

The Water Utility Perspective: LT2 and UVDGM Leave Several Important Issues in the Dark

Richard E. Hubel, Director-Design, American Water, Voorhees, NJ, and

Christopher R. McMeen, Water Quality Engineer, Tacoma Water, Tacoma, WA

The proposed Long-Term 2 Enhanced Surface Water Treatment Rule (LT2) is a major next step by the USEPA in protecting the public health from waterborne disease. Many water utilities (Utilities) in the United States will need to provide an additional treatment barrier(s) to comply with the LT2 regulation, depending on their source water characterizations. As a relatively cost-effective barrier, ultraviolet (UV) light disinfection is anticipated to receive serious consideration by most utilities that treat and deliver surface water supplies to their customers.

The draft UV Disinfection Guidance Manual (UVDGM) consolidates a tremendous amount of technical information about UV disinfection, and it is the best available compilation for those utilities that are considering UV disinfection. The UVDGM is exemplary in addressing how to implement UV disinfection, which was the intent of the USEPA.

However, understanding "how to implement UV disinfection" is not enough for most utilities, and several important questions remain:

- Is UV disinfection or an alternative enhanced disinfection process necessary?
- If yes, what are the scheduling logistics for implementation?
- How will the primacy agencies interpret the UVDGM, and how rigidly will they enforce its guidelines?
- How do the LT2 regulation and UV disinfection affect customer communications?
- And most importantly, how can a utility ensure continuous compliance with the LT2 regulation after implementing UV disinfection, especially as regards the potential for off-specification (off-spec) operation? [Note: off-spec operation happens when a UV disinfection system operates outside of its validated range of conditions.]

Answering the first question will require a source water characterization, as is explained in the proposed LT2 regulation. The number of utilities needing UV disinfection or an alternative enhanced disinfection process to comply with the LT2 regulation is unknown at this time, but is potentially significant. Likewise, many utilities will not need UV disinfection or an alternative enhanced disinfection process, either because their source water characterization does not indicate a need for additional treatment, or because lower

cost LT2 Toolbox alternatives are sufficient. These utilities then must weigh the cost of UV disinfection against their risk policies and public health obligations. In other words, some utilities may implement UV disinfection regardless of their source water characterization - several have already.

Appendix L of the UVDGM outlines the necessary tasks and provides an example time line for implementation of UV disinfection by a single utility. However, the USEPA and primacy agencies should address the logistics for a large group of utilities. Both public and investor-owned utilities will need substantial time to:

- Complete the source water characterization as well as the regulatory and risk policy evaluations to decide whether or not to implement UV disinfection
- Request and secure financing to proceed with implementation
- Solicit and procure engineering services if not available in-house
- Solicit and procure the UV disinfection equipment in coordination with a design schedule, which may entail two steps
- In the case of severe site constraints, purchase or condemn adjacent property to create enough space for the UV disinfection system
- Arrange for validation of the selected UV disinfection equipment
- Apply for and obtain approval of both the equipment validation and the UV disinfection system design from the primacy agency
- Administer construction of the project in accordance with utility policies as well as municipal, state and federal laws
- Develop standard operating procedures (SOPs), and train staff as regards UV disinfection system operation and maintenance (O&M), health and safety, and LT2 reporting requirements

Consider the ramifications if hundreds or thousands of utilities wait until they complete 24 months of source water characterization and then decide to implement UV disinfection. Think of the potential traffic jam! The LT2 regulation allows a total of six years including the 24-month source water characterization for an affected utility to achieve compliance without an extension from their primacy agency. This situation has great potential to create a

seller's market for the equipment vendors, engineering consultants, and UV disinfection system validators along with a serious design (plans and specifications) review/approval backlog for the primacy agencies. The traffic jam also has potential to cause frustration among the utilities, especially the smaller ones with fewer resources and less clout. Are quick, less thoughtful decisions, artificially inflated prices, and early violations of the LT2 rule in our collective future? The wiser utilities will initiate their source water characterizations and start planning for UV or an alternative enhanced disinfection process early (i.e., now!). They also will develop at least enough in-house expertise to make educated decisions and avoid victimization along the way.

It is very interesting that the example timeline in Appendix L includes a 2-year extension as allowed by USEPA when capital improvements are necessary to achieve compliance. However, the granting of an extension to a utility is at the discretion of the respective primacy agency and not a guarantee. Any utility that misses the compliance deadline is required to issue a Public Notice. Hence, the consequences of a traffic jam are very serious for the each affected utility.

Once the UV disinfection system is installed and in service, reality hits the utility as regards day-to-day operations and compliance with the LT2 rule. The UVDGM provides a starting point for utilities to develop SOPs and train their operators for UV disinfection system O&M. It also reiterates the terms of the LT2 rule for unfiltered water supplies: on a monthly basis, not greater than 5% of the water supply can pass the UV disinfection system during off-spec operation. The UVDGM mentions that primacy agencies may impose different off-spec limitations for filtered water supplies, but otherwise leaves the filtered water suppliers in the dark. The consequences are serious if primacy agencies impose stricter off-spec limitations for filtered water supplies. Understanding that time and volume bases are not necessarily the same, due to variations in flow rate, here are a few examples:

Limitation	Basis	Allowance for Off-Spec Operation
5%	Monthly	36 hours per month
1%	Monthly	7.3 hours per month
0.1%	Monthly	44 minutes per month
5%	Daily	72 minutes per day
1%	Daily	14.4 minutes per day
0.1%	Daily	1.4 minutes per day

Definition of these limitations is critical in the design and operation of a UV disinfection system, particularly as regards the provision of standby power or an uninterruptible power supply (UPS) to minimize off-spec operation. These limitations also are critical for utilities to maintain continuous compliance with the drinking water regulations. A related issue is that many utilities are likely to

implement UV disinfection to achieve inactivation credit for Giardia in addition to Cryptosporidium and, therefore, may reduce their reliance on chlorination. In such cases, must the utility adhere to a different and more stringent off-spec limitation to ensure compliance with the original SWTR (Surface Water Treatment Rule)? The USEPA is providing a great disservice to utilities by skirting the off-spec limitation issue for filtered water supplies and passing the buck to the primacy agencies.

The LT2 rule and UVDGM require monthly reporting of UV disinfection system performance to the primacy agencies, but the documents are unclear regarding several customer communication issues. The proposed LT2 rule requires a Tier 2 Public Notice for violations, and 40 CFR 141 allows primacy agencies to elevate such a violation to a Tier 1 Public Notice. However, it is not clear whether an off-spec excursion of a UV disinfection system is considered a treatment technique violation when all other treatment processes continue to operate in accordance with the original SWTR and other aspects of the LT2 rule. It seems unreasonable to issue a Boil Water Advisory for a temporary off-spec excursion. Also, although the risk of contaminating the water supply with mercury is very small, how should a utility communicate to the public if mercury from a broken lamp enters the distribution system? Furthermore, Consumer Confidence Reports include warnings about Cryptosporidium and other waterborne pathogens for sub-populations with weakened immune systems. Are those warnings still necessary after the implementation of UV disinfection? Clarification of these customer communication issues in the UVDGM would go a long way in helping utilities as well as the primacy agencies.

IN CONCLUSION

Utilities are encouraged to plan early (i.e., now!) and lay the financial and other groundwork for implementation of UV disinfection. An early source water characterization can make all the difference in avoiding the traffic jam and achieving compliance with the LT2 rule. Utilities also are encouraged to review the proposed LT2 regulation, the UVDGM and related documents, and appeal to the USEPA and primacy agencies for a clearer definition of the off-spec limitations for filtered water supplies as well as the expected response in the case of an off-spec excursion for both unfiltered and filtered water supplies. Finally, utilities are encouraged to develop enough in-house expertise to make educated decisions when considering, and even more so, when implementing UV disinfection.



Stockholm, Sweden UV water treatment (Photo courtesy WEDECO AG Water Technology)