Document Type / Category	Instructions For Use (IFU)
Document Number, Issue, Title	IFU 016 Rev02 - Organic Debris Digestion of Water Cooling Towers and Associated Water Circuit

1. PURPOSE

The purpose of this procedure is to digest and detach ORGANIC DEBRIS/deposits from all wet cooling tower surfaces and the associated water circuit.

- Aeris has demonstrated in extensive laboratory and field trials that the use of a combination of the appropriate enzymes enables the complete digestion of all organic layers deposited on the surfaces of bulk water systems.
- This procedure assumes that the tower has an appropriate corrosion treatment regime prior to the cleaning process being undertaken.

This IFU covers the steps and actions that need to be taken in the use of AerisGuard Multi Enzyme Cooling Tower Cleaner.

All Aeris Environmental personnel, sub-contractors and certified applicators are expected to take an active role in establishing, implementing and maintaining this Procedure in line with this IFU according to their role and responsibility.

The purpose of acting in accordance with this IFU is to have an uninterrupted, smooth process that ensures that correct process and use of the products are followed. This IFU shall also be part of Aeris' continuous improvement initiative.

2. PROCEDURE DESCRIPTION AND PROCESS FLOW

The Cleaning of Cooling Towers using AerisGuard Multi-Enzyme Cooling Tower Cleaner solution. All works to be carried out with the product should be performed in compliance with relevant national Health, Safety and Environmental standards and regulations. Before commencing use of the product consult this IFU, the SDS, your work order and / or the job specification.

If the warnings and instructions are not fully understood or compliance with all safety instructions is not possible contact the manufacturer for clarification, do not use the product.

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The steps in this procedure are as follows:

1. Preparation
    a. Product Handling & Packaging
    b. Apparatus & Equipment Required
    c. Product Dilution and Application Rates
    d. PPE and OH&S Requirements
2. Setup
3. Application Process
4. Cleanup Process

3. PROCEDURE

1. Preparation

a. Product Handling & Packaging

Consult the product Safety Data Sheet (SDS) prior to use.

b. Apparatus & Equipment Required

Measuring vessel

Water pressure washer

Hose and fittings

c. Product Dilution and Application Rates

The dilution rate of the AerisGuard Multi-Enzyme Cooling Tower Cleaner is 1 LITRE (0.26 US Gal) of product per 500 LITRES (132 US Gal) of water in the system.

d. PPE and OH&S Requirements

- Should any AerisGuard Multi-Enzyme Cooling Tower Cleaner solution splash onto the skin or clothing it should be washed off promptly with water.
- It is recommended that Gloves, safety goggles and a respiratory mask are worn when handling AerisGuard Multi-Enzyme Cooling Tower Cleaner.
- Follow all OSHA or equivalent standards regarding personal protection and site specific requirements.
  Work on cooling towers should only be performed by trained and licensed technicians.

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2. Setup

Before addition of the AerisGuard Multi-Enzyme Cooling Tower Cleaner

1. Stop all non-enzyme compatible biocides (includes - Halogens-(Bromine, Chlorine,) and Gluteraldehyde) and corrosion inhibitor additions 12 hours prior to addition of AerisGuard Multi-Enzyme Cooling Tower Cleaner.

2. Ensure that free chlorine or bromine residual is below 0.2 ppm prior to the addition of AerisGuard Multi-Enzyme Cooling Tower Cleaner.

3 Dose Cooling Tower with enzyme compatible USEPA approved biocides according to their labels' instructions (includes- Isothiazolinones, Bromo-nitro propanediol, quaternary ammonium biocides).

4. If additional enzyme compatible biocide has not been added to the water circuit then the cooling tower fan should be switched off prior to the addition of the product.

4.1 Follow local electrical codes regarding Lock Out/Tag Out procedures.

5. Ensure the cooling tower re-circulation pump is operating and continues to operate during the cleaning procedure and that the fan has been isolated not to operate.

6. Identify the location of all in-line screens and strainers and ensure ease of access for inspection and cleaning.

7. Ensure all in-line strainers and CT sump screens are free of any biological material and scale deposit build up. Monitor and clean strainers/screens as required.

7.1 It is probable that the cooling circuit will contain scale deposits, much of which is likely to be removed during the Multi Enzyme Cleaner procedure.

8. Stop all CT bleed just before the addition of AerisGuard Multi Enzyme Cooling Tower Cleaner.

3. Application Process

Addition of the Enzymatic Cleaner

1. Make an addition of the AerisGuard Multi-Enzyme Cooling Tower Cleaner at a rate of approximately 1 LITRE (0.26 US Gal) : 500 LITRES (132 US Gal) of water.

2. In larger towers introduce the AerisGuard Multi-Enzyme Cooling Tower Cleaner at several points of the CT basin; this will assist with ensuring the homogeneity of the cleaner in the basin of the CT.

3. Additions of the cleaning solution can result in a low level of foaming action.

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4. **Allow the AerisGuard Multi-Enzyme Cooling Tower Cleaner to circulate** for at least 6 hours and if an initial clean with AerisGuard Multi-Enzyme Cooling Tower Cleaner then up to **10 hours.** To a large extent the duration of the clean is dependent upon temperature. The fastest clean is encountered at 40°C (104°F) where 2 to 6 hours is ample and at least 12 hours at 15 °C (68°F). Recirculation for 15 hours or more is recommended at 15 °C (59°F) or below.

5. Note: 1 - As a rule of thumb the longer the digestion time, the better for up to 48 hours. AerisGuard Multi-Enzyme Cooling Tower Cleaner cannot cause damage to the cleaning circuit and associated equipment.

Note: 2 - To accelerate digestion time more AerisGuard Multi-Enzyme Cooling Tower Cleaner can be added. However, to halve the digestion time it is necessary to multiply the dosage rate by 4 times the initial dosage recommendation.

6. At the completion of the re-circulating/cleaning cycle, dose the CT circulating water system with a USEPA approved sodium hypochlorite used as per their label instruction.

7. Drain as much water as possible from both the CT basin and pipes.

7.1 Be aware of dead legs in the system and drain to the sewer/trade waste (in accordance with the requirements of the appropriate regulatory authority). This will ensure that as little organic debris as possible is left in the CT circuit.

8. Clean all wetted surfaces of the CT (fill and basin) using water spray or pressurised water spray and /or mechanical cleaning as required.

9. Ensure all screens and strainers are checked for scale fouling and cleaned as required.

AFTER ENZYMATIC CLEANING

1. Refill the CT with water.

2. Dose the CT circulating cooling water system with the required USEPA approved biocide and corrosion inhibiting system to the required concentrations.

3. Recommission and re-passivate the CT circulating water system.

4. Reinstate the automatic or other CT water treatment program.

4.1 USEPA approved Biocidal treatment and corrosion inhibition are critical steps. If unsure refer to water treatment contractor for appropriate addition levels for the particular system.

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4. Clean Up Process

Ensure no trace of work or cleaning related debris remains on completion of the process. The use of door mats, cardboard boxes and/or dropsheets at entry and exit points helps to keep this cleaning to a minimum.

Whilst all care has been taken in the preparation of this document it is supplied as a guide only and does not replace local, state or federal government requirements relating to the care and maintenance of Water Cooling Towers.

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