

per year. Although the estimated benefits for Alternatives 2 and 3 are potentially significant, EPA rejected these alternatives because the Agency believes that the uncertainty about the health effects data does not warrant the additional expense associated with these regulatory alternatives.

Given the uncertainty in the health effects, and the resulting rejection of Alternatives 2 and 3, a comparison of Alternative 1 with the Preferred Alternative shows that Alternative 1 would have approximately the same benefits as the Preferred Alternative but with greater costs. This results from the inability of the Agency to estimate the additional benefits of reducing the bromate MCL. Alternative 1 was also determined to be unacceptable due to the potential for increased risk of microbial exposure. See section VII.A of today's action for a description of regulatory alternatives.

#### *H. Benefits From the Reduction of Co-Occurring Contaminants*

Installing certain technologies to control DBPs also has the added benefit of controlling other drinking water contaminants. For example, some membrane technologies (depending on pore size) installed to reduce DBP precursors can also reduce or eliminate many other drinking water contaminants, including arsenic and microbial pathogens. EPA has finalized a rule to further control arsenic level in drinking water and has proposed the Ground Water Rule to address microbial contamination. The Stage 2 DBPR is also being concurrently proposed with the Long Term 2 Enhanced Surface Water Treatment Rule. Because of the difficulties in establishing which systems would have multiple problems such as microbial contamination, arsenic, and DBPs (or any combination of the three), no estimate was made of the potential cost savings from addressing more than one contaminant simultaneously.

#### *I. Are There Increased Risks From Other Contaminants?*

Today's proposed rule may slightly shift the distribution of TTHM and HAAs to brominated species. Some systems, depending on bromide and organic precursor levels in the source water and technology selection, may experience a shift to higher ratios or concentrations of brominated DBPs while the overall TTHM or HAA5 concentration decreases. However, EPA anticipates that this phenomenon may only occur in a small percentage of systems affected. For most systems, overall levels of DBPs, as well as

brominated DBP species, should decrease as a result of this rule.

EPA's analysis shows that a large portion of systems that do not currently meet Stage 2 requirements will do so by switching from chlorination to chloramination; approximately 5% of surface water plants and 1.3% of ground water plants in systems serving greater than 10,000 are estimated to convert to chloramination in order to comply with the Stage 2 DBPR from the Stage 1 DBPR (USEPA 2003i). A potential chloramination byproduct is N-nitrosodimethylamine (NDMA), a probable human carcinogen. The concern over the formation of NDMA in the treatment process is based on the compound's ability to persist for a long period of time in the distribution system. The mechanism of formation of NDMA, however, is still under examination. A number of ongoing studies will also evaluate occurrence, factors that affect NDMA formation, mechanisms, treatment effectiveness and improved analytical methods for measuring NDMA.

Another contaminant of concern to the Agency is chlorite. Levels may increase slightly because of technology shifts to chlorine dioxide resulting from this rule but very few systems (<0.1 percent) are predicted to install this technology. However, individual systems will not shift to chlorine dioxide unless they can meet the chlorite MCL (established under the Stage 1 DBPR) which is considered protective of public health.

EPA also considered the impact this rule may have on microbial contamination that may result from altering disinfection practices. To address this concern, the Agency developed this rule jointly with the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR). EPA expects that the LT2ESWTR provisions will prevent significant increases in microbial risk resulting from the Stage 2 DBPR. EPA also expects the Ground Water Rule, scheduled for promulgation in 2003, to prevent any increases in microbial risk in ground water systems deemed vulnerable to source water contamination.

#### *J. Effects on General Population and Subpopulation Groups*

Section III of today's proposed rule discusses the health effects associated with DBPs on the general population as well as the effects on pregnant women and fetuses. In addition, health effects associated with children and pregnant women are discussed in greater detail in subsection VIII.G of this preamble.

#### *K. Uncertainties in Baseline, Risk, Benefit, and Cost Estimates*

Today's proposal models the current baseline risk from DBP exposure as well as the reduction in risk and the cost for various rule options. There is uncertainty regarding many aspects of this analysis including the risk calculation, the benefit estimate, and the cost estimates. EPA has tried to capture much of the uncertainty and also the variability associated with many of the inputs used in the economic analysis by using distributions or ranges as model inputs instead of point estimates whenever possible. The Stage 2 DBPR EA contains a more extensive discussion of the modeling techniques used to address uncertainty and variability (USEPA 2003i).

In addition, the Agency conducted sensitivity analyses to address uncertainty. The sensitivity analyses focus on various benefit and cost factors that may have a significant influence on the outcome of the rule. All of these sensitivity analyses are explained in more detail in the EA for the Stage 2 DBPR (USEPA 2003i).

The major source of benefit uncertainty is the scientific uncertainty regarding the impact of DBP exposure on reproductive and developmental outcomes. However, the Agency believes that the monetized value of these outcomes could be significant. As discussed in subsection VII.C.1, EPA performed an illustrative calculation that explored the potential implications for the proposed rule using some of the published results on fetal loss, but did not attempt to quantify benefits associated with reducing other reproductive and developmental endpoints potentially associated with DBP exposure.

Another possible underestimation of today's monetized benefits results from the inability of the Agency to quantify or monetize the potential benefit from avoiding other cancers associated with DBP exposure such as colon and rectal cancers. Furthermore, while the Agency estimated the range of bladder cancer risks avoided to be 0 to 182 cases per year, the true risk of bladder cancer avoided from decreased DBP exposure may be higher than this range.

While EPA believes it has accounted for the significant costs of today's proposed rule, there are uncertainties about some of the cost inputs. As discussed in subsection VII.D.4, cost estimates do not include some alternatives to installing treatment (e.g., improving management of distribution system residence time) that may be a less costly means of complying with the