The monitoring wells are located in important well fields which are used for public water supply. The monitoring results is expected to reflect following two items.

- Seasonal groundwater fluctuation caused by seasonal change of precipitation.
- Groundwater table decline caused by pumping.

3.3 Method of Monitoring

The monitoring was carried out according to the procedure listed below:

- Selection of monitoring wells
- Levelling of monitoring wells
- Construction of monitoring huts
- Installation of groundwater level recorders

The chart speed of the recorder is 18mm/hour and groundwater level fluctuation is recorded in detail. The monitoring huts were constructed sturdily enough to prevent burglary, and in addition, were protected by guards in Lusaka. The monitoring hut is shown in Figure3-3. Detailed information about leveling are described in Supporting Report Part - S.

3.4 Monitoring Result

3.4.1 Trend of Groundwater Fluctuation

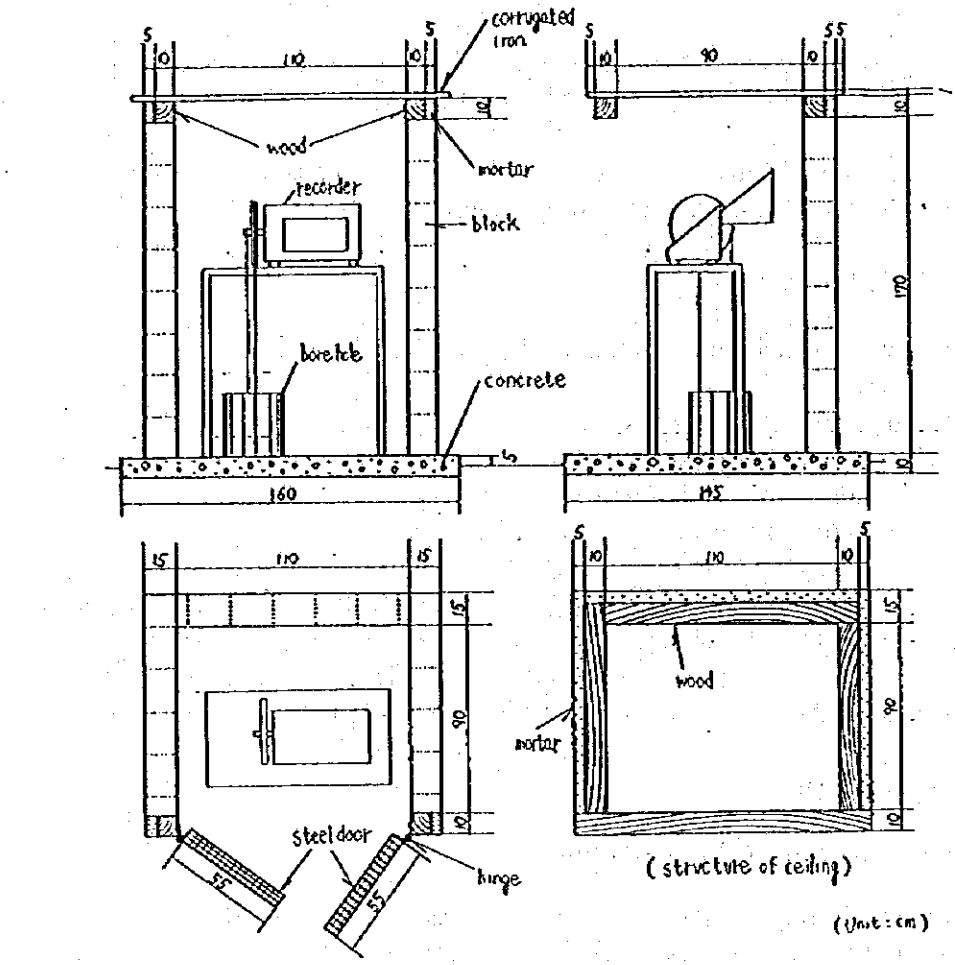
The records of monitoring are shown in Figure 3-4.As shown in Figure 3-4, the influence of production wells to the groundwater level in monitoring wells is clear at each monitoring station. The outline of the results of groundwater monitoring survey at each site is as follows.

(1) Lusaka - Mass Media

The aquifer of this borehole is Lusaka-Dolomite. There are 2 production wells within 200m of the monitoring well. Both seasonal groundwater level fluctuation and pumping draw down can be observed in the records. The seasonal groundwater fluctuation is more dominant than pumping draw down. The problem is that groundwater level decline during dry season in 1994 did not recover even after the next rainy season ended. It is thought that average groundwater level of this site in 1995 may be lower than that of in 1994. The maximum fluctuation was 2.5m between August 1994 and March 1995.

(2) Lusaka - Shaft No.5

The aquifer of Shaft No. is also Lusaka-Dolomite. Current yield is assumed to be about 140 l/s, the most productive of all the boreholes in Lusaka. The diameter of Shaft No.5 is 3.3m, the largest of all the boreholes in Lusaka. Groundwater enters the well not only through well wall but also from extra boreholes which were drilled from the bottom of Shaft No.5 The monitoring well is located 30m from Shaft No. Seasonal groundwater level fluctuation is not so clear in the record and most of the groundwater fluctuation is caused by pumping. Groundwater level has started going up since the rainy season started but strong influence of pumping is still recognised. The maximum groundwater fluctuation was 10m between August 1994 and March 1995. Pumping was sometimes stopped because of the reduction



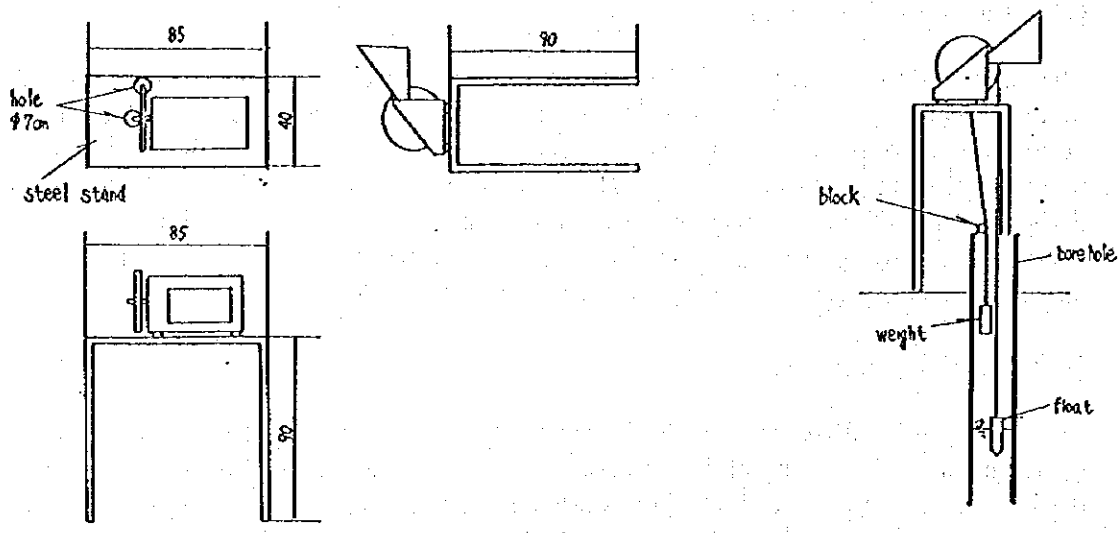
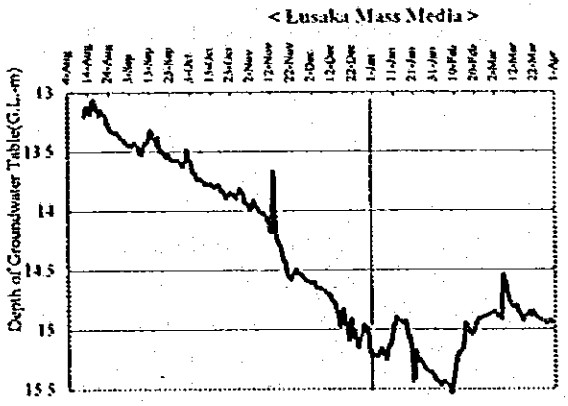
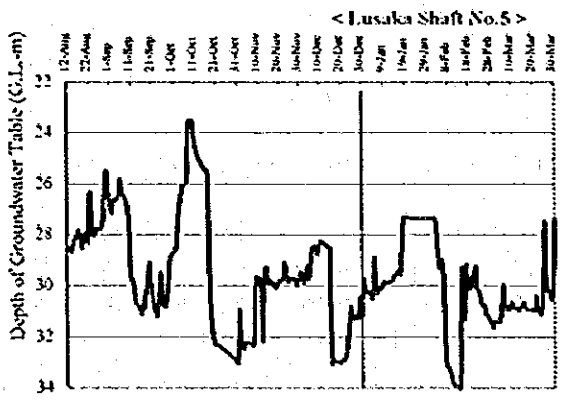
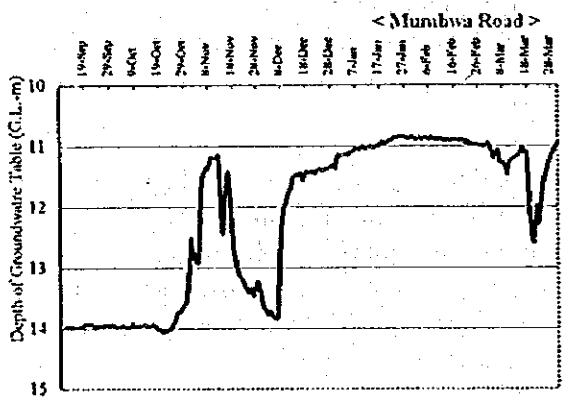
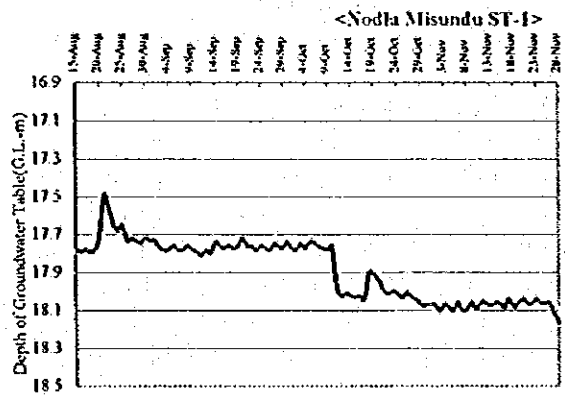


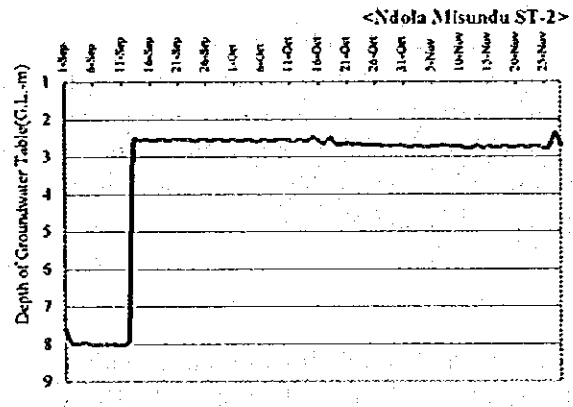
Figure 3-3 Outline of Monitoring Hut

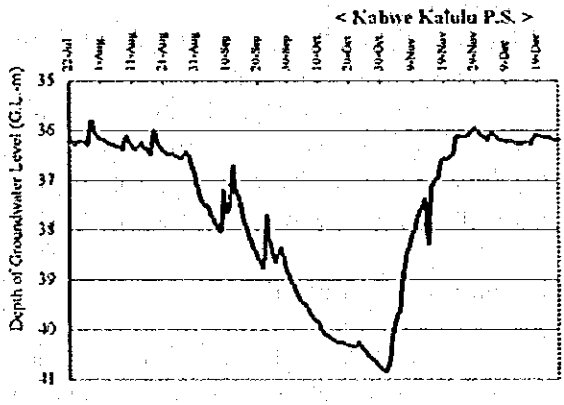












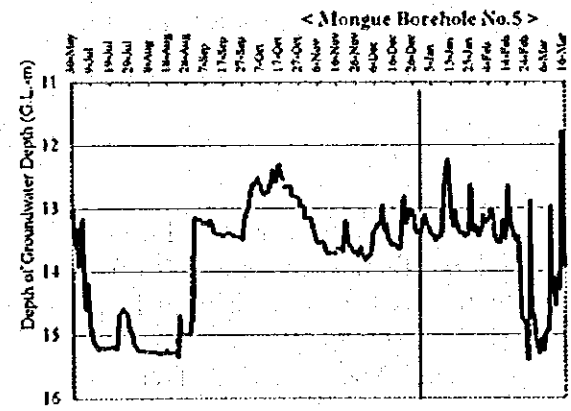


Figure 3-4
Result of Groundwater Monitoring

in groundwater level because the groundwater level was lowest at the end of October 1994. The groundwater level was gradually reducing regardless of seasonal recharge during August 1994 and March 1995.

(3) Lusaka - Mumbwa Road

The aquifer of this borehole is limestone. There are 4 currently operating boreholes within 30m from this monitoring well and the total yield of these 4 boreholes is assumed to be 136 l/s. Seasonal fluctuation and the influence of pumping are both observed in the record. Groundwater level has started going up since the rainy season started. A sudden change of groundwater table was indicated in this borehole, caused by problems with the recorder during September and October. Therefore, the record during that period is unreliable. The maximum groundwater fluctuation was 3.0m between September 1994 and March 1995. Groundwater level has risen up and almost constant after the rainy season commenced.

(4) Ndola - Misundu ST-1

The aquifer of this borehole is limestone. There are more than 7 production boreholes which are now operating within 1 km from this observation well. The nearest one is located 5m from the observation well. Both seasonal fluctuation and pumping draw down are recognised in the record but not so clearly. Groundwater level has not yet started going up even after the rainy season started and, in fact, still continues going down. The maximum groundwater fluctuation was 0.62m between August and November.

(5) Ndola - Misundu ST-2

The aquifer of this borehole is limestone. There are 4 production boreholes now operating within 1 km of this observation well and the nearest one is located 5m from the observation well. Neither seasonal groundwater fluctuation nor pumping affect are shown clearly in the record. A sudden rise in groundwater table in the middle of September was considered to be caused by a sudden decrease in pumping rate of a borehole near to the observation well. The maximum groundwater fluctuation was 5.7m between July and November.

(6) Kabwe - Kalulu P.S.

The aquifer of this observation well is limestone. There are 3 boreholes operating within 100m of the observation well and the nearest one is 10m from the observation well. Both seasonal fluctuation and pumping draw down are clearly recognised in the record. Groundwater level tended to go down during the dry season, but go up after the rainy season started. The maximum groundwater fluctuation was 4.9m between July and November.

(7) Mongu - Borehole No.5

The aquifer of this borehole is Kalahari sand. There are 13 boreholes within 1 km of observation well. Those boreholes are currently operating and the nearest one is 5m from the observation well. Seasonal groundwater level fluctuation is barely recognised in the record. Most of the groundwater fluctuation is caused by pumping. The maximum groundwater fluctuation is 3.5m between May 1994 and March 1995. Trend of

groundwater level decline has not been recognized during May 1994 to March 1995.

Groundwater level draw down depends on the yield of a borehole. If the pumped yield exceeds the available yield or aquifer capacity, the groundwater level will continue going down at a high rate. Finally, the groundwater level draws down, both under the pump and around the well. From this view point, over pumping has been recognised at Lusaka - Mass Media and Shaft No.5. On the other hand, over pumping is not evident at the other boreholes. Further continued monitoring is necessary at each observation well for more than 1 year to evaluate the influence of pumping.

CHAPTER 4 RECOMMENDATION

4.1 Continuation of Groundwater Level Observation

Nation wide groundwater level observation is very useful to assess groundwater development potential as carried out in this master plan. The groundwater development potential obtained in the master plan should be examined and, if necessary, should be revised based on new data obtained from continuous groundwater level observation. It is important to observe groundwater level at the same observation points for a long period. From this point of view, 312 observation well at 169 points established as observation wells in this master plan are useful for new observation. Data of groundwater level fluctuation at these observation points was accumulated for one year. Therefore, to continue the observation and obtain new data at these wells will contribute to formulating new groundwater development and management plan in the near future.

4.2 Continuation of Groundwater Level Monitoring

As explained in the previous section, recently a groundwater table decline in large cities has been reported. Especially in Lusaka, it is said that the trend of groundwater decline caused by over pumping is remarkable and existing water supply facilities will be damaged in the near feature. From this point of view, continuation of groundwater level monitoring is very important. The groundwater level were continuously monitored since June 1994 to March 1995 by JICA Study Team. Trend of groundwater level decline was recognised in the records. However, this data is not sufficient to conclude a relationship between the groundwater decline and over pumping. The monitoring over longer period is needed for the purpose. Effective counter-measure like a regulation against the over pumping should be examined based on the long term monitoring results. The monitoring stations were constructed by Study Team and all the monitoring stations were handed over to the responsible organisations. It is desirable for these organisations to continue groundwater monitoring at the monitoring station.

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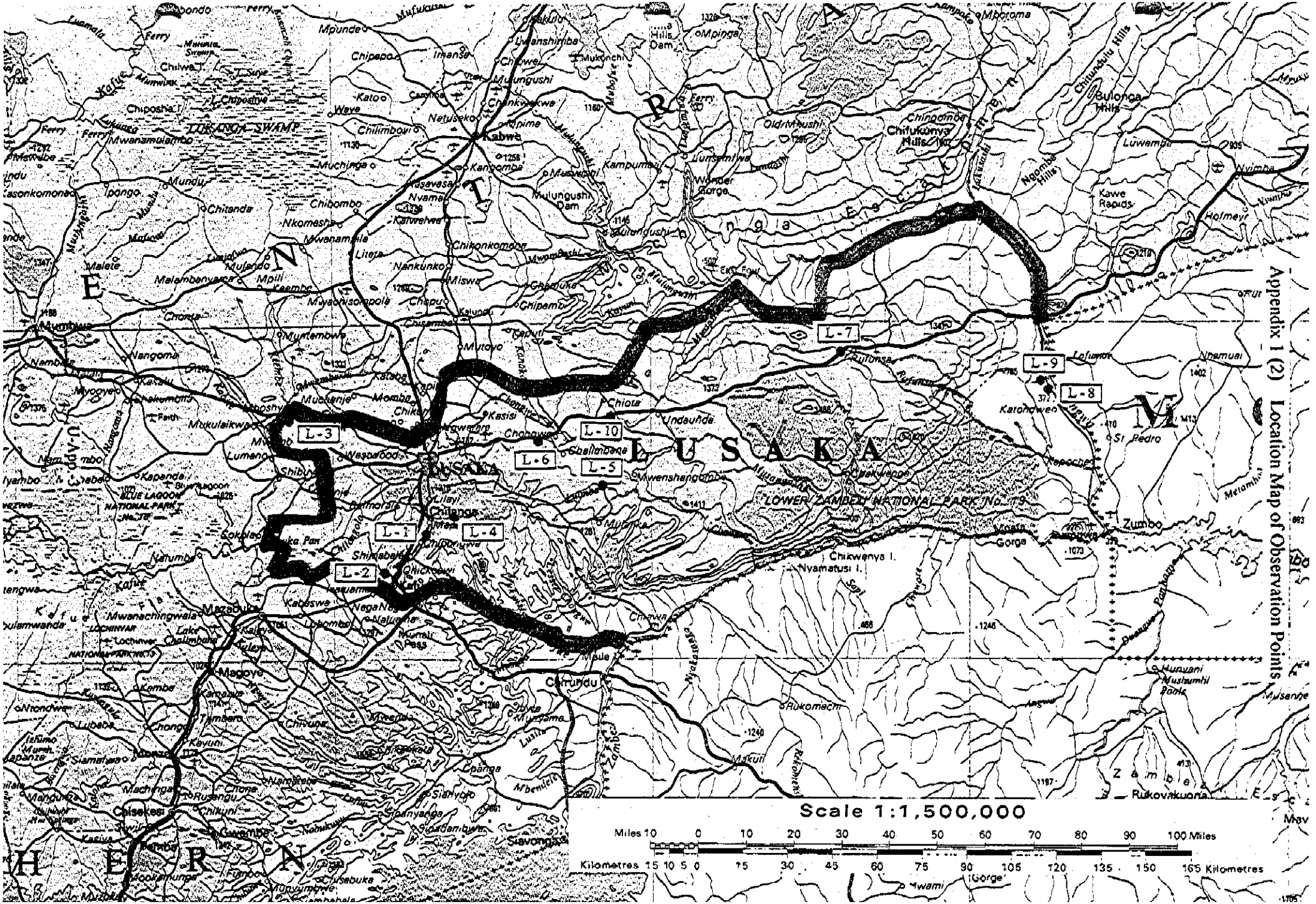
Appendix 1

Observation Result in Lusaka Province

Appendix 1 (1) List of Observation Points

< Lusaka Province >

Point No.	Well No.	Geology	Elevation (m)	District	Site Name
L - 1	A	Quartzite	1144	Lusaka-Rural	Simbeye
	B	Quartzite	1140		Shakulima
L - 2	A	Alluvium	1003	Lusaka-Rural	Kalundu Vil.
	B	Alluvium	1002		Kasusa Vil.
L - 3	A	Quartzite	1023	Lusaka-Rural	Setteu TE.V.
	B	Quartzite	1018		Mr. Zulu
L - 4	A	Limestone	1281	Lusaka-Rural	Mr. Ngoma
	B	Limestone	1281		Villagers
L - 5	A	Quartzite	1014	Lusaka-Rural	Mwaka akumba
	B	Quartzite	1017		Mr. Kakoma
L - 6	A	Quartzite	1108	Lusaka-Rural	Chikaondwa
	B	Quartzite	1100		Mutanuka Vil.
L - 7	A	Sandstone	786	Lusaka-Rural	Chimusanya
	B	Sandstone	790		Mr. Shiaka
L - 8	A	Sandstone	370	Luwangwa	Sub. Centre
	B	Sandstone	380		Village
L - 9	A	Sandstone	370	Luwangwa	Mukando Vil.
	B	Sandstone	375		Kanavente
L - 10	A	Gneiss	1130	Lusaka-Rural	Chitemela
	B	Gneiss	1110		Nsana Vil.



Appendix 1 (2) Location Map of Observation Points

Appendix 1 (3) Result of Nation-wide Groundwater Level Observation

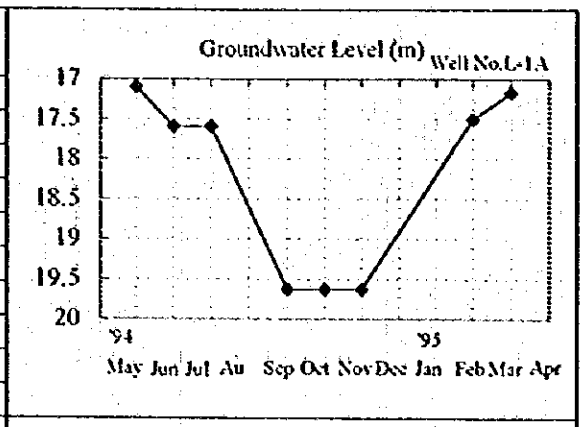
< Lusaka Province >

Point No.	Well No.	May. 199- G.W.D(m	Jun. G.W.D(m	Jul. G.W.D(m	Sep. G.W.D(m	Oct. G.W.D(m	Nov. G.W.D(m	Feb. 1995 G.W.D(m	Mar. G.W.D(m
L - 1	A	17.10	17.60	18.17	19.63	19.63	18.67	17.50	17.17
	B	8.35	8.73	10.05	10.38	10.78	10.16	9.14	9.15
L - 2	A	.65	.65	1.40	1.30	2.08	1.62	.88	.89
	B	3.94	6.00	6.12	6.32	6.37	6.20	5.40	5.40
L - 3	A	2.20	2.50	4.52	4.02	4.70	dry	dry	dry
	B	1.70	1.80	2.20	1.93	1.97	2.03	1.03	1.04
L - 4	A	2.16	2.61	3.07	4.03	4.05	4.06	dry	dry
	B	2.54	3.02	3.02	3.02	3.02	dry	dry	dry
L - 5	A	.50	1.44	dry	1.53	1.60	1.61	1.43	1.46
	B	3.52	4.10	4.52	4.38	4.40	4.43	dry	dry
L - 6	A	9.50	9.80	11.13	10.52	11.04	11.40	11.02	11.04
	B	5.63	6.20	6.99	7.42	8.30	dry	dry	dry
L - 7	A	8.96	9.48	10.02	12.48	12.48	dry	dry	dry
	B	6.69	7.11	8.42	11.03	10.99	11.05	10.00	10.12
L - 8	A	9.48	9.54	9.99	10.12	10.12	dry	dry	dry
	B	.98	.77	1.83	2.01	2.24	2.26	1.24	1.27
L - 9	A	4.68	4.83	5.62	5.78	6.30	6.33	5.33	5.36
	B	8.16	8.47	9.51	9.84	9.96	9.97	8.99	8.99
L - 10	A	.10	.23	.75	.76	.77	.78	.79	.79
	B	3.60	6.90	7.43	18.00	18.00	18.01	17.06	17.07

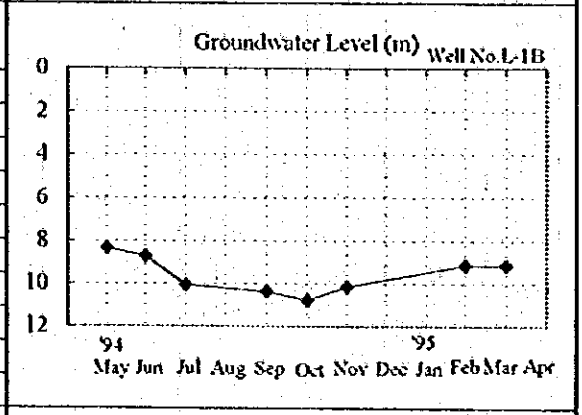
(Note) G.W.D : Groundwater Depth from Surface.

Appendix 1(4) Result of Observation

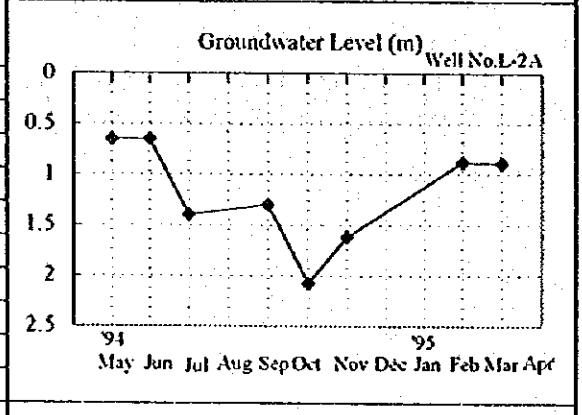
Province: Lusaka	Aquifer: Quartzite			
District: Lusaka-Rural				
Site Name: Simbeye	No.	Month	G.W.L(GL-m)	
	1	'94May	17.1	
Diameter: 1000 mm	2	Jun	17.6	
Depth: 7.1 m	3	Jul	18.2	
Yield: 1200 l/day	4	Sep	19.6	
Map No. 1528C2	5	Oct	19.6	
Elevation: 1144 m	6	Nov	19.6	
Grid Ref.: N=8274Km200m	7	'95Feb	17.5	
E=37Km350m	8	Mar	17.2	
Maximum Groundwater Level Fluctuation(m) 2.5				



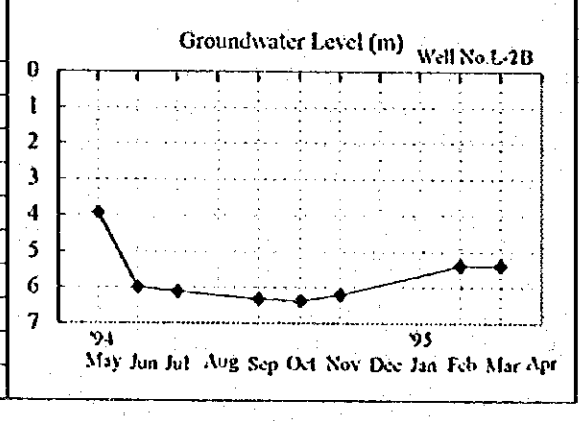
Province: Lusaka	Aquifer: Quartzite			
District: Lusaka-Rural				
Site Name: Shakulima	No.	Month	G.W.L(GL-m)	
	1	'94May	8.4	
Diameter: 1500 mm	2	Jun	8.7	
Depth: 10.65 m	3	Jul	10.1	
Yield: 1200 l/day	4	Sep	10.4	
Map No. 1528C2	5	Oct	10.8	
Elevation: 1140 m	6	Nov	10.2	
Grid Ref.: N=8273Km850m	7	'95Feb	9.1	
E=37Km500m	8	Mar	9.2	
Maximum Groundwater Level Fluctuation(m) 2.4				



Province: Lusaka	Aquifer: Alluvium			
District: Lusaka-Rural				
Site Name: Kalundu Vil.	No.	Month	G.W.L(GL-m)	
	1	'94May	0.7	
Diameter: 1500 mm	2	Jun	0.7	
Depth: 3.1 m	3	Jul	1.4	
Yield: 2000 l/day	4	Sep	1.3	
Map No. 1528C1	5	Oct	2.1	
Elevation: 1003 m	6	Nov	1.6	
Grid Ref.: N=8262Km100m	7	'95Feb	0.9	
E=620Km400m	8	Mar	0.9	
Maximum Groundwater Level Fluctuation(m) 9.2				



Province: Lusaka	Aquifer: Alluvium			
District: Lusaka-Rural				
Site Name: Kasusa Vil.	No.	Month	G.W.L(GL-m)	
	1	'94May	3.9	
Diameter: 1500 mm	2	Jun	6.0	
Depth: 8.15 m	3	Jul	6.1	
Yield: 1000 l/day	4	Sep	6.3	
Map No. 1528C1	5	Oct	6.4	
Elevation: 1002 m	6	Nov	6.2	
Grid Ref.: N=8261Km200m	7	'95Feb	5.4	
E=621Km500m	8	Mar	5.4	
Maximum Groundwater Level Fluctuation(m) 9.2				



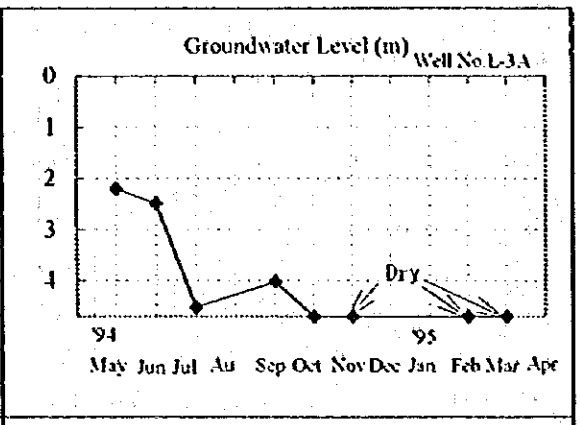
Appendix 1(5) Result of Observation

Province:	Lusaka
District:	Lusaka-Rural
Site Name:	Setteu TE.V.
Diameter:	1500 mm
Depth:	4.7 m
Yield:	1500 l/day
Map No.	1527B3
Elevation:	1023 m
Grid Ref.:	N=8312Km650m
	E=580Km250m

Aquifer: Quartzite

No.	Month	G.W.L(GL-m)
1	'94May	2.2
2	Jun	2.5
3	Jul	4.5
4	Sep	4.0
5	Oct	4.7
6	Nov	Dry
7	'95Feb	Dry
8	Mar	Dry

Maximum Groundwater Level Fluctuation(m) 2.5

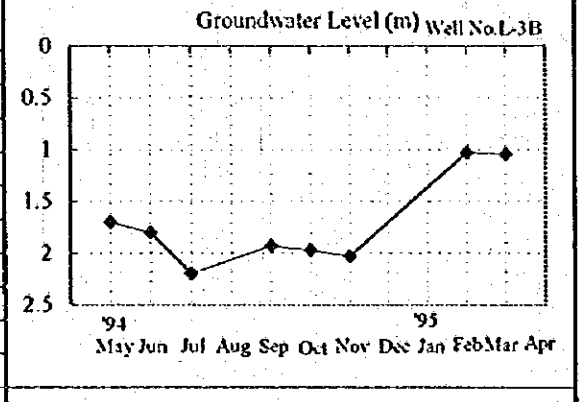


Province:	Lusaka
District:	Lusaka-Rural
Site Name:	Mr.Zulu
Diameter:	2000 mm
Depth:	2.6 m
Yield:	1000 l/day
Map No.	1527B3
Elevation:	1018 m
Grid Ref.:	N=8312Km50m
	E=579Km300m

Aquifer: Quartzite

No.	Month	G.W.L(GL-m)
1	'94May	1.7
2	Jun	1.8
3	Jul	2.2
4	Sep	1.9
5	Oct	2.0
6	Nov	2.0
7	'95Feb	1.0
8	Mar	1.0

Maximum Groundwater Level Fluctuation(m) 1.2

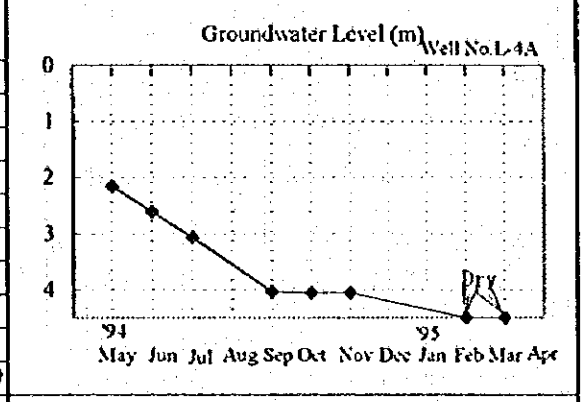


Province:	Lusaka
District:	Lusaka-Rural
Site Name:	Mr.Ngoma
Diameter:	2000 mm
Depth:	4.5 m
Yield:	1500 l/day
Map No.	1528C2
Elevation:	1281 m
Grid Ref.:	N=8287Km250m
	E=48Km150m

Aquifer: Limestone

No.	Month	G.W.L(GL-m)
1	'94May	2.2
2	Jun	2.6
3	Jul	3.1
4	Sep	4.0
5	Oct	4.1
6	Nov	4.1
7	'95Feb	Dry
8	Mar	Dry

Maximum Groundwater Level Fluctuation(m) 1.9

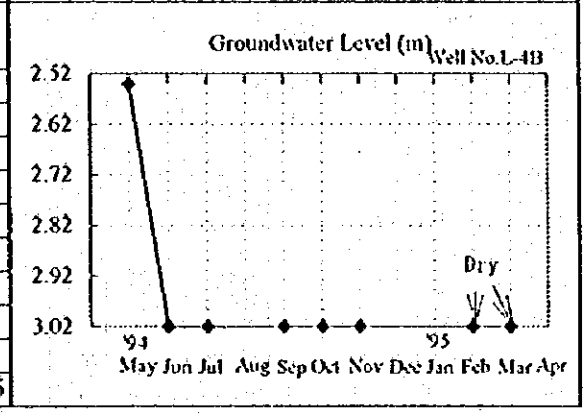


Province:	Lusaka
District:	Lusaka-Rural
Site Name:	Villagers
Diameter:	1600 mm
Depth:	3.02 m
Yield:	400 l/day
Map No.	1528C2
Elevation:	1281 m
Grid Ref.:	N=8287Km650m
	E=47Km350m

Aquifer: Limestone

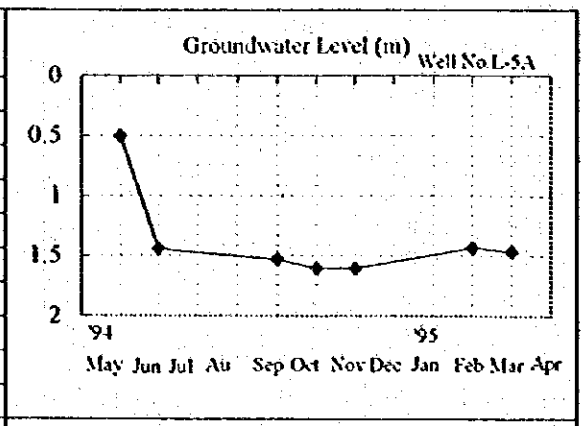
No.	Month	G.W.L(GL-m)
1	'94May	2.5
2	Jun	3.0
3	Jul	3.0
4	Sep	3.0
5	Oct	3.0
6	Nov	3.0
7	'95Feb	Dry
8	Mar	Dry

Maximum Groundwater Level Fluctuation(m) 0.5

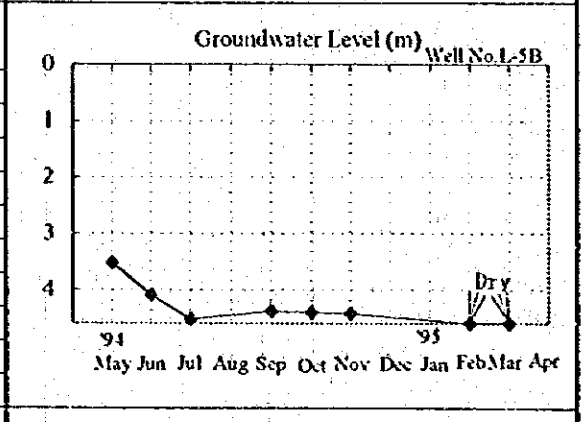


Appendix 1(6) Result of Observation

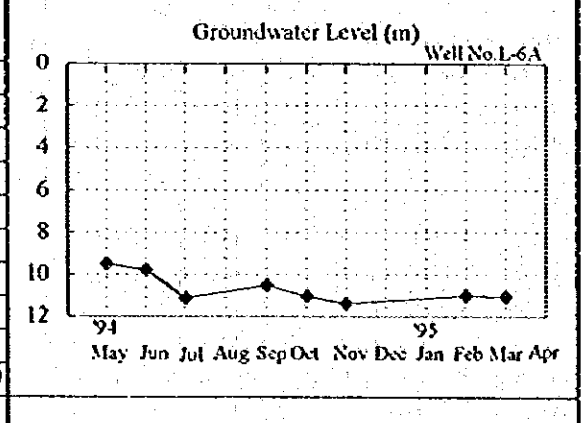
Province: Lusaka	Aquifer: Quartzite		
District: Lusaka-Rural			
Site Name: Mwaka akumba	No.	Month	G.W.L(GL-m)
	1	'94May	0.5
Diameter: 2500 mm	2	Jun	1.44
Depth: 1.6 m	3	Jul	
Yield: 1000 l/day	4	Sep	1.53
Map No. 1528B4	5	Oct	1.6
Elevation: 1014 m	6	Nov	1.6
Grid Ref.: N=8286Km300m	7	'95Feb	1.43
E=698Km0m	8	Mar	1.46
Maximum Groundwater Level Fluctuation(m) 1.1			



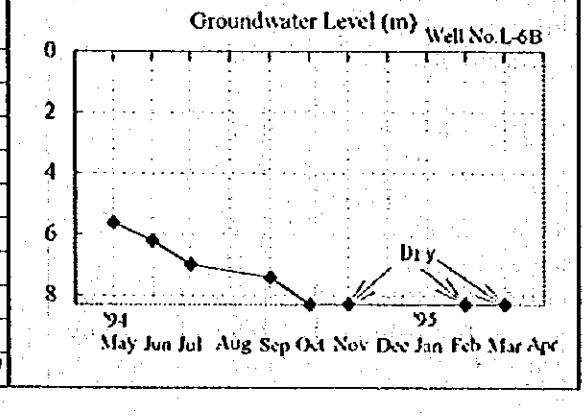
Province: Lusaka	Aquifer: Quartzite		
District: Lusaka-Rural			
Site Name: Mr.Kakoma	No.	Month	G.W.L(GL-m)
	1	'94May	3.52
Diameter: 1200 mm	2	Jun	4.1
Depth: 4.6 m	3	Jul	4.52
Yield: 900 l/day	4	Sep	4.38
Map No. 1528B4	5	Oct	4.4
Elevation: 1017 m	6	Nov	4.43
Grid Ref.: N=8285Km750m	7	'95Feb	Dry
E=697Km0m	8	Mar	Dry
Maximum Groundwater Level Fluctuation(m) 1			



Province: Lusaka	Aquifer: Quartzite		
District: Lusaka-Rural			
Site Name: Chikaondwa	No.	Month	G.W.L(GL-m)
	1	'94May	9.5
Diameter: 1500 mm	2	Jun	9.8
Depth: 10.97 m	3	Jul	11.1
Yield: 500 l/day	4	Sep	10.5
Map No. 1528B3	5	Oct	11.0
Elevation: 1108 m	6	Nov	11.4
Grid Ref.: N=8303Km550m	7	'95Feb	11.0
E=675Km550m	8	Mar	11.0
Maximum Groundwater Level Fluctuation(m) 1.9			



Province: Lusaka	Aquifer: Quartzite		
District: Lusaka-Rural			
Site Name: Mutanuka Vil.	No.	Month	G.W.L(GL-m)
	1	'94May	5.63
Diameter: 1500 mm	2	Jun	6.2
Depth: 8.3 m	3	Jul	6.99
Yield: 1000 l/day	4	Sep	7.42
Map No. 1528B3	5	Oct	8.3
Elevation: 1100 m	6	Nov	Dry
Grid Ref.: N=8303Km750m	7	'95Feb	Dry
E=674Km400m	8	Mar	Dry
Maximum Groundwater Level Fluctuation(m) 2.67			



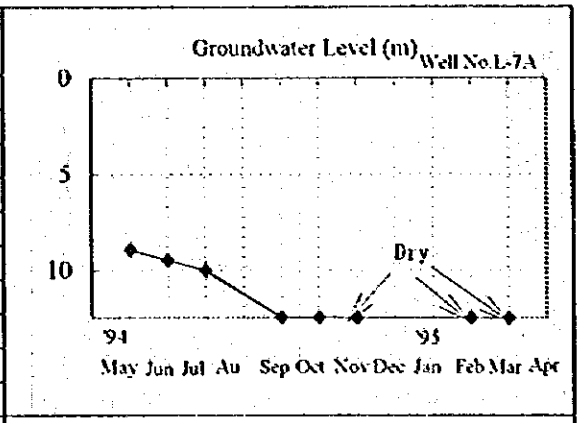
Appendix 1(7) Result of Observation

Province:	Lusaka
District:	Lusaka-Rural
Site Name:	Chimusanya
Diameter:	1500 mm
Depth:	12.48 m
Yield:	l/day
Map No.	1529B1
Elevation:	786 m
Grid Ref.:	N=8331Km450m
	E=777Km150m

Aquifer: Sandstone

No.	Month	G.W.L(GL-m)
1	'94May	9.0
2	Jun	9.5
3	Jul	10.0
4	Sep	12.5
5	Oct	12.5
6	Nov	Dry
7	'95Feb	Dry
8	Mar	Dry

Maximum Groundwater Level Fluctuation(m) 3.5

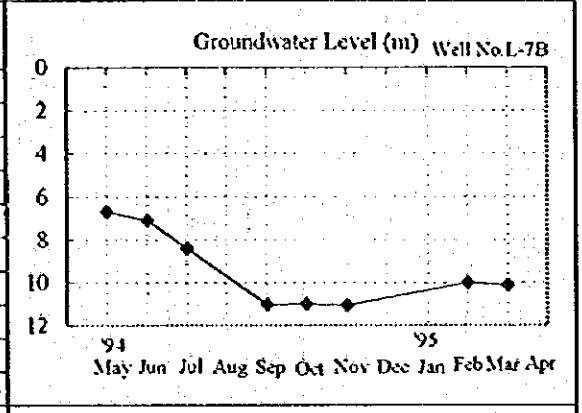


Province:	Lusaka
District:	Lusaka-Rural
Site Name:	Mr.Shiaka
Diameter:	1500 mm
Depth:	8.77 m
Yield:	1000 l/day
Map No.	1529B1
Elevation:	790 m
Grid Ref.:	N=8331Km300m
	E=776Km750m

Aquifer: Sandstone

No.	Month	G.W.L(GL-m)
1	'94May	6.7
2	Jun	7.1
3	Jul	8.4
4	Sep	11.0
5	Oct	11.0
6	Nov	11.1
7	'95Feb	10.0
8	Mar	10.1

Maximum Groundwater Level Fluctuation(m) 4.4

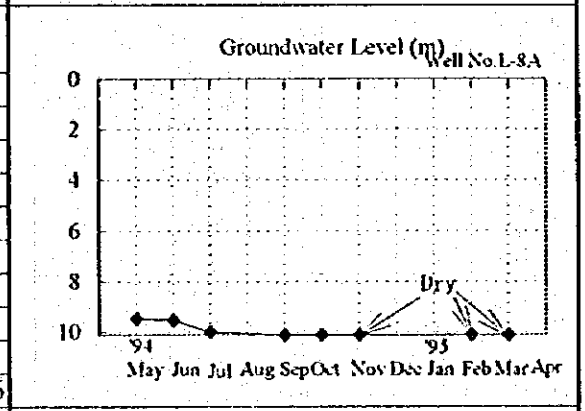


Province:	Lusaka
District:	Luwangwa
Site Name:	Sub.Centre
Diameter:	1500 mm
Depth:	10.12 m
Yield:	800 l/day
Map No.	1530A1
Elevation:	370 m
Grid Ref.:	N=8318Km350m
	E=201Km250m

Aquifer: Sandstone

No.	Month	G.W.L(GL-m)
1	'94May	9.5
2	Jun	9.5
3	Jul	10.0
4	Sep	10.1
5	Oct	10.1
6	Nov	Dry
7	'95Feb	Dry
8	Mar	Dry

Maximum Groundwater Level Fluctuation(m) 0.6

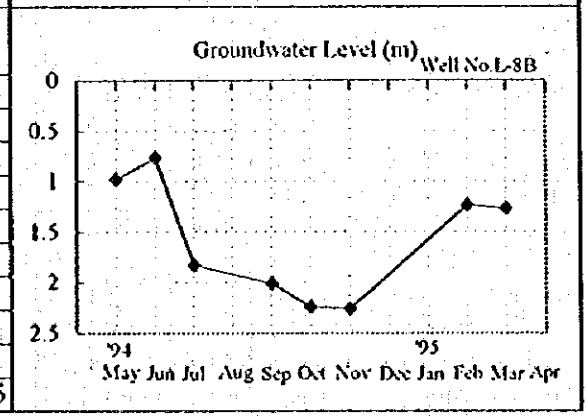


Province:	Lusaka
District:	Luwangwa
Site Name:	Village
Diameter:	1500 mm
Depth:	2.41 m
Yield:	1200 l/day
Map No.	1530A1
Elevation:	380 m
Grid Ref.:	N=8317Km300m
	E=202Km100m

Aquifer: Sandstone

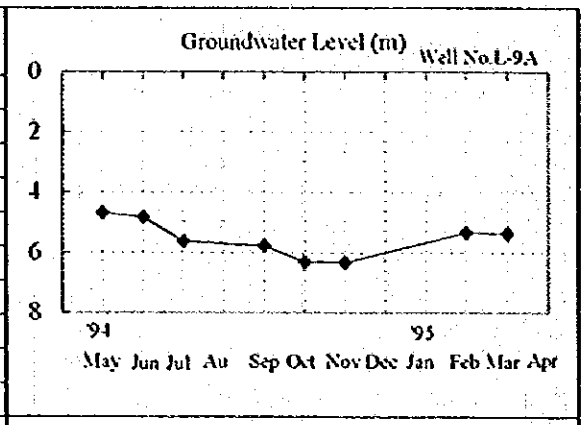
No.	Month	G.W.L(GL-m)
1	'94May	1.0
2	Jun	0.8
3	Jul	1.8
4	Sep	2.0
5	Oct	2.2
6	Nov	2.3
7	'95Feb	1.2
8	Mar	1.3

Maximum Groundwater Level Fluctuation(m) 1.5

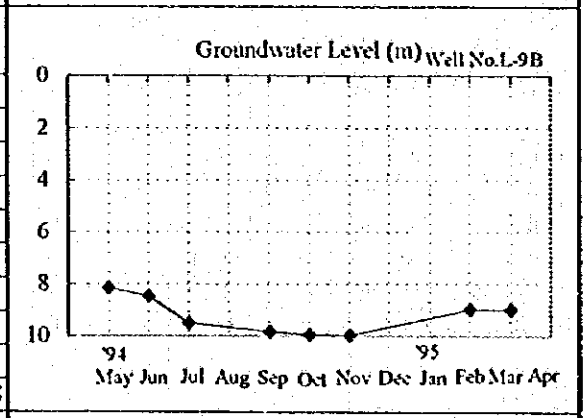


Appendix 1(8) Result of Observation

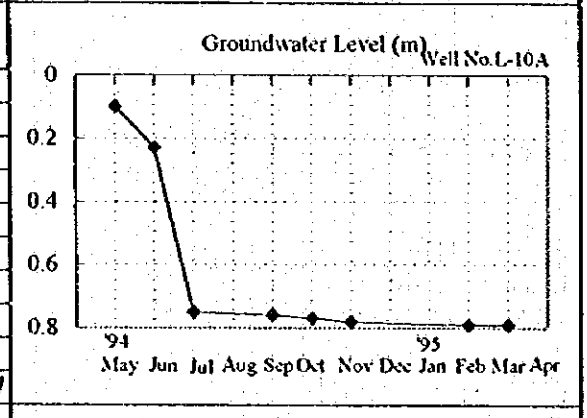
Province: Lusaka	Aquifer: Sandstone		
District: Luwangwa			
Site Name: Mukando Vil.	No.	Month	G.W.L(GL-m)
	1	'94May	4.7
Diameter: 1500 mm	2	Jun	4.8
Depth: 6.49 m	3	Jul	5.6
Yield: 1200 l/day	4	Sep	5.8
Map No. 1530A1	5	Oct	6.3
Elevation: 370 m	6	Nov	6.3
Grid Ref.: N=8319Km450m	7	'95Feb	5.3
E=199Km750m	8	Mar	5.4
Maximum Groundwater Level Fluctuation(m) 1.7			



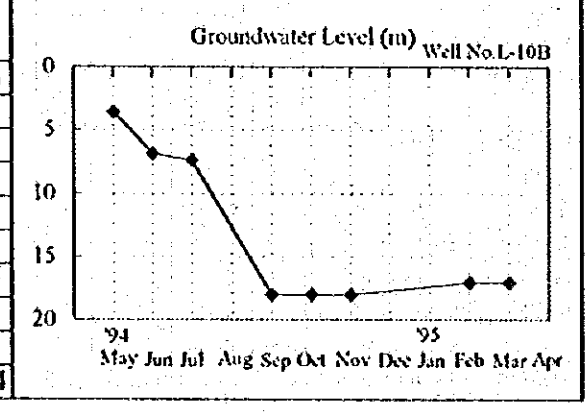
Province: Lusaka	Aquifer: Sandstone		
District: Luwangwa			
Site Name: Kanavente	No.	Month	G.W.L(GL-m)
	1	'94May	8.2
Diameter: 1500 mm	2	Jun	8.5
Depth: 9.6 m	3	Jul	9.5
Yield: 1200 l/day	4	Sep	9.8
Map No. 1530A1	5	Oct	10.0
Elevation: 375 m	6	Nov	10.0
Grid Ref.: N=8319Km500m	7	'95Feb	9.0
E=200Km45m	8	Mar	9.0
Maximum Groundwater Level Fluctuation(m) 1.8			



Province: Lusaka	Aquifer: Gneiss		
District: Lusaka-Rural			
Site Name: Chitemela	No.	Month	G.W.L(GL-m)
	1	'94May	0.1
Diameter: 1500 mm	2	Jun	0.2
Depth: 1.9 m	3	Jul	0.8
Yield: 3000 l/day	4	Sep	0.8
Map No. 1528B4	5	Oct	0.8
Elevation: 1130 m	6	Nov	0.8
Grid Ref.: N=8311Km150m	7	'95Feb	0.8
E=704Km0m	8	Mar	0.8
Maximum Groundwater Level Fluctuation(m) 0.7			



Province: Lusaka	Aquifer: Gneiss		
District: Lusaka-Rural			
Site Name: Nsana Vil.	No.	Month	G.W.L(GL-m)
	1	'94May	3.6
Diameter: 1500 mm	2	Jun	6.9
Depth: 18 m	3	Jul	7.4
Yield: l/day	4	Sep	18.0
Map No. 1528B4	5	Oct	18.0
Elevation: 1110 m	6	Nov	18.0
Grid Ref.: N=8309Km500m	7	'95Feb	17.1
E=699Km400m	8	Mar	17.1
Maximum Groundwater Level Fluctuation(m) 14.4			



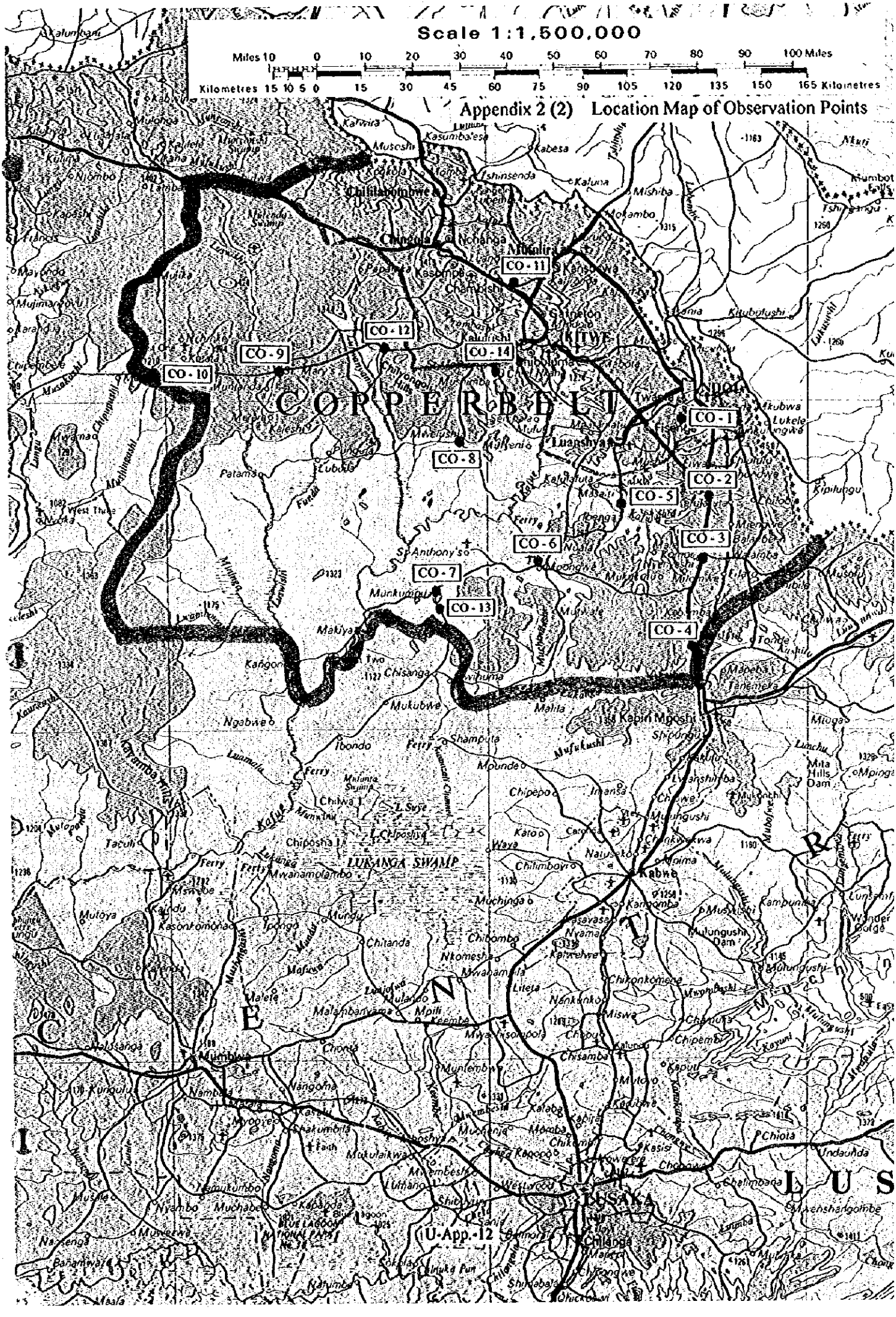
Appendix 2

Observation Result in Copperbelt Province

Appendix 2 (1) List of Observation Points

< Copperbelt Province >

Point No.	Well No.	Geology	Elevation (m)	District	Site Name
CO - 1	A	Gneiss	1219	Ndola-Urban	Mushili P.Sch.
	B	Gneiss	1300	Ndola-Rural	College Vil.
CO - 2	A	Gneiss	1234	Ndola-Rural	Kabuata Sch.
	B	Gneiss	1216		Kafulafuta Vil.
CO - 3	A	Shale	1279	Ndola-Rural	Chikolongo
	B	Shale	1294		Pwanda
CO - 4	A	Shale	1257	Ndola-Rural	Kashitu
	B	Gneiss	1255		Kallseo
CO - 5	A	Gneiss	1214	Ndola-Rural	Kushimata
	B	Gneiss	1182		Gondise
CO - 6	A	Limestone	1196	Ndola-Rural	Mubanga
	B	Limestone	1192		Mpongue
CO - 7	A	Limestone	1202	Ndola-Rural	Muansa
	B	Limestone	1201		Muicumpu
CO - 8	A	Shale	1193	Ndola-Rural	Kanini
	B	Shale	1207		Lumpyma Court
CO - 9	A	Shale	1200	Ndola-Rural	Mutesha
	B	Shale	1200		Cheushi
CO - 10	A	Shale		Ndola-Rural	Mapunga
	B	Shale			Mapunga P.Sch.
CO - 11	A	Granite	1288	Kitwe	Zambia Comp.
	B	Granite	1280		Zambia Comp.
CO - 12	A	Quartzite	1211	Ndola-Rural	Shinwkunama R.H.
	B	Quartzite	1213		Shimvkunami P.Sch.
CO - 13	A	Limestone	1189	Ndola-Rural	Chapuld
		Limestone			
CO - 14	A	Shale	1220	Ndola-Rural	Ntokoshi
	B	Shale	1220		Mabwale


Scale 1:1,500,000
Miles 10 0 10 20 30 40 50 60 70 80 90 100 Miles
Kilometres 15 10 5 0 15 30 45 60 75 90 105 120 135 150 165 Kilometres
Appendix 2 (2) Location Map of Observation Points
CO-1
CO-2
CO-3
CO-4
CO-5
CO-6
CO-7
CO-8
CO-9
CO-10
CO-11
CO-12
CO-13
CO-14
COPPERBELT
LUKANGA SWAMP
LUSAKA
U-App.-12

Appendix 2 (3) Result of Nation-wide Groundwater Level Observation

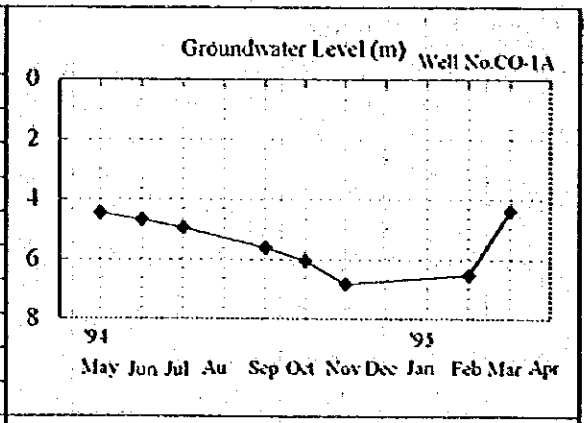
< Copperbelt Province >

Point No.	Well No.	May. 199- G.W.D(m)	Jun. G.W.D(m)	Jul. G.W.D(m)	Sep. G.W.D(m)	Oct. G.W.D(m)	Nov. G.W.D(m)	Feb. 1995 G.W.D(m)	Mar. G.W.D(m)
CO - 1	A	4.45	4.69	4.96	5.61	6.05	6.82	6.53	4.39
	B	4.68	dry	6.02	6.68	6.95	7.40	6.44	5.22
CO - 2	A	5.18	5.66	6.16	6.65	dry	7.00	6.46	5.66
	B	6.04	7.00	8.16	8.10	7.70	7.70	dry	dry
CO - 3	A	.95	1.43	1.94	2.60	2.87	3.20	3.20	2.20
	B	8.85	9.29	9.85	10.52	9.93	11.25	11.21	10.80
CO - 4	A	3.30	3.47	3.36	4.12	3.95	4.20	3.50	3.25
	B	6.45	6.89	7.32	8.20	8.00	8.78	7.89	6.03
CO - 5	A	6.65	7.03	7.37	7.93	8.24	8.75	8.16	7.30
	B	4.30	4.68	5.04	7.14	6.10	6.25	4.82	7.24
CO - 6	A	2.10	2.95	3.54	4.26	4.54	4.90	3.94	2.26
	B	3.34	4.63	3.34	6.70	7.16	7.60	7.36	6.69
CO - 7	A	4.62	5.12	5.55	6.30	6.59	7.02	7.32	6.76
	B	6.71	7.41	8.15	9.20	9.59	10.09	10.75	10.19
CO - 8	A	3.65	3.85	3.97	4.05	4.22	4.33	3.95	3.75
	B	3.25	4.02	4.80	5.39	5.86	6.17	5.80	3.88
CO - 9	A	3.91	3.90	5.57	6.90	7.75	7.85	6.68	5.71
	B	6.17	6.00	7.59	8.03	8.03	7.20	dry	dry
CO - 10	A	6.15	5.95	5.57	6.73	6.90	7.03	6.60	6.00
	B	6.55	6.25	7.10	8.42	8.55	9.27	7.15	6.71
CO - 11	A	6.00	6.10	6.45	6.72	6.80	6.80	dry	dry
	B	4.50	4.55	5.31	5.85	5.45	5.10	dry	dry
CO - 12	A	-	4.56	5.20	4.90	8.00	7.71	6.90	5.20
	B	-	5.07	5.26	5.97	6.92	7.15	6.57	6.97
CO - 13	A	-	4.78	5.10	5.82	6.00	6.32	6.42	5.78
CO - 14	A	-	7.00	6.62	7.70	7.96	8.08	6.30	7.82
	B	-	10.99	10.99	12.35	12.71	12.88	9.55	12.75

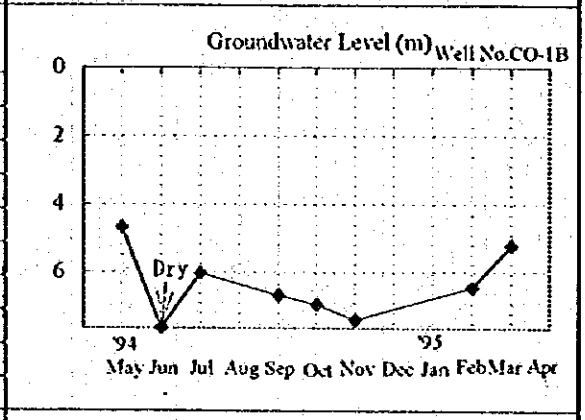
(Note) G.W.D : Groundwater Depth from Surface.

Appendix 2(4) Result of Observation

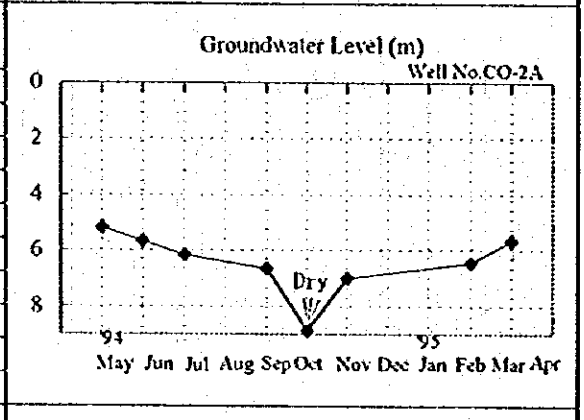
Province:	Copper belt	Aquifer:	Gneiss	
District:	Ndola-Urban			
Site Name:	Mushili P.Sch.	No.	Month	G.W.L(GL-m)
		1	94May	4.45
Diameter:	1060 mm	2	Jun	4.69
Depth:	9.38 m	3	Jul	4.96
Yield:	2500 l/day	4	Sep	5.61
Map No.	1328B1	5	Oct	6.05
Elevation:	1219 m	6	Nov	6.82
Grid Ref.:	N=8542Km750m	7	95Feb	6.53
	E=672Km350m	8	Mar	4.39
Maximum Groundwater Level Fluctuation(m) 2.43				



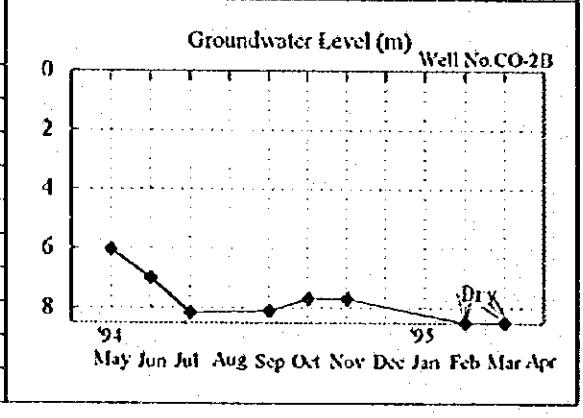
Province:	Copper belt	Aquifer:	Gneiss	
District:	Ndola-Rural			
Site Name:	College Vil.	No.	Month	G.W.L(GL-m)
		1	94May	4.68
Diameter:	900 mm	2	Jun	Dry
Depth:	7.63 m	3	Jul	6.02
Yield:	1500 l/day	4	Sep	6.68
Map No.	1228D3	5	Oct	6.95
Elevation:	1300 m	6	Nov	7.4
Grid Ref.:	N=8566Km850m	7	95Feb	6.44
	E=677Km200m	8	Mar	5.22
Maximum Groundwater Level Fluctuation(m) 2.72				



Province:	Copper belt	Aquifer:	Gneiss	
District:	Ndola-Rural			
Site Name:	Kabuata Sch.	No.	Month	G.W.L(GL-m)
		1	94May	5.18
Diameter:	1060 mm	2	Jun	5.66
Depth:	8.88 m	3	Jul	6.16
Yield:	2250 l/day	4	Sep	6.65
Map No.	1328B3	5	Oct	Dry
Elevation:	1234 m	6	Nov	7
Grid Ref.:	N=8531Km300m	7	95Feb	6.46
	E=682Km150m	8	Mar	5.66
Maximum Groundwater Level Fluctuation(m) 1.82				

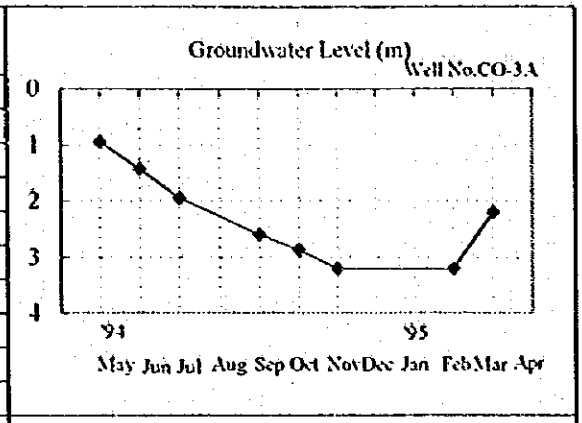


Province:	Copper belt	Aquifer:	Gneiss	
District:	Ndola-Rural			
Site Name:	Kafulafuta Vil.	No.	Month	G.W.L(GL-m)
		1	94May	6.04
Diameter:	900 mm	2	Jun	7
Depth:	8.5 m	3	Jul	8.16
Yield:	250 l/day	4	Sep	8.1
Map No.	1328B3	5	Oct	7.7
Elevation:	1216 m	6	Nov	7.7
Grid Ref.:	N=8528Km500m	7	95Feb	Dry
	E=683Km200m	8	Mar	Dry
Maximum Groundwater Level Fluctuation(m) 2.12				

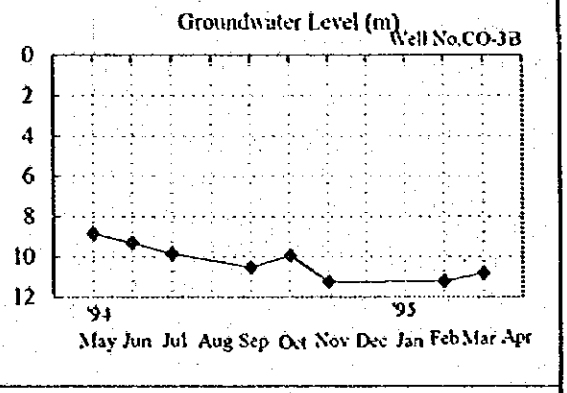


Appendix (5) Result of Observation

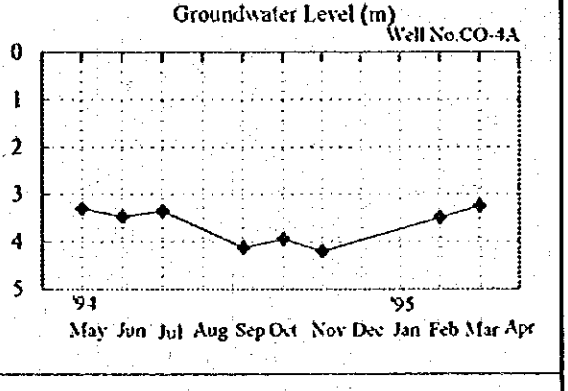
Province: Copper belt	Aquifer: Shale			
District: Ndola-Rural				
Site Name: Chikolongo	No.	Month	G.W.L(GL-m)	
	1	'94May	1.0	
Diameter: 1020 mm	2	Jun	1.4	
Depth: 10.5 m	3	Jul	1.9	
Yield: 5600 l/day	4	Sep	2.6	
Map No. 1328B3	5	Oct	2.9	
Elevation: 1279 m	6	Nov	3.2	
Grid Ref.: N=8511Km300m	7	'95Feb	3.2	
E=680Km900m	8	Mar	2.2	
Maximum Groundwater Level Fluctuation(m)			2.3	



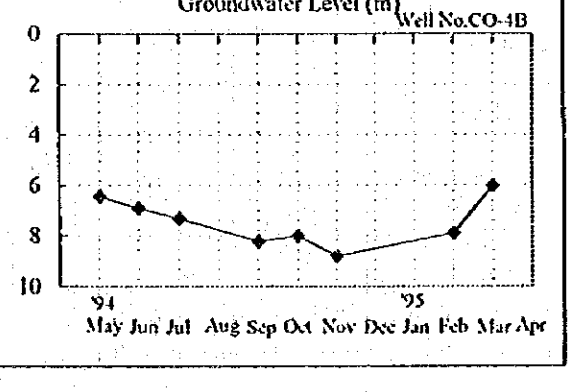
Province: Copper belt	Aquifer: Shale			
District: Ndola-Rural				
Site Name: Pwanda	No.	Month	G.W.L(GL-m)	
	1	'94May	8.9	
Diameter: 1060 mm	2	Jun	9.3	
Depth: 13.9 m	3	Jul	9.9	
Yield: 1000 l/day	4	Sep	10.5	
Map No. 1328B3	5	Oct	9.9	
Elevation: 1294 m	6	Nov	11.3	
Grid Ref.: N=8510Km0m	7	'95Feb	11.2	
E=681Km400m	8	Mar	10.8	
Maximum Groundwater Level Fluctuation(m)			2.4	



Province: Copper belt	Aquifer: Shale			
District: Ndola-Rural				
Site Name: Kashitu	No.	Month	G.W.L(GL-m)	
	1	'94May	3.3	
Diameter: 960 mm	2	Jun	3.5	
Depth: 4.44 m	3	Jul	3.4	
Yield: 1000 l/day	4	Sep	4.1	
Map No. 1328D1	5	Oct	4.0	
Elevation: 1257 m	6	Nov	4.2	
Grid Ref.: N=8487Km0m	7	'95Feb	3.5	
E=680Km0m	8	Mar	3.3	
Maximum Groundwater Level Fluctuation(m)			1.0	

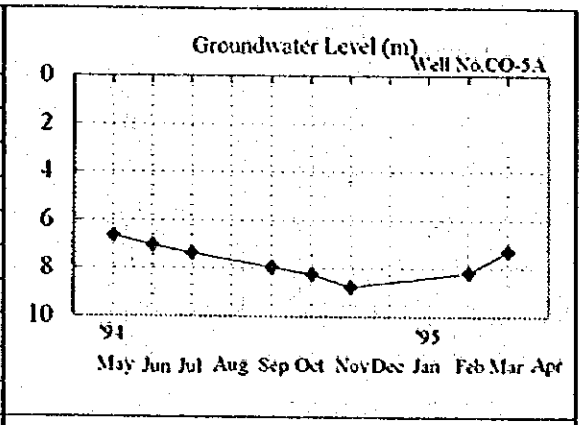


Province: Copper belt	Aquifer: Gneiss			
District: Ndola-Rural				
Site Name: Kalfseo	No.	Month	G.W.L(GL-m)	
	1	'94May	6.5	
Diameter: 1060 mm	2	Jun	6.9	
Depth: 9.15 m	3	Jul	7.3	
Yield: 1500 l/day	4	Sep	8.2	
Map No. 1328D3	5	Oct	8.0	
Elevation: 1255 m	6	Nov	8.8	
Grid Ref.: N=8474Km0m	7	'95Feb	7.9	
E=677Km800m	8	Mar	6.0	
Maximum Groundwater Level Fluctuation(m)			2.8	

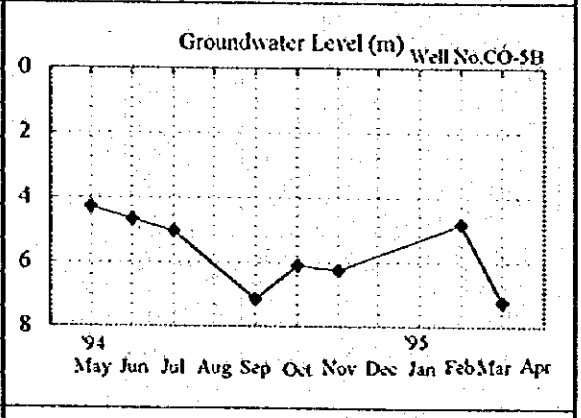


Appendix 2(6) Result of Observation

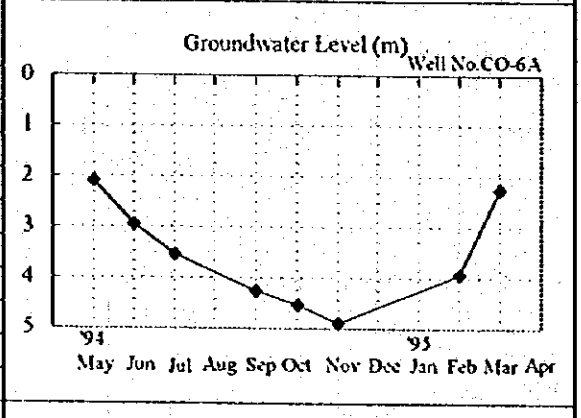
Province:	Copper belt	Aquifer:	Gneiss	
District:	Kushimata			
Site Name:	Chikolongo	No.	Month	G.W.L(GL-m)
		1	'94May	6.65
Diameter:	1060 mm	2	Jun	7.03
Depth:	9.4 m	3	Jul	7.37
Yield:	1000 l/day	4	Sep	7.93
Map No.	1328A4	5	Oct	8.24
Elevation:	1214 m	6	Nov	8.75
Grid Ref.:	N=8528Km100m	7	'95Feb	8.16
	E=653Km250m	8	Mar	7.3
Maximum Groundwater Level Fluctuation(m)				2.1



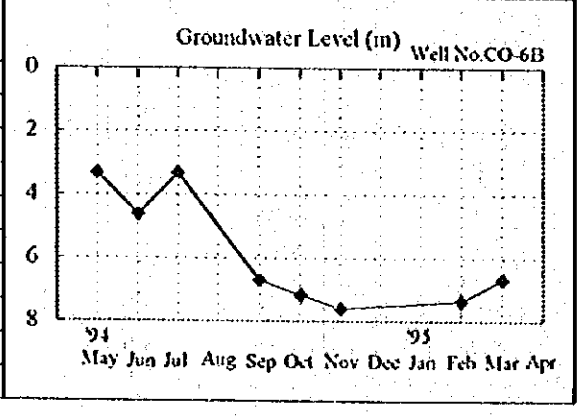
Province:	Copper belt	Aquifer:	Gneiss	
District:	Ndola-Rural			
Site Name:	Gondise	No.	Month	G.W.L(GL-m)
		1	'94May	4.3
Diameter:	900 mm	2	Jun	4.68
Depth:	7.14 m	3	Jul	5.04
Yield:	1800 l/day	4	Sep	7.14
Map No.	1328A4	5	Oct	6.1
Elevation:	1182 m	6	Nov	6.25
Grid Ref.:	N=8522Km150m	7	'95Feb	4.82
	E=653Km100m	8	Mar	7.24
Maximum Groundwater Level Fluctuation(m)				2.94



Province:	Copper belt	Aquifer:	Limestone	
District:	Ndola-Rural			
Site Name:	Mubanga	No.	Month	G.W.L(GL-m)
		1	'94May	2.1
Diameter:	1020 mm	2	Jun	2.95
Depth:	7.18 m	3	Jul	3.54
Yield:	1300 l/day	4	Sep	4.26
Map No.	1328C1	5	Oct	4.54
Elevation:	1196 m	6	Nov	4.9
Grid Ref.:	N=8507Km300m	7	'95Feb	3.94
	E=625Km300m	8	Mar	2.26
Maximum Groundwater Level Fluctuation(m)				2.8

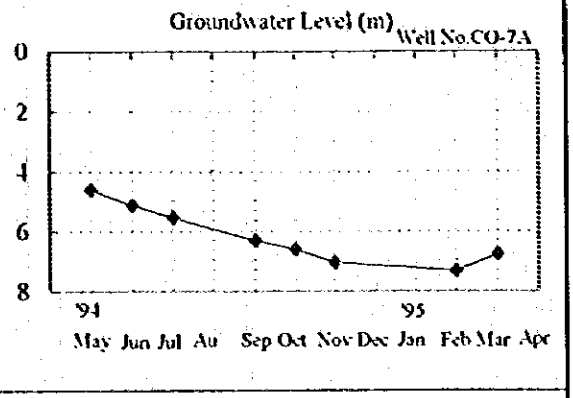


Province:	Copper belt	Aquifer:	Limestone	
District:	Ndola-Rural			
Site Name:	Mpongue	No.	Month	G.W.L(GL-m)
		1	'94May	3.34
Diameter:	1020 mm	2	Jun	4.63
Depth:	9.42 m	3	Jul	3.34
Yield:	2000 l/day	4	Sep	6.7
Map No.	1328C1	5	Oct	7.16
Elevation:	1192 m	6	Nov	7.6
Grid Ref.:	N=8507Km200m	7	'95Feb	7.36
	E=624Km700m	8	Mar	6.69
Maximum Groundwater Level Fluctuation(m)				4.26

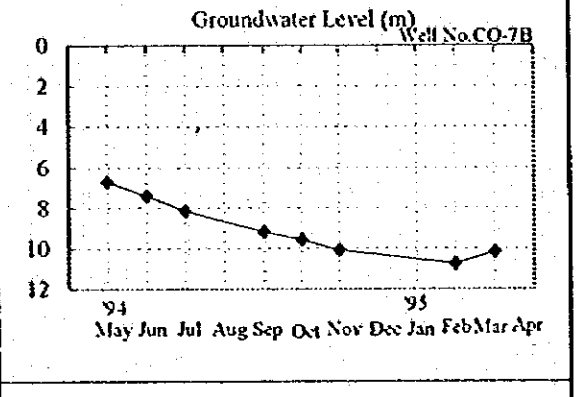


Appendix 2(7) Result of Observation

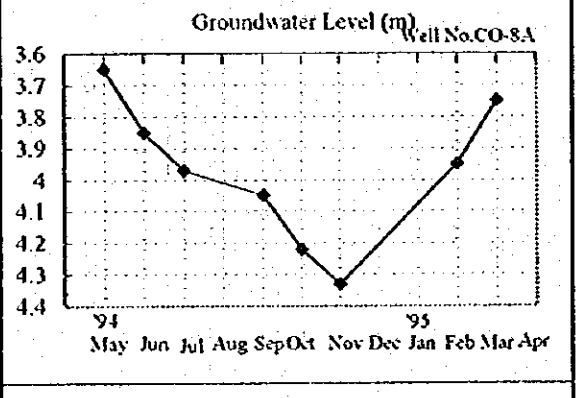
Province: Copper belt	Aquifer: Limestone			
District: Ndola-Rural				
Site Name: Muansa	No.	Month	G.W.L(GL-m)	
	1	'94May	4.6	
Diameter: 1060 mm	2	Jun	5.1	
Depth: 9.62 m	3	Jul	5.6	
Yield: 2000 l/day	4	Sep	6.3	
Map No. 1327D2	5	Oct	6.6	
Elevation: 1202 m	6	Nov	7.0	
Grid Ref.: N=8497Km0m	7	'95Feb	7.3	
E=589Km550m	8	Mar	6.8	
Maximum Groundwater Level Fluctuation(m)			2.7	



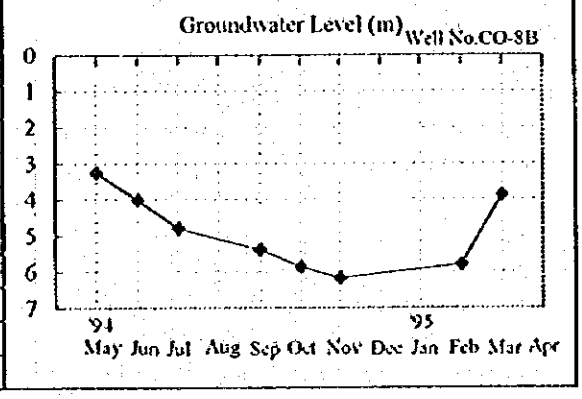
Province: Copper belt	Aquifer: Limestone			
District: Ndola-Rural				
Site Name: Muicumpu	No.	Month	G.W.L(GL-m)	
	1	'94May	6.7	
Diameter: 1060 mm	2	Jun	7.4	
Depth: 12 m	3	Jul	8.2	
Yield: 3000 l/day	4	Sep	9.2	
Map No.	5	Oct	9.6	
Elevation: 1201 m	6	Nov	10.1	
Grid Ref.: N=8497Km550m	7	'95Feb	10.8	
E=588Km50m	8	Mar	10.2	
Maximum Groundwater Level Fluctuation(m)			4.0	



Province: Copper belt	Aquifer: Shale			
District: Ndola-Rural				
Site Name: Kanini	No.	Month	G.W.L(GL-m)	
	1	'94May	3.7	
Diameter: 1050 mm	2	Jun	3.9	
Depth: 5.75 m	3	Jul	4.0	
Yield: l/day	4	Sep	4.1	
Map No. 1327B2	5	Oct	4.2	
Elevation: 1193 m	6	Nov	4.3	
Grid Ref.: N=8548Km500m	7	'95Feb	4.0	
E=599Km450m	8	Mar	3.8	
Maximum Groundwater Level Fluctuation(m)			0.7	

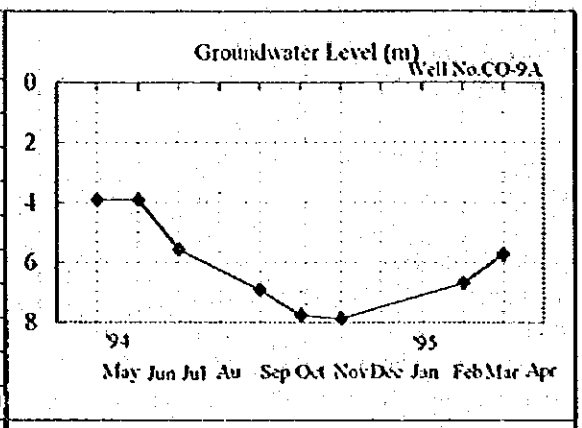


Province: Copper belt	Aquifer: Shale			
District: Ndola-Rural				
Site Name:	No.	Month	G.W.L(GL-m)	
Lumpvna Court	1	'94May	3.3	
Diameter: 1050 mm	2	Jun	4.0	
Depth: 8.1 m	3	Jul	4.8	
Yield: l/day	4	Sep	5.4	
Map No. 1327B2	5	Oct	5.9	
Elevation: 1207 m	6	Nov	6.2	
Grid Ref.: N=8549Km750m	7	'95Feb	5.8	
E=599Km100m	8	Mar	3.9	
Maximum Groundwater Level Fluctuation(m)			2.9	

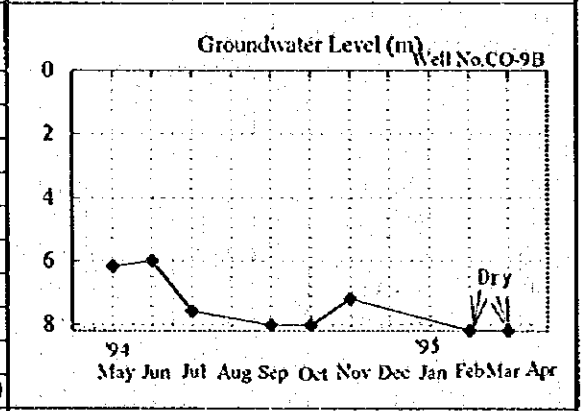


Appendix 2(8) Result of Observation

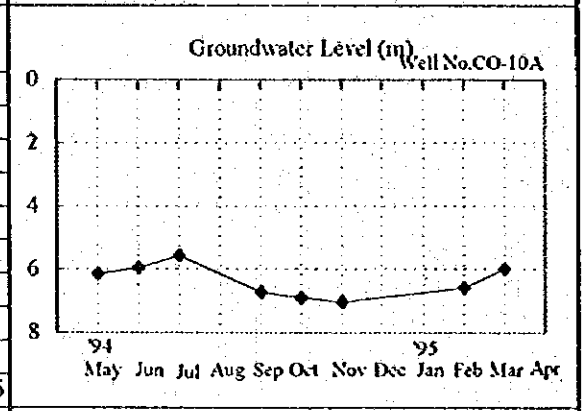
Province: Copper belt	Aquifer: Shale		
District: Ndola-Rural			
Site Name: Mutesha	No.	Month	G.W.L(GL-m)
	1	'94May	3.9
Diameter: 1050 mm	2	Jun	3.9
Depth: 12.45 m	3	Jul	5.6
Yield: l/day	4	Sep	6.9
Map No. 1227C4	5	Oct	7.8
Elevation: 1200 m	6	Nov	7.9
Grid Ref.: N=8574Km750m	7	'95Feb	6.7
E=540Km400m	8	Mar	5.7
Maximum Groundwater Level Fluctuation(m) 4.0			



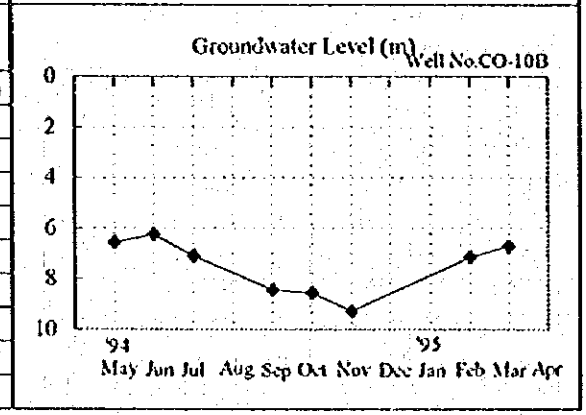
Province: Copper belt	Aquifer: Shale		
District: Ndola-Rural			
Site Name: Cheushi	No.	Month	G.W.L(GL-m)
	1	'94May	6.2
Diameter: 1400 mm	2	Jun	6.0
Depth: 8.2 m	3	Jul	7.6
Yield: l/day	4	Sep	8.0
Map No.	5	Oct	8.0
Elevation: 1200 m	6	Nov	7.2
Grid Ref.: N=8575Km150m	7	'95Feb	Dry
E=540Km700m	8	Mar	Dry
Maximum Groundwater Level Fluctuation(m) 2.0			



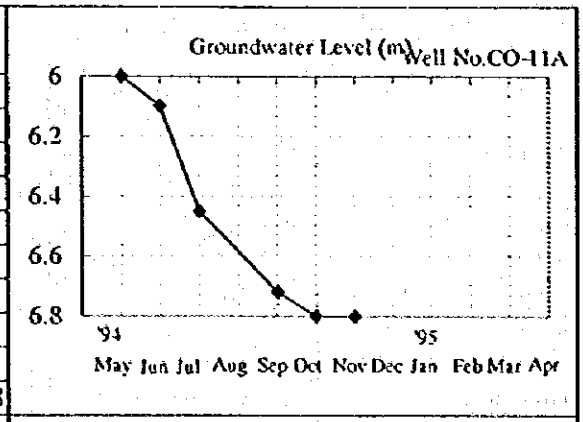
Province: Copper belt	Aquifer: Shale		
District: Ndola-Rural			
Site Name: Mapunga	No.	Month	G.W.L(GL-m)
	1	'94May	6.2
Diameter: 1200 mm	2	Jun	6.0
Depth: 7.65 m	3	Jul	5.6
Yield: l/day	4	Sep	6.7
Map No. 1226D4	5	Oct	6.9
Elevation:	6	Nov	7.0
Grid Ref.: N=8570Km800m	7	'95Feb	6.6
E=483Km900m	8	Mar	6.0
Maximum Groundwater Level Fluctuation(m) 1.5			



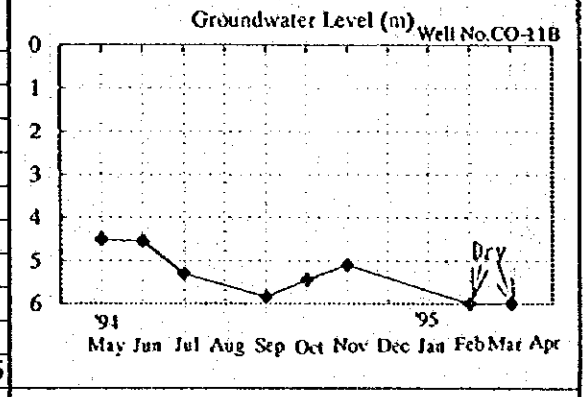
Province: Copper belt	Aquifer: Shale		
District: Ndola-Rural			
Site Name:	No.	Month	G.W.L(GL-m)
Mapunga P.Sch.	1	'94May	6.6
Diameter: 1200 mm	2	Jun	6.3
Depth: 11.05 m	3	Jul	7.1
Yield: l/day	4	Sep	8.4
Map No. 1226D4	5	Oct	8.6
Elevation:	6	Nov	9.3
Grid Ref.: N=8570Km750m	7	'95Feb	7.2
E=483Km700m	8	Mar	6.7
Maximum Groundwater Level Fluctuation(m)			



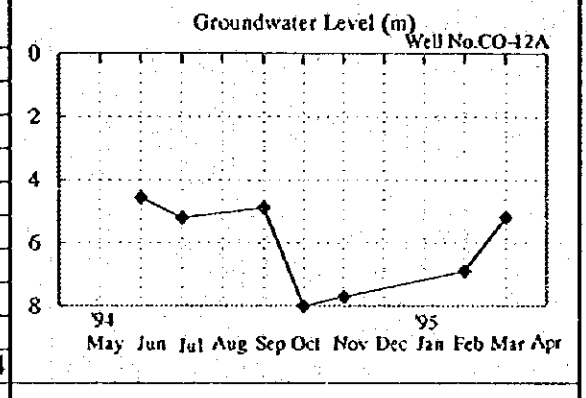
Province: Copper belt	Aquifer: Granite		
District: Kitwe			
Site Name: Zambia Comp.	No.	Month	G.W.L(GL-m)
	1	'94May	6
Diameter: 1000 mm	2	Jun	6.1
Depth: 7.1 m	3	Jul	6.45
Yield: l/day	4	Sep	6.72
Map No. 1228C1	5	Oct	6.8
Elevation: 1288 m	6	Nov	6.8
Grid Ref.: N=8603Km100m	7	'95Feb	
E=615Km450m	8	Mar	
Maximum Groundwater Level Fluctuation(m) 0.8			



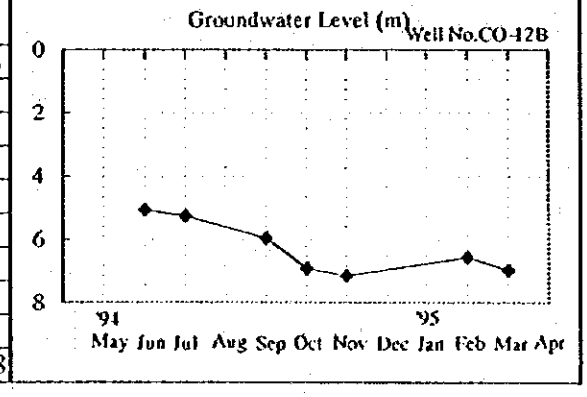
Province: Copper belt	Aquifer: Granite		
District: Kitwe			
Site Name: Zambia Comp.	No.	Month	G.W.L(GL-m)
	1	'94May	4.5
Diameter: 1200 mm	2	Jun	4.55
Depth: 5.55 m	3	Jul	5.31
Yield: l/day	4	Sep	5.85
Map No. 1228C1	5	Oct	5.45
Elevation: 1280 m	6	Nov	5.1
Grid Ref.: N=8603Km300m	7	'95Feb	Dry
E=615Km850m	8	Mar	Dry
Maximum Groundwater Level Fluctuation(m) 1.35			



Province: Copper belt	Aquifer: Quarzite		
District: Ndola-Rural			
Site Name: Shinwkunama R.H.	No.	Month	G.W.L(GL-m)
	1	'94May	
Diameter: 1200 mm	2	Jun	4.56
Depth: 8.5 m	3	Jul	5.2
Yield: l/day	4	Sep	4.9
Map No. 1227D3	5	Oct	8
Elevation: 1211 m	6	Nov	7.71
Grid Ref.: N=8579Km100m	7	'95Feb	6.9
E=573Km350m	8	Mar	5.2
Maximum Groundwater Level Fluctuation(m) 3.44			

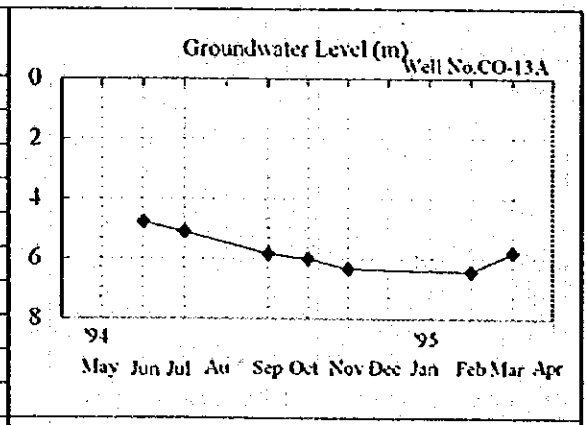


Province: Copper belt	Aquifer: Quarzite		
District: Ndola-Rural			
Site Name: Shinvkunami P.Sch.	No.	Month	G.W.L(GL-m)
	1	'94May	
Diameter: 1200 mm	2	Jun	5.07
Depth: 6.47 m	3	Jul	5.26
Yield: l/day	4	Sep	5.97
Map No. 1227D3	5	Oct	6.92
Elevation: 1213 m	6	Nov	7.15
Grid Ref.: N=8579Km0m	7	'95Feb	6.57
E=573Km500m	8	Mar	6.97
Maximum Groundwater Level Fluctuation(m) 2.08			

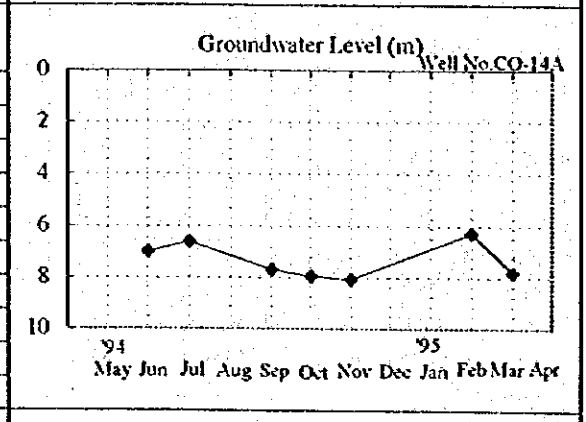


Appendix 2(10) Result of Observation

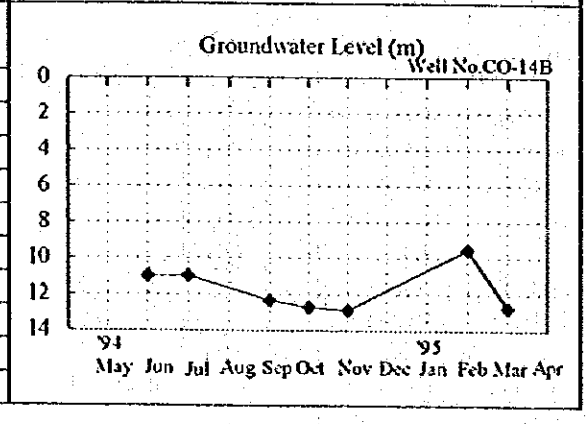
Province:	Copper belt	Aquifer:	Limestone	
District:	Ndola-Rural			
Site Name:	Chapuld	No.	Month	G.W.L(GL-m)
		1	'94May	
Diameter:	1060 mm	2	Jun	4.8
Depth:	7.66 m	3	Jul	5.1
Yield:	1500 l/day	4	Sep	5.8
Map No.	1327D2	5	Oct	6.0
Elevation:	1189 m	6	Nov	6.3
Grid Ref.:	N=8492Km800m	7	'95Feb	6.4
	E=590Km300m	8	Mar	5.8
Maximum Groundwater Level Fluctuation(m)				1.6



Province:	Copper belt	Aquifer:	Shale	
District:	Ndola-Rural			
Site Name:	Ntokoshi	No.	Month	G.W.L(GL-m)
		1	'94May	
Diameter:	1200 mm	2	Jun	7.0
Depth:	8.5 m	3	Jul	6.6
Yield:	l/day	4	Sep	7.7
Map No.	1228C3	5	Oct	8.0
Elevation:	1220 m	6	Nov	8.1
Grid Ref.:	N=8574Km100m	7	'95Feb	6.3
	E=611Km500m	8	Mar	7.8
Maximum Groundwater Level Fluctuation(m)				1.8



Province:	Copper belt	Aquifer:	Shale	
District:	Ndola-Rural			
Site Name:	Mabwale	No.	Month	G.W.L(GL-m)
		1	'94May	
Diameter:	1200 mm	2	Jun	11.0
Depth:	13.45 m	3	Jul	11.0
Yield:	l/day	4	Sep	12.4
Map No.	1228C3	5	Oct	12.7
Elevation:	1220 m	6	Nov	12.9
Grid Ref.:	N=8573Km950m	7	'95Feb	9.6
	E=611Km600m	8	Mar	12.8
Maximum Groundwater Level Fluctuation(m)				3.3



Appendix 3

Observation Result in Central Province

Appendix 3 (1) List of Observation Points

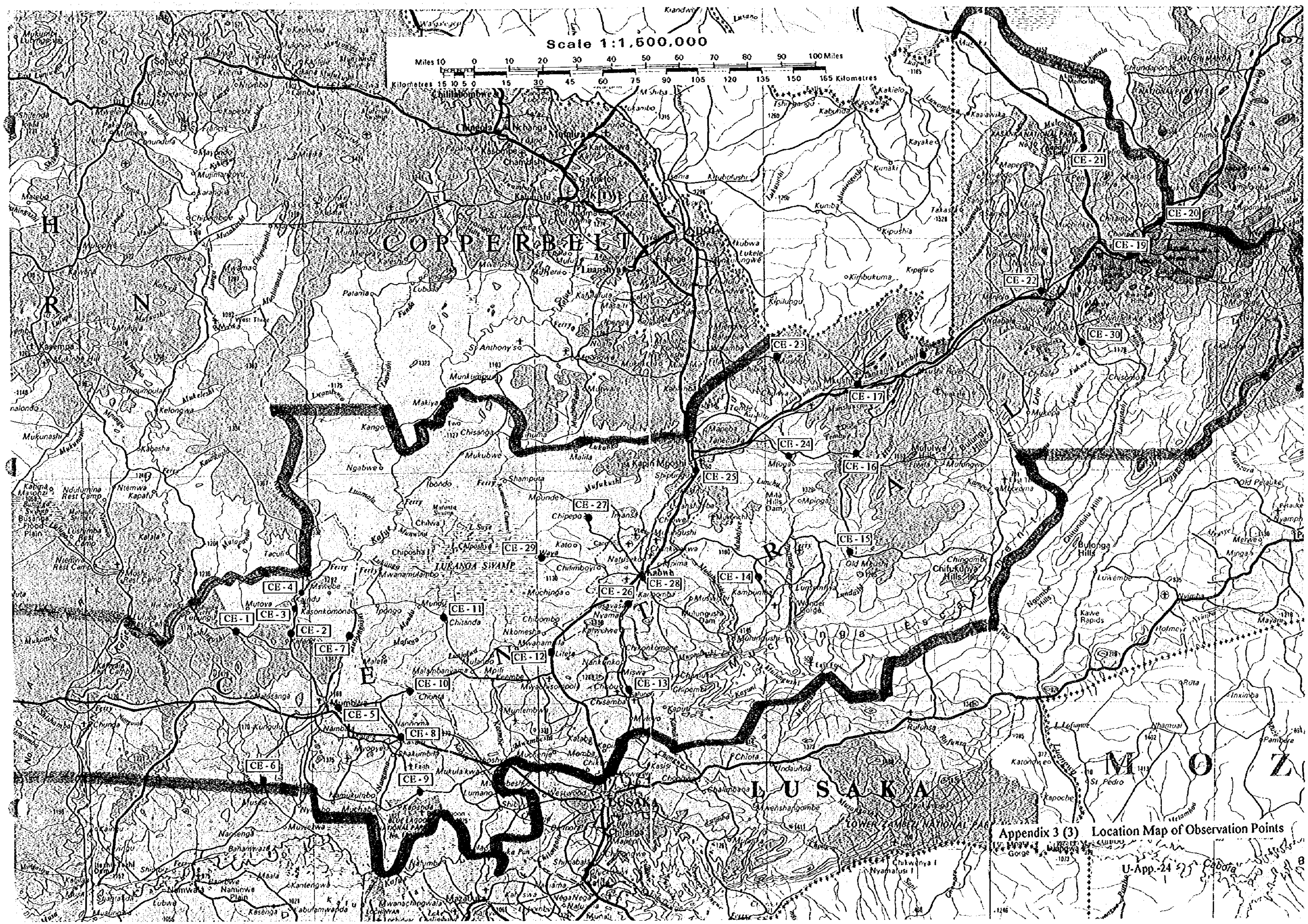
< Central Province (1) >

Point No.	Well No.	Geology	Elevation (m)	District	Site Name
CE - 1	A	Alluvium		Mumbwa	Kabulushi
CE - 2	A	Limestone		Mumbwa	Kafwikamo
CE - 3	A	Limestone		Mumbwa	Kaindu Miss.
	B				
CE - 4	A	Alluvium	1140	Mumbwa	Nzweba Farm
	B	Alluvium	1140		Kamponge
CE - 5	A	Shale		Mumbwa	Shankuku
	B	Shale			Kasondela
CE - 6	A	Quartzite	1000	Mumbwa	Nawsenga
	B	Quartzite	1000		Musulwe
CE - 7	A	Shale		Mumbwa	Mikondo
	B	Shale			Mfubisha
CE - 8	A	Limestone	1097	Mumbwa	Kasalu Mweete
	B	Limestone	1097		Chilufya
CE - 9	A	Alluvium	991	Mumbwa	Kachili
	B	Alluvium	991		Mukwengu
CE - 10	A	Shale		Mumbwa	Moseni
	B	Shale			Chitanti
CE - 11	A	Shale		Kabwe R.	Liwanika
	B	Shale			Chitanda
CE - 12	A	Limestone	1180	Kabwe R.	Liteta Court
	B	Limestone	1180		Liteta Vil.
CE - 13	A	Shale	1120	Kabwe R.	Chisamba
	B	Shale	1150		Chitakunye
CE - 14	A	Granite	1173	Mkushi	Likumbi Sch.
	B	Granite			Kampumba Sch.
CE - 15	A	Gneiss		Mkushi	Jambo
	B	Gneiss	1134		Old Mkushi
CE - 16	A	Gneiss	1279	Mkushi	Kamanga
	B	Gneiss	1311		Masansa
CE - 17	A	Shale	1250	Mkushi	Itala Comp.
	B	Shale	1219		Kasanzama
CE - 18	A	Shale	1500	Mkushi	Chalata Sec.
	B	Shale	1500		Chalata Pr.
CE - 19	A	Shale	1610	Serenje	Makombe F.
	B	Shale	1610		Kanona Sch.
CE - 20	A	Gneiss	1518	Mpika	Kapoto V.
	B	Gneiss	1524		Mpumba Rhc.
CE - 21	A	Shale	1280	Serenje	Lusenga
	B	Shale	1234		Kafioa
CE - 22	A	Gneiss	1417	Serenje	Kabalakata
	B	Gneiss	1433		Chibale F.

Appendix 3 (2) List of Observation Points

< Central Province (2) >

CE - 23	A	Shale	1280	Mkushi	Shumbua Vil.
	B	Shale	1295		Chilufya Vil.
CE - 24	A	Gneiss	1158	Mkushi	Chimdogo
	B	Gneiss	1173		Chipuluka
CE - 25	A	Gneiss	1280	Kapiri	New Kapiri
	B	Gneiss	1280		Benaro
CE - 26	A	Limestone	1170	Kabwe U.	Kasavasa
	B	Limestone	1170		Kaputo Groc
CE - 27	A	Quartzite	1134	Kabwe R.	Chipepo Sch.
	B	Quartzite	1134		Chipepo Dep.
CE - 28	A	Quartzite	1180	Kabwe U.	Nakoli Comp.
	B	Quartzite	1180		Nakoli Mark
CE - 29	A	Quartzite		Kabwe U.	Waya F. Comp.
	B	Quartzite			Katilunga
CE - 30	A	Shale		Serenje	Kamena Sch.
	B	Shale			Kamena Vil.



Appendix 3 (3) Location Map of Observation Points

Appendix 3 (4) Result of Nation-wide Groundwater Level Observation

< Cental Province (1) >

Point No.	Well No.	May. 199- G.W.D(m)	Jun. G.W.D(m)	Jul. G.W.D(m)	Sep. G.W.D(m)	Oct. G.W.D(m)	Nov. G.W.D(m)	Feb. 199- G.W.D(m)	Mar. G.W.D(m)
CE - 1	A	1.62	3.54	3.43	7.35	7.26	7.38	2.93	3.45
CE - 2	A	2.61	3.87	3.99	4.26	4.29	dry	3.87	3.48
CE - 3	A	12.31	13.10	13.18	13.34	13.91	14.08	13.07	13.21
	B								
CE - 4	A	-	-	2.73	3.12	3.33	3.54	3.00	3.02
	B	-	-	10.50	11.00	11.30	11.64	10.80	10.73
CE - 5	A	2.77	4.43	4.78	4.70	5.21	5.46	3.89	5.09
	B	6.60	7.46	7.67	7.94	7.54	5.42	8.12	8.51
CE - 6	A	-	-	15.06	15.09	14.71	14.58	14.17	14.77
	B	-	-	18.78	18.80	19.18	19.30	19.23	19.24
CE - 7	A	2.80	4.59	4.79	5.06	5.63	5.99	5.46	6.05
	B	4.14	5.23	5.54	5.83	6.30	6.89	7.18	7.39
CE - 8	A	8.38	8.70	8.72	10.89	10.84	10.75	7.72	10.50
	B	5.49	6.37	6.40	6.39	6.80	7.17	6.36	6.58
CE - 9	A	15.29	15.53	15.58	15.85	15.92	16.01	16.22	16.37
	B	20.64	20.92	21.02	21.02	20.98	21.05	21.01	21.05
CE - 10	A	2.00	2.61	2.73	2.95	3.13	3.29	3.22	3.38
	B	2.77	3.81	4.38	5.12	5.47	5.74	6.61	6.85
CE - 11	A	6.97	8.53	8.54	8.56	dry	dry	9.12	9.44
	B	10.41	12.26	12.35	12.12	12.51	12.69	12.82	12.99
CE - 12	A	4.81	5.76	5.94	6.30	6.38	6.45	6.23	6.28
	B	3.82	4.47	4.71	5.25	5.49	5.89	5.41	5.37
CE - 13	A	7.11	8.35	8.52	9.07	8.87	9.41	8.43	8.61
	B	6.10	6.92	7.35	7.34	7.33	7.68	6.43	6.43
CE - 14	A	4.50	6.29	6.93	8.64	8.46	8.50	7.86	7.88
	B	10.26	10.27	10.27	10.47	10.68	10.92	11.22	11.29
CE - 15	A	1.59	1.97	2.05	2.62	3.62	3.76	3.88	3.41
	B	3.30	4.60	4.89	5.32	4.82	6.72	7.38	5.96
CE - 16	A	3.55	4.83	5.31	5.90	6.51	7.06	7.34	7.33
	B	7.37	7.92	8.32	9.01	9.06	9.28	9.43	9.44
CE - 17	A	4.22	6.05	7.36	7.69	7.85	8.03	5.19	5.47
	B	3.94	4.27	4.93	5.27	4.70	5.31	4.08	4.46
CE - 18	A	2.05	2.37	2.50	2.88	2.56	2.77	2.18	2.36
	B	7.75	10.26	10.82	12.53	12.30	12.62	10.59	11.12
CE - 19	A	11.62	12.85	13.58	14.71	15.43	15.84	16.42	14.22
	B	3.11	3.82	4.24	4.98	5.48	5.84	4.37	3.74
CE - 20	A	5.40	6.53	6.91	7.22	dry	dry	6.14	4.59
	B	9.79	10.23	10.26	10.47	10.51	dry	10.57	10.14
CE - 21	A	6.52	7.11	7.48	7.99	8.22	8.47	dry	8.22
	B	5.32	6.29	6.84	7.25	7.44	7.71	4.85	5.22

(Note) G.W.D : Groundwater Depth from Surface.

Appendix 3 (5) Result of Nation-wide Groundwater Level Observation

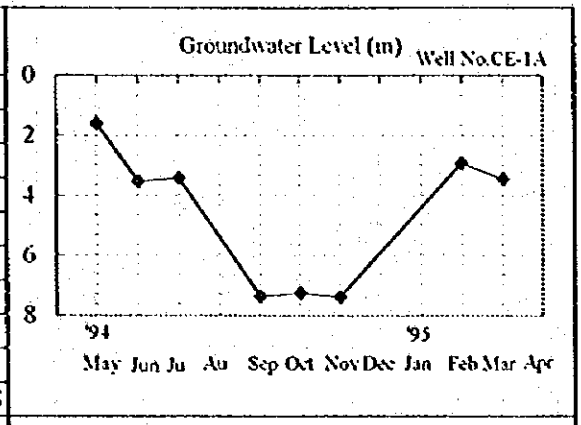
< Cental Province (2) >

CE - 22	A	-	-	7.51	8.25	8.32	8.20	8.24	7.89
	B	7.83	8.64	9.04	10.27	9.76	9.93	10.38	10.31
CE - 23	A	.86	1.67	1.89	2.22	2.32	2.45	.66	1.09
	B	1.78	2.29	2.50	2.87	3.04	3.23	1.77	2.17
CE - 24	A	.89	1.64	2.17	2.80	3.19	2.51	2.56	2.81
	B	4.00	5.34	5.43	5.55	8.34	5.53	5.01	5.12
CE - 25	A	1.76	3.32	3.71	4.80	6.29	6.54	2.37	2.84
	B	2.62	3.55	3.80	4.35	4.76	4.86	3.03	3.11
CE - 26	A	4.13	5.13	5.65	6.70	6.94	6.99	6.68	6.49
	B	3.60	5.30	5.70	6.05	6.06	6.13	6.06	6.05
CE - 27	A	6.12	6.67	6.96	9.85	11.11	10.47	7.58	7.42
	B	3.54	4.37	4.67	6.92	6.82	6.73	4.12	4.13
CE - 28	A	1.64	1.91	2.06	2.43	2.52	2.64	1.71	1.29
	B	1.16	1.60	1.92	2.20	2.33	2.64	1.72	1.06
CE - 29	A	1.06	2.60	2.85	3.16	3.35	2.60	2.93	2.74
	B	.73	2.46	2.68	2.89	3.09	3.35	2.68	2.44
CE - 30	A	-	-	15.07	15.67	16.02	16.26	17.09	17.13
	B	-	-	4.12	5.26	5.28	5.28	4.82	4.45

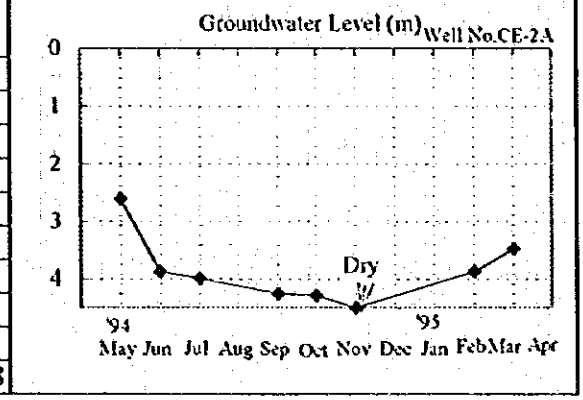
(Note) G.W.D : Groundwater Depth from Surface.

Appendix 3(6) Result of Observation

Province: Central	Aquifer: Alluvium			
District: Mumbwa				
Site Name: Kabulushi	No.	Month	G.W.L(GL-m)	
	1	'94May	1.6	
Diameter: 1000 mm	2	Jun	3.5	
Depth: m	3	Jul	3.4	
Yield: 200 l/day	4	Sep	7.4	
Map No. 1426D1	5	Oct	7.3	
Elevation:	6	Nov	7.4	
Grid Ref.: N=8377Km450m	7	'95Feb	2.9	
E=462Km950m	8	Mar	3.5	
Maximum Groundwater Level Fluctuation(m) 5.8				

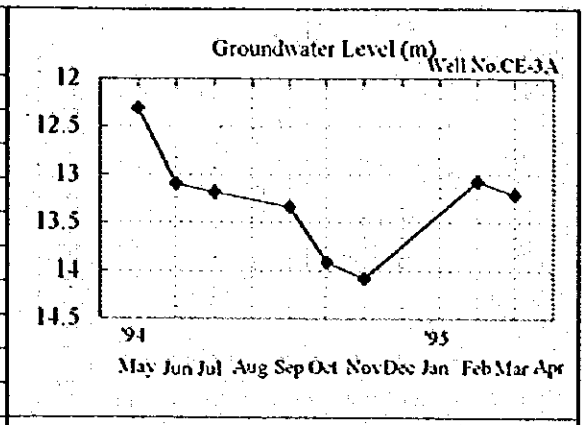


Province: Copper belt	Aquifer: Limestone			
District: Ndola-Rural				
Site Name: College Vil.	No.	Month	G.W.L(GL-m)	
	1	'94May	2.6	
Diameter: 1250 mm	2	Jun	3.9	
Depth: m	3	Jul	4.0	
Yield: l/day	4	Sep	4.3	
Map No. 1426D1	5	Oct	4.3	
Elevation: m	6	Nov	Dry	
Grid Ref.: N=8377Km200m	7	'95Feb	3.9	
E=489Km250m	8	Mar	3.5	
Maximum Groundwater Level Fluctuation(m) 1.68				

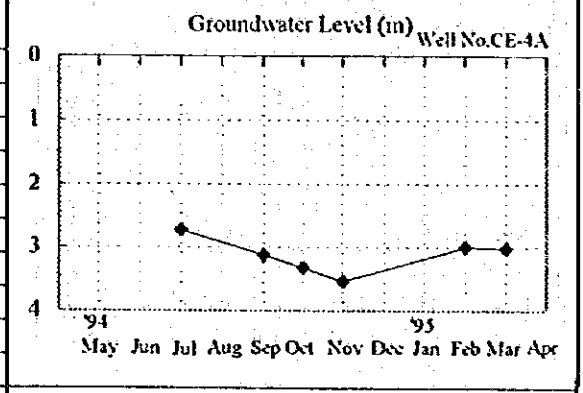


Appendix 3(7) Result of Observation

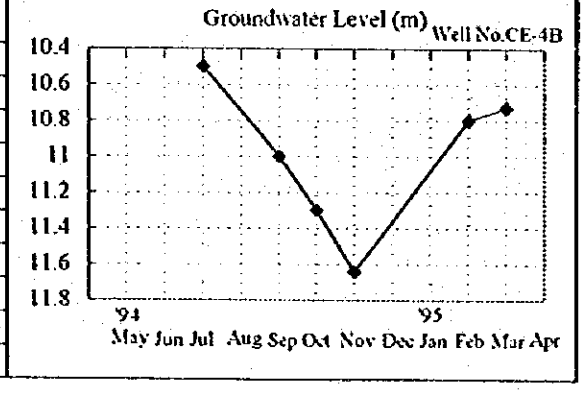
Province: Central	Aquifer: Limestone		
District: Mumbwa	Main Aquifer is Siltstone		
Site Name: Kaindu Miss.	No.	Month	G.W.L(GL-m)
	1	'94May	12.3
Diameter: 1250 mm	2	Jun	13.1
Depth:	3	Jul	13.2
Yield: 500 l/day	4	Sep	13.3
Map No. 1426D2	5	Oct	13.9
Elevation: m	6	Nov	14.1
Grid Ref.: N=8391Km350m	7	'95Feb	13.1
E=492Km150m	8	Mar	13.2
Maximum Groundwater Level Fluctuation(m) 1.8			



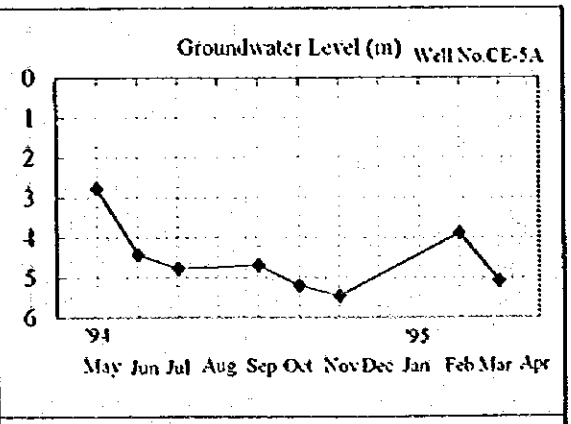
Province: Central	Aquifer: Alluvium		
District: Mumbwa	Main Aquifer is mudstone		
Site Name: Nzweba Farm	No.	Month	G.W.L(GL-m)
	1	'94May	
Diameter: 2500 mm	2	Jun	
Depth:	3	Jul	2.7
Yield: 400~700 l/day	4	Sep	3.1
Map No. 1426D4	5	Oct	3.3
Elevation: 1140 m	6	Nov	3.5
Grid Ref.: N=8401Km250m	7	'95Feb	3.0
E=498Km700m	8	Mar	3.0
Maximum Groundwater Level Fluctuation(m) 0.8			



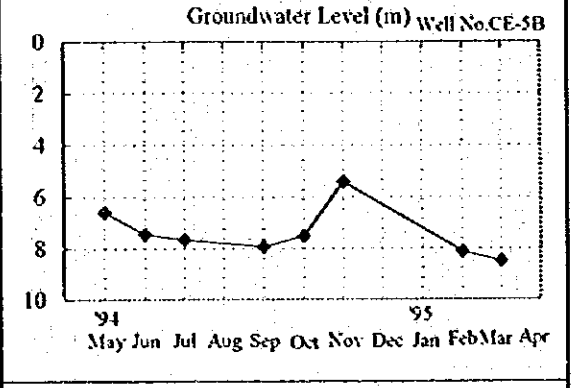
Province: Central	Aquifer: Alluvium		
District: Mumbwa	Main Aquifer is mudstone		
Site Name: Kamponge	No.	Month	G.W.L(GL-m)
	1	'94May	
Diameter: 1000 mm	2	Jun	
Depth: m	3	Jul	10.5
Yield: l/day	4	Sep	11.0
Map No. 1426D2	5	Oct	11.3
Elevation: 1140 m	6	Nov	11.6
Grid Ref.: N=8396Km0m	7	'95Feb	10.8
E=495Km200m	8	Mar	10.7
Maximum Groundwater Level Fluctuation(m) 1.1			



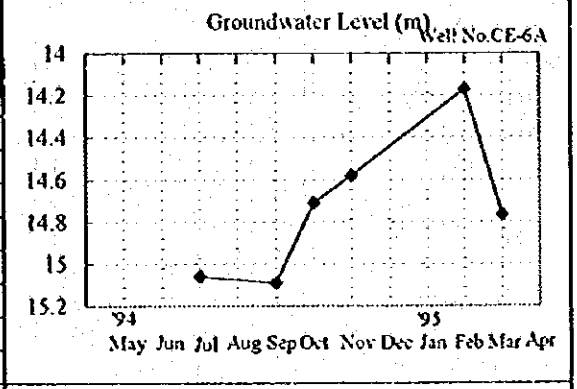
Province: Central	Aquifer: Shale		
District: Mumbwa			
Site Name: Shankuku	No.	Month	G.W.L(GL-m)
	1	'94May	2.8
Diameter: 1250 mm	2	Jun	4.4
Depth:	3	Jul	4.8
Yield: 1500 l/day	4	Sep	4.7
Map No. 1427C3	5	Oct	5.2
Elevation: m	6	Nov	5.5
Grid Ref.: N=8346Km800m	7	'95Feb	3.9
E=507Km450m	8	Mar	5.1
Maximum Groundwater Level Fluctuation(m) 2.7			



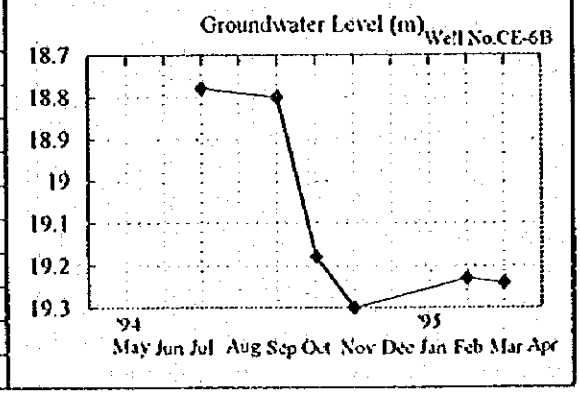
Province: Central	Aquifer: Shale		
District: Mumbwa			
Site Name: Kasondela	No.	Month	G.W.L(GL-m)
	1	'94May	6.6
Diameter: 1000 m	2	Jun	7.5
Depth: m	3	Jul	7.7
Yield: 1000 l/day	4	Sep	7.9
Map No. 1427C3	5	Oct	7.5
Elevation:	6	Nov	5.4
Grid Ref.: N=8342Km0m	7	'95Feb	8.1
E=510Km0m	8	Mar	8.5
Maximum Groundwater Level Fluctuation(m) 3.1			



Province: Central	Aquifer: Quartzite		
District: Namwala			
Site Name: Nawsenga	No.	Month	G.W.L(GL-m)
	1	'94May	
Diameter: 1250 mm	2	Jun	
Depth: m	3	Jul	15.1
Yield: 50 l/day	4	Sep	15.1
Map No. 1526B4	5	Oct	14.7
Elevation: 1000 m	6	Nov	14.6
Grid Ref.: N=8298Km600m	7	'95Feb	14.2
E=477Km500m	8	Mar	14.8
Maximum Groundwater Level Fluctuation(m) 0.9			

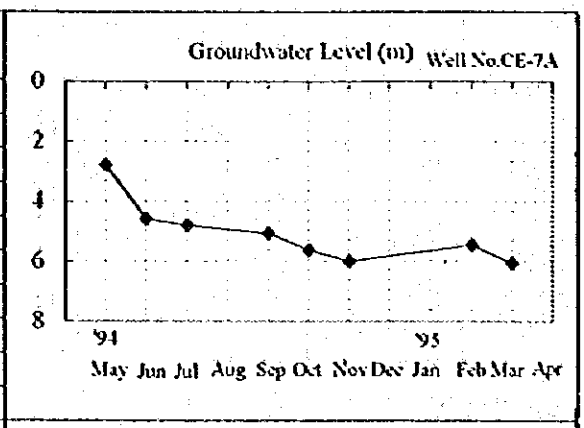


Province: Central	Aquifer: Quartzite		
District: Namwala	Main aquifer is Schist		
Site Name: Musulwe	No.	Month	G.W.L(GL-m)
	1	'94May	
Diameter: 1250 mm	2	Jun	
Depth: m	3	Jul	18.8
Yield: l/day	4	Sep	18.8
Map No. 1526B4	5	Oct	19.2
Elevation: 1000 m	6	Nov	19.3
Grid Ref.: N=8297Km700m	7	'95Feb	19.2
E=476Km100m	8	Mar	19.2
Maximum Groundwater Level Fluctuation(m) 0.5			

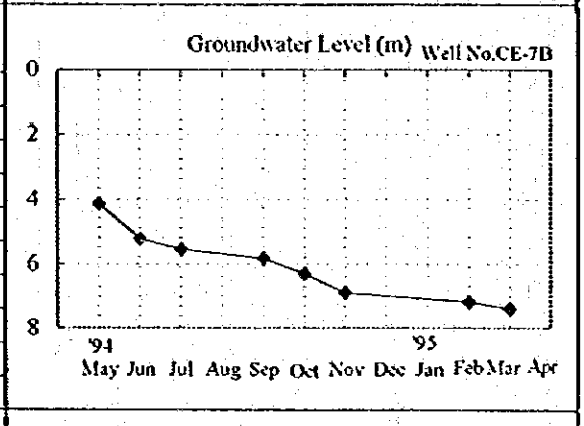


Appendix 3(9) Result of Observation

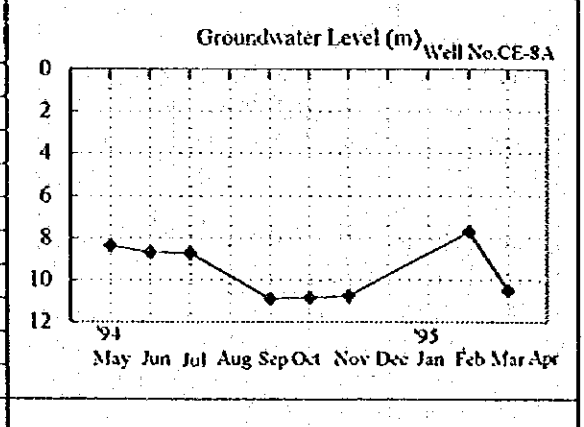
Province: Central	Aquifer: Shale		
District: Mumbwa			
Site Name: Mikondo	No.	Month	G.W.L(GL-m)
	1	'94May	2.8
Diameter: 1250 mm	2	Jun	4.6
Depth: m	3	Jul	4.8
Yield: 800 l/day	4	Sep	5.1
Map No. 1427C1	5	Oct	5.6
Elevation: m	6	Nov	6.0
Grid Ref.: N=8374Km0m	7	'95Feb	5.5
E=517Km250m	8	Mar	6.1
Maximum Groundwater Level Fluctuation(m)			3.3



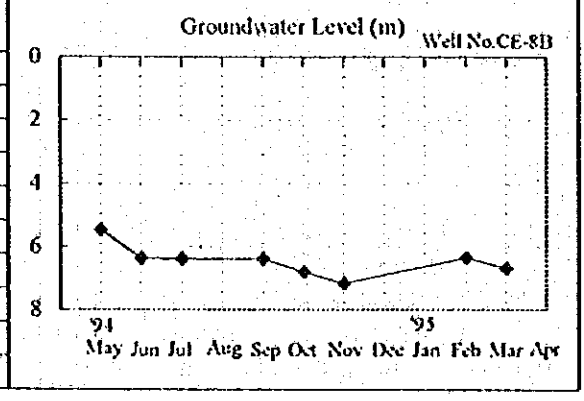
Province: Central	Aquifer: Shale		
District: Mumbwa			
Site Name: Mfubisha	No.	Month	G.W.L(GL-m)
	1	'94May	4.1
Diameter: 1250 mm	2	Jun	5.2
Depth: m	3	Jul	5.5
Yield: 1800 l/day	4	Sep	5.8
Map No. 1427C1	5	Oct	6.3
Elevation: m	6	Nov	6.9
Grid Ref.: N=8377Km300m	7	'95Feb	7.2
E=519Km200m	8	Mar	7.4
Maximum Groundwater Level Fluctuation(m)			3.3



Province: Central	Aquifer: Limestone		
District: Mumbwa			
Site Name: Kasalu Mweete	No.	Month	G.W.L(GL-m)
	1	'94May	8.4
Diameter: 900 mm	2	Jun	8.7
Depth: m	3	Jul	8.7
Yield: 600 l/day	4	Sep	10.9
Map No. 1527A2	5	Oct	10.8
Elevation: 1097 m	6	Nov	10.8
Grid Ref.: N=8326Km800m	7	'95Feb	7.7
E=539Km850m	8	Mar	10.5
Maximum Groundwater Level Fluctuation(m)			3.2



Province: Central	Aquifer: Limestone		
District: Mumbwa			
Site Name: Chilufya	No.	Month	G.W.L(GL-m)
	1	'94May	5.5
Diameter: 1000 mm	2	Jun	6.4
Depth: m	3	Jul	6.4
Yield: 1000 l/day	4	Sep	6.4
Map No. 1527A2	5	Oct	6.8
Elevation: 1097 m	6	Nov	7.2
Grid Ref.: N=8326Km850m	7	'95Feb	6.4
E=540Km50m	8	Mar	6.7
Maximum Groundwater Level Fluctuation(m)			1.7

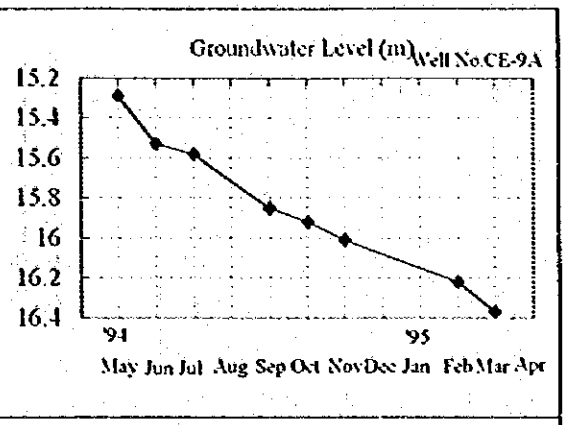


Appendix 3(10) Result of Observation

Province: Central	Aquifer: Alluvium
District: Mumbwa	
Site Name: Kachili	
Diameter: 1250 mm	
Depth:	
Yield: 2500 l/day	
Map No. 1527A4	
Elevation: 991 m	
Grid Ref.: N=8299Km800m	
E=552Km250m	

No.	Month	G.W.L(GL-m)
1	'94May	15.3
2	Jun	15.5
3	Jul	15.6
4	Sep	15.9
5	Oct	15.9
6	Nov	16.0
7	'95Feb	16.2
8	Mar	16.4

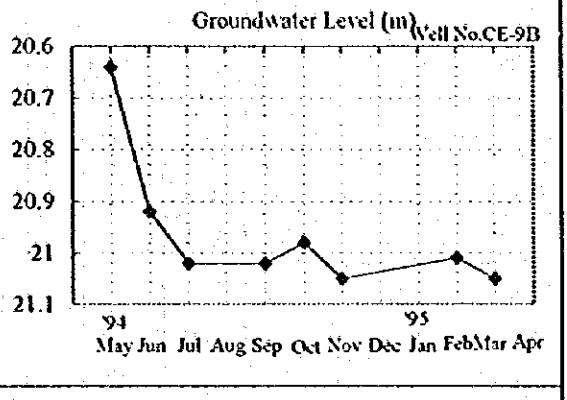
Maximum Groundwater Level Fluctuation(m) 1.1



Province: Central	Aquifer: Alluvium
District: Mumbwa	
Site Name: Mukwengu	
Diameter: 1250 mm	
Depth: m	
Yield: 1000 l/day	
Map No. 1527A4	
Elevation: 991 m	
Grid Ref.: N=8295Km950m	
E=544Km100m	

No.	Month	G.W.L(GL-m)
1	'94May	20.6
2	Jun	20.9
3	Jul	21.0
4	Sep	21.0
5	Oct	21.0
6	Nov	21.1
7	'95Feb	21.0
8	Mar	21.1

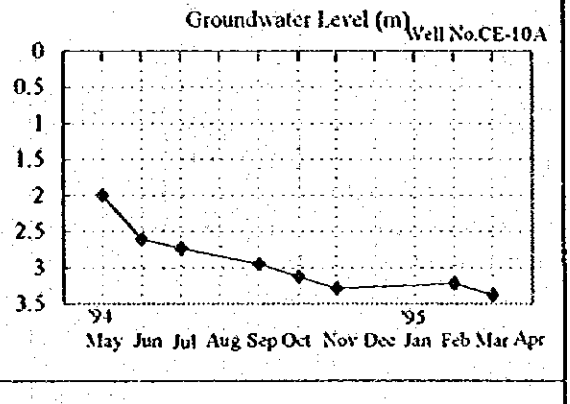
Maximum Groundwater Level Fluctuation(m) 0.4



Province: Central	Aquifer: Shale
District: Mumbwa	Main aquifer is gravel
Site Name: Monseni	
Diameter: 1000 mm	
Depth: m	
Yield: 500 l/day	
Map No. 1427C4	
Elevation: m	
Grid Ref.: N=8348Km650m	
E=549Km0m	

No.	Month	G.W.L(GL-m)
1	'94May	2.0
2	Jun	2.6
3	Jul	2.7
4	Sep	3.0
5	Oct	3.1
6	Nov	3.3
7	'95Feb	3.2
8	Mar	3.4

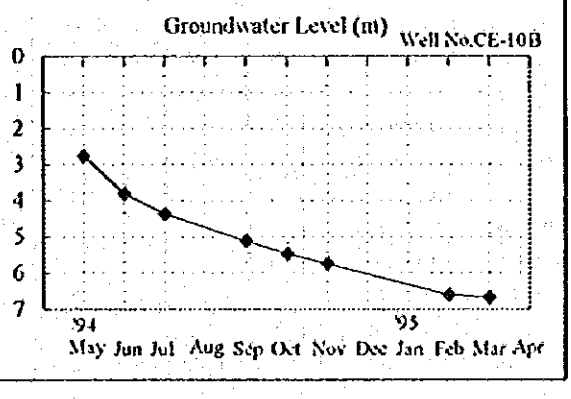
Maximum Groundwater Level Fluctuation(m) 1.4



Province: Central	Aquifer: Shale
District: Mumbwa	coarse and laferite
Site Name: Chitanti	
Diameter: 900 mm	
Depth: m	
Yield: l/day	
Map No. 1427C4	
Elevation: m	
Grid Ref.: N=8348Km250m	
E=548Km0m	

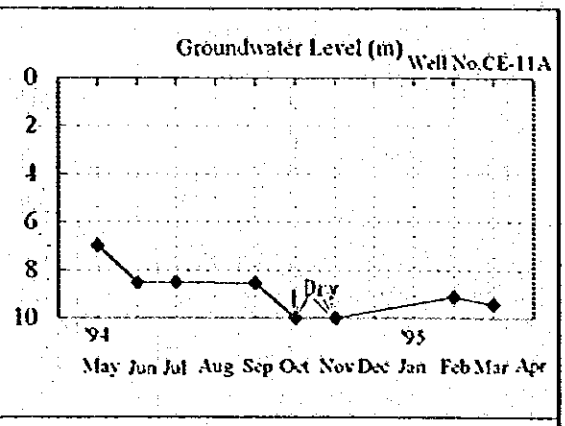
No.	Month	G.W.L(GL-m)
1	'94May	2.8
2	Jun	3.8
3	Jul	4.4
4	Sep	5.1
5	Oct	5.5
6	Nov	5.7
7	'95Feb	6.6
8	Mar	6.7

Maximum Groundwater Level Fluctuation(m) 3.9

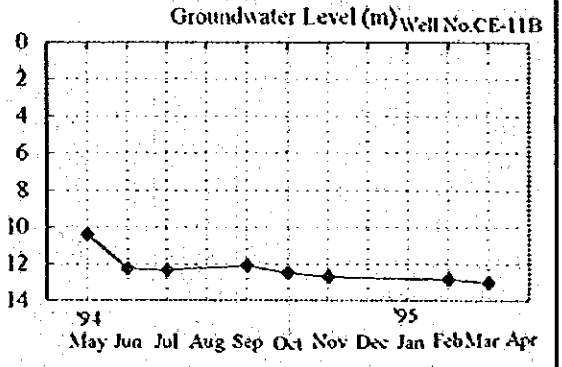


Appendix 3(11) Result of Observation

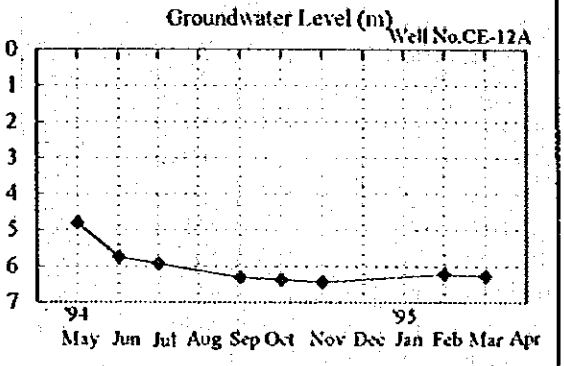
Province: Central	Aquifer: Shale		
District: Kabwe R.			
Site Name: Liwanika	No.	Month	G.W.L(GL-m)
	1	'94May	7.0
Diameter: 1250 mm	2	Jun	8.5
Depth:	3	Jul	8.5
Yield: l/day	4	Sep	8.6
Map No. 1427D1	5	Oct	Dry
Elevation: m	6	Nov	Dry
Grid Ref.: N=8381Km700m	7	'95Feb	9.1
E=563Km600m	8	Mar	9.4
Maximum Groundwater Level Fluctuation(m) 2.5			



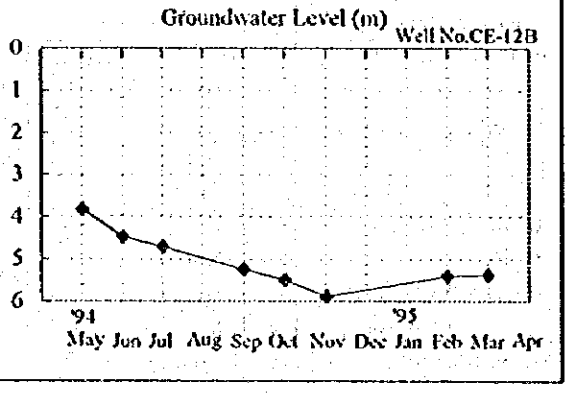
Province: Central	Aquifer: Shale		
District: Kabwe R.			
Site Name: Chitanda	No.	Month	G.W.L(GL-m)
	1	'94May	10.4
Diameter: 1250 mm	2	Jun	12.3
Depth: m	3	Jul	12.4
Yield: 1300 l/day	4	Sep	12.1
Map No. 1427D1	5	Oct	12.5
Elevation: m	6	Nov	12.7
Grid Ref.: N=8381Km750m	7	'95Feb	12.8
E=563Km850m	8	Mar	13.0
Maximum Groundwater Level Fluctuation(m) 2.6			



Province: Central	Aquifer: Limestone		
District: Kabwe R.			
Site Name: Liteta Court	No.	Month	G.W.L(GL-m)
	1	'94May	4.8
Diameter: 1250 mm	2	Jun	5.8
Depth: m	3	Jul	5.9
Yield: 1000 l/day	4	Sep	6.3
Map No. 1428C3	5	Oct	6.4
Elevation: 1180 m	6	Nov	6.5
Grid Ref.: N=8366Km300m	7	'95Feb	6.2
E=613Km600m	8	Mar	6.3
Maximum Groundwater Level Fluctuation(m) 1.6			

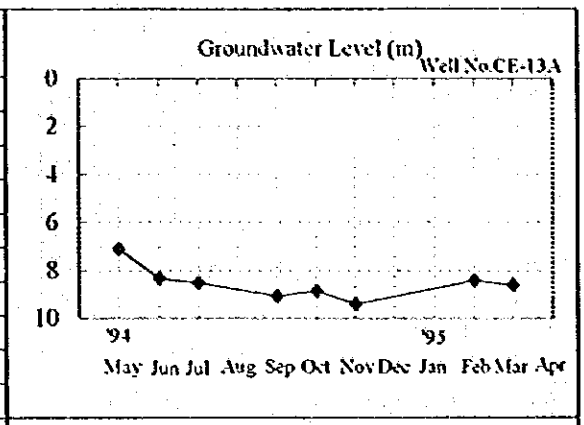


Province: Central	Aquifer: Limestone		
District: Kabwe R.	Main aquifer is Schist		
Site Name: Liteta Vil.	No.	Month	G.W.L(GL-m)
	1	'94May	3.8
Diameter: 1250 mm	2	Jun	4.5
Depth: m	3	Jul	4.7
Yield: 1000 l/day	4	Sep	5.3
Map No. 1428C3	5	Oct	5.5
Elevation: 1180 m	6	Nov	5.9
Grid Ref.: N=8366Km0m	7	'95Feb	5.4
E=613Km500m	8	Mar	5.4
Maximum Groundwater Level Fluctuation(m) 2.1			

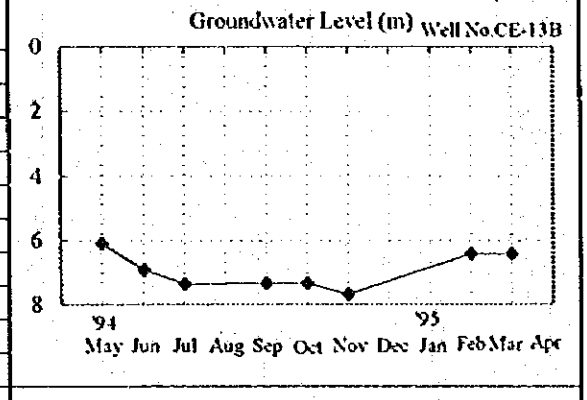


Appendix 3(12) Result of Observation

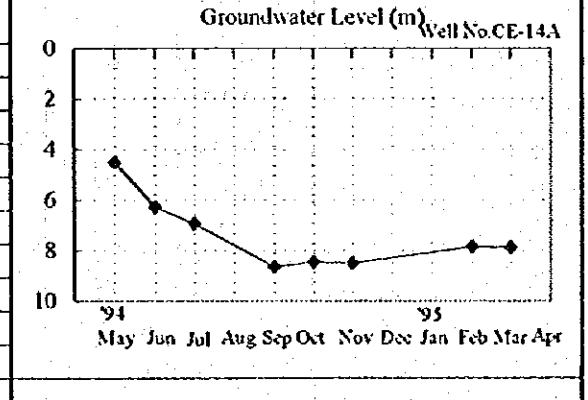
Province: Central	Aquifer: Shale		
District: Kabwe R.			
Site Name: Chisamba	No.	Month	G.W.L(GL-m)
	1	'94May	7.1
Diameter: 1000 mm	2	Jun	8.4
Depth: m	3	Jul	8.5
Yield: 400 l/day	4	Sep	9.1
Map No. 1428C4	5	Oct	8.9
Elevation: 1120 m	6	Nov	9.4
Grid Ref.: N=8345Km600m	7	'95Feb	8.4
E=649Km600m	8	Mar	8.6
Maximum Groundwater Level Fluctuation(m)			2.3



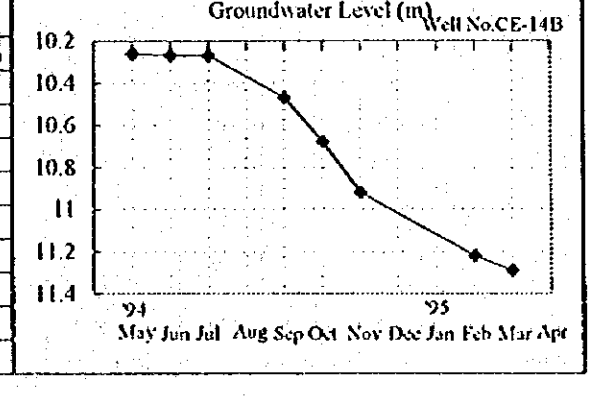
Province: Central	Aquifer: Shale		
District: Kabwe R.			
Site Name: Chitakunye	No.	Month	G.W.L(GL-m)
	1	'94May	6.1
Diameter: 1000 mm	2	Jun	6.9
Depth: m	3	Jul	7.4
Yield: 600 l/day	4	Sep	7.3
Map No. 1428C4	5	Oct	7.3
Elevation: 1150 m	6	Nov	7.7
Grid Ref.: N=8346Km850m	7	'95Feb	6.4
E=651Km400m	8	Mar	6.4
Maximum Groundwater Level Fluctuation(m)			1.6



Province: Central	Aquifer: Granite		
District: Mukushi			
Site Name: Likumbi Sch.	No.	Month	G.W.L(GL-m)
	1	'94May	4.5
Diameter: 1250 mm	2	Jun	6.3
Depth: m	3	Jul	6.9
Yield: 2000 l/day	4	Sep	8.6
Map No. 1428B4	5	Oct	8.5
Elevation: 1173 m	6	Nov	8.5
Grid Ref.: N=8408Km600m	7	'95Feb	7.9
E=709Km550m	8	Mar	7.9
Maximum Groundwater Level Fluctuation(m)			4.1

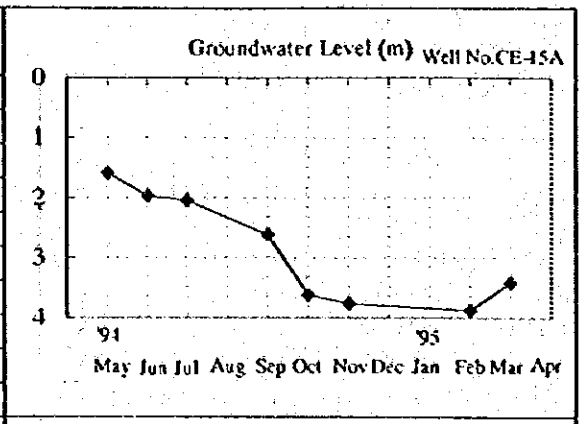


Province: Central	Aquifer: Granite		
District: Mukushi			
Site Name: Kampumba Sch.	No.	Month	G.W.L(GL-m)
	1	'94May	10.3
Diameter: 1250 mm	2	Jun	10.3
Depth: m	3	Jul	10.3
Yield: 600 l/day	4	Sep	10.5
Map No. 1429C1	5	Oct	10.7
Elevation: m	6	Nov	10.9
Grid Ref.: N=8390Km250m	7	'95Feb	11.2
E=717Km800m	8	Mar	11.3
Maximum Groundwater Level Fluctuation(m)			1.0

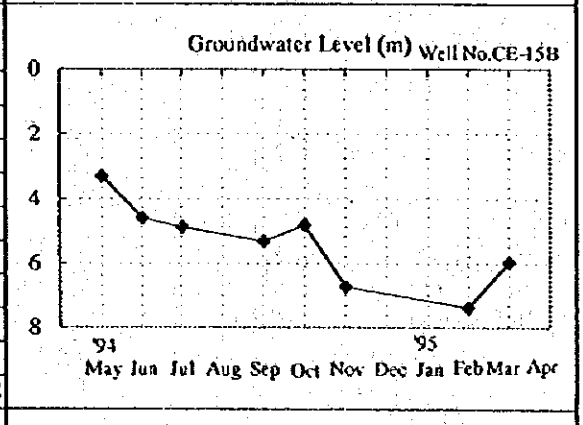


Appendix 3(13) Result of Observation

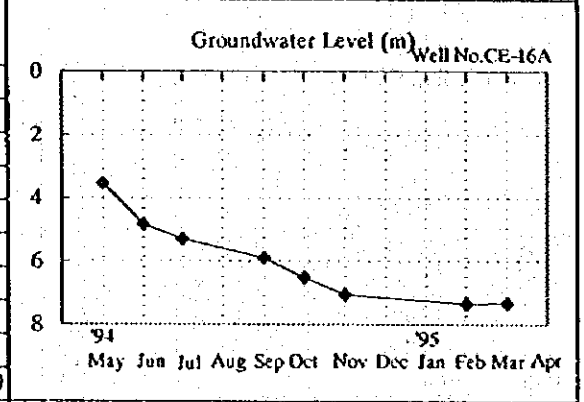
Province: Central	Aquifer: Gneiss		
District: Mukushi			
Site Name: Jambo	No.	Month	G.W.L(GL-m)
	1	'94May	1.59
Diameter: 1550 mm	2	Jun	1.97
Depth: m	3	Jul	2.05
Yield: 1500 l/day	4	Sep	2.62
Map No. 1429A4	5	Oct	3.62
Elevation: m	6	Nov	3.76
Grid Ref.: N=8411Km50m	7	'95Feb	3.88
E=754Km850m	8	Mar	3.41
Maximum Groundwater Level Fluctuation(m) 2.29			



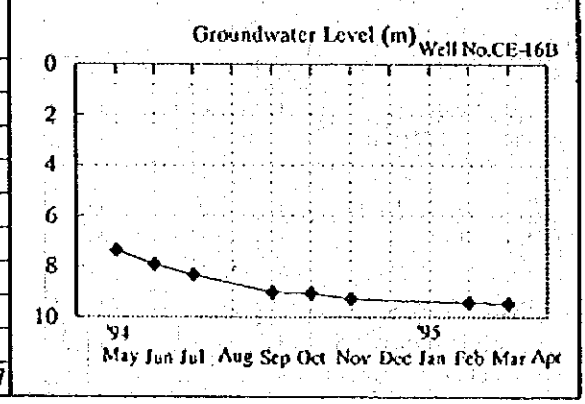
Province: Central	Aquifer: Gneiss		
District: Mukushi			
Site Name: old Mukushi	No.	Month	G.W.L(GL-m)
	1	'94May	3.3
Diameter: 1250 mm	2	Jun	4.6
Depth: m	3	Jul	4.89
Yield: 1400 l/day	4	Sep	5.32
Map No. 1429A4	5	Oct	4.82
Elevation: 1134 m	6	Nov	6.72
Grid Ref.: N=8410Km700m	7	'95Feb	7.38
E=755Km200m	8	Mar	5.96
Maximum Groundwater Level Fluctuation(m) 4.08			



Province: Central	Aquifer: Gneiss		
District: Mukushi	Main aquifer is Schist		
Site Name: Kamanga	No.	Month	G.W.L(GL-m)
	1	'94May	3.55
Diameter: 1250 mm	2	Jun	4.83
Depth: m	3	Jul	5.31
Yield: 500 l/day	4	Sep	5.9
Map No. 1329C4	5	Oct	6.51
Elevation: 1279 m	6	Nov	7.06
Grid Ref.: N=8454Km150m	7	'95Feb	7.34
E=756Km0m	8	Mar	7.33
Maximum Groundwater Level Fluctuation(m) 3.79			

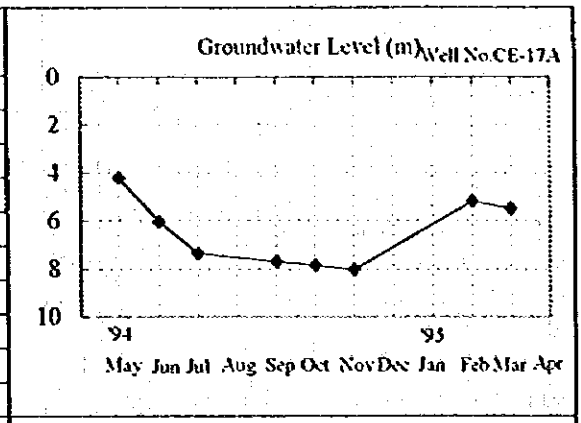


Province: Central	Aquifer: Gneiss		
District: Mukushi	Main aquifer is Schist		
Site Name: Masansa	No.	Month	G.W.L(GL-m)
	1	'94May	7.37
Diameter: 1000 mm	2	Jun	7.92
Depth: m	3	Jul	8.32
Yield: 1000 l/day	4	Sep	9.01
Map No. 1329C4	5	Oct	9.06
Elevation: 1311 m	6	Nov	9.28
Grid Ref.: N=8457Km700m	7	'95Feb	9.43
E=758Km200m	8	Mar	9.44
Maximum Groundwater Level Fluctuation(m) 2.07			

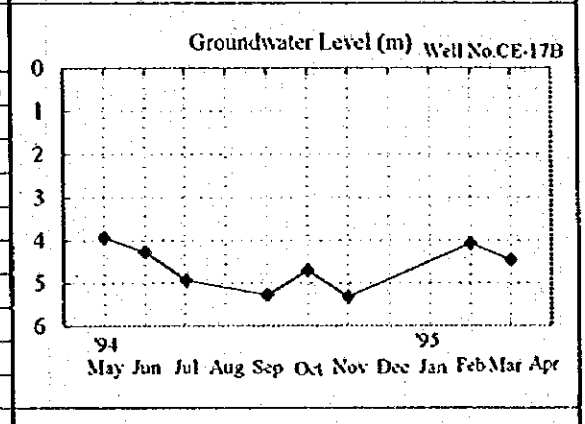


Appendix 3(14) Result of Observation

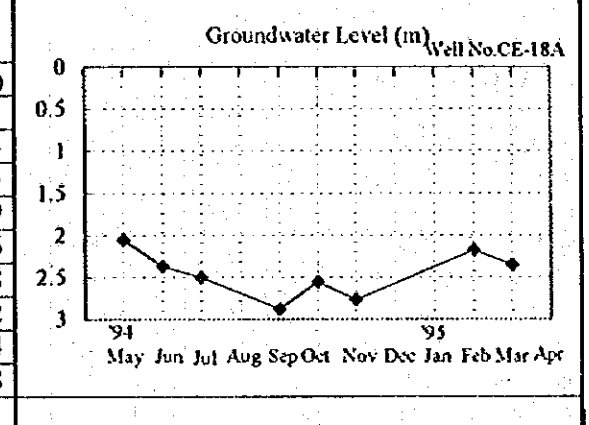
Province: Central	Aquifer: Shale		
District: Mukushi			
Site Name: Kamanga	No.	Month	G.W.L(GL-m)
	1	'94May	4.2
Diameter: 1250 mm	2	Jun	6.1
Depth: m	3	Jul	7.4
Yield: 2000 l/day	4	Sep	7.7
Map No. 1329C2	5	Oct	7.9
Elevation: 1250 m	6	Nov	8.0
Grid Ref.: N=8494Km200m	7	'95Feb	5.2
E=759Km650m	8	Mar	5.5
Maximum Groundwater Level Fluctuation(m)			3.8



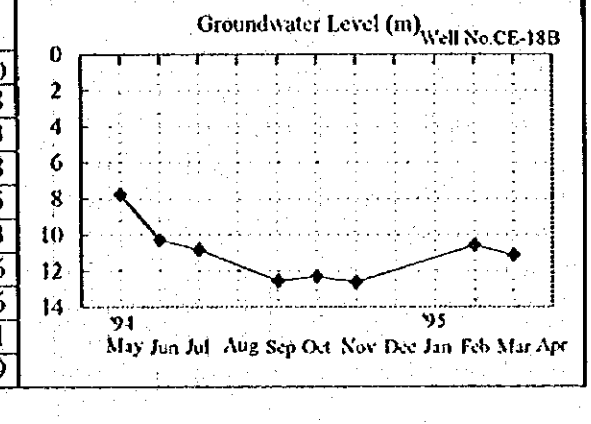
Province: Central	Aquifer: Shale		
District: Mukushi			
Site Name: Masansa	No.	Month	G.W.L(GL-m)
	1	'94May	3.9
Diameter: 1250 mm	2	Jun	4.3
Depth: m	3	Jul	4.9
Yield: 1600 l/day	4	Sep	5.3
Map No. 1329C2	5	Oct	4.7
Elevation: 1219 m	6	Nov	5.3
Grid Ref.: N=8494Km350m	7	'95Feb	4.1
E=755Km800m	8	Mar	4.5
Maximum Groundwater Level Fluctuation(m)			1.4



Province: Central	Aquifer: Shale		
District: Mukushi			
Site Name: Chalata Sec.	No.	Month	G.W.L(GL-m)
	1	'94May	2.1
Diameter: 1250 mm	2	Jun	2.4
Depth: m	3	Jul	2.5
Yield: 1200 l/day	4	Sep	2.9
Map No. SD-35-8	5	Oct	2.6
Elevation: 1500 m	6	Nov	2.8
Grid Ref.: N=850Km100m	7	'95Feb	2.2
E=79Km40m	8	Mar	2.4
Maximum Groundwater Level Fluctuation(m)			0.8

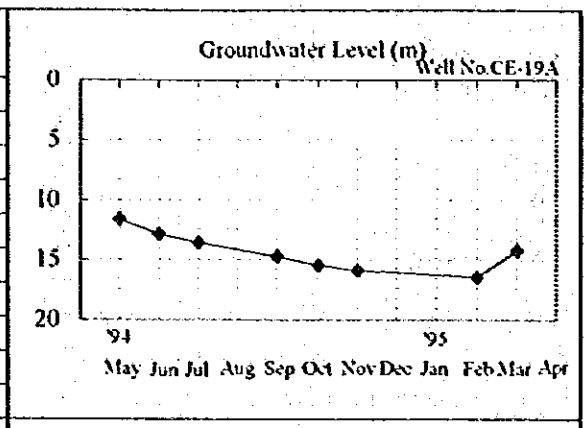


Province: Central	Aquifer: Shale		
District: Mukushi			
Site Name: Chalata Pr.	No.	Month	G.W.L(GL-m)
	1	'94May	7.8
Diameter: 1250 mm	2	Jun	10.3
Depth: m	3	Jul	10.8
Yield: 1300 l/day	4	Sep	12.5
Map No. SD-35-8	5	Oct	12.3
Elevation: 1500 m	6	Nov	12.6
Grid Ref.: N=850Km80m	7	'95Feb	10.6
E=79Km120m	8	Mar	11.1
Maximum Groundwater Level Fluctuation(m)			4.9

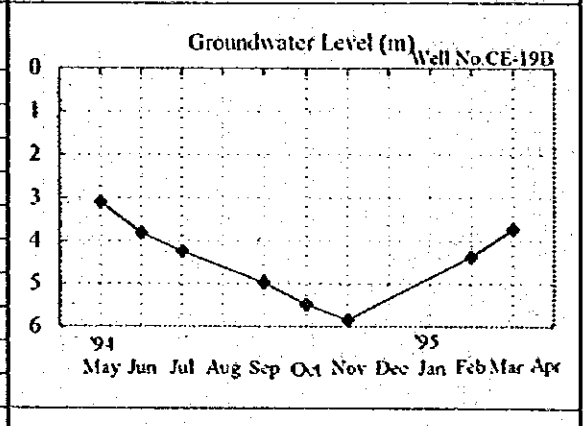


Appendix 3(15) Result of Observation

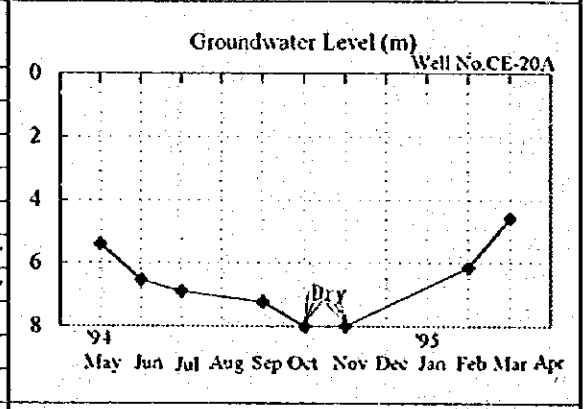
Province:	Central	Aquifer:	Shale	
District:	Serenje			
Site Name:	Makombe F.	No.	Month	G.W.L(GL-m)
		1	'94May	11.6
Diameter:	1250 mm	2	Jun	12.9
Depth:	m	3	Jul	13.6
Yield:	1000 l/day	4	Sep	14.7
Map No.	1330B1	5	Oct	15.4
Elevation:	1610 m	6	Nov	15.8
Grid Ref.:	N=8554Km100m	7	'95Feb	16.4
	E=242Km200m	8	Mar	14.2
Maximum Groundwater Level Fluctuation(m)				4.8



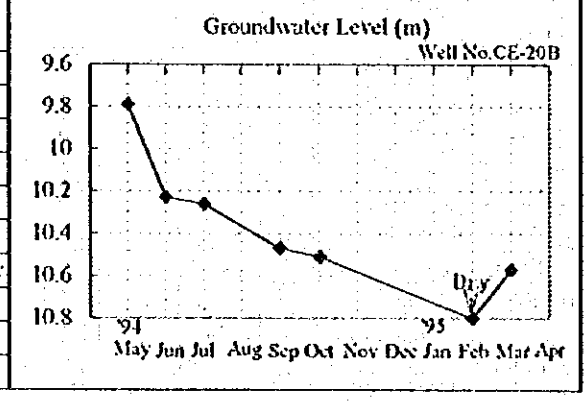
Province:	Central	Aquifer:	Shale	
District:	Serenje			
Site Name:	Kanona Sch.	No.	Month	G.W.L(GL-m)
		1	'94May	3.1
Diameter:	1250 mm	2	Jun	3.8
Depth:	m	3	Jul	4.2
Yield:	1500 l/day	4	Sep	5.0
Map No.	1330B1	5	Oct	5.5
Elevation:	1610 m	6	Nov	5.8
Grid Ref.:	N=8553Km600m	7	'95Feb	4.4
	E=242Km750m	8	Mar	3.7
Maximum Groundwater Level Fluctuation(m)				2.7



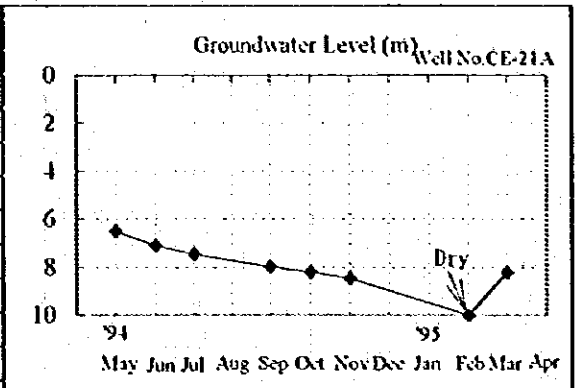
Province:	Central	Aquifer:	Shale	
District:	Mpika			
Site Name:	Kapoto V.	No.	Month	G.W.L(GL-m)
		1	'94May	5.4
Diameter:	1000 mm	2	Jun	6.5
Depth:	m	3	Jul	6.9
Yield:	800 l/day	4	Sep	7.2
Map No.	1231C1	5	Oct	Dry
Elevation:	1518 m	6	Nov	Dry
Grid Ref.:	N=8606Km350m	7	'95Feb	6.1
	E=283Km750m	8	Mar	4.6
Maximum Groundwater Level Fluctuation(m)				2.6



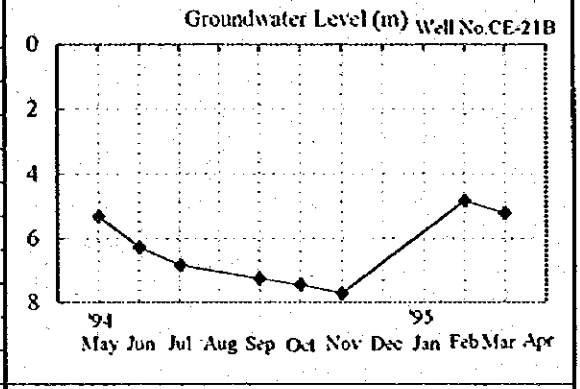
Province:	Central	Aquifer:	Shale	
District:	Mpika	Main aquifer is Clay		
Site Name:	Mpumba Rhc.	No.	Month	G.W.L(GL-m)
		1	'94May	9.8
Diameter:	1250 mm	2	Jun	10.2
Depth:	m	3	Jul	10.3
Yield:	800 l/day	4	Sep	10.5
Map No.	1231C1	5	Oct	10.5
Elevation:	1524 m	6	Nov	Dry
Grid Ref.:	N=8604Km950m	7	'95Feb	10.6
	E=283Km200m	8	Mar	10.1
Maximum Groundwater Level Fluctuation(m)				0.8



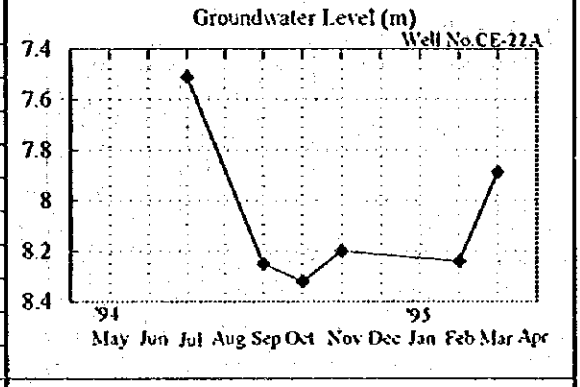
Province: Central	Aquifer: Shale		
District: Serenje			
Site Name: Lusenga	No.	Month	G.W.L(GL-m)
	1	'94May	6.5
Diameter: 1250 mm	2	Jun	7.1
Depth: m	3	Jul	7.5
Yield: 1800 l/day	4	Sep	8.0
Map No. 1230C2	5	Oct	8.2
Elevation: 1280 m	6	Nov	8.5
Grid Ref.: N=8598Km250m	7	'95Feb	Dry
E=217Km700m	8	Mar	8.2
Maximum Groundwater Level Fluctuation(m)			2.0



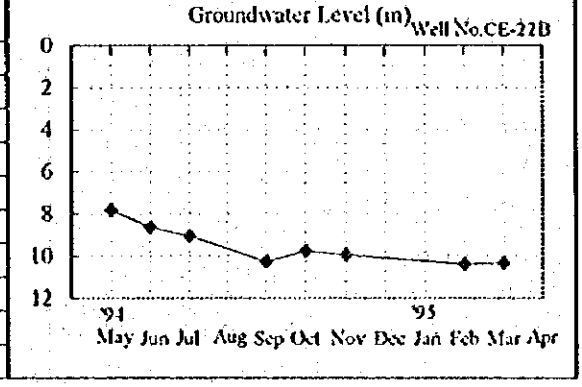
Province: Central	Aquifer: Shale		
District: Serenje			
Site Name: Kafioa	No.	Month	G.W.L(GL-m)
	1	'94May	5.3
Diameter: 1250 mm	2	Jun	6.3
Depth: m	3	Jul	6.8
Yield: 1800 l/day	4	Sep	7.3
Map No. 1230C2	5	Oct	7.4
Elevation: 1234 m	6	Nov	7.7
Grid Ref.: N=8603Km50m	7	'95Feb	4.9
E=216Km500m	8	Mar	5.2
Maximum Groundwater Level Fluctuation(m)			2.9



Province: Central	Aquifer: Shale		
District: Sereje			
Site Name: Kabalakata	No.	Month	G.W.L(GL-m)
	1	'94May	
Diameter: 1250 mm	2	Jun	
Depth: m	3	Jul	7.5
Yield: 1000 l/day	4	Sep	8.3
Map No.	5	Oct	8.3
Elevation: m	6	Nov	8.2
Grid Ref.:	7	'95Feb	8.2
	8	Mar	7.9
Maximum Groundwater Level Fluctuation(m)			0.8



Province: Central	Aquifer: Shale		
District: Sereje			
Site Name: Chibale F.	No.	Month	G.W.L(GL-m)
	1	'94May	7.8
Diameter: 1250 mm	2	Jun	8.6
Depth: m	3	Jul	9.0
Yield: 1500 l/day	4	Sep	10.3
Map No. 1330A1	5	Oct	9.8
Elevation: 1433 m	6	Nov	9.9
Grid Ref.: N=8538Km400m	7	'95Feb	10.4
E=200Km700m	8	Mar	10.3
Maximum Groundwater Level Fluctuation(m)			2.6



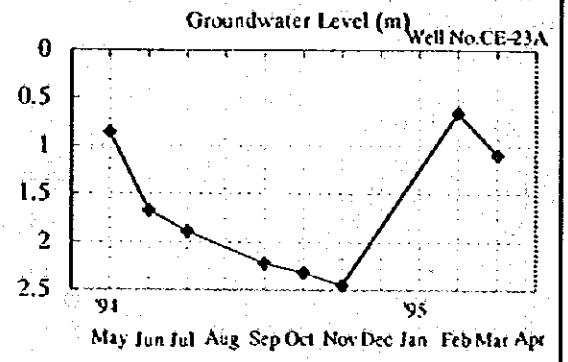
Appendix 3(17) Result of Observation

Province:	Central
District:	Mukushi
Site Name:	Shumbua Vil.
Diameter:	1250 mm
Depth:	m
Yield:	800 l/day
Map No.	1329C1
Elevation:	1280 m
Grid Ref.:	N=8505Km150m
	E=719Km950m

Aquifer: Shale

No.	Month	G.W.L(GL-m)
1	'94May	0.86
2	Jun	1.67
3	Jul	1.89
4	Sep	2.22
5	Oct	2.32
6	Nov	2.45
7	'95Feb	0.66
8	Mar	1.09

Maximum Groundwater Level Fluctuation(m) 1.79

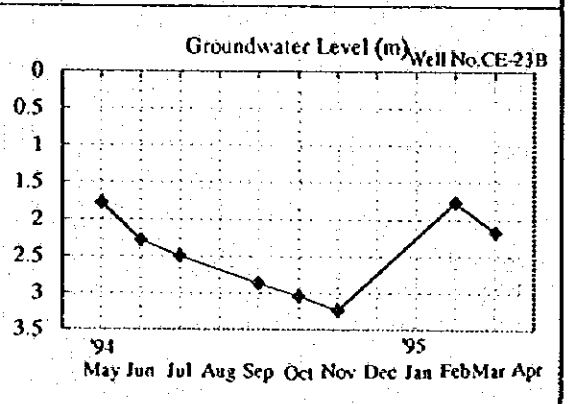


Province:	Central
District:	Mukushi
Site Name:	Chilufya Vil.
Diameter:	1000 mm
Depth:	m
Yield:	200 l/day
Map No.	1329C1
Elevation:	1295 m
Grid Ref.:	N=8505Km450m
	E=719Km600m

Aquifer: Shale

No.	Month	G.W.L(GL-m)
1	'94May	1.78
2	Jun	2.29
3	Jul	2.5
4	Sep	2.87
5	Oct	3.04
6	Nov	3.23
7	'95Feb	1.77
8	Mar	2.17

Maximum Groundwater Level Fluctuation(m) 1.46

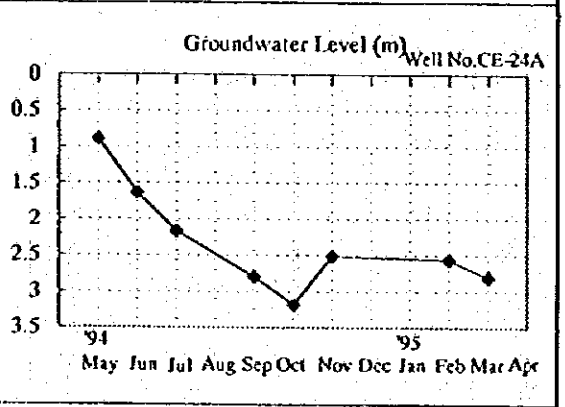


Province:	Central
District:	Mukushi
Site Name:	Chimdogo
Diameter:	1000 mm
Depth:	m
Yield:	100 l/day
Map No.	1329C3
Elevation:	1158 m
Grid Ref.:	N=8457Km150m
	E=726Km100m

Aquifer: Gneiss

No.	Month	G.W.L(GL-m)
1	'94May	0.89
2	Jun	1.64
3	Jul	2.17
4	Sep	2.8
5	Oct	3.19
6	Nov	2.51
7	'95Feb	2.56
8	Mar	2.81

Maximum Groundwater Level Fluctuation(m) 2.3

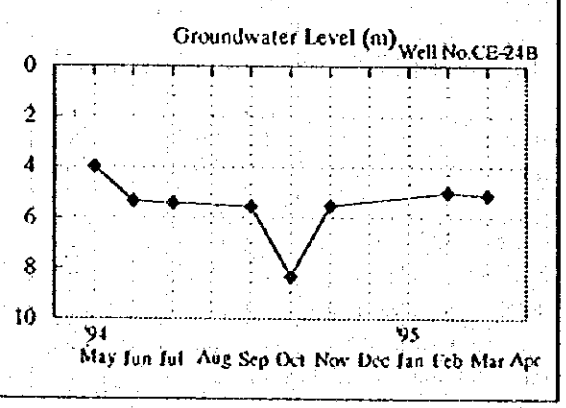


Province:	Central
District:	Mukushi
Site Name:	Chipuluka
Diameter:	1000 mm
Depth:	m
Yield:	1500 l/day
Map No.	1329C3
Elevation:	1173 m
Grid Ref.:	N=8457Km900m
	E=725Km650m

Aquifer: Gneiss

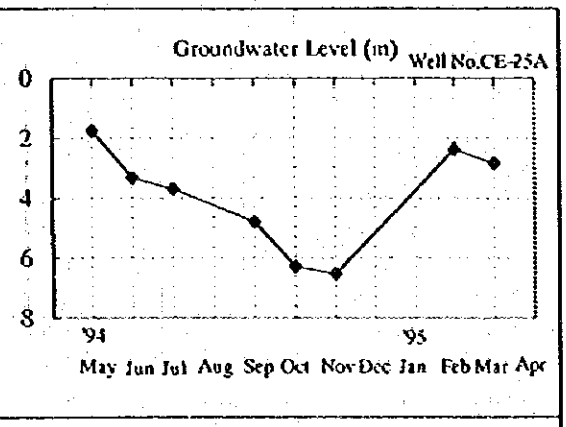
No.	Month	G.W.L(GL-m)
1	'94May	4
2	Jun	5.34
3	Jul	5.43
4	Sep	5.55
5	Oct	8.34
6	Nov	5.53
7	'95Feb	5.01
8	Mar	5.12

Maximum Groundwater Level Fluctuation(m) 4.34

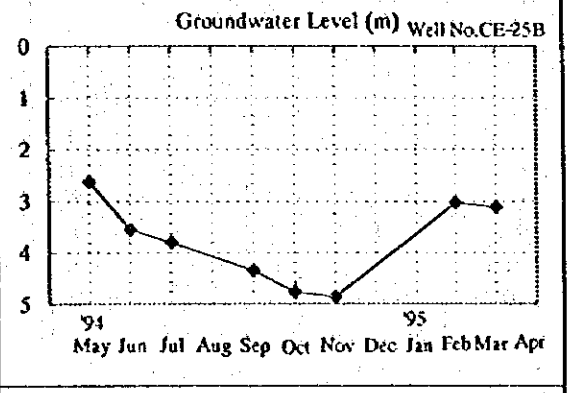


Appendix 3(18) Result of Observation

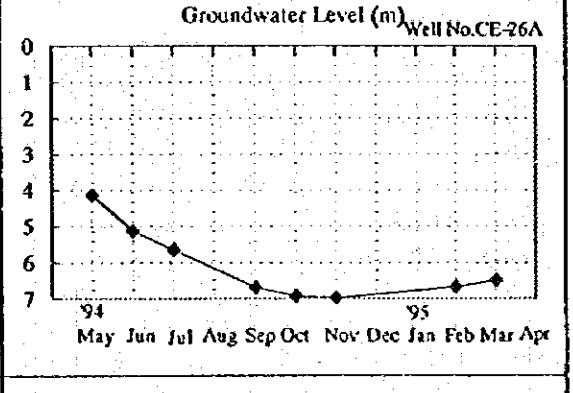
Province: Central	Aquifer: Gneiss		
District: Kapiri			
Site Name: New Kapiri	No.	Month	G.W.L(GL-m)
	1	'94May	1.76
Diameter: 1000 mm	2	Jun	3.32
Depth: m	3	Jul	3.71
Yield: 1400 l/day	4	Sep	4.8
Map No. 1328D3	5	Oct	6.29
Elevation: 1280 m	6	Nov	6.54
Grid Ref.: N=8457Km600m	7	'95Feb	2.37
E=679Km900m	8	Mar	2.84
Maximum Groundwater Level Fluctuation(m) 4.78			



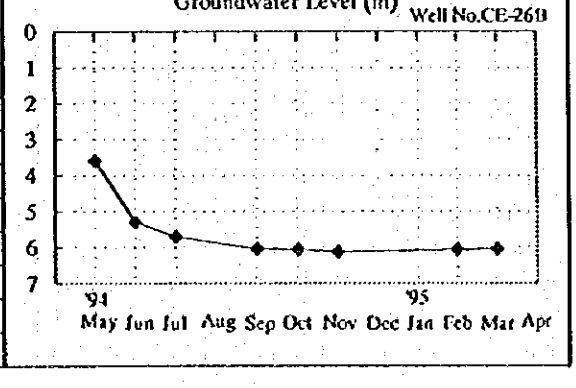
Province: Central	Aquifer: Gneiss		
District: Kapiri			
Site Name: Benaro	No.	Month	G.W.L(GL-m)
	1	'94May	2.62
Diameter: 1000 mm	2	Jun	3.55
Depth: m	3	Jul	3.8
Yield: 2000 l/day	4	Sep	4.35
Map No. 1328D3	5	Oct	4.76
Elevation: 1280 m	6	Nov	4.86
Grid Ref.: N=8457Km350m	7	'95Feb	3.03
E=680Km0m	8	Mar	3.11
Maximum Groundwater Level Fluctuation(m) 2.24			



Province: Central	Aquifer: Limestone		
District: Kabwe U.			
Site Name: Kasavasa	No.	Month	G.W.L(GL-m)
	1	'94May	4.13
Diameter: 800 mm	2	Jun	5.13
Depth: m	3	Jul	5.65
Yield: 1600 l/day	4	Sep	6.7
Map No. 1428C2	5	Oct	6.94
Elevation: 1170 m	6	Nov	6.99
Grid Ref.: N=8388Km350m	7	'95Feb	6.68
E=648Km450m	8	Mar	6.49
Maximum Groundwater Level Fluctuation(m) 2.86			

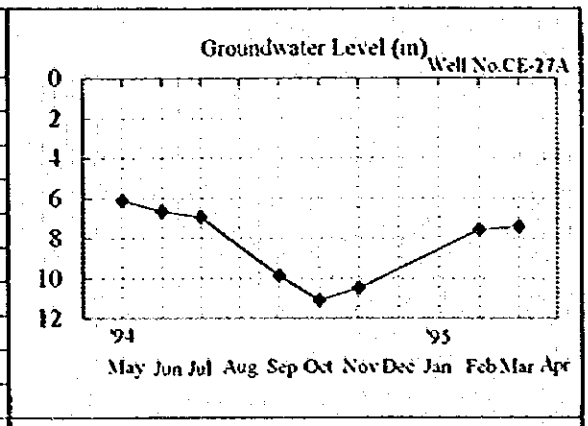


Province: Central	Aquifer: Limestone		
District: Kabwe U.			
Site Name: Kaputo Groc	No.	Month	G.W.L(GL-m)
	1	'94May	3.6
Diameter: 800 mm	2	Jun	5.3
Depth: m	3	Jul	5.7
Yield: 1100 l/day	4	Sep	6.05
Map No. 1428C2	5	Oct	6.06
Elevation: 1170 m	6	Nov	6.13
Grid Ref.: N=8388Km350m	7	'95Feb	6.06
E=648Km450m	8	Mar	6.05
Maximum Groundwater Level Fluctuation(m) 2.53			

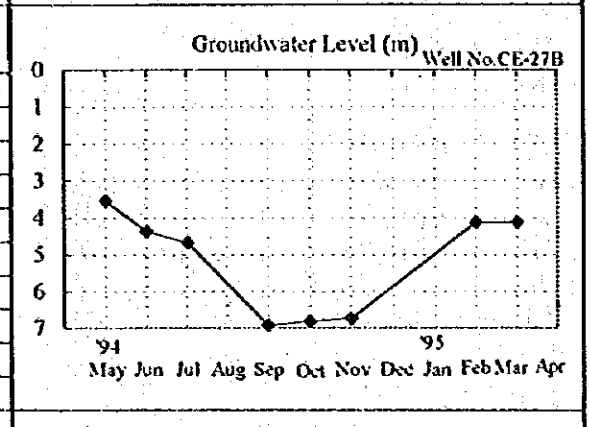


Appendix 3(19) Result of Observation

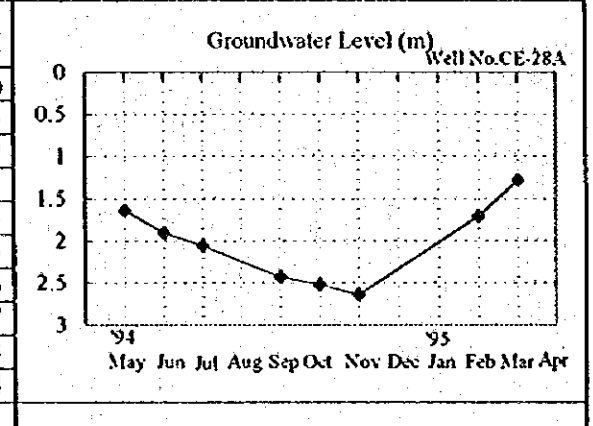
Province: Central	Aquifer: Quartzite		
District: Kabwe R.			
Site Name: Chipepo Sch.	No.	Month	G.W.L(GL-m)
	1	'94May	6.1
Diameter: 1250 mm	2	Jun	6.7
Depth: m	3	Jul	7.0
Yield: 100 l/day	4	Sep	9.9
Map No. 1428A1	5	Oct	11.1
Elevation: 1134 m	6	Nov	10.5
Grid Ref.: N=8439Km900m	7	'95Feb	7.6
E=619Km200m	8	Mar	7.4
Maximum Groundwater Level Fluctuation(m)			5.0



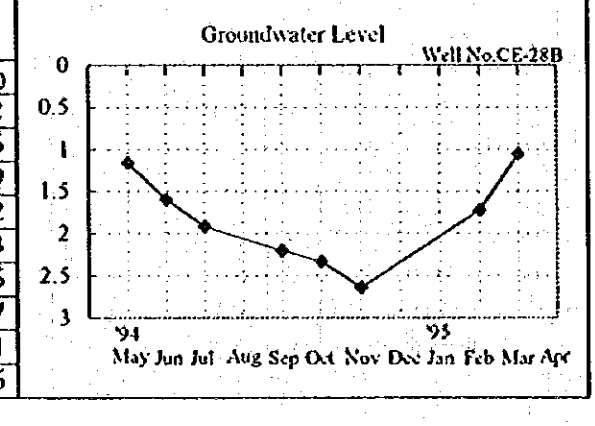
Province: Central	Aquifer: Quartzite		
District: Kabwe R.			
Site Name: Chipepo Dep.	No.	Month	G.W.L(GL-m)
	1	'94May	3.5
Diameter: 1250 mm	2	Jun	4.4
Depth: m	3	Jul	4.7
Yield: 600 l/day	4	Sep	6.9
Map No. 1428A1	5	Oct	6.8
Elevation: 1134 m	6	Nov	6.7
Grid Ref.: N=8439Km900m	7	'95Feb	4.1
E=619Km200m	8	Mar	4.1
Maximum Groundwater Level Fluctuation(m)			3.4



Province: Central	Aquifer: Quartzite		
District: Kabwe U.			
Site Name: Nakoli Comp	No.	Month	G.W.L(GL-m)
	1	'94May	1.6
Diameter: 1000 mm	2	Jun	1.9
Depth: m	3	Jul	2.1
Yield: 1800 l/day	4	Sep	2.4
Map No. 1428A4	5	Oct	2.5
Elevation: 1180 m	6	Nov	2.6
Grid Ref.: N=8407Km0m	7	'95Feb	1.7
E=456Km300m	8	Mar	1.3
Maximum Groundwater Level Fluctuation(m)			1.4



Province: Central	Aquifer: Quartzite		
District: Kabwe U.			
Site Name: Nakoli Mark	No.	Month	G.W.L(GL-m)
	1	'94May	1.2
Diameter: 1000 mm	2	Jun	1.6
Depth: m	3	Jul	1.9
Yield: 2500 l/day	4	Sep	2.2
Map No. 1428A4	5	Oct	2.3
Elevation: 1180 m	6	Nov	2.6
Grid Ref.: N=8407Km200m	7	'95Feb	1.7
E=456Km350m	8	Mar	1.1
Maximum Groundwater Level Fluctuation(m)			1.6

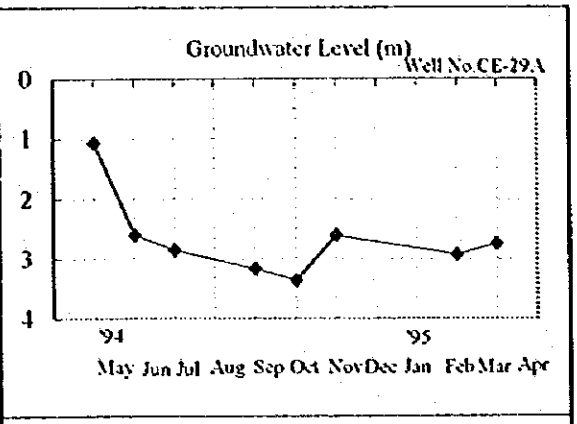


Appendix 3(20) Result of Observation

Province: Central	Aquifer: Quartzite
District: Kabwe U.	
Site Name: Waya F.Comp.	
Diameter: 1250 mm	
Depth: m	
Yield: 1800 l/day	
Map No. 1427B4	
Elevation: m	
Grid Ref.: N=8415Km950m	
E=606Km50m	

No.	Month	G.W.L(GL-m)
1	'94May	1.1
2	Jun	2.6
3	Jul	2.9
4	Sep	3.2
5	Oct	3.4
6	Nov	2.6
7	'95Feb	2.9
8	Mar	2.7

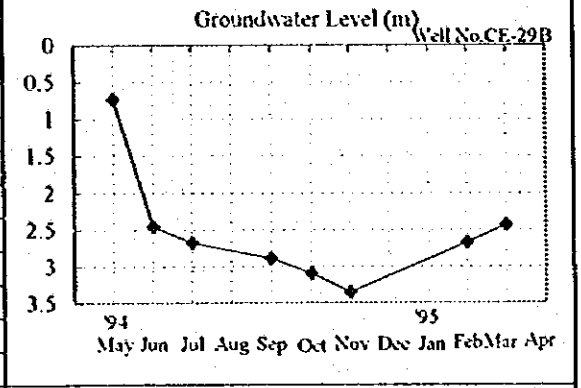
Maximum Groundwater Level Fluctuation(m) 2.3



Province: Central	Aquifer: Quartzite
District: Kabwe U.	
Site Name: Katilungu	
Diameter: 1250 mm	
Depth: m	
Yield: 600 l/day	
Map No. 1427B4	
Elevation: m	
Grid Ref.: N=8415Km950m	
E=606Km50m	

No.	Month	G.W.L(GL-m)
1	'94May	0.7
2	Jun	2.5
3	Jul	2.7
4	Sep	2.9
5	Oct	3.1
6	Nov	3.4
7	'95Feb	2.7
8	Mar	2.4

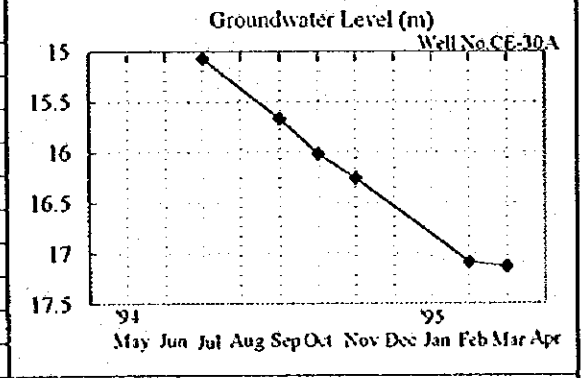
Maximum Groundwater Level Fluctuation(m) 2.6



Province: Central	Aquifer: Quartzite
District: Serenje	
Site Name: Kamena Sch.	
Diameter: 1250 mm	
Depth: m	
Yield: l/day	
Map No. 1330A4	
Elevation: m	
Grid Ref.: N=8509Km50m	
E=220Km850m	

No.	Month	G.W.L(GL-m)
1	'94May	
2	Jun	
3	Jul	15.1
4	Sep	15.7
5	Oct	16.0
6	Nov	16.3
7	'95Feb	17.1
8	Mar	17.1

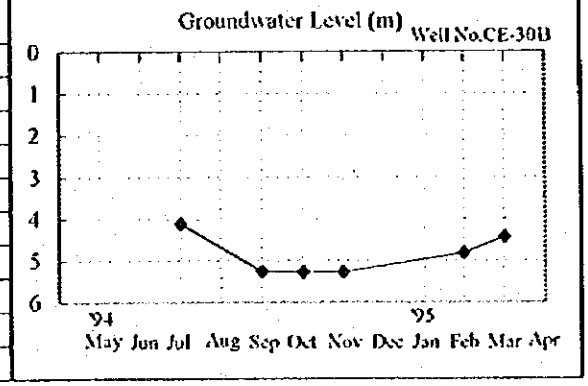
Maximum Groundwater Level Fluctuation(m) 2.1



Province: Central	Aquifer: Quartzite
District: Serenje	
Site Name: Kamena Vil.	
Diameter: 1250 mm	
Depth: m	
Yield: l/day	
Map No. 1330A4	
Elevation: m	
Grid Ref.: N=8509Km50m	
E=220Km850m	

No.	Month	G.W.L(GL-m)
1	'94May	
2	Jun	
3	Jul	4.1
4	Sep	5.3
5	Oct	5.3
6	Nov	5.3
7	'95Feb	4.8
8	Mar	4.5

Maximum Groundwater Level Fluctuation(m) 1.2



Appendix 4

Observation Result in Northwestern Province

Appendix 4 (1) List of Observation Points

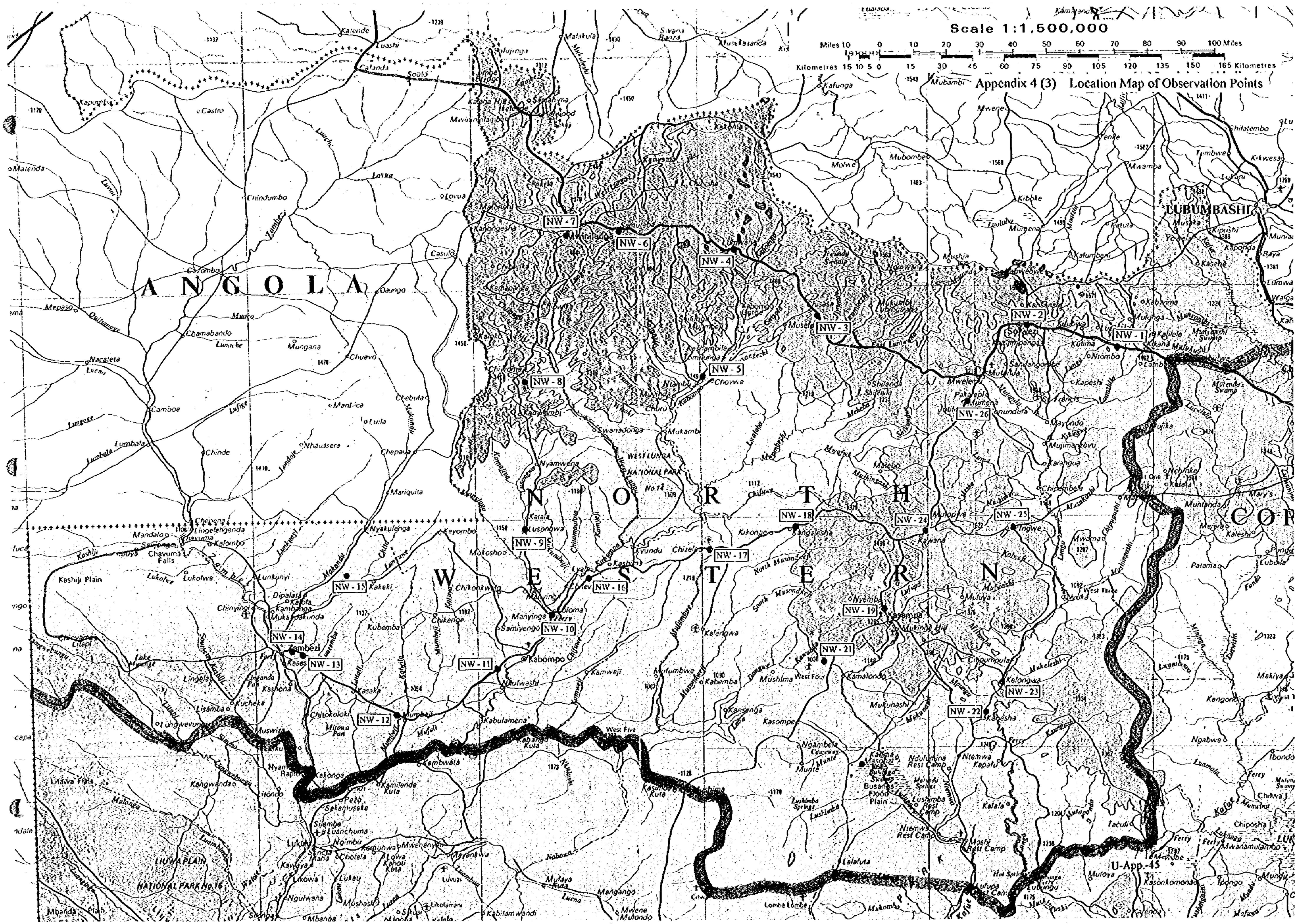
< Northwestern Province (1) >

Point No.	Well No.	Geology	Elevation (m)	District	Site Name
NW - 1	A	Shale	1300	Solwezi	Shafilundu
	B	Shale	1350		Kamalenge
NW - 2	A	Shale	1359	Solwezi	Kifita
	B	Limestone	1327		D.W.A. Yard
NW - 3	A	Quartzite	1260	Solwezi	Chisasa
	B	Quartzite	1342		Kamikold
NW - 4	A	Gneiss	1448	Solwezi	Kalepa
	B	Gneiss	1501		Kawazhi
NW - 5	A	Quartzite	1140	Solwezi	Katanga
	B	Sand	1143		Choywe
NW - 6	A	Sand	1470	Mwinilunga	Sailunga
		Sand			
NW - 7	A	Shale	1300	Mwinilunga	Njimba
	B	Shale	1365		Mwinilunwa
NW - 8	A	Shale	1387	Mwinilunga	Mazembe
	B	Sand	1372		Kanzenze
NW - 9	A	Quartzite	1120	Kabompo	Luasongwa
	B	Quartzite	1115		Kashinakazhi
NW - 10	A	Shale		Kabompo	Chingandu
	B	Shale	1090		Sandando
NW - 11	A	Sand	1075	Kabompo	Samunuga
	B	Sand			Makondo
NW - 12	A	Sand		Kabompo	Mucezi R.H.C.
	B	Sand		Zambei	Chizozu
NW - 13	A	Sand		Zambei	Chitungu
		Sand			
NW - 14	A	Sand	1078	Zambei	Kalambo
	B	Sand	1070		Lwatembo
NW - 15	A	Sand		Zambei	Kakeki
	B	Sand			Nyakulena
NW - 16	A	Sand	1105	Mfumbwe	Likulawu
	B	Sand	1120		Chilemba
NW - 17	A	Sand	1180	Mfumbwe	Fulai
	B	Sand	1178		D.W.A. Yard
NW - 18	A	Shale	1267	Mfumbwe	Nyasonso
	B	Shale	1242		Kimkonge
NW - 19	A	Shale	1273	Kasempa	Kabele
	B	Shale	1277		Kasongo
NW - 20	A	Alluvium	1121	Mfumbwe	Kashinga
	B	Alluvium	1135		Kobana
NW - 21	A	Shale	1200	Mfumbwe	Lala Futa
	B	Shale	1200		Kasuku
NW - 22	A	Shale	1121	Kasempa	Ntemwa
	B	Shale	1120		Halasa

Appendix 4 (2) List of Observation Points

< Northwestern Province (2) >

NW - 23	A	Shale	1140	Kasempa	Kelongwa
	B	Shale	1160		Kabanike
NW - 24	A	Shale	1322	Kasempa	Nsansanya
	B	Shale	1320		Kaimbwe
NW - 25	A	Shale	1280	Kasempa	Chinta
	B	Shale	1260		Old Inkwe
NW - 26	A	Shale	1350	Solwezi	Chisanswi
	B	Shale	1295		Dapp Mumena



Appendix 4 (3) Location Map of Observation Points

Appendix 4 (4) Result of Nation-wide Groundwater Level Observation

< Northwestern Province (1) >

Point No.	Well No.	May. 199- G.W.D(m)	Jun. G.W.D(m)	Jul. G.W.D(m)	Sep. G.W.D(m)	Oct. G.W.D(m)	Nov. G.W.D(m)	Feb. 1995 G.W.D(m)	Mar. G.W.D(m)
NW - 1	A	3.14	3.89	4.38	4.77	5.12	5.39	4.59	4.74
	B	3.83	4.18	4.57	4.90	5.19	5.30	3.80	2.95
NW - 2	A	7.10	9.06	9.43	9.92	10.28	10.59	7.13	7.21
	B	5.00	6.96	7.22	6.50	6.70	7.13	4.43	4.64
NW - 3	A	8.26	7.26	7.51	7.93	8.24	8.43	5.24	5.36
	B	6.57	7.08	7.39	7.70	8.29	8.46	7.49	7.50
NW - 4	A	4.53	4.94	5.21	5.56	6.06	6.16	3.91	4.10
	B	4.60	4.85	5.11	6.15	6.06	6.25	3.76	3.92
NW - 5	A	-	7.02	7.36	7.85	8.22	8.50	5.81	5.91
	B	-	10.35	10.43	10.45	dry	dry	8.08	8.22
NW - 6	A	5.20	5.90	6.43	6.79	7.08	7.24	5.26	5.50
NW - 7	A	10.21	11.96	12.99	13.44	13.85	13.98	10.82	10.94
	B	10.29	13.26	14.16	14.52	7.17	7.34	4.91	4.43
NW - 8	A	.00	4.67	5.07	5.34	5.69	5.95	3.32	3.51
	B	9.01	10.83	10.90	11.05	dry	dry	8.49	8.65
NW - 9	A	7.76	8.76	9.05	9.40	dry	dry	7.37	7.64
	B	-	6.16	6.56	6.97	7.35	7.47	5.32	5.53
NW - 10	A	-	-	8.82	9.13	9.58	9.94	7.53	7.70
	B	16.40	16.43	17.00	17.38	dry	dry	15.97	16.09
NW - 11	A	12.91	13.21	13.61	13.71	dry	dry	12.12	21.26
	B	4.20	4.56	dry	dry	dry	dry	3.15	3.41
NW - 12	A	12.00	10.75	11.18	11.63	11.72	11.91	9.96	10.27
	B	14.00	14.84	15.19	15.59	16.02	16.45	14.43	14.64
NW - 13	A	6.71	7.15	7.63	8.09	8.39	8.55	7.05	7.20
NW - 14	A	6.57	7.09	7.54	8.00	8.41	8.90	6.96	7.26
	B	3.25	3.90	4.41	4.60	dry	dry	3.24	3.50
NW - 15	A	8.90	9.37	9.68	dry	dry	dry	8.24	8.48
	B	5.03	5.43	5.95	6.24	6.60	6.91	4.79	4.98
NW - 16	A	9.47	10.00	10.52	10.88	11.37	11.64	9.34	9.56
	B	12.49	12.84	13.10	dry	dry	dry	11.41	11.67
NW - 17	A	5.43	6.79	7.36	7.63	7.93	8.14	6.06	6.34
	B	.67	5.19	5.54	5.94	6.19	6.38	4.60	4.85
NW - 18	A	4.83	5.56	6.13	6.53	6.96	7.27	5.21	5.50
	B	15.83	17.38	18.58	19.18	19.47	19.68	17.58	17.77
NW - 19	A	11.35	11.95	12.46	12.91	13.41	13.54	10.64	11.01
	B	9.37	10.77	11.85	12.35	12.75	13.15	10.21	10.43
NW - 20	A	18.37	18.43	18.60	19.06	19.48	19.80	17.21	17.02
	B	21.60	22.09	22.27	22.79	23.18	23.31	22.07	22.20
NW - 21	A	8.79	9.45	10.20	10.73	10.68	11.11	9.94	9.12
	B	19.27	19.86	20.45	20.96	21.46	21.61	20.42	20.57

(Note) G.W.D : Groundwater Depth from Surface.

Appendix 4 (5) Result of Nation-wide Groundwater Level Observation

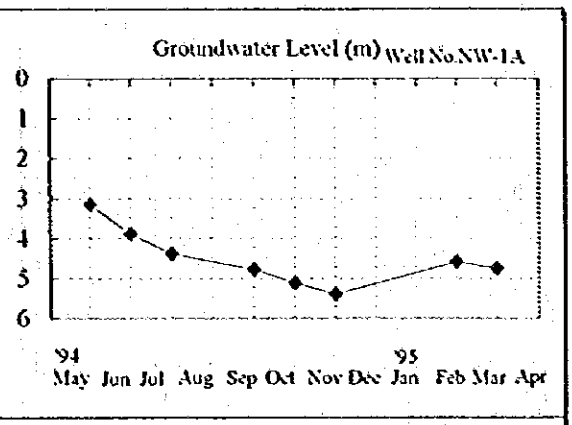
< Northwestern Province (2) >

NW - 22	A	5.90	6.16	6.26	6.49	6.68	6.80	4.40	4.55
	B	9.20	10.09	10.18	dry	dry	dry	8.07	8.24
NW - 23	A	10.36	10.81	11.20	11.57	11.95	12.31	9.20	9.05
	B	12.95	13.55	14.14	14.49	14.86	15.07	13.88	13.20
NW - 24	A	11.93	13.96	15.66	16.12	16.54	16.71	14.29	14.44
	B	7.28	7.60	7.89	8.49	9.05	9.48	7.02	7.25
NW - 25	A	10.90	11.30	11.60	12.03	12.32	12.61	9.69	9.82
	B	10.21	10.62	10.96	11.37	11.70	11.91	9.29	9.50
NW - 26	A	8.13	9.59	10.79	11.11	11.45	11.76	8.78	9.03
	B	4.08	4.49	4.81	5.27	5.65	6.02	3.17	3.29

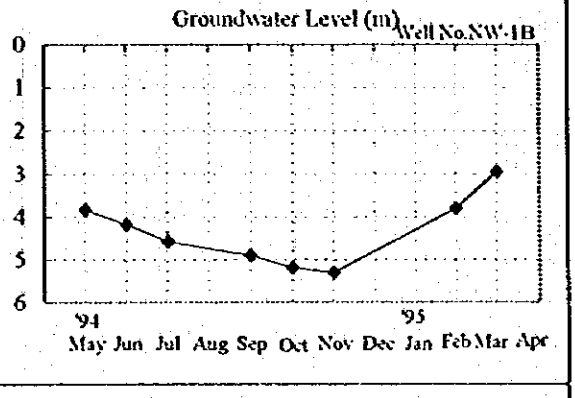
(Note) G.W.D : Groundwater Depth from Surface.

Appendix 4(6) Result of Observation

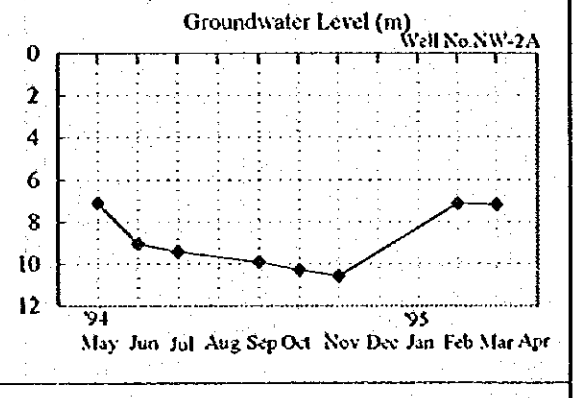
Province: Northwestern	Aquifer: Shale		
District: Solwezi			
Site Name: Shafilundu	No.	Month	G.W.L(GL-m)
	1	'94May	3.1
Diameter: 1300 mm	2	Jun	3.9
Depth: m	3	Jul	4.4
Yield: l/day	4	Sep	4.8
Map No. 1226B4	5	Oct	5.1
Elevation: 1300 m	6	Nov	5.4
Grid Ref.: N=8641Km500m	7	'95Feb	4.6
E=489Km50m	8	Mar	4.7
Maximum Groundwater Level Fluctuation(m)			2.3



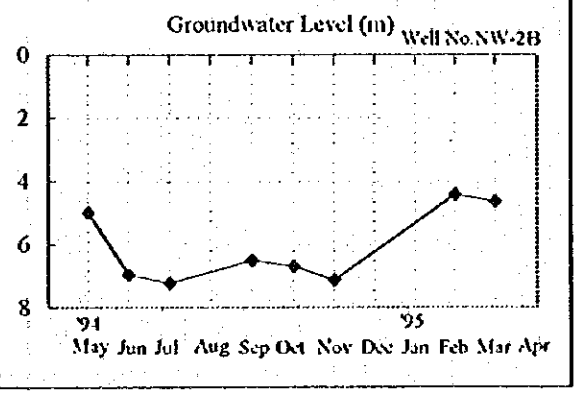
Province: Northwestern	Aquifer: Shale		
District: Solwezi			
Site Name: Kamalenge	No.	Month	G.W.L(GL-m)
	1	'94May	3.8
Diameter: 1300 mm	2	Jun	4.2
Depth: m	3	Jul	4.6
Yield: l/day	4	Sep	4.9
Map No. 1226B4	5	Oct	5.2
Elevation: 1350 m	6	Nov	5.3
Grid Ref.: N=8643Km350m	7	'95Feb	3.8
E=482Km250m	8	Mar	3.0
Maximum Groundwater Level Fluctuation(m)			2.4



Province: Northwestern	Aquifer: Shale		
District: Solwezi			
Site Name: Kifita	No.	Month	G.W.L(GL-m)
	1	'94May	7.1
Diameter: 1300 mm	2	Jun	9.1
Depth: m	3	Jul	9.4
Yield: l/day	4	Sep	9.9
Map No. 1226A2	5	Oct	10.3
Elevation: 1359 m	6	Nov	10.6
Grid Ref.: N=8653Km350m	7	'95Feb	7.1
E=434Km750m	8	Mar	7.2
Maximum Groundwater Level Fluctuation(m)			3.5

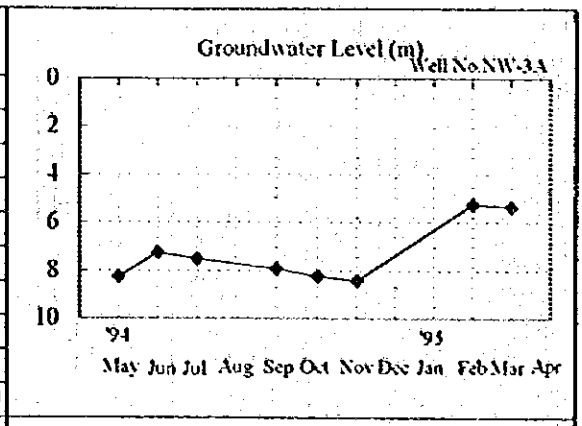


Province: Northwestern	Aquifer: Limestone		
District: Solwezi			
Site Name: D.W.A.Yard	No.	Month	G.W.L(GL-m)
	1	'94May	5.0
Diameter: 1300 mm	2	Jun	7.0
Depth: m	3	Jul	7.2
Yield: l/day	4	Sep	6.5
Map No. 1226A2	5	Oct	6.7
Elevation: 1327 m	6	Nov	7.1
Grid Ref.: N=8652Km500m	7	'95Feb	4.4
E=439Km500m	8	Mar	4.6
Maximum Groundwater Level Fluctuation(m)			2.8

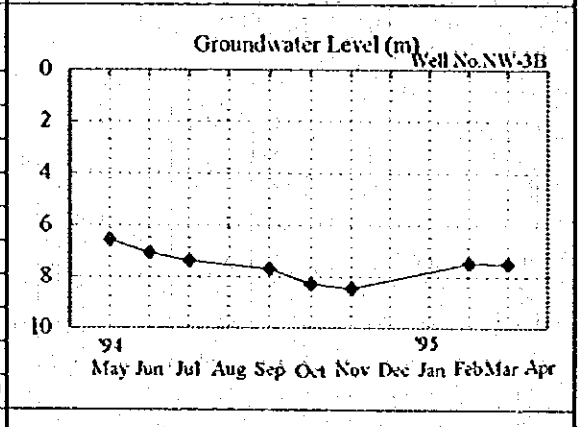


Appendix 4(7) Result of Observation

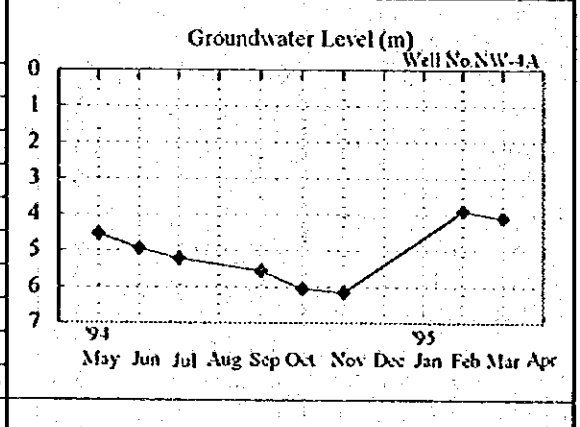
Province: Northwestern	Aquifer: Quartzite		
District: Solwezi			
Site Name: Chisasa	No.	Month	G.W.L(GL-m)
	1	'94May	8.26
Diameter: 1300 mm	2	Jun	7.26
Depth: m	3	Jul	7.51
Yield: l/day	4	Sep	7.93
Map No. 1225B1	5	Oct	8.24
Elevation: 1260 m	6	Nov	8.43
Grid Ref.: N=8656Km800m	7	'95Feb	5.24
E=341Km150m	8	Mar	5.36
Maximum Groundwater Level Fluctuation(m) 3.19			



Province: Northwestern	Aquifer: Quartzite		
District: Solwezi			
Site Name: Kamikold	No.	Month	G.W.L(GL-m)
	1	'94May	6.57
Diameter: 1300 mm	2	Jun	7.08
Depth: m	3	Jul	7.39
Yield: l/day	4	Sep	7.7
Map No. 1225B1	5	Oct	8.29
Elevation: 1342 m	6	Nov	8.46
Grid Ref.: N=8660Km700m	7	'95Feb	7.49
E=337Km50m	8	Mar	7.5
Maximum Groundwater Level Fluctuation(m) 1.89			



Province: Northwestern	Aquifer: Gneiss		
District: Solwezi			
Site Name: Kalepa	No.	Month	G.W.L(GL-m)
	1	'94May	4.53
Diameter: 1300 mm	2	Jun	4.94
Depth: m	3	Jul	5.21
Yield: l/day	4	Sep	5.56
Map No. 1125C3	5	Oct	6.06
Elevation: 1448 m	6	Nov	6.16
Grid Ref.: N=8692Km700m	7	'95Feb	3.91
E=296Km400m	8	Mar	4.1
Maximum Groundwater Level Fluctuation(m) 2.25			



Province: Northwestern	Aquifer: Gneiss		
District: Solwezi			
Site Name: Kawezhi	No.	Month	G.W.L(GL-m)
	1	'94May	4.6
Diameter: 1300 mm	2	Jun	4.85
Depth: m	3	Jul	5.11
Yield: l/day	4	Sep	6.15
Map No. 1125C3	5	Oct	6.06
Elevation: 1501 m	6	Nov	6.25
Grid Ref.: N=8692Km800m	7	'95Feb	3.76
E=300Km200m	8	Mar	3.92
Maximum Groundwater Level Fluctuation(m) 2.49