



25 May 2022

Chris Lewis  
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*via email*

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**Re: UV Disinfection (PR# 137-2021) for City of Estacada, WS #00279**

Mr. Lewis:

Thank you for your submittal to the Drinking Water Services (DWS) of plans for the new water treatment at City of Estacada (Plan Review 137-2021). Our office has received plans, a validation report, contract documents, and a review fee of \$825. All submissions were received 7 April 2022. Since the new disinfection system installation is merely expanding existing treatment, a land use compatibility statement is not required. The project includes installing two ultraviolet light (UV) reactors, Wedeco Spektron 250e, to inactivate *Giardia lamblia* and *Cryptosporidium sp.*, while viral inactivation contact times are met using chlorine in the clearwell(s) downstream.

The low-pressure, high output UV reactor was validated using the calculated-dose method outlined in the UV Disinfection Guidance Manual (UVDGM) providing a range of inactivation credits sufficient for Estacada's needs at flowrates ranging from 0.2 MGD to over 5 MGD; lamp powers ranging from 45% to 100%; and a UV transmittance (UVT) range of 69% to 98%.

*CONDITIONS*

The project is approved subject to the following conditions:

- Performance testing on start-up must verify the items listed in the UVDGM example. (2-page excerpt enclosed)
  - Assure ability to calculate and totalize off-specification water volume produced, particularly during power sags.  
(Record off-spec water volumes in Estacada's monthly report. (enclosed))

- Sample tap must be provided upstream of the UV reactors for UVT sampling.
- There must be visual verification of the operation of the lamps (e.g. indicator light)
- Lamps and UV sensor must be accessible for replacement.
- UV reactors must withstand system pressures, and a simple mercury containment plan in the rare event of mercury amalgam lamp breakage must be developed.
- There is no bypass piping around the UV reactors.
- All wetted parts must conform to NSF standard 61, or equivalent certification.

*REQUIREMENTS*

Once the UV treatment system is operational, the following requirements must be met – See corresponding enclosed forms to use for UV monitoring:

- UV intensity sensor calibration must be checked monthly using a reference sensor. The sensor needs to be re-calibrated or replaced when the calibration is off by more than 20%. See enclosed example.
- Monitor UVT of filtered water at least monthly for at least one year. Monitoring frequency can be reconsidered after that time. Since the plans for the UV system assumes at least an 85% UV transmittance, any water treated with a lower transmittance is considered off-spec and the volume of that water must be calculated and reported.

*PATHOGEN INACTIVATION CREDITS*

The UV treatment will be granted the following log inactivation credits:

- According to the UV validation report, the Wedeco Spektron 250e has been granted the following minimum inactivation credit by OHA-DWS as long as the UV reactor is operated within the operation boundaries:

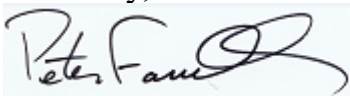
<u>Pathogen</u>	<u>log-inactivation credit</u>
<i>Giardia lamblia</i>	2.0
<i>Cryptosporidium sp.</i>	2.0
Virus	0.0

- While Estacada’s water system achieves *Giardia* and *Cryptosporidium* inactivation compliance with the UV reactors, another disinfectant must inactivate viruses. Estacada is credited with 4.0-log viral inactivation if the daily calculated chlorine CTs at the first user remain above 6 - 12. (Use [viral CT tables](#) for exact temperature-dependent requirements.) Also, at least a 0.2 mg/L chlorine residual is required at the entry point.

Upon completion of the project, the engineer must verify in writing that all conditions listed above have been met and that construction was completed according to the submitted plans. If substantial changes are made, a set of as-built drawings must be submitted.

If you have any questions or concerns, please contact me using the information above. Keith Male, DWS engineer for water systems in Clackamas County, is available as well at 503.939.1322. Thank you for your assistance and cooperation.

Sincerely,



Pete Farrelly, PE  
Drinking Water Services

cc: Curt McLoed, CURRAN-McLOED, Inc.  
Jeff Belter, Xylem  
Keith Male, DWS

enc:

- Turbidity and Disinfection Report Form – UV (*due monthly*)
- Sensor Calibration Form
- UVDGM Section 6.1.5 excerpt describing performance testing (2 pages)
- UVDGM Section 6.1.5 excerpt describing off-spec reporting (1 page)