# M/DBP Stakeholder Meeting: Ground Water Disinfection Rule

## EXECUTIVE SUMMARY

### December 18-19, 1997

EPA held a Ground Water Disinfection Rule (GWDR) stakeholders meeting on December 18-19, 1997 in Washington, D.C. The purpose of the meeting was to engage stakeholders in analysis of data, solicit further data from stakeholders, discuss EPA's next steps for rule development and stakeholder involvement, and to identify additional parties who may be interested in participating in future meetings.

**Background**

EPA has the responsibility to develop a ground water rule which not only specifies the appropriate use of disinfection but, just as important, addresses other components of ground water systems to assure public health protection. Section 1412(b)(1)(A) of the Safe Drinking Water Act requires EPA to establish National Primary Drinking Water Regulations for contaminants that may have an adverse public health effect and that present a meaningful opportunity for health risk reduction. This general provision is supplemented with an additional requirement under Section 1412(b)(8) that EPA also develop regulations specifying the use of disinfectants for ground water systems as necessary. To meet these requirements EPA is working with stakeholders to develop a GWDR proposal by March 1999, and a final rule by November 2000.

**Summary**

Six technical issues presented and discussed at the meeting are summarized below.

**Ground Water Microbial Occurrence Studies.** EPA is analyzing 15 recent studies which have focused on the occurrence of viral/bacteriological pathogens or fecal contamination indicators found in ground water.

Human enterovirus data are available from more than 600 samples representing 491 wells. Thirty-six wells were positive using cell culture methods, representing 7% of the wells. Total coliform bacteria were found in 23%, fecal coliform bacteria or *E.coli* were found in 24%, and enterococci were found in 22% of the wells tested. These represent studies of large community wells to private wells. Male-specific coliphage were found in 13% and somatic coliphage in 14% of wells tested, representing primarily community wells. Human viruses detected by PCR were found in 38% of wells tested, representing primarily community wells.

With respect to fecal contamination, the interpretation of these studies is that a substantial number of groundwater sources show evidence of fecal contamination. A central issue with regard to this data is the degree to which it is representative of public wells in general.

**State Ground Water Management Practices.** EPA recognizes that State management practices can contribute significantly to the reduction of waterborne illness, however, the variability in these practices is high. The GWDR is likely to be more effectively implemented and enforced if the new regulatory scheme is based upon what successful States and utilities are already doing. To the extent possible, EPA intends to strengthen what is in place, not replace it.

Both disinfection and Best Management Practices (BMPs) shows high state-to-state variability. Forty-nine State drinking water programs require disinfection of some sort, but when and where disinfection is

required varies considerably. Approximately 55% of community water systems, 28% of nontransient noncommunity water systems, and 17% of transient noncommunity systems disinfect.

Proper well construction is one of the most widespread required State practices. Forty-eight States require that water systems be constructed according to State codes. Forty-seven States have minimum setback distances for microbial contaminants in their well codes but the distance varies from 0-200 feet for sewer lines and 0-500 feet for septic tanks and pit privies. Twenty-four States always and five States sometimes use hydrogeological criteria in well construction codes. Requirements for casing and grouting depths are often dependent on the aquifer used and overlying materials. The specific requirements within each State code vary considerably.

All States except one conduct sanitary surveys. However, based on a nationwide questionnaire and a review of 200 sanitary surveys conducted in four States, the U.S. General Accounting Office (GAO) found that sanitary surveys were often deficient in how they are conducted, documented, and/or interpreted. Sanitary survey requirements and corrective actions were inconsistent among States. GAO also found that regardless of systems' size, deficiencies previously disclosed frequently went uncorrected. The most common deficiency cited by States was inadequate cross-connection programs.

**Evaluating Best Management Practices for Public Ground Water Systems**. A wide range of BMPs are required by State laws and implemented in different fashions. In developing the GWDR, an important question is which of these practices are most efficient and which should be considered as regulatory components. Two studies have been completed to analyze the relative effectiveness of BMPs using coliform bacteria as an indicator of contamination.

*EPA Study of State BMPs* - Six State required BMPs were analyzed: disinfection, hydrogeological criteria in well construction, minimum setback distances, flushing of distribution systems, wellhead monitoring, and a State wellhead protection program. Of these 6 practices, only disinfection and hydrogeological construction criteria showed a significant statistical relationship to lower statewide TCR violation rates.

For example, the ten States with the highest percentage of community water systems with disinfection treatment in place were compared to the ten States with the lowest percentage of systems with disinfection treatment. The highest disinfecting States had an average TCR violation rate of 16% over the four year period, versus 33% for the ten States with the lowest disinfection rates.

*Association of State Drinking Water Administrators (ASDWA) Analysis of Community Water System BMPs* - The purpose of the ASDWA study was to test the hypothesis that there is a correlation between a low incidence of coliform bacteria detection (total, fecal or *E. coli*) at the tap and the use of BMPs. Information was collected for community water systems only.

It was found that greater percentages of larger systems, than smaller systems implement BMPs and systems without coliform detections (total, fecal or *E. coli*) are more likely to implement BMPs than systems with coliform detections. Information was collected for community water systems only. BMPs with the strongest correlation to fewer total coliform detections were correction of deficiencies identified by the sanitary survey and operator certification. This varies depending on system size.

Maintaining a disinfectant residual, operator training, and correcting deficiencies identified by the State were found to be associated with significant reductions of total coliform. Treatment for purposes other than disinfection, (e.g., iron removal) and operator training were found to be associated with significant reductions of fecal coliform or *E. coli* detections.

**Ground Water Baseline Profile.** The GWDR proposal is likely to affect a large number of public ground water systems throughout the United States. There will be both benefits and costs for each possible regulatory component of the proposal which EPA must consider.

Particular attention will be paid to small water systems which may be impacted by the rule. For purposes of drinking water regulations, EPA is defining small as those public water supply systems that serve 10,000 or fewer people. EPA is focusing its efforts on collecting information on the existing conditions of small systems so the proposed rule can take into account the resources of these systems as well as what steps are necessary to assure high quality drinking water and protection of public health.

There are over 158,000 public ground water systems.The majority of ground water systems serve non-community; 60% (94,400) are transient non-community systems and 12% (19,600) are non-transient non-community. Community water systems make up the remaining 28% (44,000). Almost 89 million people are served by community ground water systems and 20 million people are served by non-community ground water systems.

Ninety-nine percent (157,000) of ground water systems serve fewer than 10,000 people. Ninety-seven percent (154,000) serve 3,300 or fewer people. However, systems serving more than 10,000, serve 55% (over 60 million) of all people who get their drinking water from public ground water systems.

The largest numbers of ground water systems are in the States of Wisconsin, Michigan, Pennsylvania, New York and Minnesota. These five States account for over 50,000 ground water systems, one third of the total number in the U.S.

Thirty-six percent of systems are publicly operated, 35% are privately owned and operated by private entities whose primary business is providing drinking water, and 29% of community ground water systems are ancillary water systems which are operated by entities whose primary business is not providing drinking water, but do so to support their primary business (e.g., mobile home park operators).

The mean revenue for community ground water systems serving less than 3,300 people is over $68,000 per year and the mean annual expenses for these systems is over $49,000 per year, however, these mean dollar figures are significantly influenced by the large number of systems serving less than 500. When isolated from the smallest systems, community ground water systems serving between 1,001 and 3,300 have mean revenue of over $186,000 and mean expenses of $167,000 per year. Community systems serving between 3,300 and 10,000 people have mean revenues of $570,000 and mean expenses of $517,000 per year. Systems with service populations between 10,000 and 50,000 have mean revenues of 2.2 million dollars and mean expenses of over 1.9 million dollars per year.

Small community ground water systems, those serving less than 10,000, typically have between one to three operators, one or two of which have been certified by the State. Larger systems have more operators. Ground water systems serving more than 100,000 people have an average of seventeen operators, thirteen of which have been State certified.

**Vulnerability Assessment Techniques.** Approximately 158,000 PWSs rely on ground water as their source for drinking water supplies. Given this large number of systems, an essential task in developing a proposed ground water rule is how to prioritize wells for further action or analysis.

An assessment of the vulnerability of a PWS well or wellfield is an attempt to answer the question, "How likely is a source water at the well to have fecal contamination?" Varying levels of resources and data are available to assess vulnerability. Given the varying availability of site-specific information in different situations, the three approaches presented below are not universally applicable to all ground water systems yet there may be more than one approach that can yield a satisfactory result.

The vulnerability assessment approach uses existing information to evaluate a well's vulnerability to fecal contamination. The information is summarized on a "checklist." Decision trees are used to evaluate the information, leading to a vulnerability rating of either "high" or "low." If there is insufficient information to make a determination, the vulnerability is "unknown." The technique is useful, technically sound, simple to

use, and builds on existing information, however, it may require information that is not readily available to all systems or wells and requires some expertise in hydrogeology to conduct the assessments.

The vulnerability components approach uses general criteria (nine) to determine whether PWS wells are vulnerable to fecal contamination (i.e., significant sanitary survey deficiencies have been identified, source water protection programs are not in place, state setback distances are not observed, the well does not have a history of stable nitrate concentrations, etc.) PWS wells are identified as vulnerable if any of the criteria are met.

The vulnerability screening approach is a statistically based technique that is intended to be simple, inexpensive and will be used to discriminate low-risk wells from high-risk wells based on a few simple physical parameters. This approach is potentially applicable to wells in all regions.

**Monitoring Methods and Indicators Data.** Monitoring plays an important role both in detecting fecal contamination in source waters, as well as in assessing best management practices and disinfection practices.

EPA is focusing on indicators of fecal contamination rather than on individual pathogens as a screening tool to identify vulnerable or at-risk wells. Under this approach, if a well is fecally contaminated, the system will be required to take corrective action.

EPA is focusing on *E. coli*, enterococci, and male-specific coliphage as the candidate indicators. In evaluating the utility of microbial indicators of fecally contaminated ground water, EPA is considering factors such as method cost, feasibility, performance, and availability, as well as occurrence data on the groundwater surveys currently being conducted.

Currently, all groundwater systems must comply with the Total Coliform Rule (TCR). Under TCR, total coliform samples are tested at the tap. This means that, for an untreated groundwater supply, the system cannot easily determine whether the presence of a total coliform-positive (or *E. coli*-positive) sample represents a contaminated source water or a problem in the distribution system. Another issue is the low monitoring frequency required under the TCR for small systems. For example, community water systems serving 1,000 people or fewer only need to monitor once per month or less; a similar size non-community water system needs to monitor only once per quarter or less.

## Next Steps

EPA will continue to evaluate occurrence data as it becomes available and work with stakeholders to develop an estimate of national occurrence and risk. EPA seeks additional human pathogen and indicator data.

EPA will continue to work with stakeholders to evaluate the BMP approach as a regulatory framework. Further analyses of the EPA and ASDWA data and additional BMP information may be necessary. EPA welcomes comments on the draft BMP studies and ideas for further data analysis.

EPA will continue to work with stakeholders to evaluate the draft vulnerability assessment techniques and develop a technique which effectively prioritizes wells for further action or analysis. EPA welcomes comments on the draft techniques.

EPA will continue to work with stakeholders to further evaluate the applicability of microbial indicators of fecal contamination. In particular, EPA will evaluate research on somatic and male-specific coliphage and low volume sample collection for the detection of viruses by polymerase chain reaction.

In order to complete the baseline profile, EPA will evaluate any additional information that stakeholders can provide about ground water systems. In particular, EPA seeks information that will help to identify the types of entities which operate non-community systems and data on the finances, existing level of treatment, and staffing for these systems. Additionally, information describing the communities served by non-community systems would help our analysis.