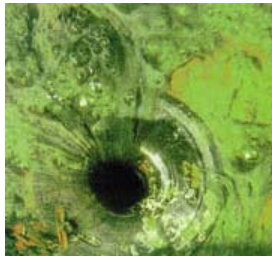




Cooling Tower Distribution Deck Covers

Although the air quality at any particular site can be the cause of serious adverse effects upon both a cooling towers longevity of service and its ability to function thermally it usually manifests itself in an undesirable perhaps unexpected change in water quality. This is because cooling towers are extremely effective air washers and the technological advances which are intended to improve their thermal performance also serve to increase their air washing efficiency. Consequently the quality of the water being circulated over a tower quickly reflects the quality of the air with which it is in intimate contact. Meanwhile the air exits a cooling tower much cleaner than its entering state.

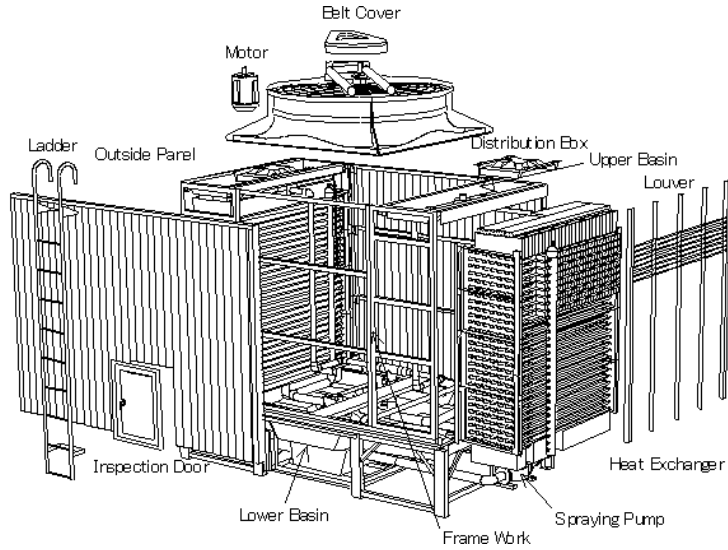
Since towers contain warm water, are open to sunlight, trap a variety of life forms and nutrient sources, they are perfect breeding grounds for algae, fungi and bacteria. Some of these forms circulate throughout the condenser system, while others attach themselves to convenient surfaces. This interferes with heat transfer operation of cooling cycle which reduces the efficiency of heat transfer thereby resulting in direct / indirect commercial loss. In addition, bacterial metabolism influences the scale forming. Corrosion is frequently found beneath these deposits which can lead to corrosion of metal on water side of heat exchanger.



Algae build-up at metering orifices on the floor the inlet basin of the distribution deck on cross-flow cooling tower.

Biofilm occurs man-made water systems such as cooling towers, where a layer of slime is found within the systems. This layer is called the biofilm. Found on the internal surfaces of water piping, it is found particularly at or near heat exchange surfaces where the temperature is right for growth, and where there is a sufficient nutrients to help in the growth of the microbiological flora. Most of the nutrients are supplied through the air to the flowing water for the cooling towers.

The microbial flora consists of both aerobic (requiring oxygen to live), and anaerobic (lives in the absence of oxygen). This includes a variety of bacteria, algae and fungi. As a result, other organisms such as protozoa and metazoa will proliferate from the basic nutrients and organisms found in the biofilm. Legionella has been linked to the presence of Biofilm. Cooling towers have been found to provide ideal breeding conditions for pathogenic bacteria such as Legionella pneumophila. Legionnaires' Disease is a potentially fatal form of pneumonia and is thought to be transitted to humans via airborne water droplets.



The schematic of a cross-flow cooling tower illustrates the position of the upper basin (distribution hot deck) in relation to sunlight, air flow and air borne contaminants.

Wooden cross flow towers are specifically susceptible to algae growth. The micro-organisms colonize in the stratifications of the wood.

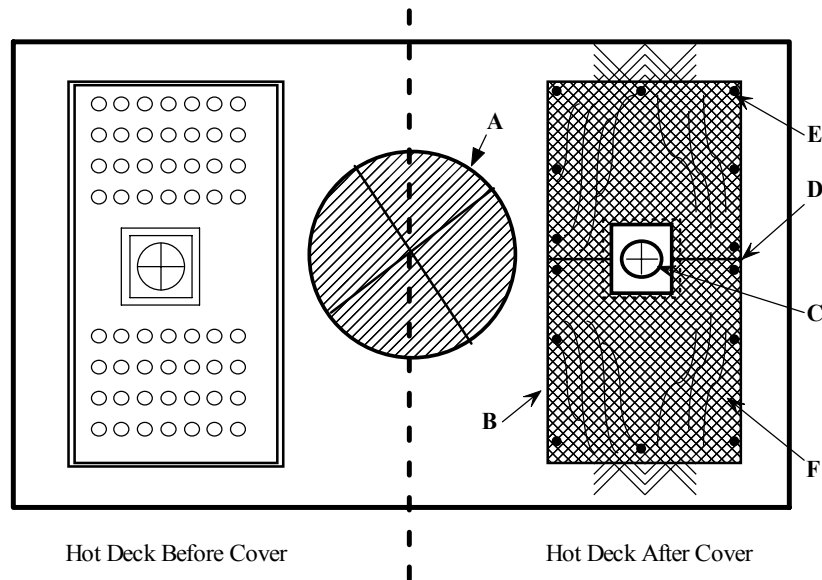
The photographic slide illustrates How algae begins to colonize in the Sunlight areas of an exposed cooling tower.



Although a biocide program may be in place, the low water levels in the distribution deck, the warm recirculation water temperature, lengthy exposure to sunlight and the presence of air borne matter and nutrients, algae continues to populate and grow. Even with continuous feed of chlorine (*chlorination*) or super chlorination programs have great difficulty in controlling the growth of the algae. Additionally, prolonged use of continuous feed of chlorine or super chlorination contributes to an accelerated delignification of the wood in the cooling tower.

Mechanical intervention is usually necessary to prevent sunlight exposure on the distribution deck. This is accomplished by installing a deck cover. The deck cover also greatly reduces the amount of air borne microbes, suspended matter and nutrients depositing in the distribution deck.

Cooling Tower Upper Distribution Hot Deck



- A cooling tower fan
- B 1/2 section of hot deck cover
- C discharge into distribution deck
- D small gap between sections
- E 1-1/2 wood screw
- F marine plywood 3/4"

A deck cover is simply a wooden cover over the exposed distribution basins on the top of the cooling tower. A treated or marine plywood of 3/4" thickness, should be used as the material of construction as the wood will be continuously exposed to water and the elements. Regular plywood and particle board should not be used. Particle board will absorb water and swell very easily. The marine plywood should be cut into two sections for each distribution basin cover and be fit around the piping supply to the distribution basin. The sections can be hinged where possible, but care should be taken to ensure that hinging is secure, that wind gusts do not lift the cover and that there is sufficient room for maneuverability. The deck cover should be secured with minimum 1-1/2" wood screws.

With the elimination of direct sunlight on the distribution deck, regular biocide treatment or chlorination can easily maintain the microbial population in check.