

ENGINEERING REPORT ON THE  
MERRITT COALFIELD

OBJECT

This report is submitted with the object of setting forth the known and reported facts concerning the Merritt Coalfield under option to Imperial Metals and Power Limited on the information gained to date from drilling, geologic examinations and the perusal of old maps and reports.

LOCATION

The property consists of Lot 166 and the northern half of Section 4, Township 9 1, Kamloops Land District. It is situated about one mile south of the Village of Merritt, B.C.

OWNERSHIP

The property is owned by S. Gerrard and partners of Merritt and is under option to Imperial Metals and Power Limited.

TRANSPORTATION

The Coalfield is traversed by a gravel road which gives access to Merritt. There are also several minor roads and trails. Merritt has highway connections with Kamloops, Spences Bridge and Princeton.

Merritt is located on the Canadian Pacific Railway line from Spences Bridge to Princeton. The line passes within a few hundred feet

## SUMMARY

The coalfield **south** of Merritt, B.C. contains an unknown quantity of a High Volatile Bituminous Coal with high BTU values and poor to good coking qualities..

It is conveniently located as regards road and rail transport. **It** is 240 miles from Vancouver.

The **coal occurs** in **two outcrop** areas. The continuity of the **seams** across the whole field is questionable, unless at considerable depth, as there appears to be an ancient river **channel** which cuts deeply into the measures. To date, no correlation of strata **on** either side of this **channel** has been possible.

A drilling programme **carried** out in 1960 indicated that there was little possibility of developing a strip mine in the field. Two thick seams were intersected in the Coal Gully **Hill** area, but insufficient drilling was done to make tonnage calculations.

The work done to date indicates that some of the old reports and maps of this field are unreliable.

AA appraisal of this property must be deferred until more exploration is done since it must be regarded in the light of an underground operation.

If it is decided to proceed with exploratory drilling, **the** drilling should be **concentrated** in the Coal Gully Hill area. Drilling **patterns** should be laid out so that the exploration proceeds outwards from the **known seams** in this area..

Transportation (cont'd)

of the northern boundary of the property and passes through the south-eastern corner of Lot 166 and through ~~the~~ middle of Section 4.. A spur to ~~the~~ Nicola Valley Sawmill runs along the northern boundary of Lot 166. The **grades of** the spurs to the old Middlesboro Colliery are **still in existence.**

**Merritt** is 240 miles from Vancouver by road and rail.

TOPOGRAPHY

The area is hilly and is covered with grass and sage-brush, There are few trees.. Sandstone and coal **outcrops** are common.

The **most** prominent topographic feature is the Coldwater River which flows down the **eastern** boundary of Lot ,166 and through the middle of **Section 4.**

The north-western **corner** of **Lot 166** is split by a narrow, deep **ravine** known as Coal Gully, Coal Gully Hill lies ~~to~~ the east and south of the gully. In the **north-eastern corner** of Lot 166 there is a prominence known as **Coldwater** Hill.

CLIMATE

The climate is generally dry with hot summers and fairly cold winters+ The **snowfall is** light.

GEOLOGY

Structural: According to a stratigraphic section prepared by the

G e o l o g y (cont'd)

Middlesboro Collieries, the coal is contained in at least seven seams as follows:

<u>Seam No.</u>	<u>Thickness</u>	<u>Mine No.</u>	<u>Interval</u>
2	6.0	2 North	70
3	2.5	3	50
6	6.0	4 Sec. 6 3 North	210
8	8.0	4, Sec. 8 & 9	160
4	25.0	4 East 4 Sec. 4 7	120
5	5.0	4 Sec. 5 5 East	160
1	26.0	1 5 West	

Note: Nos. 4 and 1 seams are double seams. No. 4 has two seams 18 and 7 feet thick with a 3 foot parting; No. 1 has two seams 18 and 8 feet thick with a 2 1/2 foot parting.

These seams outcrop in two distinct areas, the Coal Gully Area and the Coldwater Hill Area. (See Map 1). The Coal Gully seams are bounded on the west by Triassic volcanic rocks. They form a series of anticlines and synclines with their axes running north-west and south-east, and plunging at about 20 degrees to the south-east. The seams generally outcrop to the north-west. Their other limits are unknown.

The Coldwater Hill seams outcrop on the north-western side of

**the hill.** They form a broad anticline with the axis striking north 60 **degrees** east and plunging at about 20 degrees in the same direction. (Minister of Mines Report, 1946, Page 253). Three seams, No. 2, **3 and 6** outcrop in this area.

Very little is known of **the** ground between the two outcrop areas. For this **reason the** above stratigraphic section **must** be accepted as no more **than** a guide since it assumes a continuous **structure** across the whole field. It must also be borne in mind that the seam thicknesses given are those pertaining to the worked out portions of the mines. They do not **necessarily** apply to the unworked areas,

### Mineralogical:

**The coal is believed** to be Tertiary, and is, therefore, younger than the Triassic greenstones to the west and below. The folding of **the** coal beds, and the lava flows and volcanic bombs in the Merritt area suggest a period of volcanic activity since the beds were laid down.

The coal; which varies from seam to seam, is a high volatile **bituminous** coal with recorded BTU values from 10190 to 12710. The coking quality **is from "non-coking" to "good".** (Minister of Mines Report, 1946, Page 261).

### RESERVES

**Although** others have made estimates of **the** coal **reserves** in this field, **the** writer feels **that** too little is known of the extent of the various seams to make estimates which would be of any value.

## HISTORY

The property **was mined for** coal **from** 1906 to 1944 by the Middlesboro Collieries Limited. In this period over **2,000,000** tons were produced.

Since 1945 **S. Gerrard** and partners, operating as the Cold-water Coal Mines, have produced a small annual tonnage **for** local consumption.

The coal was mined by **working** the outcrop seams. No shafts **were sunk** and no stripping was done.

## DEVELOPMENT

Although the property was developed to produce a few hundred tons daily, practically nothing remains in the way of openings, plant or equipment. **From** the point of view of an operator who intends to mine coal today, the property must be considered as undeveloped, with the possible exception of Nos. **2 and 3** Mines. In these two mines the main slopes are in good condition.

## RECENT EXPLORATION

In the **spring** of 1960 Imperial **Metals** and Power Limited began an exploration **programme**. Maps, **plans** and reports were collected from various sources which gave a partial picture of the coalfield layout. Persons who worked in or were associated with the old operations were interviewed. **Much** useful information was obtained, but many gaps were left,

A **stadia** survey of **Lot 166** was made in **June** and a preliminary map prepared to show the main features such as roads, river, **portals, caved workings, etc.**

Based partly on this map and partly on **old maps** of the workings, a mine model was constructed. This model gave a picture of the relationships of the 'old' **workings** but gave **no information concerning the unworked seams.**

In an attempt to gain access to the old workings, a bull-dozer and a front-end loader were obtained and put to **work on opening up the portals** of Nos. **1, 4 and 4 East Mines.** These efforts were fruitless as the workings were found to be badly caved at various distances inside the portals. Some stripping and trenching was also done to expose outcrop **seams.**

Later, **Mr. T. Robertson** of the Mine Rescue Station at Princeton visited **the coalfield with the necessary safety equipment** for entering abandoned **mines. Attempts were** made to enter the workings through all **available** openings. The attempts in the **Coal Gully** area were unsuccessful with **the** exception of **No. 3 South.** In this case Mr. Robertson was lowered on a rope to a slope distance of 235 feet. He had to retreat at this point due to oxygen **deficiency of the mine air.** He reported that the mine was in a **fair state** of preservation as far as he **could see.** In the Cold-water Hill area **Nos. 2 and 3 Mines** were entered and **examined. Both** are in good condition. **Except for No. 3 South, all workings** had good air and were free **of gas.** The **following table summarizes the results of the examination; (next page)**

Mine	Distance Penetrated	Obstruction	Air	General Condition
2	420 Ft.	Water	Good	Good
3	200 Ft.	Water	Good	Good
3 south	235	None	Oxygen Defic.	F a i r
4	1 2 5	Cave	Good	Poor
5 West	60	Cave	Good	P o o r
6	40	Cave	Good	Poor

A drilling programme was started in **July** using a **six-inch rotary drill**. The first two holes were planned to give a correlation between the Coal Gully and the Goldwater Hill seams and to determine **whether** the seams were continuous over the unknown area between.

The first hole was drilled with **indifferent** results. **It** was found that the rotary drill did not perform well in loose or muddy ground without the use of mud, and if mud were used and recirculated, the **identification** of the cuttings was **very** difficult. **However**, the drill appeared to intersect a **13-foot** coal seam. The location of this hole is shown on **M a p 2**.

Under the impetus of an impending order for coal it was decided to drill in an area where it was felt that **strippable** coal might be found. The drill was therefore moved to the Coldwater Hill area, and Holes Nos. **2, 3, 4, 5, 6** and **7** were drilled to **intersect** Seams **2, 3** and **6**. The locations of these drill holes are shown on **Map 3**. The seams **were** found at approximately the expected depths but were too thin to support a stripping operation. (**Dwgs. 1, 2 & 3**). In this part of the field, where



**the** overburden was light and the holes were dry, the rotary drill worked well and identification of the cuttings was easy.

With the completion of this part of **the** drilling programme, **the** drill was moved back to **the** central area and Holes Nos. 8 to 13 inclusive were drilled. (Map 2). Holes 9 and 11 both intersected a thick seam of coal, presumably the No. 4 Seam. (Dwgs. 4 and 5). Holes 8, 10, 12 and 13 were **abandoned because** of water or mud conditions.

Hole No. 14 was drilled as a wild-cat hole to check the existence of strippable seams in the southern part of **the** field. It failed to reach bedrock at 140 feet; so it was abandoned.

Hole No. 15 was started to check the **existence** of **seams below** the No. **b** Seam on the **western** flank of **the** Coldwater Hill. The drill entered a zone of silt and sand which could not be kept clear without casing. It was decided to abandon this hole and terminate the contract.

**In** October a diamond drill was obtained for the purpose of **deepening** **some** of the rotary drill holes and recovering core, particularly of the coal. The **first hole** to be deepened was No. 2 which was drilled to 842 **feet**. **Although several** seams were intersected, none were of **com-**mercial interest and no correlation was possible with **the** Goal Gully area **seams**.

An attempt **was** made **to** deepen Hole No. 15 but persistent caving of boulders made **the** driving of casing impossible.

The drill was then moved to Hole No. **8**. This one was deepened without trouble and **a 28-foot coal intersection was** made, apparently of No. **1** Seam.

The logs **of all** these holes are given in Appendix A.

The drilling was done using AX bits and rods and a standard type of core barrel. Excellent core recovery was obtained in the shale and sandstone, but the coal tended to grind unless the rods were pulled every foot or two.

### CONCLUSIONS

Although the work done to date is far from conclusive, certain facts and indications have emerged which must be considered in any appraisal of the property or any future exploration programme.

One of these is the probable existence of a major break through the central portion of the field between the two hills. Drill Hole No. 10 went to an elevation of 1325 feet without reaching bedrock although Hole No. 1, 400 feet to the east, reached bedrock at 1967 and Hole No. 9, 421 feet to the west, reached it at 2056. (See Dwg. 4). Similarly, Hole No. 12 was drilled to an elevation of 1785 feet without entering bedrock. The overburden in both Hole No. 10 and Hole No. 12 contained stream-worn gravels and alluvial mud, and, frequently, pieces of float coal. These facts strongly suggest the existence of an ancient river bed through this area. (See Map 2). If this river bed were merely a water-cut valley or gorge, it could be expected that the coal seams at depth would persist from one part of the field to the other • But, if the river followed a fault zone, as frequently happens, it would be reasonable to expect that there was some movement of the blocks on either side of the fault. In this case the coal seams would not be continuous across the whole field but one set would be uplifted or offset with respect to the other. The answer to this

question can only come from the correlation of strata on either side of the old river bed.

A strange fact about Hole No. 10 is that it is surrounded on **three** sides by the workings of No. 4 East Mine, yet the hole was drilled to about 100 feet below the elevation of the workings 50 **feet** to the north without entering bedrock.. (See Map 2). **The only** suggestion that can be offered here is that **the** hole is **in** a bay **or** curve of **the** old river channel and that the existence of this channel accounts for the way in which No. 4 East was mined, **It** will be noted on **Map 2** that there are three headings south of Hole No. 10 and two headings north which could conceivably have been probes. There is no concrete evidence for this supposition, but Mr. S. Gerrard of Merritt vaguely remembers hearing of the **miners** encountering "**wash**" in this mine.

The evidence obtained to date makes it unlikely that a strip mine could be **operated** in this field, The seams dip into **the** hillsides resulting in a rapid increase of overburden with advance down the dip. In the **Coldwater** Hill area **no** seams were found which could be economically stripped, in the Coal Gully area the major outcrop seams have been mostly mined. The only possible places for stripping would be in the southern portions of the *property*, an area which, except for Hole No. 14, *has* not been explored. However, the log of this hole is *not encouraging*: it indicates that, in at least part of the area, there is a heavy mantle of overburden. The property must therefore be regarded as a potential underground mine only.

Much of the information available on the coalfield and the old workings must be accepted with reservations. Calculations of reserves based on the assumption that the seams are continuous across the field are certain to be high. There is no evidence of such continuity: if the thick Coal Gully seams run under the Goldwater Hill they must be at a great depth since the 842-foot No. 2 Hole failed to find them.

The stratigraphic section given on Page 3 of this report appears to be a somewhat fanciful document. It also assumes a continuity of seams across the whole field. If this were correct the log of Hole No. 2 would have agreed with the stratigraphic section since it went deep enough to intersect all seams but No. 1. Except for Seams 3 and 6, there was no recognizable agreement. For example, the section gives the distance between Seams 2 and 3 as 70 feet, the Minister-of Mines Report for 1946, Page 254, gives it as 150 feet, and Hole No. 6 (Dwg. 3), shows it to be 110 feet. Similarly, there seems to be little justification for saying that No. 2 and No. 2 North Mines are in the same seam; or that the No. 4 Section of No. 4 Mine is in the seam which is called No. 6 under Coldwater Hill.

The results from Holes 8, 9 and 11 are the *most* encouraging. Hole No. 8 shows that the No. 1 Seam extends well towards the northern boundary of the property. If Hole No. 9 were deepened to intersect this seam, a body of coal of well over a million tons would be blocked out between Holes 8 and 9. and the former workings of No. 1 Mine. By drilling a pattern of holes north and east from Nos. 8 and 9, the continuity of the seam could be established or disproved.

RECOMMENDATIONS

In accordance with the foregoing discussion the following recommendations are made:

1. Regard the field as a potential underground mine only and direct all thought to the economics of underground production,
2. Consider the field as largely unexplored and accept old reports, statements and maps with reservations.
3. **If more** drilling is proposed, concentrate on **the** area **surrounding** the old Coal Gully area workings, particularly to the north and the north-east. Drill on the principle of exploring outward from Known **seams** and workings **in order to** prove up coal as **the drilling** progresses.

Respectfully submitted,

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