



Review of the NO_x and SO_x Secondary National Ambient Air Quality Standards

Overview of Second Draft Policy Assessment

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EPA NO_x and SO_x secondary NAAQS Policy Assessment Team

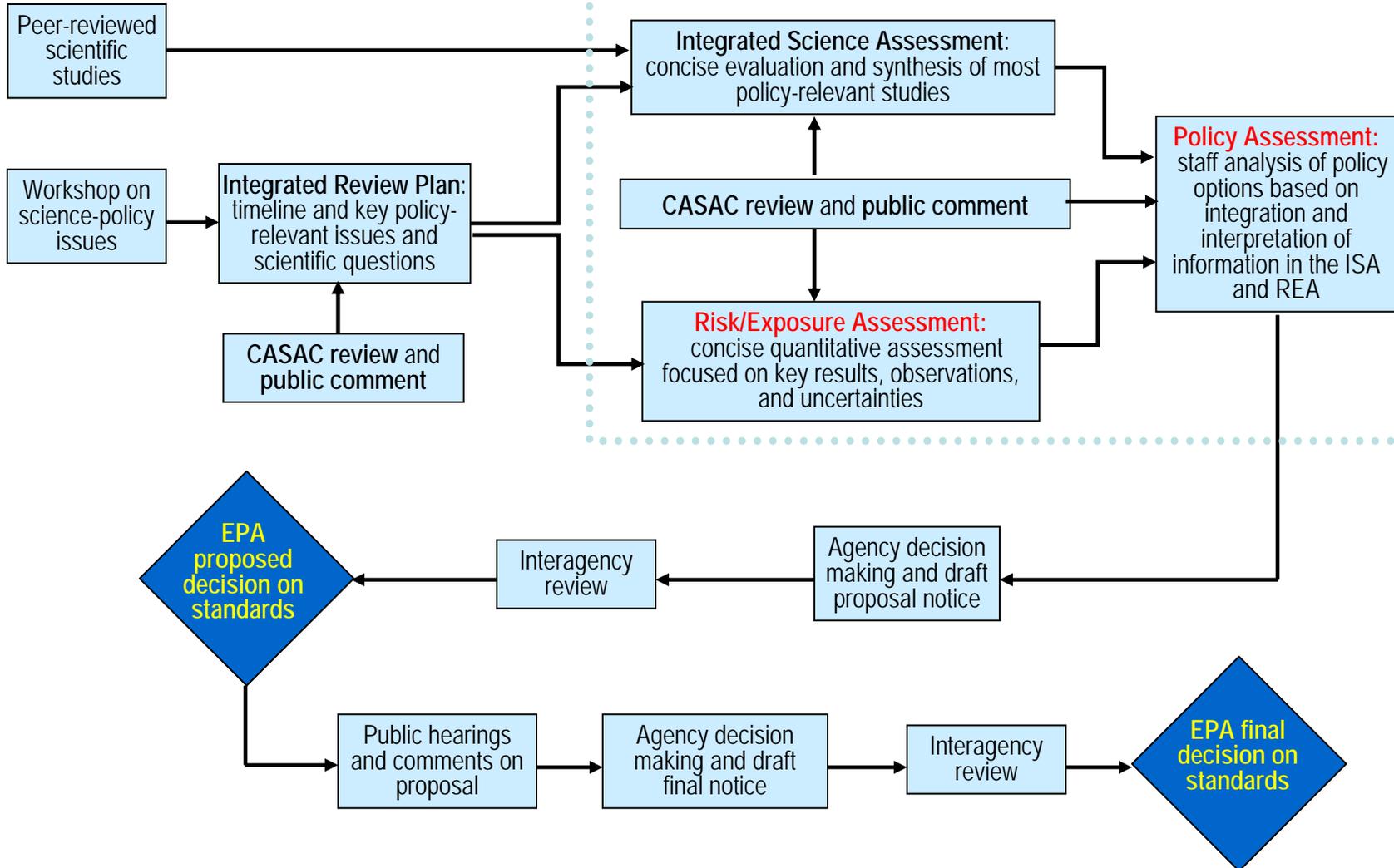
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Area Leads:	Christine Davis (adversity and ecosystem services) Tara Greaver (ecological effects and options for the standard) Jason Lynch (critical loads modeling)
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Overview of NAAQS Review Process





Projected Schedule for Completion of Review of NO_x/SO_x Secondary National Ambient Air Quality Standards (as of October 6, 2010)

Actions to complete review	Projected schedule
Prepare 1 st draft Policy Assessment (PA)	late February 2010
CASAC review and public comment on 1 st draft PA	March 1 -- April 29, 2010
CASAC public meeting	April 1 – 2, 2010
2 nd draft PA	September 15, 2010
CASAC review and public comment on 2 nd draft PA	September 15 – November 14, 2010
CASAC public meeting	October 6 – 7, 2010
Final PA	December 2010
Proposed rule (signature)	July 12, 2011
Public comment period (90 days), including public hearings	late July – late Oct 2011
Final rule (signature)	March 20, 2012

For additional information, see <http://www.epa.gov/ttn/naaqs/standards/no2so2sec/index.html>



Elements of the Standards

- **Indicator** – defines the chemical species or mixture that is to be measured in determining whether an area attains the standard
- **Averaging time** – defines the period of time over which the indicator is averaged
- **Form** – defines the air quality statistic that is to be compared to the level of the standard
- **Level** – the quantitative expression of the maximum amount of the air quality statistic that is allowable



Role of Elements of the Standard in Regulating NO_x and SO_x

- Averaging time, form (and statistic), and level all work together to determine the degree of protectiveness of the standard
- For these particular standards, there are additional complexities to defining each element that present new challenges
- All elements of the standard must be defined by rule as part of the overall definition of the standards



Structure of Policy Assessment

- Chapter 1: Introduction
- Chapter 2: Known or Anticipated Ecological Effects
- Chapter 3: Considerations of Adversity to Public Welfare
- Chapter 4: Addressing the Adequacy of the Current Standards
- Chapter 5: Options for Elements of the Standard
- Chapter 6: Co-protection for Other Effects Using Standards to Protect Against Acidification
- Chapter 7: Evaluation of Uncertainty and Variability in the Context of an AAPI Standard, including Model Evaluation, Sensitivity Analysis, and Assessment of Information Gaps
- Chapter 8. Ambient Air Monitoring
- Chapter 9: Initial Conclusions



Overarching Changes Made in the Second Draft PA in Response to CASAC Comments

- Improved consistency in units throughout document and added a definitions table to Chapter 1
- Combined Chapters 5 and 6 from first draft into an integrated chapter on Options for Elements of the Standard
- Added Chapter 7 integrating discussions on uncertainty and sensitivity analyses
- Added Chapter 8, which focused on issues related to monitoring
- Expanded discussion of role of nitrogen deposition in N limited systems
- Expanded discussions of options for elements of the AAPI form of the standard



Chapter 2: Known or Anticipated Ecological Effects

- Primarily focused on streamlining the chapter
- ✓ Includes a new table (Table 2-2) that summarizes the assumptions and limitations of the ecological effects models

- ✓ Indicates change is in response to CASAC advice



Chapter 3: Considerations of Adversity to Public Welfare

- Added discussion of decisions regarding protection of aquatic resources made by communities, NGOs, states, and the EU (regarding critical loads)
- ✓ Modified figures 3.4 and 3.5 to include state and local parks and wilderness areas.
- ✓ Clarified the role of economics in determining adversity.
- ✓ Added additional assessment of acidification damages in the Adirondacks using the Banzhaf, et al (2006) study.
- ✓ Added tables summarizing values of ecosystem services affected by NO_x/SO_x deposition.
- ✓ Included context for ecosystem service values and descriptions of damages due to NO_x/SO_x deposition where available.



Chapter 4: Addressing the Adequacy of the Current Standards

- ✓ Moved assessment of CMAQ performance to Chapter 7 (uncertainty)
- Much of monitoring discussion moved to Chapter 8 (monitoring)
- ✓ Revised sulfur and additional nitrogen plots have been added
- ✓ Added discussion regarding nutrient enrichment effects in both managed and non-managed systems



Chapter 5: Options for Elements of the Standard (1)

- Combined first draft Chapters 5 and 6 into second draft Chapter 5
 - Chapter now includes options for the atmospheric indicator, averaging time, form and levels of components of the form
 - The focus of the conceptual design is on aquatic acidification with co-protection to other effects presented in Chapter 6.
- New content includes
 - ✓ A conceptual diagram outlining each step to develop the tradeoff curves and the AAPI
 - ✓ Critical Load Modeling
 - A section comparing critical loads calculated using steady-state versus dynamic modeling
 - A section comparing SSWC critical loads using two approaches for the calculation of pre-industrial base cation weathering (F-factor vs. MAGIC)
 - Expanded critical loads data set including ~7500 sites
 - Methods to exclude catchments in which acidification results from high organic acid content, acid mine drainage or naturally low base cation weathering



Chapter 5: Options for Elements of the Standard (2)

- New content (continued)
 - Options for spatial aggregation of components of the NO_y and SO_x tradeoff curves/AAPI equation
 - to subdivide the U.S. into acid-sensitive categories and spatially aggregate populations of critical loads
 - to spatially average Neco
 - to spatially and temporally average NH_x deposition values
 - ✓ The $g(\bullet)$ term from the first draft PA has been disaggregated so that each component is represented in the AAPI equation
 - New sections on levels of components of the AAPI equation including
 - target ANC levels
 - implications of selecting percentages of water bodies identified to reach the target ANC levels



Chapter 6: Co-protection for Other Effects Using Standards to Protect Against Aquatic Acidification

- Added discussions of impacts of an aquatic acidification based standard on protection against effects from
 - Terrestrial nutrient enrichment
 - Aquatic nutrient enrichment



Chapter 7: Evaluation of Uncertainty

- New chapter
- Includes sections focused on major areas of the standard
 - Ecosystem effects
 - Ecosystem services/benefits
 - CMAQ
 - AAPI components
 - Critical load and ANC modeling
- Focus is on how uncertainty and variability may impact the standards
- Includes summary table of key uncertainty elements
- Generally high confidence in the major components of the effects to indicators linkage
 - Relatively larger uncertainties in subcomponents related to observational gaps, e.g. dry deposition, base cation weathering rates



Chapter 8: Ambient Air Monitoring

- Discussions consolidated from 1st draft chapters 4, 5, and 6
- Includes discussions of
 - Ambient air quality indicators
 - Reactive nitrogen and sulfur species
 - Measurements related to AAPI form
 - Complementary measurements
 - Sampling frequency
 - Monitoring methods
- Separate AAMS meeting will be held in early 2011



Chapter 9: Initial Conclusions

- Expanded to include a discussion of staff conclusions regarding the options for elements of the standard
 - Includes discussions of indicators, averaging times, form, and considerations relevant to selecting levels and overall options for the standards
- Added table summarizing options for elements of the standard
- Includes discussions of how critical uncertainties might influence the AAPI
 - Notes important differences between target ANC and AAPI levels
 - Highlights importance of considering uncertainty in determining the overall options for the standard
- We need advice on all of the elements of the standard including ranges of levels and combinations of elements of the standards