

# When Mother Nature Throws You a Curve: Dealing With Problem Water

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# Troubled Waters - Ailments

- High Water Temperature
- Sediment
- Water Hardness
- High pH
- TOC (total organic carbon)
- Silica

# Discussion Format

- Issues
- Confirmation
- Resolution

# High Water Temperature

- Issues
  - Feedwater temperature > 85 F
  - EBCT < 10 minutes
  - Damage equipment
  - Poor product water quality
- Confirmation
  - Temperature gauges/testing
  - Product water flow/alarms
- Resolution
  - Bypass blend valve
  - Water chiller
  - Ice pipes



# Sediment

- Issues
  - Fouling filters/media
  - Membrane replacement
  - > 10 PSI Pressure delta
- Confirmation
  - SDI (silt density index)
  - PSA (particle size analysis)
  - Membrane autopsy
  - Filter inspection
- Resolution
  - Increase system filters
  - Evaluate filter design, pore size, and location



# Water Hardness

- Issues
  - Blend valve failure
  - Membrane replacement
  - Softener “short runs”
- Confirmation
  - Hardness Check
  - Membrane autopsy
  - Visual Inspection
  - Acid test
- Resolution
  - Increase softener capacity
  - Secondary softener
  - Low pH membrane cleaning



# High pH

- Issues
  - Low rejection rate
  - Poor product quality
- Confirmation
  - Test – multiple methods
  - Confirm RO readings
- Resolution
  - Dealkalizer
  - Acid feed system

Concentration of Hydrogen Ions	pH	Examples
1/10,000,000	14	Liquid drain cleaner, Caustic soda
1/1,000,000	13	Bleach, Oven cleaner
1/100,000	12	Soapy water
1/10,000	11	Ammonia (11.9)
1/1,000	10	Milk of magnesium
1/100	9	Toothpaste
1/10	8	Baking soda, Sea water
0	7	"Pure" water
10	6	Milk
100	5	Acid rain, Black coffee
1,000	4	Tomato juice
10,000	3	Grapefruit & Orange juice
100,000	2	Lemon juice, Vinegar
1,000,000	1	Sulfuric acid
10,000,000	0	Battery acid

# TOC (total organic carbon)

- Issues
  - Premature chlorine breakthrough
  - Fouled membranes/filters
- Confirmation
  - TOC test > 2 PPM
  - Membrane autopsy
- Resolution
  - Organic scavenger system
  - High pH membrane cleaning





# Silica

- Issues
  - Blend valve failure
  - Fouled membranes
- Confirmation
  - Membrane autopsy
  - Analytical water testing
  - Identify structure
- Resolution
  - Filtration
  - Ion exchange – anion resin
  - High flux cleaning



# Summation

Mother Nature's curves are not a matter of if, but when.

Develop a good disaster preparedness plan and solid relationship with a water services company to minimize the effects a curve will have on your business.

**Thank you**

**Questions?**