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STRATIGRAPHY OF COAL OCCURRENCES IN THE BOWSER BASIN

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INTRODUCTION

Coal has been known in the Groundhog coalfield in the northern Bowser basin since the turn of the century (Buckham and Latour, 1950), but because of the remoteness of the area and the complexity of the geology the resource potential remains poorly understood. In order to better define the stratigraphy, sedimentology and coal resource potential, a field study of the Groundhog coalfield and surrounding areas has been undertaken. The purpose of this paper is to report the results of fieldwork conducted in the northern Bowser basin during the 1989 field season.

TRADITIONAL BOUNDARY OF THE GROUNDHOG COALFIELD

The boundaries of the Groundhog coalfield (Buckham and Latour, 1950) have never been formally defined, but traditionally have included coal-bearing strata from the Groundhog Range to north of Mount Klappan. Exploration was active in the Groundhog coalfield for a 10-year period ending in 1915. More recently, exploration activity has been centred near Mount Klappan, in the northern part of the coalfield, in an area now known as the Klappan coalfield (Koo, 1986). The approximate limits of the Groundhog and Klappan coalfields are shown in Figure 4-9-1.

STRATIGRAPHY

Stratigraphy proposed for the Groundhog and Klappan coalfields is summarized in Figure 4-9-2 (after Cookenboo

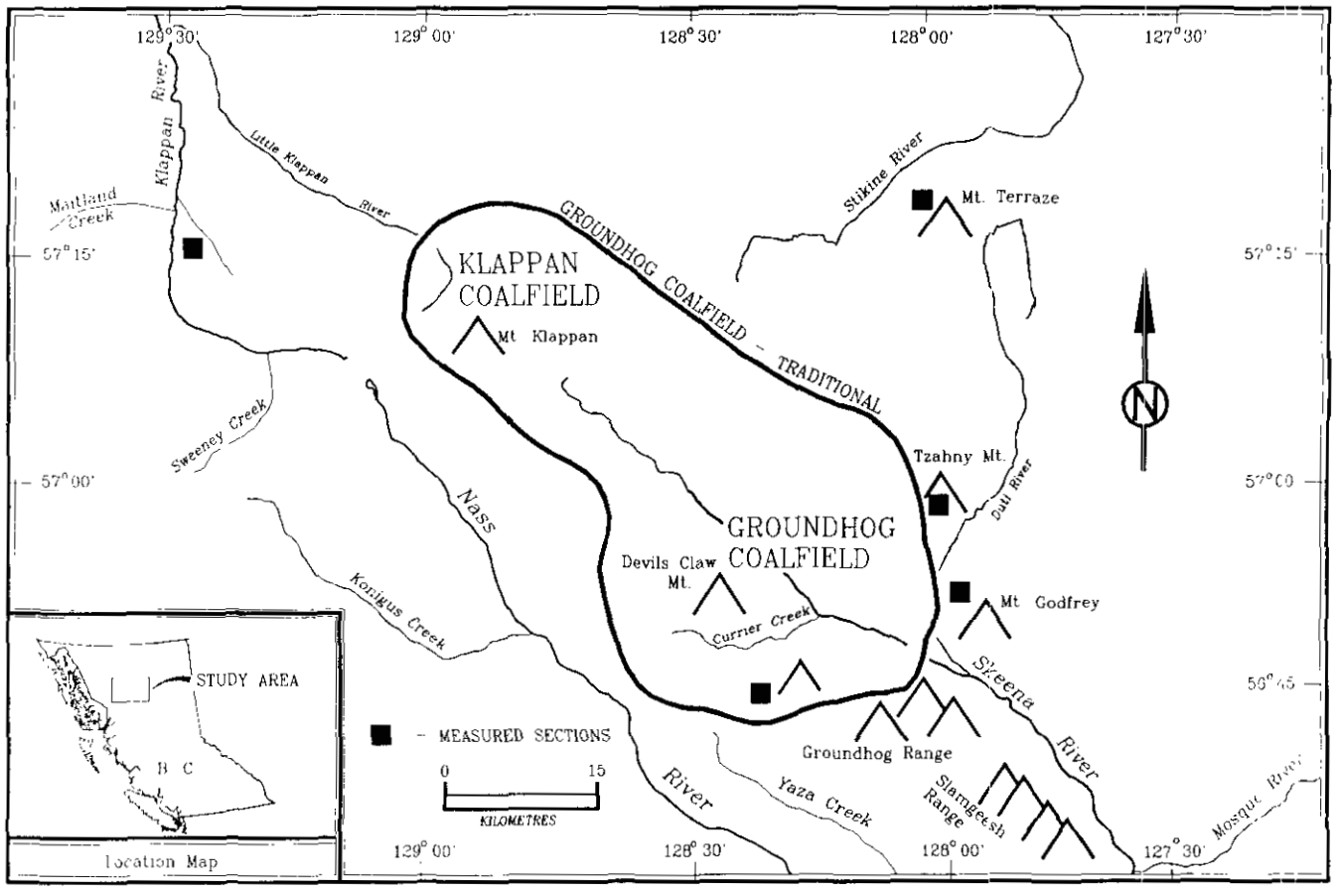

Figure 4-9-1. Location map of study area showing the Klappan and Groundhog coalfields, and sections described in this report.

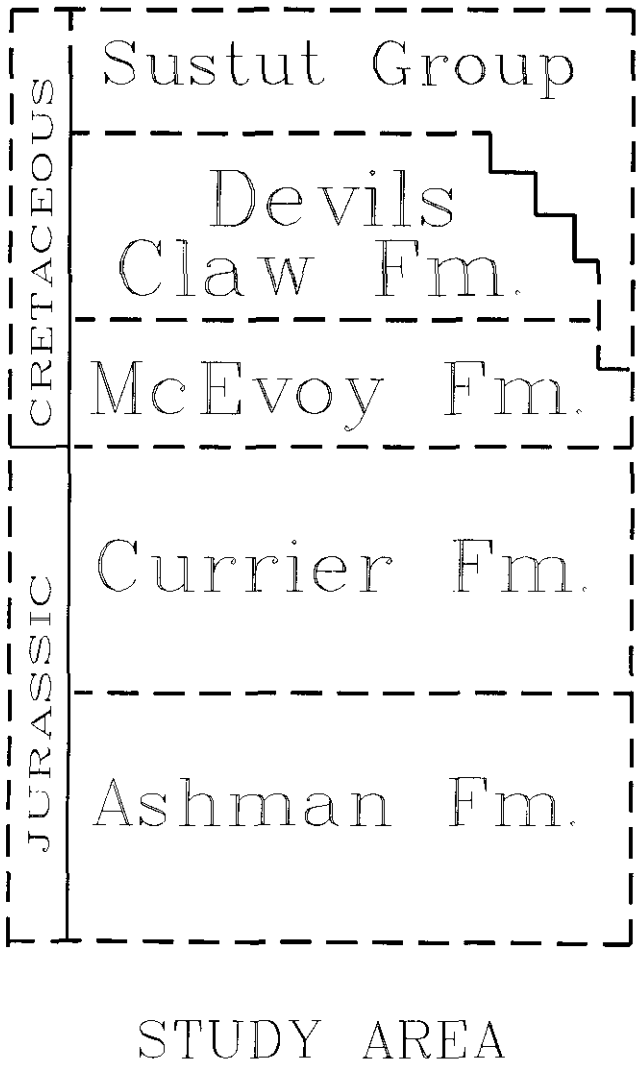

Figure 4-9-2. Stratigraphy of the northern Bowser basin.

and Bustin, 1989). From oldest to youngest, the stratigraphic units recognized in the area of the coalfields are the Ashman, Currier, McEvoy and Devils Claw formations. Sustut Group rocks occur to the east of the coalfields and include at least one coal-bearing exposure. Previous study (*c.f.* Bustin and Moffat, 1983) has documented a substantial coal resource in the Currier Formation throughout the traditional Groundhog coalfield area. Exposures examined in the 1989 field season have allowed extension of the lower contact of the Currier Formation to the top of the Ashman Formation by including the transitional facies of the informally named upper Jackson unit (Bustin and Moffat, 1983) in the Currier Formation (Cookenboo and Bustin, in press).

Three stratigraphic intervals of good coal development have been identified in the study area: the oldest occurs in the Currier Formation, the second is assigned to the McEvoy Formation and the youngest is here considered to be in strata correlative with the Sustut Group. Differences in number, thickness and rank of coal seams that have been observed in preliminary study of each interval may prove to be of great significance to exploitation of the coal resource. The best development in terms of thickness and number of seams is anthracite and meta-anthracite coals in coal measures of the Currier Formation. Thinner semi-anthracite coals typify the McEvoy Formation. High volatile bituminous coals were encountered in thinner seams in the Sustut Group.

The stratigraphic positions of the three coal-bearing zones are shown in a cross-section through the study area (Figure 4-9-3). From the cross-section, it is apparent that coal measures comprise only a fraction of the total stratigraphic thickness. Much of the remaining strata consist of lithologically monotonous, marginal marine deposits. Because of the structural complexity of the area, correlations in these rocks are difficult and the thickness assigned to each interval should be regarded as preliminary.

CURRIER FORMATION COAL ZONE

The primary coal zone of the Klappan and Groundhog coalfields occurs in the lower Currier Formation, in strata of Middle to Late Jurassic age (Cookenboo and Bustin, in press). Good coal development occurs in this zone in sections measured across a broad area of the northern Bowser basin. Currier Formation coal seams are anthracite and meta-anthracite in rank, and are the thickest in the study area, reaching 8 and 10 metres in thickness in two seams east of the Klappan River. Seams 3 to 5 metres thick have been measured in several areas, including Mount Klappan, Tzahny Mountain and Currier Creek (Bustin and Moffat, 1983).

Three sections, one 5 kilometres northwest of Panorama Mountain and two others east of Nass Lake, were measured within the Groundhog and Klappan coalfields in the 1989 field season, and two other sections of good Currier coal development were found east of the Klappan River and on Tzahny Mountain, outside the area traditionally considered part of the Groundhog coalfield.

PANORAMA MOUNTAIN

Five coal seams 1 to 3 metres thick occur in a 125-metre section northwest of Panorama Mountain. This section is well exposed on the east side of a north-trending ridge, 4 kilometres south of Currier Creek. Facies are consistent with deltaic deposition, as interpreted for the Currier Formation (Bustin and Moffat, 1983). This section is considered roughly correlative with a section previously measured on the south flank of Devils Claw Mountain, north of Currier Creek, which has been dated as late Callovian in age, based on palynoflora (G. Rouse, personal communication, 1989).

EAST OF THE KLAPPAN RIVER

Thick coals occur on the northeast side of a northwest-trending ridge east of the Klappan River, near its confluence with Maitland Creek. Two poorly exposed coal seams totalling 18 metres in thickness occur over a 55-metre interval near the base of nearly 600 metres of strata. These two thick seams are mostly covered by talus and vegetation and the top of each is marked by springs. At least five other seams between 0.5 and 2 metres thick occur higher in the section.

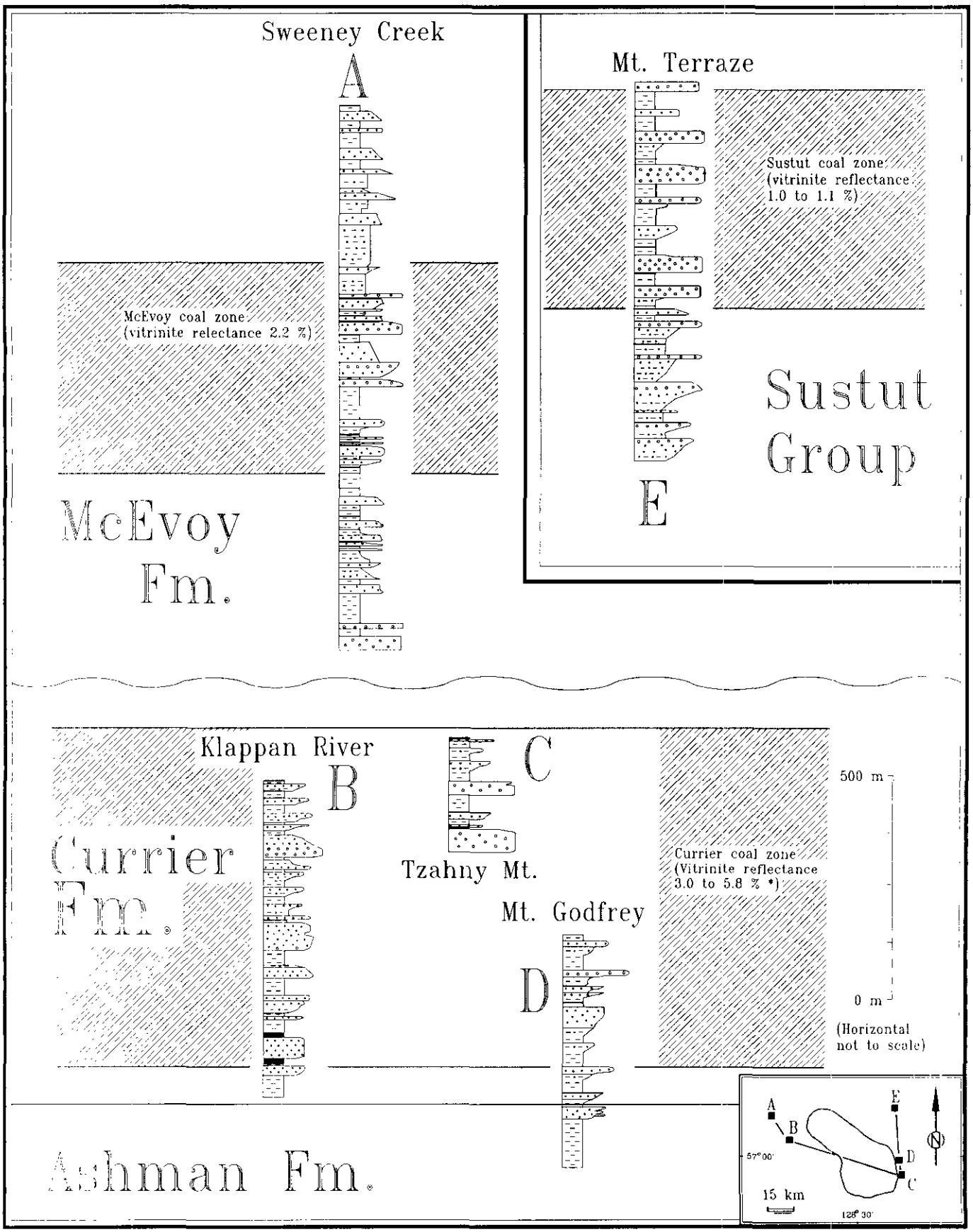

Figure 4-9-3. Stratigraphic cross-section across the north-central Bowser basin, showing the three zones of good coal development. Vitrinite reflectance values are from this report, except for Currier Formation (Bustin, 1984).

The thick coals found east of the Klappan River occur within transitional marine facies characterised by coarsening-upward sequences of mudstones, sandstones and conglomerates, with abundant biogenic structures and rare shells, in addition to plant remains. This section is correlated with the coal-bearing zone of the lower Currier Formation that is exposed within the Klappan and Groundhog coalfields 20 kilometres to the southwest. Measured vitrinite reflectance values from the two thick seams near the base of this section were 3.0 and 3.7 per cent, indicating that the coal is anthracite rank. These values are within the range previously reported from the Currier Formation, supporting the correlation with the Klappan and Groundhog coalfields. This correlation extends the reported range of the Currier Formation beyond the coalfields for the first time.

Tzahny Mountain

Coal seams exceeding 2 metres in thickness occur in coarse-grained facies tentatively assigned to the Currier Formation on Tzahny Mountain. The structure in the area is complex, including faults and tight folds, but an apparently continuous section 205 metres thick was measured including two coal seams more than 2 metres in thickness. The facies is coarser than the Currier Formation in the Groundhog and Klappan coalfields, with conglomerates to 32 metres thick accounting for nearly 30 per cent of the section. However, the coarse nature of the facies is probably misleading, and is at least partly a result of preferential exposure of the more resistant conglomerates.

McEvoy Formation Coal Zone

Good coal development was identified in sections measured south of Sweeney Creek and tentatively assigned to the McEvoy Formation.

Sweeney Creek

Six seams of 1 to 3 metres thickness are exposed within a 300-metre-thick succession near Sweeney Creek. Two exposures on ridges south of Sweeney Creek were measured, with the thickest and most complete section exceeding 1000 metres in thickness. The coal occurs in a facies of interbedded mudstones and sandstones that is interpreted as deltaic in origin. The strata at Sweeney Creek are a finer grained facies of the McEvoy Formation than that previously described in the type area of the Klappan and Groundhog coalfields east of the Nass River (Cookenboo and Bustin, 1989). Coals are thicker in the Sweeney Creek area than in the McEvoy Formation within the coalfields, where seams are typically less than 0.5 metre thick.

Coal in the Sweeney Creek area is semianthracite rank, with a measured vitrinite reflectance value of 2.2 per cent. This coal is lower rank than most of the coal previously reported from the Currier Formation (Bustin and Moffat, 1989), consistent with the stratigraphically higher position and younger age of the McEvoy Formation. The McEvoy Formation is dated as mid-Cretaceous (upper Barremian or Aptian to middle or late Albian) east of the Nass River (Cookenboo and Bustin, 1989).

Sustut Group Coal Zone

A zone of good coal development is exposed on Mount Terraze, 15 kilometres east of the Groundhog coalfield, in strata tentatively assigned to the Sustut Group (Cookenboo and Bustin, in press).

Mount Terraze

Four coal seams between 0.5 and 2 metres thick were measured in the upper 200 metres of a more than 600-metre-thick exposure on the northeast flank of Mount Terraze. The coal seams are poorly exposed on talus slopes between resistant conglomerate cliffs. Because of the poor exposure, the measured seams probably represent a minimum value for the total thickness of coal in the section. Additional coal potential is suggested by the local structure. The top of the section is a dip-slope at the the top of Mount Terraze, dipping down towards Ella Creek to the east, suggesting the possibility that related coal-bearing strata may exist in the Ella Creek valley.

Vitrinite reflectance values of 1.0 and 1.1 per cent have been measured from these coals. Such values are equivalent to high volatile bituminous rank. These coals are significantly lower rank than the semianthracite to meta-anthracite of Currier and McEvoy Formation coals. Coals of this rank have previously only been reported in northern British Columbia from the Sustut Group (Bustin, 1984; Smith, 1989). This relatively low rank supports the assignment of the these coals to a third and probably younger coal zone, and is consistent with assigning the strata to the Sustut Group (Cookenboo and Bustin, in press).

Acknowledgments

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