

SIP 101: Introduction to Air Quality Planning

Presented by U.S. EPA Region 5, LADCO, and EGLE

Part 1- May 15, 2019



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Part 1 Overview

- Overview of the Clean Air Act - 3
- NAAQS Setting Process - 28
- Ambient Air Quality Monitoring - 40
- The Designations Process - 67
- Attainment Planning Requirements - 89
- SIP Processing: Development- 105
- SIP Processing: Review and Approval - 136

Overview of the Clean Air Act

Jenny Liljegren, PhD

Physical Scientist

U.S. EPA - Region 5

Liljegren.Jennifer@epa.gov

The Clean Air Act (CAA)

- Air Quality and Public Health
- History of the CAA
- Titles I - XI of the CAA
- Focus on Title I of the CAA
 - Part A
 - Part C
 - Part D

London 1952



(TopFoto / The Image Works) <https://www.theverge.com/2017/12/16/16778604/london-great-smog-1952-death-in-the-air-pollution-book-review-john-reginald-christie>

~12,000 deaths

Donora, PA 1948



(AP Photo/Walter Stein) https://www.pennlive.com/news/2017/04/deadly_smog_in_pa_town_paves_w.html

~20 deaths

Wildfires worsen extreme air pollution in U.S. northwest

Smoke from blazes ravaging western states counteracts clean air improvements

BY LAUREL HAMERS AUG 15, 2018 — 6:45 AM EST



The 2018 Carr fire in northern California, seen here outside Redding, threw pollutants into the air for weeks, beginning July 23. The state reported that air quality was "unhealthy" throughout the region affected by this intense fire. One of the biggest in state history, this fire eventually burned more than 175,000 acres and destroyed more than 1,077 homes.

E.L. KAREY

Kennewick School District sued when boy with asthma dies after PE on smoky day

BY KRISTIN M. KRAEMER

MARCH 16, 2019 05:17 PM, UPDATED MARCH 18, 2019 06:19 PM

THE WALL STREET JOURNAL

California's deadliest wildfire finally contained; death toll rises to 85

Published: Nov 25, 2018 6:37 p.m. ET

ScienceDaily®

Your source for the latest research news

US wildfire smoke deaths could double by 2100

Date: September 10, 2018

Source: American Geophysical Union

Summary: A new study simulating the effects of wildfire smoke on human health finds continued increases in wildfire activity in the continental United States due to climate change could worsen air quality over the coming decades.

Wildfire Smoke

Ethylene Oxide

Chicago Tribune

Officials knew ethylene oxide was linked to cancer for decades. Here's why it's still being emitted in Willowbrook and Waukegan.



Grand Rapids manufacturer to stop work that raised air pollution concerns

Updated Mar 5, 2019; Posted Mar 5, 2019



Gallery: DEQ investigates toxic emissions from Viant Medical

Manganese

KARA HOLSOPPLE × NOVEMBER 9, 2017

ENVIRONMENTAL JUSTICE HEALTH YOUR ENVIRONMENT UPDATE

A new study shows kids with higher levels of the metal manganese in their bodies have lower IQ scores. The study, published in the journal *NeuroToxicology*, looked at about 100 children between the ages of 7 to 9 in East Liverpool, Ohio.

ATSDR Agency for Toxic Substances and Disease Registry



The Ohio Environmental Protection Agency (Ohio EPA) found high levels of manganese in the East Liverpool air.

Ohio EPA identified the SH Bell Company, a raw products storage and packaging facility, as the major source of airborne metals detected in community air monitors. Ohio EPA asked ATSDR to look at whether the manganese levels could harm peoples' health.

Top Priority: MDEQ investigates dangerous gas in Grand Rapids

POSTED 10:25 PM, MARCH 6, 2019, BY DOUG REARDON, UPDATED AT 10:26PM, MARCH 6, 2019

Toxic Air Pollutants

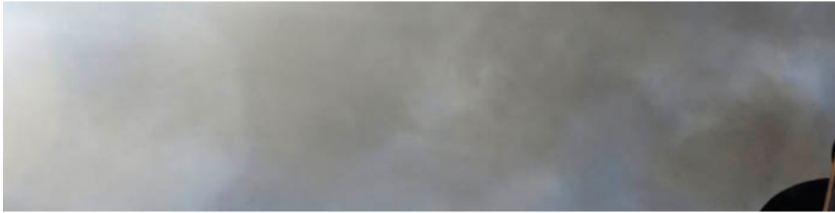


UNITED STATES
DEPARTMENT OF LABOR

Occupational Safety and Health Administration

Safety and Health Topics / Diesel Exhaust

Diesel Exhaust



<https://www.osha.gov/SLTC/dieselexhaust/>

Diesel Exhaust



United States
Environmental Protection
Agency

Health Assessment Document For Diesel Engine Exhaust

<https://nepis.epa.gov/Exe/ZyPDF.cgi/300055PV.PDF?Dockey=300055PV.PDF>

DIESEL
EXHAUST IN
THE UNITED STATES

- WHAT ARE THE HEALTH EFFECTS?
- WHO IS AT RISK?
- WHAT CAN YOU DO?

EPA
United States
Environmental Protection
Agency

<https://nepis.epa.gov/Exe/ZyPDF.cgi/P1001T82.PDF?Dockey=P1001T82.PDF>

Criteria Air Pollutants

Regional

Ozone
PM2.5

California dreamin' of clean air: 52% of Americans live with unhealthy ozone & particle pollution

Published time: 20 Apr, 2016 19:46

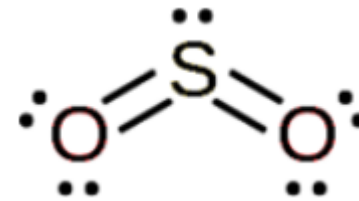
[Get short URL](#)



The skyline of downtown Los Angeles through a layer of smog © Fred Prouser © Reuters

Local

Sulfur Dioxide
(SO₂)



The Clean Air Act (CAA)

- Authorized the development of comprehensive federal and state regulations to limit emissions from both stationary (industrial) sources and mobile sources
- 4 major regulatory programs affecting stationary sources: the NAAQS, SIPs, New Source Performance Standards (NSPS), and National Emission Standards for Hazardous Air Pollutants (NESHAPs)
- Requires EPA to set NAAQS for criteria air pollutants considered harmful to public health and the environment

The Clean Air Act (CAA)

- **Two Types of Ambient Standards:**
 - Primary - set limits to protect public health, including sensitive populations (asthmatics, children, elderly)
 - Secondary - limits to protect public welfare, including decreased visibility, damage to animals, crops, vegetation, and buildings

The Clean Air Act (CAA)

- EPA sets limits, for specific pollutants, on how much of a pollutant can be in the air anywhere in the U.S.
- Gives EPA, States, and Tribes enforcement powers
 - Authority is delegated to the States if they show that they have the ability to implement a program
- States do much of the work to carry out the Act
 - Planning, implementation, enforcement
- Allows the public to participate in the process
- Requires EPA or States to take action against violators

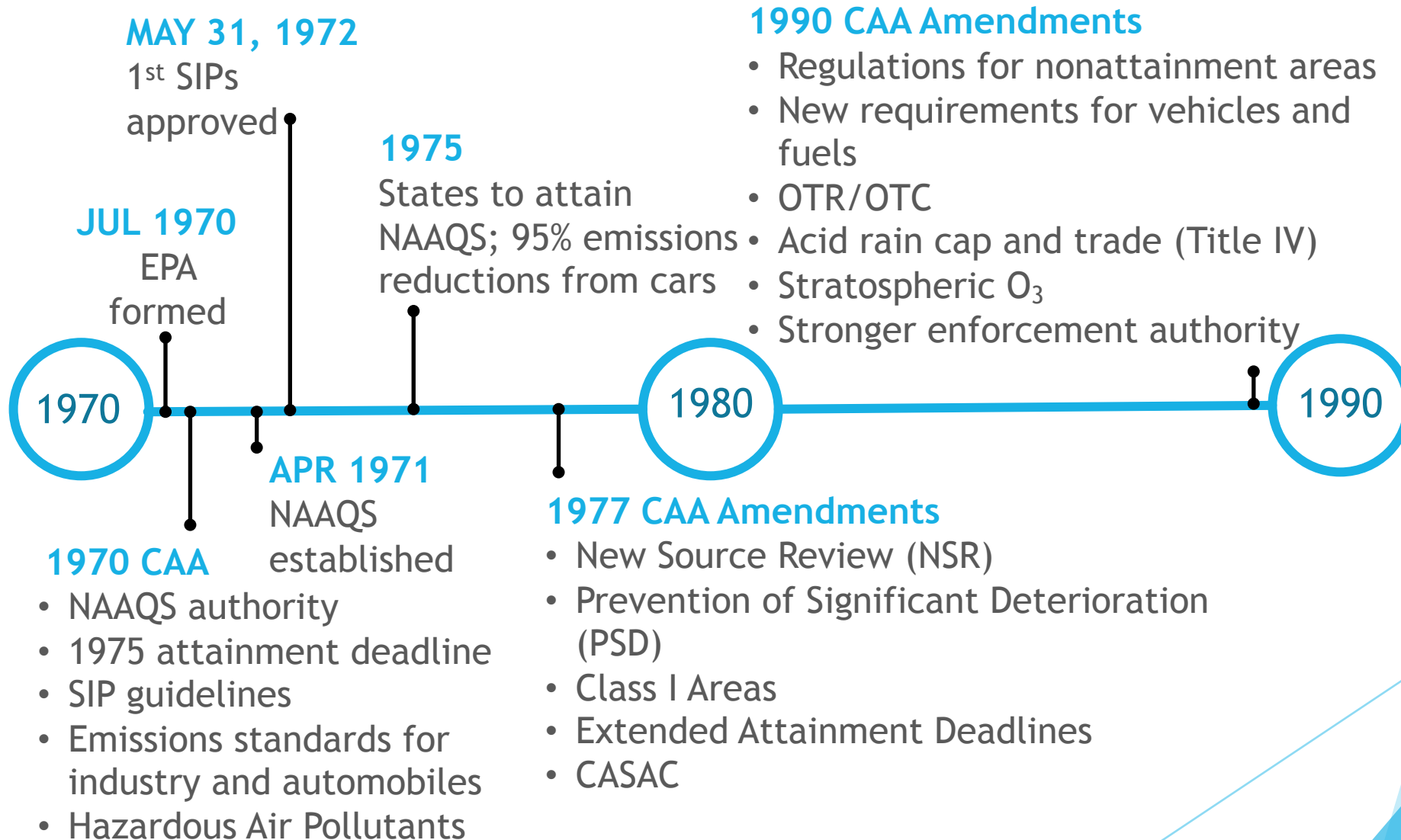
The Clean Air Act (CAA)

- Tribal Authority Rule (TAR) identifies those provisions of the CAA for which it is appropriate to treat eligible Tribes in the same manner as States
 - See *Oklahoma Dept. of Env. Quality v EPA*, 740 F.3d 185 (D.C. Cir. 2014)
 - Identifies that tribes can be found eligible for most provisions of the CAA

The Clean Air Act (CAA)

- CAA allows EPA to find federally recognized tribes eligible to be “treated in a manner similar to a State” so tribes can implement provisions of the CAA that are appropriate for their areas
- EPA will implement the CAA and provisions of the CAA in Indian country that the federally recognized tribes do not implement
- States are responsible for CAA implementation in all other tribal areas and working with other state-recognized tribes

The Clean Air Act (CAA)



1990 CAA Amendments

- **Title I: Air pollution prevention and control**
- Title II: Provisions relating to mobile sources
- Title III: General provisions including Tribal authority, emergency authority, and citizen suit provisions
- Title IV: Acid deposition
- Title V: Operating permits
- Title VI: Stratospheric O₃
- Title VII: Enforcement provisions
- Title VIII: Miscellaneous provisions
- Title IV: Clean air research
- Title X: Disadvantaged business concerns
- Title XI: Clean air employment transition assistance

CAA Title I

Air Pollution Prevention and Control

- **Part A - Air Quality and Emissions Limitations**
- Part B - Stratospheric Ozone (repealed for CAA Title VI)
- Part C - Prevention of Significant Deterioration (PSD)
- Part D - Nonattainment Area (NAA) Plan Requirements

CAA Title I - Part A Sections 108 & 109

National Ambient Air Quality Standards (NAAQS)

CAA Section 108

- Mandates the EPA Administrator to identify and set national standards for pollutants with adverse human and ecological effects
- EPA reviews each standard at least once every 5 years
- EPA to recommend pollution control techniques

CAA Section 109

- Promulgation (40 CFR)
- Primary and secondary standards
- NAAQS review process (CASAC, peer, and public)

CAA Title I - Part A Sections 108 & 109

National Ambient Air Quality Standards (NAAQS)

- Primary, health-based standards “requisite” to protect public health with an adequate margin of safety
 - Public health policy judgments required to protect sensitive *groups*, not most sensitive *individual*, from adverse effects
 - Standards are not “risk free” and not based on cost

CAA Title I - Part A Sections 108 & 109

National Ambient Air Quality Standards (NAAQS)

- Secondary, welfare-based standards required to protect agricultural crops and ecosystems from adverse effects
 - Includes visibility impairment, damage to animals, crops, vegetation, and buildings

CAA Title I Part A Section 110

The Infrastructure SIP

- Demonstrate that the State has the infrastructure to determine air quality, identify NAAQS violations, and carry out enforcement of regulations
- Provides states authority for implementation, maintenance and enforcement of primary and secondary NAAQS
- Includes “Good Neighbor” provisions
- Due to EPA within 3 years of new or revised NAAQS, following reasonable notice (usually 30 days) for public comment and opportunity for public hearing

CAA Title I

Air Pollution Prevention and Control

- Part A - Air Quality and Emissions Limitations
- Part B - Stratospheric Ozone (repealed for CAA Title VI)
- **Part C - Prevention of Significant Deterioration (PSD)**
- Part D - Nonattainment Area (NAA) Plan Requirements

CAA Title I Part C

Prevention of Significant Deterioration (PSD)

- PSD for new sources in attainment/unclassifiable areas

Subpart 1: Clean Air
Subpart 2: Visibility

- Objectives

- Preserve and enhance the air quality in Class I areas of special natural, recreational, scenic, or historic value
- Provide for public participation and consultation with Federal Land Managers prior to permitting major new sources or major modifications that would increase air pollution in Class I areas
- Ensure that the emissions sources from one State don't interfere with attainment of areas in other States

CAA Title I

Air Pollution Prevention and Control

- Part A - Air Quality and Emissions Limitations
- Part B - Stratospheric Ozone
- Part C - Prevention of Significant Deterioration (PSD)
- **Part D - Nonattainment Area (NAA) Plan Requirements**

CAA Title I Part D

Nonattainment Area Requirements

- Attain NAAQS within a specified period
- Submit a SIP with:
 - Emissions inventory
 - Permits
 - Control measures and plans to reach standards (attainment demonstration)
 - Reasonable further progress (RFP)
 - Contingency measures
 - Maintenance plan to meet NAAQS for 10 years after redesignation to attainment

CAA Title I Part D

The Nonattainment Area (NAA) SIPs

- Subpart 1 (Section 172): General provisions
- Subpart 2 (Section 182): Ozone
- Subpart 3 (Section 187): Carbon Monoxide
- Subpart 4 (Section 189): Particulate Matter

CAA Title I Part D

The Nonattainment Area (NAA) SIPs

- Subpart 5 (Section 191): SO_x/NO_x/Pb SIP
- Subpart 6 (Section 193): General Savings
 - Rules or controls promulgated for NAAs before November 15, 1990 shall remain in effect
 - New rules or modifications must ensure equivalent or greater emissions reductions

NAAQS Setting Process

Michelle Becker

Life Scientist

U.S. EPA - Region 5 and ORD

Becker.Michelle@epa.gov

Clean Air Act and NAAQS

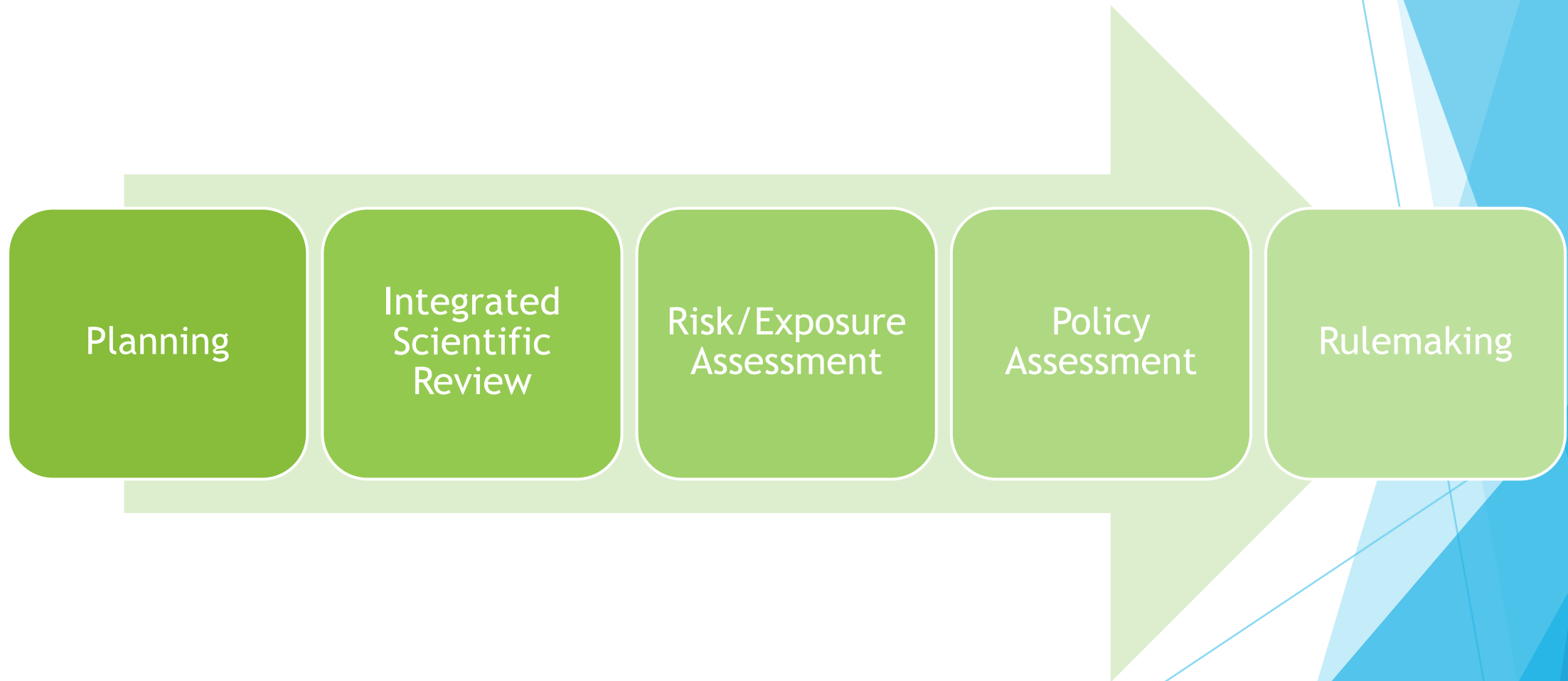
- The [Clean Air Act](#), which was last amended in 1990, requires EPA to set [National Ambient Air Quality Standards](#) (40 CFR part 50) for pollutants considered harmful to public health and the environment.
- Sections 108 and 109 of the [Clean Air Act \(CAA\)](#) govern the establishment, review, and revision, as appropriate, of the [National Ambient Air Quality Standards \(NAAQS\)](#) to provide protection for the nation's public health and the environment.



Current NAAQS

Pollutant [links to historical tables of NAAQS reviews]		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		primary and secondary	Rolling 3 month average	0.15 µg/m ³ ⁽¹⁾	Not to be exceeded
Nitrogen Dioxide (NO₂)		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb ⁽²⁾	Annual Mean
Ozone (O₃)		primary and secondary	8 hours	0.070 ppm ⁽³⁾	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	PM _{2.5}	primary	1 year	12.0 µg/m ³	annual mean, averaged over 3 years
		secondary	1 year	15.0 µg/m ³	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 µg/m ³	98th percentile, averaged over 3 years
	PM ₁₀	primary and secondary	24 hours	150 µg/m ³	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO₂)		primary	1 hour	75 ppb ⁽⁴⁾	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

Establishing the NAAQS



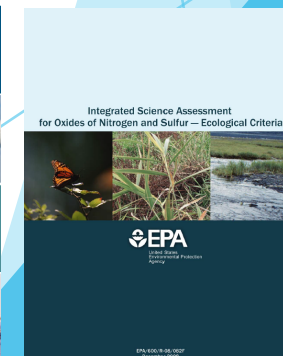
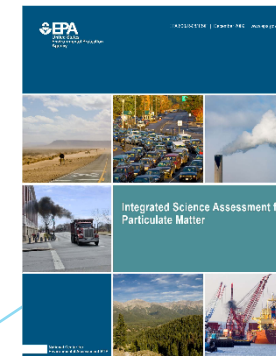
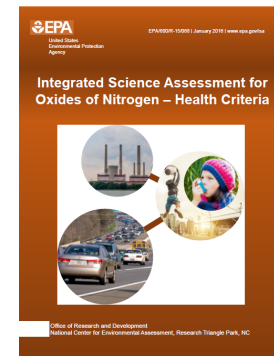
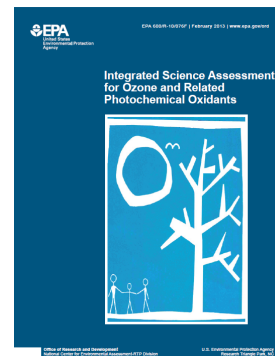
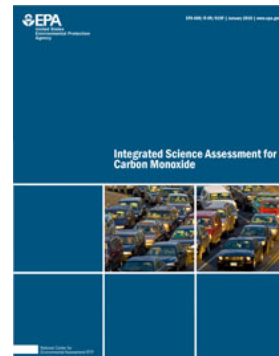
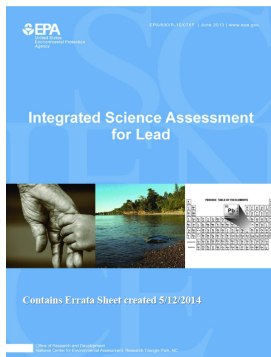
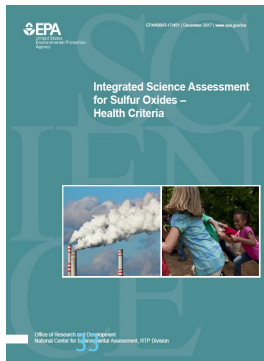
Planning

- The planning phase of the NAAQS review process begins with a science policy workshop, which is intended to gather input from the scientific community and the public regarding policy-relevant issues and questions that will frame the review.

Stage of Review	Major Milestone	Actual or Target Date
Planning	Literature Search	Ongoing
	<i>Federal Register</i> Call for Information	December 3, 2014
	Workshop on Science/Policy Issues	February 9-11, 2015
	Release Draft IRP for CASAC/public review	April 2016
	CASAC Review Meeting for Draft IRP	May 23, 2016
	Release Final IRP	December 2016
Science Assessment	Release First Draft ISA for CASAC/public review	Fall 2017
	CASAC Review Meeting for First Draft ISA	Winter 2018
	Release Second Draft ISA for CASAC/public review	Fall 2018
	CASAC Review Meeting for Second Draft ISA	Winter 2019
	Release Final ISA	Fall 2019
Risk/Exposure Assessments	Release REA Planning Document(s) for CASAC/public review	Fall 2017
	CASAC Review Meeting for REA Planning Document(s)	Winter 2018
	Release First Draft REA(s) for CASAC/Public Review	Fall 2018
	CASAC Review Meeting for First Draft REA(s)	Winter 2019
	Release Second Draft REA(s) for CASAC/Public Review	Fall 2019
	CASAC Review Meeting for Second Draft REA(s)	Winter 2020
	Release Final REA(s)	Fall 2020
Policy Assessment/ Rulemaking	Release First Draft PA for CASAC/public review	Fall 2018
	CASAC Review Meeting on First Draft PA	Winter 2019
	Release Second Draft PA	Fall 2019
	CASAC Review/Public Comment on Second Draft PA	Winter 2020
	Release Final PA	Fall 2020
	Proposed Rulemaking	2021
	Final Rulemaking	2022

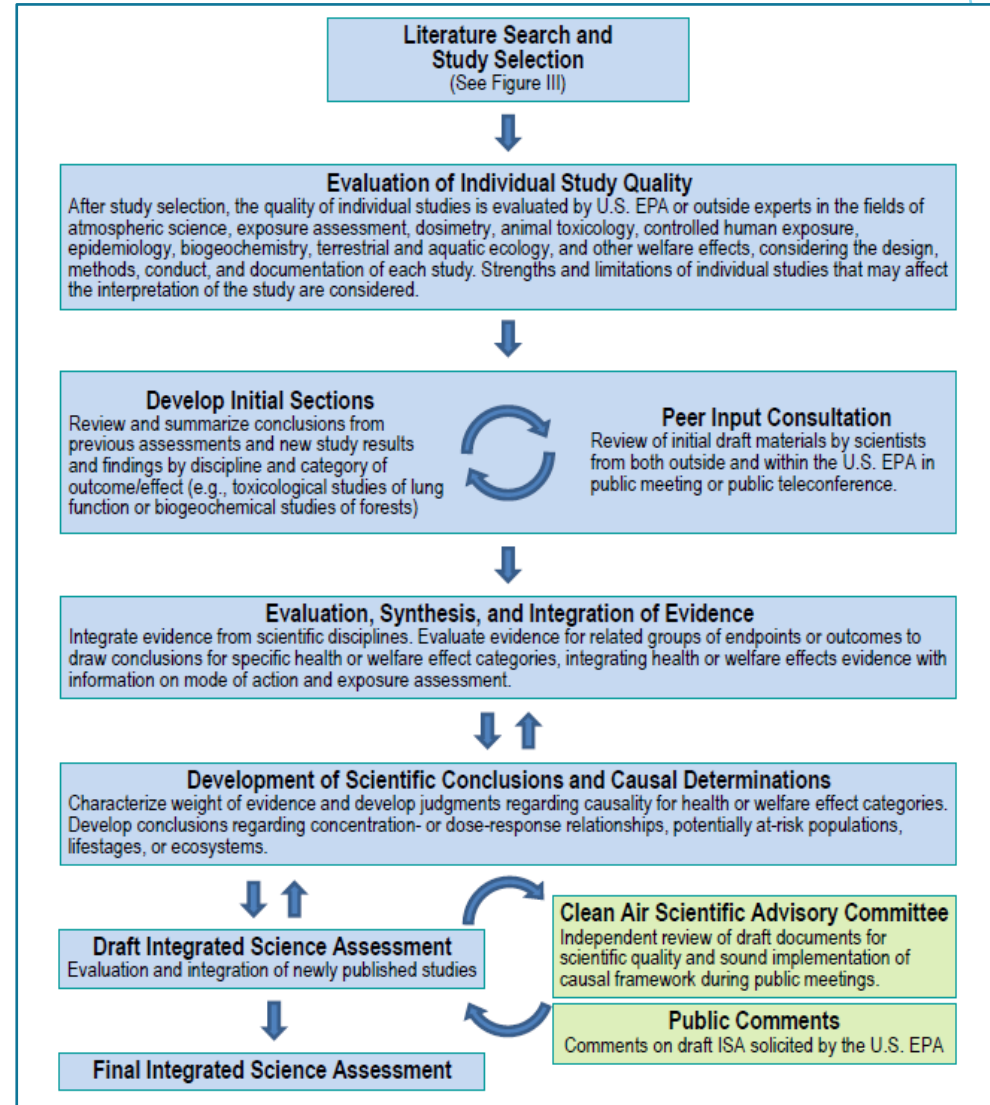
Integrated Science Assessments

- This assessment is a comprehensive review, synthesis, and evaluation of the most policy-relevant science, including key science judgments that are important to inform the development of the risk and exposure assessments, as well as other aspects of the NAAQS review.
- Emphasis on integration of the science and on clear characterization of strengths and uncertainties of available scientific evidence
- Create state-of-the-art electronic databases to catalog new studies (i.e., HERO)
- CASAC typically has reviewed 2 ISA drafts and subsequently other documents (REA, PA)
 - Public meetings announced in the Federal Register with public comment



Integrated Science Assessments

- Structured, dynamic process:
 - Literature search and study selection
 - Evaluation of individual study quality
 - Evaluation, synthesis, and integration of evidence
 - Development of scientific conclusions and causal determinations
- Several layers of review:
 - Peer input
 - Clean Air Scientific Advisory Committee
 - Public comments



Risk Exposure Assessment

- Draws from ISA and conducts analyses (quantitative and qualitative) to determine the risk and exposure to the public and environment with current and potential standards; includes uncertainties

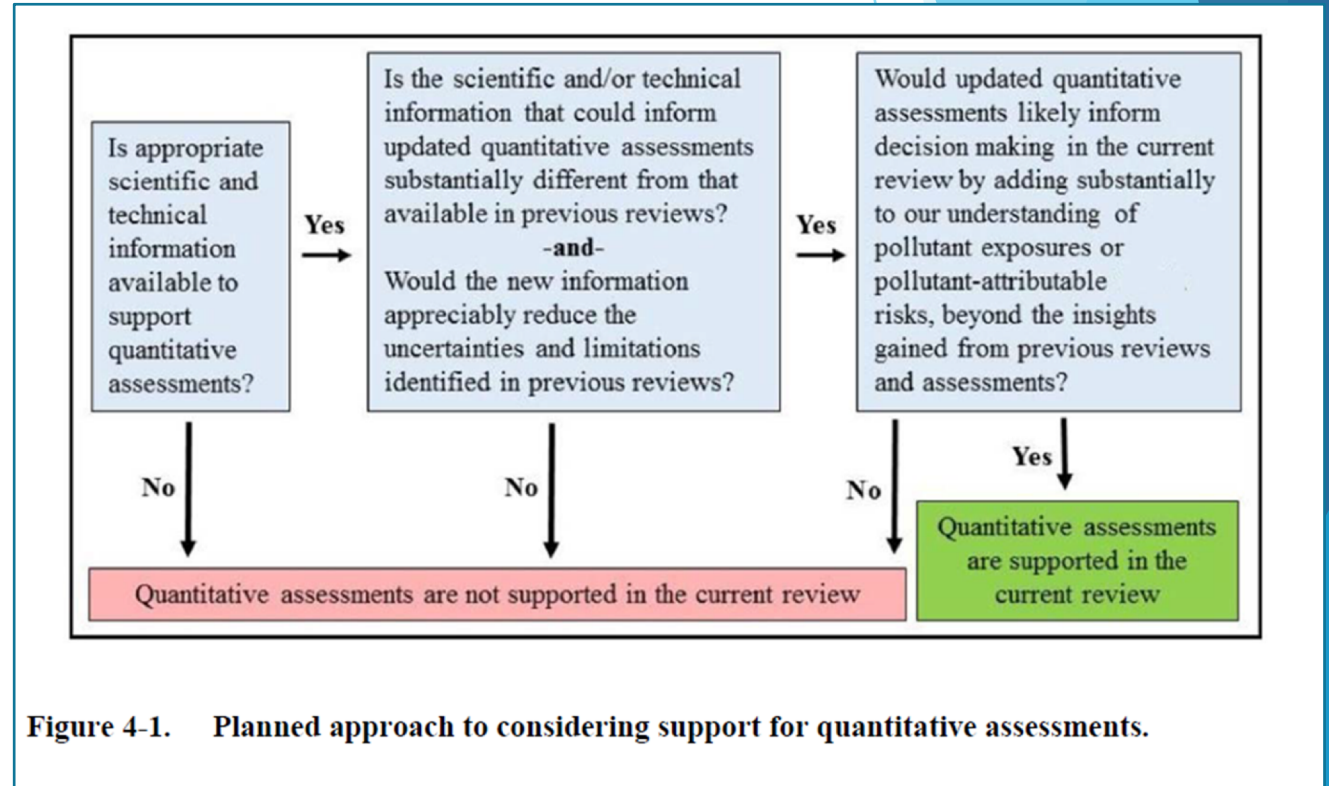


Figure 4-1. Planned approach to considering support for quantitative assessments.

Policy Assessment

- Transparent staff analysis for alternative standards; bridges the “gap” between science and policy
- Also facilitates CASAC’s role
- This includes indicator, averaging time, form, and level

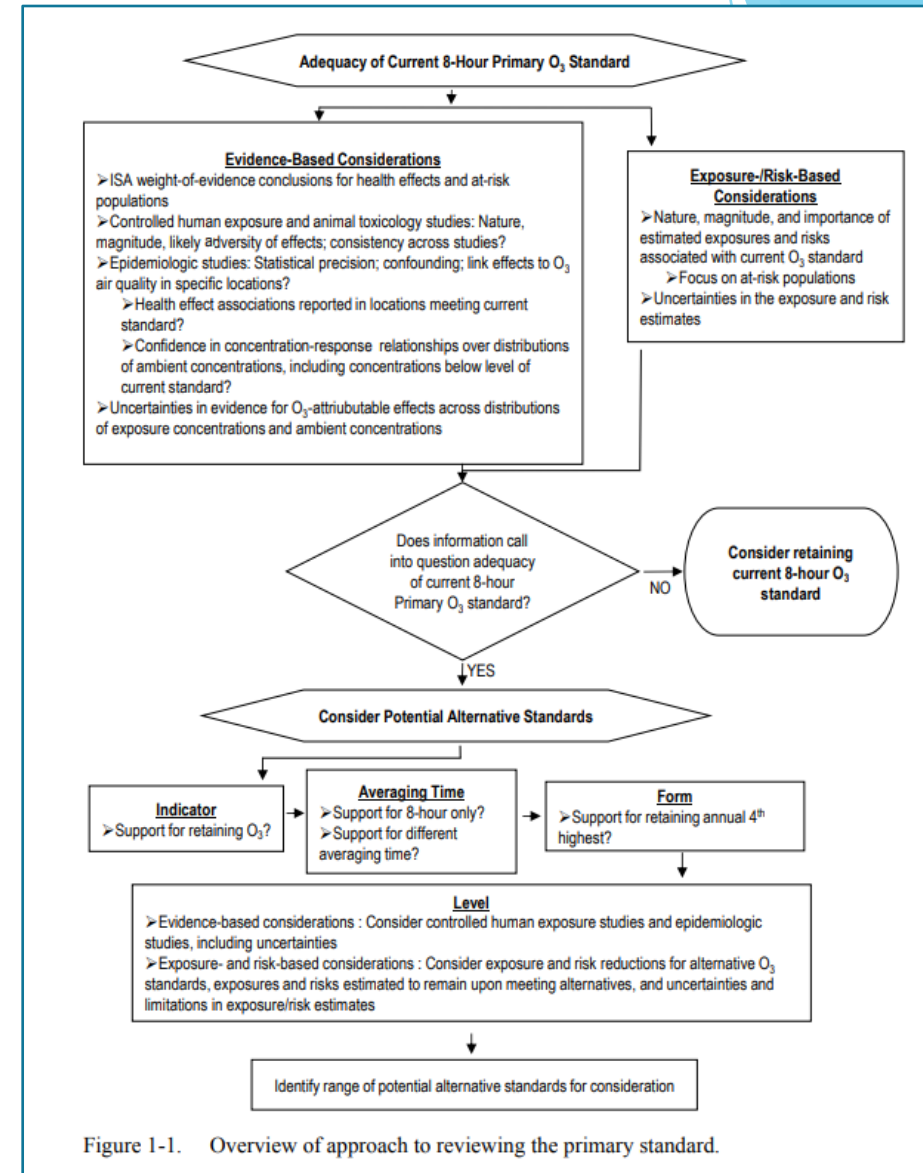
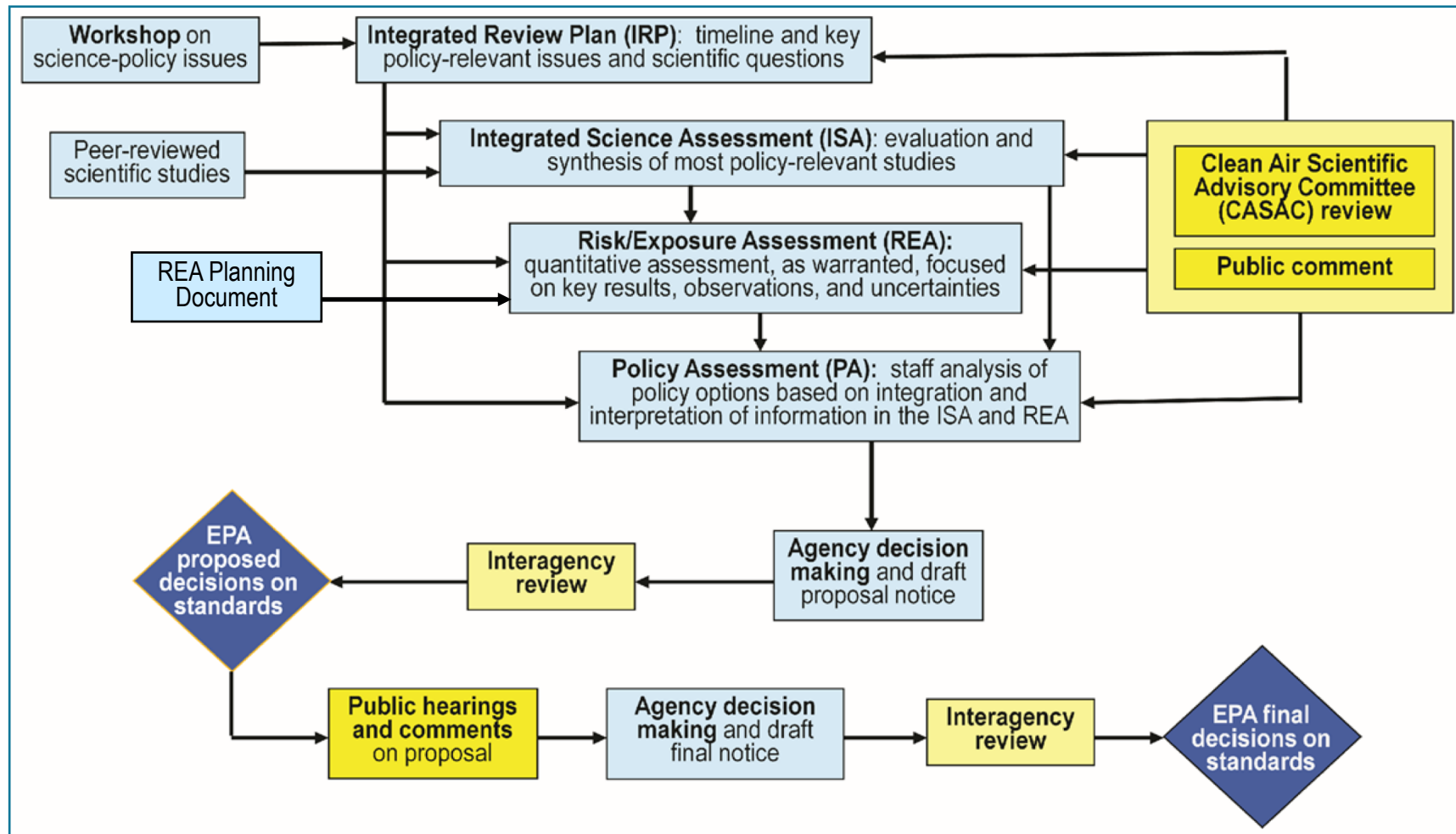


Figure 1-1. Overview of approach to reviewing the primary standard.

Rulemaking

- Taking into consideration the information in the ISA, REA(s), and PA and the advice of CASAC, EPA develops and publishes
- Notice of Proposed Rulemaking
 - Propose decisions based on consideration of staff conclusions in Policy Assessment and CASAC advice/recommendations.
 - Solicit public comment on proposed elements of NAAQS and alternatives, as appropriate.
 - Public comment period, including public hearing(s), follows publication of proposed rule.
- Final Rulemaking Notice
 - Final decisions take into account public comments on proposed rule.
 - Response-to-Comments document prepared/finalized in parallel with final rule.
- NAAQS rulemaking may be accompanied by or combined with rulemaking changes to monitoring, Air Quality Index (AQI), and/or implementation regulations.

Overview of Review Process for Ozone National Ambient Air Quality Standard (NAAQS)



SO₂ NAAQS Setting Timeline

Planning	Integrated Science Assessment	Risk/Exposure Assessment	Policy Assessment	CASAC Review	Rulemaking
Workshop: June 2014 IRP: October 2014	1 st draft: November 2015 2 nd draft: December 2016 Final: December 2017	Draft: August 2017 Final: May 2018	Draft: August 2017 Final: May 2018	Public Meeting: September 2017 Recommendation to the Administrator: April 2018	Proposed: June 8, 2018 Final: March 18, 2019

Ambient Air Quality Monitoring

Marta Fuoco

Environmental Scientist

U.S. EPA - Region 5

Fuoco.Marta@epa.gov



[Source: Minnesota 2019 Annual Network Plan]

Ambient Air Quality Monitoring

- Objectives of the National Ambient Air Quality Monitoring Network:
 - Protection of human health and welfare
 - Supports compliance with NAAQS
 - Provides timely and real-time air quality data to the public
 - Validates emissions models and verifying control strategies
 - Supports air pollution research studies
- Network Operators: Federal, state, local, and tribal (SLT) agencies

References: Air Pollution Training Institute ([APTI](#)), Ambient Monitoring Technology Information ([AMTIC](#))

Air Quality Monitoring and the NAAQS

- **CAA Section 319**
 - Requires an ambient air quality monitoring system throughout the U.S. to meet multiple objectives and provide recordkeeping with respect to such monitoring data
 - Supports periodic analysis and reporting to the general public by the Administrator with respect to air quality trends

40 CFR Parts 53 and 58

- The “Home” of requirements for:
 - Method approvals
 - Sampling frequency
 - Network design
 - Annual plans and network assessments
 - Monitoring location
 - Quality Assurance
 - Data reporting

Definitions

- **Monitor:** A device used to measure air quality, typically automated continuous gases like ozone, CO, SO₂, NO₂, and others
- **Sampler:** A device that supports manually operated, filter-based methods, typically for particles (PM and metals) and/or air toxics measurements
- **Station:** a physical monitoring location (with a building or platform) that houses monitors and samplers
- **Network:** A collection of monitoring stations of a given type or types

Networks

- SLAMS - State and Local Air Monitoring Station
- NATTS - National Air Toxics Trends Station
- NCore - National Core
- PAMS - Photochemical Assessment Monitoring Stations
- IMPROVE - Interagency Monitoring of Protected Visual Environments
- CSN/STN - Chemical Speciation Network/Speciation Trends Network
- SPM - Special Purpose Monitor
- CASTNet - Clean Air Status and Trends Network
- NADP - National Atmospheric Deposition Program
- Radnet - Radiation monitoring network

SLAMS Network

State and Local Air Monitoring Stations (SLAMS)

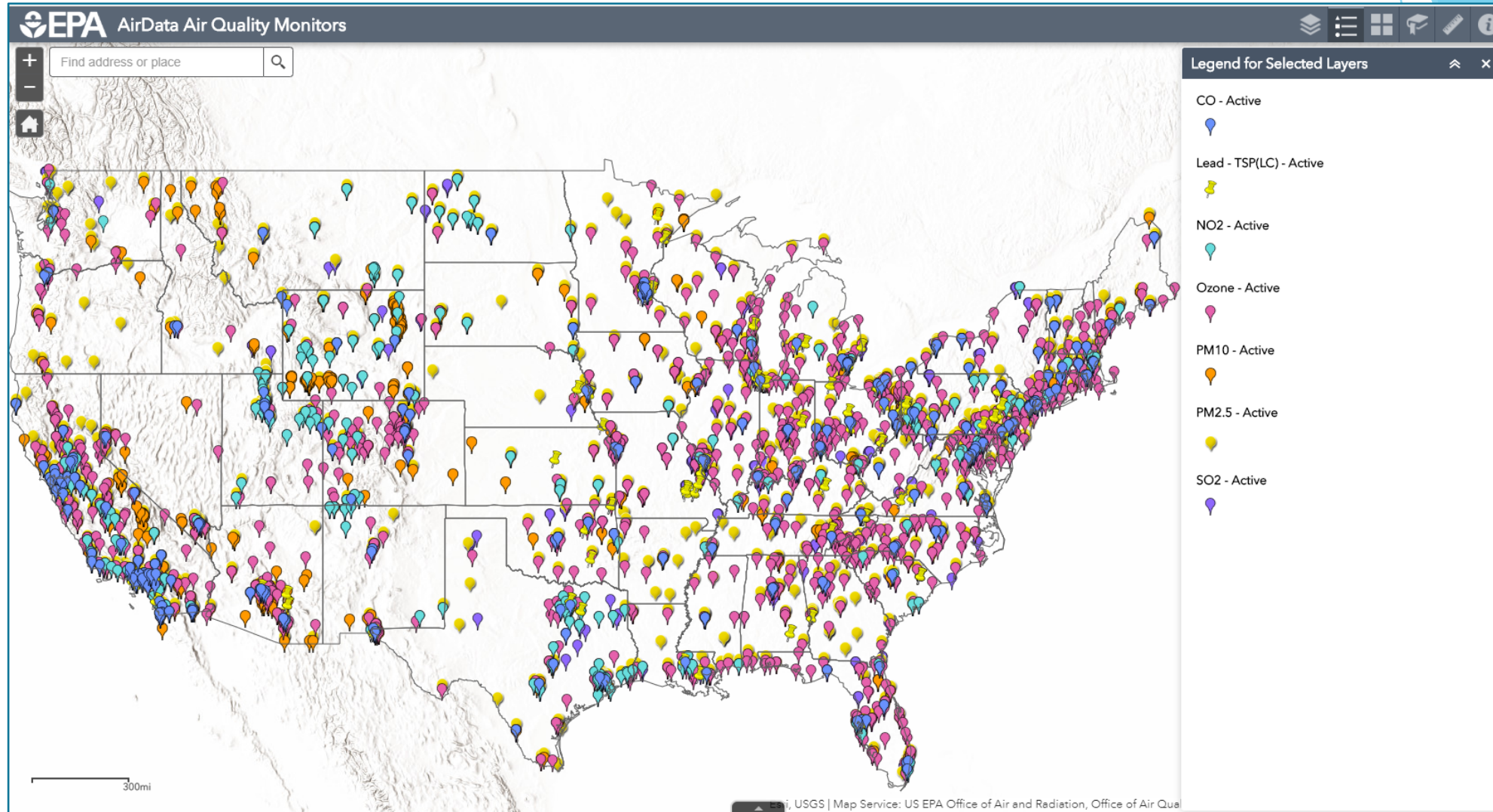
Objectives:

- Fulfills Code of Federal Regulations requirements outlined in 40 CFR Part 58 to demonstrate compliance with the NAAQS for different criteria such as:
 - Metropolitan or core based statistical areas (O_3 , $PM_{2.5}$, SO_2 , CO)
 - Facility emission based (Pb , SO_2)
 - Susceptible and vulnerable populations

Parameters Measured:

- Ozone, CO , SO_2 , NO_x
- PM_{10} and $PM_{2.5}$
- Lead (Pb) Monitoring
- Near-road CO , NO_2 , and $PM_{2.5}$ Monitoring
- Susceptible and Vulnerable Populations - NO_2 Monitoring
- Meteorological Measurements

SLAMS Criteria Pollutant Monitoring Sites



NATTS Network

National Air Toxics Trends Station (NATTS)

Objectives:

- Fulfills need for long-term hazardous air pollutant monitoring
- Assesses trends and emissions reduction program effectiveness
- Assesses and verifies air quality models

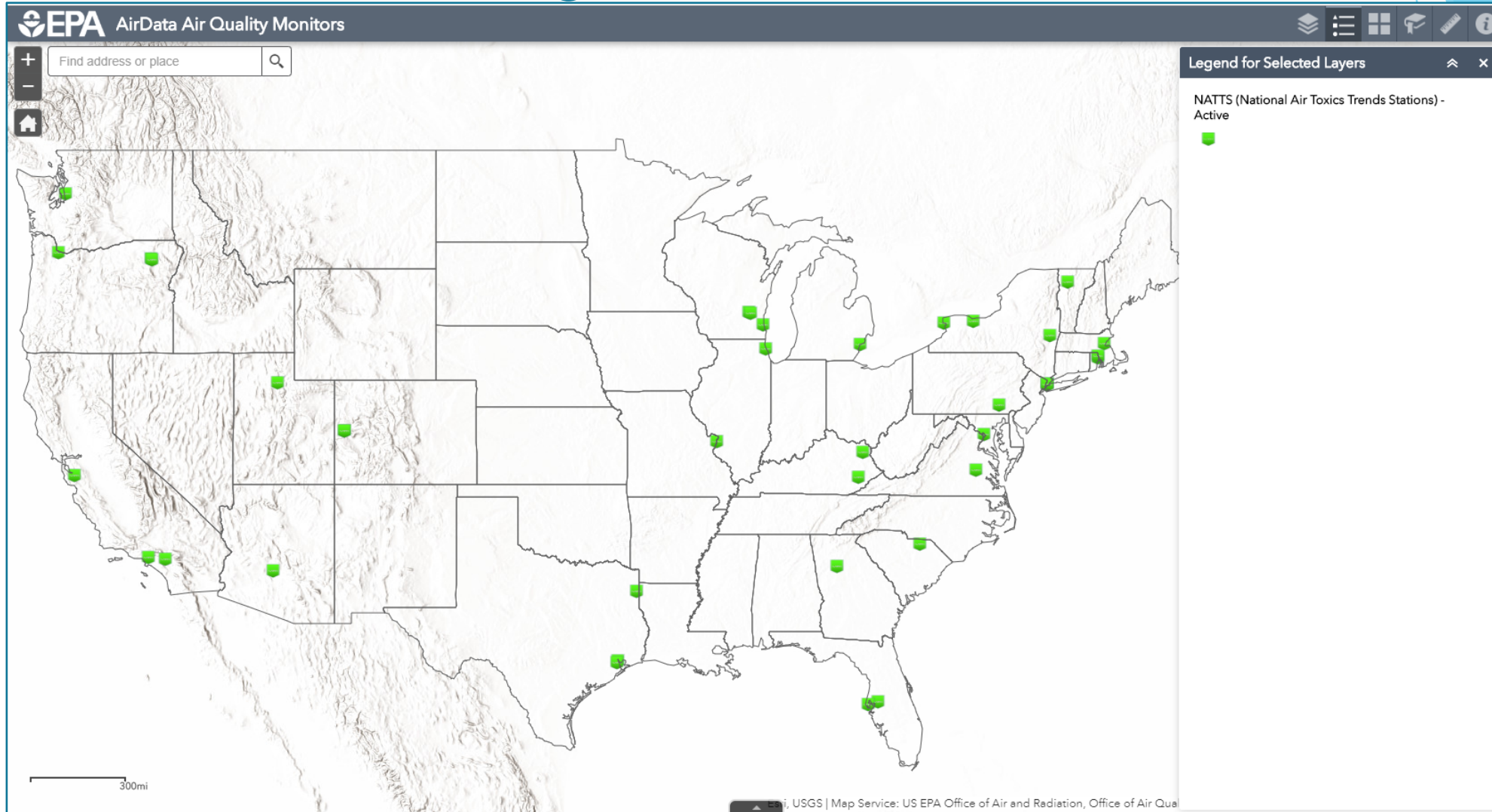
Information:

- Currently 31 sites
- Began in 2003

Parameters Measured:

- Typically over 100 pollutants measured, 19 required:
 - VOCs
 - Carbonyls
 - PM₁₀ metals
 - Hexavalent Chromium
 - Polyaromatic hydrocarbons

NATTS Monitoring Sites



NCore Network

National Core (NCore)

Objectives:

- Supports reporting of ambient air quality data reporting to public
- Supports development of emission strategies through air quality model evaluation
- Support for long-term health assessments that contribute to ongoing NAAQS reviews

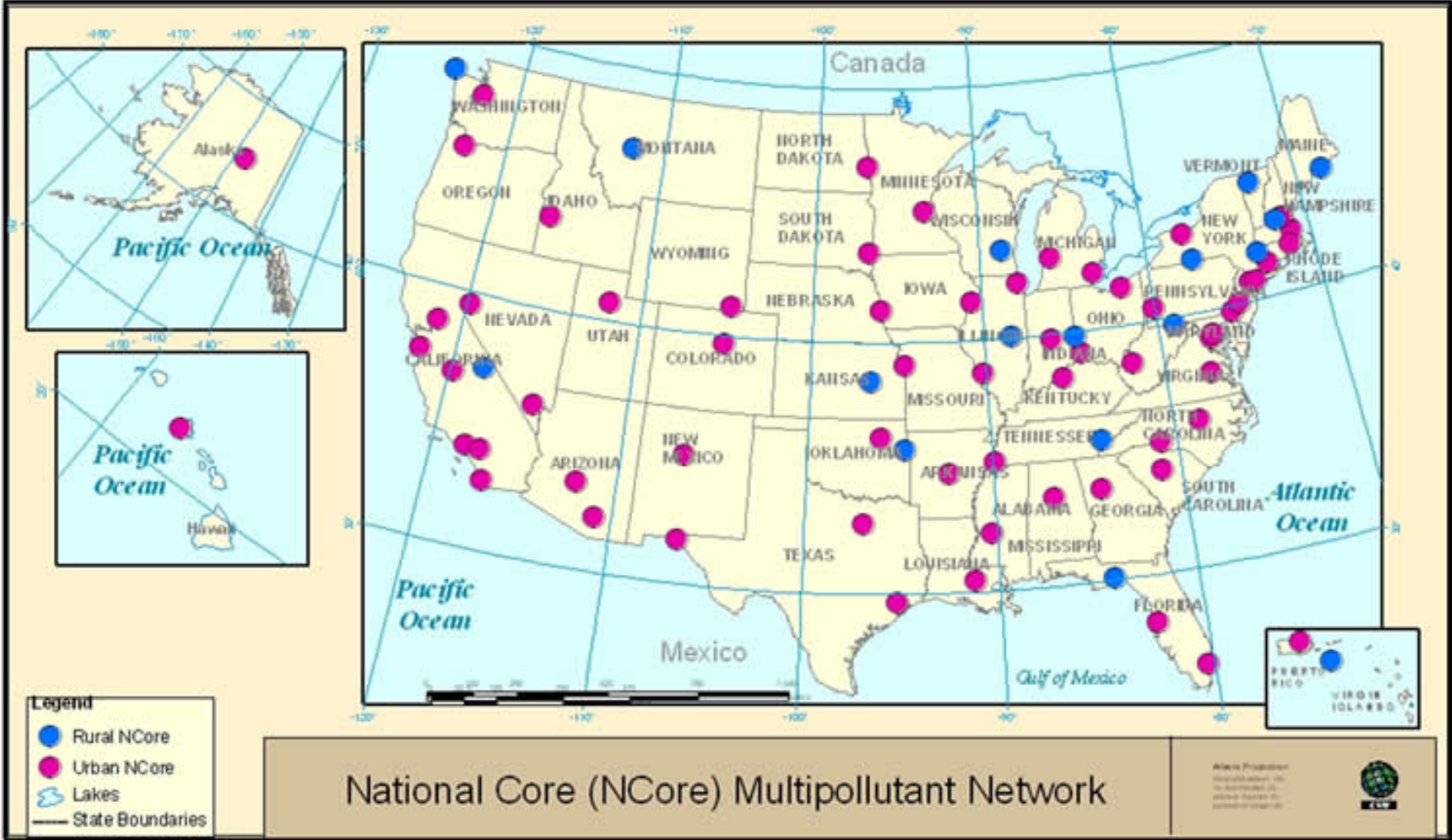
Information:

- Currently 58 sites
- Began in 2011

Parameters Measured:

- Multipollutant site:
 - $PM_{2.5}$ speciation, FRM mass, continuous
 - $PM_{(10-2.5)}$ mass
 - O_3 , CO, SO_2 , NO, total reactive nitrogen (NO_y)
 - Meteorological parameters

NCore Monitoring Sites



PAMS Network

Photochemical Assessment Monitoring Stations (PAMS)

- Provide database to evaluate tools for control strategies, cost-effectiveness, and pollutant transport
- Provide local, current meteorological and ambient air quality data for model evaluation
- Provide data to analyze emissions inventory issues and progress towards attainment

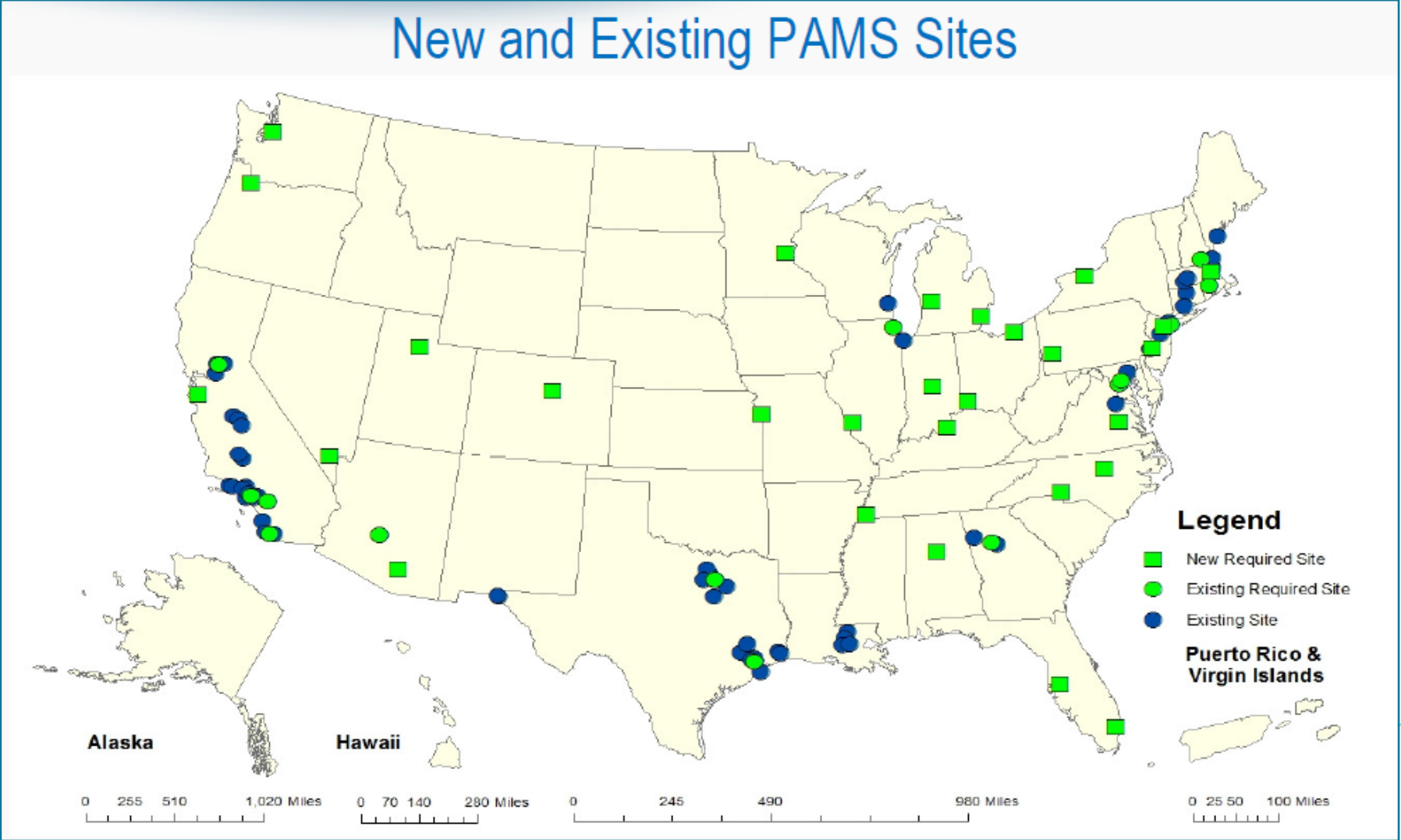
Information:

- Stationed in areas that are not attaining the O₃ standard
- 22 operating sites
- Began in 1994
- Currently undergoing re-engineering and will be fully implemented by 2021, will be collocated with NCore

Parameters Measured:

- Multipollutant site:
 - O₃, NO_y, true NO₂
 - VOCs
 - Carbonyls
 - Meteorological parameters (including upper air meteorology)

PAMS Monitoring Sites



Other Ambient Air Monitoring Networks

- **IMPROVE:** Collects visibility related data associated with Class I areas (i.e., national parks)
- **CSN/STN:** Component of the $PM_{2.5}$ national network to assess trends and chemical makeup of $PM_{2.5}$
- **SPM:** Special study monitors used by federal and SLT agencies
- **NADP:** Collaborative network to assess amounts, trends, and geographic distributions of acids, nutrients, and base cations in precipitation
- **CASTNet:** National network to assess trends in pollutant concentrations, atmospheric deposition, and ecological effects
- **Radnet:** Monitors nation's air, precipitation, and drinking water to track radiation in the environment

Documenting Network Changes

- 40 CFR 58.10 lists the requirements for documenting network changes in the Annual Monitoring Network Plan
- Must include all proposed changes due to NAAQS revisions or other reasons
- Must be made available for public inspection for at least 30 days prior to submissions to EPA, typically released for comment in *May*

Documenting Network Changes

- EPA Regional Administrator has 120 days to review and approve
- Always due to EPA by July 1 of each year
- Plan elements required to support NAAQS revisions will typically have specific due dates

Assessing Network Adequacy

- 40 CFR 58.10 also requires a network assessment every 5 years
- The assessment differs from an annual plan revision by including a more in-depth review of certain elements including:
 - Use of more advanced tools to review spatial and temporal trends in ambient data
 - Evaluation of new technologies
 - Exposure of sensitive individuals
 - Reliance of health studies on sites being proposed for discontinuing or relocation

Assessing Network Adequacy

- Network assessments are a particularly powerful tool to support monitoring network changes that are needed to respond to the recently rapid pace of NAAQS revisions
- In Region 5, the Lake Michigan Air Directors' Consortium (LADCO) organized the 2015 5-year network assessment and is planning on facilitating the 2020 assessment in conjunction with state agencies and US EPA

[LADCO 5-Year Network Assessments](#)

Monitor Siting Considerations

- Monitoring sites must be capable of informing managers about many things including:
 - Peak air pollution levels
 - Typical levels in populated areas
 - Air pollution transported into and outside of a city or region
 - Air pollution levels near specific sources

Monitor Siting Considerations

Six general classes of monitoring sites:

1. Sites located to determine the highest concentrations expected to occur in the area covered by the network
2. Sites located to measure typical concentrations in areas of high population density
3. Sites located to determine the impact of significant sources or source categories on air quality
4. Sites located to determine general background concentration levels
5. Sites located to determine the extent of regional pollutant transport among populated areas; and in support of secondary standards
6. Sites located to measure air pollution impacts on visibility, vegetation damage, or other welfare-based impacts

Reporting the Data

- 40 CFR 58.16 requires data reporting to the national database - the Air Quality System (AQS)
 - All ambient data and quality assurance data must be reported on a quarterly schedule within 90 days after the end of the quarterly reporting period. This applies to all SLAMS monitors and some special purpose monitors.
- 40 CFR 58.15 also requires a data certification letter from the senior air pollution official by May 1 of each year, attesting that the previous calendar year of data are accurate and complete, taking into account QA considerations
 - The certification process is intended to demonstrate to stakeholders that data have undergone final edits
- OAQPS typically waits for data to be certified before issuance of final Design Values (DVs) used for calculating violations of the NAAQS

Monitoring Quality Assurance Issues

- Appendix A of 40 CFR Part 58 contains QA requirements, including:
 - Quality system requirements
 - Data quality objectives
 - Performance of measurement quality checks, collocated sampling, and independent audits
 - Procedures for calculating measurement uncertainty (precision and bias)
 - Reporting requirements
- QA Handbook Volume 2: Ambient Air Quality Monitoring Program guidance document
 - Provides additional guidance and information beyond CFR requirements
 - Assist technical personnel at the SLT level in developing and implementing a quality system

Case Study: Ozone OIG Investigation

- EPA's Office of Inspector General (OIG) investigated QA practices by six air monitoring agencies in 2016-2017
- OIG concluded that air monitoring agencies' QA practices are not always implemented per EPA's recommended practices for validating ozone data
- This could reduce the quality of data that EPA uses to determine whether air is healthy to breathe during NAAQS designations
- OIG recommended further EPA guidance, oversight, auditing techniques, and verification that QA practices were being met for ozone and other criteria pollutant data

[OIG 2018 Report](#)

Monitor Design Values

- The NAAQS are defined by four parts:
 1. Indicator
 - e.g., ozone, $PM_{2.5}$
 2. Averaging period
 - e.g., 1 hour, 8-hours, 24-hours, annual
 3. Statistical form
 - e.g., three-year average of 4th highest daily maximum 8-hour concentration
 4. Level (the concentration)
 - e.g., 75 ppb, $12 \mu\text{g}/\text{m}^3$

Monitor Design Values

- The Design Value (DV) is a statistic that describes the air quality status of a given location relative to the level of the NAAQS
- The DV for an area is equal to the highest monitor-specific DV for all monitors in a nonattainment area (which could be a partial area, multi-county, or multi-state area) or in a MSA or CBSA for O₃ and PM_{2.5}

Monitor Design Values

- Design values are calculated by EPA each year for informational purpose, whether EPA is actually making an official determination or not.
 - See: www3.epa.gov/airtrends/values.html

The Designations Process

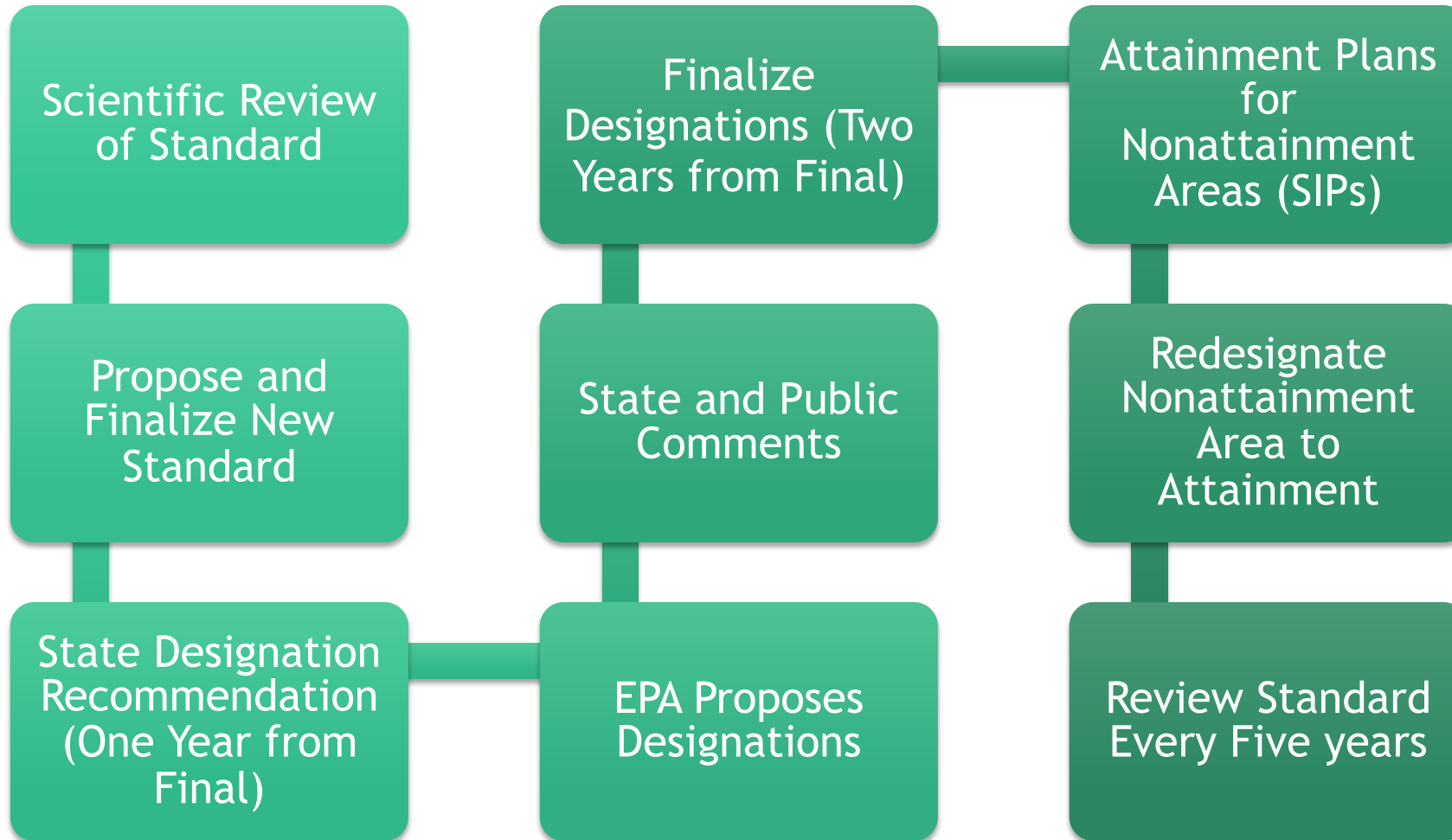
Eric Svingen

Environmental Engineer

U.S. EPA - Region 5

Svingen.Eric@epa.gov

The Designation Process



Types of area designations

- **Attainment**

- An area that meets the primary or secondary standard for a NAAQS

- **Nonattainment**

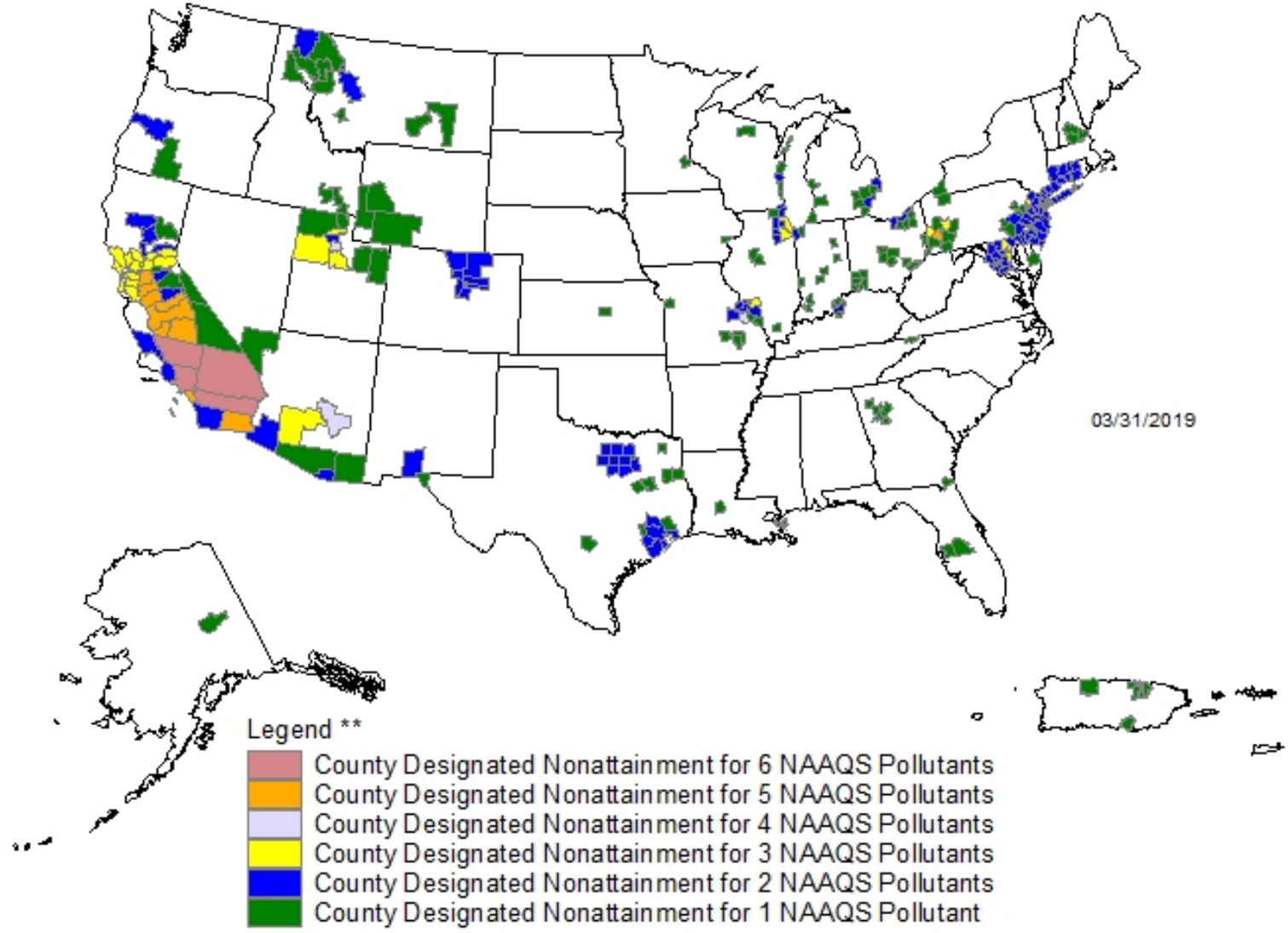
- An area that does not meet the primary or secondary standard for a NAAQS
- An area that contributes to air quality in a nearby area that does not meet the primary or secondary standard for a NAAQS

- **Unclassifiable**

- An area that cannot be classified on the basis of available information

Counties Designated "Nonattainment"

for Clean Air Act's National Ambient Air Quality Standards (NAAQS) *



The process under CAA 107(d)

- States and tribes submit to EPA a list of areas recommended as nonattainment, attainment, and unclassifiable
 - Deadline is one year from promulgation of a new or revised NAAQS
- EPA notifies states and tribes of modifications to their recommendations
 - Deadline is 120 days prior to final designations
- EPA makes final nonattainment designations
 - Deadline is two years from promulgation of a new or revised NAAQS
 - EPA may take one additional year, if available information is insufficient

EPA's five factor analysis

- Generally*, where there is a violating monitor, there is a nonattainment designation
- The extent of the area is determined using EPA's five factor analysis
 1. Air quality data
 2. Emissions and emissions-related data
 3. Meteorology
 4. Geography and topography
 5. Jurisdictional boundaries

*For SO₂, a violation may be modeled or monitored

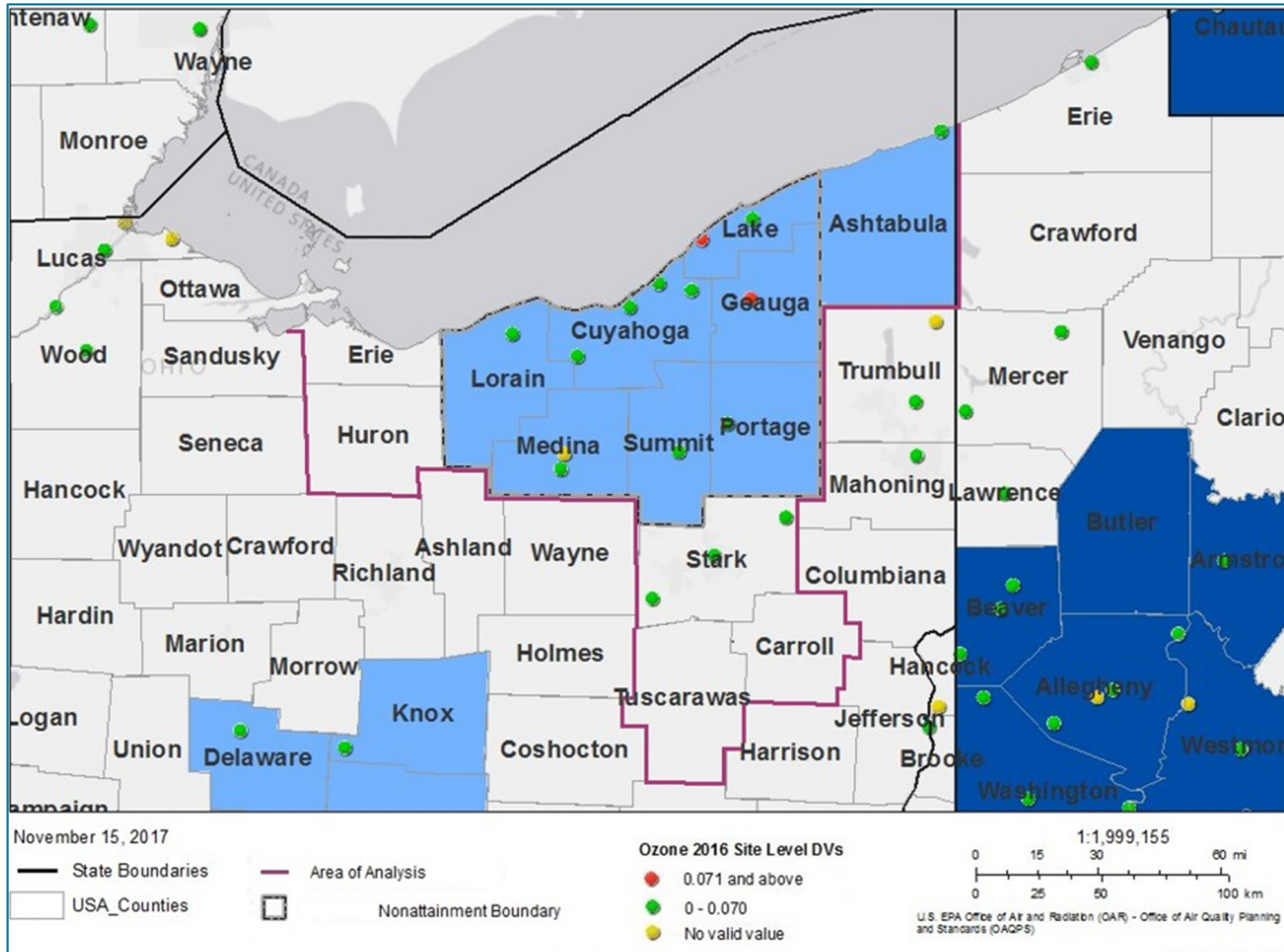
EPA's area of analysis

- For ozone and PM, the starting point for a contribution analysis is generally a census-defined statistical area
 - Metropolitan Statistical Area (MSA)
 - Core-Based Statistical Area (CBSA)
 - Combined Statistical Area (CSA)

Classifications

- For ozone and carbon monoxide (CO), initial classifications are assigned to nonattainment areas
- For the 2015 ozone standard
 - Marginal: 71ppb to 80 ppb
 - Moderate: 81 ppb to 92 ppb
 - Serious: 93 ppb to 104 ppb
 - Severe-15: 105 ppb to 110 ppb
 - Severe-17: 111 ppb to 162 ppb
 - Extreme: 163 ppb and above
- Areas that fail to attain can be bumped-up to higher classifications

Example: Cleveland for the 2015 ozone NAAQS



Getting to the 5-factor analysis

- **Monitoring data**
 - One violating monitor in Geauga County
 - One violating monitor in Lake County
- **Area of analysis**
 - Geauga and Lake are in the Cleveland CSA

Considering the state recommendation

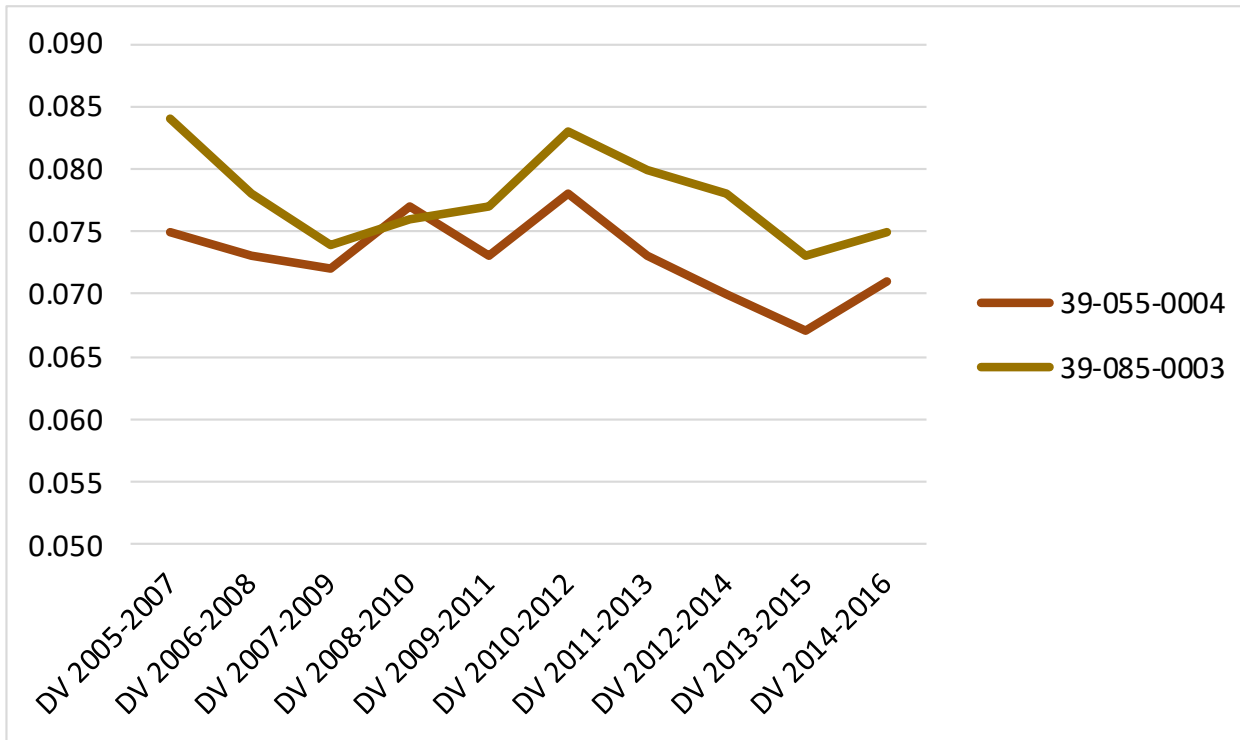
- Ohio recommended seven counties for a nonattainment area
 - Cuyahoga
 - Geauga
 - Lake
 - Lorain
 - Medina
 - Portage
 - Summit

EPA's five factor analysis

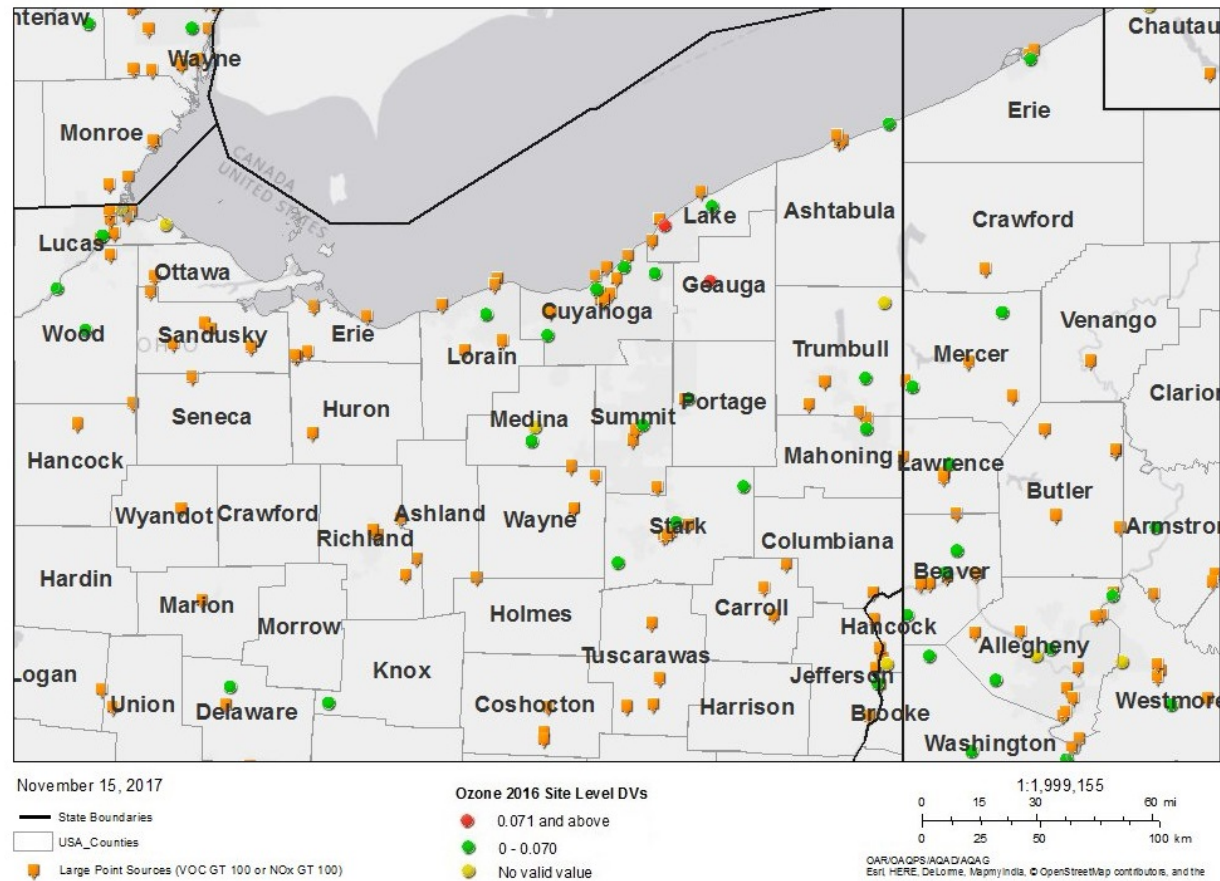
1. Air quality data
2. Emissions and emissions-related data
3. Meteorology
4. Geography and topography
5. Jurisdictional boundaries

1. Air quality data

- Three year design values for violating monitors



2. Emissions and emission-related data

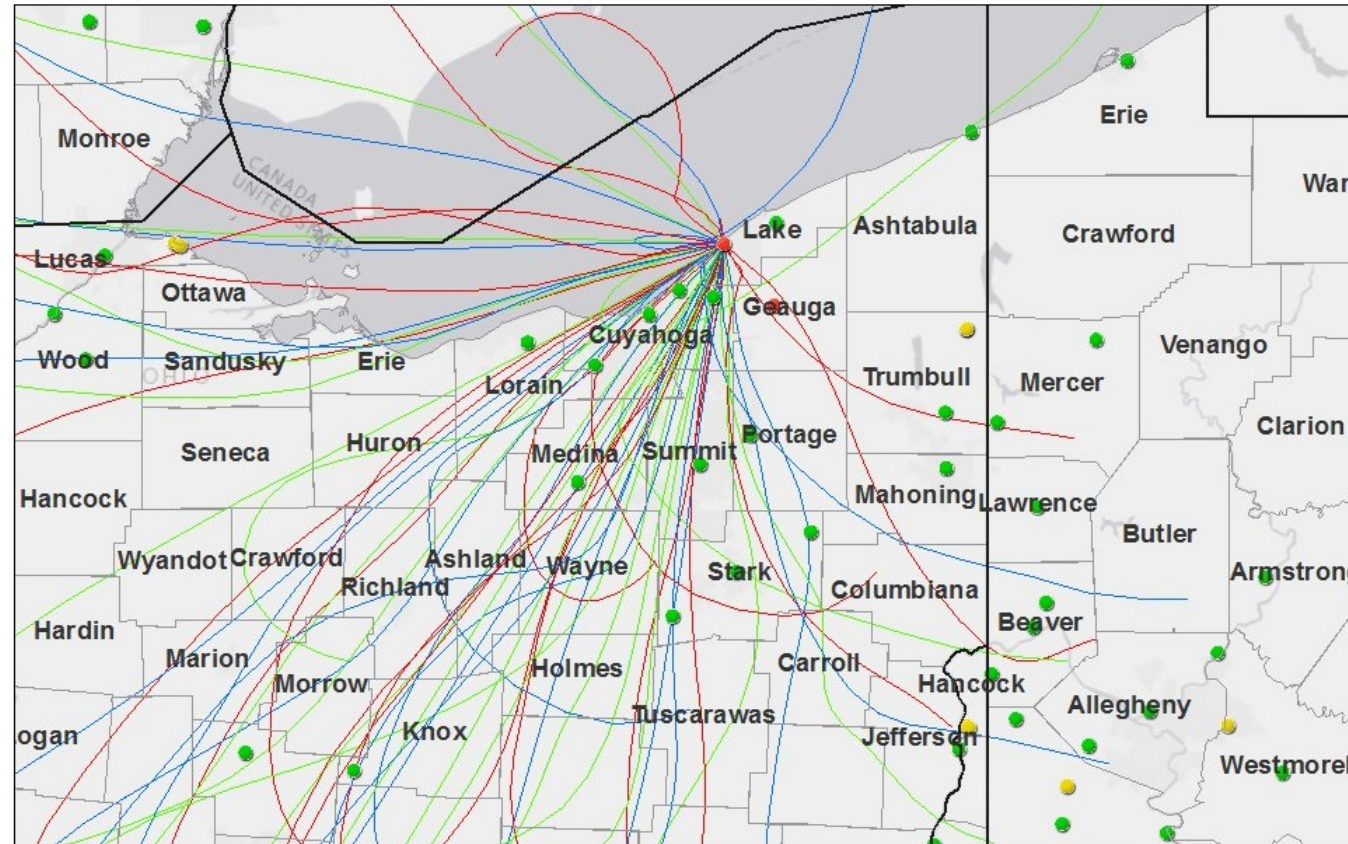


Office of Air and Radiation (OAR) - Office of Air Quality Planning and Standards (OAQPS), U.S. Census Bureau | Map Service: USEPA Office of Environmental Information (OEI), Data: USEPA Office of Environmental Information (OEI), U.S. Census Bureau | Source: U.S. Census Bureau | Web App Builder for ArcGIS

2. Emissions and emission-related data

- Emissions from large point sources
- County-level NO_x and VOC emissions
- Population density and degree of urbanization
- Population and growth
- Traffic and vehicle miles traveled (VMT)
- Traffic and commuting patterns

3. Meteorology



December 4, 2017

Site level DVs

- Violating
- Attaining
- Incomplete

Cleveland_OH_390850003

- 100
- 500
- 1,000

0 15 30 60 mi

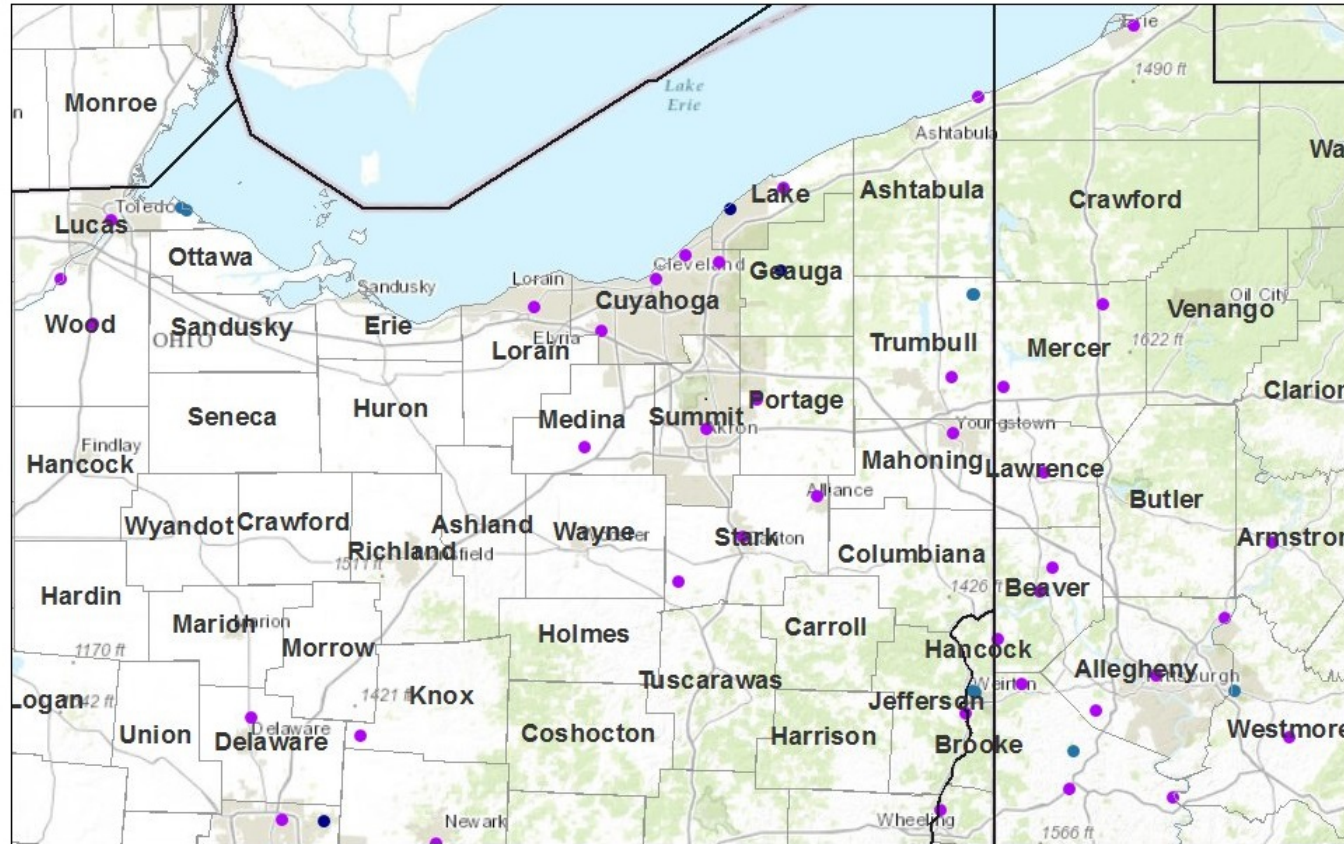
0 25 50 100 km

1:2,022,267

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Web App Builder for ArcGIS
 Air and Radiation (OAR) - Office of Air Quality Planning and Standards (OAQPS), U.S. Census Bureau | Map Service: USEPA Office of Environmental Information (OEI), Data: USEPA Office of Environmental Information (OEI), US Census Bureau | Source: U.S. Census Bureau |

4. Geography and topography

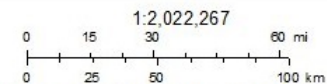


March 29, 2017

State Boundaries
 USA_Counties

Ozone 2016 Site Level DVs (preliminary)

- Violating
- Attaining
- Incomplete



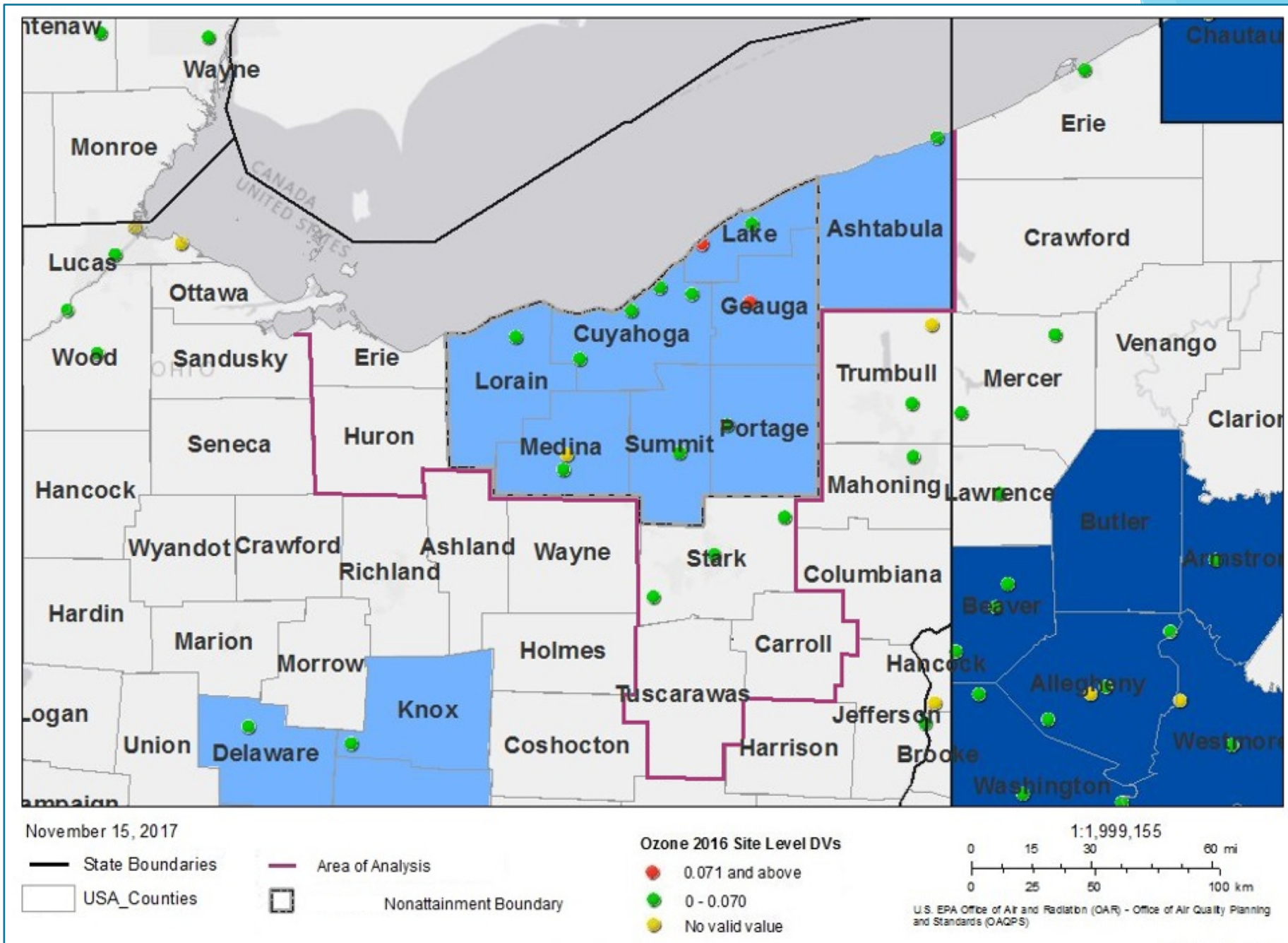
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, Geobase, IGN, Kadaster NL, Ordnance Survey,

Web AppBuilder for ArcGIS

and Standards (QAQS), U.S. Census Bureau | Map Service: USEPA Office of Environmental Information (OEI), Data: USEPA Office of Environmental Information (OEI), US Census Bureau | Source: U.S. Census Bureau | Esri, HERE, Garmin, FAO, USGS, NGA, EPA, NPS |

5. Jurisdictional boundaries

- Boundaries for previous standards
- Air districts
- Metropolitan planning organizations



Intended and final designations

- EPA publishes 120-day letters
 - EPA agrees with Ohio that the nonattainment area should be the recommended area of seven counties
- EPA takes comments
- EPA finalizes designations
 - EPA finalizes the same area of seven counties

CAA NAAQS Implementation Timeline

From Date of Promulgation	
2 years	With input from States and Tribes, EPA designates areas
3 years	All States submit Infrastructure SIPS
From Date of Nonattainment Designation	
18 months	SIPs for areas designated as nonattainment for SO ₂ , NO ₂ , PM _{2.5} , PM ₁₀ , and Lead are due
3 years	SIPs for Ozone and CO nonattainment areas are due
5 years	Areas must be attaining the SO ₂ , NO ₂ , and Lead NAAQS
5-10 years	Areas must be attaining the PM _{2.5} and PM ₁₀ NAAQS (varies on severity)
3-20 years	Areas must be attaining Ozone NAAQS (varies from Marginal - Extreme)

Example NAAQS Implementation Timeline

Timeline for Implementing the PM_{2.5} Standards

Date	Action
February 2004*	State designation recommendations to EPA
June 28- 29, 2004	EPA letters to States responding to PM _{2.5} designation recommendations
December 2004	EPA finalizes designations
February 2005	EPA proposes implementation rule
Early 2006	EPA finalizes PM _{2.5} implementation rule
April 2008	State implementation plans due
Up to April 2010 with extension up to 2015 possible	Attainment dates for nonattainment areas (based on the previous 3 years of monitoring data)

* Consolidated Appropriations Bill of FY2004 requires designations by 12/31/04. SIP due dates for PM_{2.5} and regional haze are 3 years from effective date of PM_{2.5} designations.

Attainment Planning Requirements

Kathleen D'Agostino

Environmental Engineer

U.S. EPA - Region 5

Dagostino.Kathleen@epa.gov

Nonattainment Areas

- Requirements for nonattainment areas are linked to the date of designation
- Areas are required to attain NAAQS within a specified time period (attainment date)
- States are required to submit specific State Implementation Plan elements with the goal of bringing the area to attainment by the attainment date
 - Control measures, *e.g.*, rules, administrative orders, etc.
 - Nonregulatory components, *e.g.*, emissions inventory, attainment demonstration, etc.

CAA Title I Part D

The Nonattainment Area (NAA) SIPs

- Subpart 1 (Section 172): General provisions
- Subpart 2 (Section 182): Ozone
- Subpart 3 (Section 187): Carbon Monoxide
- Subpart 4 (Section 189): Particulate Matter
- Subpart 5 (Section 191): SO_x/NO_x/Pb SIP

Subpart 1 Nonattainment Provisions

- Applies to all pollutants unless superseded by a pollutant-specific requirement
- Establishes an attainment date of 5 years from designation
- Administrator has discretion to extend up to 10 years from designation considering severity of problem and availability/feasibility of control measures
- SIPs are due no later than 3 years after designation
- SIP requirements are listed under section 172(c) and include the following...

Subpart 1 Nonattainment Provisions

Emissions Inventories & RFP

- **Emission Inventories**
 - A comprehensive, current inventory of actual emissions from all sources of the relevant pollutant (and/or precursors) in the area
- **Reasonable Further Progress (RFP)**
 - Annual incremental emissions reductions of relevant pollutants for the purpose of attaining the NAAQS by the applicable attainment date

Subpart 1 Nonattainment Provisions

Reasonably Available Control Measures (RACM)

- **RACM - requires a demonstration that:**
 - State has adopted all reasonable measures to meet RFP requirements and to demonstrate attainment as expeditiously as practicable
 - No additional measures that are reasonably available will advance the attainment date or contribute to RFP for the area.
- **At a minimum, RACM includes Reasonably Available Control Technology (RACT)**

Subpart 1 Nonattainment Provisions

RACM/RACT (cont.)

- **RACT**
 - Applies to existing sources
 - The lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility

Subpart 1 Nonattainment Provisions

Attainment Demonstration

- Demonstrate how the emissions control strategies proposed by a State will lead to attainment of the NAAQS
- Primarily a modeling exercise that simulates the changes in air quality that will result from the implementation of emissions controls

Subpart 1 Nonattainment Provisions

Contingency Measures

- NAA SIPs must provide for the implementation of measures if an area fails to attain the NAAQS or make RFP
- Contingency measures shall take effect without further action by the State or EPA

Subpart 1 Nonattainment Provisions

Nonattainment New Source Review (NSR)

- Requires the implementation of a nonattainment NSR permitting program in the nonattainment area

Subpart 2

Ozone Nonattainment Provisions

- In addition to being designated, ozone areas are classified based on the severity of their ozone levels
- Ozone nonattainment areas with lower classifications have fewer and/or less stringent mandatory air quality planning and control requirements and less time to attain than those in higher classifications

Subpart 2

Ozone Nonattainment Provisions (cont.)

- Ozone classifications and associated attainment dates
 - Marginal - 3 years after designation
 - Moderate - 6 years after designation
 - Serious - 9 years after designation
 - Severe - 15 - 17 years after designation
 - Extreme - 20 years after designation

		NSR Offset Ratio	Major Source Threshold	
EXTREME (20 years to attain)	TRAFFIC CONGESTION CONTROLS (if appropriate)	1.5 : 1 Extreme	10 tpy	
	CLEAN FUELS REQUIREMENT FOR BOILERS			
SEVERE (15/17 years to attain)	PENALTY FEE PROGRAM FOR MAJOR SOURCES	1.3 : 1 Severe	25 tpy	
	LOW VOC REFORMULATED GAS (as appropriate)			
	VMT GROWTH DEMONSTRATION (& TCMs if needed)			
SERIOUS (9 years to attain)	VMT DEMONSTRATION (& TCMs if needed)	1.2 : 1 Serious	50 tpy	
	NSR REQUIREMENTS FOR EXISTING SOURCE MODS			
	CLEAN FUELS PROGRAM (if applicable)			
	MODELED DEMO OF ATTAINMENT			MILESTONE DEMONSTRATIONS and CONTINGENCY MEASURES FOR RFP
	3% ANNUAL RFP UNTIL ATTAINMENT			ENHANCED I/M for larger population areas
	CONTINGENCY MEASURES FOR FAILURE TO ATTAIN			ENHANCED MONITORING PLAN
MODERATE (6 years to attain)	Stage II Gasoline Vapor Recovery	1.15 : 1 Moderate	100 tpy	
	BASIC VEHICLE I/M for larger population areas			
	15% VOC ROP or 15% VOC/NOx RFP (OVER 6 YEARS)			
	VOC/NOx RACT for MAJOR/CTG SOURCES			ATTAINMENT DEMONSTRATION
MARGINAL (3 years to attain)	NONATTAINMENT NEW SOURCE REVIEW PROGRAM	1.1 : 1 Marginal	100 tpy	
	BASELINE EMISSION INVENTORY (EI)			PERIODIC EMISSION INVENTORY UPDATES

NOTE: Transportation and General Conformity apply in all ozone nonattainment areas.

Subpart 2 - Ozone

Marginal

- “Base year” emission inventory - 2 years after designation and “periodic emission” inventories every 3 years beginning 5 years after designation and continuing until redesignation
- Emission statements - 2 years after designation
- Major source - 100 tons per year (tpy)
- Nonattainment NSR, 1.1 to 1 offsets

Subpart 2 - Ozone

Moderate

- All marginal SIPs
- VOC and NO_x RACT - 2 years after designation
- 15% RFP plan - 3 years after designation
- RACM - 3 years after designation
- Attainment demonstration - 3 years after designation
- Basic Vehicle Inspection and Maintenance (I/M) - 3 years after designation
- Nonattainment NSR, 1.15 to 1 offsets

Subpart 2 - Ozone

Serious

- All moderate SIPs
- Modeled demonstration of attainment - 4 years after designation
- 3% annual RFP until attainment - 9% RFP plan due 4 years after designation
- Enhanced I/M - 2 years after designation
- Enhanced monitoring - 18 months after designation
- Emissions reduction milestones = 6 years after designation and every 3 years thereafter
- Compliance demonstration = 90 days after milestone date
- Major source threshold 50 tpy (affects RACT and nonattainment NSR)
- Nonattainment NSR revisions and 1.2:1 offsets