Water Quality & Environmental Audit Report

Engineering & Scientific Services

Water Quality & Environmental Services

January 2011

Table of Contents

1. Resource Water Quality Status –January 2011

Purpose

To report on the quality of all Umgeni Water raw water sources.

Introduction

The quality of the water resources in the Umgeni Water Operational area is shown temporally and spatially with the aid of in-house developed Water Quality Indices.

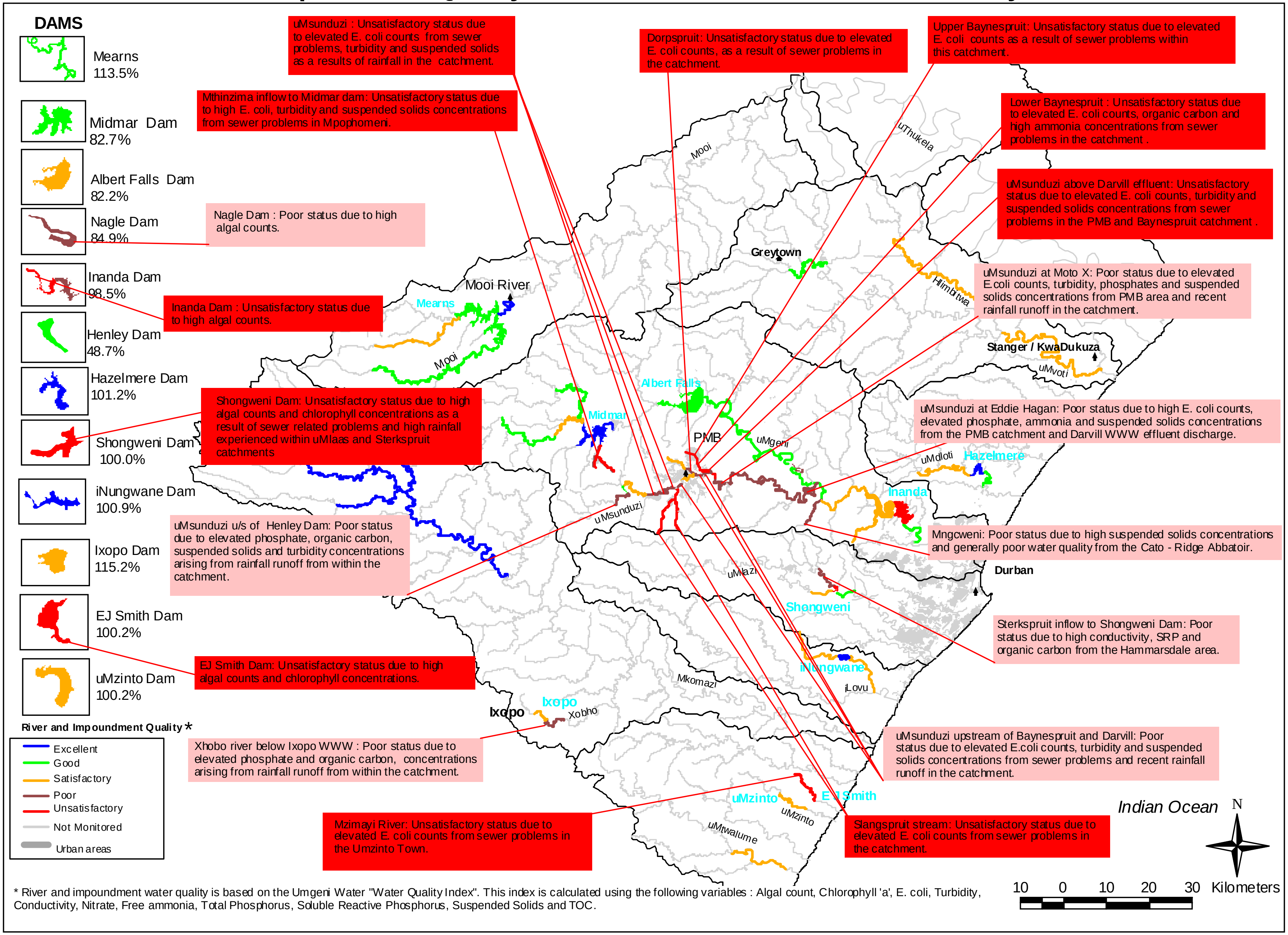
Findings

Refer to Map 1: Water quality status of rivers and dams for January 2011

- The unsatisfactory water quality status of the Mthinzima inflow to Midmar Dam, Dorpspruit, Baynespruit, Slangspruit and Mzimayi rivers were mostly due to sewer problems experienced in these areas.
- The poor water quality status of the uMsunduzi upstream of Henley Dam, upstream of Baynespruit and Darvill WWW, Moto X and Eddie Hagen was due to elevated nutrient, turbidity, organic carbon concentrations and *E.coli* counts as a result of sewer problems and rainfall runoff in the catchment.
- The poor water quality status of the Sterkspruit inflow to Shongweni Dam was due to elevated nutrient, conductivity and organic carbon concentrations as a result of industrial and wastewater effluent discharges in the catchment.
- The poor status of the Xhobo River was due to elevated nutrient and organic carbon concentrations as a result of and rainfall runoff in the catchment whilst the poor status of the Mngcweni River was due to high suspended solids concentrations in Cato Ridge area.
- The unsatisfactory status of E J Smith Dam was attributed to high algal numbers as well as high nutrient concentrations which is a result of ongoing sewer problems within Mzinto town and nutrient re-suspension as the dam starts to re-fill.
- The unsatisfactory status of Inanda and Shongweni Dams were a result of high algal numbers as a result of sewer problems, industrial and wastewater effluent discharges within these catchments.
- The dam storage values (% full) referred to in Map 1, are as at 31 January 2011.

The Water & Environmental Services Department at Umgeni Water has an active involvement with various stakeholders including the Department of Water Affairs, Department of Agriculture, Water Services Authorities and Non-Governmental Organisations (e.g. DUCT) in responding to the poor and unsatisfactory water resource quality status within the Umgeni Water area of operation. In addition to this, various Catchment Management Fora are attended where the results of the catchment monitoring programme are presented. The close working relationship between all relevant stakeholders ensures that a proactive approach is always adopted in improving the water resources within the operational area.

Map 1: Water Quality Status of Rivers and Dams for January 2011



2. Potable Water Quality Audit Summary Report January 2011

Purpose

To report on compliance of all Umgeni Water treated water supplies, including the Ilembe Schemes, with legislative requirements.

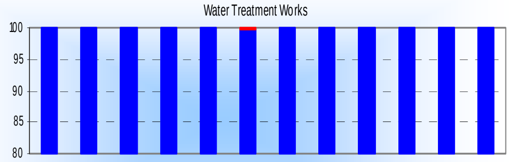
Introduction

Twelve water works, 31 off-site reservoirs, 47 reticulation sites and the Isithundu unimproved water supply scheme were audited against the SANS 241: 2006 Drinking Water Specification regulated under Section 9 (1) of the Water Services Act, 1997 (Act No. 108 of 1997).

The overall compliance represents combined compliance of the existing Umgeni Water sites including the iLembe scheme sites.

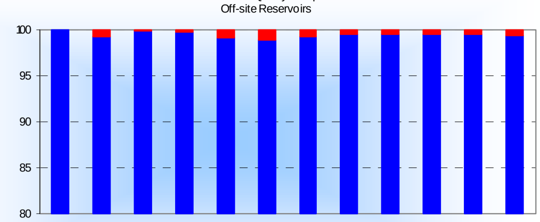
POTABLE WATER QUALITY TRENDS 2010/2011

Potable Water Quality Compliance
Water Treatment Works



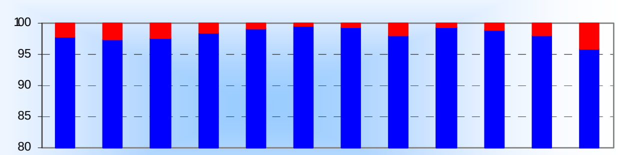
	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11
%non-compliance	0.00	0.08	0.02	0.00	0.04	0.15	0.1	0.08	0.07	0.05	0.05	0.05
%compliance	100.00	99.92	99.98	100.00	99.96	99.85	99.90	99.92	99.93	99.95	99.95	99.95

Potable Water Quality Compliance
Off-site Reservoirs



	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11
%non-compliance	0.00	0.69	0.13	0.25	0.83	1.15	0.71	0.47	0.51	0.48	0.46	0.59
%compliance	100.00	99.31	99.87	99.75	99.17	98.85	99.29	99.53	99.49	99.52	99.54	99.41

Potable Water Quality Compliance
Reticulation Reservoirs#



	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11
%non-compliance	2.27	2.63	2.37	160	0.77	0.33	0.67	190	0.73	100	190	4.23
%Compliance	97.73	97.37	97.63	98.40	99.23	99.67	99.33	98.10	99.27	99.00	98.10	95.77

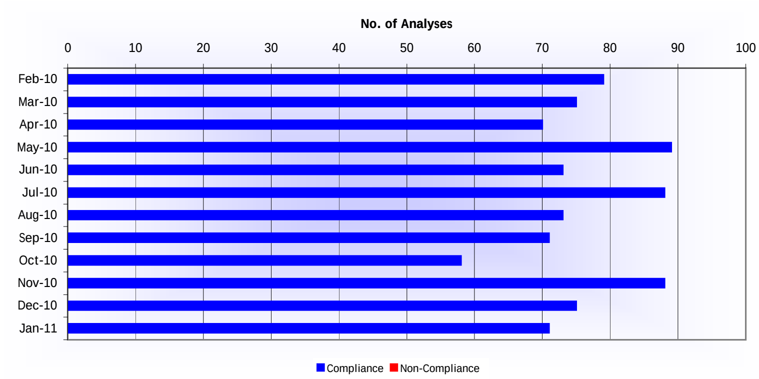
Comment:
During the period under review, the overall compliance at the bulk waterworks remained the same at 99.95 %. The compliance at the off-site reservoirs decreased to 99.41 % due to *E.coli* failures at Honolulu & La Mercy reservoirs as well as turbidity failures at the Mvoti reservoirs. Compliance at the reticulation reservoirs decreased from 98.10 % to 95.77 % as a result of *E. coli* and turbidity failures at the North Coast Reticulation Schemes.

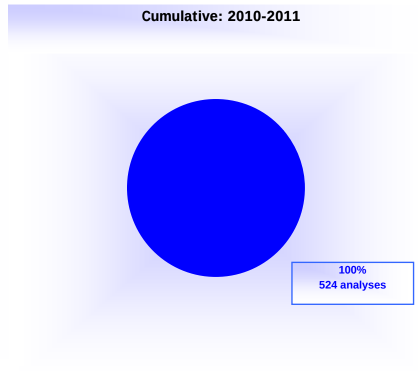
The overall compliance figure for reticulation reservoirs/ schemes includes boreholes, reservoirs and smaller schemes / treatment plants.

2. Potable Water Quality Audit: January 2011

Compliance is audited against the South African National Standard for Drinking Water (SANS 241: 2006). In accordance with this standard only water quality constituents relating to health risk are considered in the calculation of compliance.

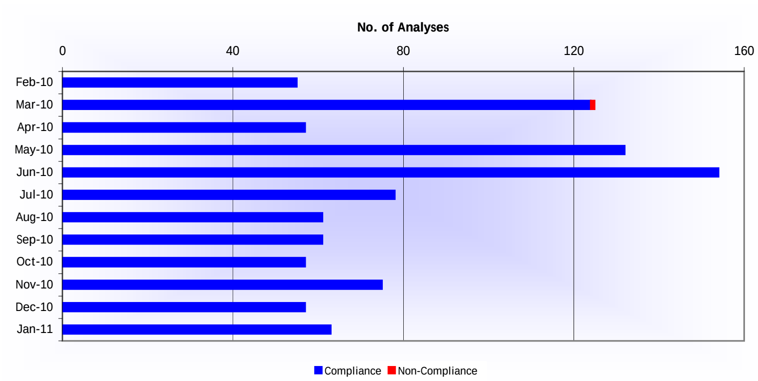
Midmar WW (209.26 Ml/d)

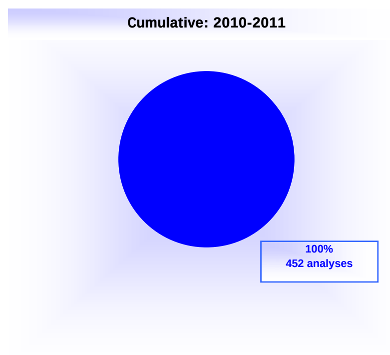




All analyses complied with the required standard.

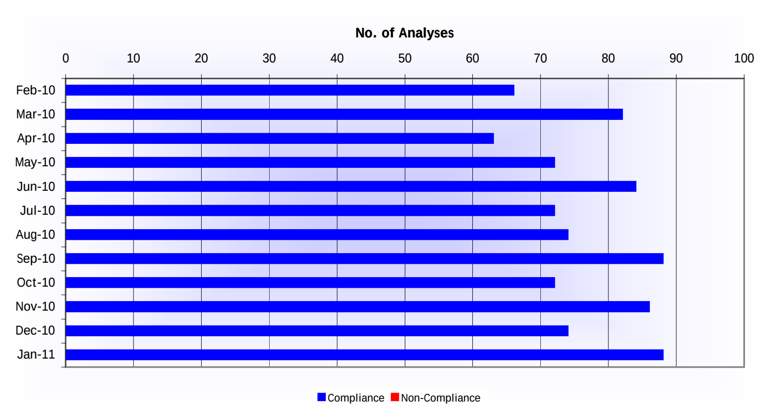
Midmar Off-site Reservoirs

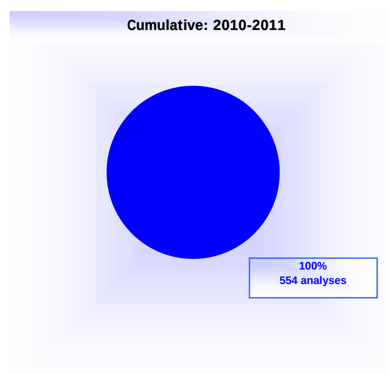




All analyses complied with the required standard.

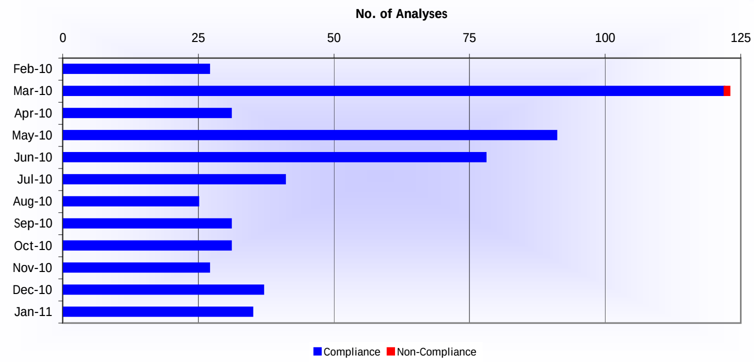
DV Harris WW (87.08 Ml/d)

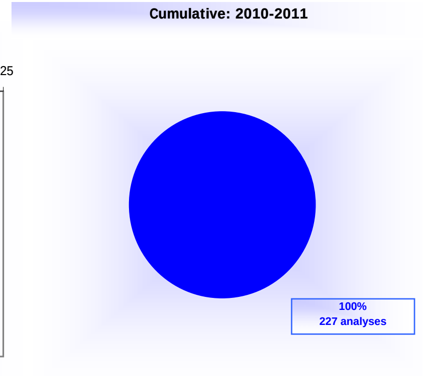




All analyses complied with the required standard.

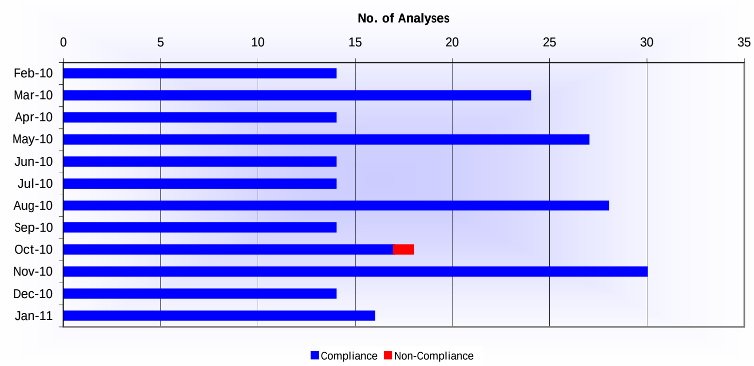
DV Harris Off-Site Reservoirs

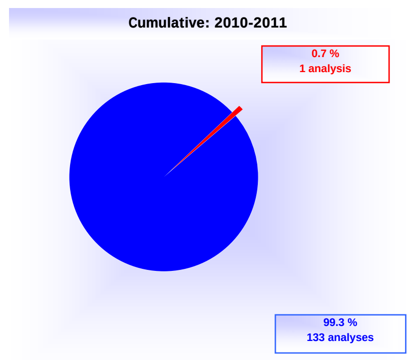




All analyses complied with the required standard.

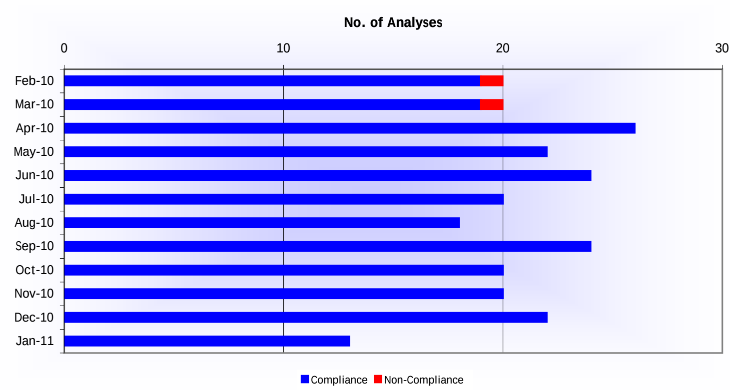
Ixopo WW (2.33 Ml/d)

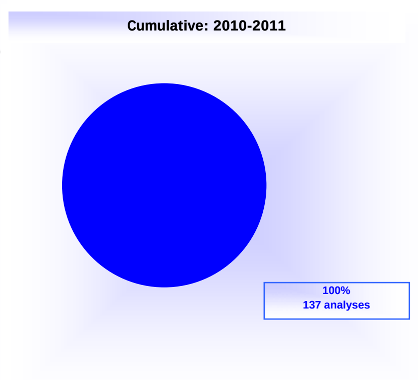




All analyses complied with the required standard.

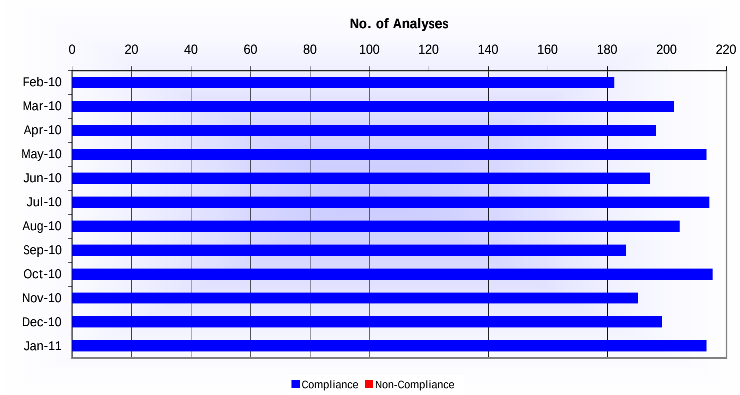
Inland Reticulation

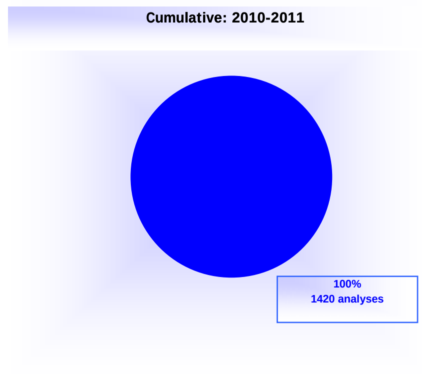




All analyses complied with the required standard.

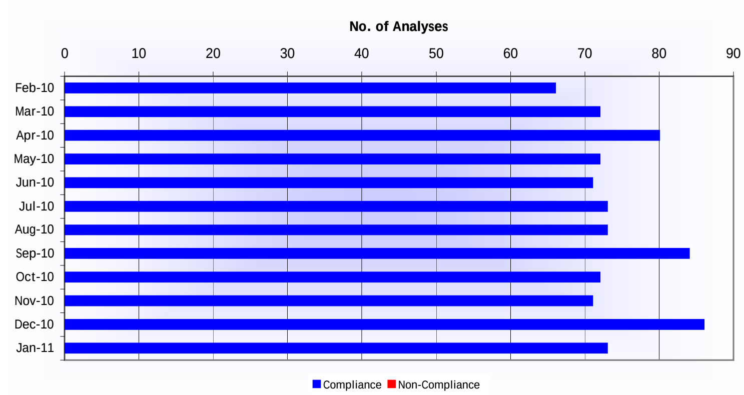
Durban Heights WW (496.72 Ml/d)

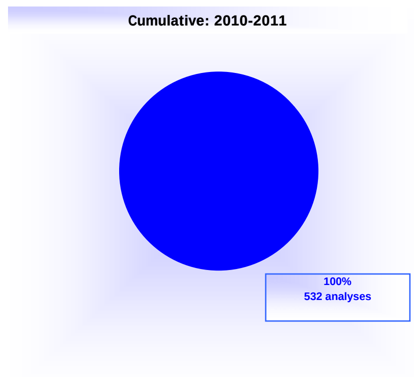




All analyses complied with the required standard.

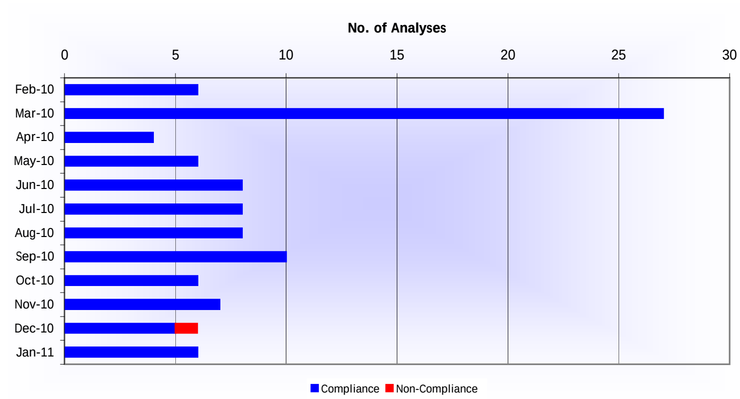
Wiggins WW (232.74 Ml/d)

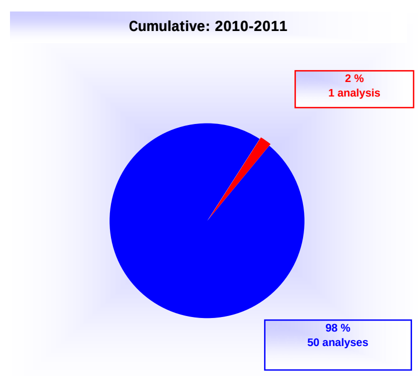




All analyses complied with the required standard.

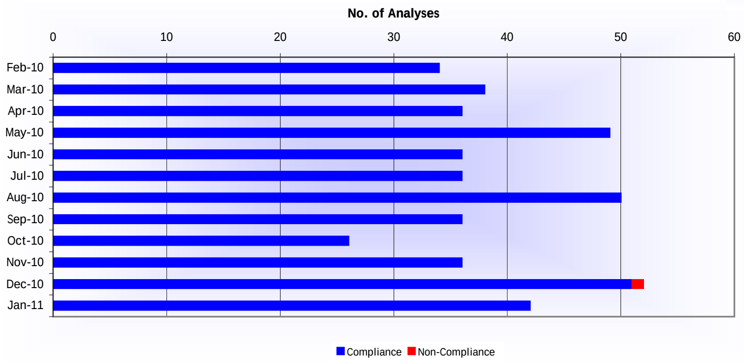
Central Reticulation

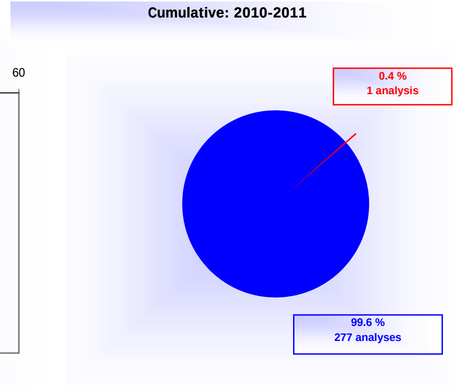




All analyses complied with the required standard.

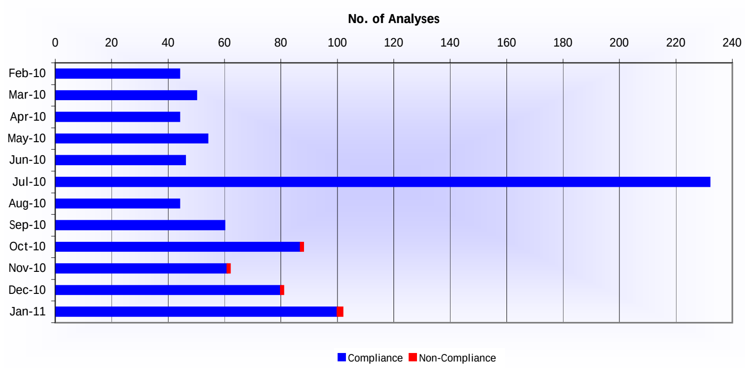
Hazelmere WW (41.83 Ml/d)

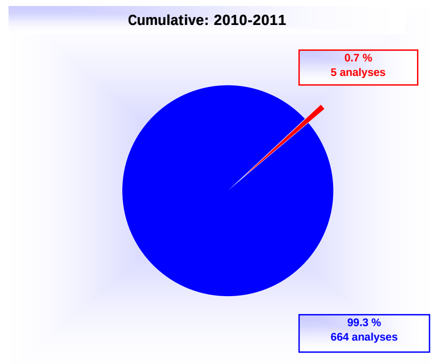




All analyses complied with the required standard.

Hazelmere Off-site Reservoirs





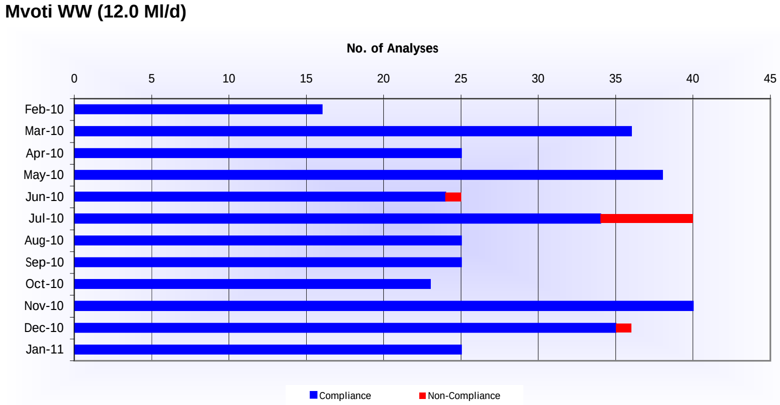
Out of 102 analyses conducted, 2 analyses failed

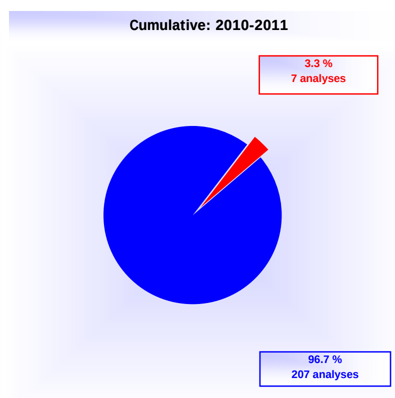
Site	Constituent	Failures	Result
La Mercy reservoir	*E. coli* (std: 0 per 100 ml)	1/8 analysis	55 per 100ml
Honolulu reservoir	*E. coli* (std: 0 per 100 ml)	1/8 analysis	4 per 100ml

Operations Incidents Report

Cause	Mitigation	Proposed Action
Demands exceeded the design capacity of the plant coupled with the limited performance capability of clarifier number three at Hazelmere WW. Long retention times allow chlorine residuals to decay to low levels which in turn can result in microbial failures.	Adequate chlorine residual levels were maintained. Reactive monitoring was conducted after the chlorine dose was maintained and the results detected acceptable water quality.	Chlorine control limits have been increased at the works from a maximum of 2,0 to 2,5 mg/l. A free chlorine flush of the system is being planned.

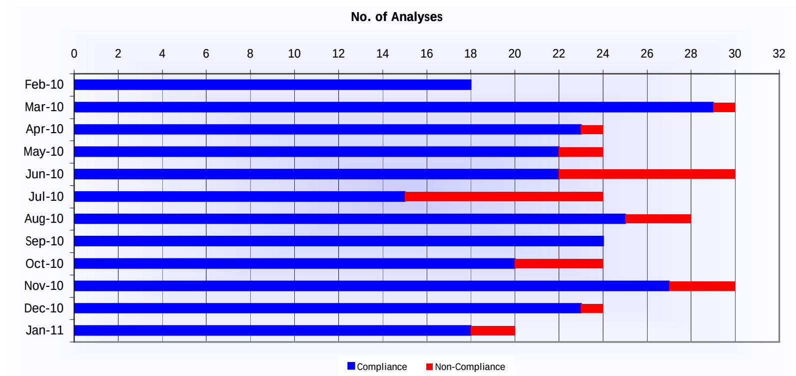
Mvoti WW (12.0 Ml/d)

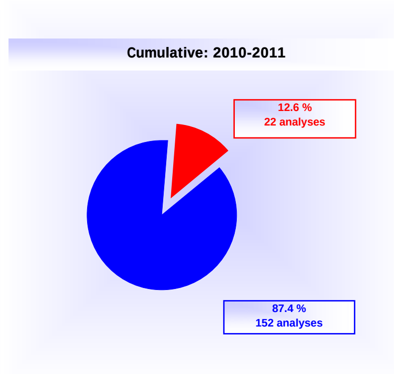




All analyses complied with the required standard.

Mvoti Off-site Reservoirs





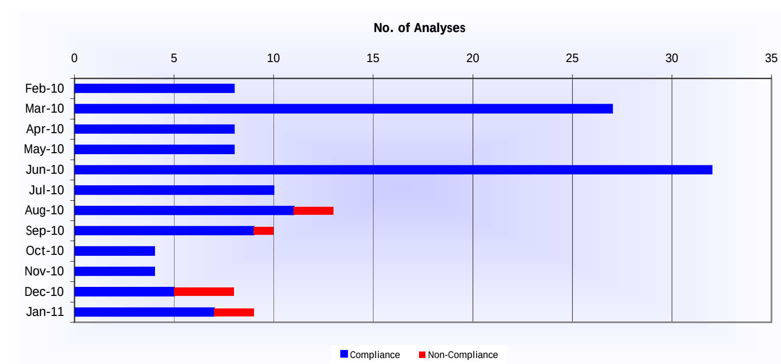
Out of 20 analyses conducted, 2 analyses failed

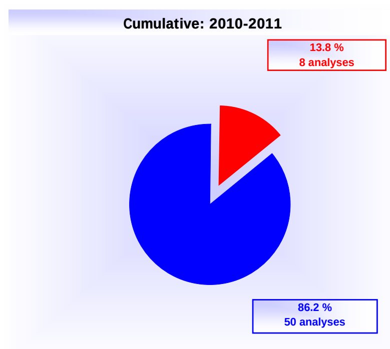
Site	Constituent	Failures	Result
Mvoti reservoir 1	Turbidity (std: 5 NTU)	1/3 analysis	11.4 NTU
Mvoti reservoir 2	Turbidity (std: 5 NTU)	1/4 analysis	6.51 NTU

Operations Incidents Report

Cause	Mitigation	Proposed Action
Reservoir 1 is dirty and the level is low.	Adequate chlorine residual levels were mainatined. Reactive monitoring was conducted after the chlorine dose was maintained and the results detected acceptable water quality	The reservoir requires cleaning.
Non-compliances at reservoirs 2 is a result of quality problems from the plant.	Adequate chlorine residual levels were mainatined. Reactive monitoring was conducted after the chlorine dose was maintained and the results detected acceptable water quality	Optimise plant treatment processes.

Bulwer WW (1.5 Ml/d)





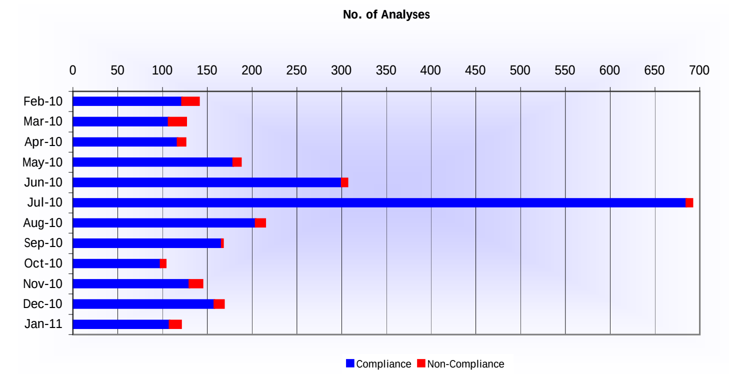
Out of 9 analyses conducted, 2 analyses failed

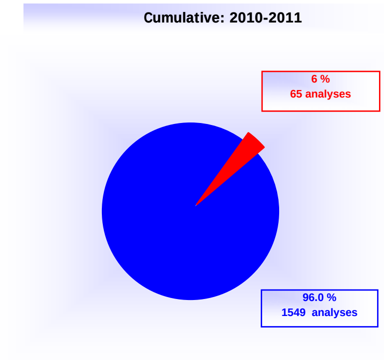
Site	Constituent	Failures	Result
Bulwer final 1	Turbidity (std: 5 NTU)	1/2 analysis	19 NTU
Bulwer final 2	Turbidity (std: 5 NTU)	1/2 analysis	41.3 NTU

Operations Incidents Report

Cause	Mitigation	Proposed Action
This is a slow sand filter plant, and there is no adequate sand in the filters for proper filtration. The out of ranges were due to a high raw water turbidity of 350 NTU entering the plant. Inadequate disinfection was due to the disinfectant dosing pump losing prime.	The plant was shut down to allow for the raw water turbidity to decrease. The disinfectant dosing pump was primed and dosage adjusted accordingly. Reactive monitoring was conducted after mitgation measures were implmented and the results detected acceptable water quality.	The slow sand filters require the filter sand to be replaced or topped up.

North Coast Reticulation Schemes





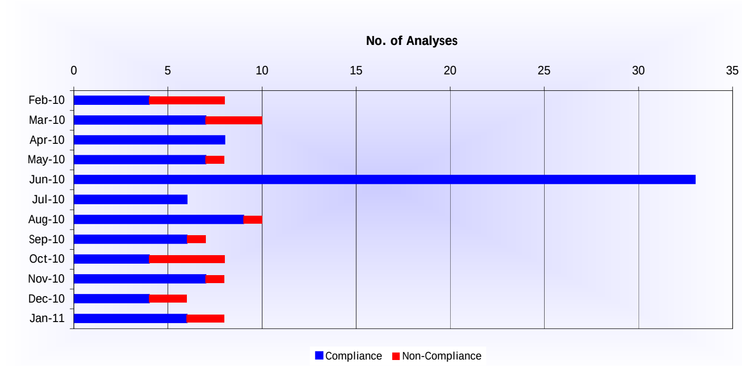
Out of 108 analyses conducted, 13 analyses failed

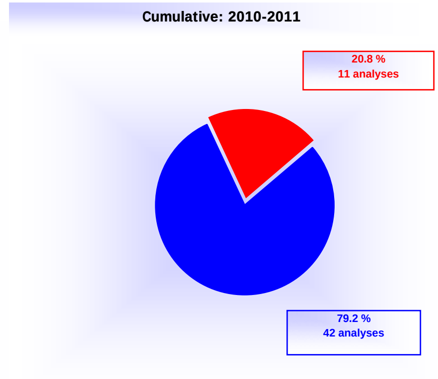
Site	Constituent	Failures	Result
Mushane Final	Turbidity (std: 5 NTU)	3/4 analyses	27.4 - 125 NTU
	Aluminium (std: 500 ug/l)	1/1 analysis	9904 ug/l
Vukile Final	Turbidity (std: 5 NTU)	1/1 analysis	8.34 NTU
Isiminya Final	*E. coli* (std: 0 per 100 ml)	1/4 analysis	41 per 100ml
Ntabaskop Final	Turbidity (std: 5 NTU)	3/4 analyses	9.55 - 21.8 NTU
Emayelisweni Final	Turbidity (std: 5 NTU)	2/2 analyses	6.43 - 25.5 NTU
Masibambisane Final	Aluminium (std: 500 ug/l)	1/1 analysis	680 ug/l
Isindi Final	Turbidity (std: 5 NTU)	1/1 analysis	5.3 NTU

Operations Incidents Report

Cause	Mitigation	Proposed Action
Vukile WW Final: The pressure filters were not backwshed the previous day thus resulting in non-compliances.	The filters were backwashed. Reactive monitoring was conducted after mitgation measures were implemented and the results detected acceptable water quality.	The operators were told to backwash the filters once a day depending on the quality of filtered water.
Esindi WW Final: The bidim on the slow sand filters were dirty.	The bidim was taken out of the filter to be cleaned. Reactive monitoring was conducted after mitgation measures were implemented and the results detected acceptable water quality.	The bidim will be cleaned when the turbidity of filtered water reaches 3.0NTU.
Mushane WW Final: The gasket in the inlet of the pressure filter had no hole to allow water into the filter, this leading to filter bypass. There was also a leak before the filter which reduced the pressure to push water through the filter. The sand level in the filter is also low.	A hole was drilled into the gasket to allow water to pass through it. The leak was closed and the filter was backwashed. Reactive monitoring was conducted after mitgation measures were implemented and the results detected acceptable water quality.	The pressure filter will be backwashed at least once a day depending on the quality of filtered water, and sand will be toppped up.
Emayelisweni WW Final: There is inadequate sand in the pressure filter. The chlorine overdose was due to a power failure at the abstraction, and the dosing pumps at the plant were not switched off.	The dosing pumps were switched off until the correct chlorine residual concentration was attained. Reactive monitoring was conducted after mitgation measures were implemented and the results detected acceptable water quality.	The operator was told to continously check the plant flow and do chlorine tests as scheduled so that problems can be detected early.
Isiminya WW Final: The dosing pump was faulty.	Floaters were used while the pump was changed. Reactive monitoring was conducted after mitgation measures were implemented and the results detected acceptable water quality.	The operator was told to use floaters in the event of faulty dosing pump, and also report faulty eqiupment early to avoid our of ranges.
Ntabaskop Final: The bidim was dirty due to colapsed abstraction wall.	The abstraction wall was repaired and bidim was washed. Reactive monitoring was conducted after mitgation measures were implemented and the results detected acceptable water quality	The operator was told to wash bidim when turbidity reaches 3 NTU and put the plant off line if raw wate turbidity is above 50 NTU to allow for it to decrease to treatable levels.

Isithundu Unimproved Water Supply



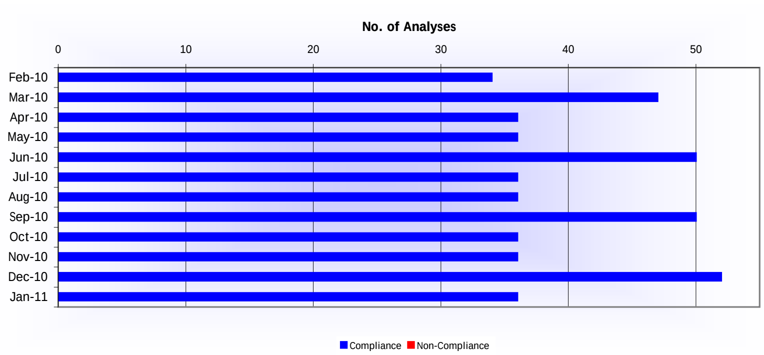


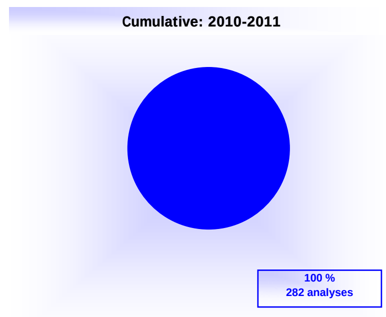
Out of 8 analyses conducted, 2 analyses failed			
Site	**Constituent**	**Failures**	**Result**
Isithundu WW	Turbidity (std: 5 NTU)	2/4 analyses	5.3 - 10 NTU

Operations Incidents Report

Cause	Mitigation	Proposed Action
There was inadequate backwashing and cleaning of clarifiers.	The filters were backwashed and clarifiers were cleaned. Reactive monitoring was conducted after mitgation measures were implemented and the results detected acceptable water quality.	An operator should be employed at this site, as backwashing and cleaning of clarifiers cannot be timed as it depends on the raw water quality.

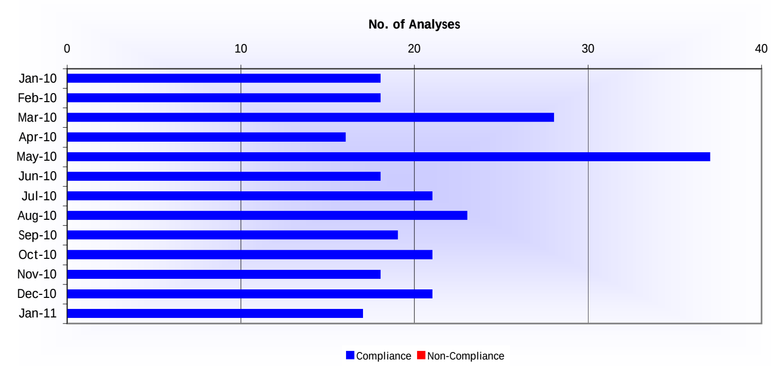
Amanzimtoti WW (50.04 Ml/d)

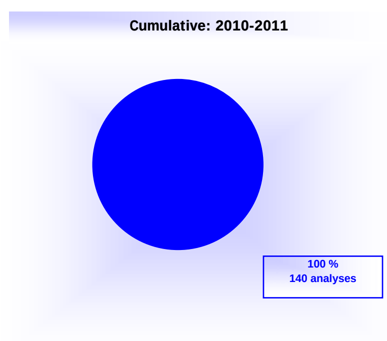




All analyses complied with the required standard.

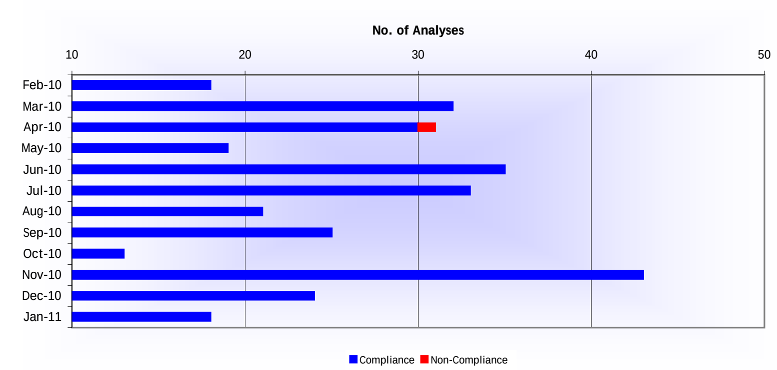
Amanzimtoti Off Site Reservoirs

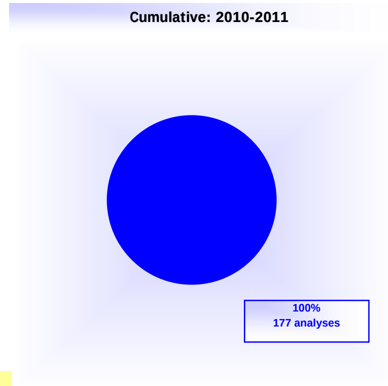




All analyses complied with the required standard.

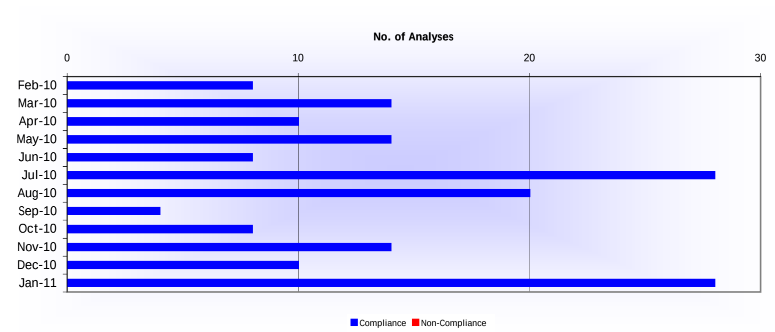
Umzinto WW (9.75 Ml/d)

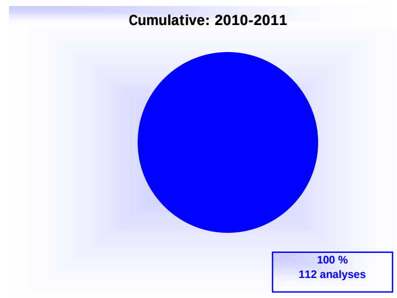




All analyses complied with the required standard.

Mthwalume WW (8.28 Ml/d)





All analyses complied with the required standard.

Appendix 1: list of final water sites

List of sites:

Midmar WW Final

Midmar Off-Site Reservoirs

HD Hill Reservoirs 1 and 2, Howick-Mixed Reservoir, Howick West Reservoir, Mpophomeni Reservoir, Hilton Reservoir, Groenkloof Reservoir, Sweet Waters Reservoir, World's View Reservoir, Blackridge Reservoir, Thornville Reservoir, Ashburton Reservoir, Umlaas Road Reservoir, Cato Ridge Reservoir and Georgedale Reservoir.

DV Harris WW Final

DV Harris Off-Site Reservoirs

Clarendon Reservoir, Belfort Reservoir, Wartburg Reservoir, Pump Station Wartburg, Table Mountain Intermediate Reservoir and Table Mountain Reservoir.

Ixopo WW Final

Inland Reticulation Reservoirs

Albert Falls Domestic Reservoir, Dominican Reservoir, Mpolweni Reservoir Low and High, Vulindlela Reservoir 1, 10, 16 and 19, Hopewell Reservoir.

Durban Heights WW Final

Wiggins WW Final

Central Reticulation Reservoirs

Nagle Domestic, Maphephetwa Reservoir 1

Hazelmere WW Final

Hazelmere Off-Site Reservoirs

Avondale Reservoir, La Mercy Reservoir, Ndwedwe Reservoirs 1 to 5 and Honolulu Reservoir.

Ogunjini WW Final

Mvoti WW Final

Mvoti Off-site Reserviors

Mvoti WW Reservoir 1, Mvoti WW Reservoir 2, Mvoti WW Reservoir 3

Bulwer WW Final

North Coast Reticulation Schemes

Blythedale Borehole Final, Driefontein Borehole Final, Zinkwazi Borehole Final, Blythedale Borehole Reservoir, Zinkwazi Borehole Reservoir, Emayilisweni WW Final, Esidumbini WW Final, Montobello WW Final, Ntabaskop Phase 1 Final, Emayilisweni Reservoir, Isiminya Standpipe, Montobello Reservoir, Ntabaskop Phase 1 Standpipe, Deda/Nkivane Final, Glendale Heights Final, Glendale Final, Kwasathane Final, Madundube Final, Phambela Final, Isithundu WW Final, Mbitane WW Final, Masibambisane WW Final, Mphumulo WW Final, Mushane WW Final, Vukile Final , Isithundu Reservoir, Masibambisane Reservoir, Mphumulo Reservoir, Vukile Reservoir, Balkomb Final, Ekwazini Final, Maqumbi/Otimati Borehole, Ndukwende Final, Ntunjambili Final, Ntunjambili Final 1, Ntunjambili Final 2, Thafamasini Final, Ntunjambili

Isithundu Unimproved Water Supply

Amanzimtoti WW Final

Amanzimtoti Off-site reservoirs

South Coat Pipeline at Toti, South Coast Pipeline at Craigieburn, South Coast Scottsburgh

Umzinto WW Final

Mthwalume WW Final

Appendix 2: SANS 241: 2006, Edition 6, Drinking Water

Determinand	Unit	Class I	Class II	Class II water consumption period,[a] max.
Physical and organoleptic requirements				
Colour (aesthetic)	mg/L Pt	< 20	20 – 50	No limit[b]
Conductivity at 25 °C (aesthetic)	mS/m	< 150	150 – 370	7 years
Dissolved solids (aesthetic)	mg/L	< 1 000	1 000 – 2 400	7 years
Odour (aesthetic)	TON	< 5	5 – 10	No limit[b]
pH value at 25 °C (aesthetic/ operational)	pH units	5,0 – 9,5	4,0 – 10,0	No limit[c]
Taste (aesthetic)	FTN	< 5	5 – 10	No limit
Turbidity (aesthetic/operational/ indirect health)	NTU	< 1	1 – 5	No limit[d]
Free chlorine	mg/l			
Total Chlorine	mg/l			
Chemical requirements — macro-determinand				
Ammonia as N (operational)	mg/L	< 1,0	1,0 – 2,0	No limit[d]
Calcium as Ca (aesthetic/operational)	mg/L	< 150	150 – 300	7 years
Chloride as Cl^- (aesthetic)	mg/L	< 200	200 – 600	7 years
Fluoride as F^- (health)	mg/L	< 1,0	1,0 – 1,5	1 year
Magnesium as Mg (aesthetic/ health)	mg/L	< 70	70 – 100	7 years
(Nitrate and nitrite) as N (health)	mg/L	< 10	10 – 20	7 years
Potassium as K (operational/health)	mg/L	< 50	50 – 100	7 years
Sodium as Na (aesthetic/health)	mg/L	< 200	200 – 400	7 years
Sulfate as $SO_4^{=}$ (health)	mg/L	< 400	400 – 600	7 years
Zinc as Zn (aesthetic/health)	mg/L	< 5,0	5,0 – 10	1 year
Aluminium as Al (health)	µg/L	< 300	300 – 500	1 year
Antimony as Sb (health)	µg/L	< 10	10 – 50	1 year
Arsenic as As (health)	µg/L	< 10	10 – 50	1 year
Cadmium as Cd (health)	µg/L	< 5	5 – 10	6 months
Total Chromium as Cr (health)	µg/L	< 100	100 – 500	3 months
Cobalt as Co (health)	µg/L	< 500	500 – 1 000	1 year
Copper as Cu (health)	µg/L	< 1 000	1 000 – 2 000	1 year
Cyanide (recoverable) as CN^- (health)	µg/L	< 50	50 – 70	1 week
Iron as Fe (aesthetic/ operational)	µg/L	< 200	200 – 2 000	7 years[b]
Lead as Pb (health)	µg/L	< 20	20 – 50	3 months
Manganese as Mn (aesthetic)	µg/L	< 100	100 – 1 000	7 years
Mercury as Hg (health)	µg/L	< 1	1 – 5	3 months
Nickel as Ni (health)	µg/L	< 150	150 – 350	1 year
Selenium as Se (health)	µg/L	< 20	20 – 50	1 year
Vanadium as V (health)	µg/L	< 200	200 – 500	1 year
Chemical requirements — organic determinand				
Dissolved organic carbon as C (aesthetic/health)	mg/L	< 10	10 – 20	3 months[e]
Total trihalomethanes (health)	µg/L	< 200	200 – 300	10 years[f]
Phenols (aesthetic/health)	µg/L	< 10	10 – 70	No limit[b]

[a] The limits for the consumption of class II water are based on the consumption of 2 L of water per day by a person of mass 70 kg over a period of 70 years. Column 4 shall be applied

[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.

[e] When dissolved organic carbon is deemed of natural origin, the consumption period can be extended.

[f] This is a suggested value because trihalomethanes have not been proven to have any effect on human health.

Determinand	Units	Operational Alert level	Standard
Bacteriological requirements			
E.coli	per 100 ml		0
Coliforms	per 100 ml	10	
CC37	per ml	5000	
Cryptosporidium	count/10L	1	
Giardia	count/10L	1	
Coliphages	count/10 mL	1	

3.1 Trade Effluent and Waste Water Audit Summary Report January 2011

Purpose

Trade Effluent Audit: To report on compliance of Pietermaritzburg industrial effluent discharges to sewer, with the water quality standards stipulated in the Msunduzi Municipal by-laws.

Wastewater Audit: To report on compliance of all Umgeni Water Wastewater Works effluent discharges with legislative requirements.

Introduction

Five Wastewater Works were audited against the relevant legislative requirements:

Primary business

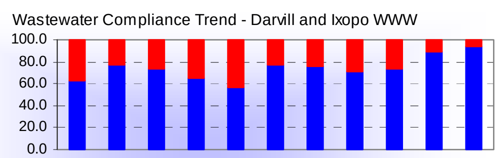
- ➔ Darvill WWW: Permit 2045B and DWA General and Special Phosphorus Standard.
- ➔ Ixopo and Albert Falls North and South WWW: DWA General Authorisation General Limit.

Other business

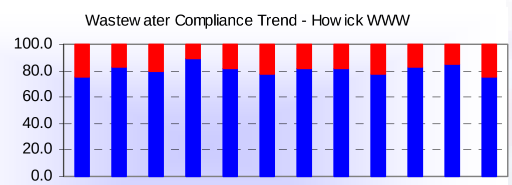
- ➔ Howick WWW: Permit 1887B and DWA General and Special Phosphorus Standard.

SUMMARY: FINDINGS AND INTERVENTIONS

WASTEWATER COMPLIANCE TREND



	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	11-Jan
% Non-Compliance	36.8	22.7	26.8	34.8	43.6	23.4	24.5	29.0	26.5	10.8	6.3
% Compliance	63.2	77.3	73.2	65.2	56.4	76.6	75.5	71.0	73.5	89.2	93.7



	Feb-	Mar-	Apr-	May-	Jun-	Jul-	Aug-	Sep-	Oct-	Nov-	Dec-	Jan-
% Non-Compliance	25.0	16.7	20.8	10.9	17.8	22.2	17.8	17.8	22.6	16.7	15.3	25.0
% Compliance	75.0	83.3	79.2	89.1	82.2	77.8	82.2	82.2	77.4	83.3	84.7	75.0

COMMENTS

WASTEWATER WORKS

During the month of January 2011, the combined percentage compliance at Darvill and Ixopo WWW's increased from 89.2% to 93.7%. Non-compliances at Darvill WWW were due to rain related high inflows that resulted in the storm dam filling and spilling for 2 separate periods in January. This resulted in the final effluent quality becoming compromised.

The percentage compliance at Howick WWW decreased from 84.7% to 75.0%. Non compliances were due to recent heavy rainfall and equipment breakdown constraints leading to sludge bulking and solids carryover.

3.2 Trade Effluent

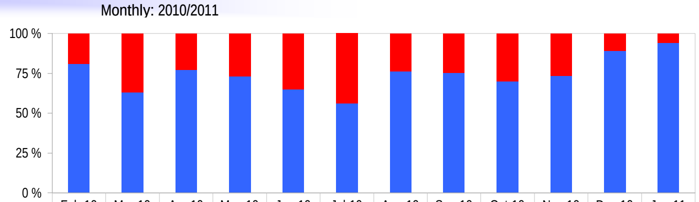
The following is a list of industries that did not comply with their permit in terms of the Msunduzi Municipal By-laws for the month of January 2011

Name Of Industry	Parameter Out Of Range	Notifications
ES And LC Manufacturing F F S Refiners KZN Tissues 1 Wig Rd KZN Tissues Site 2 Leather From Hart Man Truck & Bus Trox Hulamin Site 1 Unifoods Ramsey Engineering	Zinc Zinc Suspended solids Suspended solids SRP pH –re-inspected Zinc Fluoride pH –re-inspected Cyanide	On-site written notifications were issued for pH and conductivity. Non-compliance letters will be issued to the respective industries, for all out of range results by Msunduzi Municipality.

3.3 Waste Water Audit: January 2011

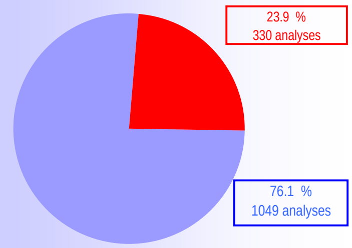
Darvill WWW

Monthly: 2010/2011



	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11
Volume (Ml/d)	102.5	83.7	80.7	76.5	69.5	70.1	71.3	69.4	78.0	89.9	97.1	101.8
Compliance	157	138	142	161	127	121	113	153	140	158	172	192
Analyses	194	219	184	220	195	216	148	203	200	215	193	204
% Non-compliance	19.1 %	37.0 %	22.8 %	26.8 %	34.9 %	44.0 %	23.6 %	24.6 %	30.0 %	26.5 %	10.9 %	5.9 %
% Compliance	80.9 %	63.0 %	77.2 %	73.2 %	65.1 %	56.0 %	76.4 %	75.4 %	70.0 %	73.5 %	89.1 %	94.1 %

Cumulative: 2010/2011



Standards
Darvill wastewater treatment works
License number: 21065561

Total number of analyses conducted were 204 of which 12 did not comply with the required limits.

Non compliance with standards: January 2011

Soluble Reactive Phosphorus (SRP) (std 1 mg/l) 2/21 analyses failed: 1100 - 1200 ug/l

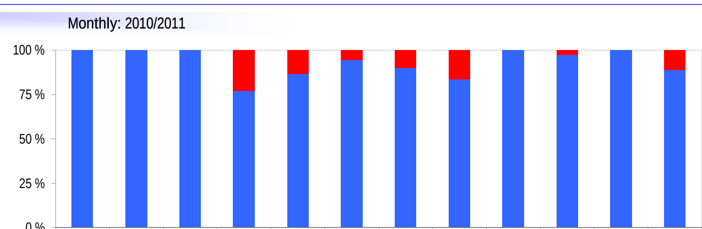
E.coli (std: 0 per 500ml) 7/21 analyses failed: 610 - 517000 per 100ml

Chlorine (std 0 - 0.3 mg/l) 3/21 analyses failed: 0.4 - 1.30 mg/l

Comments: Rain related high inflows resulted in the storm dam filling and spilling over two occasions January 2011 which resulted in the final effluent quality being compromised and resulted in *E. coli* out of ranges. Some over chlorination was partly in compensation for storm dam spills, but on other occasions was due to overdosing as a result of to lower than expected chlorine demand (very clean effluent) and reduced contact time (by-passing of maturation river during cleaning). The SRP non-compliance was linked to a trade effluent problem.

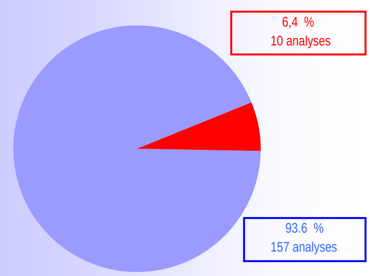
Ixopo WWW

Monthly: 2010/2011



	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11
Volume (Ml/d)	0.53	0.37	0.26	0.26	0.32	0.70	0.80	1.25	1.42	1.32	1.01	1.10
Compliance	26	18	18	20	26	17	27	15	18	36	18	16
Analyses	26	18	18	26	30	18	30	18	18	37	18	18
% Non-compliance	0.0 %	0.0 %	0.0 %	23.1 %	13.3 %	5.6 %	10.0 %	16.7 %	0.0 %	2.7 %	0.0 %	11.1 %
% Compliance	100.0 %	100.0 %	100.0 %	76.9 %	86.7 %	94.4 %	90.0 %	83.3 %	100.0 %	97.3 %	100.0 %	88.9 %

Cumulative: 2010/2011



Standards
General Authorisation - General Limit

Total number of analyses conducted were 18 of which 2 did not comply with the required limits.

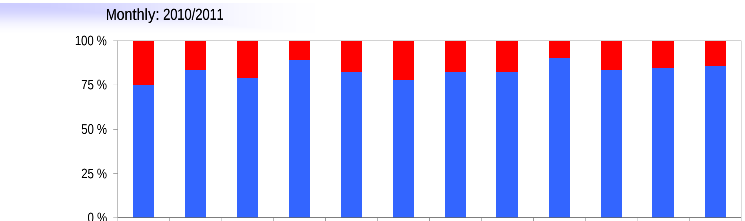
Non compliance with standards: January 2011

E.coli (std: 0 per 500ml) 1/2 analysis failed: 7400 per 100ml

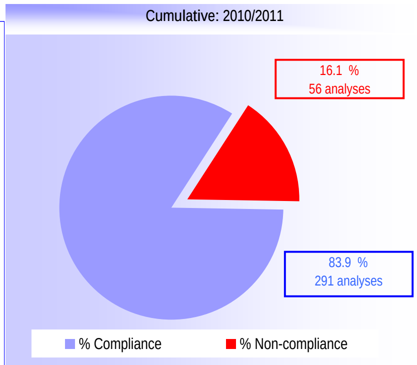
Chlorine (std 0 - 0.25 mg/l) 1/2 analysis failed: 1.20 mg/l

Comments: Chlorine dosing errors, both in over- and under-dosing resulted in problems at the Ixopo WWW. The issue was raised with the Operations staff concerned. Other effluent results were fully compliant.

Howick WWW



	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11
Volume (Ml/d)	5.4	4.6	3.1	5.2	3.6	3.9	3.0	5.0	5.0	5.0	7.0	5.0
Compliance	27	50	38	57	37	35	37	60	48	30	50	31
Analyses	36	60	48	64	45	45	45	73	53	36	59	36
% Non-compliance	25.0 %	16.7 %	20.8 %	10.9 %	17.8 %	22.2 %	17.8 %	17.8 %	9.4 %	16.7 %	15.3 %	13.9 %
% Compliance	75.0 %	83.3 %	79.2 %	89.1 %	82.2 %	77.8 %	82.2 %	82.2 %	90.6 %	83.3 %	84.7 %	86.1 %



Standards
Howick wastewater treatment works
License Number: 21067202

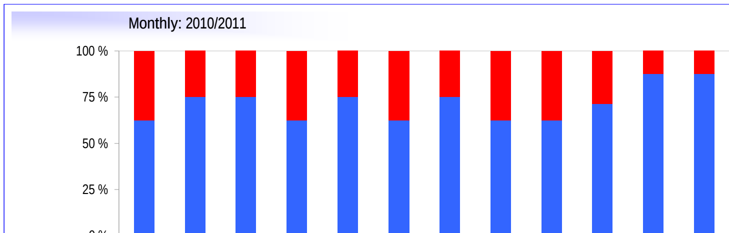
Total number of analyses conducted were 36 of which 5 did not comply with the required limits.

Non compliance with standards: January 2011

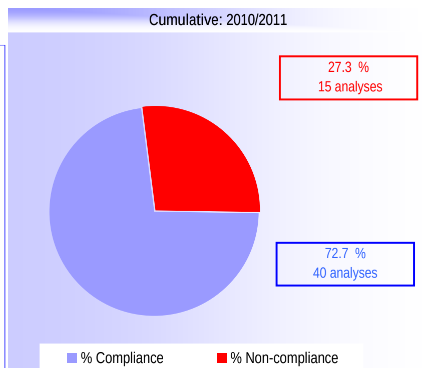
E.coli (std: 500 per 100ml) 3/4 analyses failed: 1200 - 548000 per 100ml
Suspended solids (std: 25 mg/l) 1/4 analysis failed: 1107 mg/l
Chemical Oxygen Demand (std: 75 mg/l) 1/4 analysis failed: 1397 mg/l

Comments: Chemical Oxygen Demand, *E. coli* and suspended solids non-compliances were caused by significant carryover that resulted partly to wet weather and related high flows at times. Equipment breakdown constraints also lead to sludge bulking, carryover of solids and inadequate disinfection occurring. DWA were informed at the time of the severe carryover event.

Albert Falls - North WWW



	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11
Compliance	5	6	6	5	6	5	6	5	5	5	7	7
Analyses	8	8	8	8	8	8	8	8	8	7	8	8
% Non-compliance	37.5 %	25.0 %	25.0 %	37.5 %	25.0 %	37.5 %	25.0 %	37.5 %	37.5 %	28.6 %	12.5 %	12.5 %
% Compliance	62.5 %	75.0 %	75.0 %	62.5 %	75.0 %	62.5 %	75.0 %	62.5 %	62.5 %	71.4 %	87.5 %	87.5 %



Standards
General Authorisation - General Limit

Total number of analyses conducted were 8 of which 1 did not comply with the required limits.

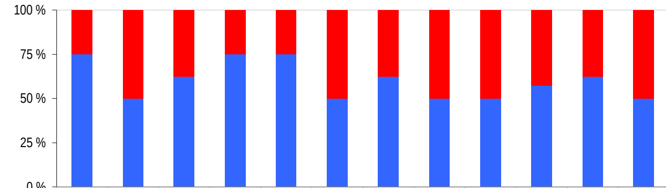
Non compliance with standards: January 2011

E.coli (std: 1000 per 100ml) 1/1 analysis failed: 5900 per 100ml

Comments: The new treatment plant is functioning well. Disinfection is yet to be implemented at this site.

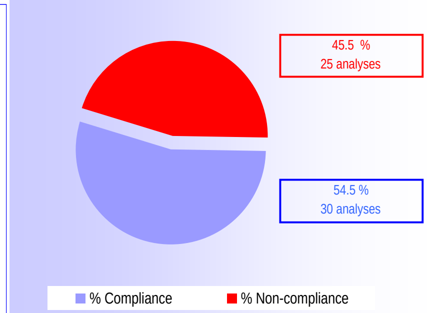
Albert Falls - South WWW

Monthly: 2010/2011



	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11
Compliance	6	4	5	6	6	4	5	4	4	4	5	4
Analyses	8	8	8	8	8	8	8	8	8	7	8	8
% Non-compliance	25.0 %	50.0 %	37.5 %	25.0 %	25.0 %	50.0 %	37.5 %	50.0 %	50.0 %	42.9 %	37.5 %	50.0 %
% Compliance	75.0 %	50.0 %	62.5 %	75.0 %	75.0 %	50.0 %	62.5 %	50.0 %	50.0 %	57.1 %	62.5 %	50.0 %

Cumulative: 2010/2011



Standards

General Authorisation - General Limit

Total number of analyses conducted were 8 of which 4 did not comply with required limits.

Non compliance with standards: January 2011

E .coli (std: 1000 per 100 ml)[5]	1/1 analysis failed: 79000 per 100 ml
Chemical Oxygen Demand (std: 75 mg/l)	1/1 analysed failed: 280 mg/l
Ammonia (std: 3 mg/l)[5]	1/1 analysis failed: 20.4 mg/l
Suspended solids (std: 25 mg/l)[1]	1/1 analysis failed: 372 mg/l

Comments: Refurbishment is still to be undertaken at this site, now that refurbishment at the Albert Falls North site has been completed. Load shifting to the Northern site has been recommended.

`