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DEPARTMENT OF MINES

SOUTH AUSTRALIA

FURTHER REPORT ON GROUNDWATER PROSPECTS HD. WALLOWAY - PEKINA IRRIGATION AREA

Following upon requests by holders of land on the Pekina Irrigation Area for advice as to whether groundwater was thought to be available to augment the failing reservoir supply, an assessment has been made of available information. Precise requirements are not known.

GENERAL:

The Walloway Basin extends from near the southern boundary of Hd. Mannanarie 10 miles south of Yatina, northward through Hds. Black Rock Plain, Walloway and Oladdie into Hd. Bendleby, a distance of almost fifty miles. Its maximum width is about 8 miles at Walloway, and minimum 2 miles at a point 3 miles south of Orroroo.

It is an intermontane valley similar to the Willochra, and consists of a northern and a southern section in echelon, the axis of each bearing N.N.E. These two sections are joined through a narrow waist south of Orroroo. The whole has been filled with presumably early Cainozoic sediments to a depth of more than 600 feet, present natural surface being highest in the south (approx. 1780 ft. above sea level) and declining northwards to about R.L. 1350 near Johnburg.

Several fairly large creeks flow onto the plain from the hills on the western flank, the most prominent being Pekina Creek. Northeast of Gallwey there is a drainage outfall, this being higher than the central plain.

GEOLOGY, HYDROLOGY:

The basin sediments have been penetrated by a number of deep bores, the stratigraphic succession comprising recent outwash of clays, sandy and gravelly clays 70-80 feet thick over

mottled light coloured clays grading downward into grey to purple clays. These latter are of the order of 300 feet maximum thickness, and overlie fine silty and clayey sands with thin sand lenses, in which artesian water occurs.

Whether these waterbearing beds rise to the surface at the basin sides and are concealed by piedmont material, or whether they are truncated against marginal faults is not clear, but the former is probably the case. That surface water is feeding into them is apparent from the hydraulic surface, which has a downward gradient of approximately 0.003 from south to north, and about 0.002 downward to the northeast from Orroroo. These gradients are high enough to cause lateral movement, and in at least two places the water appears to be escaping from springs and flowing to waste. Further losses now occur also from flowing bores, the total being not definitely known but possibly 10,000 - 20,000 g.p.hour. Although this cannot be proved, there is possibly also a subsurface escape of pressure water at the north end of the basin.

Groundwater salinity varies, but in areas near the main intakes is generally less than 150 grains. In the Hd. Walloway the intake is from Pekina Creek and to a lesser extent Walloway Creek, but most of the small watercourses descending from the westerly hills add their quota, and there also appears to be an intake at the southern end of the basin, and possibly a minor one at the north.

Shallow waters occur in the gravelly and sandy clays in the uppermost part of the section, but in most cases these are in small supply and of doubtful salinity except for stock purposes. They cannot be regarded as potential sources of irrigation water, and deep drilling will be necessary to obtain large supplies.

Bores penetrating the deep waterbearing silty sands have yielded quite large individual supplies, but because of its silty, fine grained, and relatively unconsolidated nature great difficulty has been experienced in stabilising the aquifer. As a

consequence bores either throw quantities of sand continuously, or sand up. No attempt has been made to use screens for development, and this appears to offer the only hope of success.

The monthly flow of one bore has been recorded since 1947, and the flow curve, which is the typical assymptotic shape of an artesian bore, shows that this particular bore is now in a state of balance, with a constant discharge.

During 1950-1952, when a bore half a mile away was in use, the flow declined considerably below its present figure, but recovered slowly over a period of some weeks. The behaviour of this bore is characteristic of a fairly permeable aquifer with only a limited recharge, and the immediate conclusions to be drawn are that more water could be drawn off than is at present being lost through springs and flows, but that the maximum safe yield is probably comparatively low.

Available data are not sufficient to say more than this, but it should be possible by further drilling, and the conducting of controlled pump tests, to arrive at a fairly precise estimate of the safe yield of the Walloway section of the basin. For adequate information, three bores are needed, one to be pumped and two as observation bores. The existing Government bore adjacent to the western corner of Section 70 would do for one of the latter, and two new test bores could be placed westward from this along the line of the Pekina main channel. This would serve a twofold purpose, taking advantage of any potentially coarser grained sediments towards the basin margin, and permitting of ready use of the bores for irrigation purposes if this proved possible. Simultaneous pressure observations on other bores would be advisable.

The question of whether expenditure is warranted on such work cannot be assessed without knowledge of the minimum requirements for irrigation use. At this stage it seems reasonable to say that some extra water should result, but the immediate advantage of

drilling would be the fairly precise assessment of the pressure water potential which should result.

CONCLUSIONS & RECOMMENDATIONS:

(1) There is reason to believe that the original unfavourable report by Mr. Sprigg should be revised in the light of present knowledge.

(2) Intake to the pressure water beds is believed to occur in several places, the major one being close to Pekina I.A.

(3) Some water should be available for irrigation, provided screened bores can be satisfactorily constructed.

(4) A fairly precise estimate of the basin's potential should be possible if two new bores are drilled at sites near the P.I.A. main supply channel, and carefully observed pump tests are made.

(5) These bores would need to be 400-500 feet in depth, cased with 8 inch casing, and with Johnson screens opposite the aquifer.

(6) If the future of the P.I.A. is considered to warrant the expenditure of several thousand pounds on such testing, firm recommendations as to sites, and methods of construction and testing can be made.

(7) Bores will not flow in sufficient supply for irrigation requirements, and would have to be pumped if used to augment P.I.A. supplies.

(8) The water is not of high quality, and whether it will deteriorate under pumping will not be known unless careful pump tests are made along the lines suggested above.

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