

offices, and increased asthma attacks and use of medication), due to the substantial uncertainties inherent in such ratio-of-effects-based approaches to quantifying risk. Finally, with regard to chronic effects, EPA declined to rely on available evidence, or develop quantitative estimates, of the risk of chronic O₃ respiratory-related morbidity or mortality effects in its 1997 final rule, judging that the evidence was too limited or uncertain, despite arguments by commenters on the 1996 proposed rule that such available, peer-reviewed evidence should be used as a basis for setting a lower 8-hour O₃ standard than the 0.08 ppm standard set by EPA in that rulemaking.

Second, far from discounting proffered scientific evidence of the potential ground-level ozone in screening harmful UV-B radiation, EPA has fully considered all the record evidence on the beneficial shielding effects of ground-level O₃, as well as information received in public comments, as discussed in section II.B above. Moreover, EPA has taken the additional step of provisionally considering the unpublished, Madronich draft analysis (section II.B.3), as submitted by commenters and characterized by them as an improvement over other analyses in the record. Having provisionally considered this analysis, for the reasons discussed above in section II.B, EPA has found that this analysis does not call into question the Agency's conclusions with regard to the lack of credibility of such available analyses or the likelihood that any such beneficial UV-B radiation-related effects are likely very small from a public health perspective. The fact that EPA does not agree with commenters' opinions on these issues does not in any way demonstrate that EPA has simply discounted their proffered evidence of the potential beneficial screening effects of ground-level O₃.

Therefore, EPA rejects the view of some commenters that it applied a double standard in reaching its conclusions about potential UV-B radiation-related effects that may result from a more stringent O₃ NAAQS. In fact, EPA believes that were it to rely upon the available evidence of UV-B radiation-related effects to conclude otherwise, as urged by these commenters, that it then would be applying the very type of double standard that these commenters argue against. If EPA were to have relied upon quantitative risk estimates from draft or preliminary analyses that did not utilize appropriate methods or information to take into account relevant area-specific

factors, and that had not been peer-reviewed, it would then be inappropriately applying a double standard in comparing any such UV-B radiation-related risk estimates to the adverse respiratory-related risks estimated in peer-reviewed analyses that were appropriately designed and limited by the availability of credible information and assessment methods.

In setting aside the available quantitative risk analyses, EPA notes that our above evaluation of a number of critical factors in the analyses provides reasons for believing that the public health impacts of any potential beneficial effects associated with ground-level O₃ are likely very small, albeit unquantifiable at this time (sections II.B.2–3). In giving qualitative consideration to the available evidence on potential indirect beneficial effects of ground-level O₃, EPA believes it is appropriate to weigh this information in the context of the body of evidence on adverse effects caused by direct inhalation exposures to ground-level O₃ that formed the basis for the 1997 O₃ primary standard.

As an initial matter, as discussed in the 1997 final rule, the Administrator focused primarily on quantitative comparisons of risk, exposure, and air quality in selecting both the level (62 FR 38867–8) and form (62 FR 38869–72) of the 1997 O₃ primary standard. More specifically, she looked at comparisons of both those risks to public health that can be explicitly quantified in terms of estimated incidences and the size of the at-risk population (e.g., children) likely to experience adverse effects, as well as those for which quantitative risk information is more limited, but for which quantitative estimates of the number of children likely to experience exposures of concern could be developed (as discussed in section II.A.2 above). In considering these comparisons, she recognized that although there were inherent uncertainties in these estimates, the underlying assessments took into account extensive data bases on the spatial and temporal patterns of air quality and directly relevant human activity patterns likely to result in inhalation exposures of concern. Further, the Administrator recognized that the assessment methods were appropriate and state-of-the-art, and that the results should play a central role in her decision.

Beyond the quantitative information on direct adverse effects, with regard to the qualitative evidence suggestive of potential serious, chronic adverse effects on public health associated with long-term inhalation exposures, EPA

judged that such information was too uncertain and not well enough understood at the time to serve as the basis for establishing a more restrictive 8-hour standard in terms of either level (62 FR 38868) or form (62 FR 38871). In so doing, EPA understood that further research into potential chronic adverse effects in humans would be continued, and the results considered in the next review (62 FR 38871).

In weighing the available information on potential indirect beneficial effects of ground-level O₃, the EPA considers this information in the same light as the information on potential direct chronic adverse effects associated with long-term inhalation exposures to ground-level O₃. In both instances, the potential health effects are serious and likely to develop over many years, with important periods of exposure likely occurring in childhood. Different population groups are likely affected, however, by these potential adverse and beneficial effects. Urban populations and people with impaired respiratory systems (e.g., people with asthma), who are disproportionately from certain minority groups, are most at-risk for the direct inhalation-related effects, whereas fair-skinned populations are most generally, but not exclusively, at-risk for the indirect beneficial effects related to exposure to UV-B radiation. Although different types of uncertainties are inherent in the record information on these effects, in both cases, the uncertainties related to ground-level O₃ are so great as to preclude the development of credible estimates of the size of the affected population or the probability of the occurrence of such effects.⁶⁹ In the case of indirect effects related to ground-level O₃, EPA believes that the use of plausible but unsubstantiated assumptions would likely lead to the conclusion that the potential impacts on public health are likely very small; no such conclusions have yet been drawn with regard to the public health impacts of potential direct chronic adverse effects related to inhalation exposures. After considering these factors and the public comments received, EPA now

⁶⁹ Two commenters expressed the view that EPA's analogy of UV-B radiation-related protective effects to chronic respiratory-related adverse effects is flawed because the nature of the uncertainties associated with these two types of effects are different. As discussed more fully in its response to comments (EPA, 2002), EPA explicitly recognizes here that there are different types of uncertainties inherent in the evidence of these effects, but disagrees with the commenter's characterization of these differences and with the view that any such differences in the nature of the uncertainties invalidate the weighing of these types of effects as EPA has done in reaching its conclusions.