

Isolux™ Technology For Arsenic Removal From Drinking Water

STATEMENT OF QUALIFICATIONS

Isolux™ Technologies, a division of MEL Chemicals, Inc. (MEL) has developed and patented a novel, zirconium-based adsorbent media for removal of arsenic and other heavy metals from drinking water. This media is customized for this application in MEL's Flemington, NJ manufacturing facility by systematically manipulating the morphology and surface properties of the zirconia species to produce an adsorbent with very high capacity and good kinetics for removal of arsenic. This is accomplished via control of the chemical and physical properties, specifically the surface properties. MEL's manufacturing technology produces particles with enhanced pore volume and surface area for optimum removal of arsenic. MEL has adopted the trademark Isolux™ for this technology when applied to drinking water applications.

MEL applies the media commercially via a patent pending cartridge system. Together, the media and the cartridge delivery system comprise the Isolux™ Treatment System. The Isolux™ Treatment System has been specifically engineered to address the needs of small drinking water systems, whether as point-of-use, point-of-entry or central well-head treatment. The advantages include:

- **Isolux™ technology does not require backwashing** of the unit and does not generate any liquid waste that requires disposal.
- **Spent Isolux™ media is non-hazardous** by both the USEPA TCLP test and the California WET test.
- **Isolux™ media is NSF Section 61** certified for use in drinking water systems.
- **Isolux™ technology does not require use of large pressure vessels** to contact water and media. Isolux™ technology uses a patent pending media cartridge device to allow intimate contact between the water and media. The cartridge offers several advantages in terms of minimum system footprint and simplicity of media replacement. Cartridge replacement does not require any confined space entry.
- **The engineering design provides a high degree of reliability** and maximum degree of operational simplicity. The unit is designed to run unattended for long periods. No operator function, including media cartridge replacement, requires more than one operator.
- **Isolux™ media can be recovered.** MEL's approach to media management is to offer its customers the option of returning spent cartridges for recovery. This eliminates any solid waste handling issues for the water utility and provides a cost-effective alternative to landfill disposal. Recovered cartridges and media are re-used in non-drinking water applications.

Isolux™ technology has been actively treating arsenic contaminated groundwater for over six years across the United States. During that time, technology validation exercises, under guidance of State and Federal regulatory agencies have confirmed the effectiveness of the Isolux™ Technology for arsenic removal. On the basis of this work Isolux™ Arsenic Treatment systems have been installed and are operational in numerous arsenic impacted areas across the country.

History of Isolux™ Treatment Operations

MEI began development of its arsenic removal technology in late 1999. Beginning in mid-2000, pilot scale field trials were conducted at numerous sites across the country. Commercial systems were first installed in 2005. Currently there are many systems in operation ranging from 10 gpm to over 450 gpm at sites across the United States.

A partial listing of commercial systems includes the following:

- Keeler Community Services District, Keeler CA (2004) (Community-wide POU program)
- Golden Hills CSD, Well C, Tehachapi, CA (2005) (USEPA Small Systems Demonstration Program)
- Whispering Pines, Hollister, CA (2005)
- New Jersey American Water Co., Frenchtown NJ (2005)
- Barnard School, South Hampton NH (2005)
- The Waldorf School, Princeton NJ (2005)
- Sonoma Wine Co., Graton CA (2006)
- Los Angeles Dept. of Water and Power, Independence, CA (2006)
- Dakota Magic Hotel and Casino, Hankinson, ND (2006)
- Anadigics Corp., Warren NJ (2006)
- Hillsborough School District, Hillsborough NJ (2007)
- Second Mesa Day School, Second Mesa AZ (2007)
- United Water Co. Montebello NY (2007)
- Mercadeo de Agua, S.A. Guatemala (2007)
- Plumstead Township, Pipersville, PA (2008)
- Mohrsville Water Company, Mohrsville, PA (2008)
- Boro of Ramsey, Ramsey, NJ (2008)
- Calvary Community Church, Prunedale CA (2008)
- State of Bihar, India (2009)

Operations within the above locations have confirmed a level of performance between 30,000 – 170,000 bed volumes of arsenic treatment capacity, dependant on background water quality. Even in drinking water systems with arsenic concentrations in excess of 100 ppb, Isolux has provided treatment in the range of 50,000 bed volumes to a non-detectable level of arsenic. Field testing of the Isolux Technology continues as a very important aspect of our customer development program. Due to site specific water quality considerations, we highly recommend an on-site pilot system evaluation as a means to accurately assess system performance and ongoing operational cost considerations. Isolux offers packaged pilot units that can simplify the pilot testing exercise.

Treatment Effectiveness and Efficiency:

The information referenced in this abstract represents over eight-years of laboratory studies, independent verification, and field pilot testing of Isolux™ technology. All of this work gives Isolux™ Technologies a high degree of confidence in the effectiveness and efficiency of the Isolux treatment system. Isolux™ Technologies recognizes that its' adsorption technology will not be suitable for all applications. However, Isolux Technology represents a very effective treatment technique for small and medium sized systems with limited resources available for treatment oversight.

Cost Effectiveness:

MEI concludes that Isolux™ technology is cost effective relative to other technologies when all operating costs are factored in. While Isolux™ media may be slightly more expensive to purchase than

some competing media, the minimization of waste disposal costs and the minimal operating labor involved make it competitive on a total operating cost basis.

Operation and Maintenance Requirements:

Operation and maintenance is one area where Isolux™ technology enjoys a distinct advantage over competing technologies. Isolux™ technology has been designed for simplicity of operation and maximum reliability. It incorporates the following operational advantages:

1. Use of a returnable/disposable cartridge instead of a pressure vessel for contacting media with water greatly simplifies the process of replacing media.
2. No periodic backwashing of the media is required.
3. Spent cartridges may be returned to the manufacturer. This eliminates the need to periodically arrange for disposal of solid waste.
4. No operation/maintenance function, including media replacement, requires more than one person.
5. Inherent reliability is high as there is no reliance on sophisticated, computer based control systems.

Media is manufactured and inventoried in the U.S.A. Lead-time for media purchase is minimal.

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