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Report on the Iron Ore Underlying the Area Known as "MARASEK'S", Burmis, Alberta

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Known as "Marasek's", Burmis Alberta

Location:

The Area is located in Sections 22 and 27 of Township 8, Range 3W5th Meridian.

Access:

"Marasek's" lies about one mile west of the North Burmis road about eight miles north of this road's junction with Highway #3. The junction is seven miles east of the town of Bellevue, Alberta. The North Burmis road is graveled from the junction with #3, and is in good condition at all times. The Crows Nest line of the C.P.R. parallels #3 Highway.

Climate and Geography:

This area is in the Foothills region of Southern Alberta. It is, consequently, about 4,200' to 6,000' above sea level. The Livingstone Range forms the western boundary and the Porcupine Hills occupy the eastern perimeter. The actual Marasek area forms a series of steep, high, fault scarps immediately below and to the east of the Livingstone Range.

The surface could be considered alpine tundra, in that there are large areas barren of trees. This is due to low precipitation and high winds. Generally, the prevailing winds are westerlies, and bring very little precipitation in the form of either rain or snow. Although the Livingstone Range gives some shelter, winds do get up around 50 to 60 m.p.h. mostly in May and June.

Most of the area is underlain by rolling hills, all trending northerly, or parallel to the Livingstone Range. Access to the western section is therefore easy. However, wherever ore outcrops, it tends to form steep bluffs. This applies to all parts of the area.

"Marasek's" is situated about 60 miles due south of Calgary, Alberta, and 50 miles due ~~east~~ west of McLeod, Alberta.

General Geology:

The ore lies as a distinct horizon in the basal section of the Belly River formation, close to its contact with the Wapiabi formation. Both formations are of Cretaceous age. In many places the ore outcrops in either long ridges or steep bluffs, being the most weather resistant portion of the Belly River sediments. The general strike is N22W, and is so maintained throughout the report area. However, due to structural deformation, the dip varies from 10°W to vertical.

The apparent structure in the area is a series of northerly trending, western flank segments of a large anticline. This anticline has been faulted downwards on its western flanks and its crest may in part now occupy the floor of Burmis Valley. Ore exposures on the edges of these segments are present from the SE corner of Section 11, Township 8, Range 3W5 to the NE corner of Section 3, Township 9, R3W5. Ore thicknesses up to 42' are present, in instances where folding and faulting have combined to thicken the normal 12' depth of ore. Folding and faulting have also tilted the horizon from the normal 30° to 45° westerly dip to vertical or actually overturned beds.

An example is the "Marasek Tunnel". This tunnel was begun in the early part of the century, and left by the old-timers, and is still in remarkably good condition. Here there are five distinct ore horizon sections or segments. Each one is successively higher than the one to the east. Consequently, the fifth and most westerly is also the highest. Vertical displacement appears to be about 50' for each section. Drag folding is present at each fault. This has increased the apparent thickness of ore, so that undisturbed section of the bed is the usual 12' thickness, while at the fault-face it may be upwards of 50' deep and 18-22' thick. The sections are approximately 300' wide and 2,200' long.

The upper two sections consist mainly of magnetiferous sandstone. The magnetite contents is less than 10%. This is probably due to lateral thinning of the ore bed. Cross-faulting has also displaced the beds in an E-W direction. This has in some cases shortened the N-S extension of the bed to less than 1,000'. The brown, magnetiferous sandstone is replaced northwards by magnetite ore, about 3,500' north of the Tunnel. This implies that at about 1,800' north of the Tunnel another "dune" or lens of sand begins. In general, the faults form very prominent scarps, exposing the ore remarkably well, but at the same time they tend to create very complex structures.

The primary structural control appears to be the Livingstone Thrust, approximately 5,000' west of "Marasek's" Tunnel. The secondary control seems to be the Todd Creek Fault, 4,000' east. Movement between them has set up a system of westerly trending cross-faults or slips. These latter faults have created a step-like topographical system, with the heave vertical and the throw in an easterly direction. The cross-faults have enabled erosional forces to carve deep gullies in the scarps, (exposing the ore), and to deposit large fans of alluvium, (thereby burying ore in the lower segments). Both fault systems tend to be vertical.

Since the ore horizon is cut by vertical faulting in two directions, almost at right angles to each other, it is not always at positions, subsurface, as indicated by surface observations. On one of the "steps" closely spaced drill holes thus disclosed that while at one point the ore dips 30°W, 120' west, the ore has been drag-folded into a vertical position more than 110' deep. This abnormal change in attitude is quite common close to the northerly

Trending faults. The fact that the ore horizon has been deformed from a relatively flat position to vertical, implies that there may be a much greater potential than that presently assumed. This is because a series of "en echelon" type of faults, going downwards, could increase the ore horizon by "stretching" it into a vertical system some 500' deep from an original, horizontal, bed several thousand feet wide.

There are certain features characteristic of this area which lead to the assumption that the ore thus far developed represents a very minor portion of the total potential. Some of these features are:

1. The majority of the faults dip westerly.

a) The dips and strikes are parallel, the former averaging 50 deg. W and the latter trending NW.

b) in most cases the westerly blocks moved up.

2. The area of major disturbance can be limited to the Livingstone Range, with the Livingstone Thrust Fault being the easterly limit of major disturbance.

a) folding and tilting of the sediments is not as extreme east of Section 25, Township 7, Range 3, W. 5th.

b) thrusting, particularly of blocks between parallel faults, is non-existent easterly of the Livingstone thrust.

3. The Belly River formation appears to be much greater in stratigraphic extent than shown on available maps. It is also apparent that were the various fault segments relocated in their original undistrubed positions, then the presently located ore horizon could be extended latterally over a much greater area.

Although faulting and folding have caused considerable and complex deformation, some of the features characteristic of original deposition remain. It is evident that the ore was laid down in quiet waters. This is indicated by the marked varving, from the top of the bed to the bottom. Usually the top of the bed is rather lean, that is, the iron does not run much higher than 20%. Below this layer is a much richer layer, up to 56% contained Fe. Then another lean layer is found, and so on to the bottom of the bed. The bottom is generally quite lean. The rich and lean layers are not uniform in thickness, but the richer layers tend to be thicker toward the centre.

Former reports maintain that the iron ore deposit was originally a beach sand. The writer does not agree with this hypothesis for the following reasons:

1. The deposit is present almost continuously from the Gulf of Mexico to the Arctic Ocean.

2. In the Foothills region the deposit has been traced for at least 16 miles easterly, while in Montana the deposit may be upwards of 50 miles wide. It is also present west of the Front Range.

3. There are no typical beach features, such as conglomerate.

4. There are no marine fossils, and any fossiliferous material noted has been coaly, freshwater plant material.

5. A beach deposit should not exhibit the remarkable varving noted throughout the ore horizon.

Core examination has also shown that there is an old erosional surface at the top of the ore horizon. This zone of brecciation suggests an old fault plane, along which the breccia has been cemented by calcite, and occasionally magnetite. Thus far, although the magnetite has the characteristcs of water-lain deposits, there is no evidence that it is a deltaic deposit. Some cross-bedding has been noted, particularly in the overlying sandstone, but this feature ceases some time before the ore horizon. Cross-bedding in the ore is rare, and might have been mistaken for healed fault structures. Even though the ore is a sedimentary deposit, microscopic examination has shown that both the magnetite and its matrix are relatively little water-worn. The magnetite is in haggly particles and crystals, the quartz is rarely in any other form than nearly complete crystals.

In some core sections the deposition of magnetite has been so concentrated that the ore appears massive; and consequently these sections are also very dense. The cement appears to be calcite. In sections of intense faulting the magnetite has been transformed to hematite or marcasite. The marcasite appears as globs on the fault planes. There has been no other evidence of any sulfide. Some sections show a glauconitic matrix, which suggests an ultra-basic ancestral host rock. The ore as a whole appears rather unique in its homogeneity of texture, and is generally fine grained.

Summary and Conclusions:

The property examined is underlain by a sedimentary titaniferous magnetite ore of very large economic potential. During the writer's acquaintance with "Marasek's" some 60 drill holes, NX type core, explored the area very thoroughly. The ore, of course is not confined just to "Marasek's", but extends for many miles north and south of the area.

The most efficient method of mining appears to be by stripping methods. The overlying sandstone is soft and not too deep. In general the ore is buried by not more than 80' of overburden. However, since the ore outcrops extensively, and dips at about 40°W, stripping ratios are thus much lower than if the ore were completely buried.

Examination of sections drawn up of the Marasek Area shows the following:

There are three fault sets, which appear to be the main structural controls governing the disposition of the ore horizons. The main fault, trending N25W, and dipping 75 deg. E, has created two sets of subsidiary faults, one trending E-W, dipping 75 deg. S, and the other trending N-S, dipping 20 Deg. E. The main fault is responsible for the northerly trending fault scarps and intraformational deformation such as folding of the ore horizon. The other two sets have displaced the ore horizon vertically.

The general deformation in this area has resulted in the cutting up and displacement of the ore horizon into at least three, and possibly six segments. Each segment appears to be about 800' wide, 2,000' long and 16' thick. Thus, in an area 800' x 2,000' there is and inferred potential of upwards of 6 1/2 million tons of ore.

It is apparent, from regional examination of the Burmis North Area, that the Marasek Area may be used as a type section. Thus the exposure at Boutry's may have similar conditions as those encountered in holes 15, 17, and 36. Here the ore lies in a comparatively flat position near the top, then at depth plunges nearly vertical, to give ore outlines in the order of 120' x 16' in vertical position. The strike length varies from 800' to 2,700' with the latter length indicated as the most common.

Between Boutry's and Marasek's there are several exposures similar to those outlined above. If this condition holds true for all of the area investigated, large tonnages in small pockets may be expected. Very few of the ore horizons are visible at the surface. In the Marasek area there are only two visible horizons, yet drilling has disclosed six. Thus, surface appearance has so far been extremely misleading as to the actual quantity of ore to be expected. In the Marasek area alone it is reasonable to expect, with very few more holes, to have proven reserves of upwards of 16 million tons. At present it is not permissible to estimate more than 6 - 7 million tons for this area, due to insufficient evidence.

The most significant conclusion to be drawn to date is that there is far more ore within the formations than was assumed some time ago. And it is the writer's opinion that, although sufficient ore has been developed to warrant immediate economic exploitation, thus area is probably capable of producing hundreds of millions tons of iron ore.

Respectfully submitted,

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