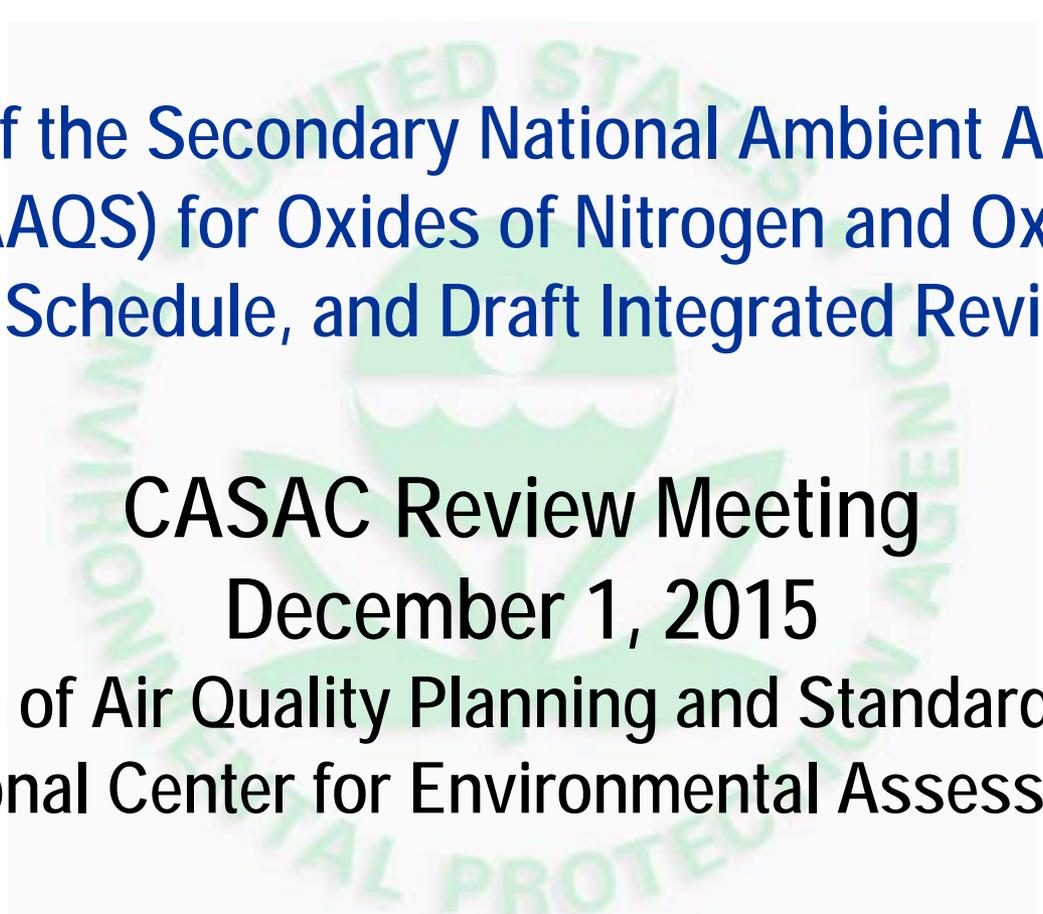




Review of the Secondary National Ambient Air Quality Standards (NAAQS) for Oxides of Nitrogen and Oxides of Sulfur: Background, Schedule, and Draft Integrated Review Plan (IRP)

**CASAC Review Meeting
December 1, 2015**

**Office of Air Quality Planning and Standards and
National Center for Environmental Assessment**





Overview

- Statutory Requirements
- NAAQS Review Process
- Current Schedule
- History of Secondary NO_x and SO_x NAAQS
- Last Review: Scope and Final Decisions
- Current Review: Scope, Overarching Questions & Key Issues
- Current Review: Organization of the Draft IRP

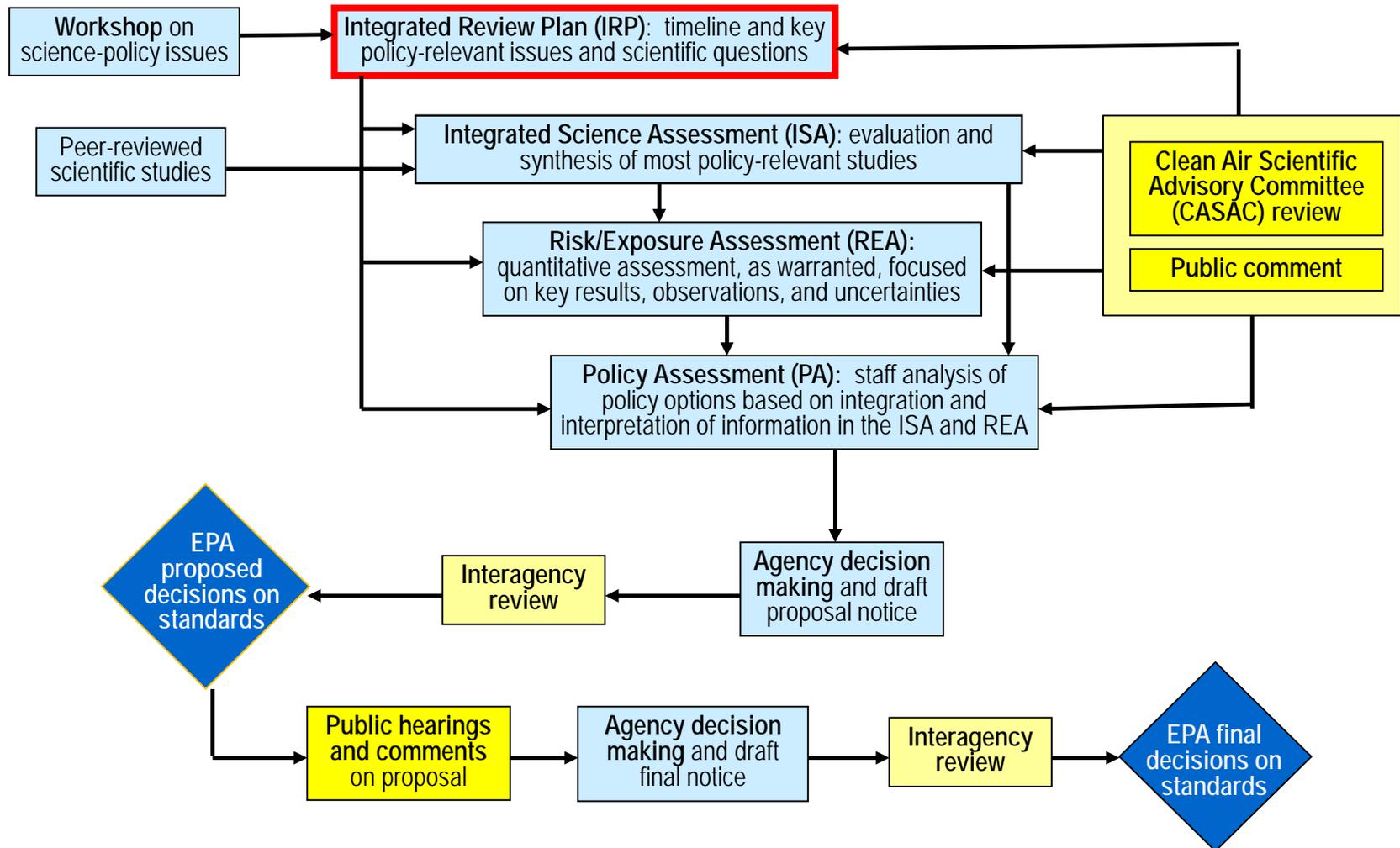


Statutory Requirements

- Sections 108 and 109 of the Clean Air Act govern the establishment, review, and revision (as appropriate) of NAAQS, including:
 - **Primary (health-based) standards** which in the “judgment of the Administrator” are “requisite” to protect public health, including at-risk populations and lifestages, with an “adequate margin of safety”
 - **Secondary (welfare-based) standards** which in the “judgment of the Administrator” are “requisite to protect the public welfare from any known or anticipated adverse effects”
 - Welfare effects include “effects on soils, water, crops, vegetation, man-made materials, animals, wildlife, weather, visibility and climate . . .”
 - “Requisite” means sufficient but not more than necessary
- The law requires EPA to review the scientific information and NAAQS for each criteria pollutant every five years, and to obtain advice from the Clean Air Scientific Advisory Committee (CASAC) on each review.
 - EPA is required to engage in “reasoned decision making” to translate scientific evidence into standards
 - EPA may not consider cost in setting standards (this has been upheld by the Supreme Court); however, cost is considered in developing control strategies to meet the standards (implementation phase)



NAAQS Review Process





Role of IRP in NAAQS Review

- Presents the current plan and specifies the schedule for the entire review, the process for conducting the review, and the key policy-relevant science issues that will guide the review
- Provides context related to previous review to provide orientation of CASAC Panel members
 - Discusses decisions made in previous review, including rationales for those decisions
 - Includes background on key scientific issues and uncertainties from previous review
- CASAC review of IRP helps guide EPA's planning throughout review
 - EPA receives specific and focused CASAC advice early in review process in order to facilitate a clear understanding of, and agreement on, the rest of the process
 - Final IRP is prepared in consideration of CASAC and public comments

Anticipated Schedule for the Secondary NO_x and SO_x NAAQS Review

Stage of Review	Major Milestone	Target Date for Completion	Target Date for CASAC Review/Consultation
Integrated Review Plan (IRP)	Literature Search	Ongoing	
	Call for Information	August 2013	
	Workshop on Science/Policy Issues	March 4-6, 2014	
	Draft IRP	October 2015	December 1, 2015
	Final IRP	May 2016	
Integrated Science Assessment (ISA)	First draft ISA	July 2016	September 2016
	Second draft ISA	June 2017	August 2017
	Final ISA	December 2017	
Risk/Exposure Assessment (REA)	REA Planning Document	November 2016	December 2016
	First draft REA	July 2017	August 2017
	Second draft REA	January 2018	March 2018
	Final REA	September 2018	
Policy Assessment (PA) and Rulemaking	First draft PA	February 2018	March 2018
	Second draft PA	September 2018	October 2018
	Final PA	April 2019	
	Notice of proposed rulemaking	May 2019	
	Notice of final rulemaking	April 2020	



History of Secondary NO_x and SO_x NAAQS

- 1971: Initial NO₂ and SO₂ secondary NAAQS established. NO₂ secondary NAAQS set at a level of 0.053 ppm, as an annual arithmetic average, and a SO₂ standard set at a level of 0.5ppm, as a 3-hour average, not to be exceeded more than once per year
- 2012: First joint review of NO_x and SO_x. Combined review allowed for consideration of the combined as well as individual effects on atmospheric chemistry and public welfare, especially with respect to acid deposition
 - Current secondary standards retained for effects related to direct, gaseous effects
 - Administrator judged that while the current secondary standards were inadequate to protect against adverse effects from deposition of NO_x and SO_x, it was not appropriate under Section 109(b) to set any new secondary standards



Last Review: Scope

- In the last review, the EPA considered the scientific evidence on deposition-related and other (direct) effects of oxides of nitrogen and sulfur in addition to the results of quantitative analyses of deposition-related effects
 - Considered the full nature of ecological effects related to the deposition of ambient oxides of nitrogen and sulfur into sensitive ecosystems across the U.S. The strongest causal evidence was developed for the following:
 - Aquatic and Terrestrial Acidification
 - Aquatic and Terrestrial Enrichment
 - Quantitative estimates of risk were developed for these endpoints using both case study and nationwide data sets
 - Due to limited information and data, the review focused on aquatic acidification
 - Developed an approach based on an “Aquatic Acidification Index” (AAI) that related deposition to acidification based on acid neutralizing capacity of different waterbodies
 - Major uncertainties included limited ambient measurements of NO_x and reduced forms of N (ammonia and ammonium), limited dry deposition data, and uncertainties in relating atmospheric concentrations to deposition



Last Review: Final Decisions

- The Administrator judged that the current standards were adequate for effects related to direct, gaseous effects but were not adequate to protect against adverse effects related to deposition
- Regarding the full nature of ecological effects related to the deposition of ambient oxides of nitrogen and sulfur into sensitive ecosystems across the U.S.
 - EPA concluded that the current secondary standards are neither appropriate nor adequate to protect from deposition-related effects such as those associated with acidification of aquatic and terrestrial ecosystems and nutrient enrichment of terrestrial and estuarine ecosystems.
 - After considering potential alternative standards, the Administrator concluded that she could not set a standard that was "requisite" using the formulation developed in the review noting that she couldn't be sure of the degree of protection afforded by such a standard.
 - The Administrator additionally considered the option of setting new secondary standards identical to the current 1-hour NO₂ and SO₂ primary standards. Concluded there was no basis for a reasoned judgment as to what levels of the current primary standards would be requisite to protect public welfare.
 - No new standards added to protect against these deposition effects.



Scope of Current Review

- Considers both **gaseous** and **particulate** species of nitrogen oxides and sulfur oxides
 - Emphasis for this review is on depositional effects
- Focuses on **secondary NAAQS** only; considers relevant scientific information related to public welfare effects associated with exposure to nitrogen and sulfur oxides
 - Primary NO₂ and SO₂ NAAQS are being reviewed separately



Current Review: Overarching Questions

- Does the currently available scientific evidence and exposure/risk information support or call into question the **adequacy of the protection afforded by the current secondary standards**?
 - NAAQS are set to protect against adverse or anticipated adverse effects to public welfare
- What **alternative standards**, if any, are supported by currently available scientific evidence and exposure/risk-based information, and are appropriate for consideration?
 - In terms of basic elements of NAAQS: indicator, averaging time, form, and level



Current Review: Key Issues (1)

- Many key issues to be addressed in current review are based upon uncertainties in evidence and exposure/risk information identified in last review. These key issues have guided the development of the key policy-relevant questions presented in draft IRP.
- Specific issues to be considered with regard to the **evidence** include...
 - Extent to which new evidence reinforces or calls into question the evidence presented and evaluated in the last review
 - To what extent is information available to improve our understanding of the scope of welfare effects of ambient NO_x and SO_x , including those from eutrophication, acidification, mercury methylation, and direct vegetative exposures?
 - Is there evidence of welfare effects not previously identified or stronger evidence than previously considered?
 - What new information is available on spatial and temporal trends in ambient NO_y and SO_x concentration, including information on sources, transport, transformation, and deposition processes that impact exposure, particularly in sensitive areas?
 - Extent to which uncertainties in scientific evidence from last review have been reduced and/or whether new uncertainties have emerged

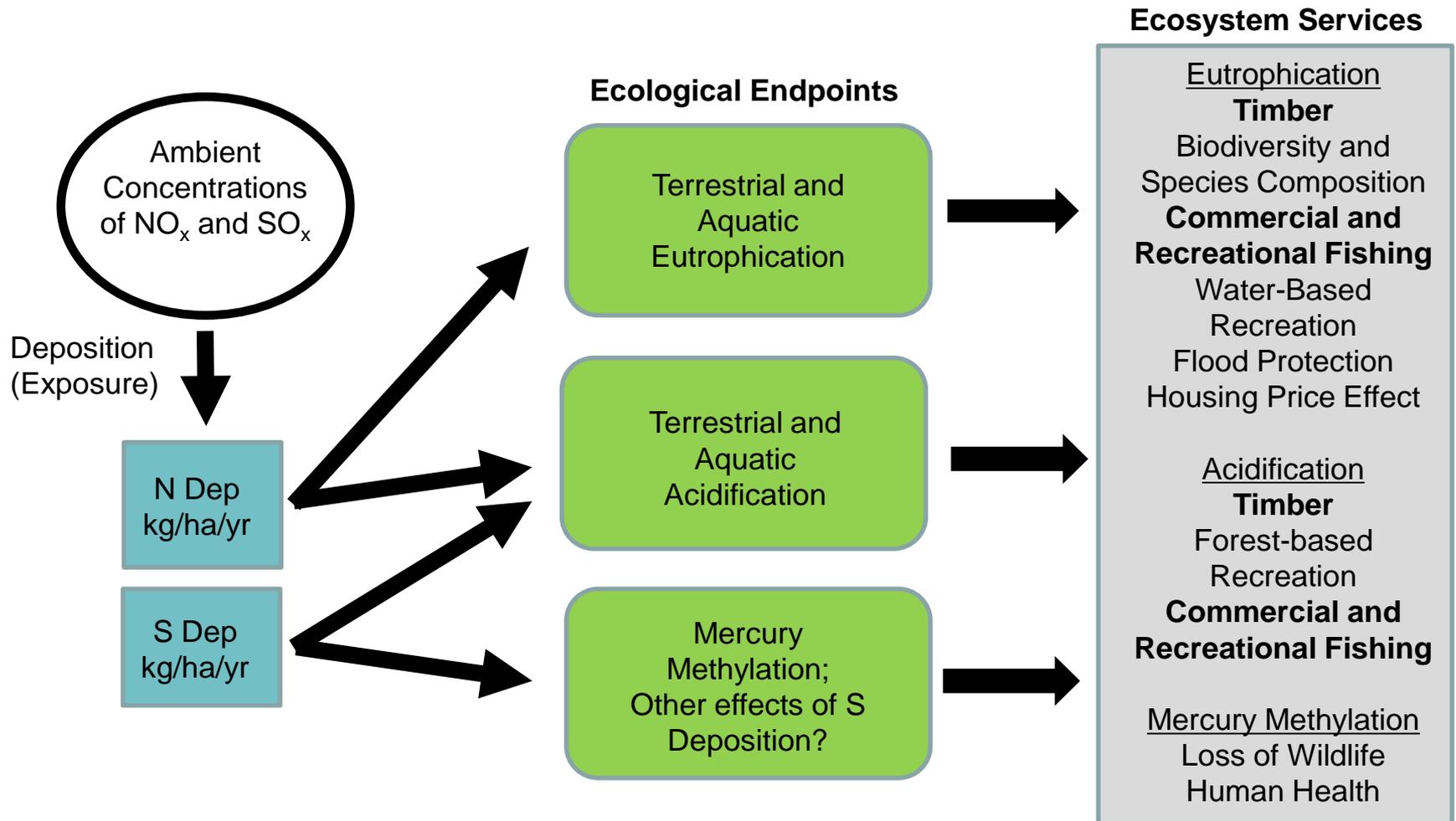


Current Review: Key Issues (2)

- Risk and exposure analyses, if warranted, will:
 - Utilize an integrated assessment approach to characterize the ecological effects
 - Focus on ecosystem services as a framework for characterizing impacts
 - Quantify effects where possible
 - Use case studies to evaluate specific regional impacts as well as national assessments
- Specific issues to be considered with regard to the **exposure and risk analyses** include...
 - What is the nature and magnitude of negative ecosystem responses to NO_x and SO_x (including atmospheric concentrations and deposition)?
 - What is the variability associated with those responses, including across ecosystem types, climatic conditions, environmental effects and interactions with other environmental factors and pollutants?
 - Are there specific levels of atmospheric concentrations and deposition associated with adverse effects of concern?



Integrated Assessment Approach for Risk and Exposure





Current Review: Organization of Draft IRP

1. Introduction (including regulatory history), status and schedule
2. Key Policy-Relevant Issues
3. Integrated Science Assessment
4. Risk and Exposure Assessment
5. Policy Assessment and Rulemaking
6. References