**Scope for Biological treatment chemicals**

Supply, deliver, offload and dose biocide (alternate two types oxidizing and non-oxidizing) and bio dispersant into the east and west center wells for the biological treatment control of concentrated cooling water at Lethabo Power Station. Successful bidder will undergo 6 months’ probation for monitoring of chemical effectiveness, before being awarded full 5 years, samples used on the 6 month probation will be kept for Eskom research, testing and development for analysis of active ingredients concentration non oxidizing biocide (40 ppm) and oxidizing biocide (20 ppm).

* 1. **Background information:**

The concentrated cooling water system at Lethabo Power Station has an approximate total volume of 128 Mega liters, with a high circulation rate. The blowdown rate is approximately 9 Ml per day. It is used to condense the turbine exhaust steam of six units in condensers with titanium tube condensers and stainless steel plate heat exchangers. The cooling water system is divided into

two systems, normally referred to as the East and West concentrated cooling waters and dosing will be needed on each side. The two systems are inter-linked and all the treatment for scale and salt concentration control is done on the West system. The function of the biological control program is to cost effectively control the biological growth in the systems at an acceptable level.

* 1. **List of chemicals required:**

Chemical: Biocide

Form: liquid;

Application: Concentrated Cooling Water, to be dosed in east and west cooling centre wells, two types of biocide to be alternated, non-oxidizing and oxidizing biocide.

Chemical: Bio-dispersant

Form: Liquid

Application: Concentrated Cooling Water, to be dosed in east and west cooling centre wells

* 1. **Biological control program requirements.**

The biological control program must have no detrimental effect on the pre-treatment (ultra-filtration membranes) or the reverse osmosis plant or process.

The biological program must have minimal effect on aquatic (fish) life after 48 hours).

The biological control program must allow for the prevention of tolerance build up by organisms

(dosing of alternating biocides). The biological control program must have no detrimental effect on the lime softening process

The supplier must sample and biologically analyze the systems water at least twice monthly before and after dosing (times to be related to effective times for the biocides) to ensure compliance to the limits in the table below, at all times.

This data is to be reported to Lethabo Power Station monthly.

Some type of biofilm (sessile) monitoring will be required, that must be reported at least monthly. The table is the minimum that is required and the supplier will be required to conduct additional analysis if and when required.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter | Planktonic | Sessile |
| 1 | Total aerobic bacteria | < 1x105 CFUs/ml | < 1x106 CFUs/cm2 |
| 2 | Total anaerobic bacteria | < 1x104 CFUs/ml | < 1x105 CFUs/cm2 |
| 3 | Sulphate reducing bacteria | < 50 CFUs/ml | < 100 CFUs/cm2 |
| 4 | Total coliforms | No spec TC /100ml | - |
| 5 | Faecal coliforms | No spec FC /100ml | - |
| 6 | Faecal streptococci | No spec FS /100ml | - |
| 7 | Chlorophyll A | < 25 g.kg-1 | - |
| 8 | Legionella | <10 000/litre |  |

The Total coliforms, Faecal coliforms, Faecal streptococci and Chlorophyll A will be assessed by considering the trends, a continuing increasing trend will not be acceptable.

* 1. **Legionella control program**

o A detailed risk assessment of each plant will be conducted by a certified assessor to

evaluate the risk of legionnaire’s infection to personnel. Site personnel will assist.

o A comprehensive, formalised, recorded chemical dosing regimen must be instituted. There must be documented proof of continued improvement in the water quality management. The supplier must sample and biologically analyse the systems water at least twice monthly before and after dosing (times to be related to effective times for the biocides) to ensure compliance to the limits in the table below, at all times. This data is to be reported to Lethabo Power Station monthly

o Cooling water samples will be submitted to an ISO 11731 accredited laboratory on a quarterly basis and must be analysed according to the ISO 11731 method (for normal counts).

* 1. **Equipment and Dosing Requirements**
* The supplier must dose the systems using their own equipment and personnel.
* The personnel must be trained in all aspects of the work and must have completed Lethabo Power Station Safety Induction.
* The supplier will have to complete a safety file to the Lethabo required standard.
* Conduct a risk analysis before the first delivery and supply copy to Eskom.
* Conduct a job observation at least every 6 months and supply copies to Eskom.
* The supplier may not store the product at Lethabo Power Station, the product must be brought on site, dosed and supplier to remove the empty containers on the same day.
* The supplier must make arrangement with the Chemical Services staff before coming to site.
* The supplier must always have appropriate warning and safety signs in place.
* The supplier is responsible for the product at all times.
* It remains the responsibility of the supplier to familiarize themselves with all equipment, storage tanks and layout for delivery.