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a Water Company

FERROLOX®

Arsenic Removal: Part I

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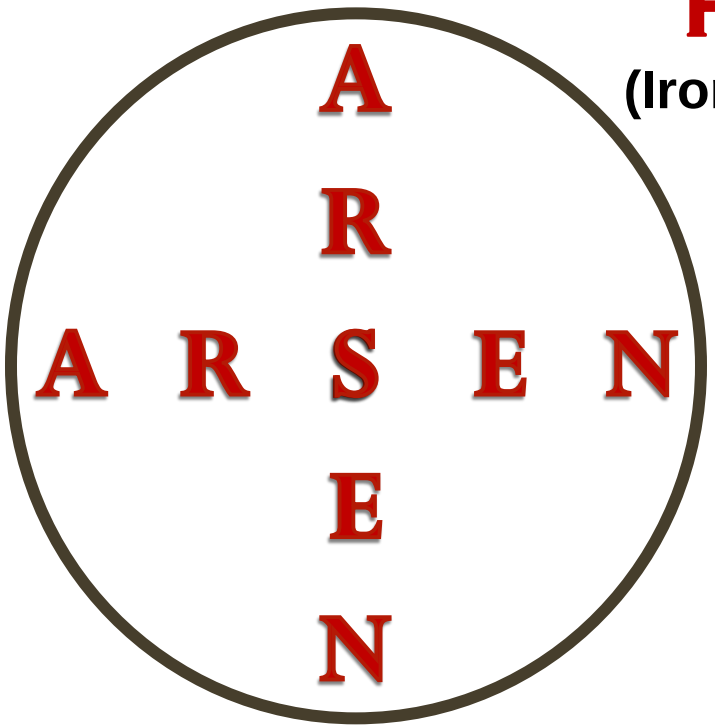
Removal of Arsenic From Drinking Water with Ferrolox

(Iron hydroxide based)



(III)

(V)

Adsorption Technologies -by Deepak Chopra

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1. Arsenic Chemistry

Arsenic Species

As (III) – H_3AsO_3, $H_2AsO_3^{-1}$, $HAsO_3^{-2}$

As (V) – H_3AsO_4, $HAsO_4^{-1}$, AsO_4^{-2}

What is the significance of Arsenic speciation?

As (V) is more effectively removed by **FERROLOX** than *As (III)* but this is the case by most of the Adsorbents.

Arsenic Occurrence

Most of the **surface waters** as they get enough oxygen the Arsenic is Predominantly *As (V)*

Lack of oxygen in Ground waters are usually found with *As (III)*. But some times they can be as *As (V)* or a combination of both *As (III)* and *As (V)*.

WATCH's SOLUTION

WATCH has changed the Arsenic Chemistry with **OXYDES** (H_2O_2)
And now maximum **As** can be removed with
Oxidizing **As (III)** to ⟶ **As (V)** before **FERROLOX**!

80% reduction and most effective?
With Solid Oxidizing Media (MnO_2 solid)
KATALOX LIGHT with **OXYDES**
As (III) Oxidation

Nothing else is more effective
Than FERROLOX Process with Low cost and High removal capacity.

Arsenic Rule

- ✓ **Best Available Technology**
- ✓ **Maximum Percent removal As (III)**

Removal Method	Product(s)	Removal
Oxidation and Filtration	**OXYDES + KATALOX LIGHT***	80%
Adsorption	**FERROLOX**	20%

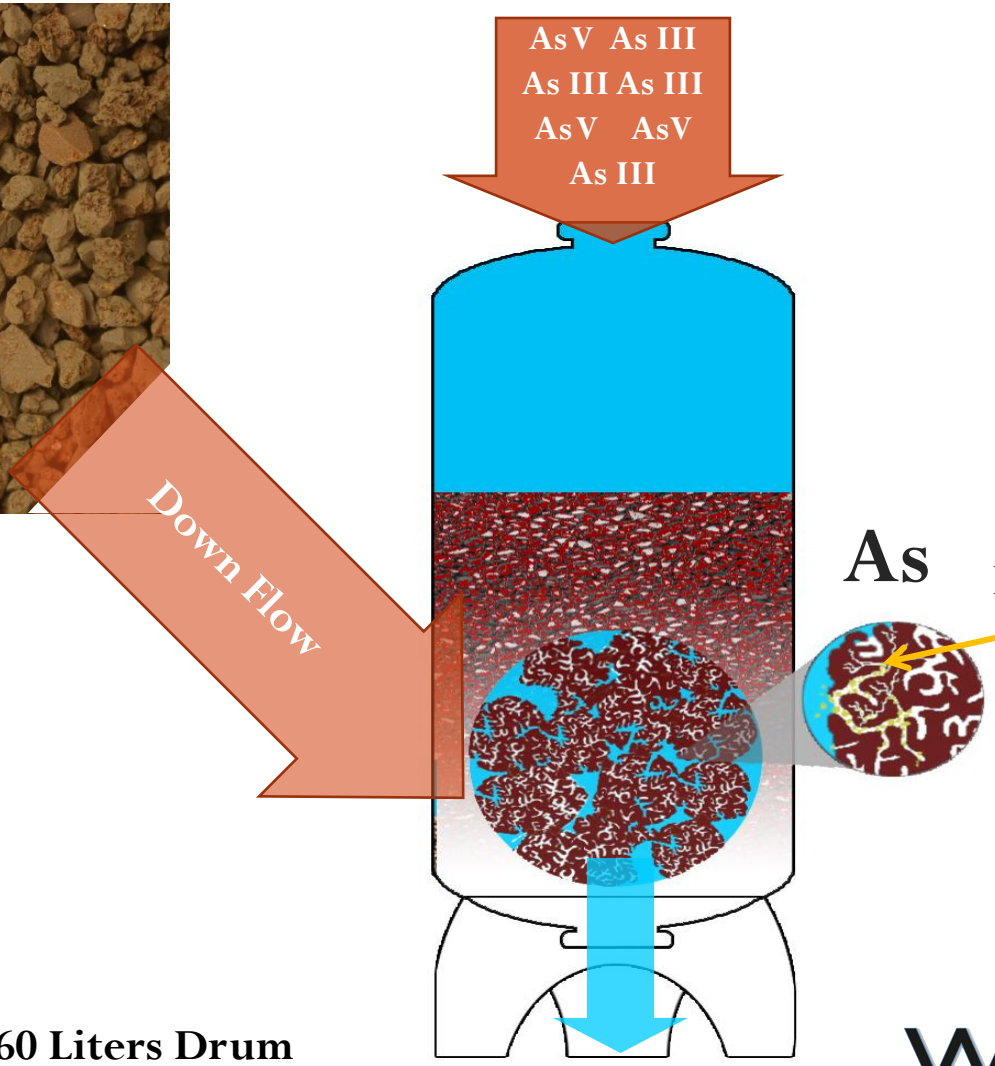
****Learn more about Advanced Catalytic Filtration from our Online Learning system.***

Increasing the service life and capacity of FERROLOX:
Using pretreatment **OXYDES + KATALOX LIGHT** increases **FERROLOX** capacity up to **500%**

2. Adsorption Technology

FERROLOX® Media

Package: 60 Liters Drum



Watch Water Adsorption Specials

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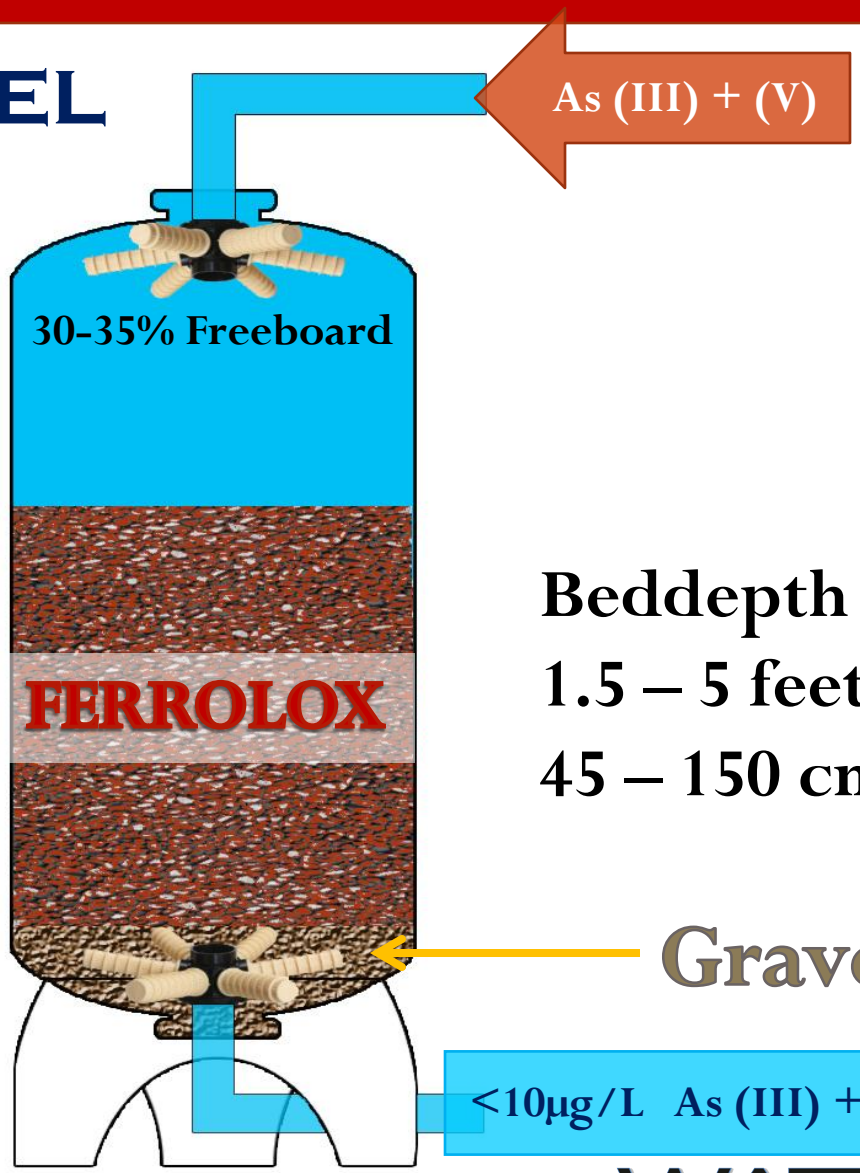
Pressure Vessel

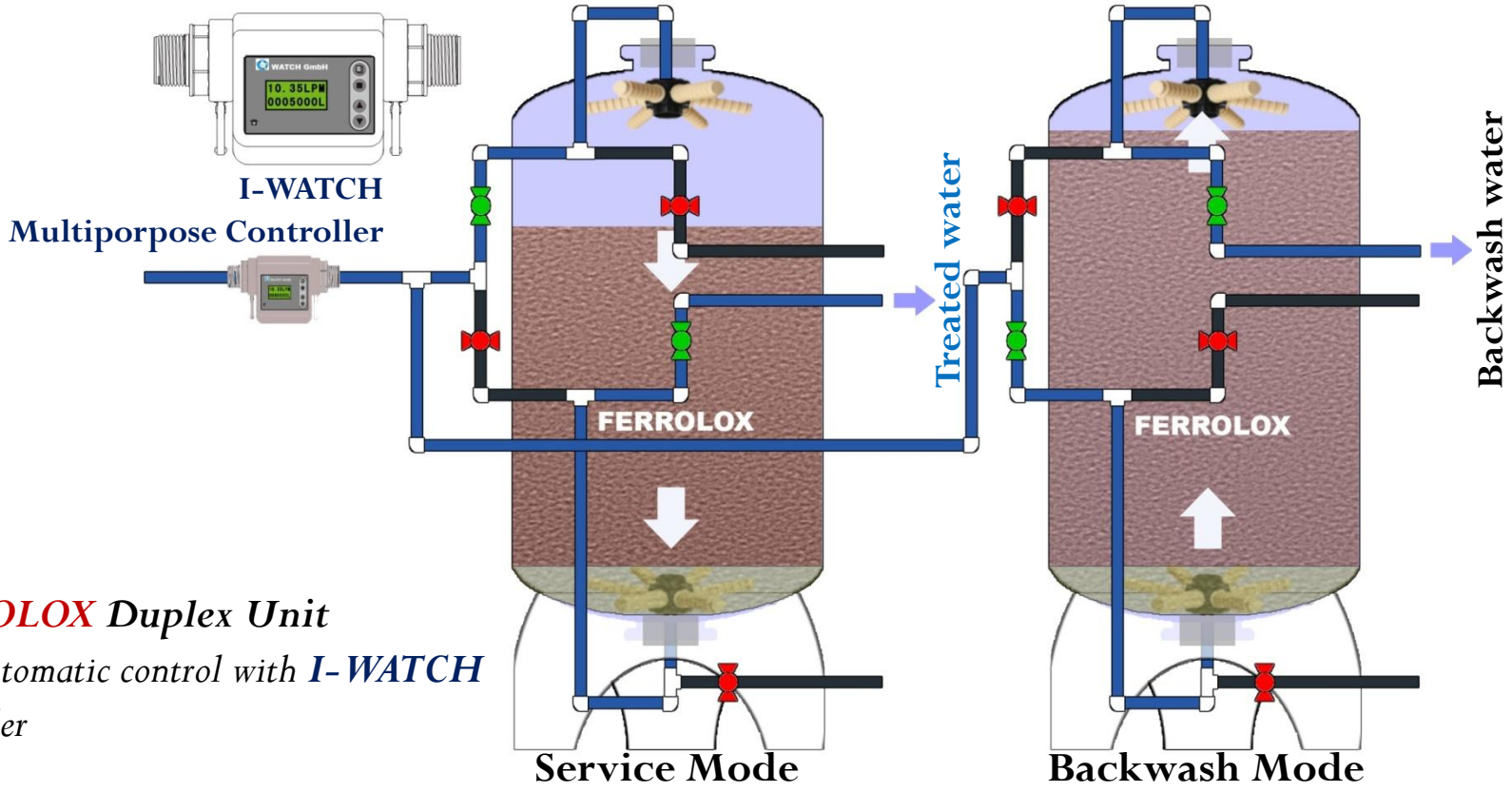


EBCT: 2 – 10 minutes

Lower the EBCT

- ***Higher the unit flow rate***
- ***Smaller the size of the pressure vessel***

Beddepth
1.5 – 5 feet
45 – 150 cm



***FERROLOX** Duplex Unit*

*Fully automatic control with **I-WATCH** Controller*

Systems Controls: **Manual** vs. **Automatic**

Pre-treatment: Oxidation and pH adjustment

Costs: Watch always recommends Manual systems.
Easy to operate, very less backwash residual.

Oxidation with (**OXYMETAL**) converting **As (III)** to **As (V)**

Note: All adsorbents (based on IRON) have greater removal capacity of **As (V)** than **As (III)**

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pH adjustment:

Arsenic removal performance for **FERROLOX** can be increased by adjusting the pH with **OXYMETAL**. Lower is the pH, greater is the removal capacity.

Arsenic Removal Project : Buenos Aires

Inlet Arsenic = 46 – 50 µg/L **As** at **pH 7.8**,
Media life 10,000 BVs with outlet **As** 10 µg/L

pH adjustment with OXYMETAL
At **pH 6.8**, media life 30,000 BVs with outlet 10 µg/L **As**

3. Application - Why / Where ?

Why Manual units ?

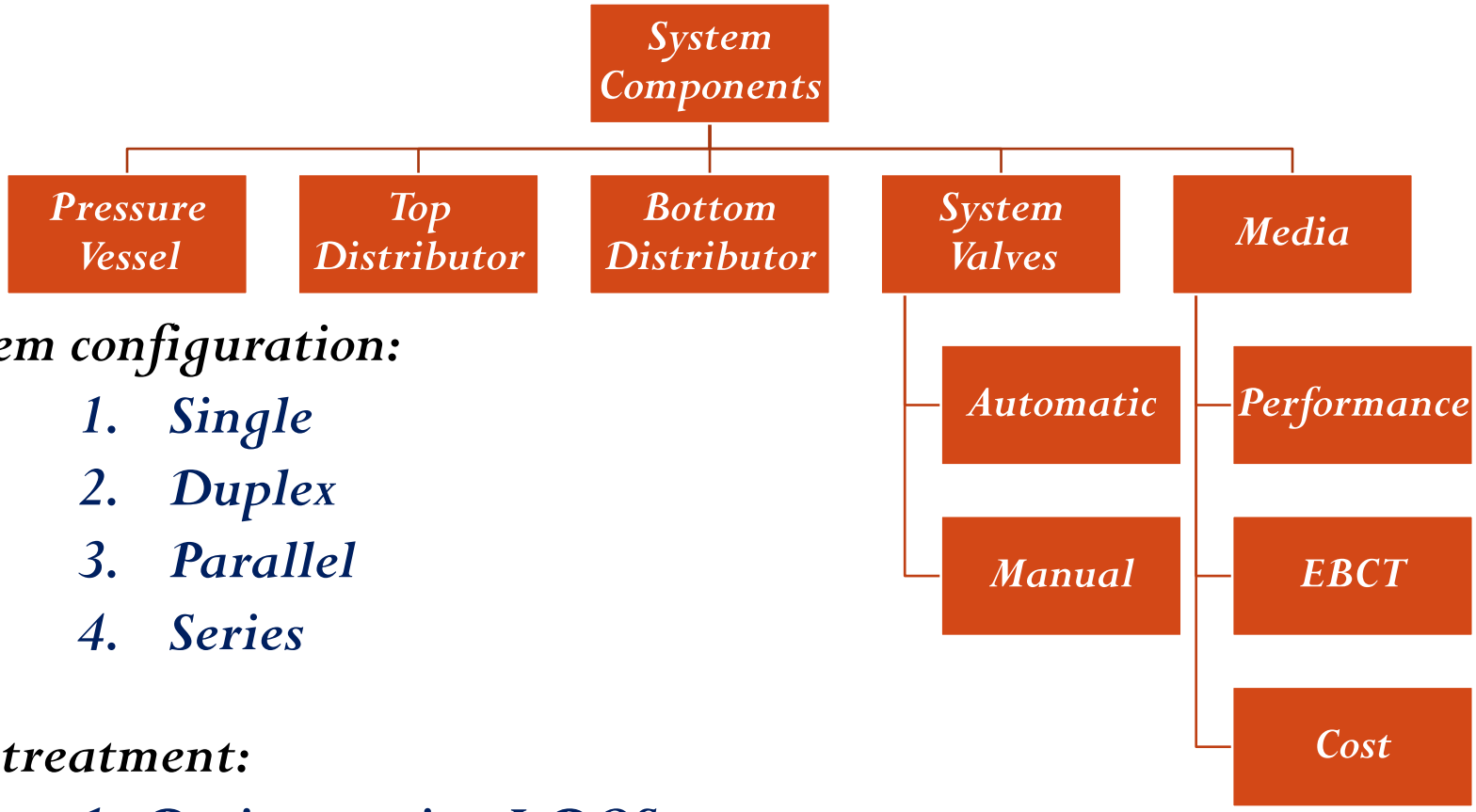
Number One Reason – Very simple to operate

- ✓ Low operating costs
- ✓ Low investment costs
- ✓ Low arsenic in treated water < 2-3 µg/L (ppb)

FERROLOX has very high adsorption capacity 15 gram/kg

4. System Design

„Technology with increasing demand“



System configuration:

1. *Single*
2. *Duplex*
3. *Parallel*
4. *Series*

Pre-treatment:

1. *Dosing station I-DOS*
2. *Proportional dosing*
3. *Oxidation (OXYMETAL)*
4. *pH adjustment with OXYMETAL*

5. Operation Costs

	Amount	Cost per unit	Total
Pressure Vessel (s)	1	A	A
	2	A	2 x A
Gravel	liters	B	
FERRLOX media	liters	C	
Accessories			
Up Flow (Packed Bed)	0 valves	none	n/a
Down flow (single)	5 valves	D	5 x D
Down flow (duplex)	10 valves	D	10 x D
System Manufacturing	Workshop		
		Grand Total	

Operational costs

If **FERROLOX** adsorbent is used only for one time use, the major cost item is media replacement (90%). 5% costs are related to disposal and 5% is manual loading or unloading of the media.

„FERROLOX can be regenerated“

Thank you for your time

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