CONCURRENT SESSION 4 – WATER RESEARCH AND OIL SPILL RESPONSE

Differences in the Inactivation of *Legionella pneumophila* Serogroups Using UVC-LED Technology in Drinking Water

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Legionella pneumophila (Lp) is an opportunistic pathogen that causes respiratory infections primarily through inhalation of contaminated aerosols. Lp can colonize premise plumbing systems due to favorable growth conditions found within those environments (e.g. lower disinfectant residual, stagnation, warm temperatures). There are 15 serogroup(sg)s of Lp, all of which have been associated with clinical cases, but sg1 is the predominate disease-causing sg. UV light emitting diodes (UVC-LEDs) are an emerging water treatment technology and have been shown to effectively inactivate various drinking water pathogens. In this study, inactivation of four Lp strains (three clinical sg1, 4, and 6 isolates and one sg1 drinking water isolate) were evaluated using a UVC-LED collimated beam device. Three wavelengths (250, 265, and 280nm) and six fluence rates (0.5-34 mJ/cm2) were evaluated for each strain in drinking water. Efficacy testing was also performed using a UVC-LED point-of-entry (POE), flow-through device. Based on the log inactivation curves, at 255nm, the sg4 and sg6 clinical isolates were more susceptible to inactivation compared to the two sg1 isolates. However, at 265 and 280nm, the sg1 and sg4 clinical isolates were more resistant to inactivation compared to the sg6 clinical and sg1 drinking water isolates. Additionally, the POE device, operated at 3 gallons-per-minute with cold-tap water, reduced sg1 levels from 5.9 to 2.4 log10 CFU/mL. Results from this study indicate that although UVC-LED disinfection is effective, variations in Lp inactivation, wave lengths, and technology applications should be considered, especially when targeting specific serogroups and isolates within premise plumbing systems.