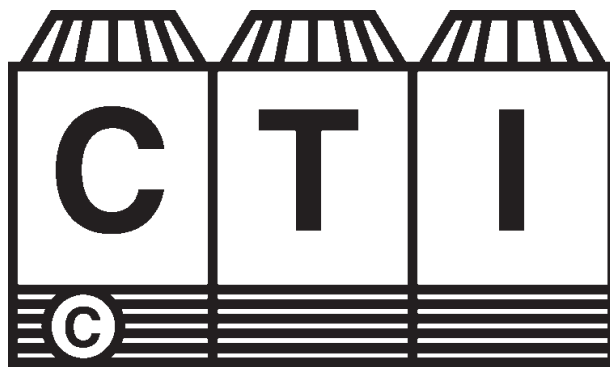


COOLING TOWER INSTITUTE

Suggested Ozone Reading List

Prepared by the CTI Water Treating Committee
(*Supplement to WTP-139*)



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This guideline document summarizes the best current state of knowledge regarding the specific subject. This document represents a consensus of those individual members who have reviewed this document, its scope and provisions. It is intended to aid all users or potential users of cooling towers.

Supplements CTI Code WTP-139, Revision 2 dated April 1992

Approved by the
CTI Executive Board

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Suggested Ozone Reading List

Batchelor, D.R., Grosz C.A.; "The Efficacy Of Ozone In Cooling Tower Water Treatment"; Proceedings of Tenth Ozone World Congress; March, 1991; Vol. 1; pp. 357-370.

Data related to the efficacy of ozone as an inhibitor of biological growth, corrosion and scaling were collected during two independent field studies. This technical status report presents the results of cooling water quality studies at both sites and describes the methods used to achieve and monitor the results.

Brooke, J.M., Puckorius, P.R.; "Ozone For Cooling Tower Systems, Is It A Panacea?"; Technical Paper 91212; Proceedings of NACE Corrosion '91 Conference.

Recently there have been a number of claims by ozonator or ozone generator manufacturers that by using ozone in cooling towers it can not only control biological micro-organisms but also will control corrosion; control and remove scale; enable cycles to rise by totally eliminating blowdown; and that no water treatment chemicals are needed.

A independent investigation has identified what ozone has been able to reliably provide, its use limitations, as well as the precautions that must be taken. Technical water chemistry data from actual case histories is provided in this paper.

Brown, B.E., Duquette D.J.; "A Review of the Effects of Dissolved Ozone on the Corrosion Behavior of Metals and Alloys"; Technical Paper 486; Proceedings of NACE Corrosion '94 Conference; February-March, 1994.

Ozone is currently being considered as a possible replacement for chlorine-based compounds as a biocide. A review of current literature related to the corrosion behavior of metals and alloys exposed to ozonated solutions indicates that there is considerable confusion concerning the effects of this strong oxidant. Some studies indicate that dissolved ozone will increase the corrosion rates of alloys such as carbon steels or brasses when compared; to aerated solutions. Others indicate a beneficial effect of ozone, while still others localized corrosion behavior, and most are anecdotal in that they report observations from service conditions with poorly defined variables. This review attempts to summarize the various corrosion rates reported in the literature, as well as present data obtained in laboratory studies of metals exposed to ozone in chloride containing environments, including artificial sea water.

Burda, P.A., Healey, B.A.; "Performance and Mechanisms of Cooling Tower Treatment by Ozone"; Technical Paper 93488; Proceedings of NACE Corrosion '93 Conference; March, 1993.

Ozone was found to be an effective biocide after a two-year evaluation of ozone application for treatment of mechanical draft counterflow water cooling towers at a large gas production utility site, and for treatment of cooling towers of cooling/heating systems of large building complexes.

Burda, P.A.; "Program Analysis for Economic Evaluation of Ozone and Chemical Treatments in Cooling Towers"; Technical Paper 460; Proceedings of NACE Corrosion '94 Conference; February-March, 1994.

A cost breakdown for installing and operating an ozone system as the sole cooling water treatment methodology was evaluated for replacement of multichemical treatment at a plant with 2,000-ton cooling towers. Data collected provides a comparison when both towers are treated chemically with ozone, and when only one tower is converted to ozonation while the second one continues with multichemical treatment. The Level Annual Revenue Requirements (LARR) was applied in the evaluation process.

Claiss, M.; Joost R.; Reedy S.; "Ozone Generator Cooling Water Technologies Study"; Proceedings of the Eleventh Ozone World Congress of the International Ozone Association; Ozone in Water and Wastewater Treatment; Volume 2; September 3, 1993.

Metropolitan Water District of Southern California requested an engineering firm to investigate several ozone generator cooling system alternatives. A central part of the investigation was to determine if ozone generator power consumption could be economically reduced by lowering generator cooling water inlet temperatures. Alternatives that were examined included once-through cooling; closed loop cooling with plate heat exchangers; closed loop cooling chillers and plate heat exchangers; closed loop cooling with plate heat exchangers and optional chillers; closed loop cooling with plate heat exchangers and cooling towers; and closed loop cooling with chillers and cooling towers.