

# Drinking Water Case History:

## NO<sub>3</sub>, FI, As Removal



### Challenge – NO<sub>3</sub>, FI, As Removal

A west Texas community receives its drinking water from a number of wells which have Fluoride, Nitrates and Arsenic levels above MCLs. Although *Cuf* (Ceramic Ultra Filtration) can remove arsenic and fluoride, RO (Reverse Osmosis) is required to reduce the nitrate below MCLs. Integrating the *Cuf* system to RO provides superior pre-treatment to the RO system as it removes RO foulants and provides a pristine feed to the RO system. *Cuf* provides a consistent feed with no upsets. This optimizes RO performance and reduces RO cleaning and membrane replacement.

### Background

In 2014 a successful pilot verification program was performed using *Cuf* (Ceramic Ultra Filtration) pretreatment and RO (Reverse Osmosis) which demonstrated sustained purification of FI, As and NO<sub>3</sub> below MCLs and provided the necessary data for regulatory approval for full scale implementation. Regulatory approval was received and the full scale system is now in production.

### Pilot Performance

During the sustained test program the pilot operated at a flux of nominally 220 GFD with TMP varying between 3-15 psi. The *Cuf* system operated for 200 hours between TMP maintenance rinses.

Parameters (ppm)	Raw Water	RO Permeate
Arsenic	0.04	< 0.01
Fluoride	4.63	< 0.5
Nitrates	6.5	1.4
Total Hardness as CaCO <sub>3</sub>	560	0.6
Total Dissolved Solids (TDS)	868	48
Sulfate	259	< 2.6
Chloride	102	0.6

### Plant Capability

The new plant will be capable of producing 1,000,000 gal/day for drinking water distribution. The *Cuf*/RO system will accept water from any combination of wells and flow rates to produce water with the quality as shown above. The finished water will be a blend consisting of 15% of the feed water to the RO permeate to provide an appropriate hardness level of nominally 80 ppm.

### Capital Works

In 2015 the purification process was approved by the state regulator (Texas Commission on Environmental Quality [TCEQ]). This plant is now under construction and to be operational Q2 2017.



Figure 1: Integrated CUF/RO System in Production



Figure 2: Building & Installation

## Other Benefits

- Reduced operator involvement, the entire process is automated and only audited.
- The *Cuf* provides very pristine and consistent feed water to the RO for enhanced RO membrane life and reduced cleaning requirements.
- For additional information reference document DOC3019 - *Cuf* Ceramic Ultra Filtration.
- NSF/ANSI 61

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