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NEW ZEALAND.

PETROLEUM

(REPORT OF GOVERNMENT GEOLOGIST ON THE PRESENT CONDITION AND FUTURE PROSPECTS OF BORING FOR), AT NEW PLYMOUTH.

Laid on the Table of the House of Representatives by leave.

SIR,—

2nd September, 1898.

I have the honour to report that, as directed, on the 23rd August I proceeded to New Plymouth, and during the week following collected evidence bearing on the past history and the present prospects of boring for petroleum in the Taranaki District.

Respecting the discovery and the earliest efforts to obtain oil little or no information could be obtained other than that in the reports by Sir James Hector published in the "Abstract Report of the Progress of the Geological Survey of New Zealand" during 1866-67. At a later date boring was carried on to greater depths, the maximum depth in one of the two bores situated near the landward end of the Breakwater being 900 ft. From these bores oil was obtained, but apparently not in sufficient quantities to warrant the further prosecution of work at that place; and I could not learn what was the nature of the strata at 900 ft. from the surface, or whether the oil obtained from that depth originated from that or from a higher level. Subsequently, the New Zealand Petroleum Company determined upon a site half a mile more to the eastward, and here two bore-holes were put down to a depth of 2,000 ft., and as these proceeded approximately correct records of the strata passed through were kept.

In No. 3 bore the superficial sands and underlying volcanic agglomerate proved to be 275 ft. thick, below which sandy papa was entered upon and continued to a depth of 810 ft., when a bed of rather coarse quartz-sandstone was encountered. This passed, fine quartz-sand containing oil was met with at 915 ft. This was not an abundant supply, and the bore was continued to greater depths, care being taken to exclude the water and oil of the higher levels from the lower parts of the well as the bore was proceeded with. Between 1,900 ft. and 1,996 ft. oil and gas were again struck, and this time in such quantity as seemed to afford hopes of the ultimate success of the undertaking. To obtain the oil pumping had to be resorted to, and then it was found that the supply was intermittent. This failure of continuity of the yield of oil, it is supposed, arose from one or other of two causes—viz.: First, material sucked into and around the foot of the pipe, and thereby preventing the access of oil to the well; or, second, the drawing away of the looser sands of the porous oil stratum, and the coming together of the impervious strata above and below the oil-bearing bed. It need not be here inquired which of these two suppositions is the correct one. It will suffice to say an accident happened whereby the derrick was destroyed by fire, and the well has since then been closed down except occasionally, when the accumulated gases and some oil are allowed to escape, the latter being collected in tanks prepared for that purpose.

On the destruction of the derrick at No. 3 bore, the company procured fresh plant and commenced putting down No. 4 bore. This being only about 4 to 5 chains south of No. 3, passed practically through the same strata at the same depth, the difference of surface levels considered. At the 915 ft. horizon of No. 3 bore traces of oil were obtained, but the amount was considerably less than in No. 3 bore. At the greater depth of between 1,900 ft. and 2,000 ft. no oil was obtained, and, thus discouraged, No. 4 bore was, for the time being, abandoned, and a site chosen some distance further to the eastward, where a bore put down some 300 ft. failed, owing to the incoherent nature of the volcanic agglomerate passed through at that depth. The last effort of the company, the present bore (No. 6), is situated on a flat terrace a short distance west of No. 5 bore. This has been successful so far as the piercing of the volcanic agglomerate to the depth reached—about 140 ft.; but in this locality it has yet to be ascertained whether the thickness to be bored before reaching the papa-rock will be much greater than at Moturoa.

About five miles east of the Breakwater, and nearly in a line between the Breakwater and the Township of Inglewood, numerous gas-springs escape from a stratified formation composed of fine and coarse alternate layers of volcanic material that appears to have been stratified under water. Other gas-springs exist in the district—as, for instance, at and near the Township of Inglewood—but they were not visited.

In No. 3 bore, and in all subsequent bores, due precautions have been taken at proper intervals to prevent leakage of oil or water to the lower depths of the wells, and thus in No. 3 bore, while the oil is escaping slowly from the oil stratum at 900 ft., this does so outside the sheathing, while in the inner pipe inside the sheathing the accumulated gas and oil are under considerable pressure. Ample evidence of the great pressure under which the gas and oil from the deeper part of the

well accumulates and its non-connection with that at 900 ft. was afforded by slightly opening the valve and allowing a portion of the gas and oil to escape.

Samples of the borings from different depths of No. 3 bore, and now in the company's office, were examined and determined, and, as showing the nature of the rocks passed through, the catalogue is here given:—

NEW PLYMOUTH PETROLEUM COMPANY'S No. 3 BORE.

	Ft.	
(1.)	50.	Very fine sand with scales of mica.
(2.)	100.	Volcanic fragments same as "Sugar Loaves" solid ash.
(3.)	150.	Subangular fragments of volcanic material.
(4.)	200.	Subangular fragments of volcanic material.
(5.)	250.	Subangular fragments of volcanic rock of a more felspathic character than No. 2; fine acicular crystals indicate a solid flow broken up by the tools.
(6.)	300.	Fine sand (papa) with a little magnetite.
(7.)	350.	Fine sand (papa) with clear quartz crystals and a little magnetite.
(8.)	400.	Arenaceous clays (papa), not marly, very fine, no contained grains. This indicates sea of some distance off shore and considerable depth of water.
(9.)	450.	Similar to No. 8, but with occasional fragments of augite.
(10.)	500.	Very fine quartz-sand (sandy papa).
(11.)	550.	Same as No. 10.
(12.)	600.	Extremely fine sand (papa), slightly argillaceous.
(13.)	650.	The same as No. 12, but with black grains added.
(14.)	700.	The same as No. 12.
(15.)	810.	Coarse quartz-sand with scales of muscovite and dark granules (green-sand?).
(16.)	850.	Same as No. 12.
(17.)	915.	Very fine quartz-sand, smells strongly of oil.
(18.)	950.	Very fine sand with spangles of mica.
(19.)	1,000.	Same as No. 18.
(20.)	1,100.	Same as No. 18.
(21.)	1,150.	Extremely fine sand; same as No. 18, but finer.
(22.)	1,250.	Similar to No. 18, but more clayey.
(23.)	1,300.	Similar to No. 18, but more clayey.
(24.)	1,350.	Fine sand similar to No. 18.
(25.)	1,400.	Fine sandy clay.
(26.)	1,450–1,500.	Fine sand with scales of mica.
(27.)	1,550–1,600.	Fine sand.
(28.)	1,680–1,750.	Very fine sand.
(29.)	1,900.	Moderately coarse sand; oil at about this horizon.
(30.)	1,976.	Moderately coarse sand with scales of mica.

No. 15, 810 ft., is so similar to 1,900 ft.–1,976 ft. that they might easily be confounded, and mistaken for one another.

As regards the prospect of successful boring for oil in the Taranaki District in the vicinity of New Plymouth, this is not of the most hopeful kind; and yet it is perfectly manifest that there exists a source of oil apart from what may be derived from the lignite deposits of Younger Tertiary or Post-tertiary age.

The facts in connection with the sinking of No. 3 bore show that the oil obtained from it is not derived from a superficial source, or from a deposit comparatively near the surface. No oil was found in the upper sands or volcanic agglomerate, and more than 600 ft. of papa-rock had been pierced before the first indications of oil were met with. Before this first oil-bearing stratum at 915 ft. from the surface no oil-bearing beds were met with till a depth of 1,900 ft. was reached, whence a much stronger flow of oil than from 900 ft. was obtained. The primary source of the oil lies at greater depth than yet reached, or at a distance from any of the wells yet bored. At 900 ft. and 1,900 ft. the oil exists merely stored in the strata, since to a depth of 2,000 ft. there are no beds that in the first instance could have given off the oil, and it does appear that a further 1,000 ft. might be bored without reaching carbonaceous beds likely to or capable of affording the oil stored at higher levels. But it is hardly a question of reaching the carbonaceous strata from which the oil has been derived; much more is it to determine an abundant supply in the storage levels at 1,900 ft. and 900 ft., or at other lesser or intermediate depths.

The supply has not proved over-abundant, and the temporary abandonment of the different localities and particular bores are certainly discouraging facts. Meantime the New Plymouth Petroleum Company has located, and is proceeding with, their No. 6 bore at a moderate distance from their former bores, Nos. 3 and 4, and it is to be hoped they will be able in this to reach the stratum equal to 915 ft. in No. 3 bore, at which depth should oil not be struck it might be matter for consideration whether boring should be continued.

I have, &c.,

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Government Geologist.

The Under-Secretary for Mines.

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