

Water Analysis Contract Scope

1. Description of the *service*

1.1 Executive overview

The purpose of this contract is to appoint a suitable qualified *Contractor* for the Provision of Potable Water Analysis and Operation & Maintenance of Water Treatment Plants in Dx KZN OU.

1.2 *Employer's* requirements for the *service*

The provision of Supervision, Labour, Equipment, Transport and Materials to provide full chemical and bacteriological analysis on an as and when required basis at Eskom Potable Water Boreholes and Jojo Tanks, Lilliput Plants and Calcamite Tank in the KZN Operation Unit, as well as Operation & Maintenance at Eskom Ixopo and Mtubatuba Water Treatment Plants, as per the list of *Sites*.

The *Contractor* is to have a valid Laboratories registration that is SANAS accredited for Chemical and Microbiological Testing Laboratory and an accredited Chemists Certificate.

Service intervals shall be agreed upon with the *Service Manager*. The *Service Manager* will have the right to stop the service at any site, and no compensation will be paid to the *Contractor* in the event of such a stoppage.

1.2.1 Full Chemical and Bacterial Analysis at Eskom Sites of Potable water (Borehole and Jojo Tank)

The *Contractor* is to collect potable water samples from the respective *Sites* and conduct full chemical and bacterial analysis of the collected samples; including providing labour, transport, equipment, material, consumables and all other items required to perform the service. The results of the analysis are to be presented to the *Service Manager* indicating the limits tested and out of specification parameters. Recommendations must be submitted for the correction of sites where samples are not within the specification parameters. All findings and recommendations including the analysis results must be presented in a report format to the *Service Manager*, within two weeks of the sample being taken.

The analysis must be in accordance with SANS 241 and other Water and Environmental regulations.

Specified Testing Methods

Materials/ Products Tested	Type of Tests/ Properties Measured, Range of Measurement	Standard Specifications, Equipment/ Technique used
Raw, potable and waste water	pH at 25°C: Electrometric	1 (Based on SANS 5011)
	Electrical conductivity at 25°C: Conductimetric	2 (Based on SANS 7888)
	Suspended solids at 105°C: Gravimetric	5 (Based on SANS 6049)
	Total solids at 105°C: Gravimetric	59 (Based on Standard Methods for the Examination of Water and Wastewater, (APHA, AWWA, WEF), 21 st Edition)
	Dissolved solids at 180°C: Gravimetric	41 (Based on SANS 5203)
	Turbidity: Nephelometric	4 (Based on Standard Methods for the Examination of Water and Wastewater, (APHA, AWWA, WEF), 21 st Edition)

	Chemical oxygen demand: Titrimetric (dichromate reflux)	3 (Based on Government Gazette 2512)
	Oxygen absorbed: Titrimetric	39 (Based on SANS 5220)
	Chloride: Titrimetric (argentometric)	16 (Based on Standard Methods for the Examination of Water and Wastewater, (APHA, AWWA, WEF), 21 st Edition)
	Alkalinity: Titrimetric	10 (Based on Standard Methods for the Examination of Water and Wastewater, (APHA, AWWA, WEF), 21 st Edition)
	Sodium by AAS	6 & 6A (Based on Standard Methods for the Examination of Water and Wastewater, (APHA, AWWA, WEF), 21 st Edition)
	Potassium by AAS	7 & 7A (Based on Standard Methods for the Examination of Water and Wastewater, (APHA, AWWA, WEF), 21 st Edition)
	Calcium by AAS	8 & 8A (Based on SANS 216)
	Magnesium by AAS	9 & 9A (Based on SANS 1071)
	Copper by AAS	24 & 24A (Based on SANS 5203)
	Zinc by AAS	23 & 23A (Based on SANS 5214)

Materials/ Products Tested	Type of Tests/ Properties Measured, Range of Measurement	Standard Specifications, Equipment/ Technique used
Raw, potable and waste water	Iron by AAS	20 & 20A (Based on SANS 5207)
	Manganese by AAS	19 & 19A (Based on SANS 5209)
	Nickel by AAS	55 & 55A (Based on SANS 6171)
	Chromium by AAS	21 & 21A (Based on SANS 6054)
	Aluminium by AAS	29 & 29A (Based on SANS 6169)
	Lead by AAS	26 & 26A (Based on SANS 5208)
	Fluoride by Colorimetric (SPADNS)	18 (Based on Standard Methods for the Examination of Water and Wastewater, (APHA, AWWA, WEF), 21 st Edition)
	Ammonia as N by FIA	64 (Quickchem method 10-107-06-2-J)
	Nitrate/Nitrite as N by FIA	65 (Quickchem method 10-107-04-1-A)
	Orthophosphate as P by FIA	66 (Quickchem method 10-115-01-1-O)
	Sulphate as SO ₄ by FIA	67 (Quickchem method 10-116-10-1-A)

	Hexavalent Chromium as Cr by FIA	68 (Quickchem method 10-124-13-1-A)
	MICROBIOLOGY	
Raw, potable and waste water	Enumeration of Total Coliforms, Faecal Coliforms and <i>E.coli</i> Standard Plate Count	31 (Membrane Filtration – Based on SANS 5221:2007) 31 (Pour Plate – Based on SANS 5221:2007)

1.2.2 Full Chemical and Bacterial Analysis of Eskom Lilliput Plants

The *Contractor* is to collect samples from the respective *Sites* and conduct full chemical and bacterial analysis of the collected samples; including providing labour, transport, equipment, material, consumables and all other items required to perform the service. The results of the analysis are to be presented to the *Service Manager* indicating the limits tested and out of specification parameters. Recommendations must be submitted for the correction of sites where samples are not within the specification parameters. All findings and recommendations including the analysis results must be presented in a report format to the *Service Manager*, within two weeks of the sample being taken.

The analysis must be in accordance with SANS 241 and other Water and Environmental regulations.

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	Nitrate/Nitrite as N by FIA	65 (Quickchem method 10-107-04-1-A)
	Orthophosphate as P by FIA	66 (Quickchem method 10-115-01-1-O)
	Sulphate as SO ₄ by FIA	67 (Quickchem method 10-116-10-1-A)

	Hexavalent Chromium as Cr by FIA	68 (Quickchem method 10-124-13-1-A)
	MICROBIOLOGY	
Raw, potable and waste water	Enumeration of Total Coliforms, Faecal Coliforms and <i>E.coli</i> Standard Plate Count	31 (Membrane Filtration – Based on SANS 5221:2007) 31 (Pour Plate – Based on SANS 5221:2007)

1.2.3 Full Chemical and Bacterial Analysis of Eskom Calcamite Tank

The *Contractor* is to collect samples from the respective *Site* and conduct full chemical and bacterial analysis of the collected samples; including providing labour, transport, equipment, material, consumables and all other items required to perform the service. The results of the analysis are to be presented to the *Service Manager* indicating the limits tested and out of specification parameters. Recommendations must be submitted for the correction of sites where samples are not within the specification parameters. All findings and recommendations including the analysis results must be presented in a report format to the *Service Manager*, within two weeks of the sample being taken.

The analysis must be in accordance with SANS 241 and other Water and Environmental regulations.

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	MICROBIOLOGY	
Raw, potable and waste water	Enumeration of Total Coliforms, Faecal Coliforms and <i>E.coli</i> Standard Plate Count	31 (Membrane Filtration – Based on SANS 5221:2007) 31 (Pour Plate – Based on SANS 5221:2007)

1.2.4 Full Chemical and Bacterial Analysis at Eskom Mkondeni Car Wash – Annually

The *Contractor* is to collect samples from the respective *Site* and conduct full chemical and bacterial analysis of the collected samples; including providing labour, transport, equipment, material, consumables and all other items required to perform the service. The results of the analysis are to be presented to the *Service Manager* indicating the limits tested and out of specification parameters. Recommendations must be submitted for the correction of sites where samples are not within the specification parameters. All findings and recommendations including the analysis results must be presented in a report format to the *Service Manager*, within two weeks of the sample being taken.

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	Oxygen absorbed: Titrimetric	39 (Based on SANS 5220)
	Chloride: Titrimetric (argentometric)	16 (Based on Standard Methods for the Examination of Water and Wastewater, (APHA, AWWA, WEF), 21 st Edition)
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	Orthophosphate as P by FIA	66 (Quickchem method 10-115-01-1-O)
	Sulphate as SO ₄ by FIA	67 (Quickchem method 10-116-10-1-A)

	Hexavalent Chromium as Cr by FIA	68 (Quickchem method 10-124-13-1-A)
	MICROBIOLOGY	
Raw, potable and waste water	Enumeration of Total Coliforms, Faecal Coliforms and <i>E.coli</i> Standard Plate Count	31 (Membrane Filtration – Based on SANS 5221:2007) 31 (Pour Plate – Based on SANS 5221:2007)

1.2.5 Full Operation and Maintenance of Water Treatment Plant including water analysis

The *Contractor* is to provide Operation and Maintenance services including a support function for Eskom Water Treatment Plants situated at the Mtubatuba CNC and Ixopo CNC sites.

1.2.5.1.1 Mtubatuba CNC Water Treatment Plant

The scope of work for the Operational and maintenance service at the Eskom Mtubatuba Water Treatment Plant on week days 07:00 – 16:00. Should the operations be required on weekends this will be instructed by Service Manager and paid as per weekend/public holidays rate. The scope includes the following:

- Production of potable water within the design capacity of the Water Treatment Plant.
- Provision of Chemicals (as stipulated in Summary of weekly inspection and operations control table below).
- Provision of two (2) onsite operator with a minimum qualification of Matric Certificate with Maths and Science to be on site on week days 07:00 – 16:00.
- Onsite staff must have training on Health & Safety for the following:
 - Water Treatment Plant operation and troubleshooting
 - Use of the on-site safety file
 - Good Laboratory Practice
 - General Health & Safety (Accredited)
 - Dangerous Goods Handling (Accredited)
 - Explain and Perform Fall Arrest Techniques when Working at Heights (Accredited)
 - First Aid Level 1 (Accredited)
 - Perform Basic Fire Fighting (Accredited)
- Operations personnel:
 - Provide trained and competent staff to manage, operate and maintain the plant.
 - Full process control including regular auditing and reporting visits.
- Provide technical and process information, in respect of the performance of the Water Treatment Plant.
- Supply anti-scale, sodium hypochlorite.
- Supply of on-site consumables including reagents for laboratory equipment.
- Maintain a comprehensive database of daily key operating data, to be interrogated as and when required, for the purpose of investigation of any process related trends or concerns.
- At all times act with due care and diligence to ensure that the water produced at the plant is within the required quality specifications, which is to be achieved insofar as the design capability of the plant allows.
- Ensure weekly compliance samples are drawn from the plant and analysed.
- Supply laboratory analytical services as are sufficient to ensure that the plant performance is monitored, measured and maintained and that identified adjustments in chemical dosing is performed.
- Written monthly and weekly reports submitted electronically on the plant performance.

Item	Summary of weekly inspection and operations control
1	Operational on-site analysis of final produced water
	* ph
	* Turbidity
	* Free Chlorine

2	Supply of Sodium Hypochlorite and Flocculent
3	Adjust Dosing Pumps
4	Inspection of equipment
5	Recording of Flows
6	Stock control of Chemicals
7	Making up of correct chemical strength for dosing
8	Checking and replacing Oil in the compressor
9	Back washing of Plant
10	Fitment only of equipment including supply of components
11	Report any equipment faults or poor plant condition to <i>Service Manager</i> timeously.

1.2.5.1.2 Mtubatuba CNC Water Treatment Plant - Supervision

Provision of one (1) Supervisor with a minimum qualification of National Diploma in Analytical Chemistry, Water Care or Chemical Engineering. Visit to the treatment plant on an as and when required basis by the Supervisor, for the purpose of troubleshooting process issues, plant procedure audits and ongoing staff coaching.

1.2.5.1.3 Mtubatuba CNC Water Treatment Plant – Specialist/Chemist

Provision of one (1) Process Specialist/Chemist with a minimum qualification of a Bachelor's Degree in Analytical Chemistry, Water Care or Chemical Engineering and registered with any of the science bodies. Initial and bi-annual visits by the Process Specialist/Chemist for the purpose of troubleshooting, process optimisation, site audit and client feedback.

1.2.5.2.1 Ixopo CNC Water Treatment Plant

The scope of work for the provision of Operation of the Water Treatment Plant at Eskom Ixopo CNC (Ixopo, KZN) on a once a week basis:

- Minor maintenance of the Water Treatment Plant.
- Production of potable water within the design capacity of the Water Treatment Plant.
- Provision of Chemicals (as stipulated in Summary of weekly inspection and operations control table below).
- Provision of one (1) Supervisor with a minimum qualification of National Diploma in Analytical Chemistry, Water Care or Chemical Engineering. Weekly operational visits shall be carried out by the site's Supervisor. This is for the purpose of chemical dosing, stock refill, troubleshooting process issues, plant procedure and stock audits. And on-site lab analysis of plant outlet and final distribution water.
- Staff must have training on Health & Safety
 - Water Treatment Plant operation and troubleshooting
 - Use of the on-site safety file
 - Good Laboratory Practice
 - General Health & Safety (Accredited)
 - Dangerous Goods Handling (Accredited)
- Provide technical, process and maintenance information, in respect of the performance of the Water Treatment Plant.
- Provide on-site analysis to determine sample pH, turbidity and free chlorine.
- Supply of flocculent, sodium hypochlorite and compressor oil.
- Supply of on-site consumables including reagents for laboratory equipment.
- Inspection and fitment of equipment including supply of components.
- Adjust dosing of stock chemicals, prepared for the correct dosing strength.
- Backwashing of the plant.
- Reporting of any equipment faults or poor plant condition to *Service Manager* timeously.
- Maintain a comprehensive database of all weekly key operating data and reported maintenance, to be interrogated as and when required, for the purpose of investigation of any process related trends or concerns.
- At all times act with due care and diligence to ensure that the water produced at the plant is within the required quality specifications, which is to be achieved insofar as the design capability of the plant allows.
- Written monthly reports submitted electronically on plant performance.

Item	Summary of weekly inspection and operations control
1	Operational on-site analysis of final produced water
	* pH
	* Turbidity
	* Free Chlorine
2	Supply of Sodium Hypochlorite and Flocculent
3	Adjust Dosing Pumps

4	Inspection of equipment
5	Recording of Flows
6	Stock control of Chemicals
7	Making up of correct chemical strength for dosing
8	Checking and replacing Oil in the compressor
9	Back washing of Plant
10	Fitment only of equipment including supply of components
11	Report any equipment faults or poor plant condition to <i>Service Manager</i> timeously.

1.2.5.2.2 Ixopo CNC Water Treatment Plant – Specialist/Chemist

Provision of one (1) Process Specialist/Chemist with a minimum qualification of a Bachelor's Degree in Analytical Chemistry, Water Care or Chemical Engineering and registered with any of the science bodies. Visits shall be performed on an as and when basis by the site appointed Process Specialist/Chemist for the purpose of troubleshooting, process optimisation, site audits and client feedback and reporting.

1.2.6 Adhoc Repairs/Maintenance and Site Investigation

Any adhoc repairs, supply of spares/parts, breakdowns, tests and site investigation to be quoted and authorisation is required from *Service Manager* before work to be done.