

# State of the Art Treatment for Arsenic, Color, and Hydrogen Sulfide.

How meaningful to the average water customer are ug/l or parts per billion? Not very. How about the word "arsenic"? That will ring some bells as the mystery novel poison-of-choice. But with a new, lower EPA arsenic standard of 10 ppb that went into effect Jan. 16, cities with arsenic problems are required to inform customers in writing of non-compliance, which is sure to cause an uproar with customers.

Hanford, CA is faced with just such a problem. In addition to the long-standing hydrogen sulfide some color difficulties in its 15 active groundwater wells, many also have been bordering on non-compliance with the old EPA arsenic standards of 50 ppb. Under the new standard, 14 of Hanford's wells are out of compliance. Hanford is a medium sized city in central California serving approximately 40,000 residential, commercial and industrial customers. In anticipation of the new arsenic standard, a pilot study at one of Hanford's wells was conducted in November 1998 using a treatment system manufactured by Filtronics Inc., a water-treatment system manufacturer located in Anaheim.

Drilled at considerable expense in 1990, the 1,700-foot-deep well was operated 18 months before it began producing colored water in the range of 30 to 60 color units (it looks like weak tea). The water has a noticeable hydrogen sulfide odor and arsenic levels ranging from 25 to 92 ug/l. As a result, the well was never put on-line.

When the portable pilot plant began treating water from the well, water was produced with non-detectable color, zero hydrogen sulfide and arsenic levels from non-detectable to 3.4 ppb near the end of the test run.

"The city of Hanford was really impressed with the pilot study and asked Boyle Engineering to design not just a treatment system, but a Filtronics treatment system said Gunter Redlin, Principal Sanitary Engineer at Boyle Engineering Corp.

Based on the success of the test, a full-scale wellhead treatment plant was designed and constructed in 2000 at an approximate cost



**Mike Wegley, Engineer; Terry Carr, Utility Superintendent; David Weisser, Utility Supervisor and Richard Hobbs, Utility Worker, all with the City of Hanford, examine the city's new Filtronics treatment unit.**

of \$600,000. Built to a 20-year municipal standard, the 1000 gpm system uses a pressure flocculator vessel (with a 10-minute retention time), in which the coagulant and other treatment chemicals react with the contaminants in the water. So treated, the



**A control panel monitors operation of the new filtration unit**

water then enters two steel pressure filter vessels (ASME Code approved and epoxy lined using an ANSI approved coating) in parallel at a loading rate of 10 gpm per square-foot of filter area.

Two filters were used to reduce the backwash flow requirement (one filter is backwashed at a time), to reduce demands on Hanford's distribution system. The non-

hazardous sludge produced during back-wash is discharged to the sewer and processed with other waste-waters normally.

The latter point is significant. "Take ion exchange, an arsenic-removal process that works similar to how home water softeners do. The filter media is regenerated with concentrated salt. But now you have a waste regenerate that in addition to being high in arsenic is also high in salt. The brine waste is very difficult and expensive to dispose of." Redlin said.

The backwash to filtration ratio is 0.2 percent for the Filtronics treatment system, so in addition to being non-hazardous, there is a comparatively small volume of wastewater and sludge of which to dispose versus other possible treatment schemes. The system is fully automated and routine maintenance is limited to checking control valves and monitoring chemical-feed equipment.

Since the Filtronics system works on multiple contaminants using a single special filtration media, it has proven to be cost effective.

For a city like Hanford with several contaminants, multiple treatment schemes aren't necessary, keeping equipment and facility costs down.

With the positive results of this first plant, Hanford has been able to use a previously unusable water source in which it had invested considerable capital. The city is now embarking on a wellhead treatment program that may one day encompass its entire well water supply.



**FILTRONICS**

Reprinted with revisions, from the March 2001 edition of WATERWORLD  
Copyright 2001 by PennWell Corporation