

### DMI-65 ADVANTAGES

- ✓ State of the art Arsenic removal
- ✓ Arsenic contamination can be reduced to undetectable levels
- ✓ Reduce downtime
- ✓ Lowest whole of life cost
- ✓ Maintain high system output and reduce initial system capital investment
- ✓ No leaching of chemicals

### DMI-65 IS USED IN:

- ✓ Reverse Osmosis Pre-treatment
- ✓ Drinking Water Treatment
- ✓ Arsenic Removal
- ✓ Irrigation Systems
- ✓ Landscape Reticulation
- ✓ Cooling Towers and Boilers
- ✓ Environmental Dewatering
- ✓ Industrial Applications
- ✓ Food and Beverage

## 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).

DMI-65 is infused technology and not just a surface coating technology. Unlike other catalytic water filtration media, giving DMI-65 the advantage of a long life span between 5 to 8 years and powerful performance.

Quantum Filtration manufactures DMI-65 in Western Australia.

DMI-65 has been tested and certified by the Water Quality Association in accordance with NSF/ANSI 61 and for use in England and Wales under Regulation 31(4)(a) of the water supply (Water Quality) regulations 2010 SI No.994 (W.99).



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.

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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.

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.

DMI-65 has been certified to the US Standard of NSF/ANSI 61 for Drinking Water System Components and for use in England and Wales Under Regulation 31(4)(a) of the water supply (Water Quality) regulations 2010 and has also been tested by many other water treatment authorities and laboratories.

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DMI-65 is manufactured in Australia.

## Case Studies



A regional Water Authority provides water and sewerage services to 38 towns, villages and cities serves an estimated population of 95,000 people in an area of approximately 20,000 square kilometres. The communities serviced are diverse in size and characteristics. They range from about 12,300 assessments in to less than 50 in the rural hamlet as well as major industrial customers. The Authority's

two major functions are treatment and distribution, and it operates 30 water treatment sites throughout the region.

The Authority was under significant pressure to ensure that a town of 16,000 people continues to be supplied with treated potable water. The area has suffered severely under drought and the decision was made by the board that North East Water will have to extract and treat bore water for potable water to avoid potential political ramifications.

North East Water (NEW) employed the services of Amiad and their subcontractors to ensure quality bore water treatment plants are delivered on time and on budget. NEW propose to utilise two bores delivering 40 l/s (3.5 MLD) each at the Kerr Street site in Wangaratta. Amiad has to design, manufacture and deliver two (2) containerised 3.5 MLD packaged water treatment plants.

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 mg/l	6.5 – 8.5	7
Mn	0.2 – 0.4 mg/l	< 0.02 mg/l	0.008 mg/l
Arsenic	0.01 – 0.014 mg/l	< 0.007 mg/l	<0.001
Turbidity	0.5 – 10 NTU	< 2 NTU	0.07 NTU
Sulphides	0.1 mg/l		<0.1 mg/l
Standard/Guideline	ADWG 2004 or better		

The two 3.5MLD water treatment plants deliver treated water that complies and in certain cases exceed the drinking water guidelines.

## The 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

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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

### 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.

### HIGH LOAD CAPACITY

Because of the increased surface area of 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.

### 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.

### 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.