



Waterco Case Study

Waterco Arsenic Filtration

# Arsenic-free water: A major goal for Far North Queensland town

## *Waterco filters a key part of the solution*

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*says Russell Fisher,  
Process & Project Engineer, Amiad*

When arsenic levels in the drinking water supply for the Far North Queensland town of Chillagoe were found to exceed recommended levels, it was clear a failsafe solution was paramount.

In response, Mareeba Shire Council engaged Amiad Water Systems, a recognised industry leader in the areas of potable water treatment, to design, construct and commission an arsenic filtration plant that would enable the township to enjoy not only a fresh water supply, but also incalculable long-term health benefits.

“Although a naturally occurring element that can be introduced into water through the dissolution of minerals and ores, elevated levels of arsenic consumption through drinking-water has been linked to the development of serious issues such as bladder, kidney and lung cancer,” says Russell Fisher, Process & Project Engineer, Amiad.

“With such major health consequences in mind, it was clear we had to design a solution that would remove all aspect of risk.”

With a population of 227, the former mining town of Chillagoe sources its water from a local bore field that registers arsenic levels in the range of 0.010-0.020mg/L, exceeding Australian Drinking Water Guidelines. Design specifications called for the plant to achieve levels of less than 0.005 mg/L.

Constructed in 2014 and commissioned in March 2015, the plant was part of the Queensland Government’s Royalties for the Regions funding program, with a focus in installing a new water plant with an arsenic-removal facility.

“To achieve the desired target we proposed a system of Chlorination, Ferric Chloride Dosing, DMI65 Catalytic Media Filtration and Cartridge Filter Polishing,” explains Fisher. “The supplied plant is fully automatic and controlled by an Allen-Bradley PLC (programmable logic controller) with a Schneider PC / Touch Screen loaded with Citect Software, for local and remote operation.”

### Waterco filters playing a vital role

With water filtration effectiveness obviously a key project component, Waterco was chosen to provide the required fiberglass filters due to their solid reputation for quality and consistency.

For the Chillagoe project, Waterco provided six Micron SMD1050 Side Mount Deep Bed fiberglass filters, which are rated at 6 Bar.

The effect of deep media bed improves the filtration efficiency over standard high-rate filters by providing enhanced in-depth filtration and increasing the contact time with a greater volume of media.

In addition, the greater bed depth permits efficient use of mixed bed filter media and water treatment media (such as the DMI65 media used on this project). The filter’s media bed ensures that finer dirt particles and colloidal substances are retained and/or adsorbed to a far greater level than a filter with a shallower bed depth.

“The specific requirements of the Chillagoe plant meant the filters needed to be of a suitable height to allow filling the vessel with media, without having to cut hatches in the top of the shipping container, thus making the filtration solution more economical,” says Sam Schuckert, Waterco’s International Commercial and International Water Treatment Manager.

“The other key technical aspect involved altering our vessel’s pressure rating. In order to pump the water uphill from the filtration plant to the water storage tank overlooking the town, we increased the pressure rating of our filters from the standard 4 Bar to 6 Bar.”



*Waterco’s Micron fiberglass filters are made from continuous strands of high quality fiberglass filament wound under controlled tension to create a seamless, impervious vessel.*

Waterco and Amiad have a strong, long-standing working relationship, with Amiad particularly valuing Waterco's FRP media filter design and quality consistency, not to mention good service.

Waterco's Micron fibreglass filters are the preferred choice for commercial and industrial operations that demand superior water quality. ▶



"We have established a very solid relationship with Amiad and understand the specific requirements for the projects the company undertakes," Schuckert says.

The project has proven an unqualified success. The plant has been successfully reducing arsenic levels to 0.001 mg/L, making it suitable for consumption by the local community.

Officially opening the new water treatment plant in April 2015, Mareeba Shire Mayor Tom Gilmore said that the facility provided the Chillagoe community with a safe and potable water supply.

"We are delighted with the result since this is such an important project for the community of Chillagoe and will serve to enhance their health," Cr Gilmore said.

### TREATMENT PROCESS

**CHLORINATION:** In ground water, Arsenic occurs predominantly as arsenite As (III), and requires conversion to arsenate As (V) by chlorination to enhance the effectiveness of the filtration process. Chlorine also acts as catalyst for the DMI-65 media, and is required for its regeneration to re-establish the oxidizing environment on the surface of the media.

**FERRIC CHLORIDE DOSING:** Arsenic can bond with iron salts in the water and with metal based coagulants such as Ferric Chloride. Ferric Chloride is dosed such that there is a sufficient reservoir of iron for arsenic to form complexes and precipitants with the iron salts via the chemical processes of precipitation, co-precipitation and adsorption, which can then be filtered.

**DMI65 CATALYTIC MEDIA FILTRATION:** DMI-65 is a manganese dioxide (MnO<sub>2</sub>) infused media whose surface acts as a good oxidant and is effective in removing both arsenite and arsenate, as well as iron/arsenic complexes and precipitants. The DMI-65 Media Filters are periodically backwashed and rinsed based on either pressure differential across the media filters or on time, whichever occurs first.

**CARTRIDGE FILTERS:** 1 micron cartridge filters were installed to polish the product water and provide a final barrier to the precipitated arsenic.



The DMI-65 is an extremely powerful catalytic action water filtration media.