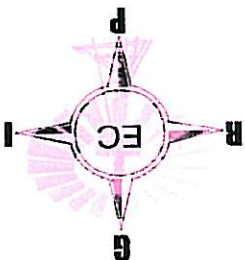


**GROUNDWATER RESOURCE INFORMATION PROJECT
EASTERN CAPE PROVINCE
GROUNDWATER INFORMATION SOURCE REFERENCE SHEET**

SOURCE REF NR:	AD 017	Own Archive	Copy attached	X
		Sourced	Copy at source	



A: SOURCE DESCRIPTION

Amatole	Chris Hanu	O.R Tambo	X
Ukhahlamba	Cacadu	Afred Nzo	

MHLONTLO

AD GEO CONSULTANTS

Institution where information is held:

Branch of Institution:

Contact details: A. VAN ROOYEN

Contact Tel: 043 7268868

Contact Email: adgeoconsul@elkomsa.net

B: TYPE OF INFORMATION

Information format: Hard copy Data Summary Electronic Report

Specify Other:

Report / Info Title: FIRST PHASE INVESTIGATION TO MANAGE THE POTENTIAL GROUNDWATER CONTAMINATION FROM ON SITE SANITATION

Report Nr: AD/011/003

Author Details: DANIEL KOEGELENERG

Author's Qualification: Hydrogeologist

Specify Other: Engineer

Captured by: R MAMPURU

Date: 13/02/2004

Signed:

C: GEOHYDROLOGICAL CATEGORIZATION

Project Type: Source development Feasibility Study Sanitation Study

Specify Other:

Reference Co-ordinate: Latitude 31.32111111 Longitude 28.8098900

Yes No Complete Incomplete

Lithological & Construction Logs

Hydrocensus Data

Pump Testing Data

Chemical Water Analysis Data

Geohydrological Data

Spring Data

Remote Sensing Data

Map Data

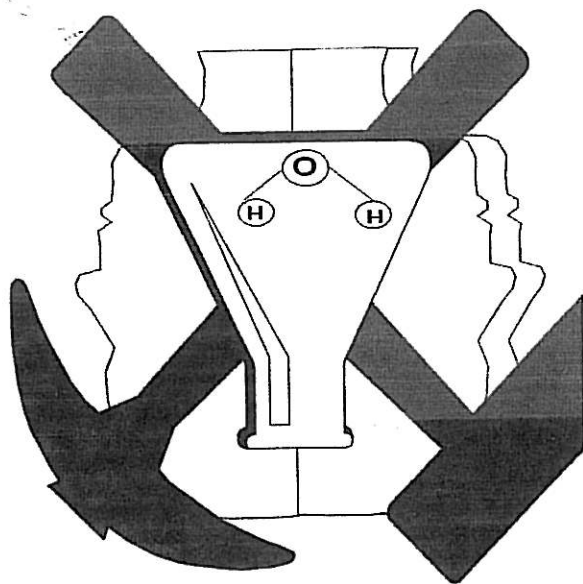
Comments: ONE VOLUME ONLY

Reviewed by: A VAN ROOYEN

Date: 13/02/2004

Signed:

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E-mail: adgeoconsul@telkomsa.net



WATER RESOURCE DEVELOPMENT
BY MEANS OF
BOREHOLE DRILLING & TESTING

GEOHYDROLOGICAL INVESTIGATION
TSOLO SCHOOL WATER PROJECT
MHLONTLO MUNICIPALITY

STEMELE BOSCH AFRICA
PO Box 11116
Southernwood
East London
5213

Date: 03 July 2003
Author: Daniel Kogelenberg
Report No.: AD/011/03

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7.	Conclusions & Recommendations

1. Introduction

Stemele Bosch Africa tasked AD Geo Consultants to develop groundwater resources by means of borehole percussion drilling for the new school near Tsolo in the O.R Tambo District Municipality. (See Map 1: Regional Layout).
This report presents the findings of the project.

2. Geology / Geohydrology

The geology underlying this village is sandstone and brownish-red and grey mudstone from the Burgersdorp and Katberg Formations. The Formations forms the Tarkastad Subgroup of the Beaufort Group. Dolerite dykes occur to the south, east and west of the target area but no geological structures occur near the target area.

3. Borehole Siting

An existing borehole was identified during the initial site reconnaissance. The borehole was used by the contractors who upgraded the tar road between Umata and Mount Frere. The equipment was however removed and the borehole and pump house destroyed. The following conclusions were made from this field visit:

- The borehole was constructed with Lpvc casing
- The concrete slab and brick wall around the borehole is evidence that the borehole was in use
- According to the geological map of the area and observations made during the field visit, no dykes or faults occur in the area. The water strike is thus speculated to be related to a bedding plane fracture.

Based on the above information and previous experience in the area, we recommended that the existing borehole be re-drilled.

4. Borehole Drilling

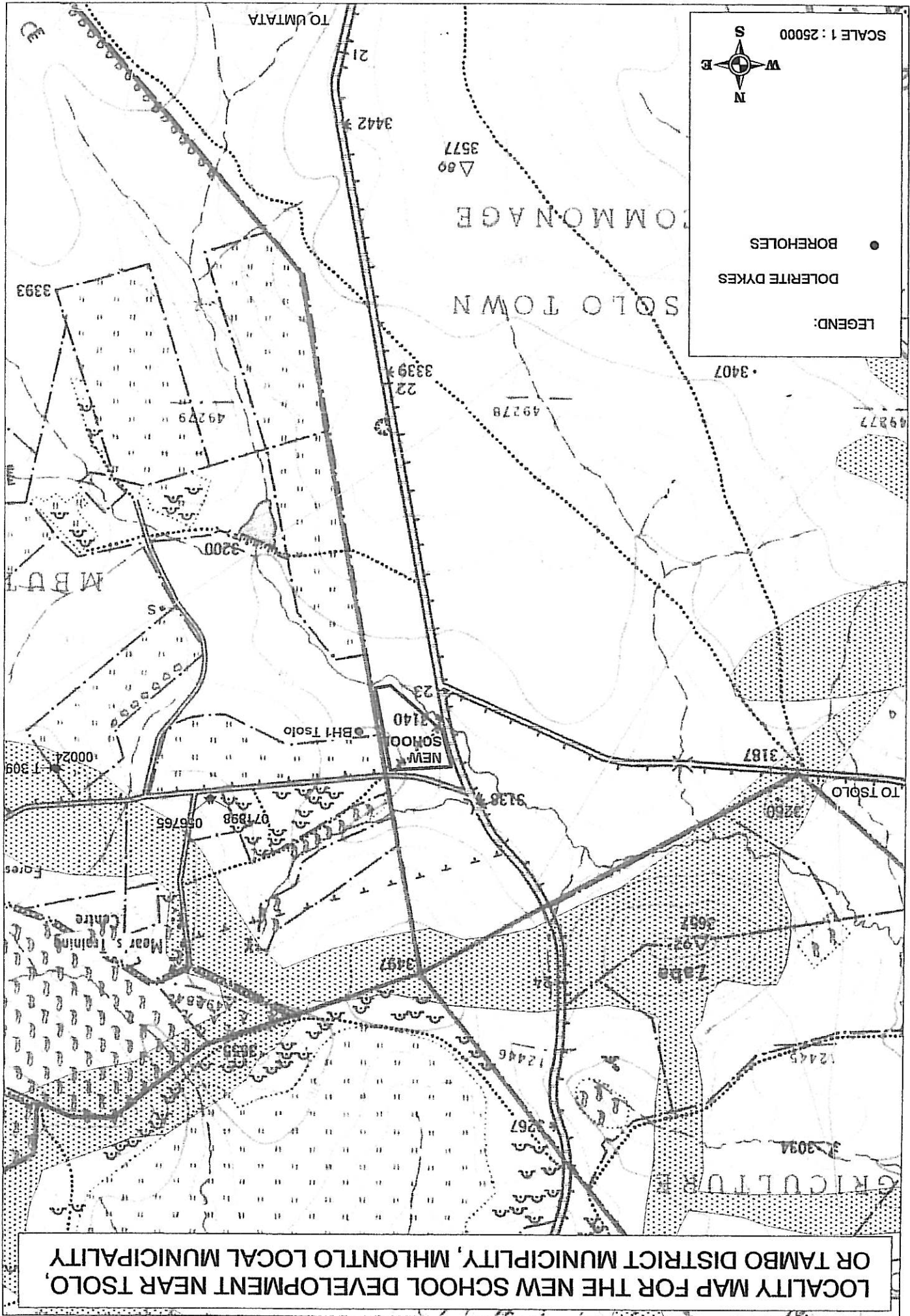
Borehole drilling was conducted by Aboutliffe by means of air percussion drilling. One borehole (*BH1 - Tsolo* on the map) was developed.

The following observations were made during the borehole drilling:

- The borehole was drilled to a depth of 63.0m.
- A blow yield of 1.8l/s was obtained at a depth of 16m.
- No problems were encountered during the borehole drilling

5. Borehole Testing

The borehole was yield tested with 1) a stepped discharge test, 2) a constant yield test and 3) a recovery test.



LOCALITY MAP FOR THE NEW SCHOOL DEVELOPMENT NEAR TSOLO, OR TAMBO DISTRICT MUNICIPALITY, MHLONTLO LOCAL MUNICIPALITY

- a) The borehole can be utilized by means of equipping it with an electrical unit for the school at a rate of 3.0l/s over a 18 hour duty cycle.
- b) An installation depth of 40m is recommended.
- c) A manhole type pump house is preferred.
- d) The pump size should be selected on the basis of the school's need rather than the recommended yield. This would save on cost since a smaller pump could be installed.
- e) The project is deemed successful.

The following conclusions & recommendations are made:

7. Conclusions & Recommendations

- The water is classified as a class 1 and therefore considered to be potable.
- We speculate that the borehole is recharged from the river and suggest that the microbiological quality of the water be tested regularly

The following observations were made regarding the water quality for the borehole:

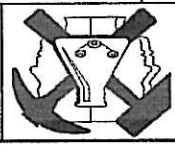
The water quality analysis was conducted by Amatola Water in East London.

6. Chemical Analysis

- The static water level was measured at 8.85m.
- A stepped discharge test was conducted at steps of 0.4l/s, 0.8l/s, 1.5l/s, 3.0l/s and 6.0l/s. These steps were conducted over a period of 1 (one) hour each consecutively. A total drawdown of 7.75m was observed at the end of the test. The recovery of the water level was measured for 60 minutes to a depth of 0.30m.
- A constant discharge test was performed at 3.02l/s over a period of 12 hours. A total water level drawdown of 3.47m was measured. At the end of the constant rate test, a recovery test was performed for 6 hours. A final measurement of 0.18m was recorded. A total recovery of 94.8% was therefore observed.
- A water sample was taken at the end of the pumping test and delivered to Amatola water for quality analysis.

The following observations were made:

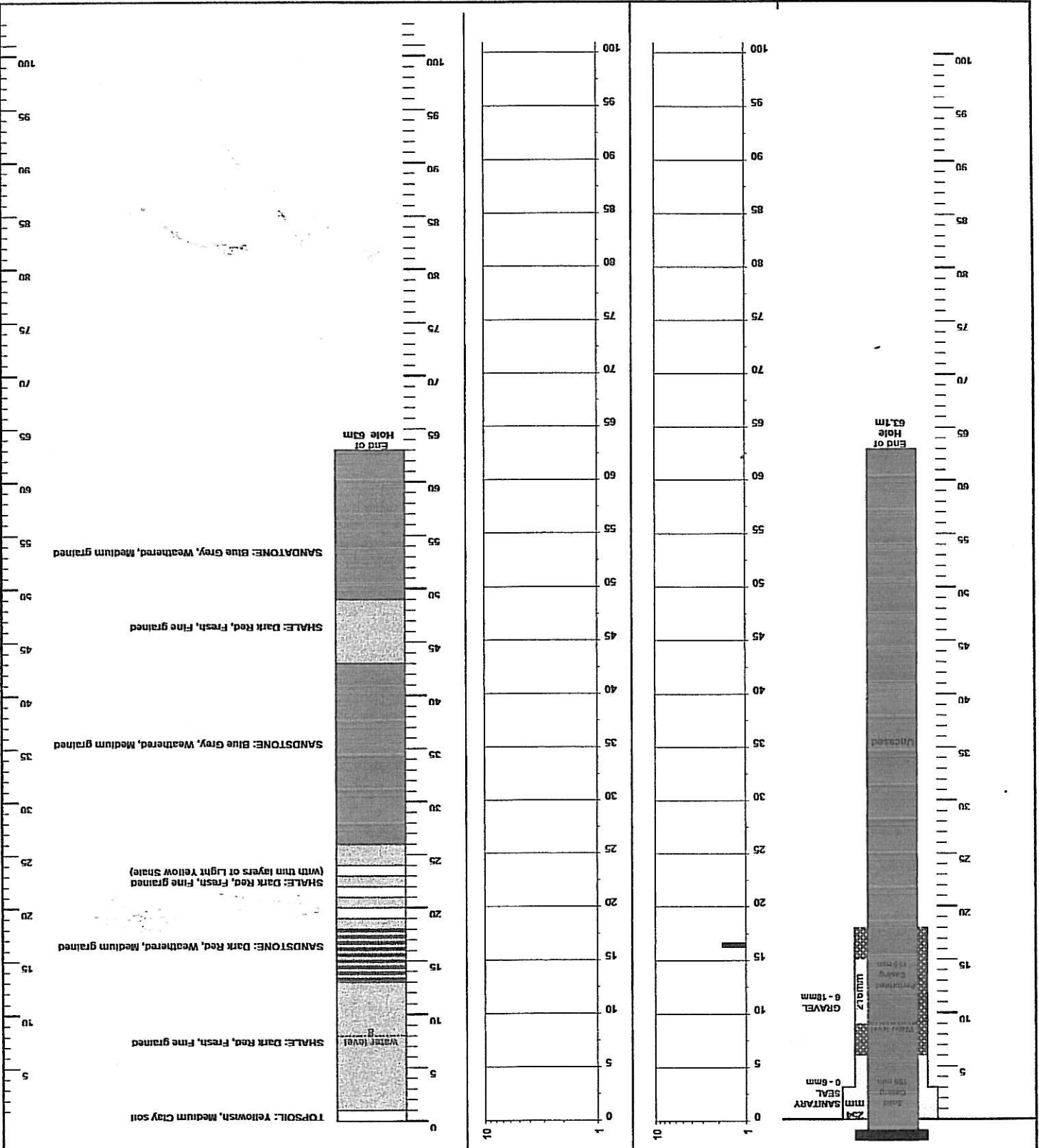
AD GEO CONSULTANTS CC
 5 High Field Road
 BEACON BAY, 5205
 TEL NO: +27 43 7482723
 FAX NO: +27 43 748 2723



PERCUSSION DRILLING RECORD
 METHODE:
 CLIENT SBA
 PROJECT: TSOLO SCHOOL
 SITE: TSOLO SCHOOL DRILLER: ABOUTLIFE
 LOG: REUBEN MAMPURU DATE STARTED: 17-Jun-03

BOREHOLE NR. BH1-TSOLO GEOPH PEG No. 211916
 WATER LEVEL: 8.85 LATITUDE: 31.321111
 COLLAR HEIGHT: 0.85 LONGITUDE: 28.809889
 ALTITUDE:
 BOREHOLE NR. BH1-TSOLO GEOPH PEG No. 211916
 WATER LEVEL: 8.85 LATITUDE: 31.321111
 COLLAR HEIGHT: 0.85 LONGITUDE: 28.809889
 ALTITUDE:

BOREHOLE	Casting diameter: 178 mm	PROGRESSIVE YIELD (L/s)	DEPTH PROFILE	LITHOLOGY
CONSTRUCTION	Casting thickness: 4 mm	PENETRATION RATE (mm/m)	(m)	



BOREHOLE TEST RECORD SHEET

FORM 5 E

STEPPED DISCHARGE TEST & RECOVERY

PROJ NO:	MAP REFERENCE:	PROVINCE:	EASTERN CAPE
BOREHOLE NO:	COORDINATES:	DISTRICT:	TSOLO
ALT BH NO:	LATITUDE:	SITE NAME:	TSOLO
ALT BH NO:	LONGITUDE:		0
BOREHOLE DEPTH (m):	DATUM LEVEL ABOVE CASING (m):	EXISTING PUMP:	0.20
WATER LEVEL (mbgl):	CASING HEIGHT (magl):	CONTRACTOR:	0.65 AB PUMPS
DEPTH OF PUMP (m):	DIAM PUMP INLET (mm):	PUMP TYPE:	180.00 P 150

DISCHARGE RATE 1	DISCHARGE RATE 2	DISCHARGE RATE 3
RPM	RPM	RPM
DATE: 17/06/03	DATE: 17/06/03	DATE: 17/06/03
TIME: 07H20	TIME: 08H20	TIME: 09H20

TIME (MIN)	DRAW (M)	YIELD (L/S)	DOWN (M)	TIME (MIN)	DRAW (M)	YIELD (L/S)	DOWN (M)	TIME (MIN)	DRAW (M)	YIELD (L/S)	DOWN (M)	TIME (MIN)	DRAW (M)	YIELD (L/S)	DOWN (M)
1	0.23	0.41	1.31	1	0.88	1.07	1.52	1	1.36	1.48	1.50	1	1.41	1.51	1.52
2	0.40	0.42	1.41	2	0.99	1.05	1.54	2	1.46	1.56	1.54	2	1.48	1.58	1.56
3	0.55	0.42	1.46	3	1.04	1.10	1.54	3	1.48	1.56	1.54	3	1.46	1.58	1.56
5	0.62	0.41	1.48	5	1.05	1.10	1.54	5	1.48	1.56	1.54	5	1.46	1.58	1.56
7	0.66	0.41	1.52	7	1.07	1.10	1.54	7	1.48	1.56	1.54	7	1.48	1.58	1.56
10	0.69	0.41	1.54	10	1.10	1.10	1.54	10	1.48	1.56	1.54	10	1.48	1.58	1.56
15	0.73	0.41	1.56	15	1.14	1.10	1.54	15	1.48	1.56	1.54	15	1.48	1.58	1.56
20	0.76	0.41	1.56	20	1.14	1.10	1.54	20	1.48	1.56	1.54	20	1.48	1.58	1.56
30	0.80	0.41	1.58	30	1.17	1.10	1.58	30	1.48	1.56	1.54	30	1.48	1.58	1.56
40	0.85	0.41	1.61	40	1.19	1.10	1.61	40	1.48	1.56	1.54	40	1.48	1.58	1.56
50	0.87	0.41	1.64	50	1.22	1.10	1.64	50	1.48	1.56	1.54	50	1.48	1.58	1.56
60	0.88	0.41	1.67	60	1.25	1.10	1.67	60	1.48	1.56	1.54	60	1.48	1.58	1.56
70				70				70				70			
80				80				80				80			
90				90				90				90			
100				100				100				100			
110				110				110				110			
120				120				120				120			
150				150				150				150			
180				180				180				180			
210				210				210				210			

TIME (MIN)	DRAW (M)	YIELD (L/S)	DOWN (M)	TIME (MIN)	DRAW (M)	YIELD (L/S)	DOWN (M)	TIME (MIN)	DRAW (M)	YIELD (L/S)	DOWN (M)	TIME (MIN)	DRAW (M)	YIELD (L/S)	DOWN (M)
1	0.88	1.07	1.52	1	3.20	4.47	2.39	1	3.87	1.60	1.21	1	3.87	1.60	1.21
2	0.99	1.07	1.52	2	4.47	5.30	2.39	2	2.39	1.60	1.21	2	2.39	1.60	1.21
3	1.04	1.07	1.52	3	5.30	5.89	2.39	3	1.60	1.21	1.21	3	1.60	1.21	1.21
5	1.05	1.07	1.52	5	5.89	6.32	2.39	5	1.21	1.21	1.21	5	1.21	1.21	1.21
7	1.07	1.07	1.52	7	6.32	6.65	2.39	7	1.10	1.10	1.10	7	1.10	1.10	1.10
10	1.10	1.07	1.52	10	6.65	7.00	2.39	10	0.81	0.81	0.81	10	0.81	0.81	0.81
15	1.14	1.07	1.52	15	7.00	7.00	2.39	15	0.67	0.67	0.67	15	0.67	0.67	0.67
20	1.14	1.07	1.52	20	7.22	7.22	2.39	20	0.55	0.55	0.55	20	0.55	0.55	0.55
30	1.17	1.07	1.52	30	7.43	6.02	2.39	30	0.45	0.45	0.45	30	0.45	0.45	0.45
40	1.19	1.07	1.52	40	7.52	7.52	2.39	40	0.38	0.38	0.38	40	0.38	0.38	0.38
50	1.22	1.07	1.52	50	7.70	7.70	2.39	50	0.34	0.34	0.34	50	0.34	0.34	0.34
60	1.25	1.07	1.52	60	7.75	6.03	2.39	60	0.30	0.30	0.30	60	0.30	0.30	0.30
70				70				70				70			
80				80				80				80			
90				90				90				90			
100				100				100				100			
110				110				110				110			
120				120				120				120			
150				150				150				150			
180				180				180				180			
210				210				210				210			

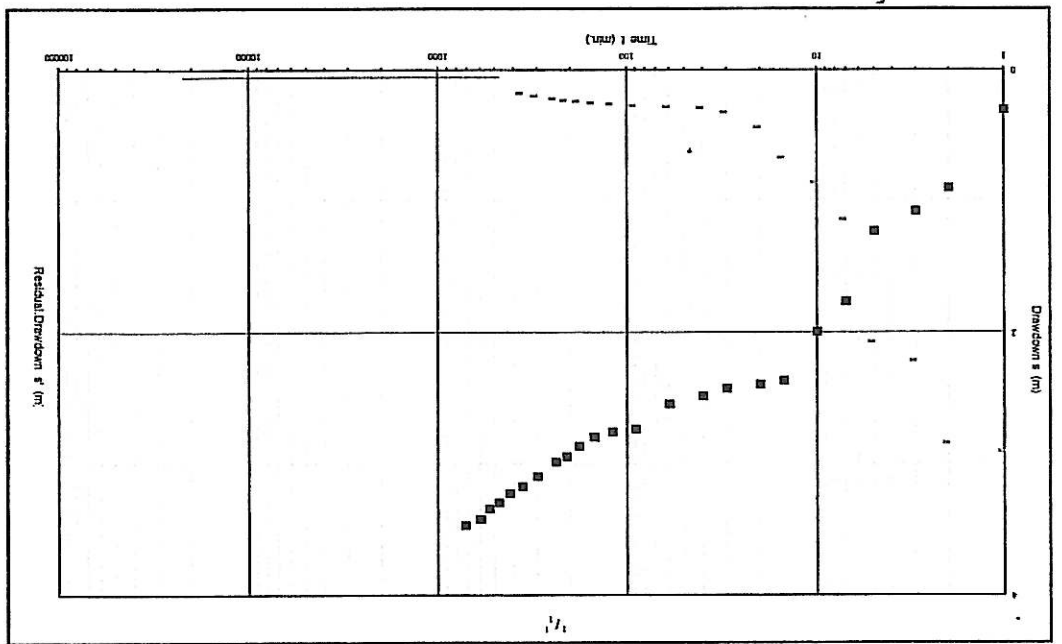
TIME (MIN)	DRAW (M)	YIELD (L/S)	DOWN (M)	TIME (MIN)	DRAW (M)	YIELD (L/S)	DOWN (M)	TIME (MIN)	DRAW (M)	YIELD (L/S)	DOWN (M)	TIME (MIN)	DRAW (M)	YIELD (L/S)	DOWN (M)
1	1.95	3.03	2.61	1	3.20	4.47	2.39	1	3.87	1.60	1.21	1	3.87	1.60	1.21
2	2.22	3.03	2.61	2	4.47	5.30	2.39	2	2.39	1.60	1.21	2	2.39	1.60	1.21
3	2.28	3.03	2.61	3	5.30	5.89	2.39	3	1.60	1.21	1.21	3	1.60	1.21	1.21
5	2.36	3.03	2.61	5	5.89	6.32	2.39	5	1.21	1.21	1.21	5	1.21	1.21	1.21
7	2.42	3.03	2.61	7	6.32	6.65	2.39	7	1.10	1.10	1.10	7	1.10	1.10	1.10
10	2.49	3.03	2.61	10	6.65	7.00	2.39	10	0.81	0.81	0.81	10	0.81	0.81	0.81
15	2.54	3.03	2.61	15	7.00	7.00	2.39	15	0.67	0.67	0.67	15	0.67	0.67	0.67
20	2.54	3.03	2.61	20	7.22	7.22	2.39	20	0.55	0.55	0.55	20	0.55	0.55	0.55
30	2.51	3.03	2.61	30	7.43	6.02	2.39	30	0.45	0.45	0.45	30	0.45	0.45	0.45
40	2.61	3.03	2.61	40	7.52	7.52	2.39	40	0.38	0.38	0.38	40	0.38	0.38	0.38
50	2.64	3.03	2.61	50	7.70	7.70	2.39	50	0.34	0.34	0.34	50	0.34	0.34	0.34
60	2.67	3.03	2.61	60	7.75	6.03	2.39	60	0.30	0.30	0.30	60	0.30	0.30	0.30
70				70				70				70			
80				80				80				80			
90				90				90				90			
100				100				100				100			
110				110				110				110			
120				120				120				120			
150				150				150				150			
180				180				180				180			
210				210				210				210			

TIME (MIN)	DRAW (M)	YIELD (L/S)	DOWN (M)	TIME (MIN)	DRAW (M)	YIELD (L/S)	DOWN (M)	TIME (MIN)	DRAW (M)	YIELD (L/S)	DOWN (M)	TIME (MIN)	DRAW (M)	YIELD (L/S)	DOWN (M)
1	1.95	3.03	2.61	1	3.20	4.47	2.39	1	3.87	1.60	1.21	1	3.87	1.60	1.21
2	2.22	3.03	2.61	2	4.47	5.30	2.39	2	2.39	1.60	1.21	2	2.39	1.60	1.21
3	2.28	3.03	2.61	3	5.30	5.89	2.39	3	1.60	1.21	1.21	3	1.60	1.21	1.21
5	2.36	3.03	2.61	5	5.89	6.32	2.39	5	1.21	1.21	1.21	5	1.21	1.21	1.21
7	2.42	3.03	2.61	7	6.32	6.65	2.39	7	1.10	1.10	1.10	7	1.10	1.10	1.10
10	2.49	3.03	2.61	10	6.65	7.00	2.39	10	0.81	0.81	0.81	10	0.81	0.81	0.81
15	2.54	3.03	2.61	15	7.00	7.00	2.39	15	0.67	0.67	0.67	15	0.67	0.67	0.67
20	2.54	3.03	2.61	20	7.22	7.22	2.39	20	0.55	0.55	0.55	20	0.55	0.55	0.55
30	2.51	3.03	2.61	30	7.43	6.02	2.39	30	0.45	0.45	0.45	30	0.45	0.45	0.45
40	2.61	3.03	2.61	40	7.52	7.52	2.39	40	0.38	0.38	0.38	40	0.38	0.38	0.38
50	2.64	3.03	2.61	50	7.70	7.70	2.39	50	0.34	0.34	0.34	50	0.34	0.34	0.34
60	2.67	3.03	2.61	60	7.75	6.03	2.39	60	0.30	0.30	0.30	60	0.30	0.30	0.30
70				70				70				70			
80				80				80				80			
90				90				90				90			
100				100				100				100			
110				110				110				110			
120				120				120				120			
150				150				150				150			
180				180				180				180			
210				210				210				210			

**FORM 5 F
CONSTANT DISCHARGE TEST & RECOVERY**

BOREHOLE TEST RECORD SHEET

PROJ NO: 0		BOREHOLE NO: TSOLO 1		ALT BH NO: 0		ALT BH NO: 0		MAP REFERENCE: EASTERN CAPE	
BOREHOLE DEPTH: 63.10		WATER LEVEL (m): 9.15		DEPTH OF PUMP (m): 38.16		DAM PUMP INLET (m): 180.00		PUMP TYPE: P 150	
BOREHOLE LEVEL ABOVE CASING (m): 0.20		CASING HEIGHT (m): 0.85		CONTRACTOR: AB PUMPS		EXISTING PUMP: NONE		DISTRICT: TSOLO	
CO-ORDINATES: 0		LATTITUDE: 0		LONGITUDE: 0		SITE NAME: TSOLO		PROVINCE: EASTERN CAPE	
TEST STARTED		TEST COMPLETED		DURATION: 1080		TYPE OF PUMP: P 150			
DATE: 17/08/03		DATE: 07/08/03		TIME: 07:30		TIME: 07:30			
DISTANCE BETWEEN DISCHARGE AND OBSERVATION HOLES IN M:		OBSERVATION HOLE 1		OBSERVATION HOLE 2		OBSERVATION HOLE 3		NR:	
DISCHARGE BOREHOLE		NR:		NR:		NR:		Distance:	
TIME (MIN)	DRAW (M)	YIELD (L/S)	TIME (MIN)	RECOVERY (M)	TIME (MIN)	RECOVERY (M)	TIME (MIN)	RECOVERY (M)	Distance:
1	0.30	3.02	1	2.90	1	2.90	1	2.90	
2	0.90	3.02	2	2.84	2	2.84	2	2.84	
3	1.08	3.01	3	2.21	3	2.21	3	2.21	
5	1.23	3.01	5	2.07	5	2.07	5	2.07	
7	1.76	3.02	7	1.14	7	1.14	7	1.14	
10	1.99	3.02	10	0.86	10	0.86	10	0.86	
15	2.36	3.01	15	0.67	15	0.67	15	0.67	
20	2.39	3.01	20	0.44	20	0.44	20	0.44	
30	2.42	3.02	30	0.32	30	0.32	30	0.32	
40	2.48	3.02	40	0.29	40	0.29	40	0.29	
60	2.54	3.01	60	0.28	60	0.28	60	0.28	
90	2.73	3.01	90	0.27	90	0.27	90	0.27	
120	2.75	3.02	120	0.26	120	0.26	120	0.26	
150	2.79	3.02	150	0.25	150	0.25	150	0.25	
180	2.86	3.01	180	0.24	180	0.24	180	0.24	
210	2.94	3.01	210	0.23	210	0.23	210	0.23	
240	2.98	3.01	240	0.22	240	0.22	240	0.22	
300	3.09	3.01	300	0.20	300	0.20	300	0.20	
360	3.17	3.02	360	0.18	360	0.18	360	0.18	
420	3.22	3.02	420		420		420		
480	3.29	3.01	480		480		480		
540	3.34	3.01	540		540		540		
600	3.42	3.02	600		600		600		
720	3.47	3.02	720		720		720		
840			840		840		840		
960			960		960		960		
1080			1080		1080		1080		
1200			1200		1200		1200		
1320			1320		1320		1320		
1440			1440		1440		1440		
1560			1560		1560		1560		
1680			1680		1680		1680		
1800			1800		1800		1800		
1920			1920		1920		1920		
2040			2040		2040		2040		
2160			2160		2160		2160		
2280			2280		2280		2280		
2400			2400		2400		2400		
2520			2520		2520		2520		
2640			2640		2640		2640		
2760			2760		2760		2760		
2880			2880		2880		2880		
3000			3000		3000		3000		
3120			3120		3120		3120		
Total time pumped (min):		720		W/L		W/L		W/L	
Average yield (l/s):		3.02							



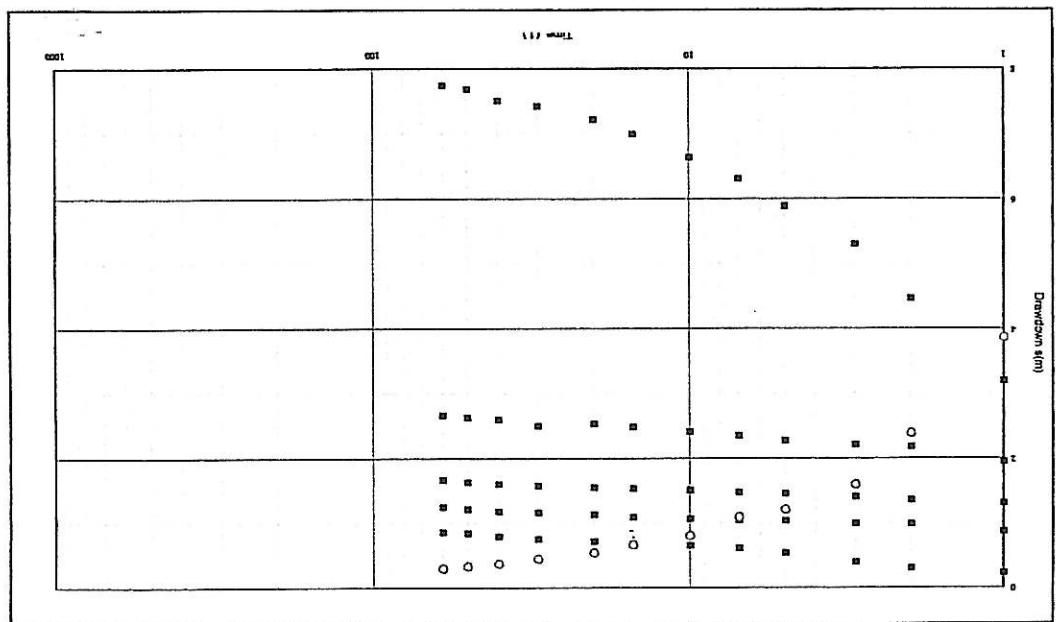
Spec. Cap. = m²/day/m
 T = m²/day
 S.W.L. = 9.15 m b.g.l.
 Q = 3.0 l/s

DATE TESTED
 17/06/03

LOCALITY
 TSOLO
 TSOLO
 TSOLO
 PUMPED B.H. NO.
 TSOLO 1

■ = Drawdown data
 X = Recovery data

CONSTANT DISCHARGE TEST DATA PLOT



S.W.L. = 8.85 m b.g.l.
 Q1 = 0.41 l/s
 Q2 = 0.80 l/s
 Q3 = 1.51 l/s
 Q4 = 3.04 l/s
 Q5 = 6.03 l/s

DISCHARGE RATES (Q)

DATE TESTED
 17/06/2003

LOCALITY
 TSOLO
 TSOLO
 TSOLO
 BOREHOLE NO.
 TSOLO 1

■ = Drawdown data
 X = Recovery data

STEP DRAWDOWN TEST DATA PLOT

