

# Source Water Analysis



## Make-Up System Monitoring Ensures a Quality Final Product and Reduces Costs

Although the incoming city water feed, pretreatment system and reverse osmosis (RO) unit are critical locations for routine analytical monitoring, they are often overlooked.

### Make-Up System Monitoring is Critical to Maintaining Final UPW Quality

Many times, system operators are not aware of a negative water quality change until it shows up at the point-of-distribution (POD). POD interruptions can be avoided altogether by early detection and swift response to city water or make-up system changes.

### Make-Up System Water Quality Disruptions Originate from Man-Made or Natural Causes

#### Man-Made Contamination Sources

Human contaminant contributions arise from operational activities such as:

- City water piping distribution changes or other construction activities
  - Blending of surface and ground water and switching water sources as water demands change or flood control issues arise
- Internal construction projects, system modifications
  - Piping changes, major component change-outs
- Routine maintenance operational activities
  - RO cleanings, component backwashing, chemical injection changes

Feedwater contaminants to be aware of:

- Trihalomethanes elevated due to periodic higher chlorination levels
- Carbon fines increased from organic treatments to lower TOC
- Aluminum from alum treatments to lower colloids
- Iron (rust) from degrading pipes and valves

#### Natural Contamination Sources

Nature related contaminant fluctuations are due to extreme weather conditions or seasonal variations.

- Droughts can concentrate contaminants, especially particulates
- Floods can cause increases in ionic activity
- Seasonal variations can cause increases in TOC

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## Feedwater contaminants to watch for

- Anions such as ammonium, nitrates and phosphates from runoff containing pesticides or fertilizers
- TOC from lake temperature inversions or biological activity increases
- Silt / colloids from increase turbidity due to floods or droughts

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## Key Parameters to Monitor in the Make-Up System

- Ions: sodium, potassium, ammonium, phosphate, nitrate, chloride, sulfate and fluoride
- Critical metals: iron, manganese, barium, aluminum, copper and boron
- Other: TOC, dissolved silica, total silica, pH, hardness and alkalinity
- Balazs™ NanoAnalysis currently offers LC-OCD test for organic speciation, especially important for dealing with fouling and UPW quality issues

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## Make-Up System Monitoring Can Save You Money

Reverse osmosis membranes are expensive and extensive pretreatment steps are used to ensure optimum performance. Closely monitoring the make-up system water quality can prevent costly RO membrane fouling or failures. By simultaneously collecting water samples at the incoming feed, pre-RO and post-RO locations, the pretreatment system and RO rejection effectiveness of the system is easily tracked. Identifying negative changes early can minimize premature equipment repairs or replacement costs and prevent contaminants from reaching the POD.

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## Balazs Analysis Offering

### Incoming / RO Package

Complete test of incoming water includes

- pH, TOC, SiO<sub>2</sub>, CO<sub>2</sub>, TDS, total hardness, total alkalinity, resistivity
- Major metals (B, Fe, Ba, Mn, Sr, Al, Cu)
- Major anions (F<sup>-</sup>, CO<sub>3</sub><sup>2-</sup>, HCO<sub>3</sub><sup>-</sup>, Cl<sup>-</sup>, SO<sub>4</sub><sup>2-</sup>, NO<sub>3</sub><sup>-</sup>, HPO<sub>4</sub><sup>2-</sup>)
- Major cations (Na<sup>+</sup>, K<sup>+</sup>, Ca<sup>2+</sup>, Mg<sup>2+</sup>)

### Anions and Cations

- Anions by IC <sup>1</sup>
- Monovalent and divalent cations by IC <sup>2</sup>

### Trace Elements

- 30 elements by ICP-MS <sup>3</sup>
- 68 elements by ICP-MS <sup>4</sup>

### Organics

- Total oxidizable carbon (TOC)
- Organic acids
- Trihalomethanes (4 compounds by GC)
- Urea
- Semi-volatile organics by GC-MS
- Organic characterization by LC-OCD

### Bacteria

- ASTM method (F1094) - 48 hour incubation

### Silica

- Dissolved
- Non-dissolved (includes colloidal and solid)
- Total silica

### Other Miscellaneous Tests

- Total dissolved solids (TDS) by conductivity (W0149) or by ASTM (W0163)
- Total suspended solids (TSS)
- Turbidity
- Carbonate/bicarbonate
- Others - ask your local technical account manager

### Consulting Services

- UPW system testing and evaluation
- UPW system monitoring and baseline program design
- Water facility personnel training
- Contamination identification and problem resolution

### Support Services

- UPW sampling kit with pre-cleaned, quality-controlled bottles
- Sampling service on-site

1. Anions: F<sup>-</sup>, Cl<sup>-</sup>, NO<sub>2</sub><sup>-</sup>, Br<sup>-</sup>, NO<sub>3</sub><sup>-</sup>, HPO<sub>4</sub><sup>2-</sup>, SO<sub>4</sub><sup>2-</sup>

2. Monovalent & Divalent Cations: Li<sup>+</sup>, Na<sup>+</sup>, K<sup>+</sup>, NH<sub>4</sub><sup>+</sup>, Ca<sup>2+</sup>, Mg<sup>2+</sup>

3. 30 Elements: Li, B, Na, Mg, Al, K, Ca, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Sr, Mo, Ag, Cd, Sn, Sb, Ba, W, Hg, Pb, Bi

4. 68 Elements: Li, Be, B, Na, Mg, Al, Si, K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Rb, Sr, Y, Zr, Nb, Mo, Ru, Rh, Pd, Ag, Cd, In, Sn, Sb, Te, Cs, Ba, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Hf, Ta, W, Re, Os, Ir, Pt, Au, Hg, Tl, Pb, Bi, Th, U