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Certificate of Analysis

BERG RIVER MUNICIPALITY

SAMPLE : Ten Samples of Reticulation Water

DATE SAMPLED : 1 March 2011

YOUR REF. : Tender 8/3/18 - 2010

OUR REF. : sc/017/2/1/887
11 March 2011

**LAB DATA SHEET NO. : 11/651,746,
745 & 747**

Location :	S33°0.75' E18°59.66'	S33°1.25' E18°59.19'	S32°54.52' E18°45.48'	S32°47.035' E18°09.850'	SANS 241 – 2006 (Drinking Water)		
Sample Marked :	Porterville Municipal Office	Porterville Biblioteek	Piketberg Municipal Office	Veldrif Municipal Office	Class I (Recomm. Operation. Limit)	Class II (Maximum Allowable for Limited Duration)	Class II Water Consump. Period, ^a max.
pH (at 25°C)	6,01	6,11	6,91	7,55	5.0-9.5	4.0-10.0	No Limit ^c
Conductivity (at 25°C) (mS/m)	6,9	7,2	21,8	23,3	<150	150-370	7 years
Turbidity (NTU)	0,96	0,44	0,60	0,75	<1	1-5	No Limit ^d
Langelier Saturation Index	-3,56	-3,58	-1,64	-0,97	-	-	-
	<u>mg/l</u>	<u>mg/l</u>	<u>mg/l</u>	<u>mg/l</u>	<u>mg/l</u>	<u>mg/l</u>	
Colour (as Pt)	<1	<1	<1	<1	<20	20-50	No Limit ^b
Total Alkalinity (as CaCO ₃)	16,0	12,0	48,0	44,0	-	-	-
Total Hardness (as CaCO ₃)	14,4	15,4	60,8	67,8	-	-	-
Calcium Hardness (as CaCO ₃)	10,3	10,5	41,5	49,3	-	-	-
Calcium (as Ca)	4,1	4,2	16,6	19,7	<150	150-300	7 years
Magnesium Hardness (as CaCO ₃)	4,1	1,9	19,3	18,5	-	-	-
Magnesium (as Mg)	0,99	1,2	4,7	4,5	<70	70-100	7 years
Sodium (as Na)	5,0	5,0	16,8	19,1	<200	200-400	7 years
Potassium (as K)	0,11	0,11	0,44	0,55	<50	50-100	7 years
Zinc (as Zn)	0,08	0,09	0,01	<0,01	<5.0	5.0-10.0	1 year
Chloride (as Cl)	28,3	16,2	36,4	44,4	<200	200-600	7 years
Fluoride (as F)	0,37	<0,10	<0,10	<0,10	<1.0	1.0-1.5	1 year
Sulphate (as SO ₄)	<4,0	<4,0	12,0	14,0	<400	400-600	7 years

Sample Marked :	Porterville Municipal Office	Porterville Biblioteek	Piketberg Municipal Office	Veldrif Municipal Office	SANS 241 – 2006 (Drinking Water)		
					Class I (Recomm. Operation. Limit)	Class II (Maximum Allowable for Limited Duration)	Class II Water Consump. Period, ^a max.
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
Total Dissolved Solids	100	100	200	240	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	<0,15	<1.0	1.0-2.0	No Limit ^d
Nitrate & Nitrite Nitrogen (as N)	0,46	0,33	0,59	0,39	<10	10-20	7 years
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	-	-	-
Free Chlorine	0,02	0,01	0,02	0,05	-	-	-
Total Chlorine	0,03	0,03	0,04	0,06	-	-	-
	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	
Iron (as Fe)	160	20	<10	<10	<200	200-2 000	7 years ^b
Manganese (as Mn)	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	72	80	98	40	<300	300-500	1 year
^a	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.						
^b	The limits given are based on aesthetic aspects.						
^c	No primary health effect – low pH values can result in structural problems in the distribution system.						
^d	These values can indicate process efficiency and risks associated with pathogens.						

**MICROBIOLOGICAL REQUIREMENTS
SANS 241 - 2006 (Drinking Water)**

Determinand	2				3	4	5
	Porterville Municipal Office	Porterville Biblioteek	Piketberg Municipal Office	Veldrif Municipal Office	Allowable Compliance Contribution ^e		
					95% of samples, min.	4% of samples, max.	1% of samples, max.
Upper Limits							
<i>E.coli</i>^f (count/100 ml)	Nil	100	Nil	Nil	Not Detected	Not Detected	1
Total Coliform Bacteria^g (count/100 ml)	Nil	Nil	Nil	Nil	-	-	-
Heterotrophic Plate Count^h (count/ml)	Nil	Nil	Nil	>5000	-	-	-
^e	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.						
^f	Definitive preferred indicator of faecal pollution.						
^g	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.						
^h	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.						

Location :	S32°46.956' E18°10.141'	S32°40.176' E18°16.405'	S32°41.098' E18°53.053'	S32°28.621' E18°32.235'	SANS 241 – 2006 (Drinking Water)		
Sample Marked :	Veldrif SDR	Dwarskersbos Water Toring	Eendekuil Kaap Agri.	Redelinghuys Municipal Office	Class I (Recomm. Operation. Limit)	Class II (Maximum Allowable for Limited Duration)	Class II Water Consump. Period, ^a max.
pH (at 25°C)	7,60	7,85	7,73	9,60	5.0-9.5	4.0-10.0	No Limit ^c
Conductivity (at 25°C) (mS/m)	23,1	22,7	15,8	82,2	<150	150-370	7 years
Turbidity (NTU)	0,44	1,0	0,52	1,4	<1	1-5	No Limit ^d
Langelier Saturation Index	-0,98	-0,69	-0,65	1,5	-	-	-
	<u>mg/l</u>	<u>mg/l</u>	<u>mg/l</u>	<u>mg/l</u>	<u>mg/l</u>	<u>mg/l</u>	
Colour (as Pt)	<1	<1	<1	15	<20	20-50	No Limit ^b
Total Alkalinity (as CaCO ₃)	40,0	44,0	60,0	84,0	-	-	-
Total Hardness (as CaCO ₃)	67,0	63,9	57,1	174	-	-	-
Calcium Hardness (as CaCO ₃)	47,3	46,3	47,3	94,3	-	-	-
Calcium (as Ca)	18,9	18,5	18,9	37,7	<150	150-300	7 years
Magnesium Hardness (as CaCO ₃)	19,7	17,6	9,8	79,5	-	-	-
Magnesium (as Mg)	4,8	4,3	2,4	19,4	<70	70-100	7 years
Sodium (as Na)	20,0	17,1	9,6	109	<200	200-400	7 years
Potassium (as K)	0,66	0,55	0,22	2,3	<50	50-100	7 years
Zinc (as Zn)	0,06	0,16	0,08	0,08	<5.0	5.0-10.0	1 year
Chloride (as Cl)	42,4	40,4	28,3	194	<200	200-600	7 years
Fluoride (as F)	<0,10	<0,10	<0,10	<0,10	<1.0	1.0-1.5	1 year
Sulphate (as SO ₄)	15,0	16,0	4,0	42,0	<400	400-600	7 years
Total Dissolved Solids	240	230	160	600	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	<0,15	<0,15	<0,15	0,19	<1.0	1.0-2.0	No Limit ^d
Nitrate & Nitrite Nitrogen (as N)	0,35	0,42	<0,05	3,7	<10	10-20	7 years
Nitrite Nitrogen (as N)	<0,08	<0,08	<0,08	<0,08	-	-	-
Free Chlorine	0,02	0,03	0,03	0,02	-	-	-
Total Chlorine	0,04	0,05	0,04	0,03	-	-	-
	<u>µg/l</u>	<u>µg/l</u>	<u>µg/l</u>	<u>µg/l</u>	<u>µg/l</u>	<u>µg/l</u>	
Iron (as Fe)	120	60	80	40	<200	200-2 000	7 years ^b
Manganese (as Mn)	<40	<40	<40	<40	<100	100-1 000	7 years
Aluminium (as Al)	60	100	60	114	<300	300-500	1 year
^a	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.						
^b	The limits given are based on aesthetic aspects.						
^c	No primary health effect – low pH values can result in structural problems in the distribution system.						
^d	These values can indicate process efficiency and risks associated with pathogens.						

MICROBIOLOGICAL REQUIREMENTS
SANS 241 - 2006 (Drinking Water)

1	2				3	4	5
Determinand	Veldrif SDR	Dwarskersbos Water Toring	Eendekuil Kaap Agri.	Redelinghuys Municipal Office	Allowable Compliance Contribution ^e		
					95% of samples, min.	4% of samples, max.	1% of samples, max.
					Upper Limits		
<i>E.coli</i> ^f (count/100 ml)	Nil	Nil	Nil	Nil	Not Detected	Not Detected	1
Total Coliform Bacteria ^g (count/100 ml)	6	9	5	2	-	-	-
Heterotrophic Plate Count ^h (count/ml)	>5000	>5000	100	20	-	-	-
^e	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.						
^f	Definitive preferred indicator of faecal pollution.						
^g	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.						
^h	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.						

Location :	S32°42.482 E18°29.105'	S32°46.437' E18°09.962'	SANS 241 – 2006 (Drinking Water)		
Sample Marked :	Aurora Municipal Office	Noordhoek Saal	Class I (Recomm. Operation. Limit)	Class II (Maximum Allowable for Limited Duration)	Class II Water Consump. Period, ^a max.
pH (at 25°C)	6,76	7,64	5.0-9.5	4.0-10.0	No Limit ^c
Conductivity (at 25°C) (mS/m)	130	22,5	<150	150-370	7 years
Turbidity (NTU)	0,52	1,0	<1	1-5	No Limit ^d
Langelier Saturation Index	-2,31	-0,88	-	-	-
	<u>mg/l</u>	<u>mg/l</u>	<u>mg/l</u>	<u>mg/l</u>	
Colour (as Pt)	<1	<1	<20	20-50	No Limit ^b
Total Alkalinity (as CaCO ₃)	16,0	44,0	-	-	-
Total Hardness (as CaCO ₃)	223	68,2	-	-	-
Calcium Hardness (as CaCO ₃)	55,8	48,5	-	-	-
Calcium (as Ca)	22,3	19,4	<150	150-300	7 years
Magnesium Hardness (as CaCO ₃)	167	19,7	-	-	-
Magnesium (as Mg)	40,8	4,8	<70	70-100	7 years
Sodium (as Na)	198	19,9	<200	200-400	7 years
Potassium (as K)	1,3	0,66	<50	50-100	7 years
Zinc (as Zn)	0,14	0,08	<5.0	5.0-10.0	1 year
Chloride (as Cl)	444	48,5	<200	200-600	7 years
Fluoride (as F)	0,19	0,11	<1.0	1.0-1.5	1 year
Sulphate (as SO ₄)	34,0	18,0	<400	400-600	7 years
Total Dissolved Solids	1080	230	<1000	1000-2400	7 years
Ammonia Nitrogen (as N)	0,34	<0,15	<1.0	1.0-2.0	No Limit ^d
Nitrate & Nitrite Nitrogen (as N)	0,75	0,35	<10	10-20	7 years
Nitrite Nitrogen (as N)	<0,08	<0,08	-	-	-
Free Chlorine	0,01	0,06	-	-	-
Total Chlorine	0,03	0,09	-	-	-
	<u>µg/l</u>	<u>µg/l</u>	<u>µg/l</u>	<u>µg/l</u>	
Iron (as Fe)	<10	140	<200	200-2 000	7 years ^b
Manganese (as Mn)	680	<40	<100	100-1 000	7 years
Aluminium (as Al)	60	64	<300	300-500	1 year
^a	The limits for the consumption of Class II water are based on the consumption of 2 litres of water per day by a person of mass 70 kg over a period of 70 years.				
^b	The limits given are based on aesthetic aspects.				
^c	No primary health effect – low pH values can result in structural problems in the distribution system.				
^d	These values can indicate process efficiency and risks associated with pathogens.				

**MICROBIOLOGICAL REQUIREMENTS
SANS 241 - 2006 (Drinking Water)**

1	2		3	4	5
Determinand	Aurora Municipal Office	Noordhoek Saal	Allowable Compliance Contribution ^e		
			95% of samples, min.	4% of samples, max.	1% of samples, max.
			Upper Limits		
<i>E.coli</i> ^f (count/100 ml)	Nil	Nil	Not Detected	Not Detected	1
Total Coliform Bacteria ^g (count/100 ml)	Nil	8	-	-	-
Heterotrophic Plate Count ^h (count/ml)	Nil	>5000	-	-	-
^e	The allowable compliance contribution shall be at least 95% to the limits indicated in column 3, with a maximum of 4% and 1% respectively, to the limits indicated in column 4 and column 5. The objective of disinfection should, nevertheless be to attain 100% compliance to the limits indicated in column 3.				
^f	Definitive preferred indicator of faecal pollution.				
^g	Only used as an alert indicator of possible problems. Alert level 10 organisms per 100 ml.				
^h	Only used as an alert indicator of possible problems. Alert level 5 000 organisms per ml.				

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APPENDIX 1 : Specific Methods used for the Analysis of Parameters indicated in this report.

Parameter	Method	Estimated Uncertainty (%)
pH (at 25 °C) - Lab	SABS 11 : (1990 – 3 rd Revision)	0,019
pH (at 25 °C) – Field*	SABS 11 : (1990 – 3 rd Revision)	-
Langelier Saturation Index (at 25 °C)*	Calculation	-
Conductivity (mS/m) (at 25 °C)	STD Method 2501 A (1992)	2,15
Turbidity (NTU)	Hach 8237	1,81
Colour (mg/l as Pt)*	Hach 8025	-
Total Alkalinity (mg/l as CaCO ₃)*	STD Methods 2320 (1992)	-
Total Hardness (mg/l as CaCO ₃)	SABS SM 1265 (2000)	0,09
Calcium (mg/l as CaCO ₃)	SABS SM 1265 (2000)	0,09
Magnesium (mg/l as CaCO ₃)	SABS SM 1265 (2000)	0,08
Chloride (mg/l as Cl)	SABS 202 (2 nd Revision)	0,08
Fluoride (mg/l as F)	Hach 8029	0,19
Iron (µg/l as Fe)	SANS 5207 (2004)	0,09
Manganese (µg/l as Mn)	SANS 5209 (2005)	0,09
Aluminium (µg/l as Al)	SANS 6169 (2005)	0,14
Calcium Carbonate Precipitation Potential*	Calculation	-
Free Chlorine (mg/l)*	Lovibond Method 3	-
Sodium (mg/l as Na)	SANS 6050 (2004)	0,08
Potassium (mg/l as K)	STD Method 3111 B (1992)	0,07
Zinc (mg/l as Zn)	SANS 5214 (2005)	0,08
Nitrate Nitrogen (mg/l as N)	Hach 8150	0,12
Nitrate Nitrogen (mg/l as N)	Lovibond Method using Brucine	0,057
Nitrite Nitrogen (mg/l as N)	Lovibond Method	0,08
Nitrate & Nitrite Nitrogen (mg/l as N)	Hach 8150	-
Ammonia (mg/l as N)	STD Method 4500-NH ₃ :C (1992)	0,07
Sulphate (mg/l as SO ₄)	Hach 8051	0,17
Total Dissolved Solids*	STD Method 2501 A (1992)	1,63
E.coli (organisms per 100 ml)	SABS 221 (2002)	-
Coliforms (organisms per 100 ml)	SABS 221 (2002)	-
Total Plate Count (organisms per ml)	Petrifilm™	-
Faecal coliforms (organisms per 100 ml)	SABS SM 221 (2002)	-
Settleable Solids (ml/l)*	STD Method 2540 F (1992)	-
Chemical Oxygen Demand (mg/l)	SANS 6048 (2005)	0,08
Total Kjeldahl Nitrogen (mg/l)*	Hach 8075	-
Dissolved Oxygen (mg/l)*	STD Method 4500 O-G	-
Total Suspended Solids (mg/l)*	STD Method 2540 D (1992)	-
Volatile Suspended Solids (mg/l)*	STD Method 2540 E (1992)	-
Total Phosphate (mg/l as P)*	STD Method 4500-PB (1992) / Hach 8114	-
Ortho Phosphate (mg/l as P)*	Hach 8114	-
Copper (µg/l as Cu)	SANS 5203 (2005)	0,13

* Tests marked “Not SANAS Accredited” in this report are not included in the SANAS Schedule of Accreditation for this laboratory.

(Schedule of Accreditation excludes sampling)