

ARSENIC REMOVAL

Arsenic is extremely poisonous. IARC (International Agency for Research on Cancer, 2004) has classified arsenic as a human carcinogenic substance (group 1). Long-term intake of drinking water with elevated arsenic concentrations can cause the development of arsenicosis, the collective term for diseases caused by chronic exposure to arsenic. It includes several kinds of skin lesions and cancers, like hyper-pigmentation, hyperkeratosis, gangrene, skin cancer, lung cancer and bladder cancer (WHO, 2006).

Why is Successful Arsenic Removal so Important?

In a bulletin (Smith et al. 2000) the World Health Organization reports that it is estimated that long-term exposure to arsenic in groundwater at concentrations over 500 µg.L-1 causes death in 1 in 10 adults in Bangladesh.

DMI-65 is a key part of new technologies based on the co-precipitation of arsenic in flocs during coagulation and arsenic adsorption to the media. If water has Arsenic present but no Iron it will be necessary to add ferric chloride (or ferric chloride) to the water. In all cases the arsenic binds to the positively-charged surface of the Iron (Hydroxide) matrix. DMI-65 is an extremely powerful silica sand based catalytic action water filtration media that is designed for the removal of iron to undetectable levels through an Advanced Oxidation Process.

Especially at low to moderate arsenic concentrations, the technology of arsenic adsorption is very effective. It should be noted that this only applies to inorganic As (As III and V) since not all organic As readily bonds with the Fe.

In a laboratory test, approximately 78 PPB of arsenic and a small amount of ferric chloride were added to uncontaminated well water, which was then run through DMI-65 Media. The results showed that the DMI-65 Media reduced the arsenic from 78 PPB down to < 1 PPB. In full scale applications, the DMI-65 can be simply backwashed with clean chlorinated water and then put back into service. It does not have to be regenerated like conventional green sand media.



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Quantum recognises that the highly toxic nature of Arsenic means that there is no margin for error in water treatment and design. Systems that do not address a proven chemical processes, or establish a point of proof conducting a pilot trial may run the risk of miscalculating correct chemical dosing, detention times, and filtration velocities and ultimately inhibiting removal performance increasing the risk of not reducing arsenic contamination to or below acceptable levels. We strongly recommend proof of water treatment plant design through pilot testing to establish correct settings, or the use of already proven DMI-65 based arsenic removal systems.

DMI-65 is infused technology and not just a surface coating technology, unlike other catalytic water filtration media, which removes the chance of any chemical leaching into the water stream.

In order to begin the process of oxidation of the iron (and manganese) in solution DMI-65 is designed to operate in the presence of chlorine or other oxidant. In this process the oxidant removes electrons and is consumed in the process. The operator needs to ensure that there is a 0.1 – 0.3 ppm free chlorine residual in the effluent water. Chlorine, fed as sodium hypochlorite or bleach (12.5% NaOCl), is the preferred oxidant since it is relatively inexpensive, readily available around the world and it is effective. It also performs the vast majority of any disinfectant process.

Certification

DMI-65® is Tested and Certified Under Industry Standards: NSF / ANSI 61 Drinking Water System Components by the Water Quality Association of USA Gold Seal Program covering safety and health effects for drinking water components.

Compliant : Drinking Water Inspectorate safe to use according to: Reg. 31(4)(a) of water supply (Water Quality) regulations 2010 for UK, England and Wales.

DMI-65 has also been tested by many other water treatment authorities and laboratories.

DMI-65 is manufactured in Australia.



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Advantages of using DMI-65® in Arsenic Removal Water Treatment

Arsenic Removal

DMI-65 does not actually remove the Arsenic but rather relies on the fact that Arsenic and Iron (Fe) readily form a complex and when the media takes out the Fe it takes the As with it. DMI-65 promotes the highest oxidation rate of any catalytic filtration media to achieve the removal of dissolved iron to almost undetectable levels as low as 0.005 PPM. In the correct operating conditions, Arsenic will also be removed to well below guidelines.

Reduced Costs

The total cost of the arsenic removal water filtration system is significantly less than alternative solutions, the effectiveness, but relative simplicity, of DMI-65 based systems reduces the upfront capital expenditure on plant complexity as well as the ongoing operational expenditure in chemicals, power and backwash waste water recovery.

High Load Capacity

Because of the increased surface area due to the micro – porous structure of the matrix material the DMI-65® also has higher iron and manganese load capacity which can extend the duration of filter runs and the time between backwashing, thereby reducing downtime, operating expense and wastage.

Regeneration Not Required

The media operates with a continuous injection of sodium hypochlorite at low residual levels (0.1 to 0.3 ppm) which eliminates the need for Potassium Permanganate.

High Flow Rates

The infused technology of DMI-65® promotes the highest oxidation rate of any catalytic filtration media. This permits a significantly higher water flow rate to achieve the same level of iron and manganese removal. DMI-65® can operate at linear filtration velocities up to twice that of conventional media with a corresponding reduction in capital equipment costs.





Case History

Chillagoe, QLD, Australia

Extract from Chillagoe Drinking Water Filtration Plant Case Study, Amiad 2015.

INTRODUCTION

Mareeba Shire Council engaged Amiad Water Systems to design, construct and commission a 6-10 L/s Arsenic Filtration Plant for the township of Chillagoe in far North Queensland. The town sources their water from a local bore field which suffers from high Arsenic levels in the range of 0.010 – 0.020 mg/L, exceeding the Australian Drinking Water Guidelines. The contract specified that the plant must achieve a target level of Arsenic of less than 0.005 mg/L in the product water.

TREATMENT PROCESS

To achieve the target Amiad proposed a system of Chlorination, Ferric Chloride Dosing, DMI65 Catalytic Media Filtration and Cartridge Filter Polishing. The supplied plant is fully automatic and controlled by an Allen Bradley PLC with a Schneider PC / Touch Screen loaded with Citect Software, for local and remote operation.

CONCLUSION

The Arsenic Filtration Plant, designed and constructed by Amiad utilizing DMI65 Media, was commissioned in March 2015, and has been successfully reducing the Arsenic to 0.001 mg/L, making it suitable for consumption by the community of Chillagoe, Queensland.



Water Source	Bore Water	Requirements	Results
Iron	1.6 – 2.0 mg/l	< 0.3 mg/l	0.01 mg/l
pH	6.7 – 6.8	6.5 – 8.5	7
Mn	0.2 – 0.4 mg/l	< 0.02 mg/l	0.008 mg/l
Arsenic	0.01 – 0.020 mg/l	< 0.005 mg/l	< 0.001 mg/l
Turbidity	0.5 – 10 NTU	< 2 NTU	0.07 NTU
Sulphides	0.1 mg/l		< 0.1 mg/l
Standard / Guideline	Australian Drinking Water Guidelines.		



Applications & Industries We Serve

- ✓ Drinking Water Treatment
- ✓ Reverse Osmosis
- ✓ Arsenic Removal
- ✓ Mining Industry
- ✓ Industrial Applications
- ✓ Irrigation Systems
- ✓ Landscape Reticulation
- ✓ Cooling Towers & Boilers
- ✓ Environmental Dewatering
- ✓ Food & Beverage

Why DMI-65®?



Expertise & Experience

Years of industry experience, we offer knowledgeable & professional services



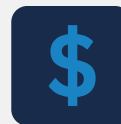
Customer-Centric Approach

We put YOU first, offering solutions tailored to your specific needs.



Highest Quality

We're committed to providing the highest quality in everything we do.



Competitive Pricing

Our rates are competitive giving you the best value for your money.



Reputation

We have built trust, professionalism and exceptional service within the community.



Innovative Solutions

Our cutting-edge technology is efficient and meets modern demands.

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