

 <b>Eskom</b>	<b>Specification</b>	<b>Technology</b>
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Title: **SCOPE OF WORK FOR  
MAINTENANCE OF  
HENDRINA COOLING  
TOWERS**

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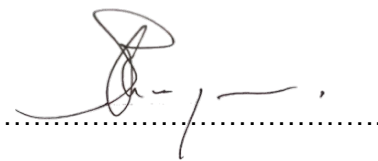
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## 1. EXECUTIVE SUMMARY

There are three cooling towers on the South side and are mostly in operation and there is no opportunity to take some off and do maintenance due to high vacuum on the south units. The scope below will address majority of maintenance activities to keep the cooling system as efficient as possible. CW pumps maintenance regime is aligned with unit outages and there is adequate opportunity to do maintenance.

The high level scope for the south side includes cleaning of distribution pipes using high pressure cleaning machine, replacement of missing and damaged ham sprayers, cleaning of the ponds and removal of loose and fallen fills on cooling tower no.8. Maintenance opportunity is used when some of the units are off to execute some of the scope but it's not enough to execute all the required scope.

This scope will be outsourced following the procurement processes to get the successful service provider. Maintenance and Engineering will co-ordinate all the processes until execution.

The contractor must be aware and fully comply with the following list of activities and requirements whenever work is carried out on site under this contract:

ACTIVITY	SPECIFICATIONS
<b>2. ACCESS CONTROL</b>	
2.1.1 Provide all authorised people with entry permits. Obtain permit to work as per site procedure.	
2.1.2 Relevant PPE to be used on specified systems, e.g. where there are chemicals etc.	Refer to Legionella Control and management in Water Systems (240-123919938)
<b>2.2 QUALITY</b>	
The contractor shall provide a detailed QCP (including hold points) containing all relevant information based on the agreed upon scope of work. The QCP shall be reviewed and approved by <i>Employer</i> before any work commences.	5 days before works starts on each work instruction/task order.

<b>2.3 SPARES</b>	
<p>2.3.1 The spares will be provided by the employer</p> <p>Typical spare items required include</p> <p>a) Ham sprayers, pipe straps, end caps, etc.</p>	
<b>2.4 PREPARATORY WORK - COOLING TOWER ISOLATION AND DRAINING</b>	
<p>2.4.1 Isolate the specific tower for maintenance.</p>	<p><i>Isolation to be carried out by the Authorised Person according to plant safety regulations</i></p>
<p>2.4.2 Cooling Water in the cooling tower pond to be drained before work can start. If the Maturation pond is full, make up system shall be closed and diesel pumps used to pump from one cooling tower to another.</p>	<p><i>Monitoring water levels at maturation pond</i></p>

### 3. SCOPE OF WORK FOR COOLING TOWERS (5,7,8)

#### 3.1 Distribution Pipes unblocking and ham sprayer replacement

- a) *The Contractor shall provide all resources deemed necessary to execute the scope. The resources includes HP machines, high pressure pipes, personnel, lighting equipment, etc.*
- b) *The Contractor shall compile a risk assessment conduct toolbox talk, obtain a permit to work (PTW) before any commencement of work.*
- c) *The contractor shall inspect the cooling tower for all missing and damaged ham sprayers and submit report to Eskom Engineer or Contract manager.*
- d) *The contractor shall submit a plan on how the task will be conducted per quadrant, refer to figure 1.*
- e) *The contract shall open all end caps and start cleaning the distribution pipes until they are clear of scale and mud.*
- f) *The Contractor shall report all defective end caps to the Employer.*
- g) *The Contractor shall clean drift eliminators only if instructed to do so by the Employer.*
- h) *The Contractor shall remove all damaged sprayers from distribution pipes and replace them with provided sprayers from the employer.*
- i) *The Contractor shall install passing end caps provided by the Employer if they are missing or damaged.*
- j) *Where distribution pipes have no threads or impractical to secure hamsprayer in position ,the Contractor shall use the strap provided by the employer and record all pipe straps used per cooling tower.*
- k) *Damaged sprayers shall be discarded and new sprayers fitted to the distribution pipes.*
- l) *Distribution pipes shall be cleaned by high pressure at a pressure suitable to remove all debris and lime deposit in the distribution pipes.*
- m) *The Contractor shall ensure that the all debris flushed from the pipes and sprayers is removed from the towers and is not discarded on the tower fill or allowed to enter the pond. Only fine silt which passes through a 45% shade cloth may be allowed to reach the pond.*
- n) *The Contractor shall bag all debris removed from the towers and place the bags in an area designated by Employer, the bags will be provided by the employer.*
- o) *The Contractor shall inform the Employer in writing in every case where the Contractor is delayed due to factors outside of the Contractor's control. The Contractor shall also keep a daily log where all daily activities progress is recorded.*
- p) *The Contractor will be supplied with all shall stainless steel clamps for each different pipe sizes in the cooling tower*
- q) *The Contractor shall fix cracked and broken distribution pipes.*
- r) *During the cleaning process, the Contractor shall at all times notify Employer's Quality Control Personnel to inspect pipes that are cleaned and ham sprayer replacement before moving to the next quadrant.*
- s) *Neither the Contractor nor their staff or workers shall walk directly on the splash pack fill material. The Contractor shall provide walkways of a minimum width of 600 mm wherever they are required.*
- t) *The Contractor shall erect temporary walkways on the distribution pipe supports if the original steel grids and concrete grids are not in place.*
- u) *House keeping to take place before the PTW is cleared ,housekeeping includes all debris found inside the cooling tower and all scale flakes lying on top of the fills.*

### **3.2 EQUIPMENT TO BE PROVIDED BY THE EMPLOYER**

- a ) Ham sprayers (Hams sprayers - 19mm bore ham sprayers –Pressure head 2m 2 ¼ inch B.S.F male screw)
- b) Ham sprayers unblocking tool, removing and installing tool.
- c) End caps
- d) Bags.
- e) Pipe clamps
- f) Pipe straps

### **3.3 EQUIPMENT TO BE PROVIDED BY THE CONTRACTOR**

- a) High Pressure Machines ( 4 off per cooling tower)
- b) Torches
- c) Personal Protective Equipment

## **4. CLEANING THE COOLING TOWER POND**

- a) Risk assessment, tool box talk and PTW must be in place before any work commences.
- b) Contractor to submit the methodology to the employer of how the work will be executed two days prior work commences.
- c) The contractor to remove the fence around the pond where entrance and exit will be possible before work commences.
- d) The Employer to drain water from the pond.
- e) Contractor to provide the safe platform to be used to enter exit the pond.
- f) Contractor to prepare the area where sludge will be deposited, preparations include the micro film of about 3mm enough to contain all the sludge to avoid spillage on the ground surface, soil or sand bags to be used as a temporary boundary to avoid sludge spillage on the ground surface. Front end loader to prepare the surface ,permanent solid barricading with a sign indicating hazardous material.
- g) Inspect the pond for any possible asbestos material that may be found in the pond, if any found report to Employer.
- i) Inspect for possibilities of fishes and if any observed report to the Employer and ensure they are removed by the relevant authorities before any activity takes place.
- j) Use the safety lifting equipment such as crane to put the bobcats inside the pond. Four water proof bobcats with their operators are required at a time to work in each quadrant of a pond.
- k) Push the sludge to one area where it will accumulate and loaded to the front end loader then transported to the prepared temporary storage until it's dry to be loaded on the tipper truck.
- l) Sludgocats and debris are to be removed from the pond by the contractor and dumped on a designated site area that will be predetermined by the Station. All dumped debris should be removed by the contractor and transported to the ash dams.
- m) The floor of the pond is then to be swept with brooms to remove all loose debris. The contractor must ensure that debris is not collected/ dumped to the outlet screens.

- n) Ensure the sludge is completely removed and the floor is dry.
- o) use the brooms to collect the sludge between the columns where bobcat cannot reach.
- p) In a case where there are solid objects, ensure solid objects are removed from the pond and stored in a designated area preferred by the Employer.
- q) As a safety measure ensure the bobcat does not bump the columns because that could lead to the beams to fall.
- r) Inform the Employer to inspect to pond to satisfaction and remove all tools and material from the pond including solid stairs erected.
- s) Restore fence to its original state.
- t) Clear the PTW.
- u) Once the dry sludge is removed, rehabilitation be conducted on the area used to store sludge to be put into its original state and proper house keeping to be done.

#### **4.1 EQUIPMENT TO BE PROVIDED BY THE CONTRACTOR**

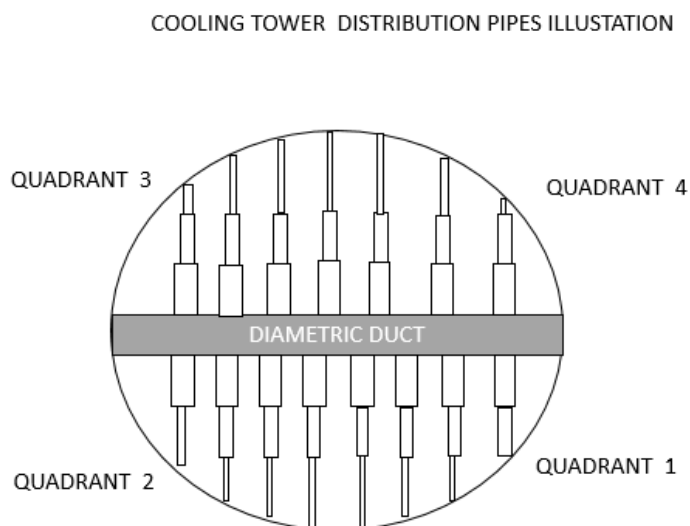
- a) Four bobcats with its operators
- b) Front end loader and operator
- c) 3MM micron material
- d) Brooms
- e) 12 cubeTipper truck/s

#### **5. FILL REMOVAL ON COOLING TOWER NO. 8**

- a) *The Contractor* shall provide all resources deemed necessary to execute the scope. The resources includes scaffolding, personnel, lifting equipment, truck to transport fills for disposal, etc.
- b) *The Contractor* shall compile a risk assessment conduct toolbox talk, obtain a permit to work (PTW) before any commencement of work.
- c) Some of the fill has fallen on the pond on this cooling tower, all the fallen and hanging fills must be removed from the pond and disposed according to waste management procedure HSPPIN003 latest revision.
- d) Contractor to do inspection on the cooling tower and submit a methodology including timelines to the Employer on how to execute the task.
- e) There may be a sludge on the pond, which could make impossible to erect scaffolding and free movement to remove fills. Sludge must be removed first on the pond, apply the scope as indicated on point no.4 (*cleaning of cooling tower pond*) to prepare for sludge removal.
- f) Create solid barricading where fills will be temporally stored before disposal.
- g) Do housekeeping before clearing PTW
- h) Rehabilitation of the area

## 7.FILL REMOVAL ON COOLING TOWER NO. 6

- i) *The Contractor* shall provide all resources deemed necessary to execute the scope. The resources includes scaffolding, personnel, lifting equipment, truck to transport fills for disposal, etc.
- j) *The Contractor* shall compile a risk assessment conduct toolbox talk, obtain a permit to work (PTW) before any commencement of work.
- k) There is no fallen fill on the pond on this cooling tower, once the fill has been removed it has to be disposed according to waste management procedure HSPPIN003 latest revision.
- l) Contractor to do inspection on the cooling tower and submit a methodology including timelines to the Employer on how to execute the task.
- m) There may be a sludge on the pond, which could make impossible to erect scaffolding and free movement to remove fills. Sludge must be removed first on the pond, apply the scope as indicated above to prepare for sludge removal.
- n) Create solid barricading where fills will be temporally stored before disposal.
- o) Do housekeeping before clearing PTW
- p) Rehabilitation of the area



**Figure 1: Cooling tower sections**

**TABLE 1.COOLING TOWER GEOMETRY**

A.1.1. COOLING TOWER GEOMETRY	
Cooling Towers	North Cooling towers 1-4; South Cooling Towers 5,7,8.

Distribution pipe material	Asbestos
Drift eliminator material	PVC
End-cap valves	112 per tower
Screen type	Metallic Mesh
Number of screen outlets	2 screens per tower
Type of system / Fill	North – Polygrid South – x-grid
Tower diameter (top)	57 m
Tower diameter (throat)	51.2 m
Tower diameter (skirt)	78.5 m
Pond diameter	80.3 m
Shell height	107.1 m
Air opening height	7.4 m
Height from cooling tower pond	114.5
Sprayer sizes	Nozzle 19mm & 20mm
Sprayer orientation	Upwards

## 5.2 MANADATORY TECHNICAL EVALUATION CRITERIA

- Valid certificate stating that the contractor (or sub-contractor) is certified to handle and dispose asbestos products to recognized hazardous waste disposal site(s). Valid certification in terms of the requirements of the OHSA is to be provided in the tender. As part of the returnable, the contractor shall provide a typical procedure for handling and disposal of asbestos cement products.
- Site meeting attendance.

**Table 2 Plant/Equipment**

Item no	Equipment/Plant Hire – Description (wet rate)
010	1200Bar High Pressure Machine with accesories
020	Double Cab Bakkie with full time operator
030	Bobcat (front windscreen enclosed)
040	TLB
050	12 Cube Tipper Truck
060	6" diesel pump
070	Front end loader
080	20 ton mobile crane



090	
011	
012	
013	