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Orange County Section

## Environmental Group Monthly Presentation:

# *Low Dose Risks from Bromate: Chemistry and Modes of Action*

***– Introduction to the Water Research Foundation Report # 4042***

Thursday, 25 April, 2013 at 7:30 p.m.

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**Presentation Abstract:**

Ozone is an excellent disinfectant and oxidant that can effectively inactivate a wide range of pathogenic microorganisms, including *Cryptosporidium*, and degrade many organic and inorganic constituents in drinking water supplies. Ozone can also oxidize naturally occurring bromide ($Br^-$) to bromate ($BrO_3^-$), which is carcinogenic in high dose animal bioassays. Many regulatory agencies, including the US EPA and the World Health Organization recognize bromate as likely (or probably) carcinogenic to humans and regulate or recommend bromate at 10 µg/L in drinking water. However, there are critical uncertainties associated with the current low-dose bromate risk assessment which is based upon a summation of all tumor types, namely kidney, thyroid and testicular mesothelium cancers, in the male Fisher 344 rats. The risk assessors assumed a genotoxic mode of action and linear dose response in the low dose region, although the fate of low doses of bromate after ingestion and during metabolism, as well as the shape of actual dose-response curve and the modes of action at low doses, was largely unknown.

In order to address these issues, a Water Research Foundation (Water RF) Project (Project #4042: Contractor: Joseph Cotruvo & Associates, Co-sponsored by International Ozone Association) has been completed. This presentation is intended to introduce and disseminate the critical findings of this important Water RF Project. Some of the highlights include: (1) kinetic study has demonstrated rapid disappearance of bromate from rat blood *in vivo* and after intravenous and oral exposures; (2) 28-day in vivo studies showed for the first time generation of organobromine compounds (e.g., 3-bromotyrosine) in a dose response manner during bromate metabolism; and (3) genotoxic mechanisms do not appear to be important at low doses for the rat kidney. These findings suggest that an MCLG of about 20 µg/L could be derived if all of the rat tumors are through non-genotoxic mechanisms.

**Speaker Biography:**

Dr. Keisuke Ikehata is the Advanced Water R&D Manager at Pacific Advanced Civil Engineering (PACE), Inc. in Fountain Valley, California. Dr. Ikehata received his B.Eng. (Appl. Chem.), M.Eng. (Civil Eng.), and Ph.D. (Civil Environ. Engi.) from Doshisha University, Kyoto, Japan, McGill University, Montreal, Quebec, and University of Alberta, Edmonton, Alberta, respectively. Dr. Ikehata is a registered professional engineer in Alberta and Arizona. He has more than 15 years of experience in basic and applied research in water science and engineering. His research interests include water chemistry and toxicology, advanced water and wastewater treatment technologies, water reuse, and environmental microbiology and biotechnology.

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