



Graver Technologies

Gravertech MetaSorb™ Treats Drinking Water at Elementary School Twelve-Month Qualification Program

In February 2002, the federal government adopted a 10 ppb arsenic drinking water standard in place of the current 50 ppb federal standard. On January 23, 2006 public water systems in the United States must comply with the 10 ppb standard for arsenic in drinking water. Some states are considering even lower levels. For example, in New Jersey a more stringent standard of 5 ppb for arsenic concentrations in drinking water was proposed the most recent New Jersey Governor during his 2004 State Of the State address.

The East Amwell, New Jersey school district, knew full well that their school's drinking water source contained significant arsenic concentrations. The local well used for the school's source water had repeatedly been tested and found to contain up to 20 ppb (micrograms per liter) of arsenic. Not willing subject their young children to high arsenic standards known to soon be violative of Federal Regulations, and wait until the Federally-imposed "hammer date" of January 23, 2006, the city elected to begin an immediate arsenic remediation program.

Stevens Institute of Technology and their licensee of arsenic remediation technology, of Graver Technologies had completed several small-scale with the NJ Department of Environmental Protection. Based upon that comfort level, Graver was chosen as the technology provider for a twelve month qualification program at the East Amwell Township Elementary School in Ringoes, NJ to remove arsenic from the drinking water. Using the novel adsorbent MetSorb™ HMRG developed and manufactured by Graver, it was quickly shown that the source water arsenic of up to 20 ppb can be reduced to below 2 parts per billion (ppb). This is significantly below the soon to be effective Federal regulation of 10 ppb, and the New Jersey State regulation of 5 ppb.

The equipment supplied by Graver is a simple modified water softener, where the ion exchange resin softening bed has been replaced with three and one-half "cubes (a "cube" is one cubic foot) of MetSorb™ HMRG, titania-based arsenic adsorbent media. This system is effectively treating all of the drinking water in the school. With an average inlet arsenic level of 20 ppb, the MetSorb™ HMRG adsorbent removes arsenic to below 2ppb. Over 300,000 gallons of well water have been treated using 3.5 cubic

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East Amwell MetSorb™ HMRG Installation Report

- The East Amwell Grammar School has well water that is pumped into a 4ft diameter x 18 ft long storage tank. It is pressurized to 60 psi. Typical daily water usage is 3000gallons +/-200 gallons. The pump fills the tank at 30gpm.
- The MetSorb™ HMRG unit was installed between the well and storage tank with appropriate disconnects and bypasses for easy service. It was installed the last week of September 2003.
- The MetSorb™ HMRG unit is a typical 14”x 65” fiberglass reinforced plastic vessel with downflow design, lateral collection system with riser and gravel underbedding. The gravel size of 1/8 by 1/4 inch or 1/4 by 1/2 inch provides proper distribution during backwashing.
- The unit was charged with 36” or 3.2 cubic feet (1 cube ~ 40lbs) of HMRG 16/60 media.
- The unit has an ECBT of 2.4 minutes. This contact time is short of the preferred range of 3-5 minutes but with a maximum of 20 ppb Arsenic, it was acceptable for this application. Normally the flow rate would have been decreased to bring the ECBT to the desired time, but 10 gpm was required to handle the peak demand usually attributed to sticking flush valves.
- The media was backwashed twice @10-12gpm (9-11 gpm/sq ft). The recommended backwash flux for HMRG is 10gpm/sq ft to expand the bed 30-40%. For multimedia applications, the flux will need slightly higher, 10-15gpm/sq ft. The flow rate needs to be appropriate to expand the bed without discharging media. Each backwash cycle was 20 minutes long with a 5 minute fast rinse. The media is ready for service once the backwash rinse runs clear and without any taste. (Taste would indicate all the fines had not been flushed completely). All backwash water was discharged to the school septic system.
- Pre-Startup average raw water samples and average filter effluent sample analysis for Total Arsenic:

<u>Before Filter</u>	<u>After Filter</u>
18.87ppb (n=4)	2.35ppb (n=2)
- MetSorb™ HMRG unit put into service on October 22, 2003

- The inlet pressure is typically 100 psi and the discharge averages 94 psi @10gpm service flow. Pressure drop is nominal and has never been an issue in its 1.5 years of service. The unit does automatically backwash every 260,000 gallons to clear any sediment and re-set the bed. This is not requirement but a feature of the control head the school staff do not care to override.
- The following table is some pressure drop data for this unit:

Flow (gpm)	Pressure Drop (psi)
9	4
10	5
11	7
15	6

- The service flow rate is 10 gpm resulting in a flux of 9.4 gpm/sq ft. The recommended flux is 5-8 gpm/sq ft. No application using HMRG media should run above 10 gpm/sqft.
- The system is performing very well with almost 30,000 bed volumes and an exit Arsenic concentration of ~2.5 ppb. The system is expected to run for another 1-1.5 years or 60,000-90,000 bed volumes before a media changeout.
- Based on similar installation, the media will pass TCLP or TTLC making for convenient and safe disposal.

