

## **WATER QUALITY REPORT ON POTABLE WATER AND EFFLUENT DISCHARGES – HARRY GWALA DISTRICT MUNICIPALITY**



December 2014

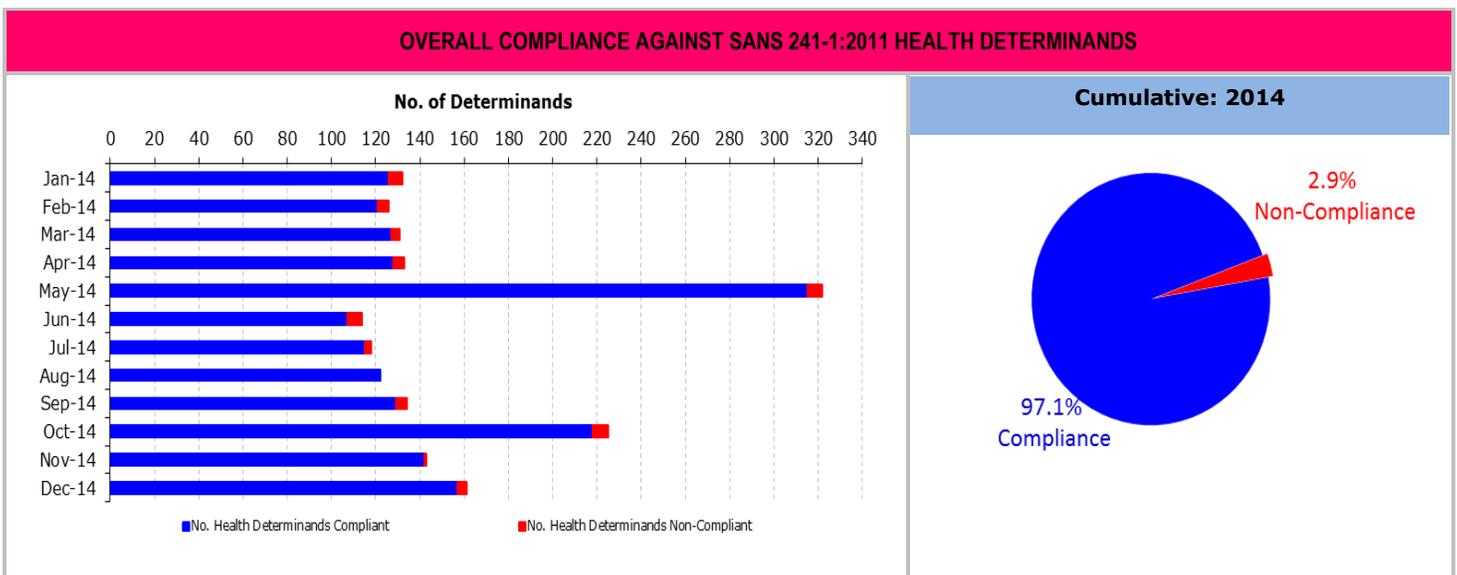
## Potable Water Quality Report-December 2014

A total of 50 sites were visited of which 47 sites were sampled and analyzed in December. The collected potable water samples were analyzed for key water quality indicators and assessed against SANS 241-1:2011 drinking water standards (Table 2); the results are presented below:

### NOTES

**Water quality assessment:** The assessment of the quality of drinking water is based on standard limits of the SANS 241-1:2011 specifications. The health-related standards are based on the consumption of 2L of water per day by a person of a mass of 60kg over a period of 70 years.

**% Compliance:** is calculated based on the results failing to comply with the standard limits of SANS 241-1:2011. Compliance is further categorized as Operational Compliance, Aesthetic Compliance and Health (Acute & Chronic) Compliance

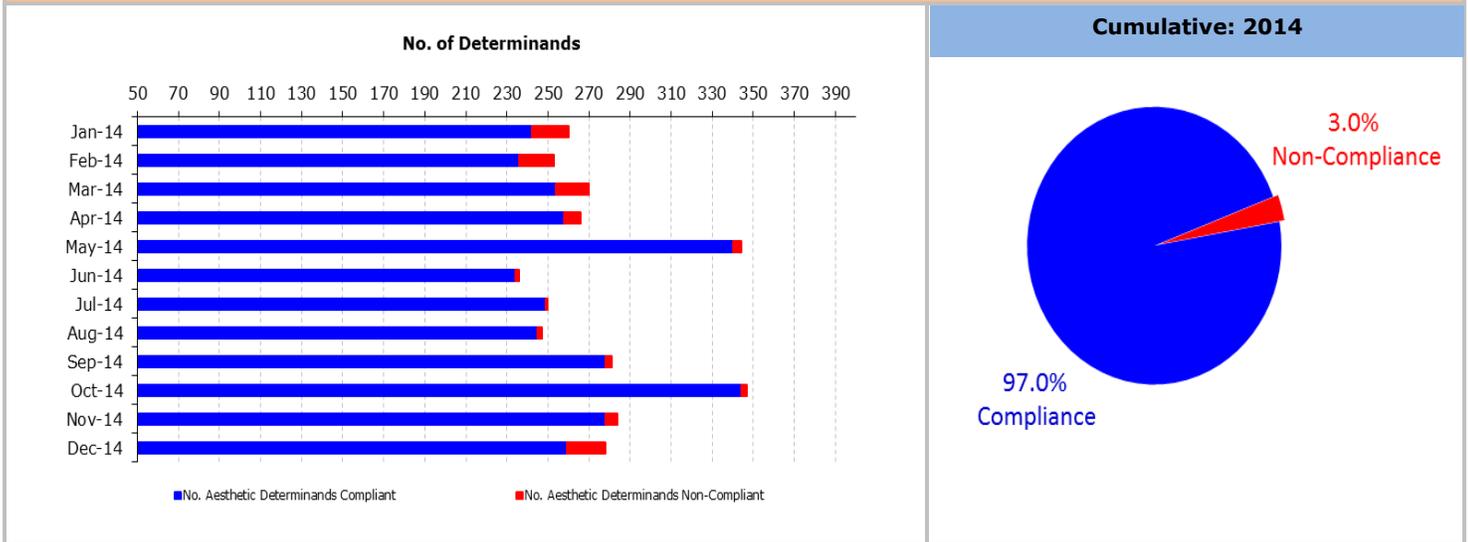


The overall potable water compliance against SANS 241-1:2011 health determinands for the period January 2014 up to December 2014 is 97.1% with 2.9% failing the standard limits.

**E. coli** concentration in **Bulwer Final** (3 per 100mL), **Bulwer Garage Reticulation** (3 per 100mL), **Washbank Final** (11 per 100mL) and **Washbank Ethafeni Reticulation** (9 per 100mL) exceeded the health standard limit of 0 per 100mL.

This is mainly due to inadequate chlorine levels in water resulting in poor disinfection. Continuous consumption of contaminated water may lead to gastro-intestinal related diseases such as gastroenteritis.

**OVERALL COMPLIANCE AGAINST SANS 241-1:2011 AESTHETIC DETERMINANDS**

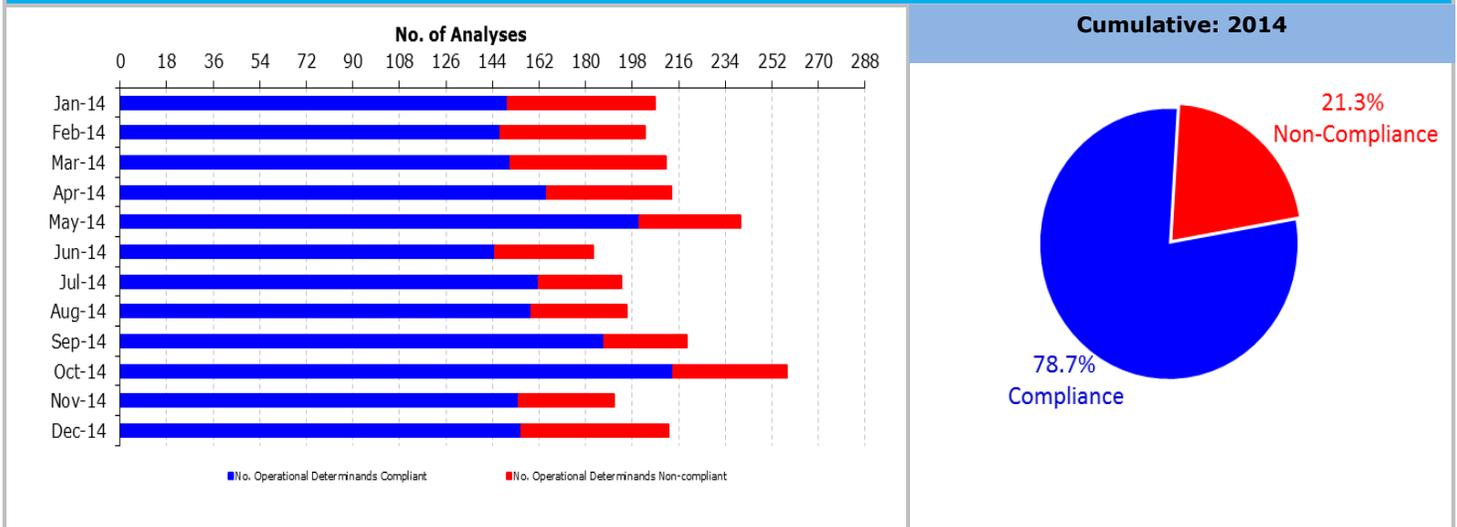


The overall potable water compliance against SANS 241-1:2011 aesthetic determinands for the period January 2014 up to December 2014 is 97.0% with 3.0% failing the standard limits.

Turbidity concentrations in **Bulwer Final** (9.5 NTU), **Bulwer Garage Reticulation** (9.4 NTU), **Creighton Shop Reticulation** (10.3 & 7.3 NTU), **Himville Reticulation from Underberg** (15.6 NTU), **Umzimkulu Total Garage Reticulation** (26.8 NTU), **Nokweja Standpipe A** (5.6 & 14.6 NTU), **Nokweja Standpipe B** (15.1 NTU), **Riverside Final** (28.7 & 23.5 NTU), **Riverside Reticulation** (13.2 & 23.7 NTU), **Esiqanduleni Final** (8 & 34.7 NTU), **Esiqanduleni Reticulation** (28.5 NTU), **Underberg Final** (11.0 NTU), **Washbank Final** (11.5 NTU) and **Washbank Ethafeni Reticulation** (9.9 NTU) exceeded the aesthetic standard limit of 5 NTU.

The presence of turbidity in water results in a cloudy or muddy appearance; this may reduce disinfection effectiveness and contribute to taste and colour of the water.

OVERALL COMPLIANCE AGAINST SANS 241-1:2011 OPERATIONAL DETERMINANDS



The overall potable water compliance against SANS 241-1:2011 operational determinands for the period January 2014 up to December 2014 is 78.7% with 21.3% failing the standard limits.

**Turbidity** concentration in **Bulwer Final** (9.5 NTU), **Bulwer Garage Reticulation** (9.4 NTU), **Creighton Final** (1.5 & 2.7 NTU), **Creighton Shop Reticulation** (10.3 & 7.3 NTU), **Franklin Final** (1.6 NTU), **Himville Reticulation from Underberg** (15.6 & 2.2 NTU), **Ibisi Final** (1.6 & 1.5 NTU), **Ibisi Police Station Reticulation** (2.0 & 2.9 NTU), **Jolivet Reticulation from Vulamehlo** (2.8 & 3.0 NTU), **Umzimkulu Final** (2.7 NTU), **Umzimkulu Total Garage Reticulation** (26.8 & 4.0 NTU), **Umzimkulu Informal Settlement** (1.4 & 4.1 NTU), **Nokweja Standpipe A** (5.6 & 14.6 NTU), **Nokweja Standpipe B** (4.3 & 15.1 NTU), **Rietvlei High School** (1.2 NTU), **Riverside Final** (28.7 & 23.5 NTU), **Riverside House Reticulation** (13.2 & 23.7 NTU), **Esiqanduleni Final** (8 & 34.7 NTU), **Esiqanduleni Reticulation** (2.1 & 28.5 NTU), **St Appolinaris Final** (2.1 & 3.6 NTU), **St Appolinaris Hospital Reticulation** (2.1 NTU), **Underberg Final** (11 & 2.2 NTU), **Washbank Final** (1.2, 11.5 & 2.4 NTU) and **Washbank Ethafeni Reticulation** (1.6, 9.9 & 2.5 NTU) exceeded the operational standard limit of 1 NTU for turbidity.

The presence of turbidity in water results in a cloudy or muddy appearance; this may reduce disinfection effectiveness and contribute to taste and colour of the water.

The **Aluminium** concentrations in **Riverside Final** (810 & 540 µg Al/L), **Esiqanduleni Final** (8564 µg Al/L), **St Appolinaris Final** (328 & 359 µg Al/L), **Underberg Final** (4952 µg Al/L) and **Washbank Final** (847, 575 & 684 µg Al/L) exceeded the operational standard limit of 300 µg Al/L.

The main effects of Aluminium in domestic water are aesthetic, relating to discolouration in the presence of iron and manganese. Prolonged exposure to Aluminium has been implicated in chronic neurological disorders such as Alzheimer's disease. It is, however, not clear whether the presence of Aluminium causes such conditions or is an indicator of other

factors. Therefore, the link between Aluminium in water and the adverse effects on human health remains to be conclusively identified.

**Heterotrophic plate counts** in **Kokstad Truck Shop Garage** (>1000 per mL), **Rietvlei High School Reticulation** (>1000 per mL), **Esiqanduleni Final** (>1000 per mL) and **Esiqanduleni Reticulation** (>1000 per mL) exceeded the operational standard limit of 1000 per mL. This indicates inadequate disinfection of the water due to inadequate chlorine contacts times or chlorine levels

All other results were well within the SANS 241-1:2011 drinking standard limits.

## **ADDITIONAL OPERATIONAL ALERT INDICATORS**

The **Free Chlorine** levels in **Bulwer Final** (5 & 19/12), **Bulwer Garage Reticulation** (5 & 19/12), **Creighton Final** (18/12), **Creighton Shop Reticulation** (11 & 18/12), **Franklin Final** (1 & 29/12), **Franklin Police Station** (1, 15 & 29/12), **Himeville Reticulation from Underberg** (12 & 24/12), **Hlanganani Final** (8/12), **Ibisi Final** (4/12), **Ibisi Police Station** (4 & 31/12), **Jolivet Reticulation from Vulamehlo** (9 & 23/12), **Kokstad Khanyiselani Reticulation** (8/12), **Kokstad Bongweni Correctional Service Reticulation** (22/12), **Shayamoya Reticulation** (8 & 22/12), **Truck Shop Garage Reticulation** (8 & 22/12), **Nokweja Standpipe A** (20/12), **Nokweja Standpipe B** (10 & 18/12) **Rietvlei High School Reticulation** (4/12), **Riverside Final & Reticulation** (11 & 18/12), **Esiqanduleni Final and Reticulation** (9 & 23/12), **St Appollinaris Hospital** (11 & 18/12), **Underberg Final** (12/12), **Washbank Final and Reticulation** (4, 18 & 31/12) is below the Umgeni Water recommended limit of 0.5 mg/L. **Low chlorine** is mainly associated with inefficient/inadequate dosing systems or long retention times of treated water in reservoirs.

**Table 1: MONTHLY SUMMARY OF FINAL WATER COMPLIANCE FOR INDIVIDUAL SITES**

SITE NAMES	Operational Limits			Aesthetic Limits			Health Limits (Acute & Chronic)		
	No of analyses done	% Compliance	Non-Compliant Analyses	No of analyses done	% Compliance	Non-Compliant Analyses	No of analyses done	% Compliance	Non-Compliant Analyses
Bulwer Final	4	75%	Turbidity	6	83.3%	Turbidity	4	75%	<i>E. coli</i>
Bulwer Garage Reticulation	4	75%	Turbidity	6	83.3%	Turbidity	4	75%	<i>E. coli</i>
Creighton Final	8	75%	2Turbidities	8	100%	-	4	100%	-
Creighton Shop Reticulation	6	66.7%	2Turbidities	7	71.4%	2Turbidities	4	100%	-
Franklin Final	12	91.7%	Turbidity	14	100%	-	6	100%	-
Franklin Police Station Reticulation	9	100%	-	14	100%	-	6	100%	-
Himeville Final from Underberg	6	66.7%	2Turbidities	8	87.5%	Turbidity	4	100%	-
Hlanganani Final	4	100%	-	8	100%	-	4	100%	-
Hlanganani Clinic Reticulation	4	100%	-	8	100%	-	4	100%	-
Hlokozi Final RRT from Vulamehlo	No Tap	No Flow							
Ibisi Final	10	80%	2Turbidities	17	100%	-	29	100%	-
Ibisi Police Station Reticulation	6	66.7%	2Turbidities	8	100%	-	4	100%	-
Jolivet RRT from Vulamehlo	6	66.7%	2Turbidities	4	100%	-	4	100%	-
Kokstad Final	8	100%	-	10	100%	-	4	100%	-
Kokstad Truck Shop Garage Reticulation	6	83.3%	Plate Count	10	100%	-	4	100%	-
Kokstad Khanyiselani Reticulation	6	100%	-	10	100%	-	4	100%	-
Kokstad Bongweni Correction Service Reticulation	3	100%	-	5	100%	-	2	100%	-

**Table 1: MONTHLY SUMMARY OF FINAL WATER COMPLIANCE FOR INDIVIDUAL SITES - continued**

SITE NAMES	Operational Limits			Aesthetic Limits			Health Limits (Acute & Chronic)		
	No of analyses done	% Compliance	Non-Compliant Analyses	No of analyses done	% Compliance	Non-Compliant Analyses	No of analyses done	% Compliance	Non-Compliant Analyses
Kokstad Shayamoya Reticulation	6	100%	-	10	100%	-	4	100%	-
Umzimkulu Final	8	87.5%	Turbidity	8	100%	-	4	100%	-
Umzimkulu Total Garage	6	66.7%	2Turbidities	8	87.5%	Turbidity	4	100%	-
Umzimkulu Informal Settlement	6	66.7%	2Turbidities	8	100%	-	4	100%	-
Nokweja Final	8	100%	-	9	100%	-	4	100%	-
Nokweja Standpipe A	6	66.7%	2Turbidities	8	75%	2Turbidities	4	100%	-
Nokweja Standpipe B	6	66.7%	2Turbidities	8	87.5%	Turbidity	4	100%	-
Rietvlei Final	No	Access							
Rietvlei High School Reticulation	3	33.3%	Plate Count, Turbidity	4	100%	-	2	100%	-
Riverside Final	8	50%	2Aluminiums, 2Turbidities	8	75%	2Turbidities	4	100%	-
Riverside (House) Reticulation	6	66.7%	2Turbidities	8	75%	2Turbidities	4	100%	-
Esiqanduleni Final	6	33.3%	Aluminium Plate Count, 2Turbidities	8	75%	2Turbidities	4	100%	-
Esiqanduleni Reticulation	6	50%	Plate Count, 2Turbidities	8	87.5%	Turbidity	4	100%	-
St Appolinaris Final	8	50%	2Aluminiums, 2Turbidities	8	100%	-	4	100%	-
St Appolinaris Hospital Reticulation	6	83.3%	Turbidity	8	100%	-	4	100%	-
Underberg Final	8	62.5%	Aluminium, 2Turbidities	8	87.5%	Turbidity	4	100%	-
Washbank Final	12	50%	3Aluminiums, 3Turbidities	12	91.6%	Turbidity	6	83.3%	<i>E. coli</i>
Washbank Ethafeni Reticulation	9	66.7%	3Turbidities	12	91.6%	Turbidity	6	83.3%	<i>E. coli</i>

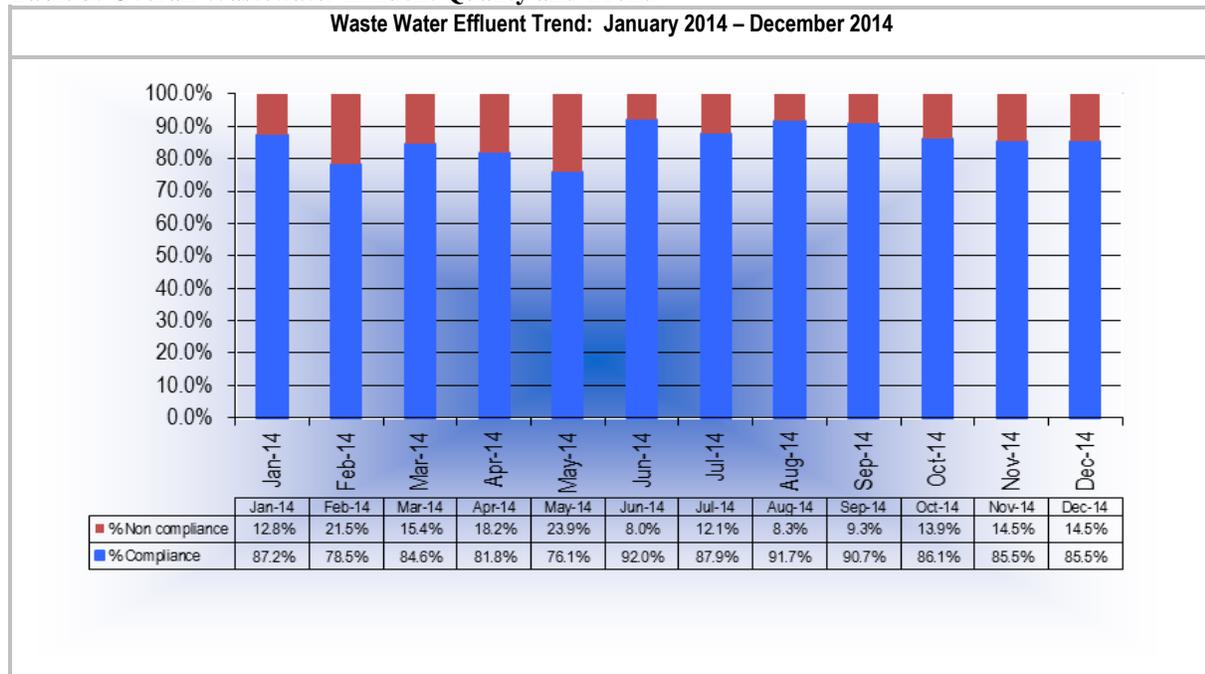
**Table 2: SANS 241-1:2011 DRINKING WATER STANDARD LIMITS**

Determinands	Risk	Units	Standard Limits
Nitrite	Acute Health - 1	mg/l	≤0.9
Nitrate	Acute Health - 1	mg/l	≤11
Sulphate SO <sub>4</sub> <sup>=</sup>	Acute Health - 1	mg/l	≤500
Cyanide (recoverable) as CN <sup>-</sup>	Acute Health - 1	µg/l	≤70
<i>E. coli</i>	Acute Health - 1	count/100 ml	Not detected
Cytopathogenic Viruses	Acute Health - 2	count/10 l	Not detected
Protozoan Parasites Giardia/Cryptosporidium	Acute Health - 2	count/10 l	Not detected
Monochloramine	Chronic Health	mg/L	≤3
Fluoride F <sup>-</sup>	Chronic Health	mg/l	≤1.5
Arsenic as As	Chronic Health	µg/l	≤10
Manganese as Mn	Chronic Health	µg/l	≤500
Antimony as Sb	Chronic Health	µg/l	≤20
Cadmium as Cd	Chronic Health	µg/l	≤3
Total Chromium as Cr	Chronic Health	µg/l	≤50
Cobalt as Co	Chronic Health	µg/l	≤500
Copper as Cu	Chronic Health	µg/l	≤2000
Lead as Pb	Chronic Health	µg/l	≤10
Mercury as Hg	Chronic Health	µg/l	≤6
Nickel as Ni	Chronic Health	µg/l	≤70
Selenium as Se	Chronic Health	µg/l	≤10
Uranium	Chronic Health	µg/l	≤15
Vanadium as V	Chronic Health	µg/l	≤200
Iron as Fe	Chronic Health	µg/l	≤2000
Total organic carbon as C	Chronic Health	mg/l	≤10
Bromoform (CHBr <sub>3</sub> )	Chronic Health	mg/l	≤0.1
Bromodichloromethane (CHCl <sub>2</sub> Br)	Chronic Health	mg/l	≤0.06
Dibromochloromethane (CHClBr <sub>2</sub> )	Chronic Health	mg/l	≤0.1
Chloroform (CHCl <sub>3</sub> )	Chronic Health	mg/l	≤0.3
Microcystin	Chronic Health	µg/l	≤1
Free Chlorine	Chronic Health	mg/L	≤5
Turbidity	Aesthetic	NTU	≤5
Taste or Odor	Aesthetic	-	Inoffensive
Colour	Aesthetic	mg Pt-Co	≤15
Conductivity at 25 degrees	Aesthetic	mS/m	≤170
Ammonia as N	Aesthetic	mg/l	≤1.5
Chloride Cl <sup>-</sup>	Aesthetic	mg/l	≤300
Sodium as Na	Aesthetic	mg/l	≤200
Sulphate SO <sub>4</sub> <sup>=</sup>	Aesthetic	mg/l	≤250
Zinc as Zn	Aesthetic	mg/l	≤5
Manganese as Mn	Aesthetic	µg/l	≤100
Iron as Fe	Aesthetic	µg/l	≤300
Total dissolved solids	Aesthetic	mg/l	≤1200
Phenols	Aesthetic	µg/l	≤10
pH value at 25 degrees	Operational	pH units	≥5 to ≤ 9.7
Turbidity	Operational	NTU	≤1
Aluminium as Al	Operational	µg/l	≤300
Coliphages	Operational	count/10 ml	Not detected
Total coliforms	Operational	count/100 ml	≤10
Heterotrophic Plate Count	Operational	per ml	≤1000

## Waste Water Quality Report-December 2014

A total of 20 sites were visited of which 16 sites were sampled and analyzed in December. The collected wastewater effluent discharges were assessed against relevant effluent standards as prescribed by Department of Water Affairs and Forestry i.e. General Effluent standards for plants >2 ML/d and General Authorization for plants <2ML/d. The results are presented below:

**Table 3: Overall Wastewater Effluent Quality and Trend**



The overall compliance of the monitored sites in December 2014 is **85.5%** with **14.5%** of results non-compliant with the respective limits, as shown in the graph above.

Monthly compliance per site is tabulated below:

**Table 4: Effluent Quality Compliance per site**

Sites > 2 ML/d (General Effluent Standards apply)			
Sites	Total No. of analyses	Non-compliant with effluent standards/limits	Overall % compliance
<b>Kokstad WWW</b>	28	2NH <sub>3</sub> , SS, 2 <i>E. coli</i>	82%
Sites < 2ML/d (General Authorisation Limits apply)			
Sites	Total No. of analyses	Non-compliant with effluent standards/limits	Overall % compliance
<b>Umzimkhulu WWW</b>	11	<i>E. coli</i>	91%
<b>St Appolinaris WWW</b>	11	-	100%

<b>Bulwer WWW</b>	0	No Access-gates locked	-
<b>Underberg WWW</b>	0	No Flow - Pumps not working	-
<b>Riverside WWW</b>	11	<i>E. coli</i>	91%
<b>Polela WWW</b>	11	NH3, SS, <i>E. coli</i>	73%
<b>Franklin WWW</b>	11	SS, COD	82%

The effluents problems/non-compliance was due to *E. coli* counts, exceeding the effluent limits of 0/100 mL for the general standard or 1000/100mL for general authorizations. Adequate Chlorine levels need to be maintained to ensure *E. coli* is within limits.

Other non-complying results are Ammonia, Chemical Oxygen Demand and Suspended Solids. The plant process needs to be optimized to improve the effluent quality at affected sites.

**Table 5: Water quality results – Mzimkhulu River upstream and downstream of Underberg discharge point** Error! Not a valid link.

**Table 6: Water quality results – Kokstad River upstream and downstream of Kokstad discharge point**

Analyses	Kokstad River U/S	Kokstad River D/S	Kokstad River U/S	Kokstad River D/S	General Standards
	08-12-2014	08-12-2014	22-12-2014	22-12-2014	
Total Chlorine (mg/L)		<0.05		<0.05	-
Free Chlorine (mg/L)		<0.05		<0.05	0.1
Conductivity (mS/m)	16.1	16	13.9	14.6	85
Temperature (°C)	21.8	21.5	19.3	21.3	25
pH (pH Units)	7.7	7.4	7.7	7.6	-
Colour (°H)	18.3	14.5	14.1	13.2	40
Nitrite (mg/L)	0.08	<0.05	<0.05	<0.05	-
Nitrate (mg/L)	0.27	0.29	0.28	0.34	-
Ammonia (mg/L)	0.49	0.51	0.11	0.11	10
Suspended solids (mg/L)	17.6	14.4	13.2	20.4	25
SRP (ug/L)	95.3	102	56.6	56	10000
COD (mg/L)	<20	<20	<20	<20	75
Oil & grease (mg/L)	<1.20	<1.20	<1.20	<1.20	2.5
<i>E. coli</i> (per 100 mL)	<b>24196</b>	<b>19863</b>	<b>15531</b>	<b>17329</b>	0