



A GEOLOGICAL UPDATE OF THE CARBON CREEK AND BUTLER RIDGE AREAS* (93O/15, 94B/1)

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INTRODUCTION

The area of study is located west of the W.A.C. Bennett Dam in northeastern British Columbia (Figure 5-4-1). Compilation and geologic mapping at a scale of 1:50 000 was initiated in 1982, focusing on coal geology, structure and Jurassic-Lower Cretaceous stratigraphy. One preliminary map has been published (Butler Ridge, 94B/1) and another (Carbon Creek, 93O/15) is pending.

Fieldwork in 1986 had three objectives:

- (1) Mapping the west margin of the Carbon Creek syncline;
- (2) Measuring a section of the Bickford Formation;
- (3) Tracing Minnes Group stratigraphy eastward and resolving problems of correlation across the Carbon fault (see Legun, 1985b).

General geology will not be reviewed here. The reader is directed to previous reports (Legun, 1983, 1984, 1985a, 1985b, 1986) for a background of the structural geology and stratigraphy in the area, which are still undergoing revision. This paper presents an update which supersedes previous reports.

MINNES GROUP STRATIGRAPHY

Fieldwork at Mount Gething and examination of the Quasar *et al.* Dunlevy (a-40-L, 94B/1) lithology log suggests that a 50-metre interval of quartz arenite was correctly assigned to the Monteith Formation east of the Carbon fault and that an alternative assignment to the Monach Formation (interpretation 2 in Table 22-1 of Legun, 1985b) is incorrect.

With the top of the Monteith Formation correlated across the Carbon fault, the thickness of Minnes strata between the Monteith

and Cadomin Formations can be shown to decrease from a maximum 990 metres in the West Carbon Creek area to 145 metres on the eastern slope of Butler Ridge (Table 5-4-1 and Figure 5-4-2). Thinning is dramatic in the area of Mount Gething where (barring hidden faults) the section is reduced from 370 to 225 metres over a distance of only 5 kilometres. Immediately west of the Carbon fault, Minnes strata above the Monteith Formation can be divided into the Beattie Peaks Formation shale, Monach Formation arenite, and

TABLE 5-4-1.
STRATIGRAPHIC THICKNESS DATA
(See Figure 5-4-2 for locations)

Area	Top of Monteith Formation to Base of Cadomin Formation (Metres)
(1) Eleven Mile Creek, south fork, head of valley.....	—
(2) Peak south of Mount Wrigley.....	990
(3) Carbon Lake..... (Mount McAllister).....	744 (650)
(4) Mount Gething..... (South Mount Gething).....	370 (225?)
(5) Quasar <i>et al.</i> Dunlevy a-40-L.....	210
(6) Butler Ridge.....	175
(7) Czar <i>et al.</i> Butler d-59-J.....	145

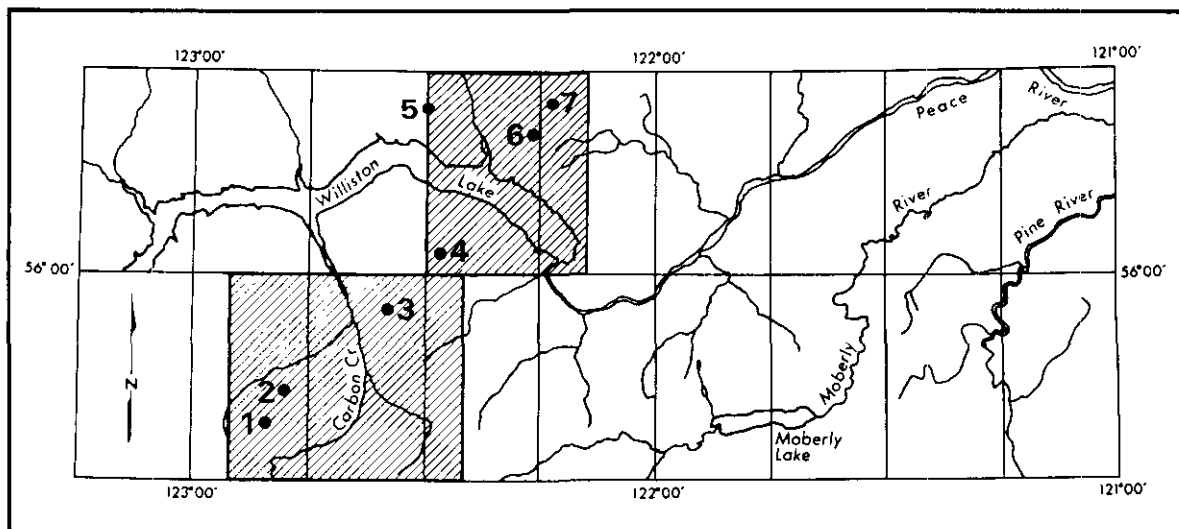


Figure 5-4-1. Location of the Carbon Creek and Butler Ridge map areas; stratigraphic thickness data at numbered locations (see Figure 5-4-2 and Table 5-4-1).

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British Columbia Ministry of Energy, Mines and Petroleum Resources, Geological Fieldwork, 1986, Paper 1987-1.

Bickford Formation interbedded arenite and shale. This lithostratigraphic subdivision cannot be made east of the fault. On Mount Gething, the section immediately above the Monteith quartz arenite consists of several shale to arenite cycles suggesting the Beattie Peaks Formation is shoaling (shaling out) to the east. Any overlying arenites of the Monach Formation cannot be lithologically separated from an arenaceous Beattie Peaks Formation. The writer has recognized facies typical of the Monach Formation (that is, low-angle crossbedded arenites) east of the Carbon fault (Legun, 1983) but the facies has proved to be discontinuous and it is uncertain whether the same stratigraphic interval is represented from one locality to the next. The entire sequence above the Monteith Formation east of the Carbon fault consists of interbedded arenites and siltstones with no persistent markers. As a whole the sequence crudely coarsens upward such that thick arenites often directly underlie the Cadomin Formation.

Since east of the Carbon fault the Minnes Group above the Monteith Formation undergoes facies changes and is not coherent laterally, the final map of the Butler Ridge area will only recognize an upper Minnes Group (undifferentiated).

BICKFORD FORMATION

A 290-metre section of the Bickford Formation was measured in the Carbon Creek area at the head of a valley just west of Mount Monach. The formation is well exposed on both limbs of a tight

syncline. The section ends in the core of the syncline, without reaching the Cadomin Formation. The lower contact with the Monach Formation is placed at the transition from thick units of arenite to an interbedded sequence of arenite and shale. The arenite interbeds display swaley cross-stratification modified by wave-rippled (and variably burrowed) tops. The occasional arenite is intensely burrowed with packed single (*Skolithos*) or double (*Diplocreterion*) tubes. Upsection a quartz arenite is found followed by alternating beds of carbonaceous shale and rooted, current-rippled arenites. A change from shallow marine to beach to subaerial depositional environments is indicated.

RELATIONSHIP OF CADOMIN FORMATION TO UNDERLYING MINNES GROUP

The lithological contact of the Cadomin Formation with the underlying Minnes Group varies from gradational in the west to sharp in the east. The lithology immediately underlying the lowest pebbly arenite varies from carbonaceous arenites and thin coals (gradational contact) to burrowed marine siltstone (sharp contact) to quartzitic and/or noncarbonaceous arenites (sharp contact).

Detailed fieldwork suggests the Cadomin Formation lies at a different stratigraphic level from locality to locality. At Mount Gething the basal pebbly arenite is replaced by stratigraphically

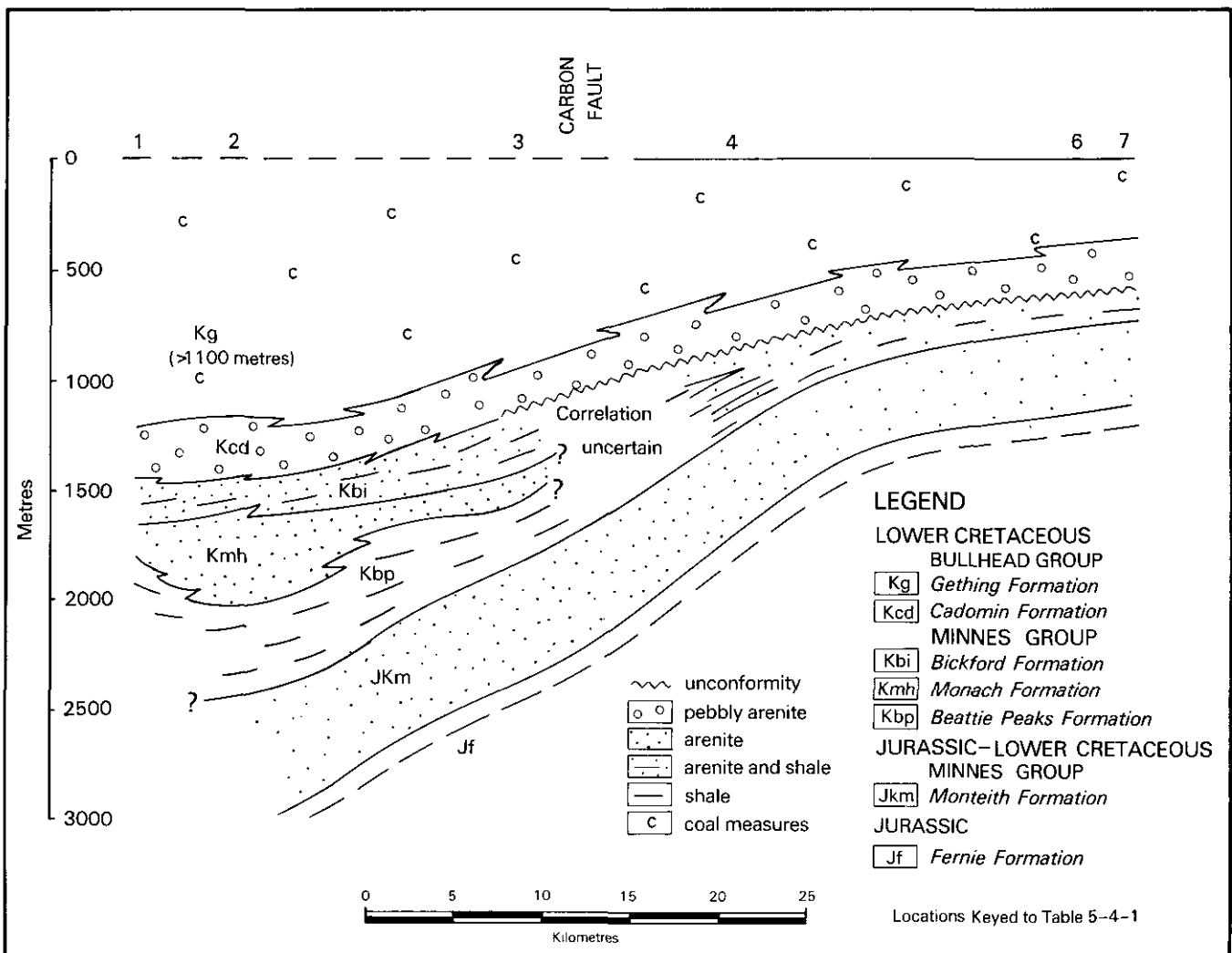


Figure 5-4-2. Generalized southeast-northwest stratigraphic section of Jurassic-Lower Cretaceous Formations (see Figure 5-4-1 for locations).

lower pebbly arenites along strike. At Mount Wrigley careful tracing of marker units on airphotos shows basal pebbly arenites of the Cadomin Formation lie on strike with interbedded arenites and shales of the Bickford Formation.

Biostratigraphic evidence for a regional unconformity at the base of the Cadomin Formation has been documented by Stott (1973) and Broatch (1986). Stott considers the Cadomin Formation to rest on Beattie Peaks Formation strata at Bullhead Mountain. Legun (1983) considered it to rest on the Monach Formation, but has subsequently (this paper) decided that the Minnes Group is not subdivisible east of the Carbon fault due to facies changes at the hinge line of the depositional basin at Mount Gething (Figure 5-4-2). The question of what proportion of the Minnes Group has been eroded, and what proportion has thinned out by onlap onto the basin margin, can only be resolved by biostratigraphic comparison of the Minnes succession at Carbon Creek and Bullhead Mountain.

GEOLOGIC MAPPING

Additional fault and fold structures complicate the trace of geologic map units on the west margin of the Carbon syncline as presented in Legun (1985b, Figure 22-3). These include north-plunging folds in the area of Cadomin Formation exposure at Eleven Mile Creek and fault repeats of the Monach and Bickford Formations immediately north of Mount Monach. Map units were also redefined east of Mount Cowper and east of the Beattie Peaks, as a result of creek traverses. The extension of the Canfor road up the Carbon Creek watershed was also mapped.

In the Butler Ridge map area a major fault on the south face of Mount Gething was redefined (*see* section C-D in Legun 1985a). Near surface, at the peak, the fault is more shallow-dipping than previously thought (25 degree dip) and steeper (subvertical) at depth, as exposed on the lower slopes. Hangingwall strata form a box anticline with the east limb cut off by the fault. Formation of the box anticline is probably related to the fault ramp below. The traces of the Monteith and Cadomin Formations were carefully remapped on Mount Gething, allowing thickness compilation of the Monteith to Cadomin Formation interval (*see* Minnes Group Stratigraphy).

FUTURE WORK

No further fieldwork is contemplated.

ACKNOWLEDGMENTS

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