

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

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Rich Benner CWS III

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

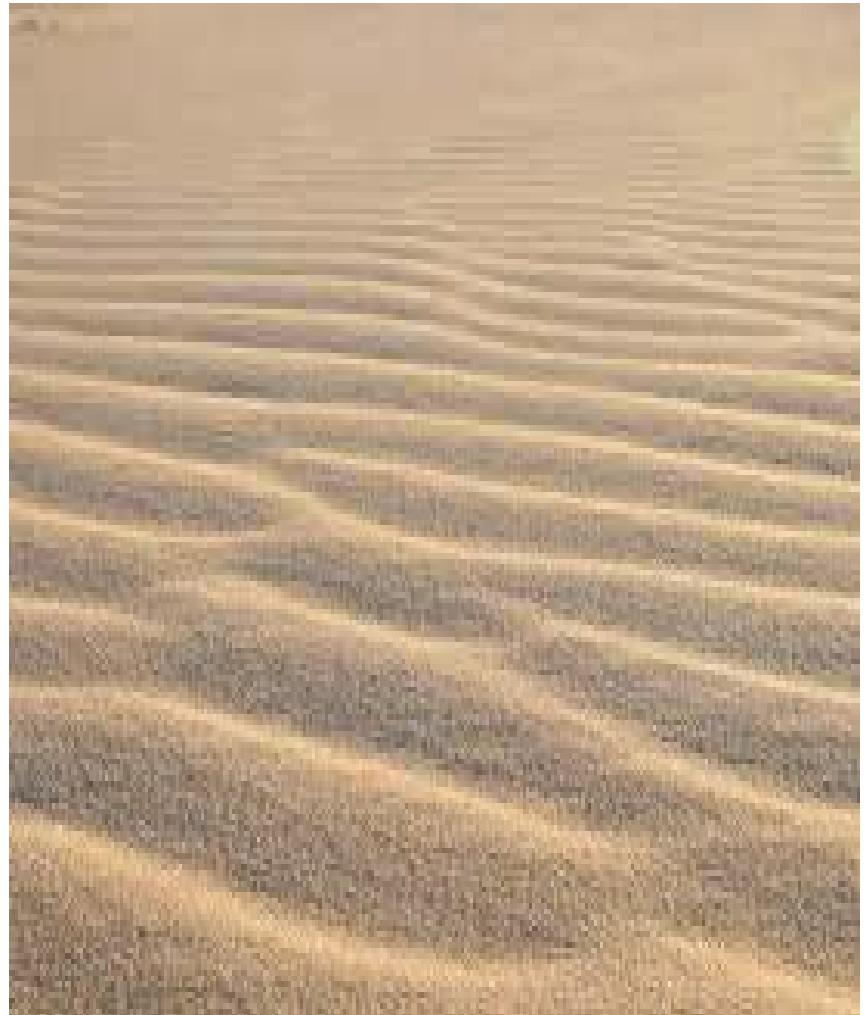
TOC (total organic carbon)

- 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?