

The Ohio Water Resources Center staff, Dr. Zuzana Bohrerova and Dr. Linda Weavers of the Department of Civil, Environmental and Geodetic Engineering at The Ohio State University, completed a project funded by a Ohio Water Development Authority award. This project, titled **“Developing design standards to enable the use of innovative technology in Ohio public water systems,”** aimed to reduce the cost barrier to enable the use of well-established emerging technologies by small water systems in Ohio.

Small public water systems (PWSs) in Ohio have been reluctant to introduce new treatment technologies because of the current requirements of pilot- or full-scale demonstration study for their approval. Requiring predesign demonstration studies effectively prevents small PWSs from installing emerging technologies because of the costs of equipment rental and shipment, PWS labor, design labor, analytical labor, and all associated management and reporting. The research team in collaboration with regulators (state and federal), PWSs engineers and managers, and design engineers selected low pressure-membranes (LPM) for criteria development (Figure 1). This technology is in demand with small PWSs for particle removal and has a proven track record.



Figure 1 LPM installation in Byesville, OH

In order to develop design criteria for LPM, the team created several committees, including the stakeholders described above, with relevant expertise in membrane filtration. The team determined that for the particle removal application, temperature corrected flux was the most critical design parameter. The membrane flux is affected by the membrane configuration, membrane material, backwash schedule, and membrane influent water quality, especially connected to turbidity and TOC. The project team decided that design flux would be specific to the membrane manufacturer and product and would differ based on water quality parameter bins established by the committees (see Table 1).

Table 1. Water Quality ranges influent to the membrane

Parameter	Good Water Quality ^a		Medium Water Quality ^a		Poor Water Quality ^b	
	Avg	95 th	Avg	95 th	Avg	95 th
Turbidity (NTU)	≤ 5	≤ 10	≤ 10	≤ 50	> 10	>50
TOC (mg/L)	≤ 2		≤ 4		> 4	
Fe, dissolved (mg/L)	≤ 0.05		≤ 0.3		> 0.3	
Mn, dissolved (mg/L)	≤ 0.02		≤ 0.05		> 0.05	

^a Plan Approval at provided flux with no demonstration required

^b Pilot-scale demonstration required

These LPM design criteria have been developed and are currently reviewed by Ohio EPA.

Profile: The Ohio Water Resources Center (Ohio WRC) is a federally authorized and state designated Water Resources Research Institute in the State of Ohio. Dr. Zuzana Bohrerova is the center’s Associate Director and also a Research Specialist in the Department of Civil, Environmental and Geodetic Engineering at OSU, focusing on drinking water and wastewater treatment and disinfection. Dr. Linda Weavers is the co-Director of the Ohio WRC and Professor in the Department of Civil, Environmental and Geodetic Engineering at OSU. Dr. Weavers’ research is multi-pronged with expertise in developing water and hazardous waste treatment technologies, promoting innovation in the water industry and determining fate of emerging contaminants in water systems.