

REPORT ON GEOLOGICAL WORK DONE FOR DEVELOPMENT OF THE UNDERGROUND WATER SUPPLY OF THE S.A.R. & H. AND O.F.S. SYSTEM

BLOEMFONTEIN – KIMERLEY SECTION

1. EMMAUS

Geological and Topographical Conditions

Emmaus is situated on the Eccca Series of the Karroo Dolerite occur in this formation and the siding has been built on such a dolerite sheet. Only a few feet of loose red sandy soil covers the dolerite, which is weathered on top but very soon becomes hard and solid with depth.

Topographically the siding is on a "bult", which in turn is due to the differential weathering of the more resistant dolerite and the soft shales and sandstones of the Eccca Series. On account of its elevated nature the surface drainage is away from this railway site.

Present Supply

The only underground water at present is obtained from a borehole drilled into the dolerite to a depth exceeding 200 feet. This scanty supply is brought to the surface by means of a hand pump and 1 inch piping.

Hydrological Record

From information obtained locally it seems that at least 15 boreholes must have been sunk in the past without notable success on this Railway property of a few morgen. The majority of these holes were absolute failures, while as to the rest the supply was minimal.

Formally the water for domestic use was obtained from a well but for some reason of the other this source was abandoned as the water turned importable.

All the existing boreholes, excepting the above mentioned deep one, were drilled by jumper drill through the weather upper portion of the dolerite, and stopped when this rock become too hard. Their respective depths range from 18 to 45 feet, with only two holes down to 70 feet. These two holes yielded small but insufficient supplies. The boreholes on the premises are scattered at irregular intervals on both sides of the line.

Recommendation

It is evident that striking a strong underground supply of water on this limited property is improbable, but one promising site has been selected for a prospective borehole, and this should if successful, supply in or largely supplement the domestic needs.

The exact position of the recommended site is exactly halfway between mileposts 65/II and 65/III on the right side of the track and midway between same and fence. This position is west of the two 70 feet holes, and is situated topographically in catchments area for surface flow, as well as allowing for greatest depth of weathered dolerite.

This will be a dolerite drilling and therefore entails the use of a heavy drilling machine down to a maximum of 250 feet.

2. HEUWELSIG

Geological and Topographical Conditions

The country rock around Heuwelsig consists of blue ish fine grained shales and sandstones in nearly horizontal stratification. These beds form part of the Eccca Series of the Karroo System and because of the easy mode of weathering are only exposed in excavations, being elsewhere covered by a dark clayey soil an considerable surface limestone.

The local countryside is devoid of topographical features, being solutely flat due to the fact that the sediments have not been disturbed by intrusions of Karroo Dolerite.

Present Supply

The only underground water supply on the premises of the Railway Cottage is at present obtained by hand pump from a well dug into the shales. The water table is about 40 feet beneath the surface. Ye yield is adequate for domestic purposes, but the water has become useless as the result of contamination by ants in the well. No other boreholes or wells exist on the property.

Recommendation

Drilling for underground water should be very successful and a strong supply is anticipated. A maximum depth of 200 feet is suggested, although a plentiful yield is expected at a depth of less than 100 feet. A 30 feet length of casing should be inserted into borehole to prevent contamination by ants etc.

The position of boring site selected is as follows: Milepost 71/II plus 400 feet (which is position of present concrete tank next to line), and the 100 feet left of centre of track. This site is more or less in line with present well and front corner of cottage.

3. OLIFANTSKOP

Geological and Topographical Conditions

The topography of the area in the immediate neighbourhood is governed by the outcrop of a sheet like railway property except on the northern side of the line. The dolerite dips at low angle to the north in beneath some fine grained blueish shales, probably belonging to the Eccca Series of the Karroo System. As a result of this geological structure the ground slopes to the north with surface drainage in the same direction.

The contact between the overlying shales and the dolerite is concealed by a covering of red sandy soil, but occurs about 200 yds. south of the cottage. The cottages are built on these shales of which the thickness steadily increases down the slope.

Present Supply

There is no underground supply, and all the water need is carried by rail.

Previous Boreholes

According to scanty information gathered form the ganger four holes have been drilled in the area, of which two are situated on the premises. They were stopped on reaching the hard dolerite beneath the

thin covering of shales, and the supply was negligible. The other two holes ere drilled about 300 yds. west of the halt and close to the line with similar results.

Recommendation

The prospects for successful drilling for underground water on Olifantskop seem to be rather poor, not only on account of its relatively high topographical position with out any catchment area for surface flow and consequent underground concentration of water, but mainly by reason of the adverse geological structure, where the dolerite on the slope is only thinly covered by shales.

Two sites have, however, been selected at the following positions:

1. 65 Feet short of milepost 92 on the right side of the track, and halfway between centre of track and fence.
2. 2. 365 Feet short of milepost 91/III on right side of line and halfway between centre of track and fence.

These two prospective holes have been selected with the view of piercing the greatest local thickness of water carrying shale before the dolerite is struck, but they will probably both turn out to be dolerite drillings at limited depth. A maximum depth of 250 feet is suggested.

Site no. 1 has the advantage of being close to the cottages, but no. 2 is the most promising, although if successful, it would necessitate pumping costs for about a quarter mile.

BLOEMFONTEIN – SPRINGFONTEIN SECTION

1. BETHANY

Geological and Topographical Conditions

Bethany is situated on the Beaufort Series of the Karroo System, which locally consists of alternating thin beds of soft blue and grey shale and sandstone dipping eastward at the low angle of about 5°.

Topographically the area is fairly flat with positive features mostly formed by Karroo Dolerite intrusions resistant to quick weathering and it is on such high ground that the station was built. About 100 yds. N.W. of the station and extending in a N.E. – S.W. direction a big dolerite dyke was intruded, and this in turn is crossed at right angles by a smaller dolerite dyke running south of the station. A lateral by a smaller dolerite dyke funning south of the station A lateral spreading of dolerite also took place beneath a light covering of shales and sandstones, on which the railway buildings stand. All the surface drainage is away from the railway grounds.

Present Supply

There are two boreholes at present supplying water for domestic purposes. One is on the premises close to the Station Master's house, and from this a windmill is yielding an insufficient supply. The other borehole is 1.1 miles to the north of the station next to the railway line, and from this source a supply of about 600 galls. per hour is pumped to the tanks.

Hydrological Record

Four of five boreholes have been drilled at various places on the railway premises without notable success, ie. excepting the above mentioned one with the windmill (depth 200 feet plus). On the

adjacent school grounds seven boreholes exist and from only one of them a weak supply is obtained by windmill. They range in depth from 80 – 90 feet.

The geological conditions on both railway and school grounds are the same, and the scarcity of water can be ascribed to the fact that the premises are situated on the watershed so that there is no concentration of underground water in the relatively thin covering of potentially water bearing shales overlying the solid dolerite. The records of all these boreholes show that their respective supplies, when drilled down to solid dolerite, are about the same and therefore inadequate.

Recommendation

Judging by results obtained from the dozen or so existing boreholes, no new sites on or close to the premises can be recommended with justification. North of the station, however, there is a fairly wide and deep valley between two low ridges of dolerite, and which has an extensive drainage area to the west. The floor of this valley is covered by alluvium, which rests on Beaufort sediments without any sign of dolerite, and would thus constitute a good aquifer. The position of this prospective site in the valley is as follows: 40 feet short of milepost 414/II on the left side of the track and halfway to fence. A maximum depth of 250 feet is suggested, and a good supply can be expected.

This position is about halfway between tanks at station and the present pumping plant, but would still need forcing the water some distance at a 1/110 gradient.

BLOEMFONTEIN – ALIWAL NORTH SECTION

1. BRUGHALT

Geological and Topographical Conditions

This small Railway property is underlain by the Upper Beds of the Beaufort Series of the Karroo System, which locally consists of nearly horizontal and alternating strata of fine grained red and blue shale and grey sandstone. Karroo Dolerite intrusions are numerous in this formation but no dolerite outcrops occur on or close to the property, which is situated on slightly sloping country near the base of some hills to the west.

As far as is known no previous drilling or digging for underground water has been attempted at Brughalt.

Recommendation

Two sites for future boreholes have been selected, and both will start off in sedimentary rocks with shale predominating. The prospects are that a good supply of underground water will be struck if dolerite is not encountered at too limited depth, which, however, seems improbable. The depth suggested is 200 feet.

Positions of sites:

1. On the premises and on the right hand side of the line, 50 feet to the back of the small waiting room. (The only structure on the place).
2. Opposite milepost 45 on the right hand side of the line and halfway between centre of track and fence.

Drilling on site no. 1 is to be attempted first.

2. BOESMANSKOP

Geological and Topographical Features

The situated at the base of a fairly high hill to the west, while on the eastern side the Boesmanskopspruit has its course with a good drainage area from the north. The country rock, where exposed, consists of nearly horizontal beds of blue, red and purple shale alternating with sandstone. These brightly coloured sediments belong either to the Upper Beaufort Series of the Karroo System or to the Red Beds of the Stormberg Series of the same System, but more probably to the last mentioned formation. The shale and sandstone have been intensively intruded by sills of Karroo Dolerite.

The railway property is on slightly sloping ground underlain by alluvium of the valley, and no outcrops are visible.

Present Supply

The only supply is obtained from a borehole in the southern part of the premises. This hole, which is over 200 feet deep, cannot supply loco needs.

Hydrological Record

Several boreholes have in the past been drilled on the premises. No records of their respective depths and yields exist and not even the sites are known. Formerly water was taken from a well dug into the alluvium, but this practice was discontinued and the well sealed up.

Recommendations

The chances for drilling successfully for underground water on the premises will be enhanced by attempts east of the track and lower down towards the spruit, in order to take advantage of the subsurface supplement of water caused by the Boesmanskopspruit. In drilling, alternative beds of sedimentary rocks and dolerite may be pierced, and seeing that relatively shallow borehole gave unsatisfactory results, depths of 300 feet are suggested for the following sites.

1. On the right hand side of the track and perpendicularly in line from the southern corner of the goods shed, 10 yards inside the eastern fence of premises. This position is close to that of the old well.
2. 40 Feet short of milepost 111/land 140 feet to right hand side of the track.

If no adequate supply is obtained from either of these two prospective boreholes, the average yield is too small and pumping plants can be erected so as to draw water from two or more boreholes simultaneously.

BLOEMFONTEIN - KROONSTAD SECTION

1. GENEVA

General Information

This station was visited and the following information received from the local Station Master.

Some time ago the underground water supply diminished and it was suspected that the yield of the borehole had given in. Later on, however, it was discovered that the shortage was due to a defective pumping plant, which after the necessary repairs have been effected, is now keeping the tanks well filled because the underground supply is good. It seems that there is no water shortage problem at present and a better site than the one now in use can hardly be recommended. It might be advisable to deepen the present borehole if periodical droughts affect the supply adversely.

VIERFONTEIN BULTFONTEIN SECTION

1. WESSELSBRON

Geology and Topography

Wesselsbron is situated on fairly flat country consisting of Ecca shales and sandstones with dolerite sills forming the higher ground. The station is built on such a dolerite rise.

Present Supply

Two boreholes exist on the railway premises. The one on the southern end of the property was drilled to a depth of 71 feet into rocks consisting mainly of dolerite. A weak supply is brought to the surface by means of a windmill. The other borehole is north of the station and from here an inadequate supply of water is pumped to the tanks.

Recommendations

No drilling for water on the premises is recommended, because both the above mentioned boreholes, as well as some other even deeper ones on adjacent ground to the south, gave poor results on account of solid dolerite just below the surface and no facilities for underground concentration of water.

A promising site has been selected in valley north of station where there exists a drainage area to the west, and where dolerite, if present below, should be weathered to an appreciable depth. A drilling depth of 300 feet is suggested.

The position of the site chosen is as follows: Milepost 62/II plus 480 feet and then 66 feet to the right hand side of the track

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