

bromate concentrations below the 0.010 mg/L level (USEPA 2003c). However, approximately 20% of these ozone plants did not meet the 0.005 mg/L level. Using the assumption that systems operate their plants using a safety margin of 20% below the MCL, about 30% of ozone plants did not reliably attain this level (0.004 mg/L). During the Information Collection Rule, for the first half of 1998, much of the U.S. was wetter than normal (NOAA 1998). This hydrogeological condition often leads to lower than normal bromide concentrations due to dilution by higher water flows. In the second half of 1998, California continued to experience El Nino rains (40% of Information Collection Rule ozone plants were located in California) but many other areas of the country such as Texas and Florida experienced a drought. The percentage of ozone systems unable to achieve 0.005 mg/L bromate would likely increase during years in which bromide concentrations in California were elevated as consequence of drought.

The ability of systems to use ozone to meet *Cryptosporidium* treatment requirements proposed under the LT2ESWTR would be diminished if the bromate MCL was decreased from 0.010 to 0.005 mg/L. The proposed LT2ESWTR will require a subset of systems, based on source water pathogen levels, to provide from 1.0 to 2.5 logs of additional treatment for *Cryptosporidium*. Ozone doses required to inactivate *Cryptosporidium* are substantially greater than those required for *Giardia* and viruses. To assess the potential impact of a lower bromate MCL on the ability of systems to treat for *Cryptosporidium*, the TWG estimated the percentage of treatment plants that could use ozone to inactivate from 0.5 to 2.5 log of *Cryptosporidium* without exceeding a bromate MCL of either 0.005 or 0.010 mg/L (USEPA 2003i). These estimations were based on analyses of Information Collection Rule source water quality data, coupled with projected ozone dose requirements for *Cryptosporidium*. This analysis suggests that 88% of systems could use ozone to achieve 1 log of *Cryptosporidium* inactivation and 47% could inactivate 2 log while complying with a bromate MCL of 0.010 mg/L. With the bromate MCL reduced to 0.005 mg/L, though, these estimates drop to 67% of systems able to inactivate 1 log of *Cryptosporidium* with ozone and only 14% able to inactivate 2 log. The number of plants predicted to be able to treat for *Cryptosporidium* with ozone and meet a 0.005 mg/L standard was

further reduced when periods of higher bromide levels, similar to drought conditions, were modeled. This trend is further exacerbated since the proposed LT2ESWTR would require more stringent ozone operating conditions (such as higher ozone doses and longer contact times) than under current surface water treatment requirements for the subset of plants with higher *Cryptosporidium* concentrations in their source water and would thus result in higher bromate formation than assumed by the TWG. Thus, as systems are required to meet more stringent inactivation requirements, a large number of systems would be forced to select treatment processes other than ozone if the bromate standard were lowered to 0.005 mg/L.

The Stage 2 M-DBP Advisory Committee considered that reducing the bromate MCL to 0.005 mg/L could both increase the concentration of other DBPs in the drinking water and interfere with the efficacy of microbial pathogen inactivation. Therefore, the Advisory Committee recommended, for purposes of the Stage 2 DBPR, that the bromate MCL remain at 0.010 mg/L. EPA will review the bromate MCL as part of the ongoing 6-year review process and determine whether the MCL should remain at 0.010 mg/L or be reduced to a lower concentration based on new information.

Today, EPA is proposing to leave the bromate MCL at 0.010 mg/L, consistent with the Advisory Committee's recommendation. EPA believes that this is a prudent step at this time, in order to preserve microbial protection. EPA will continue to analyze any new bromate health effects data as they become available. It is possible that EPA may determine that the bromate MCL should be decreased to 0.005 mg/L or lower in a future rulemaking.

b. *Bromate in hypochlorite solutions.* The Stage 2 M-DBP Advisory Committee also discussed the issue of hypochlorite solutions contaminated with bromate. This contamination can occur during the production of hypochlorite solutions from natural salt deposits. The range of bromate concentrations in hypochlorite stock solutions varies widely (Bolyard *et al.* 1992; Chlorine Institute 1999, 2000). Moreover, the bromate contained in the stock solution is diluted upon addition to the drinking water. From data on Information Collection Rule ozone systems that used hypochlorite versus those that used gaseous chlorine, the TWG estimated that hypochlorite solutions contributed an average of 0.001 mg/L bromate.

The Advisory Committee discussed these results and, since the bromate level resulting from hypochlorite solutions was small compared to the MCL, did not recommend regulating bromate at systems not using ozone (non-ozone systems). The Advisory Committee recognized that ozone systems also using hypochlorite will have to be careful about the quality of their stock solution.

c. *Criterion for reduced bromate monitoring.* Because more sensitive bromate methods are now available, EPA is proposing a new criterion for reduced bromate monitoring. In the Stage 1 DBPR, EPA required ozone systems to demonstrate that source water bromide levels, as a running annual average, did not exceed 0.05 mg/L. EPA elected to use bromide as a surrogate for bromate in determining eligibility for reduced monitoring because the available analytical method for bromate was not sensitive enough to quantify levels well below the bromate MCL of 0.010 mg/L.

In section V.O., EPA is proposing several new analytical methods for bromate that are far more sensitive than the existing method. Since these methods can measure bromate to levels of 0.001 mg/L or lower, EPA is proposing to replace the criterion for reduced bromate monitoring (source water bromide running annual average not to exceed 0.05 mg/L) with a bromate running annual average not to exceed 0.0025 mg/L.

In the past, EPA has often set the criterion for reduced monitoring eligibility at 50% of the MCL, which would be 0.005 mg/L. However, as discussed before, EPA is proposing that the MCL for bromate remain at 0.010 mg/L, a level that is higher than EPA's usual excess cancer risk range of 10(-4) to 10(-6) at 2x10(-4) because of risk tradeoff considerations. EPA believes that the decision for reduced monitoring is separate from these risk tradeoff considerations. Risk tradeoff considerations influence the selection of the MCL, while reduced monitoring requirements are designed to ensure that the MCL, once established, is reliably and consistently achieved. Requiring a running annual average of 0.0025 mg/L for the reduced monitoring criterion allows greater confidence that the system is achieving the MCL and thus ensuring public health protection.

### 3. Request for Comment

EPA requests comment on the decision to maintain the Stage 1 DBPR bromate BAT and MCL of 0.010 mg/L. EPA also requests comment on the decision not to require bromate