Comparison of NAAQS RIA and Risk Assessments

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Purposes

- NAAQS Risk Assessment:
  - intended to provide quantitative estimates of the risk to public health associated with existing air quality levels and with air quality levels that would occur if current and alternative standards were met.
  - intended to assist the Administrator in selecting primary standards that will protect the public health with an adequate margin of safety, recognizing that such standards will not be risk-free.
  - a premium is placed on reducing the level of uncertainty in the quantitative estimates.
- NAAQS RIA:
  - Intended to provide a comprehensive assessment of costs and benefits, both to health and welfare, of illustrative strategies to attain alternative standards.
  - Required by E.O. 12866, but the Clean Air Act prohibits EPA from considering costs in setting or revising any national air quality standard.
  - In these benefit-cost analyses, a balance between comprehensiveness and precision is sought, because of the direct comparison between costs and benefits.

	EPA NAAQS Risk Assessment	EPA Benefits Analysis
Geographic Scope	Location specific, matched with studies	National extrapolation of study results
Incidence Rates	More refined baseline incidence rates	National or regional baseline incidence rates
Populations	Focus is often on sensitive subpopulations	Focus on expected outcomes in the general population
Exposures	Detailed exposure modeling for health endpoints based on controlled human exposure studies, otherwise uses ambient concentrations	Uses only ambient exposures
AQ Data	Uses monitored air quality data for current or recent years	Uses modeled and monitored air quality data
Analysis Year	Does not project to future years, but adjusts air quality data to simulate just meeting current and alternative standards	Often uses projections to future years
Scope	Generally fewer health endpoints	Comprehensive set of health endpoints

Detailed Comparison of Risk and Benefits Analysis Methods for the 2006 PM2.5 NAAQS Rulemaking

Component	PM NAAQS Risk Analysis	PM NAAQS Benefits Assessment
Geographic scope of coverage	9 urban areas (Boston, Detroit, LA, Philadelphia, Phoenix, Pittsburgh, San Jose, Seattle, St. Louis) with counties in these areas selected to match the areas considered in the epidemiology studies	Nationwide, using a 36km grid based on the resolution of the $PM_{2.5}$ air quality model, CMAQ.
Air Quality	Recent year of air quality (2003) served as base case and also ran scenario where highest concentration monitor was rolled back to just meet the current and alternative suites of annual and daily standards. Air quality adjustment used proportional rollback of concentrations exceeding estimated policy relevant background. Amount of rollback was determined by 2001-2003 design value and was applied to 2003 year for most, but not all cases. Proportional rollback was applied to the composite monitor (where all daily monitor values available on each day are averaged to obtain a single value for each day for the area).	Future baseline air quality projected to 2020 using relative reduction factors based on CMAQ modeling, applied to recent years of monitoring data. Future air quality scenarios based on illustrative control strategies to attain alternative standards are modeled using CMAQ.
Health endpoints	Long-term exposure mortality (9 areas) Short-term exposure mortality (8 of 9 areas) Hospital admissions (3 areas) Respiratory symptoms (children) (2 areas)	Long-term exposure mortality Hospital admissions Respiratory symptoms (children) Chronic bronchitis Nonfatal heart attacks ER visits Acute bronchitis (children) Asthma exacerbations (children) Minor restricted activity days (adults) Work loss days

Detailed Comparison of Risk and Benefits Analysis Methods for the 2006 PM2.5 NAAQS Rulemaking (Continued)

How Potential Threshold is Addressed	Alternative cutpoints (10, 15, 20 μg/m^3 for short-term and 10, 12 μg/m^3 for long-term exposure mortality) presented along with case down to background for short-term exposure mortality and down to 7.5 μg/m^3 (lowest measured level) for long-term exposure mortality. Concentration-response slope was adjusted for cutpoints that were above background or lowest measured level.	Alternative cutpoints (0, 5, 10, 15, 20 μg/m^3) for long-term exposure mortality presented as a sensitivity analysis. Primary analysis measures impacts down to 10 μg/m^3 for all functions. Concentration-response slopes were adjusted for cutpoints that were above background or lowest measured level.
Baseline Incidence Rates	Used CDC Wonder mortality baseline incidence for 2000. Used recent city-specific hospital admission baseline incidence rate data from local or state agencies. For respiratory symptoms used baseline incidence from study since it was the only source of this information.	Various. Described completely in the CAIR RIA, chapter 4. For premature mortality, county-level data are available. For hospital admissions, regional rates are available. However, for all other endpoints, a single national incidence rate is used, due to a lack of more spatially disaggregated data. In these cases, we used national incidence rates whenever possible, because these data are most applicable to a national assessment of benefits. However, for some studies, the only available incidence information comes from the studies themselves; in these cases, incidence in the study population is assumed to represent typical incidence at the national level.
Sensitivity Analyses	Examined alternative background estimates, alternative rollback, alternative use of spatial average instead of highest monitor for design value.	Alternative C-R functions, alternative cut-points, uncertainty analyses
Time Period	2003 for recent air quality scenario and meeting current and alternative standards is not specific to any specific year	2020
Projection	Population, baseline incidence rates are not projected to future, simply relies on recent data	Population, demographic composition, geographic location of populations, mortality rates are projected to 2020 using census and Woods and Poole forecasts (see CAIR RIA for more details)