

Bulletin No. 17 as the Inangahua Graben, but in the area north of the Buller River it has features characterizing a fault-angle depression, and in reality is a combination of these two structural types. Thus the authors of Bulletin No. 17 write, "the western limit" [of the Inangahua Graben north of the Buller] "is somewhat indefinite, or rather, there is difficulty in defining it" (p. 52). The reason for the difficulty in defining it is because the structure is not a simple graben. The north-east-striking Papahaua block, from the higher portions of which much of the Tertiary strata has been removed exposing the granitic undermass, dips south-east towards the Glasgow fault, but a number of minor north-east-striking faults traverse it, and with the exception of the western most faults bounding two small horst-like blocks—the Mount Berners ridge, and the ridge between New and Slug Creeks—the downthrow is to the east. Some of these faults are shown on the Mokihiui-Lyell sheet accompanying Bulletin No. 17, but in addition the contours of the back-slope of the Mount William block suggest the presence of small strike-faults traversing it, not shown on the map. The Blackburn fault-zone is the westernmost of these subsidiary faults traversing the reserve, and though the throw on it amounts to several hundred feet within this area it dies out rapidly in both directions beyond it. To this fault is due the preservation of apparently the most valuable portion of the reserve, for it dropped much of the coal-bearing strata below erosion level. Next in importance are the faults along the Mount Berners ridge, which is of granite upthrown to the east. These faults die out north-eastward before reaching Ngakawau River, and south-westward only the larger of the two reaches the Mackley River, beyond which it is not well established. Minor faults close to the eastern boundary of this Mount Berners block give the impression that it may be a small horst, but some outcrops show the Tertiaries resting on the granite, dipping westward so that the structure of this minor block is a miniature repetition of the Papahaua block. Within half a mile east of the reserve, the Glasgow Fault cuts off the eastward extension of the Tertiary rocks and upthrows the granite and metamorphic rocks of the Glasgow Range some thousands of feet.

Denniston (1877, pp. 121–71) interpreted the broad structural outlines of the part of the depression occupied by the reserve as those of a basin-shaped coal area. Cox (1877, pp. 17–29) did not comment on the structure of the "Upper Orikaka Country" in his report, but his cross-section through "Orikaka Valley N.S." shows that he considered the coal-measures rested on a basement of marked relief.

Morgan and Bartrum (1915) showed in the cross-sections accompanying Bulletin No. 17 that they considered the Blackburn field west of the Mount Berners ridge to be a structural basin or broad synclinal fold much of the east limb of which is cut off by the Mount Berners fault. They pointed out that a moderately irregular or undulatory structure appears in the Blackburn, and they apparently considered that this was superposed on the larger synclinal fold.

The writers interpret the structure as a broad syncline, folded along a north-east axis, and superposed on this broad folding are minor folds and fractures. This interpretation is practically identical with the opinions expressed in Bulletin No. 17, as will be gathered from the following account in which for convenience of description different subsidiary structural blocks referred to on the map are lettered alphabetically.

The western margin of the possible coal-bearing area is bounded by the north-east-striking Blackburn Fault, the throw on which brings up the granite and must amount to several hundred feet. East of this fault are two narrow elongated fault-blocks, B and C, in which coal either outcrops or is probably present at no great depth. These two blocks do not appear to be broken by minor faults, but there is no positive proof of their absence.

Block A: Throughout block A, the northernmost block containing a seam of workable thickness, the strata are either horizontal or dip east and south-east at angles up to 25° . This dip was recorded at the coal outcrop at the northern edge of the block, where a small south-east-striking normal fault dipping south-west at 40° downthrows the coal about 12 ft. Other minor faults may intersect this block.

Block B: Within block B the strata dip probably easterly throughout the southern two-thirds of its length, but north of this the beds are synclinally folded, the strata being more or less horizontal over a small area at its north extremity.

West of Island Hill, within a faulted area, are some westerly dips up to 60° , but these steep dips probably do not persist beyond the east-bounding fault-zone, the throw on which may be as much as 250 ft. to 300 ft., about midway along the block. Assuming that the one recorded easterly dip of 15° midway along the block represents the average dip of the strata south of this, the easterly dip of 30° some 35 chains south-west being disregarded because it probably represents the drag of the fault, the coal horizon is nowhere at a greater depth than 250 ft. to 300 ft. in any part of the block, and throughout much of it this horizon would be at a much less depth, especially if the synclinal structure at its north persists throughout its southern end. By analogy with block C, the structure of which is better displayed, it is thought that the southern portion of block B is homoclinally folded.

Block C: Over the greater length of block C south-easterly dips of from 5° to 10° prevail, but at its southern end the block rises and the strata dip north-west.

Block D: Block D, east of blocks B and C, is roughly two miles long in a north-easterly direction, and about 60 chains wide. It does not appear to be intersected by any major faults. The Tertiary rocks between the flanking faults are folded with little or no fracturing into two synclines and two anticlinas the axes of which pitch north-east, in which direction the folding gives place to a single broad synclinal fold. The structure perhaps may be more correctly interpreted as two basins aligned along a north-east axis. West of the small synclinal and anticlinal folds at the south of the block is a small upfaulted block, which appears to represent an anticlinal fold that has fractured along its limbs. There is little displacement along the faults bounding it, and to the north they die out and the strata assume a regular easterly dip.