

REPORTON THE SUPPOSED INDICATIONS OF OIL ON BRUNI ISLAND

1 - PRELIMINARY REMARKS

That the belief in the possibility of the occurrence of oil on Bruni Island should have been revived at the present juncture in spite of the very definite conclusions to the contrary arrived at after geological examinations and actual boring, is clear evidence of the ignorance of those holding such belief as to the geology of Tasmania and the general geological conditions necessary for the formation and storage of oil in nature. Such lack of knowledge is not surprising in view of the almost total absence of any instruction in the subject of geology in our secondary schools and the University. Therefore no discredit attaches to those whose desire to locate oil has lead them to believe that oil occurs on Bruni Island, but have not possessed that technical knowledge of the subject which would have shown them that the evidence before them was valueless as an indication of oil.

It has been my duty to examine the evidence which has given rise to the renewal of this old belief, and this report is intended to state and describe the evidence, to discuss it and to draw definite conclusions from it and all the accumulated general geological evidence in a logical and scientific manner.

It may be stated at once, however, that the evidence, other than the accumulated general geological evidence, has not been very comprehensive or definite and can be divided into two simple divisions. The first of these is the discovery of the so-called "bitumen", and the second can be grouped under the general heading "Seepages and Gas-bubbles". These will be described under the respective headings. There will then be presented a concise statement of the general geological evidence which leads inevitably and conclusively to a final decision as to oil prospects on Bruni Island.

2 - THE SUPPOSED BITUMEN

It was the discovery of a substance on North Bruni referred to as "bitumen" by certain individuals, which is very largely responsible for the present interest in the subject of oil-prospects on Bruni. In describing the discovery and the conclusions drawn therefrom, the Hobart "Mercury" recently stated that the experts differed in regard to the nature of the substance referred to as "bitumen". This, however, is not the case as any divergence is more apparent than real and is due to the fact that some of the chemists who have examined the substance have done so from the purely chemical standpoint and not from the viewpoint of geology and the genetic relationship to petroleum. These particular chemists have submitted reports which do not include a final determination of the exact nature of the substance and its genetic association, and therefore seem not to agree with the other determinations which are stated in terms of genesis or mode of origin. It is incumbent upon me therefore, to review the results of the various analysts and to draw the full conclusion from them as

to the exact nature of the substance and its relationship or lack of relationship to petroleum.

At the outset it is necessary to definitely state the meaning and significance of the terms "bitumen" and "pitch" as they will play a prominent part in the following discussion, and are unfortunately in certain quarters used very loosely.

The term "bitumen" as used by the highest geologic authorities indicates the general class of natural substances which represent solidified, dried up (inspissated) or congealed petroleum. On the other hand, the American Society for Testing Materials uses the term "bitumen" to indicate any pitch-like substance used in road-making or the building trades whether they be natural or artificial, and embraces under this term all hydro-carbons which are soluble in carbon bisulphide whether gases, easily mobile liquids, viscous liquids or solids. Now it is therefore perfectly obvious that a chemist reporting upon any such material, having in his mind this latter acceptance of the term, would unconsciously mislead an individual who was searching for petroleum and was accepting the geologic definition of the term "bitumen" given above. Further such a chemist receiving a sample termed "bitumen" by the petroleum searcher may acquiesce in the application of such a term to it not perhaps realising the construction that would be put upon such acquiescence. The necessity is apparent, therefore, to delimit the meaning of the word "bitumen" to its geologic definition, and in all discussions in regard to petroleum to confine it to that meaning. This practice is that adopted by the Geological Survey of Tasmania, in order to avoid confusion it is advisable that it should be universally adopted in Tasmania.

The word "pitch" has also been loosely used as indicating both artificial products and the bitumen from the so-called Pitch Lake of Trinidad. To avoid confusion it is necessary to definitely fix the limit of the application of the word "pitch". In concordance with the most modern authorities on the subject the Geological Survey of Tasmania has adopted the term "pitch" as indicating the solid or semi-solid substances derived from the distillation of coal, wood, lignite, &c. Accordingly the terms "coal tar pitch", "wood pitch", "pine pitch", &c. are used.

Reviewing now the results of the various analyses and determinations, it is found that in every case the first property that has been noticed is that of the odour. Without exception such odour has been given as that of a variety of pitch. No inference has been drawn from this observation by either Mr. C. Wood or the analyst of the Electrolytic Zinc Company, I therefore have to point out that this odour on heating is a means of distinguishing various bitumens and pitches from one another. The odour of wood pitch is quite different from that of coal tar pitch, and both of these differ markedly from bitumen. The agreement of all the analysts therefore, in regard to the smell of pitch indicates with almost definiteness that the substance is pitch. This preliminary conclusion is confirmed by the subsequent results as I will now describe.

Much prominence has been given to the distillation test. That the substance gives oils on distillation cannot by any means be interpreted as indicating that the substance has any relation to petroleum. Wood pitch, if submitted to such a distillation, would give oils as the result. Now wood pitch is obtained by submitting the

tar from wood distillation plants to further fractional distillation. The first product obtained is termed "light oil" and this is collected up to 150°C . The distillation is then carried to 250°C . when a product termed "heavy oil" is collected, containing creosote, toluene, &c. The distillation is generally stopped at 250°C or slightly below and the residue in the still is run out and after cooling sold as wood pitch.

Now an examination of the distillation tests by both Mr. C. Wood and the Electrolytic Zinc Company shows that they agree that the first oil product comes off at from 250° to 265° up to 300°C . The Electrolytic Zinc Company's analyst further reports that a second oil is distilled at just over 350°C . Now this is exactly what one would expect from the distillation of wood pitch, and the natural conclusion resulting therefrom that the substance is wood pitch is confirmed by the fact that the distillate at 350°C . is a reddish oil which is characteristic of the oil distilled from wood tar at that temperature.

The observation made by the Electrolytic Zinc Company's chemist that an odour reminiscent of creosote was noticed during the distillation is important and significant. The same odour has been noticed during the tests in the Geological Survey Laboratory. Only one conclusion is possible from the presence of creosote, and that is that the material being distilled is either wood pitch or coal tar pitch.

The properties and conclusions noted above narrow the conclusion down to that of wood pitch. The report made by Mr. C. Wood that the distillate smelt of gasolene and kerosene was confirmed by neither the Electrolytic Zinc Company's analyst nor by the test made in the Geological Survey Laboratory. I have shown therefore that the general conclusion from the published analyses is that the substance is wood pitch. This conclusion has been confirmed by the application in the Geological Survey Laboratory of the sulphonation test described in "Natural Rock Asphalte and Bitumens" by Arthur Danby. This test has shown definitely that the substance is not natural bitument.

The question now arises as to how this artificial substance-- wood pitch-- has reached the position in which it has been found at Cape Frederick Henry on Bruni Island. The spot is described as at about 60 yards from the sea. The suggestion can at once be made, therefore, that the substance has been washed up by some storm and lodged in the crevices in which it has been found, and becoming soft and plastic under the hot sun has completely filled these crevices for a short distance. It would have been highly desirable if I had been given the opportunity to demonstrate this on the spot, but owing to the fact that the discoverers refused to take me to the spot or to help me in any way, this has not been possible. I visited Cape Frederick Henry, however, and searched along the whole foreshore on which the discovery is stated to have been made. I found no sign of the substance, however, but made the all important observation that the whole rock of that foreshore consisted of the igneous rock diabase which is traversed by numerous joint planes and crevices. Now the occurrence of bitumen in igneous rocks such as diabase, syenite, &c. has been recorded and is regarded as a geologic curiosity, but no such occurrence has yet been found, or is ever likely to be found associated with a commercial

oil field. Even therefore if the substance found by discoverers at Cape Frederick Henry had been bitumen, the geological features of the country would have indicated that there is no hope whatever of the occurrence there of a commercial oil field.

What might possibly have been mistaken for bitumen by fishermen and others in this locality is a black exudation from the diabase which occurs quite plentifully on the rock faces and in crevices. Samples of this were collected and examined in the Geological Survey Laboratory. The black colour was found to be due to manganese and the substance showed no sign whatever of mineral oil.

3 - SEEPAGES AND GAS-BUBBLES

In connection with the areas taken up by Mr. J. L. Frizoni under licence to search for oil, the evidence leading to such a step consisted of what was supposed to be an oil scum on the water and the occurrence of combustible gas. I examined these occurrences and collected samples which have been tested in the Geological Survey Laboratory. The supposed oil seepage or oil scum on the surface of a stagnant pool of fresh water just above high water mark, shows no trace of mineral oil whatsoever, but consists of decomposition products of fetid organic matter and some iron compounds.

The gas occurrence was located in an old water hole and consisted of marsh gas and carbon dioxide. This gas is given off from the bottom of the water hole by decaying vegetable matter there. Neither of these occurrences therefore would warrant any belief in the occurrence of oil.

4 - FINAL DECISION AS TO OIL PROSPECTS ON BRUNI ISLAND.

The geology of the whole of Bruni Island is well known and thoroughly understood. It has been studied and described in some detail by the late R.M. Johnston. Dr. Arthur Wade, Commonwealth Oil Expert, visited the North Island in 1915 and reported on the prospects of obtaining petroleum thereon, after making a geological examination. During the early part of this year Mr. A. McIntosh Reid, Assistant Government Geologist made a geological survey of the whole of Bruni Island. These examinations have shown that Bruni Island is underlain practically wholly by diabase at no great depth. On this diabase rest Permo-Carboniferous strata which are either horizontal or have a very slight dip. Not the slightest sign of folding occurs in this Permo-Carboniferous sedimentary series. There are no Tertiary strata on Bruni Island. With such complete information in my hands, accompanied by my own observations and knowledge, I am able to authoritatively and without any hesitation make the following statement.

The occurrence and storage of petroleum in nature require the existence of certain well known geologic structures, and without these structures no commercial oil field is possible. These essential geologic structures do not occur on Bruni Island. Therefore there is no hope whatever of payable liquid oil being found thereon. This conclusion confirms that made by Dr. Wade six years ago. Dr. Wade's opinion was regarded as wrong by certain people who proceeded to spend money in putting down two bores. Both these bores failed to show

the slightest trace of petroleum or anything associated with it, but added confirmation to the conclusion as to the geologic structure of the Island. It seems appropriate therefore to repeat at the present stage the statement made by Dr. Wade in his report of 1915:-

"Apart from the lack of seepages, there is no more evidence to justify the boring for petroleum on the part of the island with which we are concerned than there is in any part of Hobart itself or over the rest of Tasmania. Even a genuine oil seepage from which samples can be taken and tested in a tolerably thick series of sedimentary rocks showing suitable structure is a speculation, but a legitimate speculation: but to bore for petroleum on the evidence which is available on Bruny, and with igneous rocks forming the greater part of the surface and the whole of the foundation of the island at no great depth, is a waste of public money at a time when money is required for urgent national purposes and for legitimate enterprise.

It would, of course, be a very valuable thing for Tasmania if liquid oil could be found on Bruny Island or elsewhere, and I therefore regret having to make this condemnation but it is far better to realise the hopelessness of the situation now than after capital has been expended which is badly wanted for enterprises having some hope of success.

It is appropriate to place on record the straightforward way in which Mr. J. L. Frizoni has made available the details as to the evidence which lead him to hope he had discovered an oilfield, and the way in which he facilitated the work of examination in every possible way.

L. Hills

GOVERNMENT GEOLOGIST.

LAUNCESTON,

31st October, 1921