



Emily T. Carpenter
Water Protection Program, Financial Assistance Center
Missouri Department of Natural Resources
1101 Riverside Drive, Jefferson City, MO 65101

May 19, 2014

RE: 10 CSR 20-8.190 Disinfection draft revised - UV Section

Dear Ms. Carpenter,
Trojan respectfully submits the following comments on the UV Section of the draft Disinfection Rule, revised and sent March 18, 2014.

6.B.2.C. The UV system should be designed to have their power cycled up to the maximum number of batches per day to accommodate the batch discharges.

Trojan comment: While the use of the word "should" will give flexibility to designers, the language of this section is unnecessary and the wording is somewhat confusing. Suggest deleting this section completely.

6.B.2. Bioassay. An independent, third party bioassay shall be used to verify the design UV requirements. The UV system shall deliver the target dosage based on the equipment's derating factors. If needed, the UV equipment manufacturer shall verify that the scale up or scale down factor utilized in the design is appropriate for the specific application under consideration. The bioassay report shall be available upon request by the department. The independent, third party engineer's imprint of his/her registration seal with the date and engineer's signature shall be affixed to the bioassay report.

Trojan comment: section 6.B.2 is repeated (i.e. the numbering of the sections is incorrect)

Trojan comment: The section alludes to lamp life and fouling factors. These factors are equipment-specific and Missouri should require third-party reports justifying the factors used. All UV systems experience fouling and aging, even those systems in which lamp/sleeves are not submerged in water, and these factors must be accounted for in the system design. If third-party reports are not available, the state should consider defining default factors. Trojan suggests that the wording be amended as follows:

Bioassay. An independent, third party bioassay shall be used to verify the design UV requirements. The UV system shall deliver the target dosage based on the equipment's derating factors. If needed, the UV equipment manufacturer shall verify that the scale-up or scale-down factor utilized in the design is appropriate for the specific application under consideration. Derating factors must include end of lamp life and fouling as a minimum. End of lamp life and fouling factors shall be determined as follows:

- The bioassay dose will be adjusted using an end of lamp life factor of 0.5 to compensate for lamp output reduction over the time period corresponding to the manufacturer's lamp warranty. The use of a higher lamp aging factor shall be considered only upon review and approval of independent third party verified data.
- The bioassay dose will be adjusted using a quartz sleeve fouling factor of 0.8 to compensate for quartz sleeve transmission reduction due to wastewater effluent fouling. The use of a higher quartz sleeve fouling factor shall be considered only upon review and approval of independently verified data.

The bioassay report shall be available upon request by the department. The independent, third party engineer's imprint of his/her registration seal with the date and engineer's signature shall be affixed to the bioassay report.

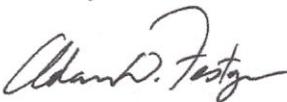
6.B.3. New wastewater treatment facilities. The design delivered UV dosage for a new wastewater treatment facility shall be a minimum of thirty thousand microwatt seconds per centimeters squared ($30,000 \mu\text{W} \cdot \text{s}/\text{cm}^2$) based on MS-2 phage inactivation. This dosage is to be delivered assuming a high quality effluent having at least sixty-five percent (65%) ultraviolet radiation transmittance (UVT) at two hundred fifty-four nanometers (254 nm) wave length.

Trojan comment: the requirement of a design dose of $30,000 \mu\text{Ws}/\text{cm}^2$ based on MS2 will prevent installations in the state of Missouri from taking full advantage of advancements in UV validation that have been taking place over the last several years. For example, the use of T1 and other surrogate microorganisms that more closely match target organisms is leading to UV systems that use less electricity and equipment yet accomplish the same treatment objective. States such as Colorado have incorporated language into disinfection rules that allow users greater flexibility and will ultimately lead to more economical UV systems. To allow Missouri to also capitalize on these advancements, Trojan suggests the following language be incorporated:

New wastewater treatment facilities. The design delivered UV dosage for a new wastewater treatment facility shall be based on either thirty thousand microwatt seconds per centimeters squared ($30,000 \mu\text{W} \cdot \text{s}/\text{cm}^2$), MS-2 phage inactivation, or a lower bioassay dose based on a different organism in similar water quality. The use of a lower bioassay dose based on a different organism will be considered upon review and approval of collimated beam data. These collimated beam data must be derived from water samples collected from plants employing treatment processes producing water of equal or lower water quality. For new facilities, the dosage is to be delivered assuming a high quality effluent having at least sixty-five percent (65%) ultraviolet radiation transmittance (UVT) at two hundred fifty-four nanometers (254 nm) wave length.

Thank you for you consideration of these comments. If you have any questions, please feel free to contact me at 520-297-3637 or by email at afestger@trojanuv.com.

Sincerely,



Adam D. Festger, M.S.
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