# PRELIMINARY GROUND-WATER SURVEY, DELAREYVILLE MUNICIPALITY

## Introduction

This survey was carried out between the 24th of November 1969 and the 6th of December 1969. Being declared as a border area, the existing water supply of the town will not be sufficient for future industries. A better water supply for a Bantu area, approximately 15 miles north of Delareyville, was also investigated.

## Geology and Physiography

The area forms part of the Highveld of the southwestern Transvaal, with an altitude between 4000 and 4500 feet above sea-level. The Hartsrivier drains the eastern part to the south. Pans are widespread throughout the area especially in the western part. Rainfall occurs mainly in the summer in the form of thunderstorms. The greater part of the area is covered by andesitic lava of the Ventersdorp System. To the northwest of Delareyville, round Geysdorp, Tertiary to Recent deposits consisting of limestone, gravel and conglomerate are found. Some small outcrops of Archaean granite also occur northwest of Delareyville, and granite was struck in boreholes east of Geysdorp on farm Skynsvlakte. Erosion channels exist in the Ventersdorp lava which are filled up with unconsolidated material consisting mainly of gravel with a limestone cover.

## Boreholes and waterconsumption

The Municipal boreholes are drilled in the weathered lava. BH 1, 2, 3 (see map in Delareyville file) yield about 120,000 g.p.d., if pumped 10 hours daily. The yield of the other 7 boreholes is about 500-600 g.p.h. per borehole. Two boreholes were drilled recently, one of them yielding approximately 3000 g.p.h., the other approximately 1500 g.p.h. The water consumption of the Municipality during the period June/July, 1963/64, was 11,684,600 gall., that is an average of 975,000 gall. per month. During October 1969, water consumption rose to 2,365,700 per month.

Plan GH 2286 shows that the boreholes with yields of approximately 10,000-25,000 g.p.h. are situated in the above-mentioned erosion channels. Boreholes in the weathered lava seldom yield more than 3-4000 g.p.h. In the eastern part of the area round the Hartsrivier, strong boreholes are seldom found (see also enclosed list of boreholes).

## Preliminary Pumpingtests

In order to calculate the hydraulic characteristics of the aquifer, two twentyfour hour constant yield pumping-tests were carried out. The first test was carried out on farm Blesbokpan. The coefficient of transmissibility T was calculated after the residual-drawdown formula, the Theis and the Jacob formula. The coefficient of storage S was calculated by means of the time-drawdown curve.

The results of the three observation boreholes are as follows:

Pumphole (Nr. 35) on map.

Observation BH 1 (Nr. 38), BH 2 (Nr. 37), BH 3 (Nr. 36).

| | | | |
|---|---|---|---|
| T of BH 1 | (Residual drawdown) | $68.2 \times 10^3$ g.p.d. per ft. | 1018 m²/day |
| | (Jacob) | $54.2 \times 10^3$ " " | 805 " |
| S " " | | = 1.6% | |
| T of BH 2 | (Residual drawdown) | $66.9 \times 10^3$ g.p.d. per ft. | 1000 m²/day |
| | (Theis) | $76.0 \times 10^3$ " " | 1135 " |
| | (Jacob) | $51.0 \times 10^3$ " " | 762 " |
| S " " | | = 2.5% | |
| T of BH 3 | (Residual drawdown) | $71.6 \times 10^3$ g.p.d. per ft. | 1068 |
| | (Theis) | $83 \times 10^3$ " " | 1240 |
| S " " | | = 1.72% | |

The average coefficient of transmissibility is approximately $68.0 \times 10^3$ (1000 m²/day), and the average coefficient of storage is approximately 1.7%.

In the second pumptest on the farm Boschpan the observation hole was only 4 meters away from the pumped hole. In this case it was only possible to get a figure of the coefficient of transmissibility from the residual drawdown curve. But the drawdown of over 70' in 24 hours, and the low coefficient of transmissibility ($2.1 \times 10^3$ g.p.d. per ft.) shows that this borehole is weak in comparison with the borehole on farm Blesbokpan.

The plotted data of the pumptests are enclosed in this report.

## Conclusions

The coefficient of storage (about 1.7%) shows that the aquifer is semi-unconfined, as the water was nearly always struck deeper than the water-level, and during drilling, clay lenses were encountered in the boreholes. It will be necessary to do 72 hour pumping-tests to determine whether recharge or boundary effects will occur.

To delineate the aquifer and the thickness thereof, electrical depth probes etc. will have to be carried out. If no results are obtained with resistivity work, one should consider gravity or seismic observations. Electrical logging in all the existing boreholes in the erosion channel areas will give an approximate thickness of the aquifer. In some boreholes in the erosion channels near saltpans, little water was struck. It is possible that in these cases less permeable layers (clay) of the aquifer were encountered.

It is suggested that the geophysical work be started on farm Blesbokpan. Afterwards the work can be continued at places nearer to Delareyville. Possible erosion channels on Municipal ground should be investigated. All the investigated areas should be mapped carefully and in the most promising aquifers, sites should be selected and boreholes drilled and tested.

The erosion channels mapped from areal photographs are only approximate and only indicate the more prominent aquifers.

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| Water-level in feet | Tested yield in g.p.h. | Abstraction g.p.h. | Abstraction period | Pump type | Yearly abstraction in gall. | Geology | General informati |
|---|---|---|---|---|---|---|---|
| 3/12/69 | 25,000 | 20,000 | 3 months 24 hours | Turbine | | Limestone, sand | 8' hole |
| 17.27 | | | | | | | |
| 17.79 | 12,000 | | | | | | |
| 20.21 | 6,000 | | | | | | |
| 18.54 | 7,000 | | | | | | |
| 17.39 | 2,000 | | | | | | |
| | 4,000 | | | | | | |
| 28/11/69 | 37,000 | 31,000 | 3 months 24 hours | 5" turbine (10 stages) | | | |
| 45'8½" | | | | | | | |
| | 27,000 | | | | | | |
| | 3,000 | | | | | | |
| | 5,000 | | | | | | |
| | 20,000 | | | | | Granite, sand | |
| Approx. 30 | 20,000 | | | Turbine 15 stages | | Quartz, sand | |
| Approx. 70 | 11,500 | | | Turbine | | | |
| Approx. 70 | 8,500 | | | | | | |
| | 15,000 | | | 2½" turbine | | | |
| | 4,500 | | | 4" turbine | | | |
| | 4,000 | | | | | | |
| | 5,000 | | | | | | |
| | 30,000 | 20,000 | | 5" turbine (10 stages) | | | |
| | 8,000 | | | | | | |
| | 4,500 | | | | | | |
| | 4,500 | | | | | | |
| Approx. 20 | 12,000 | | | | | Limestone with pieces of lava, sand, lava | |
| | 3,800 | | | | | | |
| | 7,000 | | | | | | |
| Approx. 28 | 10,000 | | | 4" turbine (5 stages) | | | 8" hole |
| | 9,000 | | | | | | |
| | 20,000 | 12,000 | 7 months | 4" turbine (10 stages) | | | 8" hole |
| 4'4" | 15,000 | | | | | | |
| | 9,000 | 6,000 | 7 months | 2½' turbine | | | |
| Approx. 25 | 19,000 | | | 5' turbine | | | 8" hole |
| | 2.000 | | | | | | |

| Water-level in feet | Tested yield in g.p.h. | Abstraction g.p.h. | Abstraction period | Pump type | Yearly abstraction in gall. | Geology | General informati |
|---|---|---|---|---|---|---|---|
| | 3,600<br>3,600 | | | | | | |
| | 2,000<br>9,000 | | | | | | |
| | 25,000 | 20,000 | 3 months<br>10 hours | 5" turbine<br>(10 stages) | | | 8" hole |
| | 9,000 | 8,000 | 3 months<br>10 hours | | | | |
| | 7,000 | | | | | | |