

STEVE TSHWETE MUNICIPALITY

P.O. Box 14
MIDDELBURG
1050

CHEMICAL ANALYSIS	Our Ref: STE / 1 - 8 /B /12/09
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Date received: 15 December 2009
Date completed: 29 December 2009
Quantity Analyzed: 8
Lab No :

Attention: Mr. R. Bouwer
Attention: Me. Z. Louw

Analysis Results mg/l	B 1 Kruger Dam Water Treatment Plant	B 2 Vaalbank Final (8) Water Treatment Plant	<i>SANS Standa</i>
			<i>Class I (recommended operational limit)</i>
<i>Total Dissolved Solids</i>	150	388	<i>< 1 000</i>
<i>Nitrate & Nitrite as N</i>	0.35	0.72	<i>< 10</i>
<i>Chlorides as Cl</i>	11	26	<i>< 200</i>
<i>Total Alkalinity as CaCO₃</i>	42	62	
<i>Fluoride as F</i>	<0.20	0.29	<i>< 1.0</i>
<i>Sulphate as SO₄</i>	67.1	205	<i>< 400</i>
<i>Calcium as Ca</i>	18.0	46.5	<i>< 150</i>
<i>Magnesium as Mg</i>	11.5	34.5	<i>< 70</i>
<i>Sodium as Na</i>	10.2	19.3	<i>< 200</i>
<i>Potassium as K</i>	3.16	13.60	<i>< 50</i>
<i>Iron as Fe</i>	<0.01	<0.01	<i>< 0.20</i>
<i>Manganese as Mn</i>	<0.01	<0.01	<i>< 0.10</i>
<i>Conductivity at 25° C in mS/m</i>	24.1	59.3	<i>< 150</i>
<i>pH-Value at 25 ° C</i>	7.20	7.67	<i>5.0 - 9.5</i>
<i>Turbidity as N.T.U</i>	2.00	2.40	<i>< 1</i>
<i>Free & Saline Ammonia NH₃ as N</i>	<0.20	<0.20	
<i>Aluminium as Al</i>	<0.01	<0.01	<i>< 0.30</i>

All heavy metal analyses have been performed on filtered samples

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QUALITY CONTROL CHECKS		
<i>Cation Balance</i>	2.37	6.35
<i>Anion Balance</i>	2.57	6.31
<i>% Difference</i>	-4.1	0.3
<i>Measured TDS</i>	150	388
<i>Calculated TDS</i>	148	386
<i>Limits > 1.0 - <1.2</i>	1.0	1.0
<i>Calcul TDS / E.C. (0.55 - 0.70)</i>	0.6	0.7

P.L.G. UYS (M.D.)

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Attention: Me. Zeldi Louw

Analysis Results mg/l	B 1	B 2	SANS Standard
	Kruger Dam Water Treatment Plant	Vaalbank Final (8) Water Treatment Plant	Class I (recommended operational limit)
<i>Selenium as Se</i>	<0.01	<0.01	<0.02
<i>Vanadium as V</i>	<0.01	<0.01	<0.20
<i>Total Organic Carbon (TOC)</i>	2.3	10.0	
<i>Phenolic Compounds</i>	<0.005	<0.005	<0.01
<i>Cyanide as CN</i>	<0.01	<0.01	<0.05
<i>Cadmium as Cd</i>	<0.003	<0.003	<0.005
<i>Cobalt as Co</i>	<0.01	<0.01	<0.50
<i>Total Chromium as Cr</i>	<0.01	<0.01	<0.10
<i>Copper as Cu</i>	<0.01	<0.01	<1.0
<i>Antimony as Sb</i>	<0.005	<0.005	<0.01
<i>Nickel as Ni</i>	0.01	0.02	<0.15
<i>Lead as Pb</i>	<0.01	<0.01	<0.02
<i>Zinc as Zn</i>	0.03	0.03	<5.0
<i>Arsenic as As</i>	<0.01	<0.01	<0.01
<i>Mercury as Hg</i>	<0.001	<0.001	<0.001
<i>Colour as Pt-Co*</i>	54	59	<20
<i>Odour*</i>	No offensive odour	No offensive odour	
<i>Taste*</i>	Acceptable Taste	Acceptable Taste	

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B 4

Analysis Results mg/l	Presidentsrus Water Treatment Plant	<i>SANS Standard Class I (recommended operational limit)</i>
<i>Total Dissolved Solids</i>	350	<i>< 1 000</i>
<i>Nitrate & Nitrite as N</i>	0.36	<i>< 10</i>
<i>Chlorides as Cl</i>	23	<i>< 200</i>
<i>Total Alkalinity as CaCO₃</i>	62	
<i>Fluoride as F</i>	0.42	<i>< 1.0</i>
<i>Sulphate as SO₄</i>	176	<i>< 400</i>
<i>Calcium as Ca</i>	47.3	<i>< 150</i>
<i>Magnesium as Mg</i>	29.8	<i>< 70</i>
<i>Sodium as Na</i>	23.5	<i>< 200</i>
<i>Potassium as K</i>	5.28	<i>< 50</i>
<i>Iron as Fe</i>	<0.01	<i>< 0.20</i>
<i>Manganese as Mn</i>	<0.01	<i>< 0.10</i>
<i>Conductivity at 25° C in mS/m</i>	56.4	<i>< 150</i>
<i>pH-Value at 25 ° C</i>	7.90	<i>5.0 - 9.5</i>
<i>Turbidity as N.T.U</i>	5.50	<i>< 1</i>
<i>Free & Saline Ammonia NH₃ as N</i>	<0.20	
<i>Aluminium as Al</i>	<0.01	<i>< 0.30</i>

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QUALITY CONTROL CHECKS	
<i>Cation Balance</i>	5.97
<i>Anion Balance</i>	5.60
<i>% Difference</i>	3.2
<i>Measured TDS</i>	350
<i>Calculated TDS</i>	345
<i>Limits > 1.0 - <1.2</i>	1.0
<i>Calcul TDS / E.C. (0.55 - 0.70)</i>	0.6

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Attention. Me. Zelda Louw*

B 4

Analysis Results mg/l	Presidentsrus Water Treatment Plant	SANS Standard
		Class I (recommended operational limit)
<i>Selenium as Se</i>	<0.01	<0.02
<i>Vanadium as V</i>	<0.01	<0.20
<i>Total Organic Carbon (TOC)</i>	3.6	
<i>Phenolic Compounds</i>	<0.005	<0.01
<i>Cyanide as CN</i>	<0.01	<0.05
<i>Cadmium as Cd</i>	<0.003	<0.005
<i>Cobalt as Co</i>	<0.01	<0.50
<i>Total Chromium as Cr</i>	<0.01	<0.10
<i>Copper as Cu</i>	<0.01	<1.0
<i>Antimony as Sb</i>	<0.005	<0.01
<i>Nickel as Ni</i>	0.02	<0.15
<i>Lead as Pb</i>	<0.01	<0.02
<i>Zinc as Zn</i>	0.03	<5.0
<i>Arsenic as As</i>	<0.01	<0.01
<i>Mercury as Hg</i>	<0.001	<0.001
<i>Colour as Pt-Co*</i>	67	<20
<i>Odour*</i>	No offensive odour	
<i>Taste*</i>	Acceptable Taste	

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B 5

B 6

Analysis Results mg/l	Hendrina Water Treatment Plant	Nazareth Reservoir (7)	SANS Standard
			Class I (recommended operational limit)
Total Dissolved Solids	120	578	< 1 000
Nitrate & Nitrite as N	0.37	0.49	< 10
Chlorides as Cl	16	27	< 200
Total Alkalinity as CaCO ₃	49	74	
Fluoride as F	<0.20	0.30	< 1.0
Sulphate as SO ₄	24.3	320	< 400
Calcium as Ca	17.0	69.5	< 150
Magnesium as Mg	8.02	58.6	< 70
Sodium as Na	11.7	27.5	< 200
Potassium as K	2.92	12.0	< 50
Iron as Fe	<0.01	<0.01	< 0.20
Manganese as Mn	0.01	0.01	< 0.10
Conductivity at 25° C in mS/m	20.6	86.4	< 150
pH-Value at 25 ° C	7.89	7.77	5.0 - 9.5
Turbidity as N.T.U	0.44	2.50	< 1
Free & Saline Ammonia NH ₃ as N	<0.20	<0.20	
Aluminium as Al	<0.01	<0.01	< 0.30

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QUALITY CONTROL CHECKS

Cation Balance	2.09	9.79
Anion Balance	1.96	8.95
% Difference	3.2	4.5
Measured TDS	120	578
Calculated TDS	111	562
Limits > 1.0 - <1.2	1.1	1.0
Calcul TDS / E.C. (0.55 - 0.70)	0.5	0.7

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B 5

B 6

Analysis Results mg/l	Hendrina Water Treatment Plant	Nazareth Reservoir (7)	SANS Standard
			Class I (recommended operational limit)
<i>Selenium as Se</i>	<0.01	<0.01	<0.02
<i>Vanadium as V</i>	<0.01	<0.01	<0.20
<i>Total Organic Carbon (TOC)</i>	3.6	4.4	
<i>Phenolic Compounds</i>	<0.005	<0.005	<0.01
<i>Cyanide as CN</i>	<0.01	<0.01	<0.05
<i>Cadmium as Cd</i>	<0.003	<0.003	<0.005
<i>Cobalt as Co</i>	<0.01	<0.01	<0.50
<i>Total Chromium as Cr</i>	<0.01	<0.01	<0.10
<i>Copper as Cu</i>	<0.01	<0.01	<1.0
<i>Antimony as Sb</i>	<0.005	<0.005	<0.01
<i>Nickel as Ni</i>	0.01	0.02	<0.15
<i>Lead as Pb</i>	<0.01	<0.01	<0.02
<i>Zinc as Zn</i>	0.03	0.04	<5.0
<i>Arsenic as As</i>	<0.01	<0.01	<0.01
<i>Mercury as Hg</i>	<0.001	<0.001	<0.001
<i>Colour as Pt-Co*</i>	60	56	<20
<i>Odour*</i>	No offensive odour	No offensive odour	
<i>Taste*</i>	Acceptable Taste	Acceptable Taste	

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Analysis Results mg/l	B 7	B 8	SANS Standard
	Doornkop (1) Borehole Phase 1	Doornkop (2) Borehole Phase II	Class I (recommended operational limit)
<i>Total Dissolved Solids</i>	76	70	< 1 000
<i>Nitrate & Nitrite as N</i>	1.5	4.00	< 10
<i>Chlorides as Cl</i>	4.0	12	< 200
<i>Total Alkalinity as CaCO₃</i>	57	21	
<i>Fluoride as F</i>	<0.20	<0.20	< 1.0
<i>Sulphate as SO₄</i>	2.8	2.4	< 400
<i>Calcium as Ca</i>	10.6	8.52	< 150
<i>Magnesium as Mg</i>	5.38	3.79	< 70
<i>Sodium as Na</i>	8.47	8.21	< 200
<i>Potassium as K</i>	1.03	0.75	< 50
<i>Iron as Fe</i>	0.07	<0.01	< 0.20
<i>Manganese as Mn</i>	<0.01	0.02	< 0.10
<i>Conductivity at 25° C in mS/m</i>	12.6	12.1	< 150
<i>pH-Value at 25 ° C</i>	7.88	6.87	5.0 - 9.5
<i>Turbidity as N.T.U</i>	7.80	1.10	< 1
<i>Free & Saline Ammonia NH₃ as N</i>	<0.20	<0.20	
<i>Aluminium as Al</i>	0.02	<0.01	< 0.30

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QUALITY CONTROL CHECKS		
<i>Cation Balance</i>	1.37	1.11
<i>Anion Balance</i>	1.42	1.09
<i>% Difference</i>	-1.6	0.9
<i>Measured TDS</i>	76	70
<i>Calculated TDS</i>	74	66
<i>Limits > 1.0 - <1.2</i>	1.0	1.1
<i>Calcul TDS / E.C. (0.55 - 0.70)</i>	0.6	0.5

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B 7

B 8

Analysis Results mg/l	Doornkop (1) Borehole Phase 1	Doornkop (2) Borehole Phase II	SANS Standard
			Class I (recommended operational limit)
Selenium as Se	<0.01	<0.01	<0.02
Vanadium as V	<0.01	<0.01	<0.20
Total Organic Carbon (TOC)	0.54	<0.44	
Phenolic Compounds	<0.005	<0.005	<0.01
Cyanide as CN	<0.01	<0.01	<0.05
Cadmium as Cd	<0.003	<0.003	<0.005
Cobalt as Co	<0.01	<0.01	<0.50
Total Chromium as Cr	<0.01	<0.01	<0.10
Copper as Cu	<0.01	<0.01	<1.0
Antimony as Sb	<0.005	<0.005	<0.01
Nickel as Ni	<0.01	<0.01	<0.15
Lead as Pb	<0.01	<0.01	<0.02
Zinc as Zn	0.03	0.56	<5.0
Arsenic as As	<0.01	<0.01	<0.01
Mercury as Hg	<0.001	<0.001	<0.001
Colour as Pt-Co*	66	46	<20
Odour*	No offensive odour	No offensive odour	
Taste*	Acceptable Taste	Acceptable Taste	

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<i>rds -241 (2005,</i>
Class 2 (max allowable for limited duration)
> 1 000 - 2 400
> 10 - 20
> 200 - 600
> 1.0 - 1.5
> 400 - 600
> 150 - 300
> 70 - 100
> 200 - 400
> 50 - 100
> 0.20 - 2.0
> 0.10 - 1.0
> 150 - 370
> 4.0 - 10.0
> 1 - 5
> 0.30 - 0.50



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<i>rds -241 (2005)</i>
<i>Class 2 (max allowable for limited duration)</i>
<i>>0.02 - 0.05</i>
<i>>0.2 - 0.5</i>
<i>>0.01 - 0.07</i>
<i>>0.05 - 0.07</i>
<i>>0.005 - 0.01</i>
<i>>0.50 - 1.0</i>
<i>>0.10 - 0.50</i>
<i>>1.0 - 2.0</i>
<i>>0.01 - 0.05</i>
<i>>0.15 - 0.35</i>
<i>>0.02 - 0.05</i>
<i>>5.0 - 10.0</i>
<i>>0.01 - 0.05</i>
<i>>0.001 - 0.005</i>
<i>>20 - 50</i>

<i>rds -241 (2005,</i>
Class 2 (max allowable for limited duration)
> 1 000 - 2 400
> 10 - 20
> 200 - 600
> 1.0 - 1.5
> 400 - 600
> 150 - 300
> 70 - 100
> 200 - 400
> 50 - 100
> 0.20 - 2.0
> 0.10 - 1.0
> 150 - 370
> 4.0 - 10.0
> 1 - 5
> 0.30 - 0.50



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<i>rds -241 (2005)</i>
<i>Class 2 (max allowable for limited duration)</i>
<i>>0.02 - 0.05</i>
<i>>0.2 - 0.5</i>
<i>>0.01 - 0.07</i>
<i>>0.05 - 0.07</i>
<i>>0.005 - 0.01</i>
<i>>0.50 - 1.0</i>
<i>>0.10 - 0.50</i>
<i>>1.0 - 2.0</i>
<i>>0.01 - 0.05</i>
<i>>0.15 - 0.35</i>
<i>>0.02 - 0.05</i>
<i>>5.0 - 10.0</i>
<i>>0.01 - 0.05</i>
<i>>0.001 - 0.005</i>
<i>>20 - 50</i>

<i>rds -241 (2005,</i>
Class 2 (max allowable for limited duration)
> 1 000 - 2 400
> 10 - 20
> 200 - 600
> 1.0 - 1.5
> 400 - 600
> 150 - 300
> 70 - 100
> 200 - 400
> 50 - 100
> 0.20 - 2.0
> 0.10 - 1.0
> 150 - 370
> 4.0 - 10.0
> 1 - 5
> 0.30 - 0.50



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<i>rds -241 (2005,</i>
<i>Class 2 (max allowable for limited duration)</i>
<i>>0.02 - 0.05</i>
<i>>0.2 - 0.5</i>
<i>>0.01 - 0.07</i>
<i>>0.05 - 0.07</i>
<i>>0.005 - 0.01</i>
<i>>0.50 - 1.0</i>
<i>>0.10 - 0.50</i>
<i>>1.0 - 2.0</i>
<i>>0.01 - 0.05</i>
<i>>0.15 - 0.35</i>
<i>>0.02 - 0.05</i>
<i>>5.0 - 10.0</i>
<i>>0.01 - 0.05</i>
<i>>0.001 - 0.005</i>
<i>>20 - 50</i>

<i>rds -241 (2005)</i>
Class 2 (max allowable for limited duration)
> 1 000 - 2 400
> 10 - 20
> 200 - 600
> 1.0 - 1.5
> 400 - 600
> 150 - 300
> 70 - 100
> 200 - 400
> 50 - 100
> 0.20 - 2.0
> 0.10 - 1.0
> 150 - 370
> 4.0 - 10.0
> 1 - 5
> 0.30 - 0.50



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<i>rds -241 (2005)</i>
<i>Class 2 (max allowable for limited duration)</i>
<i>>0.02 - 0.05</i>
<i>>0.2 - 0.5</i>
<i>>0.01 - 0.07</i>
<i>>0.05 - 0.07</i>
<i>>0.005 - 0.01</i>
<i>>0.50 - 1.0</i>
<i>>0.10 - 0.50</i>
<i>>1.0 - 2.0</i>
<i>>0.01 - 0.05</i>
<i>>0.15 - 0.35</i>
<i>>0.02 - 0.05</i>
<i>>5.0 - 10.0</i>
<i>>0.01 - 0.05</i>
<i>>0.001 - 0.005</i>
<i>>20 - 50</i>