PRINCETON BASIN
(92H/7E, 8W, 9W, 10E)

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INTRODUCTION

Remapping of the Princeton basin, south-central British Columbia, was undertaken during the summer of 1975 in order to:

(1) produce an up-to-date, detailed geological map of the basin and the immediate surroundings.

(2) determine the structural and stratigraphic setting of coal-bearing strata, if possible.

(3) develop a geological framework under which coal exploration could adequately be assessed.

The project is being carried out under contract with the British Columbia Department of Mines and Petroleum Resources.

FIELDWORK

The Princeton basin, which covers an area of 170 square kilometres, was mapped at a scale of 1:15 840. The project commenced in mid-May and fieldwork was completed by late September.

Fieldwork involved detailed examination of outcrops, including section measurement where appropriate. Outcrop was found to occupy significantly less than 1 per cent of the overall basin by area and as much as one-third of this showed definite signs of slumping or other disturbance. The best exposures were found immediately adjacent to the Tulameen and Similkameen Rivers and along Summers Creek (Fig. 19). Remaining exposures were mainly restricted to small creeks or road cuts, although resistant arkosic sandstone/granule conglomerate ridges were locally prominent.

While there are numerous coal workings in the Princeton basin which operated from the turn of the century until the mid-1950's, only the surface operations were visited and described as the underground ones are presently inaccessible due to caving or slumping. Data on the underground operations are available in the Annual Reports of the Minister of Mines and in Geological Survey of Canada Paper 52-12 (Shaw, 1952). Borehole data are reported by Rice (1947); Granby Mining Corporation drilled two holes (Shaw, 1952) and Bethlehem Copper Corporation drilled 12 holes in 1971 (unpublished report, B.C. Dept. of Mines & Pet. Res).

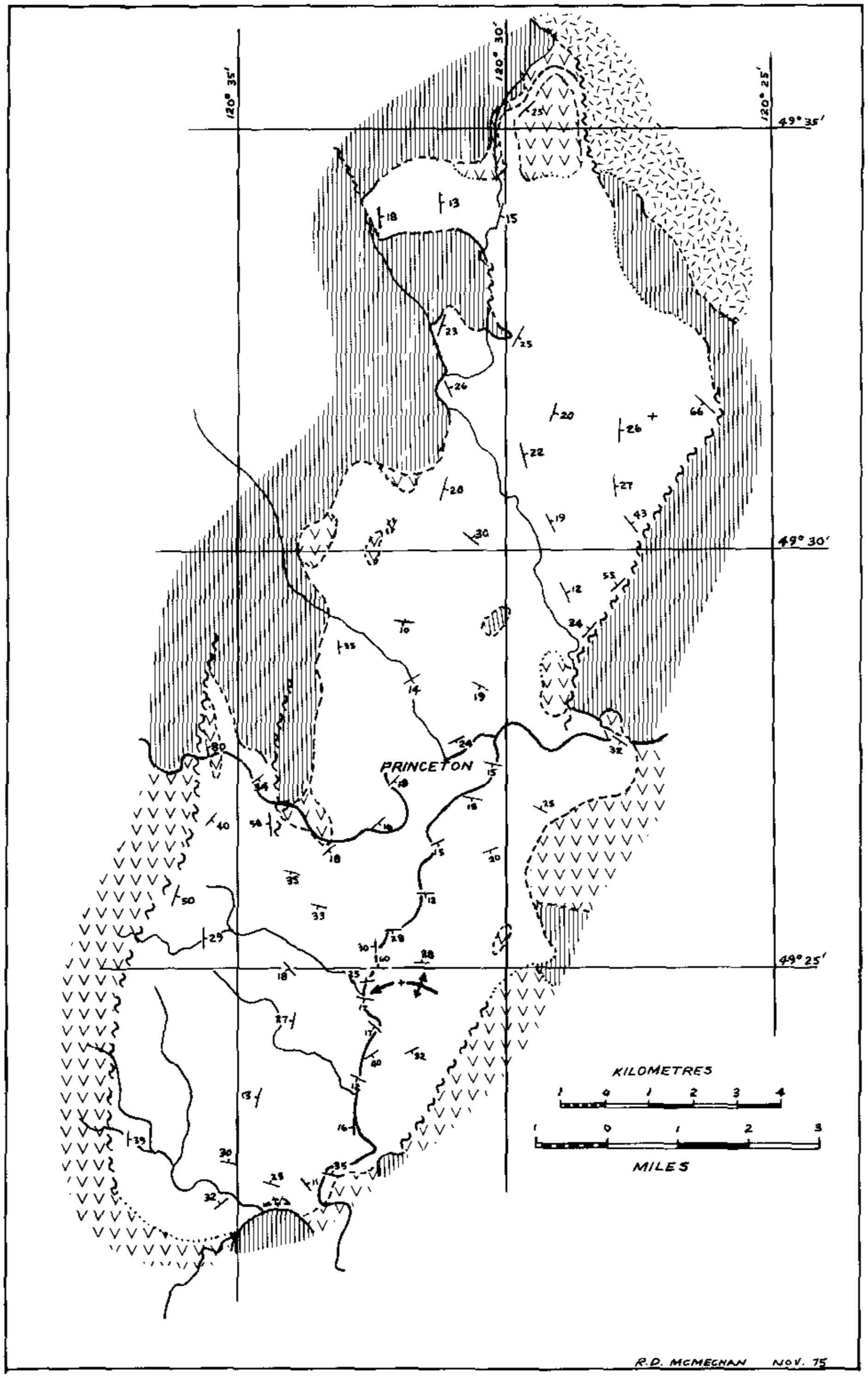


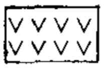
Figure 19. Preliminary geological map of Princeton basin.

LEGEND

TERTIARY

EOCENE

ALLENBY FORMATION: MAINLY SHALE, MUDSTONE, ARKOSIC WACKE, TUFFACEOUS SANDSTONE, ARKOSIC CONGLOMERATE, BENTONITE, COAL



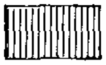
PRINCETON VOLCANICS: UNDIFFERENTIATED FLOWS OF DACITIC (?) TO BASALTIC COMPOSITION, RED LAHARS, AND BRECCIAS (IN PART INTERBEDDED WITH BASAL ALLENBY FORMATION)

JURASSIC OR LATER (?)

OSPREY LAKE INTRUSIVE BODY: PINK TO GREY GRANITE/ QUARTZ MONZONITE AND ASSOCIATED PORPHYRIES

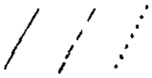
TRIASSIC

UPPER TRIASSIC AND LATER (?)



NICOLA GROUP: UNDIFFERENTAITED VARICOLOURED FLOWS, TUFFS, AND BRECCIAS, MINOR LIMY SEDIMENTARY ROCKS; ALSO INCLUDES INTRUSIVES AND VOLCANIC BRECCIAS OF APPARENTLY YOUNGER AGE

FAULT (INFERRED)

GEOLOGICAL CONTACT (KNOWN, APPROXIMATE, ASSUMED) 

ANTICLINE (PLUNGING) 

PRELIMINARY INTERPRETATION

On the basis of palynological study, K-Ar dating and mammal-tooth dating, Hills (1965b) assigned an age of mid–Eocene to the sedimentary and associated volcanic rocks of the Allenby Formation of the Princeton basin.

Early sedimentation appears to have alternated with local vulcanism in a structurally controlled, north-northeast-trending Tertiary basin in which the sedimentary and volcanic rocks were deposited unconformably on Upper Triassic (?) Nicola Group rocks. This early phase may have deposited a pile of sedimentary and volcanic rocks as much as 800 metres thick. Deposition of coal-bearing strata occurred during later stages. Four major coal zones [Princeton – Black, Pleasant Valley – Jackson, Gem – Bromley Vale and Golden Glow in ascending order after Shaw (1952)], together with intervening strata, occupy the next 500 metres. A further 600+ metres of sedimentary rocks, including other coal zones, may make the total column as much as 1 900 metres thick. Present information indicates that the dominant current direction on a basin-wide scale was south to southwesterly, in agreement with Hills (1965a).

Sedimentation appears to have occurred in an alluvial floodplain environment within a Tertiary basin having at least 300 metres of relief. Lateral lithological changes observed in outcrop scale suggest the existence of larger scale facies changes in such an environment. Field correlation was thus made difficult by anticipated lateral discontinuity, by lack of areally extensive marker beds, and by poor exposures. Therefore, it does not appear possible, nor meaningful, to construct a single stratigraphic column applicable to the whole basin. Nevertheless it was possible to correlate on scales of a few kilometres by tracing resistant units and to construct a 'piece-by-piece' section through much of the coal-bearing zone along the Similkameen River. The general succession of environments portrayed in this section should be a useful correlation tool for local exploration in the southern half of the basin. Hills (1965b) identified a palynological succession within the Tertiary which can be used as a laboratory check on tentative field correlations.

STRUCTURE

The northern half of the basin appears to be a 'block' that has been folded into a very gentle open syncline about a gently plunging, easterly trending fold axis. The 'limbs' of the syncline dip inward about 15 to 25 degrees.

A 'knob' of Nicola Group rocks surfaces approximately 2.5 kilometres north of Princeton (Fig. 19). From this point, sedimentary rocks generally dip gently (10 to 20 degrees) to the south through the village area. On the extreme west, sedimentary rocks dip approximately 50 degrees to the east while volcanic rocks in the Tulameen River dip as steeply as 80 degrees east.

The southern part of the basin is, in a broad sense, a structural depression having its greatest apparent depth west of the Similkameen River, 7 kilometres southwest of Princeton. Numerous meso-scale undulations occur south along the Similkameen River from Princeton, and a major east-west, asymmetric anticlinal structure is encountered near Allenby [Shaw's (1952) Allenby anticline]. A gentle to moderate southerly dip continues to the south. Dip direction swings around to the west and north at the extreme southern end of the basin. Little information is available in the southwest corner of the basin, but an easterly or northeasterly dip is postulated.

Margins of the basin are well defined in many places, either by visible contacts as in the extreme northern parts, or by strong topographic boundaries as on the western side.

Numerous normal faults of small displacement (a few metres to tens of metres) are visible along the Similkameen River section although extensive covered intervals along the higher reaches of the Similkameen frustrate detailed structural interpretation. Significant disturbance (dip steepening and/or reversal and local inconsistency of attitudes) and topographic breaks along some present basin margins suggest post-depositional vertical movement along regional basin-boundary fracture systems.

SUMMARY

While the present geological study combined with those done previously should yield enough structural and stratigraphic information to initially guide coal exploration, it should be borne in mind that extensive Quaternary and Recent cover, as well as surface disturbances such as landslides, leave large gaps in the present understanding and interpretation of the Princeton basin. A carefully planned drilling program, using the expected succession of sedimentary environments rather than single coal seams as a correlation tool (perhaps backed up by a palynological study), should fill in many of these gaps.

REFERENCES

Hills, L. V. (1965a): Source of the Allenby Formation, Princeton Coalfield, B.C., *Can. Petrol. Geol.,* Bull., Vol. 13, No. 2, pp. 271-279.

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