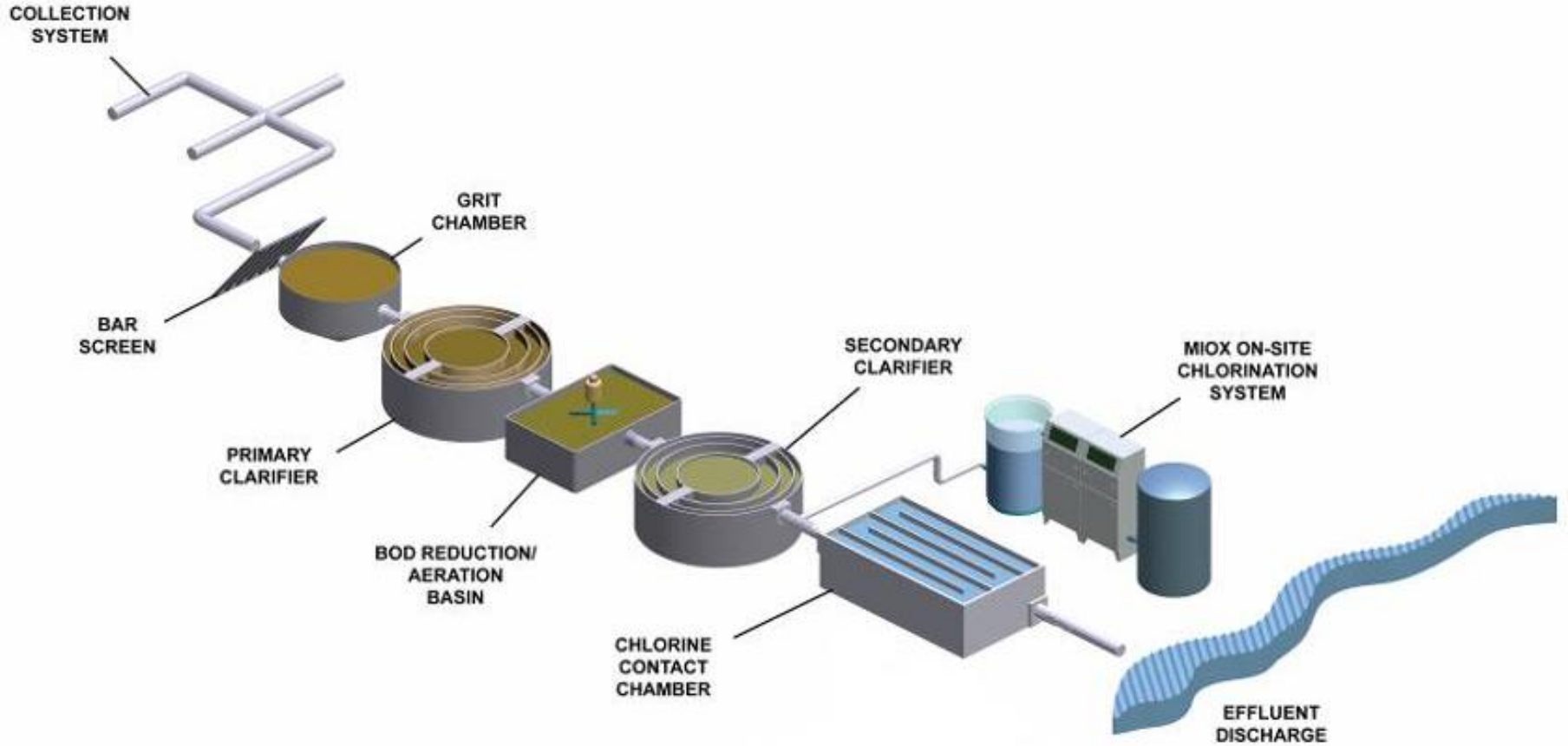




*The SAFEST WATER In The World*

## Module: Wastewater Treatment Application

# WWTP Process Flow Diagram



# Benefits of Mixed Oxidant Solution for Wastewater Treatment and Reuse

- ▶ Low lifecycle costs
- ▶ No hazardous chemicals used or produced
- ▶ Reduces or eliminates biofilm in distribution lines
- ▶ Reduces total coliforms
- ▶ The dechlorination feed rate stabilizes to a steady state, eliminating constant monitoring and adjustment.
- ▶ A durable chlorine residual is achieved, yet discharged effluent has lower chlorine levels than with conventional chlorination
- ▶ Improved water quality for sustainable reuse



# Stable Chlorine Residual Reduces Costs

- ▶ Regulations require most wastewater treatment operations to remove chlorine before discharge
- ▶ With unstable chlorine residuals, many WWTP operators overdose  $\text{SO}_2$  to take care of the spikes in chlorine
- ▶ Mixed oxidant solution provides a more stable chlorine residual in wastewater effluent
- ▶ With mixed oxidant solution and a more stable residual, less  $\text{SO}_2$  is needed, reducing chemical consumption



# Typical Wastewater Chlorine Dosage Rates

Reason for Chlorination		Typical Dosage ppm (mg/l)
<b>Disinfection of:</b>	Raw Sewage	15 – 20
	Primary disinfection	10 – 15
	Trickling filter effluent	3 – 8
	Activated sludge effluent	3 – 8
	Sand filter effluent	2 – 5
<b>Odor control of:</b>	Upper sewer	1 – 10
	Plant influent	1 – 10
	Trickling filter effluent	1 – 5
<b>BOD reduction:</b>	Raw screened sewage	10
	Activated sludge effluent	10
<b>Cyanide destruction:</b>	To cyanate	2.7 times cyanide content
	Complete destruction	7.3 times cyanide content

# Mixed Oxidant Solution is the Best Treatment Option for Wastewater

	Gas Chlorine	Delivered Hypo	Calcium Hypo	Ozone	UV	On-Site Hypo	Mixed Oxidants
<b>Safe</b>	No	No	?	No	Yes	Yes	<b>Yes</b>
<b>Ease of regulatory compliance</b>	No	No	?	Yes	Yes	Yes	<b>Yes</b>
<b>Consistent disinfectant dose</b>	No	No	No	Yes	n/a	No	<b>Yes</b>
<b>Dose not impacted by solids</b>	Yes	Yes	Yes	Yes	No	Yes	<b>Yes</b>
<b>Effluent discharge w/o dechlor</b>	No	No	No	Yes	Yes	No	No
<b>Consistent dechlor dose</b>	No	No	No	n/a	n/a	No	<b>Yes</b>
<b>Chlorine residual for reuse</b>	Yes	Yes	Yes	No	No	Yes	<b>Yes</b>
<b>Easy to maintain</b>	Yes	No	No	No	No	Yes	<b>Yes</b>
<b>Low lifecycle costs</b>	Yes	No	No	No	No	Yes	<b>Yes</b>



# Santa Ana Pueblo, New Mexico:

## Mixed Oxidant Solution for Wastewater Reuse



- ▶ Disinfection converted in 2007 from competitor's hypochlorite to MIOX mixed oxidant solution
- ▶ Influent from residential and business districts, the Hyatt® Regency Tamaya, and the Star Casino
- ▶ WWTP supplies 50,000 gallons at a time to golf course, with remaining irrigation needs met by groundwater

*“MIOX played an important role in helping the Pueblo meet our environmental goals.”*

Glenn Tenorio, Chairman of Tribal Utilities Authority



# Los Alamos National Laboratory: Mixed Oxidant Solution Eliminates Safety Concerns

- ▶ DOE study showed chlorine gas is the most hazardous material on DOE facilities other than nuclear materials.
- ▶ Annual \$10,000 savings for training and O&M
- ▶ Elimination of HAZMAT requirements
- ▶ Extremely low infrastructure change costs
  - 7 ppm dose with chlorine resulted in < 5 CFU/ml
  - 5 ppm dose with MOS resulted in < 1 CFU/ml
- ▶ Effluent is re-used at an adjacent facility for cooling tower water treatment

