

Effective Point of Use Filtration of Ultrapure Water for Critical Tools and Processes

A new approach for reducing critical sized particles at the tool level

It's all about Particle Risk Management

Occurrence

- Filter performance
- Transient conditions



Detectability

- On wafer
- In UPW

Impact

- Yield
- Ability to remove

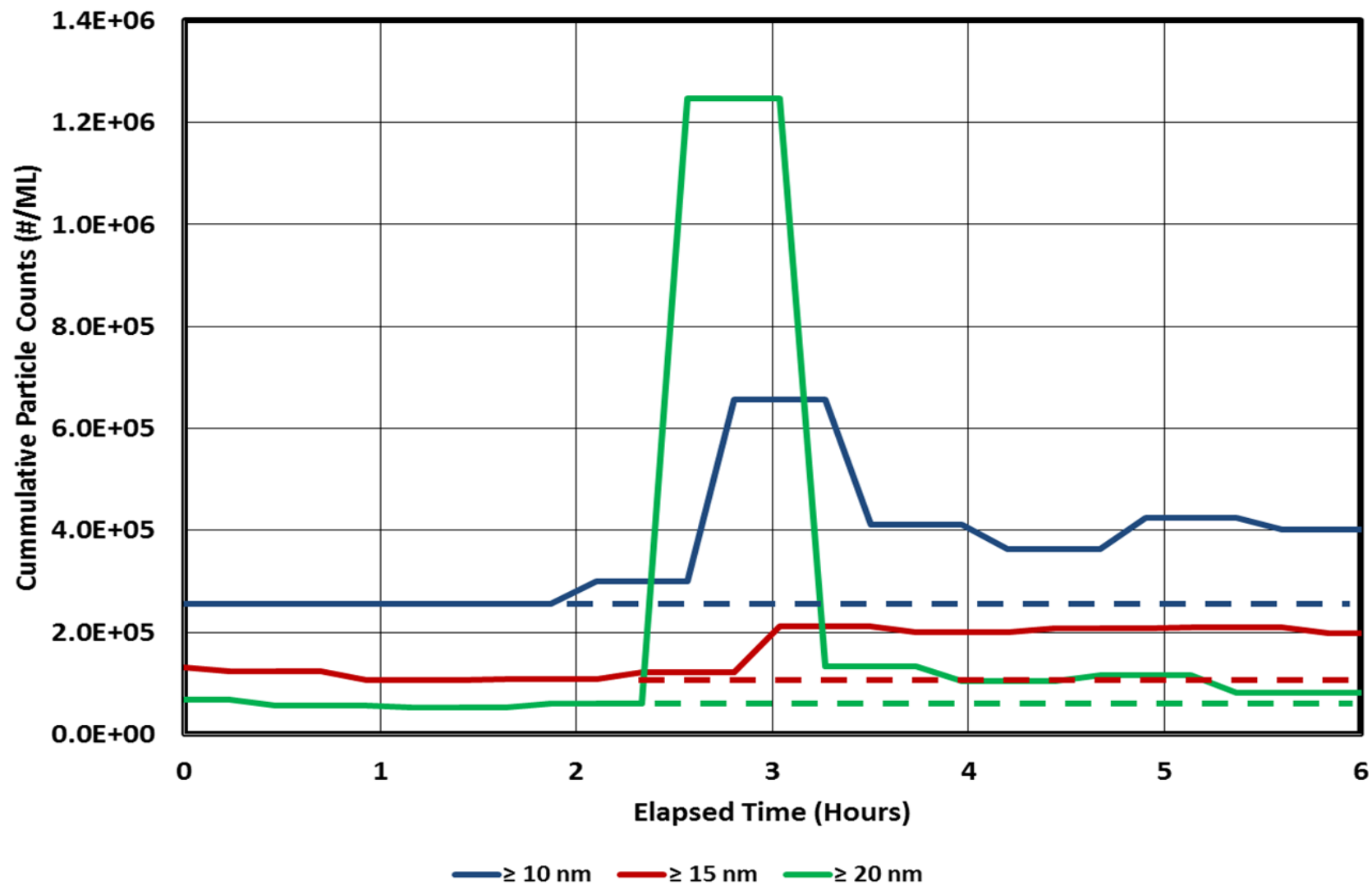
IRDS Input:

- The most advanced manufacturing processes are susceptible to particles as small as 10 nm
- Even the most advanced UPW final filters do not completely remove sub-50 nm particles
- Definition - critical concentration of “Killer” particles in UPW is 1,000 #/L (# = counts)

Particle Occurrences from:

- Transient conditions (flow, pressure)
- Valves (on/off, throttling, regulating)
- Pumps (seals and shear)
- Rinse-up of new component
- Vibration
- Ineffective final filtration

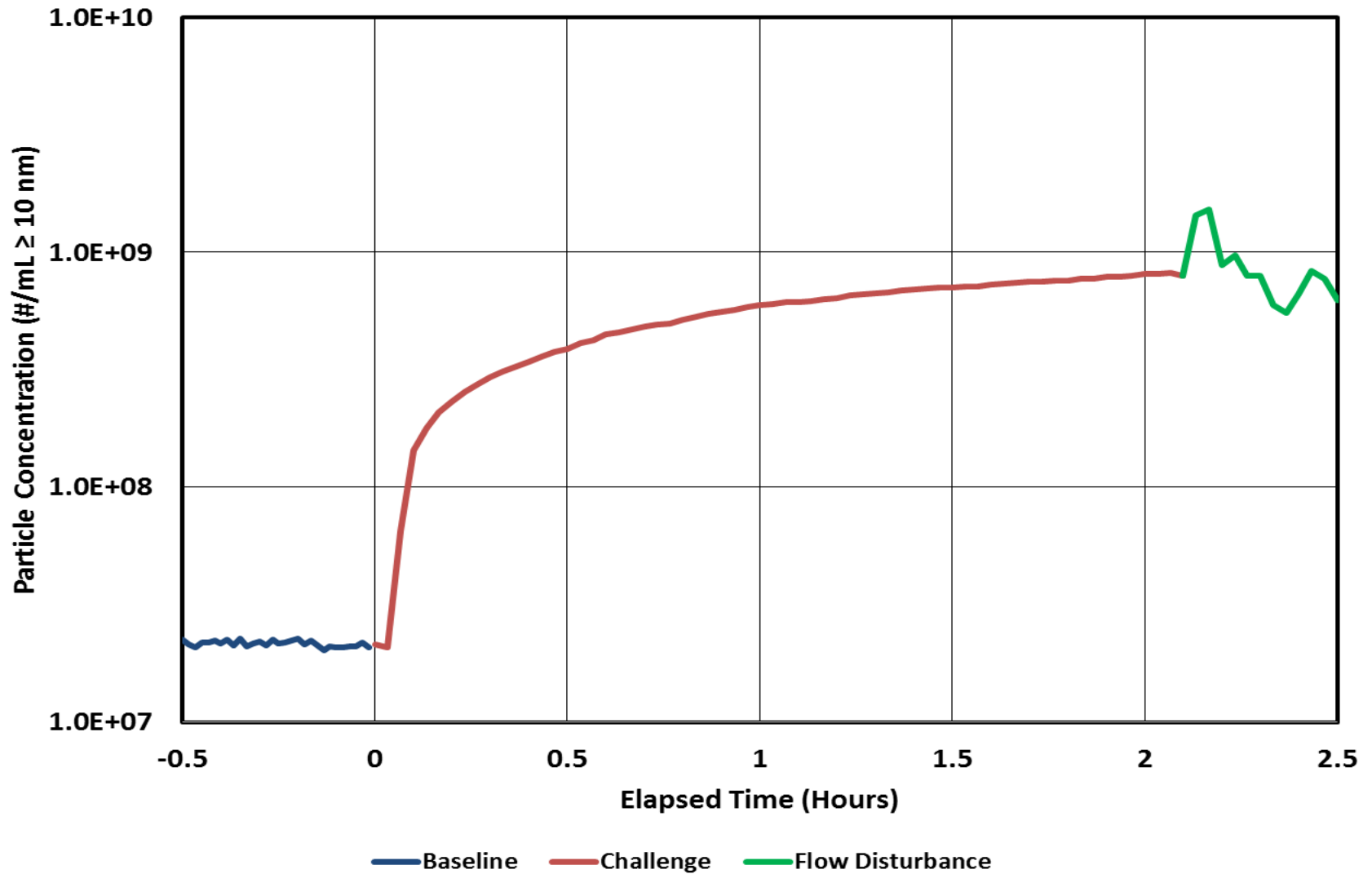
Effects of Sample Valve Movement



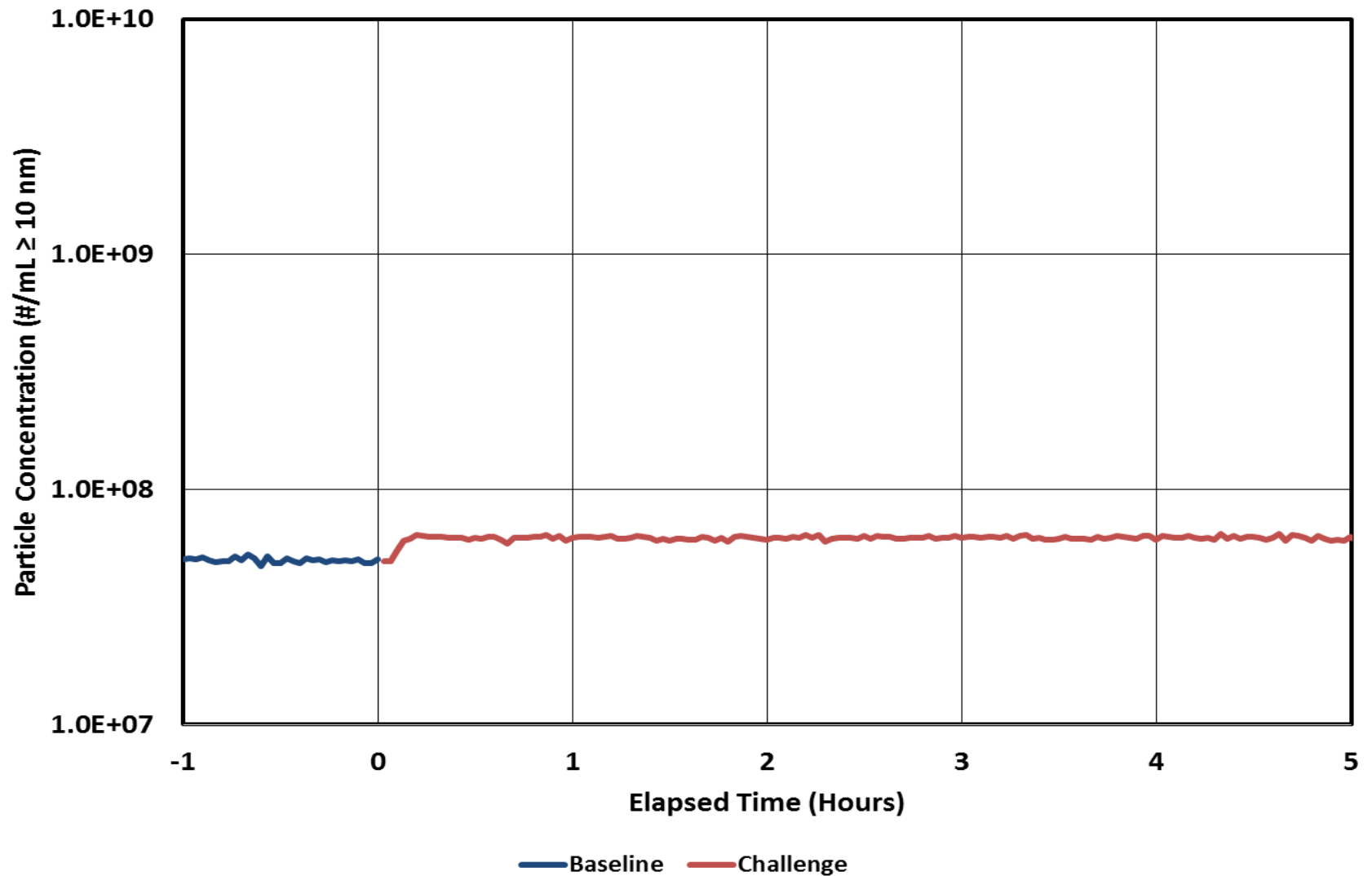
SEMI C079 Test Method:

- 5E+9 #/mL challenge
- 12 nm Silica particles
- LNS, STPC and OPC
- 10 nm cartridge filter
- 4,000 MWCO UF

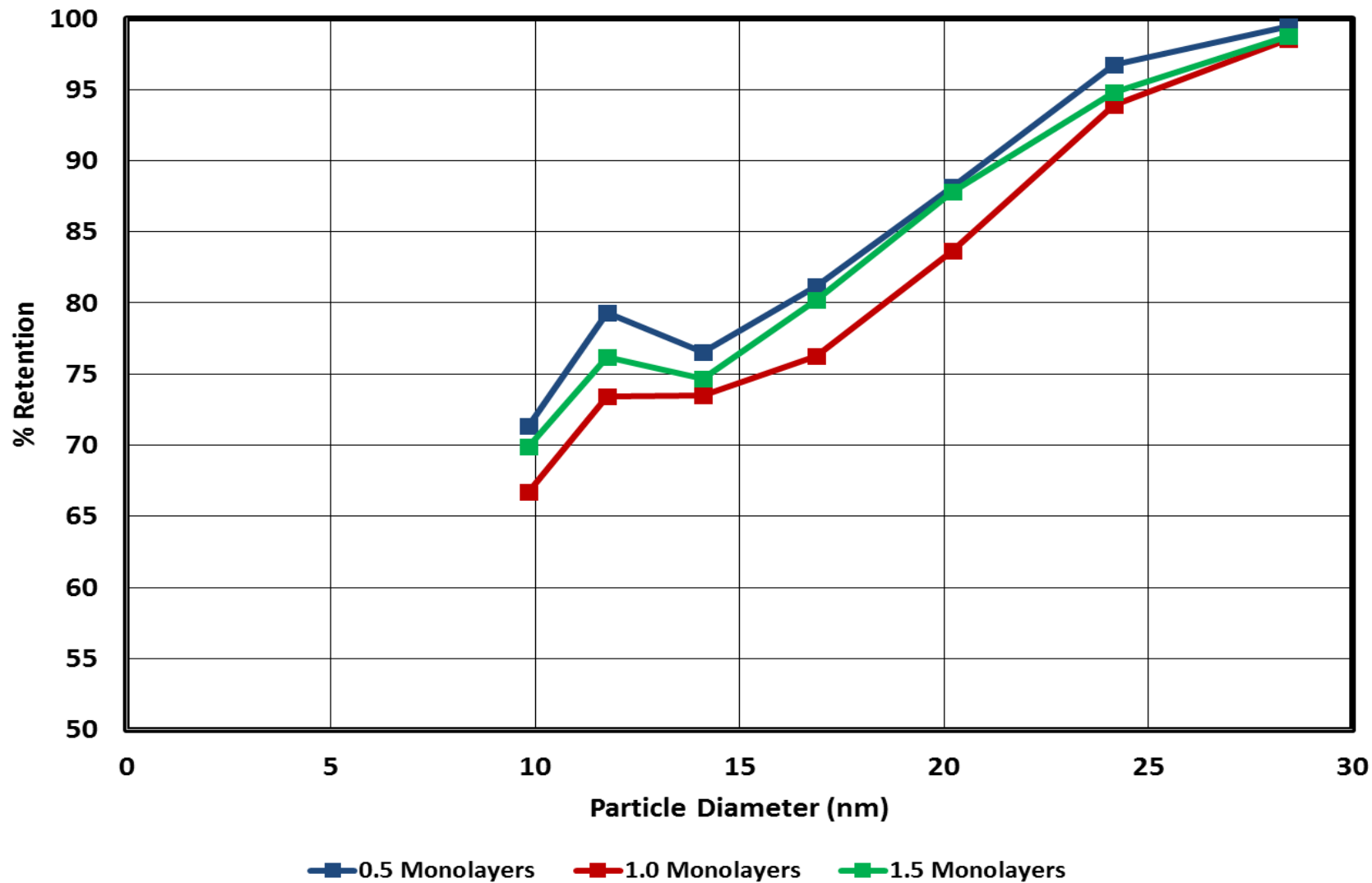
Cartridge Filter Challenge



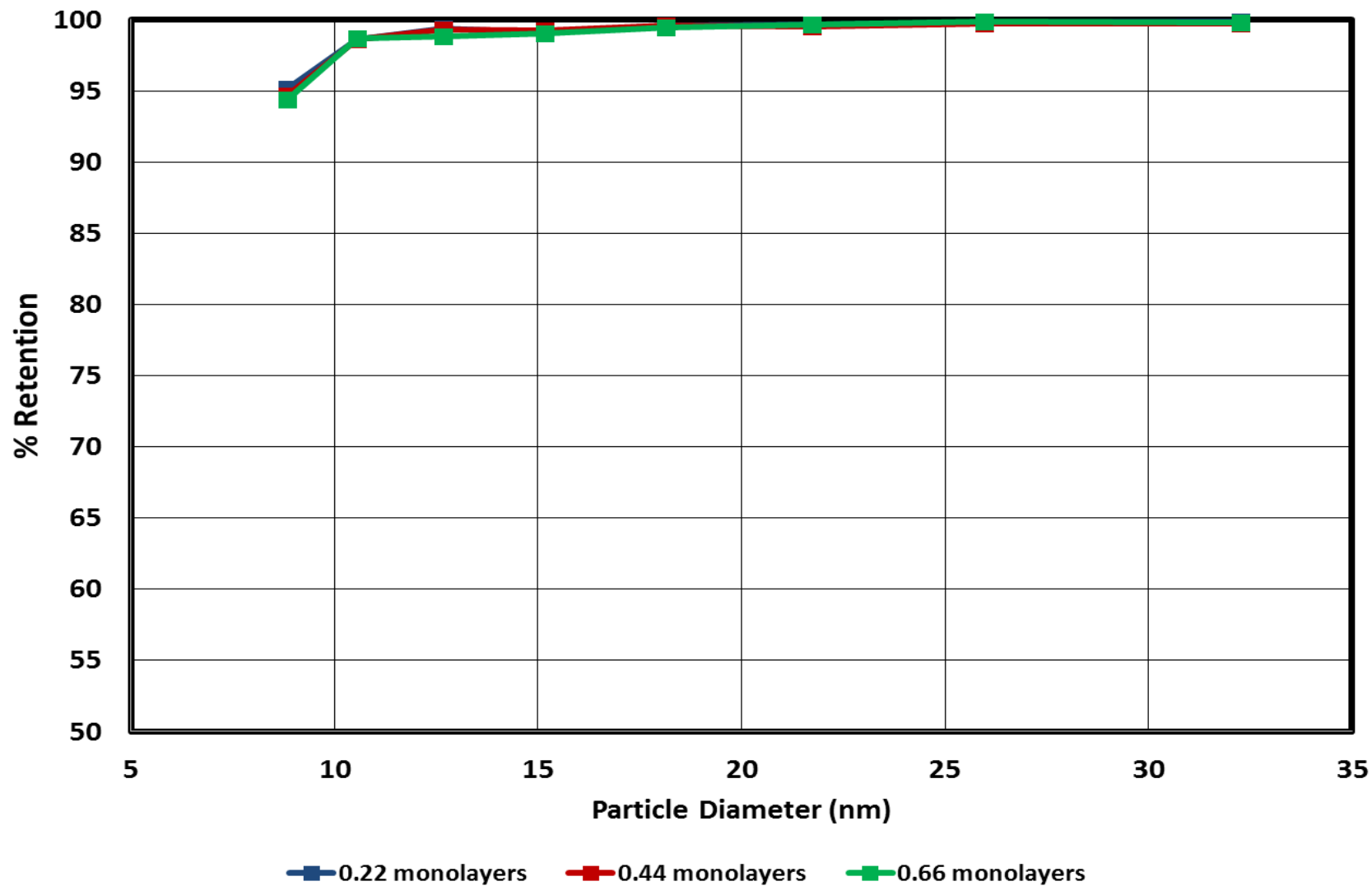
Ultrafilter Challenge



Cartridge Filter Retention Efficiency



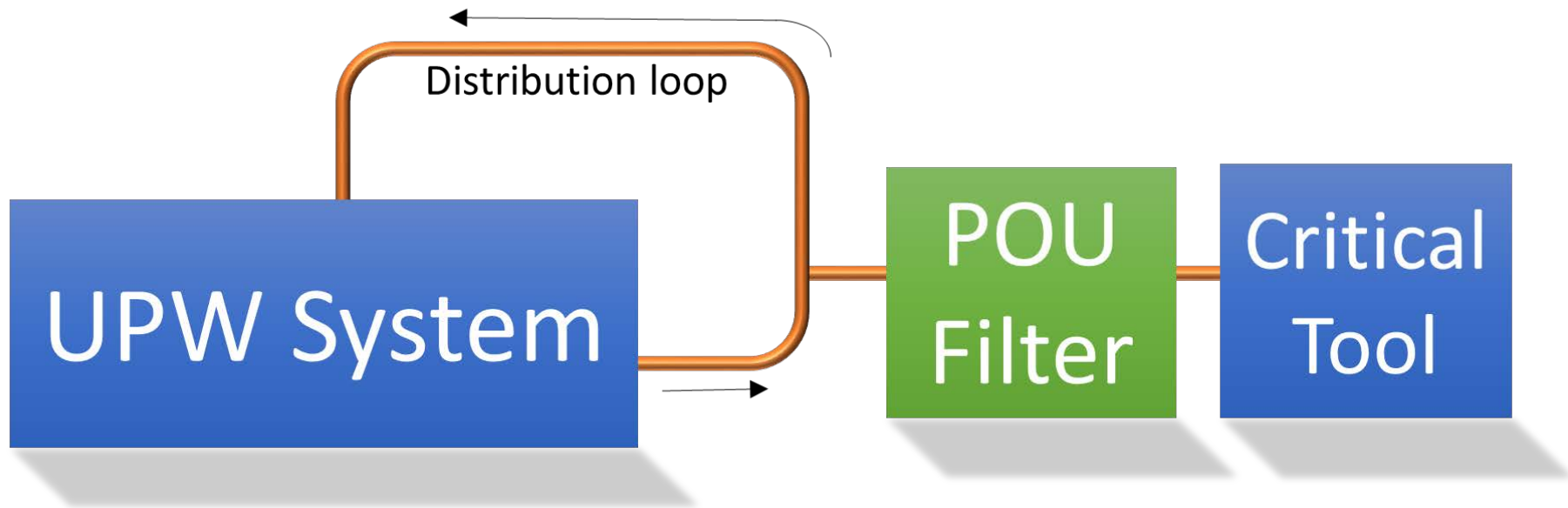
Ultrafilter Retention Efficiency



Solution

- ❑ Bring particle control as close to the tool as possible
- ❑ Deliver filtered water at the same pressure as the UPW supply
- ❑ Reduce or eliminate fluctuations in velocities, especially through the filter

Implementation of solution



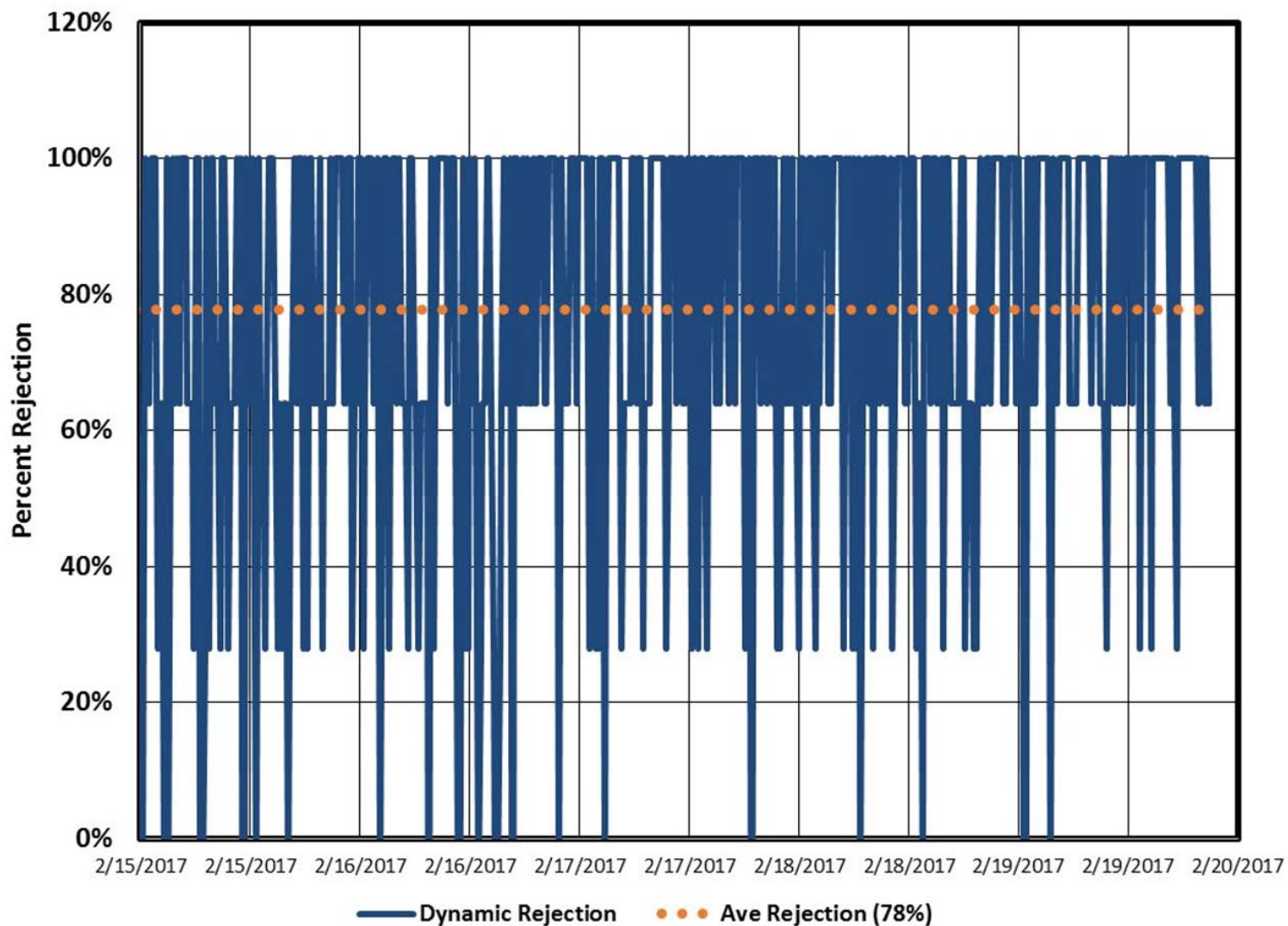


VANOX® POU-F Self-Contained System:

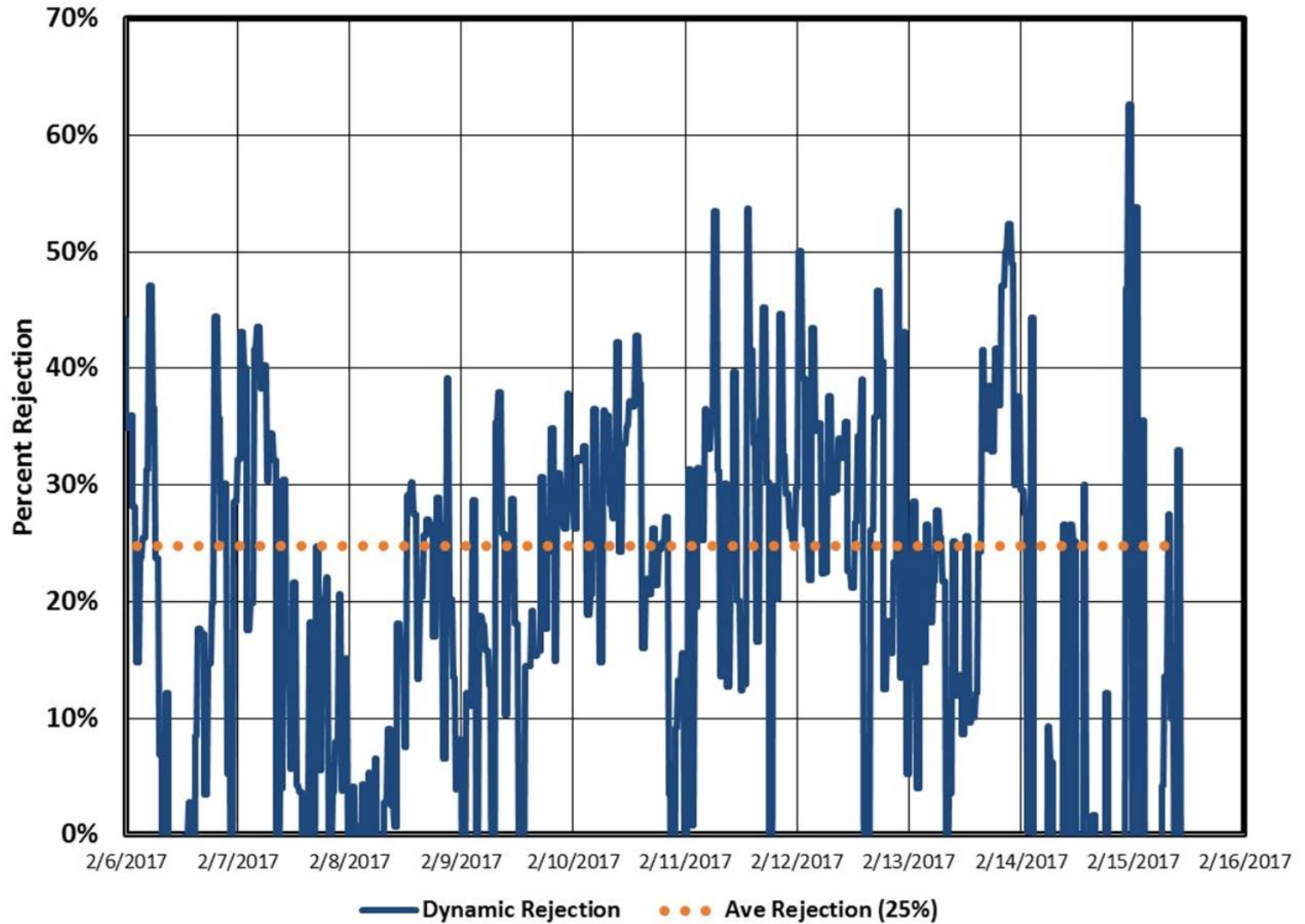
- UF membrane filter
- 11 ft² of floor space
- 76 inches tall
- 25 gpm tool consumption

Operation

UF Average Rejection: 50 nm



UF Average Rejection: 10 nm



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