Palm Valley
Production Bore RN 12024
BORE WORKOVER 1994

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1. INTRODUCTION

In the course of correspondence between Water Resources Branch (WRB), Power and Water Authority, PAWA, and the Conservation Commission of the Northern Territory (CCNT) in 1994 over long term water management strategies in the Finke Gorge National Park (located to the west of Alice Springs as shown in Figure 1), it was noted by WRB that bore records showed the main production bore (RN 12024) at Palm Valley was hydraulically inefficient due to a poorly constructed bore. It was recommended by WRB that if the CCNT wished to improve water supply at Finke Gorge, then RN 12024 should be reconstructed. Accordingly the Asset Policy unit of the Dept of Transport and Works made funds available to WRB to reconstruct and test bore RN 12024 in September 1994. A WRB field crew and equipment worked over this bore in the week beginning the 28/11/94.

2. BACKGROUND

Bore records held by WRB show RN 12024 was initially drilled and constructed in 1978 (as shown in Figure 2a). In 1986 the hole was deepened and reconstructed (as shown in Figure 2b). When the reconstructed bore was subsequently tested in 1986 the drawdown response indicated a poor construction had led to a decrease in hydraulic efficiency when compared to the previous test of the original bore (compare Figures 3a to 3b). This decrease in efficiency was attributed to the main zone of water influx to the bore having been cased off by the 1986 work. Consequently the aim of these 1994 works was to again set perforations adjacent to the main zone of water influx and retest the bore.
3. RESULTS

3.1 1994 Reconstruction

A WRB drilling plant pulled the casing from RN 12024 in late November 1994. When the casing was pulled it was unexpectedly found to be perforated from the top to the bottom of the hole. As some tree roots were noticed, the hole was cleaned out to total depth with a 185 mm drilling bit. The bore was then reconstructed with some new lengths to replace damaged sections, as displayed in Figure 2c.

3.2 1994 Test

Following reconstruction the bore was again test pumped. The drawdown response graph is shown in Figure 3c where it can be seen bore efficiency is certainly better than during the 1986 test (Figure 3b).
4. DISCUSSION

The state of bore construction (fully perforated casing string) found when the casing was pulled was unexpected. It is considered likely that following the unfavourable test report in 1986, some interested party at CCNT independently arranged for a more favourable reconstruction of this hole. The lack of documentation for this work is unfortunate, in that some of the 1994 works may not have been recommended, had records of this work been available to WRB.

The results of test pumping (Figure 3c) clearly show this bore, at least at the time of the 1994 testing, is hydraulically efficient and could easily meet the 1986 recommended maximum continuous pumping rate of 0.8 L/s.

The slight differences in water level for each test annotated in Figure 3 may also be of significance to bore efficiency. For instance during testing in 1986 the water level was 9.25 m below the top of casing, while in 1979 and 1994 the water level was 8.16 and 8.42 metres respectively. This slight variation in water level may indicate that a temporary increase in available storage, due to recharge, periodically enhances bore performance. Just such a phenomenon was witnessed in bore RN 2830 at Areyonga when performance was noted to decrease when the adjacent creek stopped running in between subsequent testing (see Wischusen 1994). This bore at Areyonga is somewhat analogous to Palm Valley as both RN 12024 and RN 2830 tap the same Hermannsburg Sandstone aquifer. Indirect evidence that periodic recharge may temporarily enhance RN 12024 pumping performance, is the fact that the (locally) deep water level allows space for additional storage to be replenished from recharge. This would also then explain the fact that the campground bore (RN 4508) 2 km upstream from RN 12024 (see figure 1), where the water level is near surface (no room for recharge) has a Radiocarbon content of only 4% Modern Carbon (MC) while RN 12024 has a Radiocarbon content of 27% MC. This higher percentage of MC indicating some mixing of modern (100+% MC) recharge water with the old (4% MC) groundwater (evident at RN 4508) occurs at this bore. Thus
it appears that the poorer bore performance recorded in 1986 may have arisen from a combination of poor construction and a reduction in accessible storage, when compared to the 1979 and 1994 tests. From the data available, it is not possible to predict the likely affect changes in bore water level will have on bore performance, however the recorded water levels in RN 4508 suggest the water level of the old groundwater in RN 12024 should remain constant, thus a modest recommended pumping rate should be sustainable from this bore, with periodic improvements likely after rainfall events.
5. CONCLUSIONS AND RECOMMENDATIONS

Poor performance, noted after the reconstruction of RN 12024 when the main water influx zone was cased off, may also have been in part due to the absence of additional available storage from recent recharge, that may have characterised other performance tests on this bore. This bore has now been proved to be suitably constructed to access all available water influxes.

The recorded fluctuations in bore water level between 1979, 1986 and 1994 suggests a modest continuous pumping rate is a prudent recommendation. Consequently a continuous pumping rate of 0.6 L/s or an 8 hour per day duty cycle of 1.0 L/s is the recommended yield of this bore.

6. REFERENCES

Bore Construction Diagrams
RN 12024

FIGURE 2
FIGURE 3a

PREDICTED DRAWDOWN (metres)

Q = 2.5 L/s

PALM VALLEY – RN 12024
TEST JAN 1979
CONSTANT RATE TEST PUMP GRAPH

FIGURE 3a
Palm Valley - RN 12024

TEST : APRIL 1986 (with 1979 & 1994 for comparison)

CONSTANT RATE TEST PUMP GRAPH

FIGURE 3b

1979 TEST Q = 2.5 L/s (see figure 3a) SWL = 8.16m
1994 TEST Q = 1.3 L/s (see figure 3c) SWL = 8.42m

Q = 1.3 - 0.8 L/s
FIGURE 3c

Palm Valley - RN 12024
Test: Dec 1994
Constant Rate Test Pump Graph

Q = 1.3 L/s

Test pump book 1135