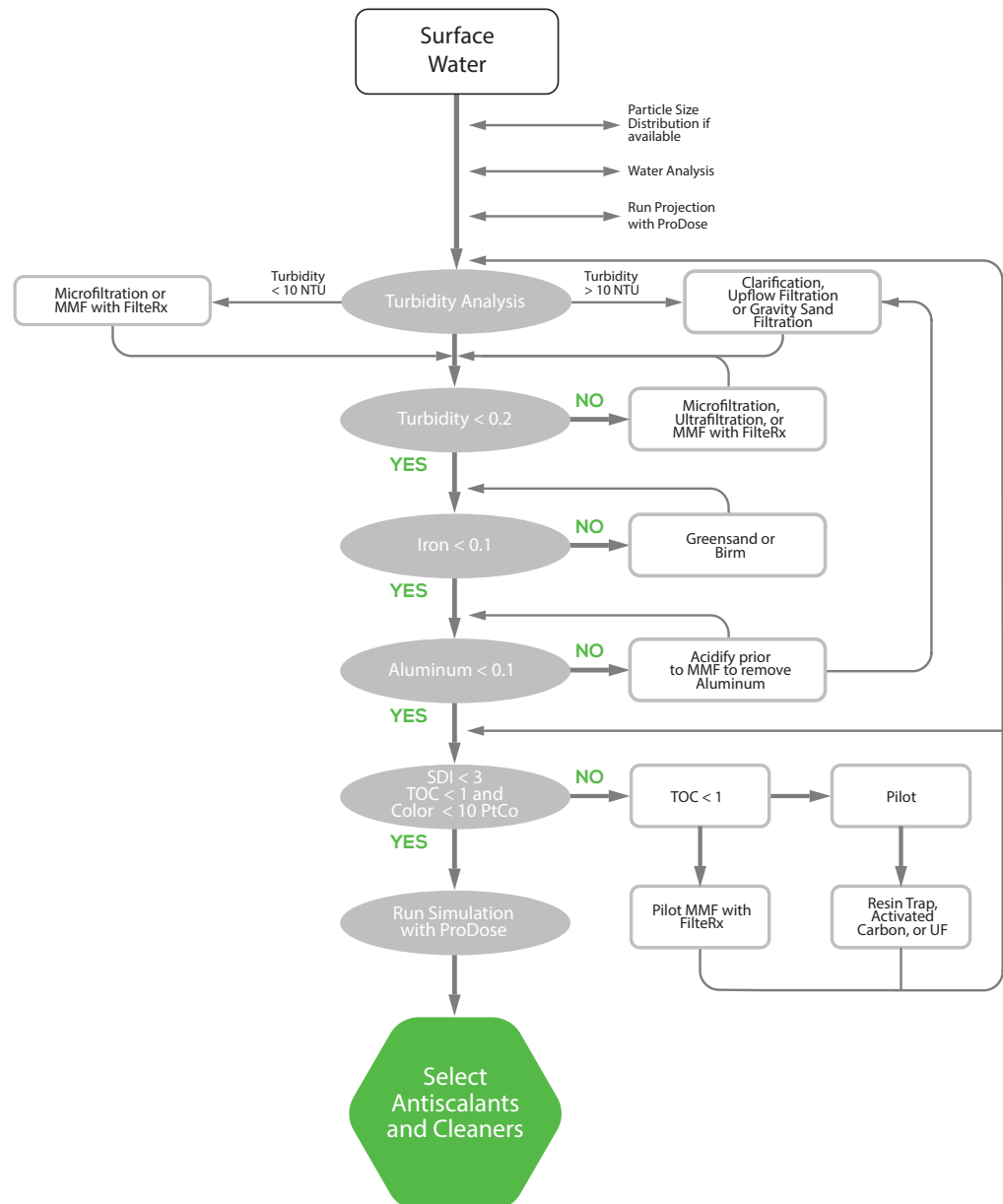


# PRETREATMENT MATRIX: Element Flow for Surface Water & Well Water

## SURFACE WATER

For municipal water see pretreatment information.



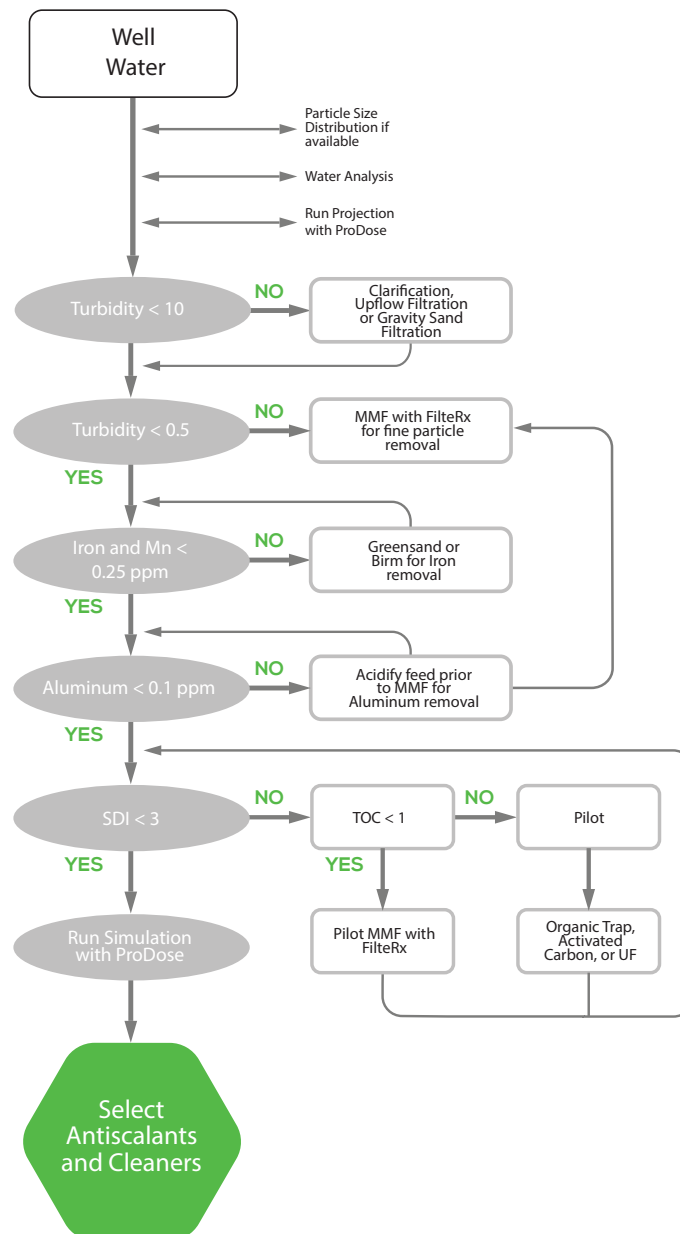
### Notes:

- 1) Birm is a natural Zeolite for the removal of Iron and Manganese. No regeneration is required. The pH must be maintained above 8.
- 2) Surface Water Systems may benefit from the use of a dispersant in addition to antiscalant.
- 3) Low Turbidity High SDI waters are difficult to treat. Pilot testing of such waters is strongly suggested.

# PRETREATMENT MATRIX: Element Flow for Surface Water & Well Water

## WELL WATER

Organics tend to be less fouling as compared to Surface Water. Organics in Well Water tend to have higher soluble iron and Manganese levels which can either be handled with low rejection rates, softening or dispersants. Soluble iron and Manganese levels which can either be handled with low rejection rates, softening or dispersants.



Birm is a natural zeolite for the removal of iron or manganese. No regeneration is required but pH > 8 is necessary.

# PRETREATMENT MATRIX: Element Flow for Surface Water & Well Water

## WATER SOURCE

WATER SOURCE	CHARACTERIZATION	TURBIDITY	COLOR	TOTAL ORGANIC CARBON (TOC)	TOTAL DISSOLVED SOLIDS (TDS)	SILT DENSITY INDEX
River	Unstable, with seasonal fluctuations, especially during rainy periods and spring thaw	High, with seasonal variation	Moderate	Moderate to high	Low	Extremely high >5
Lake or large pond	Unstable, with seasonal fluctuations, esp. during warm months	Low, with seasonal variation	High, with seasonal variation	High, with seasonal variation	Low	High 4-5
Well	Relatively stable, with low or moderate seasonal changes. Many wells are contaminated with iron and iron reducing bacteria. Metals may be soluble due to lack of oxygen. Also barium is a potential contaminant in some wells.	Low	Low	Moderate, in general. Well Water Organics tend to be easier to handle as they are not oxidized. Check to see if well pumps are oil or water lubricated.	Low	Must be tested as it can range from 1 to >5 depending on the well
Municipal Water	Potential Seasonal Variations Potential carry over of organics and aluminum. Most municipalities use alum and do not concern themselves with carryover --Al is death to membranes. Quite often will have high chlorine.	Low to moderate	Low	Low to moderate	Low to moderate	Low to very high
Brackish	Relatively stable with moderate changes in turbidity in spring and fall, and moderate other seasonal changes.	Low	Low	Low to moderate	Moderate to high (up to 10,000 ppm)	High



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## WATER SOURCE

WATER SOURCE	CHARACTERIZATION	TURBIDITY	COLOR	TOTAL ORGANIC CARBON (TOC)	TOTAL DISSOLVED SOLIDS (TDS)	SILT DENSITY INDEX
Seawater	Relatively stable, with moderate changes in turbidity in spring and fall, and moderate other seasonal changes	Low to moderate	Low	Low to moderate	High (above 10,000 ppm)	Very Low to High
Tertiary Effluent	Relatively stable, with moderate seasonal changes, quality depends on treatment plant performance	Low to moderate	Moderate to high	High	Moderate	High

ANALYSIS	LOW	MEDIUM	HIGH
Turbidity NTU	<10	10 to 25	>25
Color (PtCo)	<10	15 to 30	>30
TOC (mg/liter)	<1	2 to 10	>10
Total Dissolved Solids (ppm)	10-150	150-300	>10,000 (brackish water)

# PRETREATMENT MATRIX: Element Flow for Surface Water & Well Water

WATER SOURCE	EXAMPLE CHARACTERISTICS	RECOMMENDED PRETREATMENT TECHNIQUE(S) AND EQUIPMENT
River	Turb > 50 NTU	Clarifier + Media filter, or possibly Microfiltration alone
	Turb > 50 NTU	Clarifier + MF or MF/UF membranes
	Turbidity < 50 NTU	Upflow filter alone or MF alone
	Turb 10-50 NTU	MF/UF membranes alone or MMF with Polymer
	Turb < 10 NTU	MF or MMF with polymer
Lake or large pond	Hard water + TOC	Enhanced coagulation + Lime Softening + Clarifier + Media Filter
	Turb > 50 NTU	Enhanced coagulation + Clarifier + MF/UF membranes, or Upflow filters
	Turbidity < 50 NTU	Enhanced coagulation + MF membranes or Upflow filters
Well	Iron and manganese	Greensand filter, Birmor chlorination and filtration
	Turb < 10 NTU	UF/MF membranes or Multimedia (MMF)
	Turb > 10 NTU	Media filter (MMF)
Brackish Water	Turb > 10 NTU	UF/MF membranes
	Turb < 10 NTU	Media filter
Sea/Ocean Water	Turbidity > 100 NTU	Clarifier + MMF or MF/UF membranes
	Turbidity < 100 NTU	–
	Turbidity < 50 NTU	Upflow filter alone
	Turbidity < 25 NTU	Media filter
Tertiary Effluent	All water characteristics	Media filter Upflow filter or MF/UF membranes, if Ammonia is an issue, lime clarification and stripping may be required or special membrane treatment

## LEGEND

TSS = Total Suspended Solids

TOC = Total Organic Carbon

RO = Reverse Osmosis

MF = Microfiltration

UF = Ultrafiltration

MMF = Multimedia Filtration