

Chapter 1: Introduction and Background

Synopsis

This document estimates the incremental costs and monetized human health and welfare benefits of attaining a revised primary ozone National Ambient Air Quality Standard (NAAQS) nationwide. This document contains illustrative analyses that consider limited emission control scenarios that states, tribes and regional planning organizations might implement to achieve a revised ozone NAAQS. In some cases, EPA weighed the available empirical data to make judgments regarding the proposed attainment status of certain urban areas in the future. According to the Clean Air Act, EPA must use health-based criteria in setting the NAAQS and cannot consider estimates of compliance cost. This Regulatory Impact Analysis (RIA) is intended to provide the public a sense of the benefits and costs of meeting new alternative ozone NAAQS, and to meet the requirements of Executive Order 12866 and OMB Circular A-4 (described below in Section 1.2.2).

1.1 Background

Two sections of the Clean Air Act (“Act”) govern the establishment and revision of NAAQS. Section 108 (42 U.S.C. 7408) directs the Administrator to identify pollutants which “may reasonably be anticipated to endanger public health or welfare,” and to issue air quality criteria for them. These air quality criteria are intended to “accurately reflect the latest scientific knowledge useful in indicating the kind and extent of all identifiable effects on public health or welfare which may be expected from the presence of [a] pollutant in the ambient air.” Ozone is one of six pollutants for which EPA has developed air quality criteria.

Section 109 (42 U.S.C. 7409) directs the Administrator to propose and promulgate “primary” and “secondary” NAAQS for pollutants identified under section 108. Section 109(b)(1) defines a primary standard as “the attainment and maintenance of which in the judgment of the Administrator, based on [the] criteria and allowing an adequate margin of safety, [are] requisite to protect the public health.” A secondary standard, as defined in section 109(b)(2), must “specify a level of air quality the attainment and maintenance of which in the judgment of the Administrator, based on [the] criteria, [are] requisite to protect the public welfare from any known or anticipated adverse effects associated with the presence of [the] pollutant in the ambient air.” Welfare effects as defined in section 302(h) [42 U.S.C. 7602(h)] include but are not limited to “effects on soils, water, crops, vegetation, manmade materials, animals, wildlife, weather, visibility and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being.”

Section 109(d) of the Act directs the Administrator to review existing criteria and standards at 5-year intervals. When warranted by such review, the Administrator is to retain or revise the NAAQS. After promulgation or revision of the NAAQS, the standards are implemented by the States.

1.2 Role of the Regulatory Impact Analysis in the NAAQS Setting Process

1.2.1 Legislative Roles

In setting primary ambient air quality standards, EPA's responsibility under the law is to establish standards that protect public health. The Clean Air Act requires EPA, for each criteria pollutant, to set a standard that protects public health with "an adequate margin of safety." As interpreted by the Agency and the courts, the Act requires EPA to create standards based on health considerations only. Economic factors cannot be considered.

The prohibition against the consideration of cost in the setting of the primary air quality standard, however, does not mean that costs or other economic considerations are unimportant or should be ignored. The Agency believes that consideration of costs and benefits are essential to making efficient, cost effective decisions for implementation of these standards. The impact of cost and efficiency are considered by states during this process, as they decide what timelines, strategies, and policies make the most sense. This RIA is intended to inform the public about the potential costs and benefits that may result when a new ozone standard is implemented, but is not relevant to establishing the standards themselves.

1.2.2 Role of Statutory and Executive Orders

There are several statutory and executive orders that dictate the manner in which EPA considers rulemaking and public documents. This document is separate from the NAAQS decision making process, but there are several statutes and executive orders that still apply to any public documentation. The analysis required by these statutes and executive orders is presented in Chapter 8.

EPA presents this RIA pursuant to Executive Order 12866 and the guidelines of OMB Circular A-4.¹ These documents present guidelines for EPA to assess the benefits and costs of the selected regulatory option, as well as one less stringent and one more stringent option. OMB circular A-4 also requires both a cost-benefit, and a cost-effectiveness analysis for rules where health is the primary effect. Within this RIA we provide a cost benefit analysis. We also provide a cost-effectiveness analysis which will be jointly presented in Appendix 6b.

1.2.3 Market Failure or Other Social Purpose

OMB Circular A-4 indicates that one of the reasons a regulation such as the NAAQS may one may be issued is to address market failure. The major types of market failure include: externality, market power, and inadequate or asymmetric information. Correcting market failures is one reason for regulation, but it is not the only reason. Other possible justifications include improving the function of government, removing distributional unfairness, or promoting privacy and personal freedom.

An externality occurs when one party's actions impose uncompensated benefits or costs on another party. Environmental problems are a classic case of externality. For example, the smoke

¹ U.S. Office of Management and Budget. Circular A-4, September 17, 2003. Found on the Internet at <<http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>>.

from a factory may adversely affect the health of local residents while soiling the property in nearby neighborhoods. If bargaining was costless and all property rights were well defined, people would eliminate externalities through bargaining without the need for government regulation. From this perspective, externalities arise from high transaction costs and/or poorly defined property rights that prevent people from reaching efficient outcomes through market transactions.

Firms exercise market power when they reduce output below what would be offered in a competitive industry in order to obtain higher prices. They may exercise market power collectively or unilaterally. Government action can be a source of market power, such as when regulatory actions exclude low-cost imports. Generally, regulations that increase market power for selected entities should be avoided. However, there are some circumstances in which government may choose to validate a monopoly. If a market can be served at lowest cost only when production is limited to a single producer of local gas and electricity distribution services, a natural monopoly is said to exist. In such cases, the government may choose to approve the monopoly and to regulate its prices and/or production decisions. Nevertheless, it should be noted that technological advances often affect economies of scale. This can, in turn, transform what was once considered a natural monopoly into a market where competition can flourish.

Market failures may also result from inadequate or asymmetric information. Because information, like other goods, is costly to produce and disseminate, an evaluation will need to do more than demonstrate the possible existence of incomplete or asymmetric information. Even though the market may supply less than the full amount of information, the amount it does supply may be reasonably adequate and therefore not require government regulation. Sellers have an incentive to provide information through advertising that can increase sales by highlighting distinctive characteristics of their products. Buyers may also obtain reasonably adequate information about product characteristics through other channels, such as a seller offering a warranty or a third party providing information.

There are justifications for regulations in addition to correcting market failures. A regulation may be appropriate when there are clearly identified measures that can make government operate more efficiently. In addition, Congress establishes some regulatory programs to redistribute resources to select groups. Such regulations should be examined to ensure that they are both effective and cost-effective. Congress also authorizes some regulations to prohibit discrimination that conflicts with generally accepted norms within our society. Rulemaking may also be appropriate to protect privacy, permit more personal freedom or promote other democratic aspirations.

From an economics perspective, setting an air quality standard is a straightforward case of addressing an externality, in this case where firms are emitting pollutants, which cause health and environmental problems without compensation for those suffering the problems. Setting a standard with a reasonable margin of safety attempts to place the cost of control on those who emit the pollutants and lessens the impact on those who suffer the health and environmental problems from higher levels of pollution.

1.2.4 Illustrative Nature of the Analysis

This ozone NAAQS RIA is an illustrative analysis that provides useful insights into a limited number of emissions control scenarios that states might implement to achieve a revised ozone NAAQS. Because states are ultimately responsible for implementing strategies to meet any revised standard, the control scenarios in this RIA are necessarily hypothetical in nature. They are not forecasts of expected future outcomes. Important uncertainties and limitations are documented in the relevant portions of the analysis.

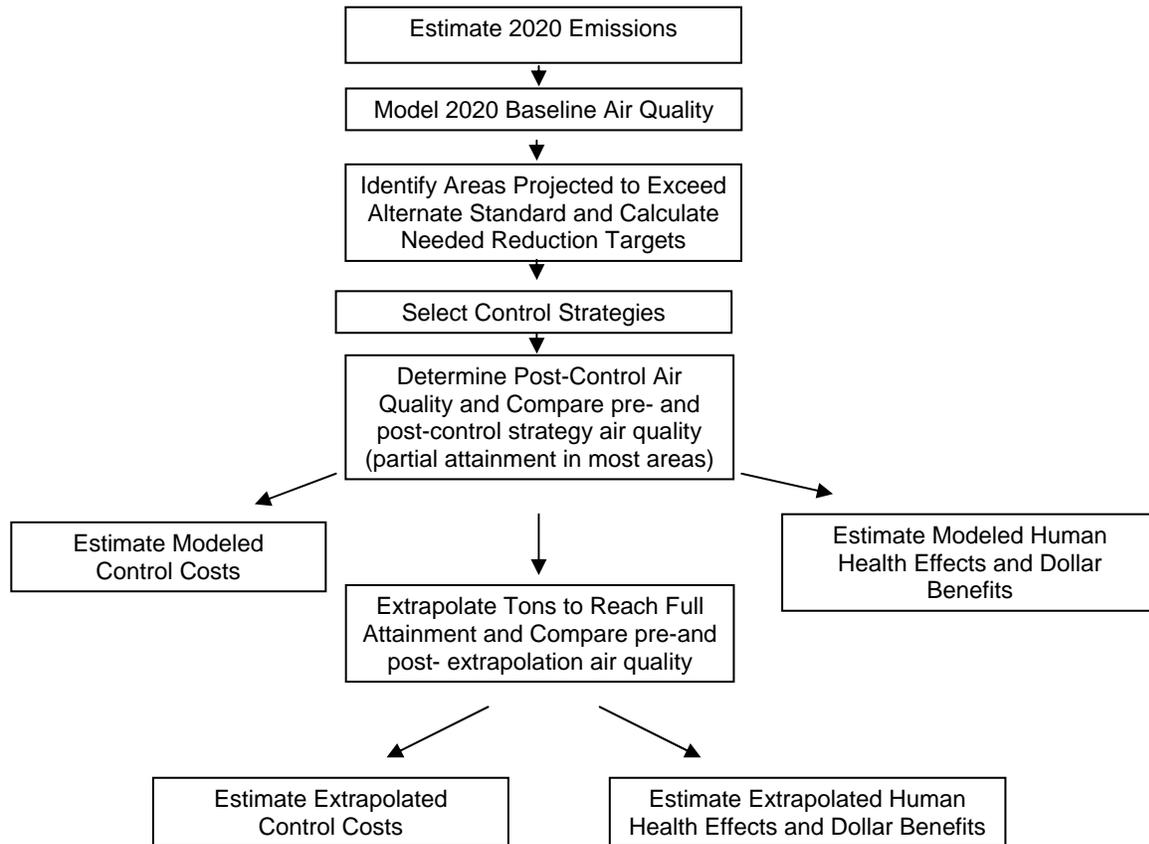
The illustrative goals of this RIA are somewhat different from other EPA analyses of national rules, or the implementation plans states develop, and the distinctions are worth brief mention. This RIA does not assess the regulatory impact of an EPA-prescribed national or regional rule such as the Clean Air Interstate Rule, nor does it attempt to model the specific actions that any state would take to implement a revised ozone standard. This analysis attempts to estimate the costs and human and welfare benefits of cost-effective implementation strategies which might be undertaken to achieve national attainment of new standards. These hypothetical strategies represent a scenario where states use one set of cost-effective controls to attain a revised ozone NAAQS. Because states—not EPA—will implement any revised NAAQS, they will ultimately determine appropriate emissions control scenarios. State implementation plans would likely vary from EPA's estimates due to differences in the data and assumptions that states use to develop these plans.

The illustrative attainment scenarios presented in this RIA were constructed with the understanding that there are inherent uncertainties in projecting emissions and controls. Furthermore, certain emissions inventory, control, modeling and monitoring limitations and uncertainties inhibit EPA's ability to model full attainment in all areas. An additional limitation is that this analysis is carried out for the year 2020, before some areas are required to reach the current ozone standard. Section 1.3.1 below explains why EPA selected the analysis year of 2020. Despite these limitations, EPA has used the best available data and methods to produce this RIA.

1.3 Overview and Design of the RIA

This Regulatory Impact Analysis evaluates the costs and benefits of hypothetical national strategies to attain several potential revised primary ozone standards. The document is intended to be straightforward and written for the lay person with a minimal background in chemistry, economics, and/or epidemiology. Figure 1.1 provides an illustration of the framework of this RIA.

Figure 1.1: The Process Used to Create this RIA



1.3.1 Baseline and Years of Analysis

The analysis year for this regulatory impact analysis is 2020, which allows EPA to build the ozone RIA analysis on the previously completed PM NAAQS RIA analysis which also used 2020 as its analysis year. Many areas will reach attainment of the current ozone standard or any alternative ozone standard by 2020. For purposes of this analysis, we assume attainment by 2020 for all areas except for two areas in California with unique circumstances described in Appendix 7b. Some areas for which we assume 2020 attainment may in fact need more time to meet one or more of the analyzed standards, while others will need less time. This analysis does not prejudice the attainment dates that will ultimately be assigned to individual areas under the Clean Air Act, which contains a variety of potential dates and flexibility to move to later dates (up to 20 years), provided that the date is as expeditious as practicable.

The methodology first estimates what baseline ozone levels might look like in 2020 with existing Clean Air Act programs, including application of controls to meet the current ozone standard and the newly revised PM NAAQS standard and then models how ozone levels would be predicted to change following the application of additional controls to reach a tighter standard. This allows for an analysis of the incremental change between the current standard and an alternative standard. This timeline is also consistent with expected attainment in 2020 of the revised

Particulate Matter (PM) NAAQS covered in the PM NAAQS RIA issued in September 2006. As explained in Chapter 2, since one of the principal precursors for ozone, NO_x, is also a precursor for PM, it is important that we account for the impact on ozone concentrations of NO_x controls used in the hypothetical control scenario used in the PM NAAQS RIA, so as to avoid double counting the benefits and costs of these controls.

1.3.2 Control Scenarios Considered in this RIA

A hypothetical control strategy was developed for an alternative 8-hr ozone standard of 0.070 ppm, in order to illustrate one national scenario for how such a tighter standard might be met. First, EPA modeled the predicted air quality changes that would result from the application of emissions control options that are known to be available to different types of sources in portions of the country that were predicted to be in non-attainment with 0.070 ppm in 2020. However, given the limitations of current technology and the amount of improvement in air quality needed to reach a standard of 0.070 ppm in some areas, it was also expected that modeling these known controls would not reduce ozone concentrations sufficiently to allow all areas to reach the more stringent standard. We performed air quality sensitivity modeling by reducing the remaining NO_x and NO_x + VOC emissions by 30, 60, and 90% beyond the percentage inventory reductions that were achieved by the modeled known control strategy. This enabled us to determine, for an extrapolation analysis, the approximate number of tons of additional reductions, beyond those achieved by known controls that would be required to meet the alternate standards.

1.3.3 Evaluating Costs and Benefits

Applying a two step methodology for estimating emission reductions needed to reach full attainment enabled EPA to evaluate nationwide costs and benefits of attaining a tighter ozone standard, albeit with substantial additional uncertainty regarding the second step estimates. Costs and benefits are presented in this RIA in the same two steps that emissions reductions were estimated. First, the costs associated with applying known controls were quantified, and presented along with an estimate of their economic impact. Second, EPA estimated costs of the additional tons of extrapolated emission reductions estimated which were needed to reach full attainment. The analysis of the benefits of setting an alternative primary standard included both mortality and morbidity calculations matching the costs of applying known controls and then the benefits of reaching full attainment. The costs and monetized benefits were then compared to provide an estimate of net benefits nationwide. It is important to note that this analysis did not estimate any separate costs or benefits of attaining a secondary NAAQS standard due to resource and time constraints. Since the secondary is being set to be equivalent to the primary standard, few additional costs and benefits are expected.

To streamline this RIA, this document refers to several previously published documents, including two technical documents EPA produced to prepare for the ozone NAAQS proposal. The first was a Criteria Document created by EPA's Office of Research and Development (published in 2006), which presented the latest available pertinent information on atmospheric science, air quality, exposure, dosimetry, health effect, and environmental effects of ozone. The second was a "Staff Paper" (published in 2007) that evaluated the policy implications of the key studies and scientific information contained in the Criteria Document, as well as presented a risk assessment for various standard levels. The Staff Paper also includes staff conclusions and

recommendations to the Administrator regarding potential revisions to the standards. In addition to the Criteria Document and Staff Paper, this ozone RIA relies heavily on the 2006 RIA for particulate matter (PM). Many of the models and methodology used here are the same as in the PM NAAQS RIA. This RIA identifies methodologies used to generate data, but refers readers to the PM NAAQS RIA for many technical details. The focus of this RIA is to explain in detail how the approach or methodologies have changed from the PM NAAQS RIA analysis, and to present the results of the methodologies employed in this analysis, which compares attainment of tighter levels of the ozone standard to the baseline of the current standard.

1.4 Ozone Standard Alternatives Considered

EPA has performed an illustrative analysis of the potential costs and human health and visibility benefits of nationally attaining a new ozone standard of 0.075 ppm. Per Executive Order 12866 and the guidelines of OMB Circular A-4, this Regulatory Impact Analysis (RIA) also presents analyses of three alternative standards, a less stringent 0.079 ppm and two more stringent options (0.065 and 0.070 ppm). The benefit and cost estimates below are calculated incremental to a 2020 baseline that incorporates air quality improvements achieved through the projected implementation of existing regulations and full attainment of the existing ozone and particulate matter (PM) National Ambient Air Quality Standards (NAAQS). The baseline also includes the Clean Air Interstate Rule and mobile source programs, which will help many areas move toward attainment of the current ozone standard.

1.5 References

Henderson, R. 2006. October 24, 2006. Letter from CASAC Chairman Rogene Henderson to EPA Administrator Stephen Johnson, EPA-CASAC-07-001.

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U.S. EPA. 2006. Air Quality Criteria for Ozone and Related Photochemical Oxidants (Final). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-05/004aF-cF.

U.S. EPA. 2007. Review of the National Ambient Air Quality Standards for Ozone: Policy Assessment of Scientific and Technical Information. OAQPS Staff Paper. North Carolina. EPA-452/R-07-003