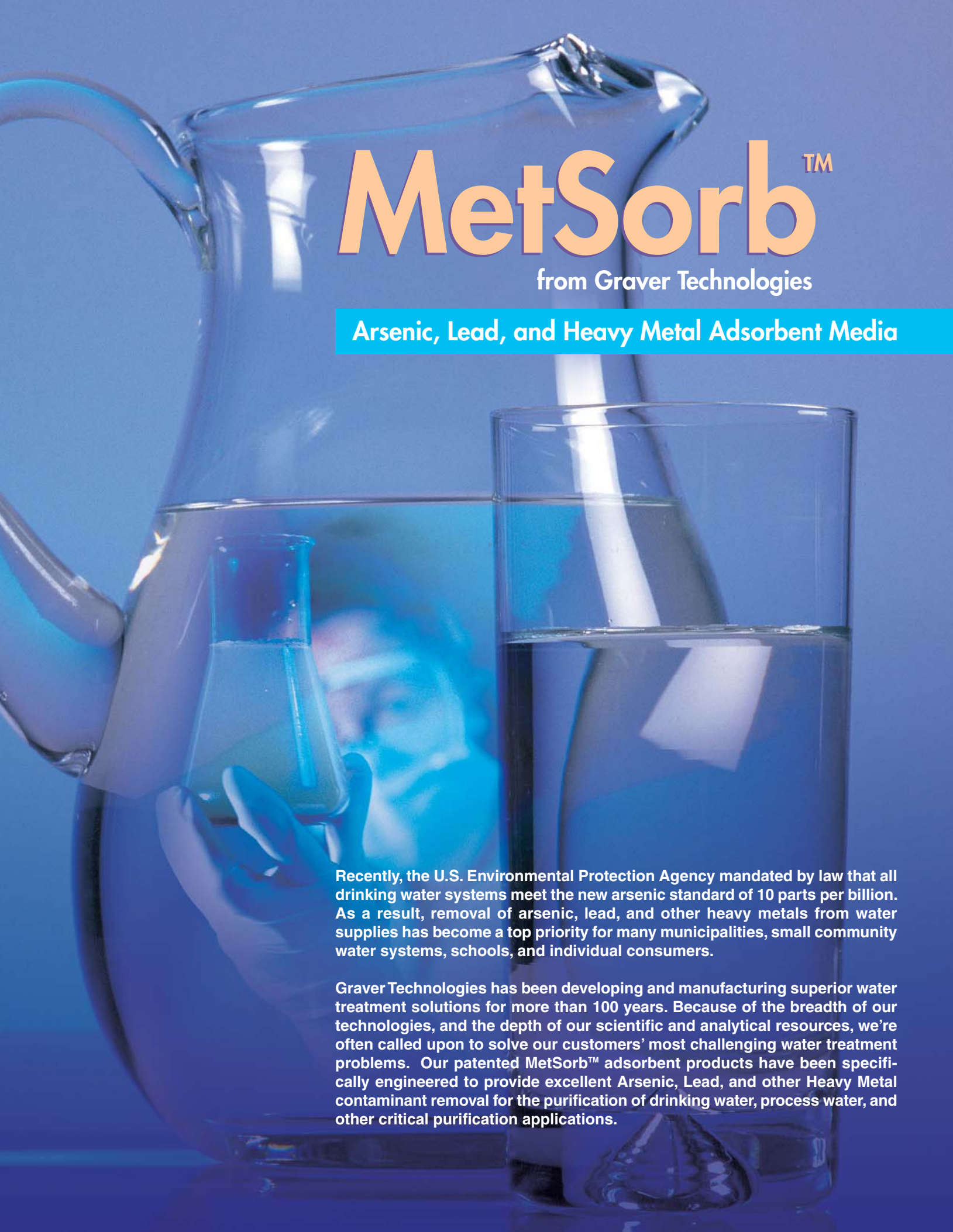


MetSorb™

from Graver Technologies

Arsenic, Lead, and Heavy Metal Adsorbent Media

Recently, the U.S. Environmental Protection Agency mandated by law that all drinking water systems meet the new arsenic standard of 10 parts per billion. As a result, removal of arsenic, lead, and other heavy metals from water supplies has become a top priority for many municipalities, small community water systems, schools, and individual consumers.

Graver Technologies has been developing and manufacturing superior water treatment solutions for more than 100 years. Because of the breadth of our technologies, and the depth of our scientific and analytical resources, we're often called upon to solve our customers' most challenging water treatment problems. Our patented MetSorb™ adsorbent products have been specifically engineered to provide excellent Arsenic, Lead, and other Heavy Metal contaminant removal for the purification of drinking water, process water, and other critical purification applications.

MetSorb™ Adsorption Media

MetSorb™ HMRG is a highly effective granular adsorbent that removes arsenic III & V, and a wide variety of heavy metals including Lead, Cadmium, Copper, Chromium+6, Selenium, and Zinc from aqueous sources. MetSorb adsorbent technology utilizes a patented Titanium compound to adsorb both forms of arsenic as well as a wide range of contaminants in water. The increased surface area afforded by Titanium coupled with advanced pore volume provides excellent kinetics of adsorption.

MetSorb maintains a higher capacity and a lower level of ion interference than competitive iron and alumina based products.

The media is long-lasting and upon exhaustion, has consistently tested nonhazardous for disposal classification.

The media is NSF Standard 61 approved, and has received regulatory approval from agencies across the United States and Canada.

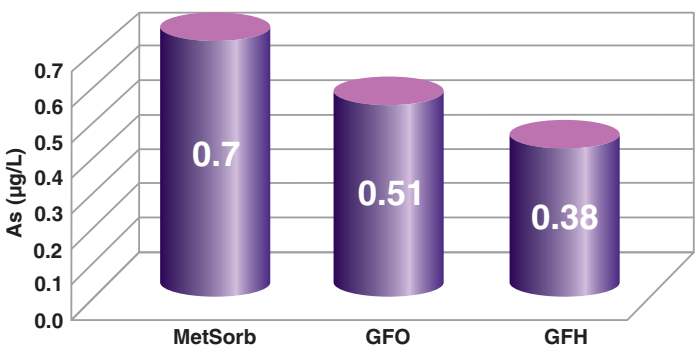
Typical MetSorb Properties

Media Chemical Designation	Crystalline Titanium Oxide (TiO_2) (Anatase)
Physical Form/Color	White Granular Solid
Moisture Content	< 7%
Particle Size	-16 mesh /+ 60 mesh
Surface Area	200–240 m^2/gram
Bulk Density	0.65 grams per millimeter (40 lbs / ft^3)
Pore Volume	0.34–0.44 cm^3/gram
Avg. Pore Size	64 - 84 Angstroms

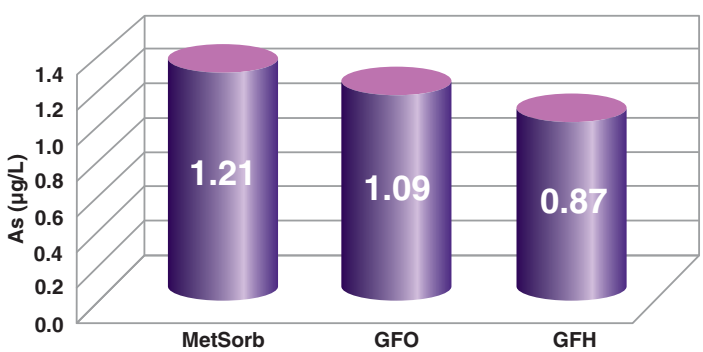
MetSorb Features and Benefits

- Removes As (III) and As (V) to <1.5 µg/L (non-detect)
- High adsorbent capacity for arsenic and lead (>10 mg As per gram of METSORB)
- Extremely Fast Kinetics: Empty Bed Contact Times (EBCT) between 1.5 - 3 minutes
- Reduced equipment footprint
- Simple installation and start-up
- Reduced (in some cases eliminated) frequency of backwash
- Nonhazardous disposal as solid waste–passes EPA TCLP (Toxicity Characteristic Leach Procedure)
- No regeneration Chemicals Required
- Removing Arsenic in millions of gallons of drinking water daily

Adsorption Capacity – 100 µg/L As (V) in NSF Challenge



Adsorption Capacity – 100 µg/L As (V) +13.5 mg/L SiO_2



Results of AWWA Research Foundation Study *"Adsorbent Treatment Technologies for Arsenic Removal"*, 2005

MetSorb™ Application

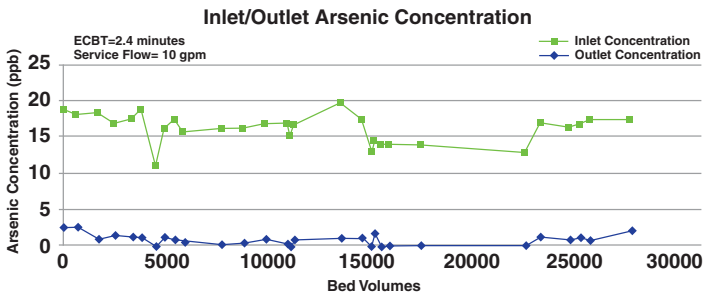
MetSorb adsorbent media is applicable in a wide range of water treatment processes, from large-scale municipal systems to small-scale residential treatment units. Regardless of the system size, there are operational design parameters that must be considered to ensure effective, trouble-free performance of the MetSorb adsorbent media.

Groundwater or surface water is simply pumped in a down-flow mode through a single or multiple fixed bed pressure vessel containing the MetSorb media. The multiple pressure vessel design is either assembled in Parallel Flow or Series Flow when additional adsorption protection is deemed necessary. Flow to each vessel is measured and totalized to record the volume of water treated. Pressure differential through each vessel is also monitored. Periodic back-washing is typically performed at start-up and every 8-10 weeks thereafter depending on usage and water quality.

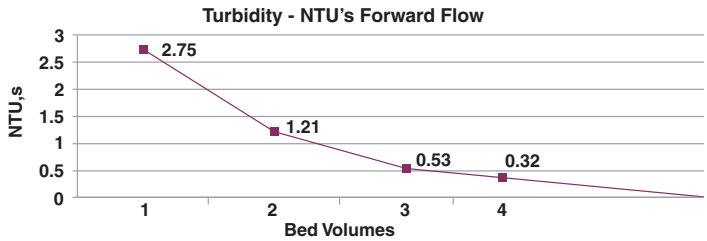
Dual vessels containing MetSorb plumbed in series for added consumer protection

Operational Design Parameters

Service Flow Rate	8-10 gpm/ft²
Flow Direction	Downward Flow
EBCT	1.5-3 Minutes
Typical Pressure Drop	< 5 psi
Backwash Flow Rate	8-10 gpm/ft²
Backwash Volume	5-7 Bed Volumes
Typical Freeboard	35 - 40%
Minimum Bed Depth	2 Feet
Maximum Feed Temperatue	150°F



Example of arsenic removal from drinking water supply well



Stability of MetSorb allows fast cleanup after backwash, placing in service flow promptly

MetSorb Disposal

MetSorb is operational in numerous locations across the US and Canada providing much experience in managing the exhausted media. Arsenic (or "heavy metal") laden MetSorb HMRG 16/60 has been evaluated using both the EPA TCLP (CFR 40-RCRA Regs.) and California WET methods and has been found to be nonhazardous and safe for landfill disposal. Since each application differs, however, we recommend exhausted MetSorb HMRG 16/60 be evaluated following all federal, state, and local regulations regarding necessary approvals for landfill disposal.

NOTES:

- Graver recommends treatment system monitoring to determine media breakthrough and changeout.
- Pre-filtration for particulates can greatly reduce frequency of backwash.
- High levels of iron and magnesium can influence efficiency of MetSorb adsorption.
- EBCT of 3 minutes is recommended for challenging water qualities.
- Backwash water discharged to sewer or POTW. Direct discharge according to state and local regulations.

www.gravertech.com

Graver Technologies is a Member of the Marmon Group of Companies, an international corporation with over $6 Billion in annual sales. Graver Technologies has the technical resources and financial strength that make us the perfect partner for your business, whether it's around the corner or around the world.

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