basins, some of the highest grade bituminous coals were found in good workable form.

The greater the degree of alteration, the more moisture and volatile matter were driven off, and the higher the percentage of fixed carbon remained. Near the axis of the Rocky Mountains the conditions were most favourable for the development of good coal and the percentage of fixed carbon is generally between 65 p.c. and 78 p.c. Going eastward from the axis of the Rockies, the pressure gradually diminished and the fixed carbon is found to decrease, while there is a corresponding increase in moisture and volatile matter in the coals. Continuing eastward the coals soon become lignitic in character and when the great plains are reached they are represented only by lignites proper.

The Crow's Nest field, situated just west of the main divide, suffered to some extent like the rest of the region. Its edges were turned up and a wider strip, now the Elk River Valley, was broken and carried away by erosion, but the main body of the field was lifted bodily up without any serious distortion. Generally speaking, the measures of the Crow's Nest field as they stand to-day, are bent upward all around the western edge of the field. The bending is almost universally gradual and regular, changing the altitude of the coal seams from horizontal to an extreme pitch of 40 in a distance of about three miles.

At three places on the western edge of the field, tributaries of the Elk River which run partly or entirely across the field have cut out deep valleys, thus making the coal seams accessible by level entries at places where the seams are more or less closely approaching the horizontal position. The highest seams in the main group of coal measures are exposed at points farthest up the valleys and, consequently, they are lying flatter than the lower ones where the latter are exposed by the same streams lower down and nearer to the edge of the basin.

At Morrissey, Fernie and Michel, situated respectively on the three transverse streams before mentioned, the Crow's Nest Pass Coal Company is carrying on active mining operations. At Coal Creek (the oldest of these collieries) the upper seams are lying in altitudes varying from horizontal to a dip of 15°. The lower seams on the same creek dip as high as 20°. At Morrissey the dips vary from 8 degrees to 24 degrees, and at Michel, they run from 15 degrees to 35 degrees.

It is evident that a system of mining and handling the coal in a *flat* seam will not apply to all these cases. Where the dips are moderate, the equipment is simple like that for a flat seam, horses drawing the cars from the working places to the main haulage roads. With the steeper dips, incline planes are used on which gravity does the work of lowering the cars to the main roads. Horses are then only employed on the secondary levels. Rooms are driven up the pitch from the levels and in each room there is a simple self-acting incline, or "McGinty", which is operated by the miners themselves. Where the dip approaches 35 degrees, chutes are used in the rooms and the coal is drawn from these into cars on the levels.

To obtain the greatest economy in handling the coal, the main haulage roads must be carefully laid out to take every advantage of the ground. Incline planes must be so located as to concentrate the work of lowering the cars. For this reason each incline is laid out so that it takes the cars from a set of rooms, 15 to 20 in number, on each side at every successive level. Without a proper system and equipment, the cost of handling the coal in a pitching seam is greater than for a flat one, but these once being installed, the arguments are by no means all in favor of the flat seam.

The physical and chemical properties of the coal depend to some extent upon the amount of cover now overlying the seams, but are affected to a greater extent by the pressure which has been exerted by the bending of the measures and by the manner in which the strata have yielded to the bending movement.

Where the seams are lying flat, or nearly so, assays like the following one, made from a sample specimen of coal from the face of No. 2 Mine, Coal Creek, are usual :

Moisture	0.41
Volatile matter	24.78
Fixed carbon	68.36
Ash	6.45
	100.

The bodily tilting up of the seams when unaccompanied by bending does not materially affect the constituents, as may be seen from the following assay of an average specimen from the face of the main level of No. 8 Mine, at Michel :—

Moisture	0.99
Volatile Matter	23.64
Fixed Carbon	67.99
Ash	7.38
	100.

The seam on which No. 8 Mine is operated is tilted up to an angle of 30 degrees to 35 degrees without bending.

Where the measures are bent even slightly, if it continues for some distance to either side, there is a noticeable increase in fixed carbon and a corresponding decrease of volatile matter. The resulting coal is rather better in quality, having greater heating power.

An example of this may be taken from No. 4 Mine at Michel, across the valley from No. 8, where the measures are dipping about 15 degrees and where the altitude of the rocks outside shows that there was a slight bending movement ; the assay from No. 4 Mine is as follows :—

Moisture	0.63
Volatile Matter	21.44
Fixed Carbon	73.85
Ash	3.23
Sulphur	.85
	100.

A similar example may be taken from No. 1 Mine at Morrissey where the bending conditions are more pronounced :—

Moisture	0.65
Volatile Matter	13.48
Fixed Carbon	78.88
Ash	6.40
Sulqhur	0.59
	100.

These assays were all made by Mr. R. W. Coulthard.

As regards physical properties of the coal it appears that when the roof and floor have held the coal under intense pressure during the bending movement, the coal remains firm. In some instances, however, this has not been the case and the roof and floor have apparently yielded readily to the induced lateral pressure, allowing the seam to "thicken out". The result is, then, that a certain amount of shearing has taken place and the coal mines freely, producing a higher percentage of slack. This is an advantage rather than otherwise, where so much slack coal is needed for making coke, as it saves the cost of crushing lump coal.