

The Impacts of the UVDGM on Large Systems

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ABSTRACT

The EPA's final Ultraviolet Disinfection Guidance Manual (UVDGM) provides a much-needed reference document for the water treatment community. Included within the UVDGM, are several key issues for consideration by large utilities.

INTRODUCTION

Congratulations to the EPA and its team for finalizing the Ultraviolet Disinfection Guidance Manual (UVDGM). This comprehensive document is a much-needed UV disinfection reference for regulators, utilities, consultants, and other interested parties. Perhaps no other treatment technology in the history of water treatment has had to withstand as much scrutiny, interest, comment, and debate as UV disinfection did during the process of UVDGM development.

Elements Of Interest For Large Utilities From The UVDGM

For large systems (i.e., those in the 50 to 100 million gallon per day range and larger), several elements of UVDGM may be of particular interest, including the following:

- As described in Chapter 3, *Planning Analyses for UV Facilities*, UV transmittance (UVT) is the most important water quality parameter for UV disinfection planning. All utilities considering the future implementation of UV disinfection should be monitoring UVT on a regular basis now. Rather than prescribe how much data to collect, how to analyze the data, and how to select a UVT value as the basis for UV disinfection design, however, the UVDGM leaves these decisions up to the utility. This approach allows flexibility and room for tailoring sampling plans to match the specific needs of a utility, including the ability to consider multiple source waters, seasonal differences, and upstream treatment impacts in developing an appropriate sampling plan.
- Chapter 4 of the UVDGM, *Design Considerations for UV Facilities*, addresses UV disinfection facility layout and electrical requirements. Although the UVDGM notes that "the continuous operation of the UV reactor is highly dependent on the power supply and its quality," the UVDGM does not specify requirements or guidelines with respect to the need for back-up power or power conditioning equipment. Utilities will need to evaluate the potential need for an uninterruptible power supply (UPS), or other power conditioning equipment, specific to their potential installation. With this approach, the UVDGM does not force expensive electrical requirements on utilities, but rather allows utilities to make appropriate decisions based on their own power quality and their own operating philosophy with respect to the potential for off-specification operation. Similarly, the location for UV disinfection is open for utilities to select the optimum post-filtration approach for their water treatment plant.
- Chapter 5 of the UVDGM, *Validation of UV Reactors*, has been simplified greatly to facilitate the ease of understanding and implementation by the industry. One over-riding principle that has been maintained is that it is essential that flexibility be provided for potential approaches to validation testing. The vast majority of installations will be able to use off-site validation results from validation test centers. However, there will be a small number of installations that will require site-specific validation testing. For example, on-site validation testing was conducted for Winnipeg, Manitoba, to supplement off-site test results so that test results covered the full range of UVT values that the utility expected to encounter. In evaluating

potential UV disinfection systems for installation, all utilities should closely examine test center validation results including the range of validated conditions (including UVT, flow rates, and doses) and the specific validation and installation piping configurations to verify the applicability of the results.

- Many large utilities elected to move forward prior to UVDGM publication and implement UV disinfection for the public health benefits it provides. The UVDGM incorporates caveats for systems already in operation to facilitate assessment of the validation factor for establishing operating boundaries and achieving regulatory approval. For example, a few large systems are already in operation and utilize medium-pressure lamps and “non-germicidal” sensors. While the UVDGM states that UV sensors should be germicidal, the document recognizes that some systems use non-germicidal sensors (see Page 5-15 of the UVDGM), and the UVDGM includes factors to determine an additional factor, the polychromatic bias, to incorporate in the validation factor for these installations.
- Chapter 6 of the UVDGM, Start-up and Operation of UV Facilities, describes the requirements and recommendations for operation, maintenance,

monitoring, and reporting. For large systems, the O&M requirements will represent a substantial undertaking, with UVT analyzer evaluation recommended at least weekly, and calibration of each UV sensor with a reference sensor recommended at least monthly. Large systems should carefully review Chapter 6 to understand the implications. Operations plans should anticipate these UV system requirements, and requirements for UV system performance testing should incorporate the UV system components addressed by the UVDGM.

- The UVDGM is a formidable document. Many of the items described above result in flexibility, which will allow large systems to make the right UV disinfection decisions for their particular installation. To many state regulators, finding time to digest and implement the full contents of the UVDGM represents a daunting task. In addition, the flexibility means that state regulators will be faced with specific decisions in evaluating UV disinfection installations. As such, all utilities implementing UV disinfection should plan to work closely with their regulators to ensure a common understanding and agreement on key issues early in projects. Even with 436 pages of UVDGM details, there will be gray areas and decisions to make that aren't specifically addressed in the UVDGM, and regulator involvement will be critical.




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