Air Quality Monitoring, Modeling and Other Technical Updates

AAPCA Spring Meeting
April 29, 2022

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Ambient Monitoring Updates

Source: GAO File Photo.

Ambient Air Monitoring Topics

- American Rescue Plan for Ambient Air Monitoring
- Government Accountability Office (GAO) Report Response (Asset Management & Modernization)
- PM NAAQS Reconsideration and Ambient Air Monitoring
- National Ambient Air Monitoring Conference – August 2022
- Air Toxics Monitoring
- PAMS
- CY2021 Data Certification
- Ozone Absorption Cross Section Change
- Ambient Air - Protocol Gas Verification Program (AA-PGVP)
- Revised Ozone Photometer TAD Status

American Rescue Plan – Status Update

- Competitive Grant ($20M)
  - December 13, 2021 - Request for Applications (RFA) Opened
  - March 25, 2022 - RFA Closed; > 200 proposals received
  - August-September 2022- Anticipated Notification of Selection
  - October-November 2022- Anticipated Awards
- Direct Awards ($22.5M)
  - Direct award funding from the ARP is being used to address health outcome disparities from pollution and the COVID-19 pandemic.
  - Grants will be awarded to state, Tribal and local air agencies to enable continuous monitoring of fine particle pollution (PM2.5) and replace other aging air monitoring equipment.
  - Regional offices will work with SLTs in the coming months on the grant award process.
- Regional Office Short-term Community Monitoring Projects ($5M)
  - EPA Regions are working on developing sensor loan programs and mobile monitoring platforms.

https://www.epa.gov/arp

Government Accountability Office (GAO) Report – EPA Response

- GAO report titled *Air Pollution: Opportunities to Better Sustain and Modernize the National Air Quality Monitoring System* (GAO-21-38) released November 2020 (https://www.gao.gov/products/gao-21-38)
  - Two key recommendations focused on asset management and modernization.
  - EPA committed to address each recommendation in coming years.
  - Asset management is being addressed first, with modernization to follow.
  - Examples of modernization are not just technology based, and include:
    - Increasing local-scale, real-time air quality data availability
    - Increasing air toxics monitoring capabilities and coverages
    - Addressing persistent and complex pollution (e.g., wildfires)
    - Evaluate increased use of low-cost sensors and satellite data
  - Each issue requires significant engagement and buy-in by state, local, and tribal air agencies as well as federal and other partners.
  - Funding is also a key consideration for success.

November 2020

AIR POLLUTION

Opportunities to Better Sustain and Modernize the National Air Quality Monitoring System

GAO Highlights

Highlights of GAO-21-38, a report to congressional requesters

Why GAO Did This Study

The national ambient air quality monitoring system shows that the United States has made progress in reducing air pollution but that risks to public health and the environment continue in certain locations. The system consists of sites that measure air pollution levels around fixed locations across the country using specific methods. Since the system began in the 1970s, air quality concerns have changed—such as increased concern about the health effects of air toxics.

GAO was asked to evaluate the national air quality monitoring system. This report examines the role of the system and how it is managed, challenges in managing the system and actions to address them, and needs for additional air quality information and actions to address challenges in meeting those needs.

GAO reviewed literature, laws, and agency documents; conducted a demonstration of low-cost sensors; and interviewed EPA officials, selected state and local officials, representatives from air quality associations, and stakeholders.

What GAO Recommends

GAO is making two recommendations for EPA to (1) establish an asset management framework for the monitoring system that includes key characteristics and (2) develop an air quality monitoring modernization plan that aligns with leading practices. In written comments on the report, EPA generally agreed with the recommendations.

View GAO-21-38. For more information, contact J. Alfredo Gómez at (202) 512-3841 or gomezj@gao.gov.

What GAO Found

The ambient air quality monitoring system is a national asset that provides standardized information for implementing the Clean Air Act and protecting public health. The Environmental Protection Agency (EPA) and state and local agencies cooperatively manage the system, with each playing different roles in design, operation, oversight, and funding. For example, EPA establishes minimum requirements for the system, and state and local agencies operate the monitors and report data to EPA.

Officials from EPA and selected state and local agencies identified challenges related to sustaining the monitoring system. For example, they said that infrastructure is aging while annual EPA funding for state and local air quality management grants, which cover monitoring, has decreased by about 20 percent since 2004 after adjusting for inflation (see fig.). GAO found inconsistencies in how EPA regions have addressed these challenges. GAO's prior work has identified key characteristics of asset management, such as identifying needed resources and using quality data to manage infrastructure risks, which can help organizations optimize limited resources. By developing an asset management framework that includes such characteristics, EPA could better target limited resources toward the highest priorities for consistently sustaining the system.

Annual Inflation-Adjusted EPA Funding for State and Local Air Quality Management Grants

Real value fiscal year 2019 dollars (in millions)

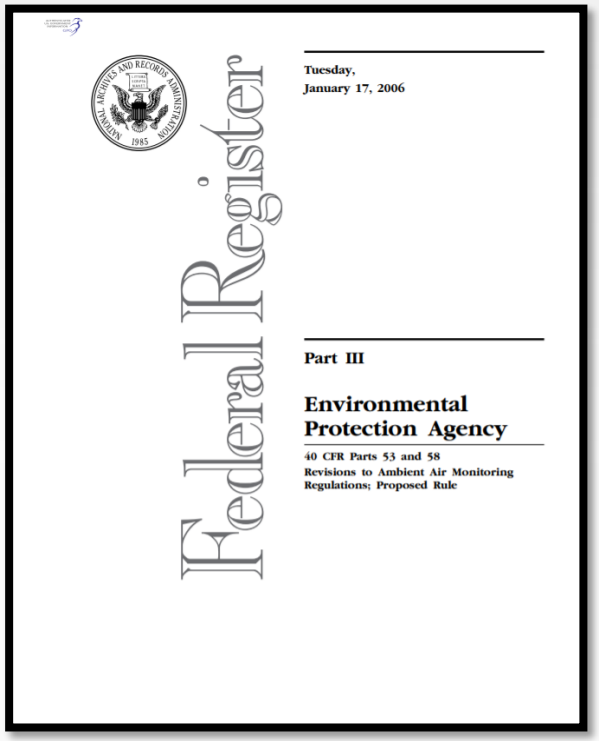
Source: GAO analysis of Environmental Protection Agency and U.S. Department of Commerce, Bureau of Economic Analysis, data. | GAO-21-38

Air quality managers, researchers, and the public need additional information so they can better understand and address the health risks from air pollution, according to GAO's review of literature and interviews GAO conducted. These needs include additional information on (1) air toxics to understand health risks in key locations such as near industrial facilities; and (2) how to use low-cost sensors to provide real-time, local-scale air quality information. EPA and state and local agencies face persistent challenges meeting such air quality information needs, including challenges in understanding the performance of low-cost sensors. GAO illustrated this challenge by collecting air quality data from low-cost sensors and finding variability in their performance. EPA has strategies aimed at better meeting the additional air quality information needs of managers, researchers, and the public, but the strategies are outdated and incomplete. For example, they do not clearly define roles for meeting additional information needs. GAO's prior work on asset management suggests that a more strategic approach could help EPA modernize the system to better meet the additional information needs. By developing a modernization plan that aligns with leading practices for strategic planning and risk management, such as establishing modernization goals and roles, EPA could better ensure that the system meets the additional information needs of air quality managers, researchers, and the public and is positioned to protect public health.

United States Government Accountability Office

PM NAAQS Reconsideration and Ambient Air Monitoring

- EPA continues to work on reconsideration of the particulate matter (PM) National Ambient Air Quality Standards (NAAQS).
- Two important monitoring related topics we are working on:
  - How to improve FEM/FRM comparability
  - $PM_{2.5}$ network design and relationship to environmental justice
- Our technical staff have had several calls over the winter with SLTs on these and additional technical topics to help improve the clarity, fixing any issues, and putting current practices into regs, where appropriate.
- Additional technical topics include:
  - Data calculations
  - Reference and Equivalent Methods
  - Quality Assurance and Quality Control
  - PM10 topics that are technical in nature and could be considered without affecting the PM10 NAAQS
  - Probe and Siting Criteria in Appendix E


Federal Register

Tuesday,
January 17, 2006

Part III

Environmental Protection Agency

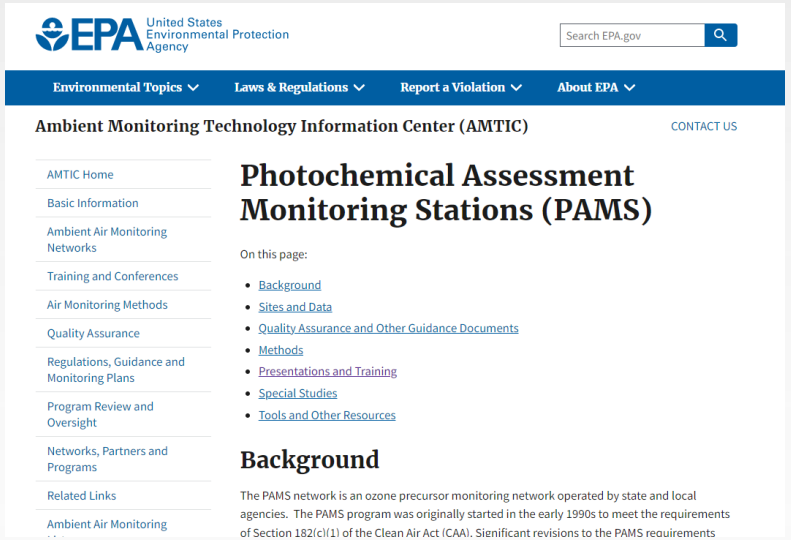
40 CFR Parts 53 and 58
Revisions to Ambient Air Monitoring Regulations; Proposed Rule

Preparing for 2022 National Ambient Air Monitoring Conference

- This conference routinely occurs every 2 years.
  - Draws upwards of 700 attendees from federal, state, local, and tribal government organizations, plus industry, instrument manufacturers and vendors, academics, and other air quality management professionals.
  - Considered a highly valuable activity to provide training, interactivity and networking, and critical informational updates on all things ambient air monitoring.
- 2020 iteration was cancelled/postponed due to COVID.
- Save the Date! August 22 – 25, 2022 in Pittsburgh, PA.
  - Planning to be fully in-person conference.
  - Call for papers closed April 1, 2022.
  - Tentative Agenda expected in May 2022.

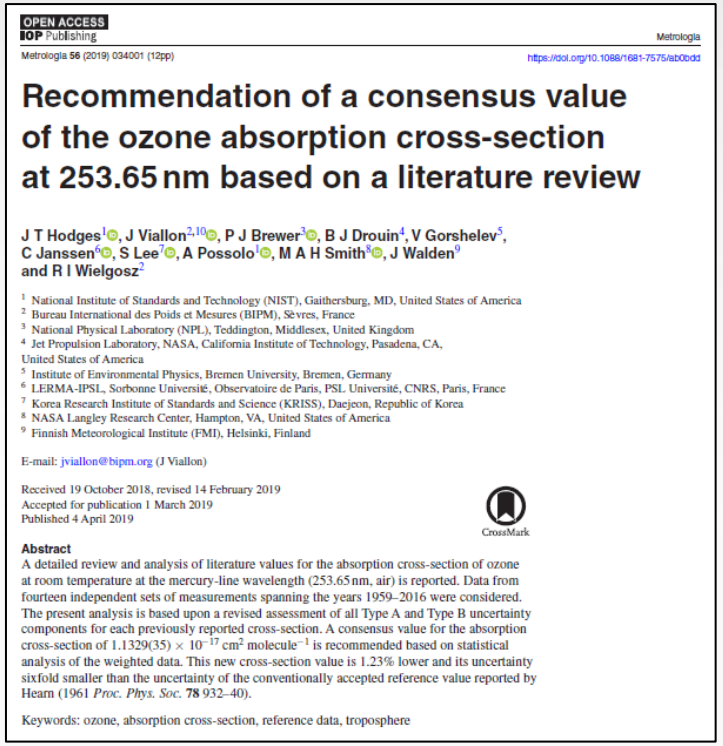
PAMS Update

- 2021 PAMS Season
  - First PAMS required year of operation included some challenges
    - COVID caused delays in equipment installations, site support, and training
    - Equipment issues (particularly noted with the CAS auto-GC)
  - More than half of the PAMS sites collected data in 2021
  - States are required to meet the PAMS requirements, but EPA recognizes the unique challenges presented in 2021 and 2022 PAMS Seasons
- EPA Support in 2022
  - National orders collected and being processed
  - Unified Ceilometer Network (UCN) available for collecting, storing, and retrieving ceilometer data
  - EPA investigating issues with CAS Auto-GC and working to simplify data processing and reporting
  - Nearing finalization of a recompeted National Lab contract



Ozone Absorption Cross-Section Change

- An international group was charged with recommending a consensus-based ozone absorption cross-section value for adoption in standard photometer-based instruments for ozone measurements (published in JT Hodges et al., 2019).
  - The current value was implemented in 1961
  - The change represents technology advancement and improvement in the accuracy and uncertainty of ozone measurements
- The cross-section value is used in Standard Reference Photometers (SRPs) that are the reference for ozone monitoring in the US and internationally.
- The National Institute of Standards and Technology (NIST) and its international counterpart, Bureau of Weight and Measures (BIPM), recommended a change the ozone absorption cross-section value used in SRPs and worldwide for surface ozone measurements.
- Following a consensus recommendation of participants in a workshop on “Accurate Monitoring of Surface Ozone”, October 2020, a task group has been established to manage change to the ozone cross-section value.
- The task group is globally coordinating the universal implementation of the cross-section value for the measurement of ozone worldwide.
- **The target timeline for implementing the change is January 1, 2024.**
- Changes to the reference measurement principle and calibration procedure for ozone in 40 CFR part 50, appendix D, will need to be revised to incorporate the new value through rulemaking.



OPEN ACCESS
IOP Publishing
Metrologia

Metrologia 56 (2019) 034001 (12pp)
https://doi.org/10.1088/1681-7575/ab0bdd

Recommendation of a consensus value of the ozone absorption cross-section at 253.65 nm based on a literature review

J T Hodges[1], J Viallon[2,10], P J Brewer[3], B J Drouin[4], V Gorshelev[5], C Janssen[6], S Lee[7], A Possolo[1], M A H Smith[8], J Walden[9] and R I Wielgosz[2]

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Received 19 October 2018, revised 14 February 2019
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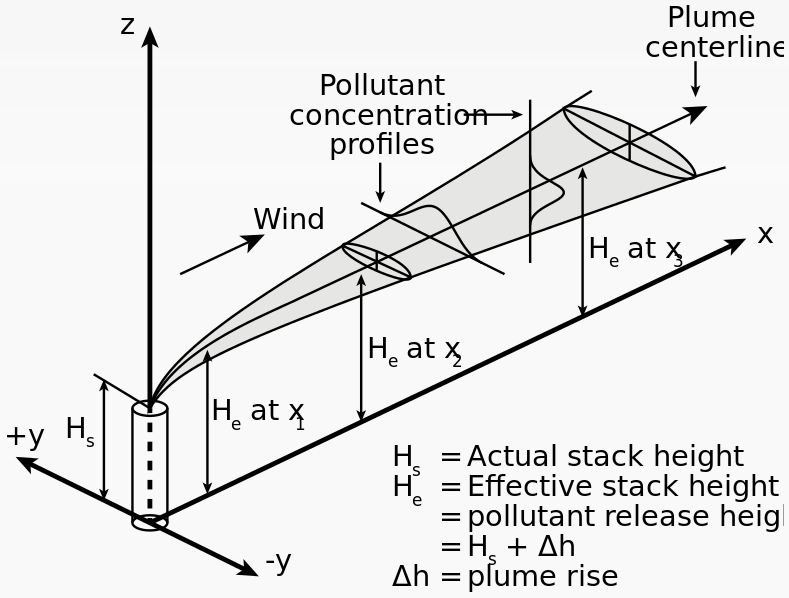
Abstract
A detailed review and analysis of literature values for the absorption cross-section of ozone at room temperature at the mercury-line wavelength (253.65 nm, air) is reported. Data from fourteen independent sets of measurements spanning the years 1959–2016 were considered. The present analysis is based upon a revised assessment of all Type A and Type B uncertainty components for each previously reported cross-section. A consensus value for the absorption cross-section of $1.1329(35) \times 10^{-17}$ cm^2 molecule^{-1} is recommended based on statistical analysis of the weighted data. This new cross-section value is 1.23% lower and its uncertainty sixfold smaller than the uncertainty of the conventionally accepted reference value reported by Hearn (1961 *Proc. Phys. Soc.* **78** 932–40).

Keywords: ozone, absorption cross-section, reference data, troposphere

https://doi.org/10.1088/1681-7575/ab0bdd

Air Quality Modeling Updates



Revised Draft Guidance on O3/PM2.5 Permit Modeling

- Sept 2021 revised draft released for informal public comment
- OAQPS/OGC has reviewed the comments and working on appropriate tweaks to the guidance
  - 13 comment packages received from state/local agencies, tribal nations, and industrial stakeholders
- Final review version of the guidance planned for submission to OMB for Interagency Review in April (*though OMB is currently backlogged*)
- OMB Interagency Review (60 – 90 days)
  - May require additional revisions or updates to guidance
- Once cleared OMB, EPA will release the guidance as "final" in Fall 2022 or ASAP
- In the interim, we continue to recommend all state/local agencies follow the recommendations in the Sept 2021 revised draft guidance and to reach out to their EPA Regional Offices for coordination/consultation on all O_3 or $PM_{2.5}$ PSD compliance demonstration

2022 AERMOD Modeling System Release

- Release in the late-May timeframe
- AERMOD
  - General code maintenance
  - Bug fixes (*e.g.*, NO_X background, BUOYLINE, RLINE)
  - Updates to NO_2 options:
    - TTRM being integrated into all three NO_2 Tier 3 methods
    - GRSM transitioning from Alpha to Beta
  - Alpha platform downwash option (from OCD)
  - Alpha option (new source type, for now) for "sidewash" effects testing and eventual integration into PRIME
- AERMET
  - Draft AERMET to replace current AERMET based on feedback received
    - https://www.epa.gov/scram/draft-aermet
  - Overwater processing of prognostic data

AQ Modeling for 2015 Ozone NAAQS Transport

Analytic Year	Model Runs
2016	Base Year
2023	Baseline
	State total anthropogenic contributions
2026	Baseline
	State total anthropogenic contributions
	State EGU contributions
	State Non-EGU contributions
	State EGU + Non-EGU 30% NOx cut
2032	Baseline

Nationwide air quality modeling was performed for several purposes:

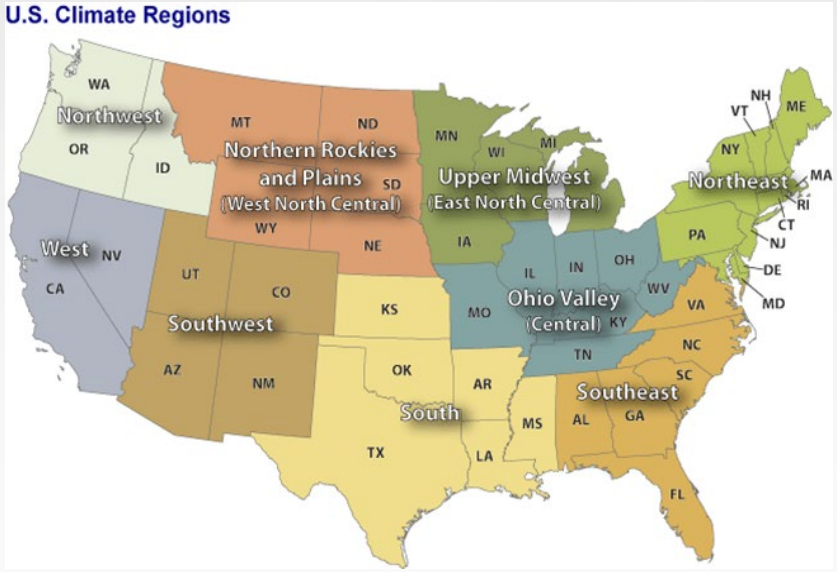
(1) Project ozone design values in 2023, 2026 and 2032 to identify nonattainment and maintenance receptors

(2) Calculate contributions to identify upwind-downwind "linkages" in 2023 and 2026

(3) Evaluate the impacts of EGU and non-EGU NOx reductions in upwind states

Details on the construct of the modeling platform, model performance evaluation, methods for projecting design values and contributions, and resulting data for individual receptors can be found in the Air Quality Modeling TSD in the HQ docket for the proposed SIP Disapprovals and the docket for the Proposed Transport FIP

May – September Ozone Model Performance Statistics by Region for MDA8 O3 ≥ 60 ppb*



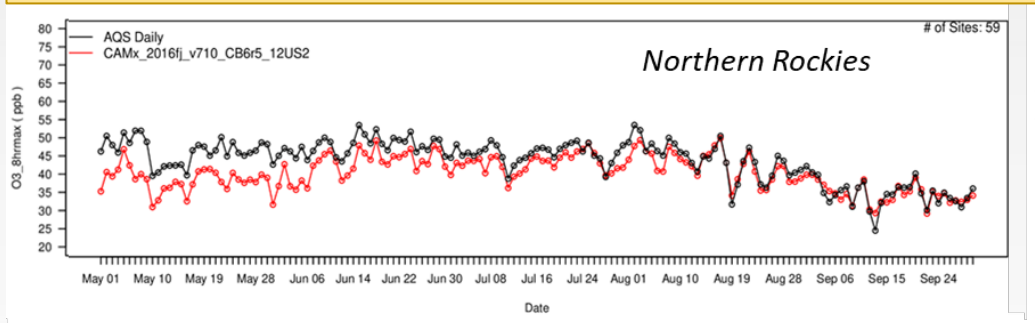
Climate Region	Number of Site-Days ≥ 60 ppb	MB (ppb)	ME (ppb)	NMB (%)	NME (%)
Northeast	2997	-4.1	7.1	-6.2	10.7
Ohio Valley	3211	-7.1	8.7	-10.9	13.3
Midwest	1134	-12.7	13.0	-19.1	19.5
Southeast	1477	-2.9	6.1	-4.5	9.4
South	993	-7.8	9.1	-12.0	14.1
Southwest	3054	-8.8	9.7	-13.6	15.1
Northern Rockies	215	-11.9	12.4	-19.0	19.8
Northwest	84	-5.8	10.8	-9.0	16.6
West	8279	-9.7	11.4	-13.8	16.2

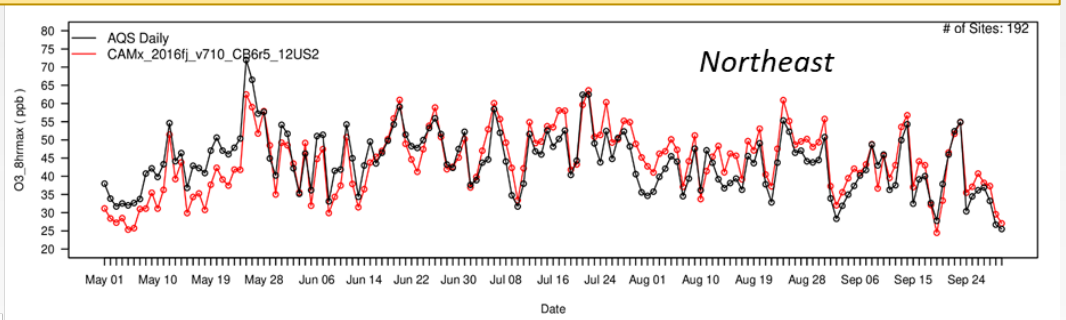
- On average, for May thru September the model under predicts MDA8 ozone ≥ 60 ppb in each region.
- Because the model predictions are used in a relative manner to project future year ozone design values and contributions, the 2016 base year under prediction does not necessarily imply that future year receptors or contributions are understated.

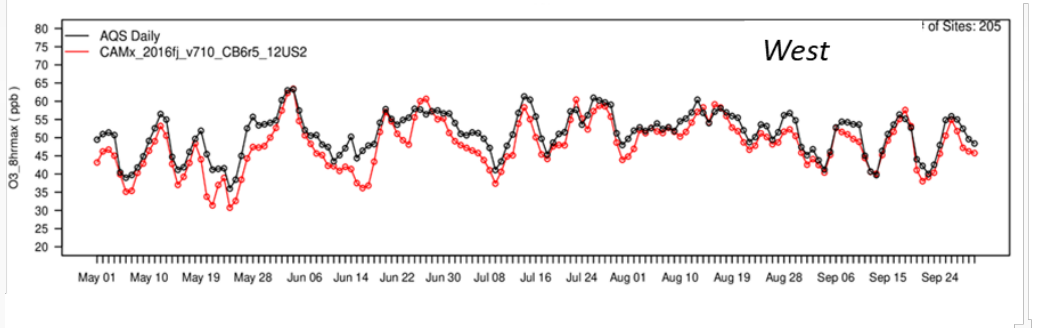
*Using 60 ppb as a threshold to help gauge model performance is based on recommendations in EPA's photochemical modeling guidance

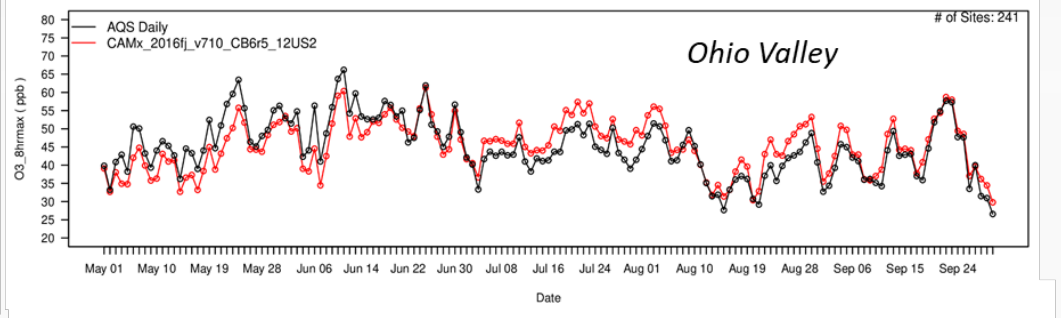
May – September Time Series of Average Measured and Modeled MDA8 O3

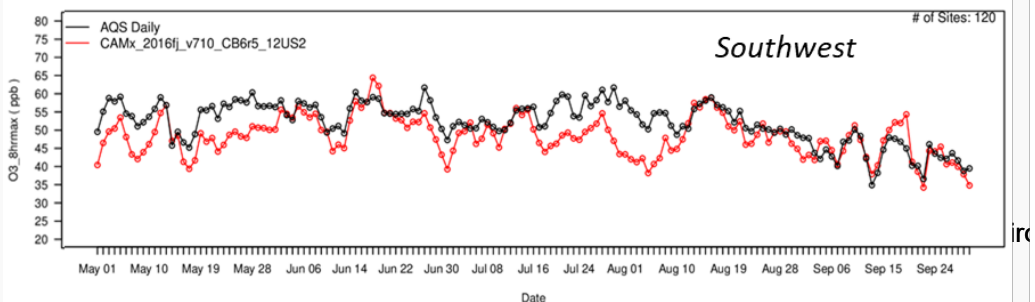
- There are large differences between regions in the magnitude and degree of day-to-day variability in measured ozone concentrations as shown in the figures below.
- The model performs equally well for eastern and western regions in closely replicating the relative magnitude and temporal characteristics of measured MDA8 O3 in individual regions.

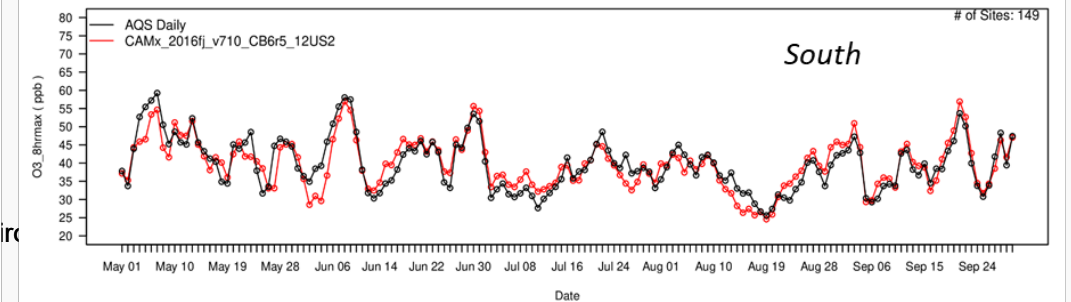












Emission Inventory Updates

2016 Modeling Platform

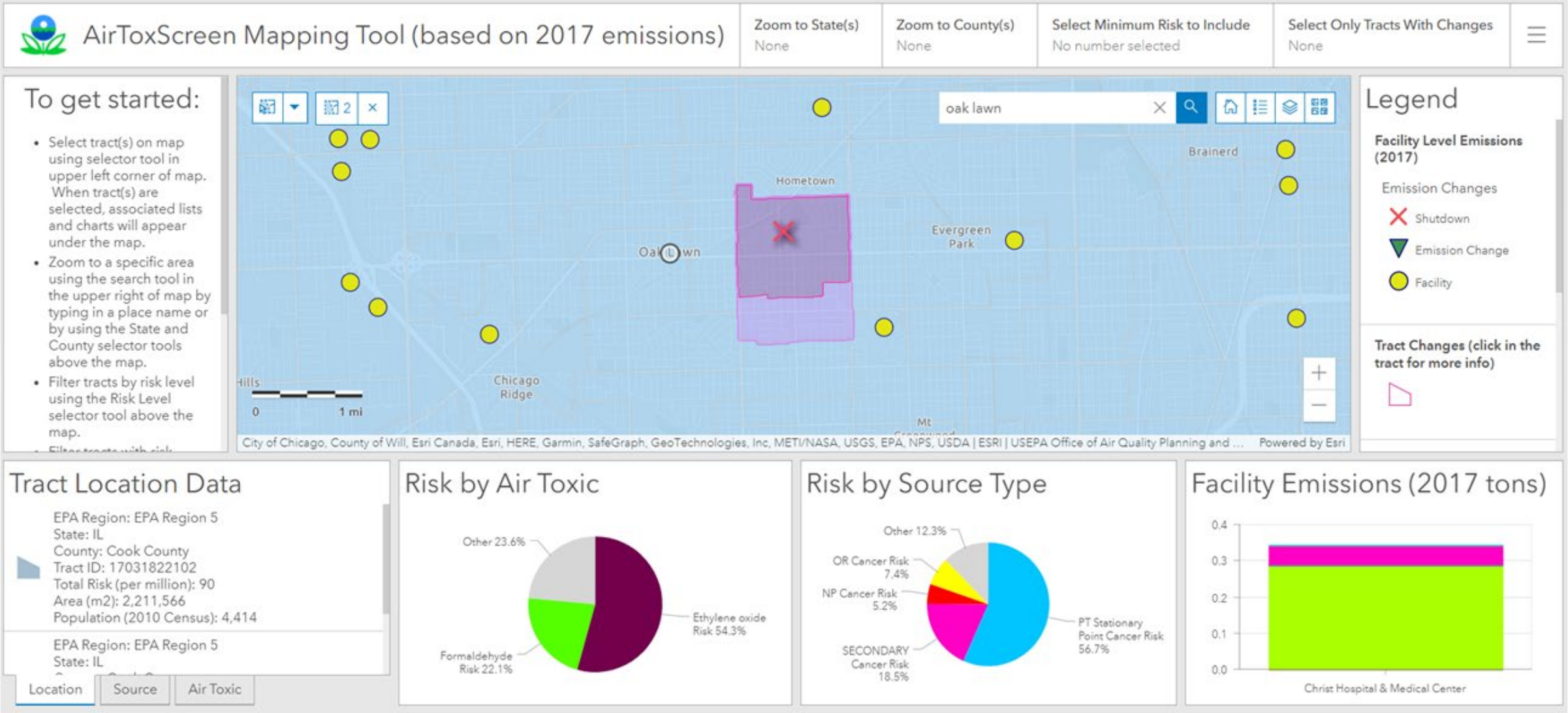
- The 2016v2 platform emissions were released publicly on September 21, 2021
- Comments on 2016v2 had been requested by December 17, 2021
- Comments were provided on the 2016v2 platform by 23 states, WRAP, and the Midwest Ozone Group
  - States that commented: AR, CO, CT, DE, FL, GA, IL, ID, IA, KS, NJ, MA, MI, MN, MO, NC, ND, OH, OK, TN, TX, VA, WI
  - Sectors that received the most comments were non-EGU point sources and EGUs
  - Four to six agencies commented on airports, commercial marine vessels, oil and gas sources, solvents, and other nonpoint sources
  - One or two agencies commented on nonroad and rail sources and residential wood combustion
- These emissions were used for AQ modeling to support the proposed interstate transport "good neighbor" FIP
- We expect to receive additional comments from various stakeholders on these emissions through comments on the proposed rule

Air Toxics Data Updates (2017-2019)

- 2017 Air Toxics Data Update released via AirToxScreen and EJScreen
  - https://www.epa.gov/AirToxScreen
- 2018 AirToxScreen planned release summer 2022
- 2019 AirToxScreen planned release end of 2022/early 2023
  - Will be included in 2023 EJScreen update
- 2020 point source HAP review by SLTs
  - Will be part of main NEI data review before the first public version of 2020 point sources are released on website
  - 2020 HAP review scheduled for late summer 2022
  - Same plan for 2021 and beyond

AirToxScreen Mapping Tool

www.epa.gov/AirToxScreen

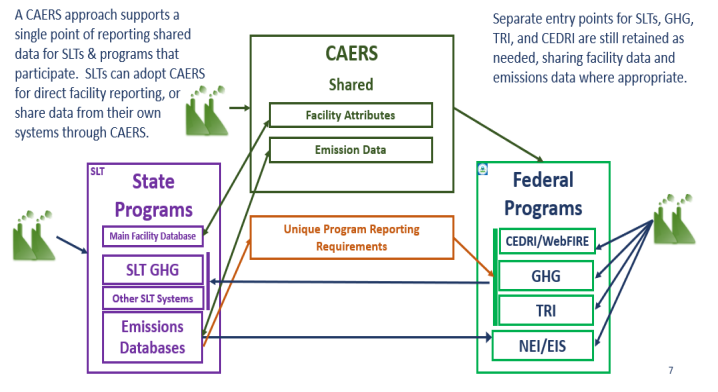


2020 National Emissions Inventory Plans

- **Ongoing virtual trainings** (POC: Snyder.Jennifer@epa.gov)
  - See https://www.epa.gov/air-emissions-inventories/air-emissions-inventory-training
- **Now through 2022**
  - Compilation and quality assurance of Point, Onroad/Nonroad Mobile, and Events data categories
  - State, local, tribal (SLT) collaboration on quality assurance - provides great value to the process
  - Methods and draft data review for a few nonpoint data sources (agricultural NH3, CMV, Oil and Gas)
  - Nonpoint data category compilation and QA
- **March 31, 2022:** Reporting deadline for nonpoint data category (input templates, survey, emissions)
- **April 2022:** Final feedback reports sent to Air Directors
- **May/June 2022:** Point source review for air toxics (and all pollutants) for Air Toxics Data Update
- **Fall 2022:** Releases of Point, Onroad/Nonroad Mobile, and Event data categories as they are completed
- **March 2023:** Full public release including documentation, summaries, and query tools

CAERS Update

- CAERS (Combined Air Emissions Reporting System):
  - Participating State/Local/Tribal (SLT) agencies & inventory year: GA (2019), DC, & Pima AZ (2020), RI (2021), AZ, ME, MT (2022-2024)
  - Several more SLTs have requested test accounts, some seeking management approval to adopt CAERS
  - CAERS V3 released February 2022 includes new customizations for SLTs
  - Reporting for inventory year 2022 started February 2nd
- We are recruiting SLTs on an ongoing basis:
  - SLTs who want to adopt CAERS "as-is" can start onboarding any time
  - EPA is exploring sharing code with SLTs so they can develop their module
  - Interested SLTs who aren't on our Product Design Team (PDT) can join any time to provide input towards the continued development of CAERS



Air Emissions Reporting Rule

- AERR updates under consideration for the 2023 inventory reporting year:
  - Updating the nonpoint emissions requirements to use current best practices and meet transparency and quality assurance goals
  - Ensure that AERR requirements are consistent with the latest emissions documentation available to data reporting agencies
  - Considering emissions reporting directly from permitted facilities in Indian Country when an Indian tribe is not required to report emissions data
  - An approach to acknowledge and incorporate CAERS in some cases
- AERR updates under consideration for later inventory years:
  - Improving air toxics emissions data
  - Improving fires emissions data for prescribed fires
  - Improving emissions from intermittent sources (e.g., backup generators)
- Two listening sessions with state/local/tribal agencies were held in April 2021
  - Additional input has also been received by email and can be sent to the POCs listed below

Source Monitoring Updates

Updates to EPA Method 23

- Method 23 (Dioxin/Furan testing) updates – Final expected early summer (GC/MS)
  - Improves analytical approach and sensitivity for Dioxins/Furans
  - Adds options to measure PCB compounds and PAH compounds, if desired
  - Laboratories already on notice and adapting to new analytical practices
- Proposal version published as OTM-046 to support ongoing ICR testing in several sector rules
- Starting work on EPA Method 31 – Dioxin/Furan testing using a different analytical finish to accommodate future laboratory technology (MS/MS)

Fenceline /sorbent monitoring

- Work is underway to study sorbent materials for fenceline measurement of
  - Chloroprene
  - Ethylene Oxide
  - 1,3, Butadiene
  - Vinyl chloride
- Method 325A/325B method can be used for measurement/reporting in other sectors
- Investigation into large area methane monitoring also underway

Residential Wood Heating

- Revocation of Alt 125 /127 (Cordwood test method) final Feb. 23, 2022
  - Crib wood test method remains available, along with Alt-140 (IDC method)

- Large effort precision study of IDC wood heater test method and TEOM measurement of PM
  - West coast lab work – 52 test runs on 3 wood heater models burning D. fir and maple – completed
  - East coast lab work – Same stoves, 52 more tests, maple and birch – beginning soon

- 21 tests conducted with paired TEOM devices at EPA – ORD – complete
  - 21 tests examining TEOM measurements for ruggedness (sensitivity to change) scheduled for May, 2022

- Precision testing of hydronic heater IDC method to begin soon – April 2022

- OAQPS supporting OECA on test report review of Alaska identified test report issues
  - New checklist to Third Party Certifiers has demonstrated to improve new report completeness
  - First revision to that checklist under internal EPA review – Expected to release in April 2022

Questions?