United States Environmental Protection Agency

Office of Air Quality Planning and Standards

NO_2 Primary NAAQS Review: Final Risk and Exposure Assessment Document

Office of Air and Radiation
Office of Air Quality Planning and Standards

Timeline for NO_2 Rulemaking

Major Rulemaking Milestones	Projected Date
ANPR Signed	January 9, 2009
ANPR Published	January 16, 2009
Proposal	June 26, 2009*
Final	January 22, 2010*

*These dates reflect a 1-month extension that has been agreed to by the plaintiffs but has not yet been officially entered by the court

Overview of Major Changes Made From 2nd Draft REA

- Changes in analyses
  - Made our evaluations of alternative standards consistent, such that all alternative standards are now based on 1-h daily maximum NO_2 concentrations (chapter 7)
  - Air quality health characterization is now based on the number of times the daily maximum 1-hour NO_2 concentration exceeds benchmarks rather than number of hours with exceedances (chapter 7)
  - Ambient monitors separated into 3 near-road distance categories (≤ 20 m; > 20 m and < 100 m; ≥ 100 m) rather than the two done previously (<100 m; ≥ 100 m) (chapter 7)
  - Enhanced uncertainty analyses including…
    - A sensitivity run that estimated on-road concentrations using a lognormal distribution (section 7.4.6)
    - AERMOD evaluation of the vertical concentration gradient (sectoin 7.4.4)
    - APEX model sensitivity runs using alternative inputs (section 8.12.2)
    - Tables summarizing the qualitative analysis of uncertainty for the air quality and Atlanta exposure analyses (tables 7-31, 8-17)
- Topics for which discussions have been expanded and/or modified
  - Representativeness of the Atlanta results for the rest of the U.S. (8.11)
  - NO_2 monitoring network (sections 2.2.1 and 7.2.3)
  - Distinction between potential health benchmark levels and alternative standards (sections 4.5.3, 5.5, 6.2)
  - Justification for focusing on health endpoints with causal and likely-causal judgments in the ISA (sections 4.5.1, 10.3.1)
  - Consideration of indoor studies (sections 4.3.2, 4.5.2, 10.3.1)

Overview of Major Changes Made From 2nd Draft REA: Addition of Chapter 10

Purposes of chapter 10:

- Provides a framework for the policy assessment that will be included in the ANPR
- Presents the analyses and approaches that will be used in considering whether to retain or revise the NO_2 NAAQS
- Considers the scientific evidence and the exposure-/risk-based information specifically as it relates to the issues of…
  - Adequacy of the current standard
  - Indicator
  - Averaging time
  - Form
  - Level

Final REA: Conclusions on Adequacy of the Current Standard

- The scientific evidence clearly calls into question the adequacy of the current standard to protect public health and supports consideration of a short-term NO_2 standard that would provide increased health protection for sensitive groups
  - Causality judgments in ISA provide stronger support for effects associated with short-term exposures than long-term exposures
  - ISA concludes that the evidence supports a direct effect of short-term NO_2 exposure on respiratory morbidity at ambient concentrations allowed by the current NAAQS

- Exposure- and risk-based results reinforce the scientific evidence in supporting the conclusion that consideration should be given to revising the current standard so as to provide increased public health protection
  - Results of exposure and risk analyses indicate that appreciable health risks could occur in a hypothetical scenario in which air quality were to just meet the current standard

Final REA: Conclusions on Averaging time

- The primary focus of an NO_2 standard should be to protect against short-term exposures
  - Conclusions in the ISA support the importance of protecting against respiratory effects associated with short-term exposures
  - Epidemiologic studies have reported associations with both 1-h (daily max) and 24-h (average) NO_2 concentrations
  - Controlled human exposure and animal toxicological studies have reported effects following NO_2 exposures of shorter duration than 24 hours (e.g., 1-h to 3-h)
- A standard based on 1-h daily maximum NO_2 concentrations could provide protection against health effects associated with short-term exposures and potential effects associated with long-term exposures
  - Analysis of air quality suggests that a 1-h (daily max) standard could provide protection against 24-h concentrations
  - A 1-h (daily max) standard of 100 ppb or below could maintain annual average NO_2 concentrations below current standard level
- An annual standard is not an effective or efficient approach to protecting against short-term exposures
  - A standard based on annual average concentrations would likely require more control than necessary in some areas and/or less control than necessary in others

Final REA: Conclusions on Form and Level

- For 98th and 99th percentile forms (and a 1-h daily maximum averaging time), the scientific evidence supports a range of levels from 50 ppb to 200 ppb
  - Based on key U.S. epidemiologic studies and controlled human exposure studies of airway hyperresponsiveness
- When the scientific evidence is considered in conjunction with exposure and risk results, the strongest support is for standards based on 98th/99th percentile 1-h daily maximum NO_2 concentrations between 50 and 100 ppb
  - This represents a range of levels that is consistent with the scientific evidence and that would be expected to provide improved public health protection relative to that provided by the current annual standard