THE SUSTUT COAL MEASURES
(94D)

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INTRODUCTION

Recent interest and successful exploration programs in the Telkwa and Klappan coal measures in northwestern British Columbia have attracted other companies to explore for coal elsewhere in the region. The Sustut coal measures represent one such area, which Suncor Inc. Resources Group have explored by diamond drilling during the 1983 (seven holes totalling 1 464.2 metres) and 1984 (10 holes totalling 1 027.8 metres) seasons.

The present investigation, which consisted of three field days and six office days, was carried out to examine the property geology, structural development, depositional environment, age, areal extent, nature of the coal seams, and possible economic significance.

Suncor holds 23 coal licences on 6 624 hectares of land located approximately 170 kilometres north-northeast of Smithers and 10 kilometres northeast of Bear Lake; it is centred at latitutde 56 degrees 20 minutes north and longitude 127 degrees 30 minutes west (Fig. 106). Access to the property is via fixed wing aircraft to a good gravel airstrip adjacent to the B.C. Rail line 4 kilometres north of the northern tip of Bear Lake, then by helicopter to the property, 11 kilometres to the northeast.

The Sustut coal property is underlain primarily by strata of Mesozoic and Paleocene age. Coal-bearing strata occur within both the Jura-Cretaceous Upper Bowser Lake Group and the Paleocene Tango Creek Formation.

PROPERTY GEOLOGY

The geology of the Sustut coal licence area is complex. Pronounced folding and faulting in a southeast-northwest direction, with numerous minor faults orientated in a east-west direction, has greatly affected the stratigraphy making correlation difficult. As well, thick overburden, particularly in the valleys, has presented problems for both drilling and mapping programs within the licence area.

The most important coal-bearing sedimentary unit found on the property consists of marine and non-marine sedimentary rocks with lesser volcanic rocks of the Bowser Lake Group. Tipper and Richards (1976) divided the Bowser Lake Group into the coal-bearing Upper Bowser Lake Formation and the lower, non-coal-bearing Ashman Formation.

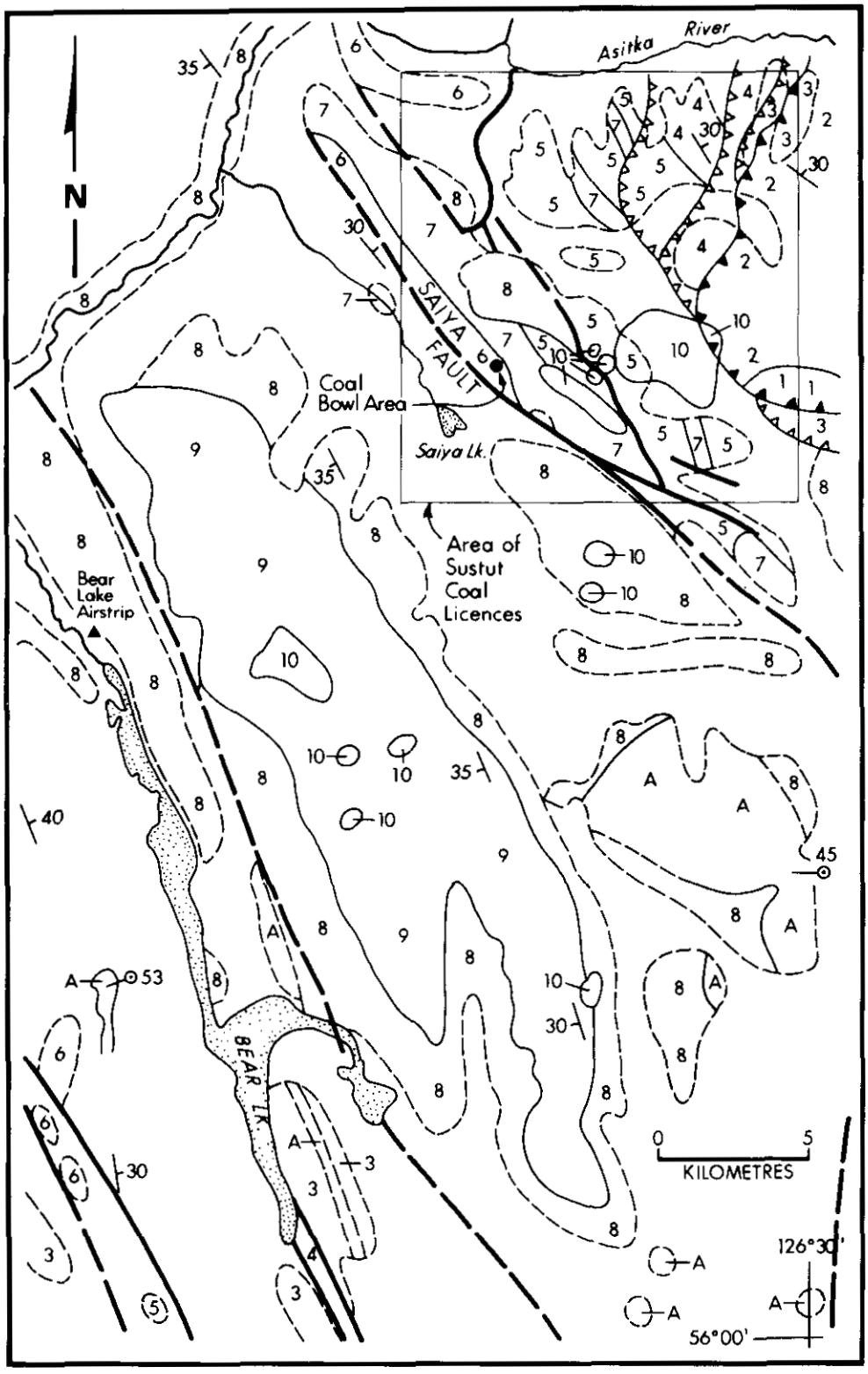

Figure 107. Regional geology of the area northeast of Bear Lake (modified after Richards, 1975).

LEGEND

STRATIFIED ROCKS

UPPER TERTIARY AND/OR QUATERNARY

10 BASALT; FLOWS, BRECCIA, PLUGS, AND DYKES

UPPER CRETACEOUS TO EOCENE
SUSTUT GROUP

9 **BROTHERS PEAK FORMATION:** CONGLOMERATE, SANDSTONE, SILTSTONE, AND ACID TUFF, MINOR COAL

8 **TANGO CREEK FORMATION:** CONGLOMERATE, SANDSTONE, AND SILTSTONE, MINOR COAL

JURASSIC
MIDDLE AND UPPER JURASSIC
BOWSER LAKE GROUP
UPPER OXFORDIAN

7 VOLCANICS, BASALT AND ANDESITE FLOWS, BRECCIA, TUFF, AND LAHARS

6 SEDIMENTS, SANDSTONE, SILTSTONE, ARGILLITE, AND CONGLOMERATE; MINOR COAL

CALLOVIAN TO LOWER OXFORDIAN

5 **ASHMAN FORMATION:** ARGILLITE AND SILTSTONE; MINOR SANDSTONE AND TUFF

LOWER AND MIDDLE JURASSIC
HAZELTON GROUP
MIDDLE TOARCIAN TO MIDDLE BAJOCIAN

4 **SMITHERS FORMATION:** GREYWACKE, SILTSTONE, SANDSTONE, AND TUFF

SINEMURIAN TO ? LOWER PLIENSBACHIAN

3 **TELKWA FORMATION:** CALCALKALINE BASALT, ANDESITE, DACITE AND RHYOLITE FLOWS, BRECCIA, TUFF AND LAHARS, INTRAVOLCANIC FANGLOMERATE, CONGLOMERATE, SANDSTONE, AND SILTSTONE

POLYMICTIC CONGLOMERATE WITH ASITKA, TAKLA, AND GRANITIC CLASTS

UPPER TRIASSIC
TAKLA GROUP
UPPER KARNIAN TO MIDDLE NORIAN

2 **DEWAR FORMATION:** TUFF, SANDSTONE, AND ARGILLITE; MINOR LIMESTONE AND BRECCIA

PERMIAN
ASITKA GROUP

1 BASALT, RHYOLITE, TUFF, CHERT, ARGILLITE, AND CARBONATE

INTRUSIVE ROCKS

EOCENE

A **KASTBERG INTRUSIONS:** QUARTZ MONZONITE, QUARTZ-EYE PORPHYRY, AND FELSITE

SYMBOLS

GEOLOGIC BOUNDARY, KNOWN, APPROXIMATE

FAULT KNOWN, APPROXIMATE

HIGH ANGLE REVERSE FAULT
KNOWN, APPROXIMATE

THRUST FAULT KNOWN, APPROXIMATE

BEDDING, UPRIGHT

K/Ar AGE DETERMINATIONS (Ma)

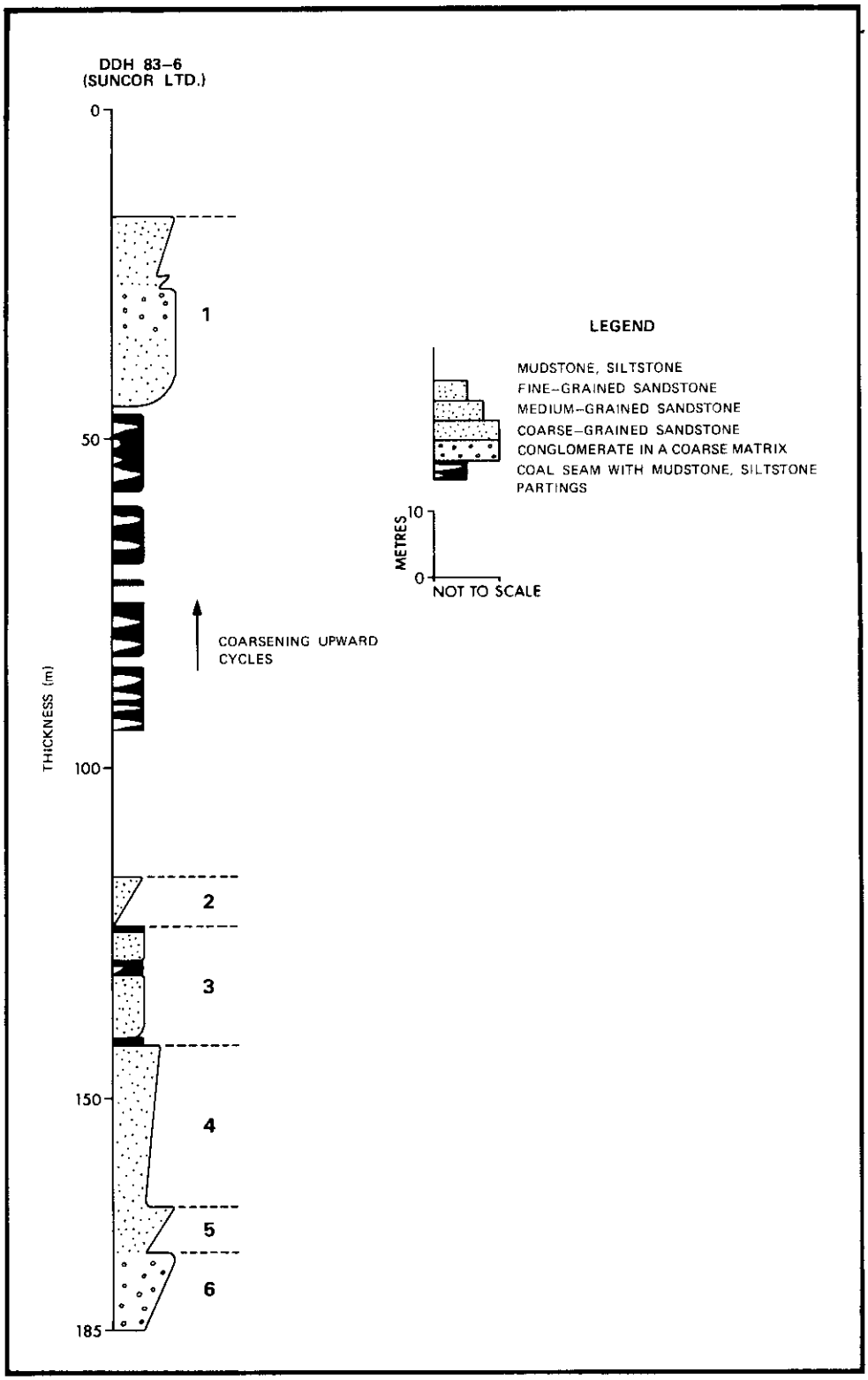

Figure 108. Stratigraphic section of sedimentary rocks of the Upper Bowser Lake Formation.

Based on diamond-drill core and geophysical log examination, Upper Bowser Lake rocks within the licence area consist of sandstones, siltstones, mudstones, shales, and coals. The sandstones are fine to coarse grained, light to medium grey in colour, exhibit crossbedding in places, and generally are well sorted. The siltstones are light brown in colour and appear to be part of a fining upward sequence. They do not form thick units (for example, 2 to 3 metres) and are bioturbated. The carbonaceous mudstones and shales are dark grey to black in colour and closely associated with the coal horizons; they represent periods of low energy with low levels of input of fine sediments.

Coals in the Upper Bowser Lake Formation within the licence area are of high to medium volatile bituminous rank. Company tests also suggest that coals of sub-bituminous and low volatile bituminous rank occur.

Major outcrops of coal are situated in an area that company personnel call the 'Coal Bowl' (Fig. 107). At this location, considerable trenching has revealed seams up to 9 metres in thickness; however, they are steeply dipping (up to 90 degrees) and seam correlation is difficult.

From examination of drill core and geophysical logs it appears that a general coarsening upward sequence characterizes the Upper Bowser Lake Group (Fig. 108). The sediments were probably deposited in a deltaic environment and the coal seams could have substantial lateral extent. However, intense faulting and folding within the licence area has greatly interrupted the continuity of the sequence.

The non-coal-bearing Ashman Formation of the Bowser Lake Group lies conformably below the coal-bearing Upper Bowser Lake Formation. This formation crops out within the licence area and is not easily distinguished from the Upper Bowser Lake Formation. Company geologists have separated the Upper Bowser Lake from the Ashman Formation by the presence of concretions in the Ashman. These concretions are light brown to rusty brown in colour and range in size from 1 to 20 centimetres. No concretions have been recognized within Upper Bowser Lake sedimentary rocks.

A second coal-bearing stratigraphic unit occurs in the Sustut Group, which lies unconformably over the Bowser Lake Group and crops out within the licence area. Eisbacher (1974) divided this group into the Upper Brothers Peak Formation and the coal-bearing Tango Creek Formation.

These sediments were recognized by company geologists, but because of limited time and transportation, were not examined by the writers. Suncor geologists report that coal is present in the upper portion of the Tango Creek Formation but that correlation is made difficult and seam continuity is disrupted by extensive folding and faulting.

CONCLUSIONS

The intense folding and faulting and thick overburden in valley bottoms inhibits coal exploration within the Sustut coal licence area. Nonetheless, substantial Middle to Late Jurassic coal seams with low to high volatile bituminous ranks have been identified. Further mapping and drilling are needed to assess the nature and extent of the Sustut coal measures.

ACKNOWLEDGMENTS

The writers would like to thank Suncor Resources Incorporated of Calgary, in particular, project geologist John Fisher and staff, for their generous support and willing cooperation.

REFERENCES

Eisbacher, G. H. (1974): Sedimentary History and Tectonic Evolution of the Sustut and Sifton Basins, North-central British Columbia, *Geol. Surv., Canada,* Paper 73-31.

Richards, T. (1975): McConnell Creek Map-area, *Geol. Surv., Canada,* Open File 342.

Tipper, H. W. and Richards, T. A. (1976): Jurassic Stratigraphy and History of North-central British Columbia, *Geol. Surv., Canada,* Bull. 270.