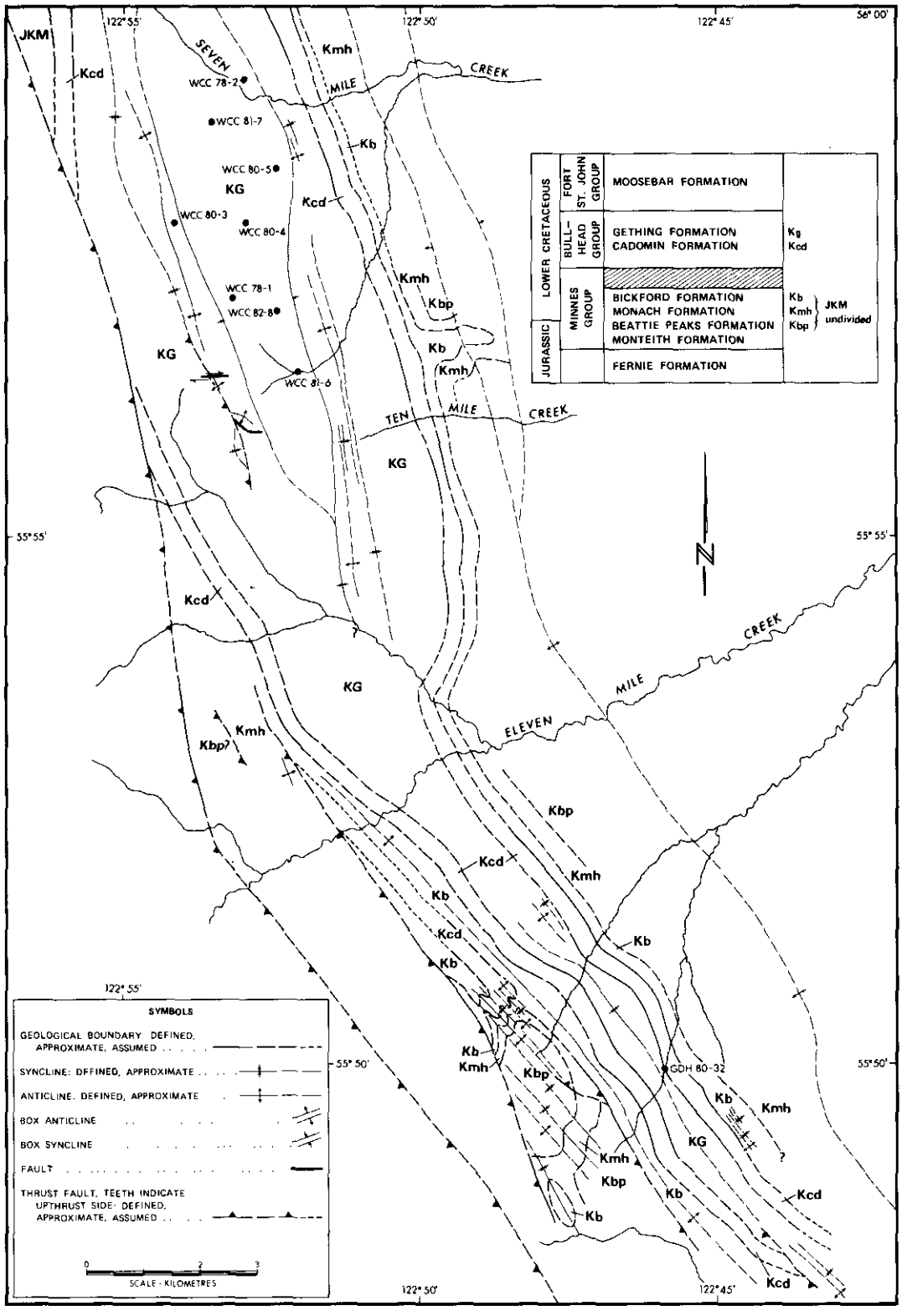

Figure 78. West Carbon Creek map-area (930/15). Geology of a major coal-bearing syncline is shown.

present. Stott (1983) shows Moosebar and Gates Formations to be present in the core of the syncline; this interpretation is doubted both by other Geological Survey of Canada personnel and by coal company personnel.

The writer spent 16 field days tracing and mapping geologic units in the vicinity of the syncline. Field data was integrated with air photograph examination and relevant data from previous maps. Essentials of the geology are shown on Figure 78. The mapping enabled reinterpretation of the structure and the stratigraphy.

STRUCTURE AND STRATIGRAPHY

The trace of the Cadomin Formation delineates the major syncline. The syncline is flat bottomed and box-like on Utah Mines' licences but closes and becomes very tight southward on Gulf's former licences. Tight folding with minor thrust faulting marks each steep limb of the fold. The structure may plunge southeast because the coal measures do not extend northward to Williston Lake. Similar reasoning suggests a northwest plunge in the south, therefore a doubly plunging syncline. The syncline is faulted at its south end, according to Gulf Canada's 1982 mapping.

The area of the 'box' structure is structurally delineated on Figure 78. Strata are flat lying within an elongate diamond-shaped area, whose north end is outside the map-area. High ground in the south half of the 'diamond' contains the uppermost preserved beds of the Gething Formation. An arenite marker unit at the base of a prominent hill has been correlated to the north and east. To the north it corresponds to the very top of diamond-drill hole 82-8 (Utah Mines). Beds above the marker, which comprise the remaining 120-metre height of the hill, have not been intersected in any Utah Mines' drill holes and are additional to the section measured by Stott on the west slope of Mount Rochfort. A total thickness of 1 100±100 metres for the Gething Formation is calculated by the writer. Stott assigned strata of the hill to the Gates Formation. Stott's Moosebar Formation is an anomalously thin 60-metre mudstone interval below the marker. However, field examination indicates that the whole interval is better assigned to the coal measures of the Gething Formation.

BULLHEAD GROUP

GETHING FORMATION

The Gething Formation is a coal measure sequence consisting of inter-bedded thin coals that are usually less than 1 metre thick, carbonaceous shales, mudstone, siltstone, arenite, and lesser calcareous equivalents. In the West Carbon Creek area the sequence appears to be sandier than it is in the east (for example, Peace River Canyon section). It is also

distinguished by the presence of channel conglomerates 5 to 10 metres thick and 50 to 100 metres in apparent width. In the flat-lying beds of the 'box' structure, channel deposits that are within coal measures correlate laterally with extensive sheet-like, crossbedded units of arenite, pebbly arenite, and conglomerate. One of these 'sheets' is the important local marker unit discussed previously that is exposed beside the site of diamond-drill hole 82-8 (Fig. 78). Other channel bodies correlate laterally with interbedded coal measure lithologies; these may be fluvial overbank deposits.

Gulf Canada trenched one 3-metre coal seam at the south end of the syncline in the Gething Formation. Their single drill hole was spudded in the Cadomin Formation; therefore it left the interval of Gething Formation untested. In the north, Utah Mines drilled eight holes in the Gething Formation but did not intersect an economically interesting thickness of coal. Worth pursuing is a 1.5-metre seam, 10 metres below the top of diamond-drill hole 82-8. It should also be present in an undrilled area to the south, in the vicinity of the prominent hill described previously.

CADOMIN FORMATION

The Cadomin Formation is characterized by thick, up to 10-metre, sandstone to pebbly sandstone units with thinner recessive intervals. Consequently the formation tends to form 'ribbed' ridges that can be traced on air photographs. The proportion of resistant units to recessive intervals varies laterally and vertically within the formation. Locally thick carbonaceous recessive intervals develop laterally so that basal Gething Formation coal measures grade into upper Cadomin Formation pebbly sandstones or vice versa.

In the West Carbon Creek area the Cadomin Formation varies from 200 to 275 metres in thickness, comparable to thicknesses well to the east in the Butler Ridge area (Legun, 1984). No westward thickening is indicated. The proportion of conglomerate is less than in the east, which suggests that the source is not from the west. Perhaps deposits of the Cadomin Formation are related to the outlet of the Spirit River channel drainage system to the east (McLean, 1977). Paleocurrent data is required to resolve this question.

Utah Mines' designation of a thin (40 to 60-metre) unit as the Cadomin Formation is incorrect. It and the coal measures below are actually in the Gething Formation; the Cadomin lies stratigraphically below.

MINNES GROUP

BICKFORD FORMATION

This formation consists of salt-and-pepper sandstones, massive and low angle crossbedded (flaggy) arenite, quartz arenite, carbonaceous shale,

thin coals, and local thin beds of grit. The contact with the Cadomin Formation is gradational to lithologically distinct. The presence of flaggy beds, salt-and-pepper sandstones, and local quartz arenites, together with the absence of thick pebbly units, distinguishes the Bickford from the Cadomin Formation. On air photographs the Bickford tends to be a recessive band between the more resistant units of the Cadomin and Monach Formations; exposure is fair to poor.

This formation is distinct to the south, west of Mount Monach, but loses lithological identity to the north. There it becomes increasingly dominated by flaggy arenites and indistinguishable from the Monach Formation, except for the presence of carbonaceous intervals. The Bickford Formation is about 150 metres thick and appears to thicken slightly to the south in the Mount Monach area. It must thicken considerably between there and Mount Bickford where Stott (1981) measured 348 metres of section.

MONACH FORMATION

The Monach Formation is typified by units of flaggy, planar to shallow crossbedded arenites; massive arenite; and minor amounts of quartz arenite. Coquinas of *Buchia* are present toward the base of the formation in exposures east of the principal syncline. The Monach forms the top of a coarsening upward sequence that begins in the shales of the Beattie Peaks Formation. The contact between the two formations is arbitrarily placed where shaly interbeds of the Beattie Peaks disappear; thickness varies from 100 to 200 metres. Sedimentary structures indicate a shallowing upward marine sequence ending with beach and shoreface deposits.

CONCLUSIONS

The Cadomin Formation in West Carbon Creek area is mappable and can be used to delineate the border of the coal-bearing syncline, as well as to separate the stratigraphy above (Gething Formation) from that below (Minnes Group).

The maximum thickness of Gething Formation is reached at the south end of the flat-bottomed portion of the syncline on a flat-topped hill with elevation 1 819 metres. Total thickness is 1 100±100 metres.

No Gates or Moosebar Formation rocks are present in the core of the syncline.

Fluvial channel deposits in the Gething Formation pass laterally into sheet-like bodies of pebbly sandstone which locally form marker units.

In the south the syncline becomes tight and has vertical dips in the axial zone. Only the lower part of the Gething Formation is present there.

The Bickford Formation is thinner than on previous maps and its trace on the map differs considerably from interpretations by Stott and Utah Mines personnel. The Bickford Formation has poor coal development and loses distinctive lithological character northward, where it is increasingly dominated by flaggy arenites that are typical of the Monach Formation; this is interpreted to reflect an increasing marine influence northward.

REFERENCES

Cowley, P. S. (1981-1983): Report of Exploration Activities on the West Carbon Creek Property, *Utah Mines Ltd.*, unpub. repts.

Gulf Canada Resources Inc., Goodrich Coal Project Geological Repts. 1981-1983.

Legun, A. (1983): Stratigraphy and Sedimentology Notes on the Bullhead Mountain-Peace River Canyon, Carbon Creek Area, Northeastern British Columbia (93O/15, 16; 94B/1, 2), *B.C. Ministry of Energy, Mines & Pet. Res.*, Geological Fieldwork, 1982, Paper 1983-1, pp. 93-98.

..... (1984): Butler Ridge Map-area (94B/1), *B.C. Ministry of Energy, Mines & Pet. Res.*, Geological Fieldwork, 1983, Paper 1984-1, pp. 123-130.

Matthews, W. H. (1947): Geology and Coal Resources of the Carbon Creek-Mount Bickford Map-area, *B.C. Ministry of Energy, Mines & Pet. Res.*, Bull. 24.

McLean, J. R. (1977): The Cadomin Formation: Stratigraphy, Sedimentology and Tectonic Implications, *Cdn. Pet. Geol.*, Bull., Vol. 25, No. 4, pp. 792-827.

Stott, D. F. (1981): Bickford and Gorman Creek, Two New Formations of the Jurassic-Cretaceous Minnes Group, Alberta and British Columbia, *in* Current Research, Part B, *Geol. Surv., Canada*, Paper 81-1B, pp. 1-9.

..... (1983): Mackenzie Map-area, British Columbia, *Geol. Surv., Canada*, Open File 925.

Stott, D. F. and Gibson, D. W. (1980): Minnes Coal, Northeastern British Columbia, *in* Current Research, Part C, *Geol. Surv., Canada*, Paper 80-1C, pp. 135-137.