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RB104

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S.R. 24/1/2

FINAL REPORT.

UNDERGROUND WATER SURVEY OF MARALINGA AREA.

With the conclusion of the pump test on Bore No. 6 the preliminary phase of underground water investigation in the area is completed, and a final review of hydrological prospects follows, summarising drilling results and information already furnished in previous reports listed hereunder.

Previous Reports.

The following reports have been previously issued dealing with the same subject:

(1) Preliminary Report. Water boring at X300 by T. A. Barnes, 2/12/53.

(2) Progress Report No. 2. Underground Water Survey of Maralinga Area, by T.A. Barnes, 3/3/54.

(3) Water Requirements at Maralinga, by T. A. Barnes, 18/3/54.

1. BORING RESULTS may be summarised thus:

Bore No.	Location	Total Depth	Salinity grns/gall.	Supply galls/hour	Remarks
1	Tietken's Plains (in bottom of No. 2 Well)	200 ft. (initial 120 ft. well)	2403.4	Not tested	Unable to develop due to excessive "milkiness". Abandoned.
2	Tietken's Plains 6 miles N.N.W. of strip	95	80.3	100-130	Salinity constant. Pumped for total of 26 hours at 100 galls/hr.
3.	Tietken's Plains 3 miles W. of strip	225	1)1390.5	12	1) Cut at 104 ft.
			2)1982.4	400 +	2) Large supply of salt water cut at 125 ft. Unable to develop because of excess "milkiness". To be deepened further.
4	Tietken's Plains ½ mile E. of No. 2	108	1855.8	Small	Bore abandoned.
5	Tietken's Plains ¼ mile S. of No. 2	140	1212.6	150	Water "milky". Bore abandoned.

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Bore No.	Location	Total Depth	Salinity grns/gall.	Supply galls/hour	Remarks
6	Village area	743	1) 2500.3	1) 80 est.	1) Cut at 499.
			2) 2562.0	2) 500 est.	2) Cut at 591.
			3) ?	3) 2000 +	3) Cut from 591 on. Tested for 18 hours at 1500 g.p.h. Unable to measure draw down.

Bore No. 2 has been left equipped with a pumping unit and should not be pumped at a rate exceeding 100 g.p.h.

Bore No. 3 is unfinished - lined with 6" casing to present bottom (225 ft.) and will require deepening perhaps a further 100 ft. to try and obtain salt water free from milkiness. Final decision required as to whether salt water should be provided here or elsewhere for a technical area.

Bore No. 6 is lined with 6" casing to 591 ft. approximately and thence open hole (5") to bottom 743 ft.
The maximum yield of this bore could not be determined, but it is thought to be in the range 2,000 to 5,000 galls. per hour.

CONCLUSIONS AND RECOMMENDATIONS.

1. TIETKEN'S PLAINS AREA.

1) Fresh -

Difficult to obtain but not impossible. Any supplies struck should be most carefully handled, with a view to maximum utilisation.

There are several places considered worth trying for fresh water within a 2-3 mile radius East and South of No. 2 bore.

Without aerial spotting, it is not possible to select with certainty the most promising afeas to test. A helicopter is considered ideal for this type of reconnaissance.

The pump test on No. 2 bore with salinity remaining steady encourages the belief that a useful supply of potable water has been cut here.

The exact quantity available could only be determined by considerable test drilling and pumping, but it is certainly limited - as a working basis it is assumed the fresh water is stored in an area 600 ft. x 300 ft, and that the 7 ft. of water bearing sand might provide 1 ft. of water. The quantity available would then be approximately 1 million gallons.

At the recommended pumping rate of 100 gallons per hour(for say 10 hours daily) this represents 3 years supply, and even in this desert country it is reasonable to assume sufficient

precipitation from thunderstorms to replenish this supply once during that period. Under the conditions outlined this supply can therefore be considered reasonably permanent.

2) Brackish - Salt.

Considerable supplies of saline water are available at depths from 100-150 ft. below surface - the persistent presence of fine kaolin makes these waters useless due to excessive 'milkiness', and deeper water must be sought. It is estimated that such water (saline) can be met at depths from 200-300 ft. approximately below surface, provided a suitable impermeable horizon is met, which can shut off the overlying 'milky' water.

2. VILLAGE AREA.

Bore No. 6 was stopped at a depth of 743 ft. below surface. The bore is still in sedimentary strata potentially water-bearing, and has not entirely eliminated the possibility of fresh water being available at greater depth. However, all water cut here proved exceedingly saline and there is little justification for deeper drilling, unless either present palaeontological investigations can throw further light on the matter, or geophysical investigation can establish the depth of sediments.

'Milky' waters have proved troublesome in this area as well as Tietken's Plain, and only the presence of a sticky clay between 563 and 591 ft. below surface has permitted the successful shutting off of the upper 'milky' waters and the development of clear water beneath. The 6" casing is at present firmly seated in this clay horizon and should not be moved, as any movement might break the seal separating the milky and clear waters and so spoil the present supply. Provided similar clay (or rock) horizons are encountered it is considered similar salt water supplies can be developed in this area - for instance at No. 7 site and elsewhere at perhaps ½ mile intervals.

To provide the estimated water needs of the community it is recommended that two further bores be sunk to depths comparable to No. 6, and No. 6 Bore be further tested by equipping with a Pomona pump of a capacity of 2-5,000 gallons per hour and pumped to capacity for 48 hours.

If a permanent output exceeding 2,000 gallons is available per bore, (and this seems very probable on the present evidence), then two pumping bores with a third standby for emergency use should suffice.

3. NULLABOR PLAIN.

There has been no further work here and previous statements stand.

The only portion of the Nullarbor Plain surveyed is within a few miles of the track to Watson. A helicopter is considered easily the best method of hydrologically surveying the Nullarbor Plain.

In general, the plains in this locality appear to comprise fossiliferous limestone to a depth of around 200 ft., underlain by various types of basement rocks. The main water supplies are

very saline and the only apparent chance of any improvement in quality is in the local areas of quick intake, i.e. small swamps with "runaway" holes, etc.

The area covered by ground survey has not shown any such swamp of dimensions sufficient to make the prospects of good quality water inviting.

Water for construction purposes should be obtainable at depths of perhaps 200 feet or more below surface - drilling may be very slow in hard limestone judged on exposures in the railway quarry at Watson.

T. A Bowes

4/5/54 DEPUTY DIRECTOR OF MINES.

ATTACHED: Plan No. US-324.
Bore Logs - Bores No. 1 to 6.
Water Analyses - Bores No. 1 to 6.