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RB 38773
D.M. 1323/54
Hyd. 56

DEPARTMENT OF MINES

SOUTH AUSTRALIA

REPORT ON GROUNDWATER PROSPECTS

SECTIONS 2571, 2572 - HD. BREMER -

- G. GALE, STRATHALBYN -

This property was inspected on 30th August, 1954.

REQUIREMENTS:

Mr. Gale requires water for stock purposes; also for pastures if possible.

LOCATION, TOPOGRAPHY ETC.:

Situated approximately 3 miles south of Strathalbyn, Sections 2571 and 2572 are on the flat plain of a valley that roughly trends north-south between two fairly low bedrock rises, several miles to the west of the known western margin of sedimentation of the Murray Basin, which roughly corresponds to the valley of the Angas River.

Local surface drainage is poor, the runoff from the western slopes spreading out over the valley floor and mostly disappearing underground.

Rainfall is approximately 19 inches.

GEOLOGY, HYDROLOGY:

Basement rocks comprising Kanmantoo sandy schists underlie the area, outcropping on the western flank, and having been penetrated in a bore on Section 530 to the east. These rocks are rather dense in character, but have been folded and jointed, so that where rain and surface runoff has access to them at the surface, some downward percolation into the joint planes occurs. For this reason, bores drilled into the rocks in areas where they outcrop or under-lie the surface at shallow depth can usually be relied on to yield stock supplies of water. The water quality in such circumstances is governed largely by

conditions of intake and replenishment, the rocks yielding rather poor quality water unless these conditions are very favourable.

Where a considerable overburden exists, under which the basement rocks are buried at some depth, the rate of movement and replenishment of groundwater is much slower, and conditions within the bedrock itself deteriorate. It is common in such circumstances to find that supplies are very limited, because the weight of overlying rock tends to close the joints in which the water occurs, and also the quality is poor, sometimes too saline for stock use. It has also been found elsewhere that some beds in the rock tend to yield more saline water than others, apparently the result of differing conditions of deposition in their formative stages.

At the date of inspection, depth to bedrock in the valley was not known with certainty. A local report is that a bore to 200 feet on Section 2567 was in what appeared to be sediments for the whole depth, but spoil from a well on Section 2020, not far south of the property, contains fragments of sandy schist. This well is stated to have been 100 feet in depth, and must have penetrated bedrock for at least part of its depth. It is known that in some places the bedrock is rather soft and micaceous, and if the bore on Section 2567 was drilled into such material it is quite possible that it was not readily apparent. The balance of probability is that the bore did reach bedrock, either decomposed or else of a soft character, and this is supported in some measure by the fact that the good supply of water obtained was too salt for stock use.

On the evidence, the conclusion was reached that the sedimentary overburden forming the valley floor was not more than 100 or so feet in thickness, and that bedrock of a decomposed nature or otherwise probably occurred somewhere below that depth.

Mr. Gale was advised that because of the poor surface drainage conditions, it could be expected that a reasonable

proportion of the rainwater runoff would percolate underground, and it should be possible to obtain a windmill supply of water by drilling. Because of local evidence that the salinity varied considerably, and in some instances was too high for stock, the quality was in some doubt, but there seemed a reasonable chance of obtaining water suitable for stock purposes. Drilling was therefore recommended, Mr. Gale being asked to forward for immediate analysis a sample of any water obtained. Drilling contractors Messrs. Walker & Butcher were already at the site, and drilling commenced forthwith.

The first bore, located approximately at "A" on the plan, was taken to 146 feet, and the strata forwarded to this Department for examination. The log is as follows:-

0	-	½	sandy soil
½	-	1	brown stiff sandy clay
1	-	10½	light grey brown sandy marl
10½	-	17	brown sandy clay
17	-	45	brown micaceous sandy clay
45	-	51	grey brown sandy clay
51	-	60	grey brown stiff very sandy clay
60	-	70	brown stiff sandy clay
70	-	83	grey brown stiff very sandy clay
83	-	88	creamy gritty clay and fossiliferous sandy limestone
88	-	89	cream sandstone, grit and limestone - ? beach deposit
89	-	91	cream gravelly calcareous sandstone
91	-	94	light brown very sandy marl
94	-	101	cream gritty sandy limestone
101	-	146	pegmatite and granitized rocks of the Kammantoo Series (bedrock)

A small quantity of water occurred at 83-88 feet, quality being 1010 grains per gallon. At 126 feet a supply of 120 gallons per hour was obtained, salinity being 850 grains per gallon total dissolved salts. This latter water would be usable for sheep, but could not be recommended for cattle.

Palaeontological and petrological examination of the sludges gave some interesting information. The samples from 101 to 119 feet were difficult to identify in the hand specimen, but proved to be a pegmatite, while those from 119 to 146 feet, which resembled fragments of sandy schist in the hand specimen, were found to be granitic.

Above this basement rock there is a thin section of marine fossiliferous calcareous sandstone, which has been correlated by Dr. Ludbrook with the Mannum beds, probably Oligocene to Miocene in age. This is evidence that what appeared to be a beach deposit is actually the shoreline of a narrow inlet at the edge of the Murray Basin, and represents at that point the very margin of deposition. Similar strata were not penetrated in the second bore some 500 yards to the northwest, so it seems reasonable to conclude that a narrow finger of the Tertiary sea entered the valley from the South, and deposited a thin shoreline facies at its edge, which did not extend very much further westward than the site of the first bore.

This marine shoreline facies contained water too saline for stock use (1010 grains) and the conclusion to be drawn from its occurrence is that drilling along the valley centre would probably mean penetrating the same series, with similar results. Any future drilling should therefore be more towards the valley flanks where the marine beds are less likely to occur.

It is of interest to note that the water in the underlying bedrock was rather less saline, and at 850 grains per gallon can be considered usable for sheep.

The second bore, as noted above, did not penetrate the marine beds, but was drilled in alluvial outwash and passed directly into bedrock. The water quality, at 691 grains per gallon, is considered suitable for sheep and cattle, although inferior in quality to water obtained in the bedrock elsewhere where the alluvial or soil cover is much thinner, and does not restrict downward percolation from rain.

The overall picture is of a narrow and elongated valley in the Kanmantoo bedrock, the centre of the valley having during Tertiary times been inundated by a shallow and narrow finger of the sea covering the Murray Basin. The thin marine deposit which resulted is probably confined to the central and presumably deeper part of the old valley floor, and contains water too saline for stock use.

Over this marine deposit a layer of about 100 feet of alluvial outwash derived from the adjacent bedrock hills has been deposited. This in places yields small quantities of fairly fresh water (a shallow well on the property yields 157 grain water) when soakage from surface sources is high, but cannot be regarded as a good or reliable source of water.

Limited stock supplies should occur in bores drilled more towards the valley edge where they will penetrate directly into bedrock below the alluvium, but the quality will not be very good because of the blanketing effect of the alluvium, which is believed to restrict downward soakage from rain. Bedrock water will therefore have to migrate from the valley edge where the rock is at shallow depth, and its salinity could be expected to increase as a result.

CONCLUSIONS & RECOMMENDATIONS:

Stock supplies of rather poor quality water may be anticipated in bores located towards the western boundary of the property. Drilling elsewhere does not appear warranted, because of the probable occurrence of saline water in the marine beds.

W.O'Driscoll

SENIOR GEOLOGIST
HYDROLOGY.

EPO'D:AGK
15/10/54.

DEPARTMENT OF MINES

SOUTH AUSTRALIA

Sample No. F217/54

Reference .....

PALAEONTOLOGICAL EXAMINATION OF MATERIAL.

Locality: County Hindmarsh. Distance and direction from nearest
Hundred Bremer town or station .....
Section 2572. .....

Details: Collected from bore, outcrop etc.

Bore for G. K. Gale, Contractors Walker & Butcher.

Depth 0' - 146'

Information required .....

Submitted by E. P. O'Driscoll

Address .....

Date .....

PALAEONTOLOGIST'S REPORT

At the request of the Senior Hydrologist and the Palaeontologist, samples were collected by the contractors to assist in the interpretation of the sequence in this area, south east of Strathalbyn.

0	-	0'6"	Dark brown surface soil.
0'6"	-	1'	Surface soil and travertinous rubble.
1'	-	10'6"	Reddish brown clay.
10'6"	-	30'	Brown sandy clay.
30'	-	45'	Grey-brown mottled sandy clay.
45'	-	51'	Brown sandy clay.
51'	-	55'	Yellow-brown sandy clay.
55'	-	83'	Grey brown mottled sandy clay and clayey sandstone.

Sample from 65'-70' was washed and examined under the microscope. Residues consisted of fine rounded to subrounded quartz grains with limonite. No microfossils were detected.

83' - 88' Greenish-grey clay and calcareous sandstone and gravel with the following foraminifera:

	No. of specimens
Cassidulina subglobosa Brady	1
Cibicides pseudoungerianus Cushman	1
Discorbis collinsi Parr	1
Elphidium crassatum Cushman	34
Elphidium sp. 1 cf. advenum Cushman	1
Elphidium cf. parri Cushman	1

	No. of specimens
Guttulina lactea (Walker & Jacob)	1
Lagena striata d'Orbigny	1
Notorotalia sp. nov.	5
Operculina sp.	1
Planorbulina sp.	1
Rosalina cf. orbicularis (Terquem)	2
"Rotalia" beccarii Linne	7
Rotorbinella cycloclypeus (Howchin & Parr)	3

88' - 89' Yellow calcareous gravelly sandstone with the following foraminifera:

Angulogerina sp. 6	1
Bolivina plicatella Cushman	1
Conorbella patelliformis (Brady)	8
Discorbis sp.	1
Elphidium crassatum Cushman	46
Elphidium parri Cushman	6
Elphidium sp. 1 cf. advenum Cushman	12
Globigerinoides trilocularis (d'Orbigny)	1
Guttulina problema d'Orbigny	1
Gyroidina sp.	1
Nonion sp.	1
Notorotalia sp. nov.	10
Rectobolivina bifrons var. striata Chapman	1
"Rotalia" beccarii (Linne)	3
Rotorbinella cycloclypeus (Howchin & Parr)	2
Textularia sp. 1	1
Vaginulina cf. patens Brady	1

89' - 91' Yellowish calcareous quartz conglomerate, not examined in detail.

91' - 94' Yellow brown clayey sandstone and loose conglomerate.
A few shallow water foraminifera, including Elphidium crassatum.

94' - 101' Calcareous sandstone, clayey gravel and quartz chips.

The following foraminifera were recovered:

Conorbella patelliformis (Brady)	1
Elphidium crassatum Cushman	5
Elphidium parri Cushman	2
Elphidium sp. 1	1
Notorotalia sp. nov.	2
Operculina sp.	1
Rosalina cf. orbicularis (d'Orbigny)	1
Rotalia beccarii (Linne)	1
Rotorbinella cycloclypeus (Howchin & Parr)	1

101' - 119' Crushed decomposed pegmatite.
119' - 146' Identified by Petrologist as "pulverized product of granitic rocks" - see Petrological Reports P289/54 - 292/54.

Sequence and Correlation.

From surface to 83 feet the sediments are unfossiliferous and consist probably of alluvial fan detritus. Between 83 feet and 88 feet the bore entered a formation of calcareous sandstone and quartz conglomerate, continuing to between 94 feet and 101'. This contains a shallow water microfauna characteristic of the calcareous sandstone at Mannum, - "Mannum Beds" of probable

Oligocene-Miocene age.

The coarse nature of the sediments and the contained fauna indicate deposition near margin of the mid-Tertiary overlap.

As there is some admixture of material in the samples from 83 feet to 101 feet the thickness of the marine bed can only be inferred as of the order of 10 to 15 feet.

Between 83 feet and 101 feet the bore entered bed rock derivative the washed residues containing a quantity of quartz chips derived from pegmatite.

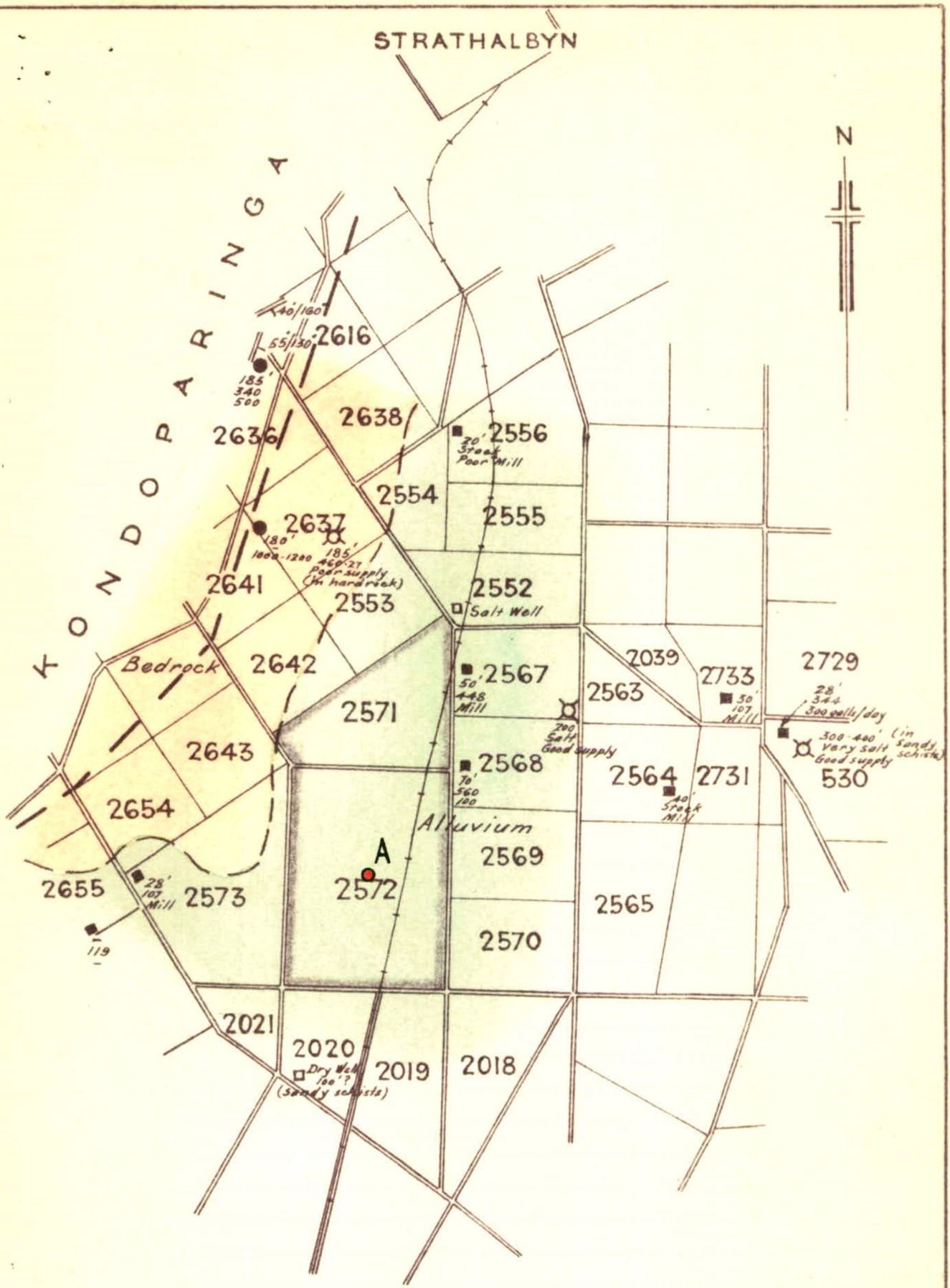
Material below 101 feet consisted of basement pegmatite and granititized rocks of the Kanmantoo series.

It is now possible to correlate spoil samples F204/54 from Section 3559, Hundred of Bremer, and F203/54 from Section 3555, Hundred of Freeling, which were previously examined.

Sample F204/54 also belongs to the Mannum beds although locality is probably a little further from the edge of the basin. The sediments represented by F203/54 are finer; they represent either less marginal deposition, though still shallow water, or slightly older sediments. Ranges of the contained foraminifera in this sample are not fully known.

(N. H. Ludbrook)
PALAEONTOLOGIST.

14/10/54.



To accompany report by E. O'Driscoll.

S. A. DEPT. OF MINES

Approved	Passed	Drn. R.R.	UNDERGROUND WATER SURVEY	D.M.	Scale 40 Chns. to 1 inch
		Tcd.	HD BREMER Secs. 2571/2	Reg.	S 949
		Ckd.	G. GALE		Hc 6
Director	C.D.	Exd.			Date 7·9·54