

# FERROLOX®

## ARSENIC REMOVAL: PART I

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GmbH

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Watch Adsorption Specials

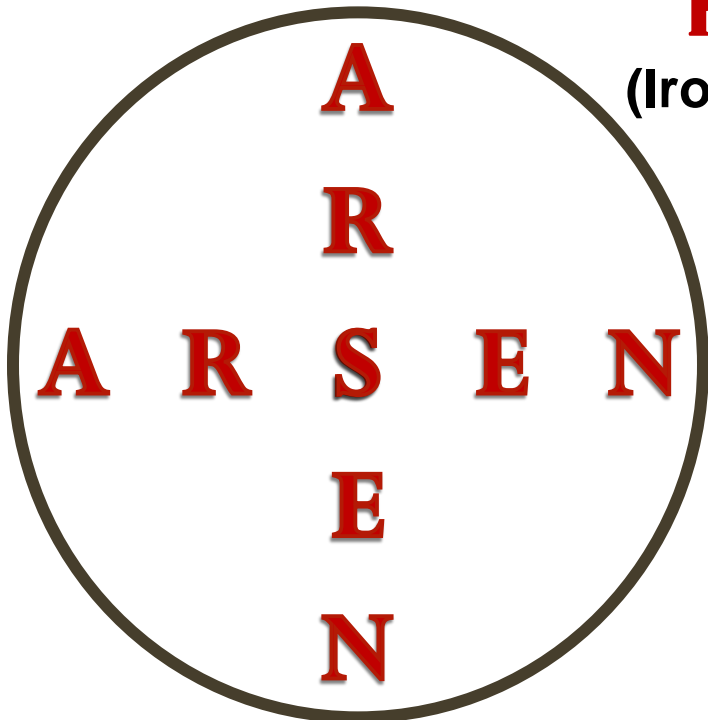
**WATCHER**®  
WATCH WATER  
*a Water Company*

„Technology with increasing demand“

# REMOVAL OF ARSENIC FROM DRINKING WATER WITH

**FERROLOX**

(Iron hydroxide based)



(III)

Adsorption Technologies

-by Deepak Chopra

(V)

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# 1. ARSENIC CHEMISTRY

## *Arsenic Species*



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  $\longrightarrow$  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	<b>OXYDES</b> + <b>KATALOX LIGHT*</b>	80%
Adsorption	<b>FERROLOX</b>	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%

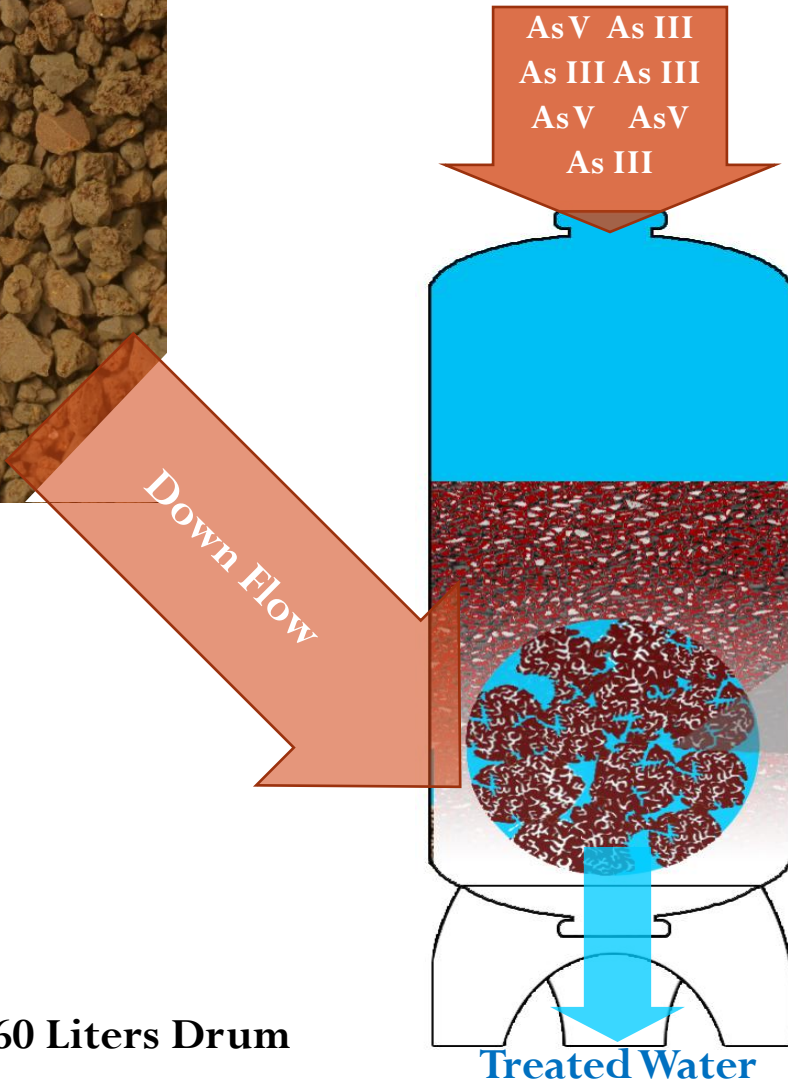
## 2. ADSORPTION TECHNOLOGY



**FERROLOX®** Media



Package: 60 Liters Drum



**As** Diffusion  
> 99% of surface for removal is internal

Watch Adsorption Specials

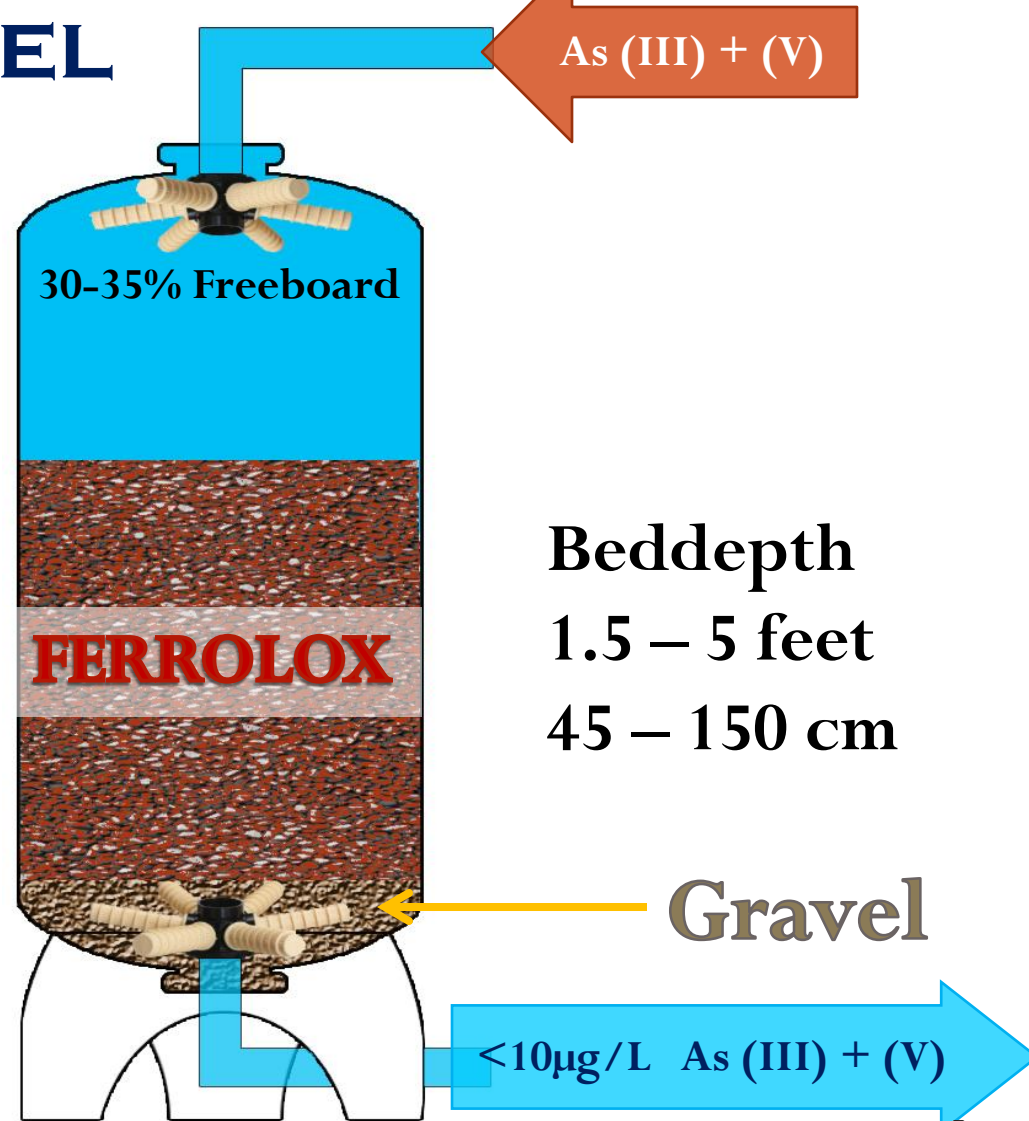


## PRESSURE VESSEL

EBCT: 2 – 10 minutes

*Lower the EBCT*

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



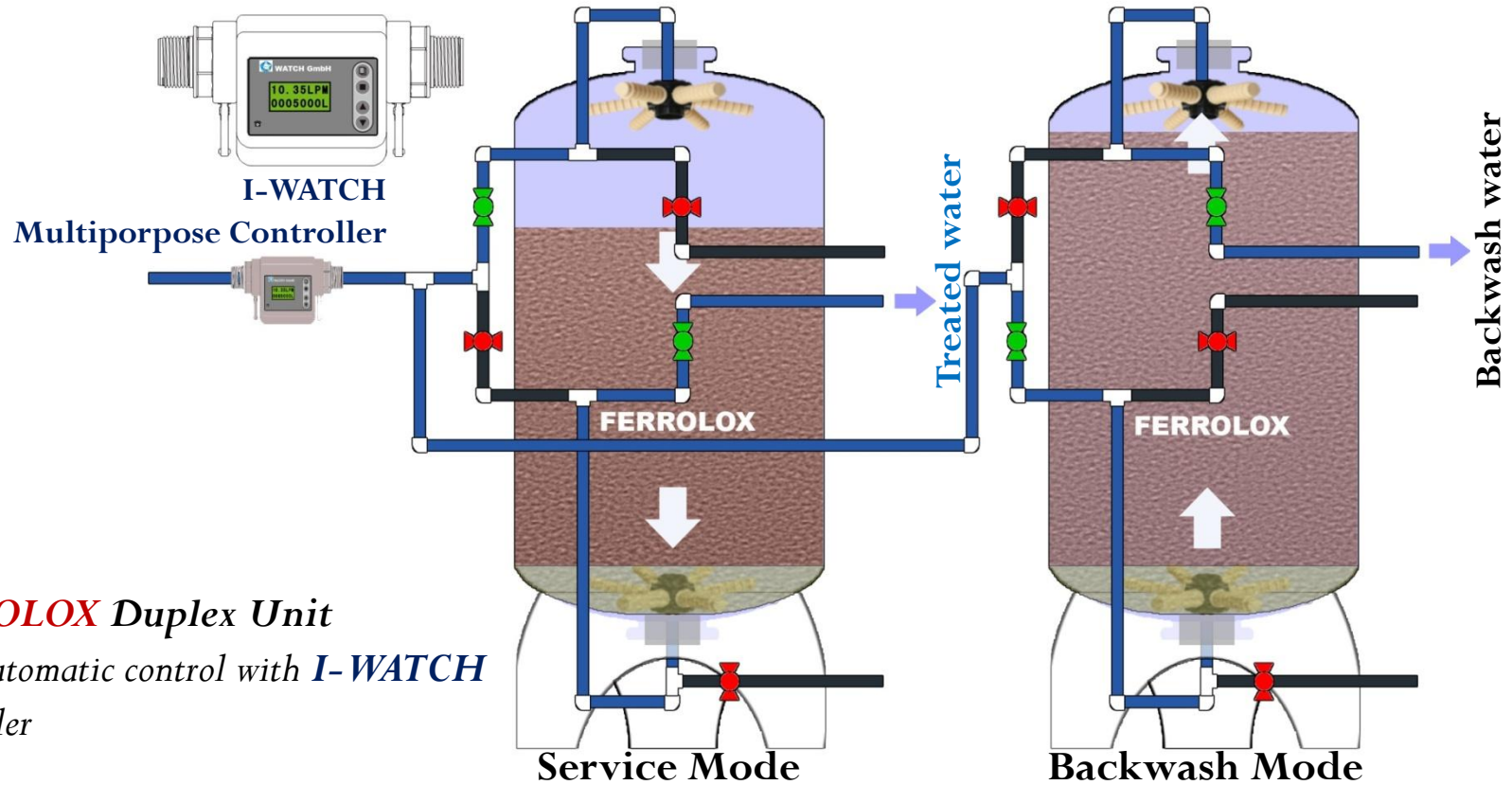
Beddepth  
1.5 – 5 feet  
45 – 150 cm

Gravel

<10µg/L As (III) + (V)



# „Technology with increasing demand“



## **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)

## 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 ?

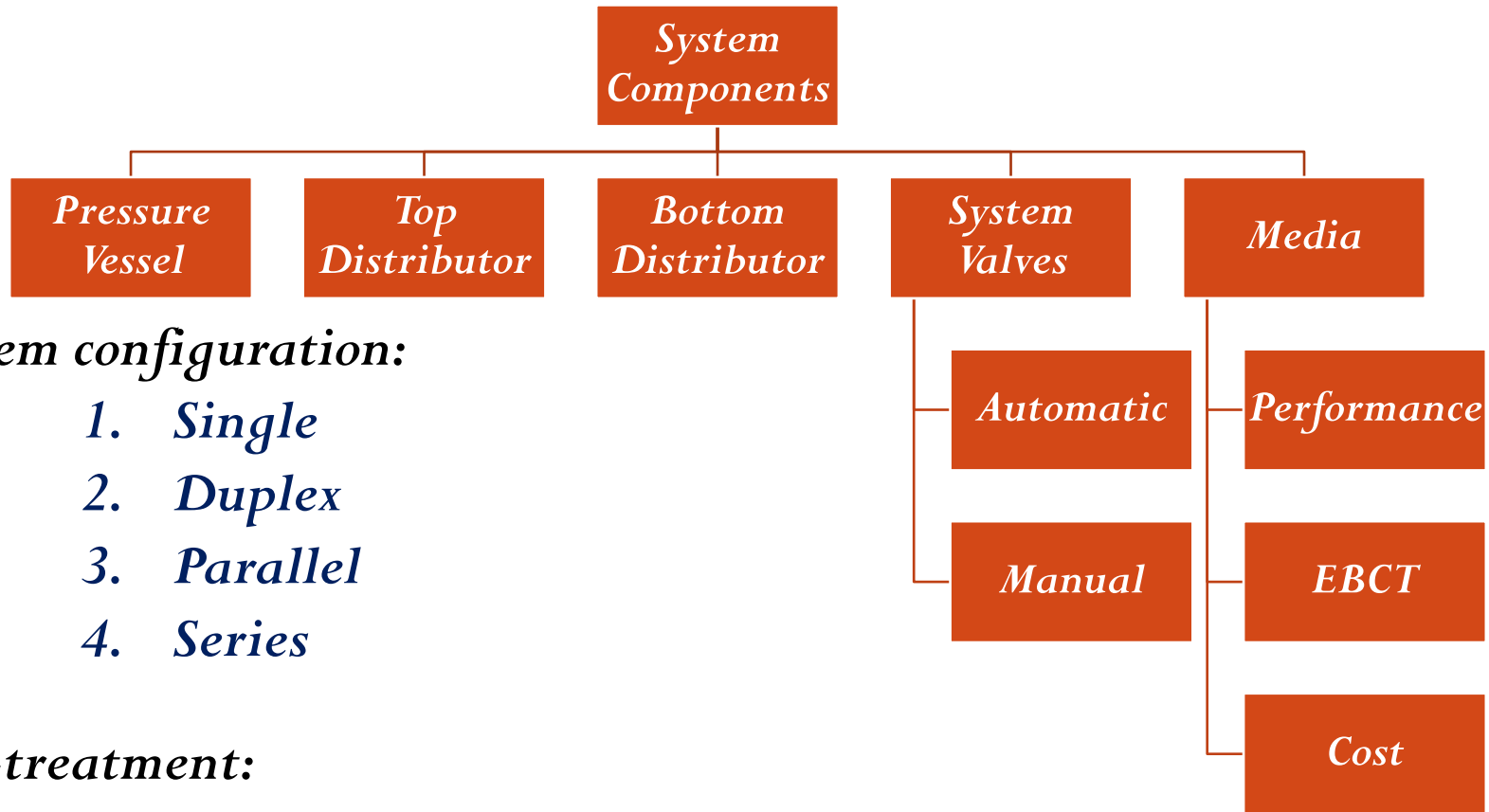
#### Why Manual units ?

Number One Reason – Very simple to operate

- ✓ Low operating costs
- ✓ Low investment costs
- ✓ Low arsenic in treated water < 2-3  $\mu\text{g/L}$  (ppb)

**FERROLOX** has very high adsorption capacity 15 gram/kg

„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	
<b>Accessories</b>			
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		
<b>Grand Total</b>			

## 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“**