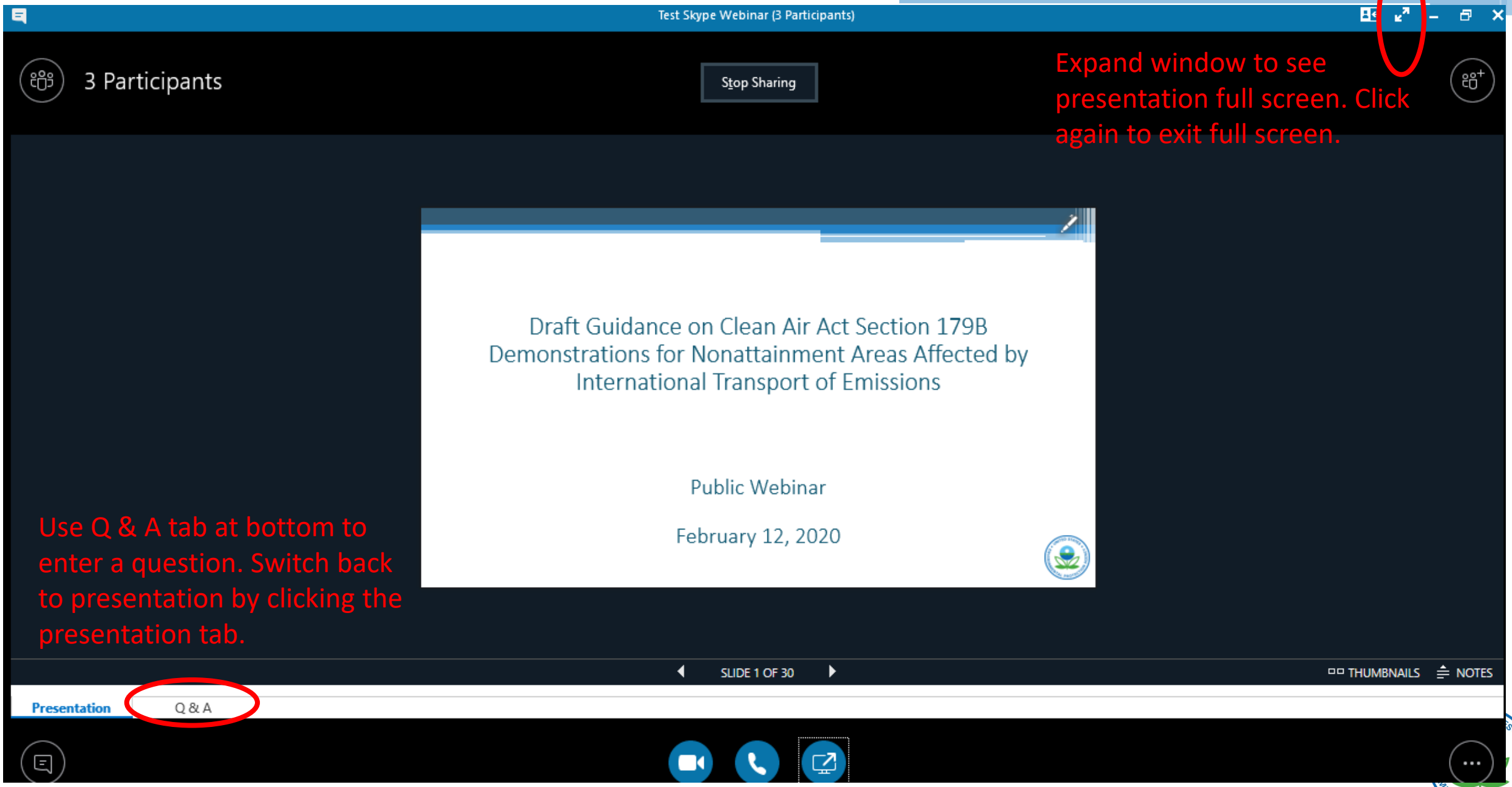
Draft Guidance on Clean Air Act Section 179B Demonstrations for Nonattainment Areas Affected by International Transport of Emissions

Public Webinar

February 12, 2020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Use Q & A tab at bottom to enter a question. Switch back to presentation by clicking the presentation tab.
SLIDE 1 OF 30
THUMBNAILS
NOTES
Presentation
Q & A

Overview

- Purpose and Scope
- Terminology
- Background on Policy and Regulatory Considerations
- Process
- Technical Analyses
- How to comment
- Questions

Purpose and Scope

This draft guidance is intended to assist air agencies that are considering the development of a demonstration, under section 179B of the Clean Air Act (CAA), that a nonattainment area *would be able to attain,* or *would have been able to attain*, the relevant National Ambient Air Quality Standard (NAAQS) but for emissions emanating from outside the U.S.

This draft guidance focuses on the development of a technical demonstration under section 179B and identifies the types of analyses that are recommended for such demonstrations.

This draft guidance also identifies the expected process and schedule an air agency would follow for developing and submitting a CAA section 179B demonstration to EPA.

Terminology Check: Prospective vs Retrospective

- A prospective demonstration pursuant to section 179B(a) (*i.e.*, one intended to support approval of a SIP submission by showing that the plan would be adequate to *attain and maintain the standard by the attainment date* but for international emissions), should be submitted prior to or as part of the overall SIP submission.

- A retrospective demonstration pursuant to sections 179B(b)-(d) (*i.e.*, one intended to avoid a higher classification by showing that an area *would have attained the standard* but for international emissions) should illustrate that past air quality was impacted by international emissions on specific days during the years that contribute to the design value calculation for the area.
  - Typically, this retrospective demonstration would be submitted after certified air quality data are available indicating that the area failed to attain by the attainment date

Background: Regulatory Relief of Section 179B

Prospective demonstration under Section 179B(a)

- If demo is approved, attainment demonstration does not need to show that the area will attain by the attainment date

Retrospective demonstration under Section 179B(b)-(d)

- If demo is approved, the area would not be reclassified to the next higher classification and subject to requirements of that classification

An approved section 179B demonstration does NOT result in: (See Section 3, pg 9 of draft)

- A lower design value
- Concurrence on exceptional events claims or exclusion of air quality data from regulatory determinations
- Redesignation of the area to attainment
- Reclassification of the area to a lower classification
- Relief from interstate transport obligations under section 110(a)(2)(D)

Background: Applicability of Section 179B

Not limited geographically (See Section 1.4, pg 5 of draft)

- Despite the title of section 179B ("International Border Areas"), EPA has twice affirmed in recent years its interpretation that this provision is not restricted to areas adjoining international borders. *See* 80 FR 12294 (March 6, 2015); 83 FR 63010 (December 6, 2018)

Not limited by nonattainment area classification (under the Ozone NAAQS)

- EPA has affirmed its interpretation that this provision is not restricted to areas classified as Moderate or above. If applicable, Marginal areas may submit retrospective demonstrations to avoid reclassification to the next higher level. (See Section 4.3.1, pg 14 of draft)
- (Note that for a Marginal area, a prospective demonstration would not yield any regulatory relief since attainment demonstrations are not required for Marginal areas). *See* 80 FR 12294 (March 6, 2015); 83 FR 63010 (December 6, 2018)

Evaluation of Section 179B Demonstrations

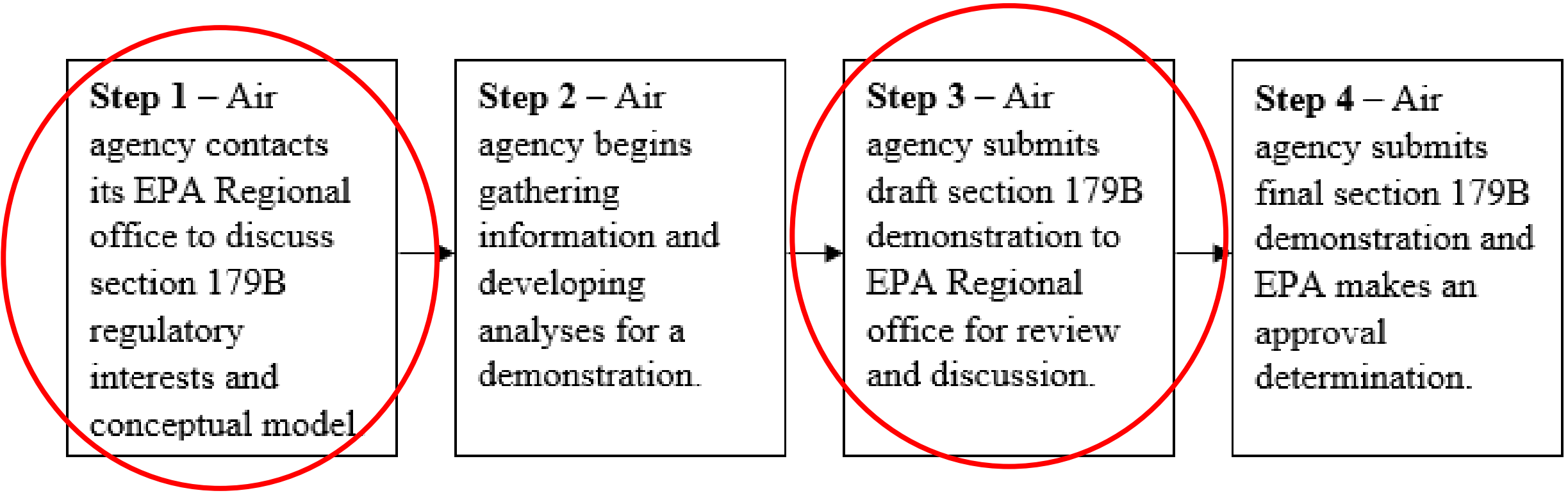
- Every demonstration will be evaluated on a case by case basis as a weight of evidence assessment.
- Individual lines of evidence are evaluated separately and as a whole.
- The strength of each piece of evidence is evaluated in the context of that case.
- Early engagement with your EPA Regional Office along the way is beneficial.

6.4. Example Conclusion Statement in the Demonstration

A section 179B demonstration should begin with a conceptual model and follow with a demonstration that establishes a relationship between international anthropogenic emissions and the monitored exceedance(s) based on the weight of evidence. The demonstration includes multiple lines of evidence and analyses such as those identified in Section 6 of this guidance and should conclude with a statement similar to the language below:

> Based on the evidence, including comparisons and analyses, provided in section [*reference the relevant section(s)*] of this demonstration with respect to ambient air concentrations measured at the [name of monitor] on [dates], [*Air Agency Name*] has established that the [area name] area [would attain (for 179B(a) demonstrations) or would have attained for 179B(b)-(d) demonstrations) the [name of NAAQS] NAAQS by the relevant attainment date but for emissions emanating from outside the U.S.

Overall Process for Developing a Section 179B Demonstration



Recommend air agency consult with EPA before and during development of a section 179B demonstration

Public Comment Process

EPA encourages air agencies to conduct and document (in the demonstration) a public comment process for all section 179B demonstrations prior to submitting the demonstration to EPA.

- In the case of a section 179B(a) "prospective" demonstration, the public comment process will typically be conducted as part of the overall public comment process on the SIP.
- In the case of a section 179B(b)-(d) "retrospective" demonstration, EPA recommends the air agency conduct a demonstration-specific public comment process to include in its stand-alone submission.
- EPA also recommends that air agencies include in the demonstration any comments received and the air agency's responses to those public comments.

"Background" includes natural and non-US anthropogenic sources, including international transport

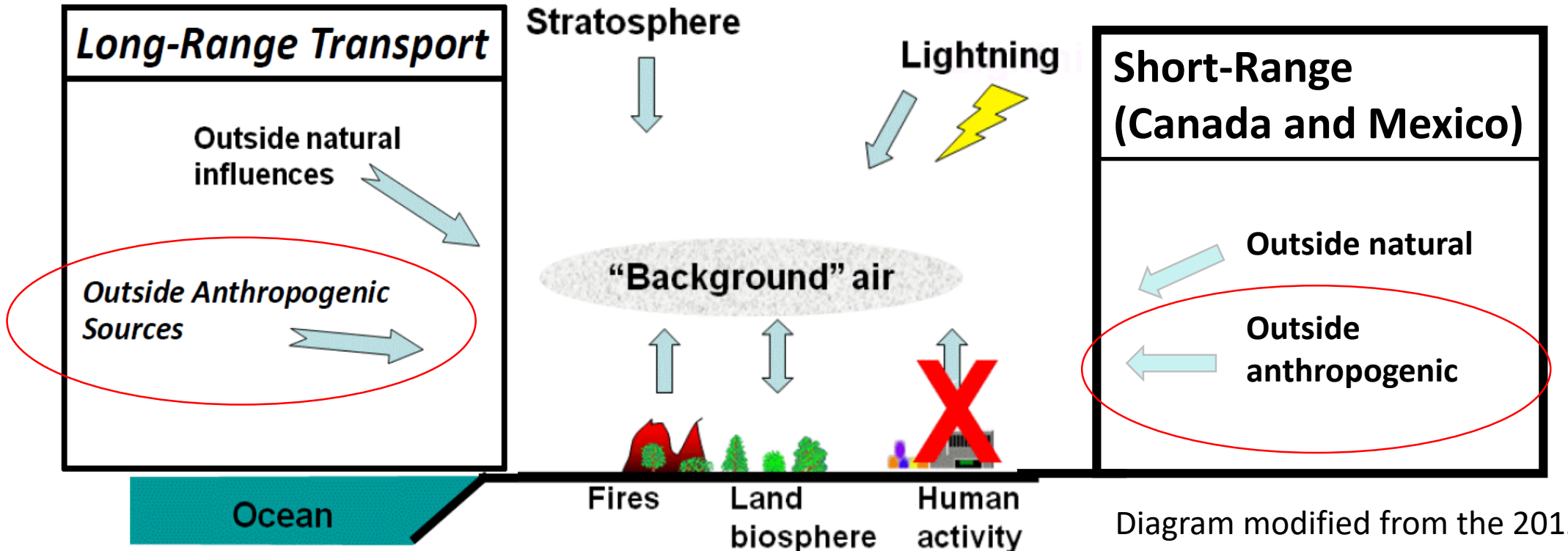


Diagram modified from the 2012 Ozone ISA
EPA 600/R-10/076F

Section 179B Demonstrations should focus on non-US anthropogenic emissions as illustrated by the red ovals.

Focus on International Anthropogenic Emissions

- EPA expects section 179B demonstrations to be developed in a manner consistent with the CAA principles and practices used in attainment plans.
- Nonattainment area plan requirements are based on evaluations of anthropogenic emissions. For example, states are required to evaluate and adopt controls on domestic anthropogenic sources as necessary to fulfill their nonattainment planning requirements.
- In a consistent manner, section 179B demonstrations should focus on the contribution to ambient concentrations attributable to international *anthropogenic* emissions. (Section 1.3, pg 4)

Conceptual Model for Section 179B Demonstration

Should include:

- Attainment and classification information
- Information on the existing ambient monitors in the area
- Information on the monitor(s) and days that the air agency has identified as influenced by international anthropogenic emissions
- Comparison between the measured exceedances influenced by international emissions concentrations and typical exceedances influenced by local, non-international emissions.

Conceptual Model (cont'd)

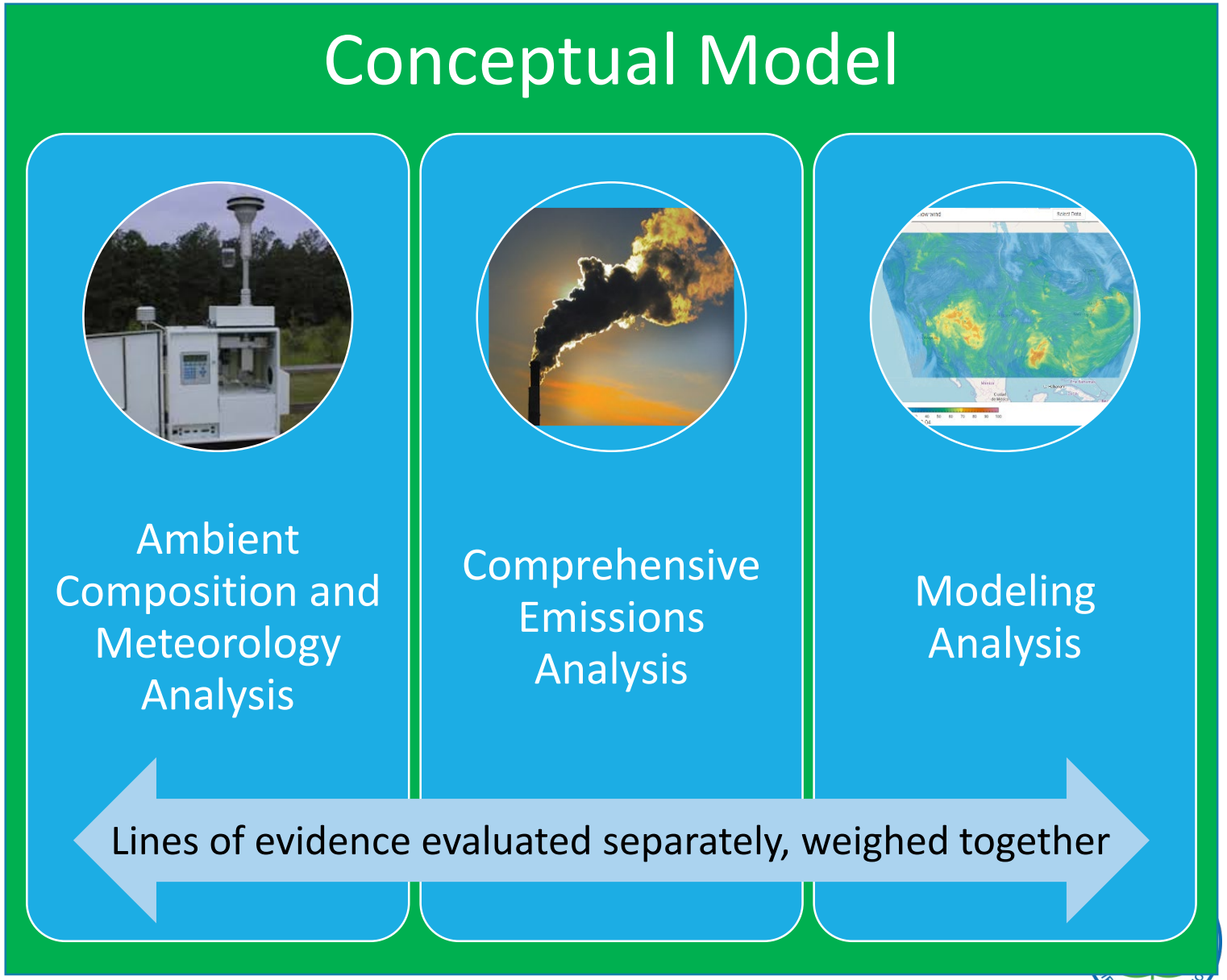
- A summary of the meteorological and atmospheric conditions that lead to high concentrations at the monitor on days influenced by international anthropogenic emissions and days not influenced by international anthropogenic emissions.

- Identification of specific international anthropogenic emissions sources (*e.g.*, an international emitting facility) or source regions (*e.g.*, an international metropolitan area) that predominantly impact the monitor location on internationally influenced days.

- Where available, a description of how controls on the upwind international anthropogenic sources differ from those required within the U.S.

Technical Overview

- Conceptual model drives analysis
- Demonstration includes
  - Observations
  - Emissions
  - Meteorology
  - Modeling results
- Lines of evidence depend on the conceptual model
  - Less complex conceptual models use fewer lines of evidence
  - More complex conceptual models use more lines and strength of evidence
- Final: Weight of Evidence



Types of Technical Analyses

General characteristics of an area that would suggest the need for a demonstration with fewer lines of evidence:

- Affected monitors located near an international border.
- Large international emission sources located across the border near the affected monitors.
- Meteorology and international transport patterns connect emissions from identified international sources to monitors on days with monitored exceedances.
- Exceedances do not occur on days with similar conditions when transport to monitors is domestic in origin.

Types of Technical Analyses (cont'd)

General characteristics of an area that would suggest the need for a more detailed demonstration with additional lines of evidence:

- Affected monitors not located near an international border.
- Specific international sources and/or their contributing emissions are not identified or are difficult to identify.
- Exceedances on internationally influenced days are in the range of typical exceedances attributable to local sources.
- Exceedances occurred in association with other processes and sources of pollutants, or on days where meteorological conditions were conducive to local pollutant formation (*e.g.*, for O_3, clear skies and elevated temperatures).

Ambient Observational Analysis

- Day of Year Analysis and Table of Percentile Ranked Days
  - When days associated with international sources occur during efficient transport seasons that are distinct from local production, these results support the weight of evidence.
- Coincidence between high pollution and meteorological/air quality conditions characteristic of international transport.
  - When well-known international transport phenomenon are associated with exceedances, these results support the weight of evidence.
- Air Mass History Analysis
  - Wind Roses, Backward Trajectories, Backward Dispersion
  - When an overwhelming majority of hourly back trajectories or dispersion identify a proximate international source, these results support the weight of evidence

Evidence Likely Associated with Border Proximity

Near border areas have less complex conceptual models

- Reasonable to compare emission magnitudes to local sources
- Easy to connect meteorology
- Trajectories or backward dispersion estimates impact

Other areas have more complex conceptual models

- Emission magnitude comparisons are only meaningful in context of transport
- Hemispheric transport and entrainment to surface is complex
- Full emissions, chemistry, transport, deposition and evaluation are necessary

*Figures based on 2023en ozone source apportionment modeling.

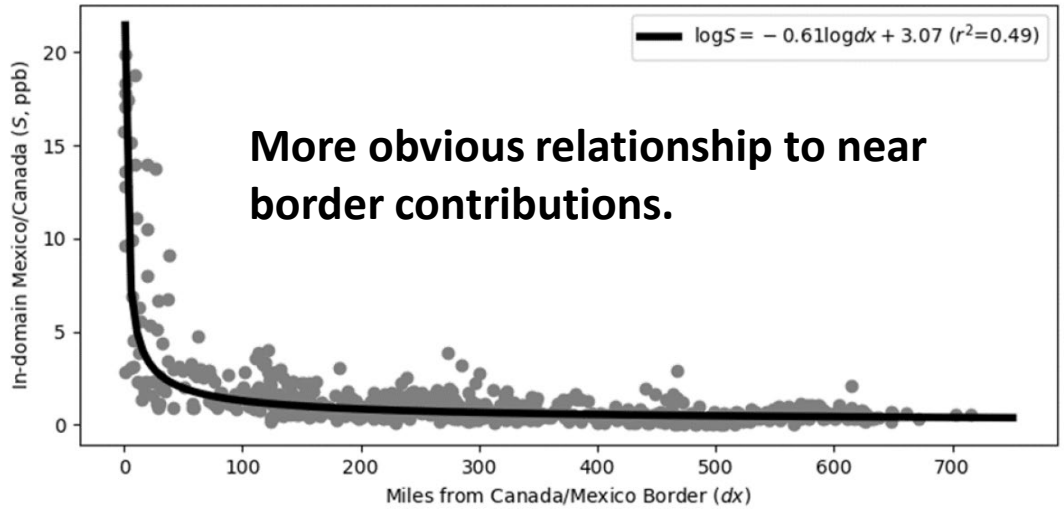


Figure 4 Mexico/Canada source contribution (S) in 2023 at monitors by distance from border

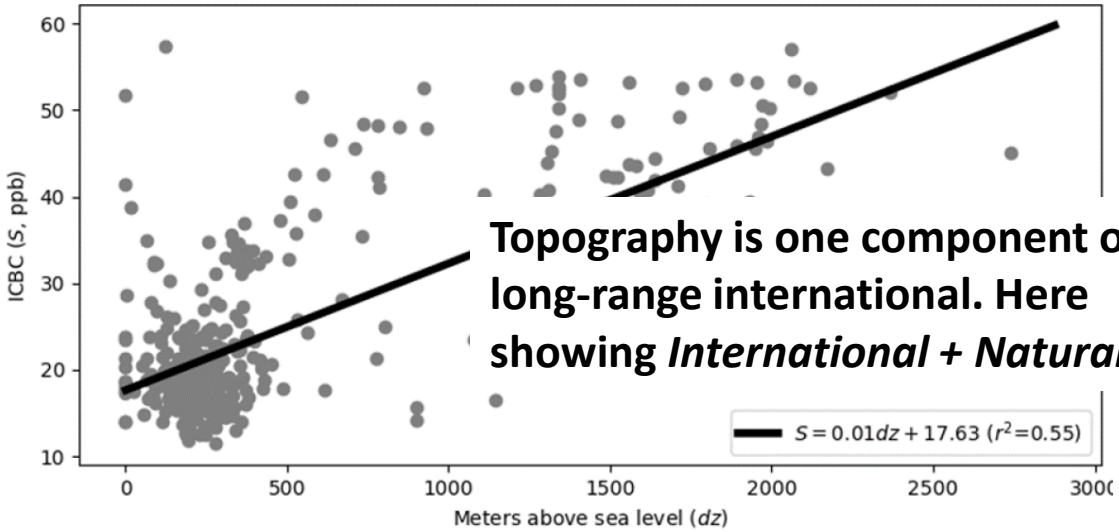


Figure 5 Initial and Boundary Conditions contribution (ICBC) to design values in 2023 as a function of elevation at AQS monitors that are farther than 100 miles from the border.

Ambient Observational Analysis Example

Table 3. Example tabular summary of exceedance days for internationally influenced O_3 data.

Transport Day	Concentration (ppm)
3/1/2015	0.074
4/19/2015	0.071
5/18/2016	0.071
5/30/2016	0.070
6/7/2016	0.075
6/30/2016	0.071
7/7/2016	0.070
7/12/2016	0.074

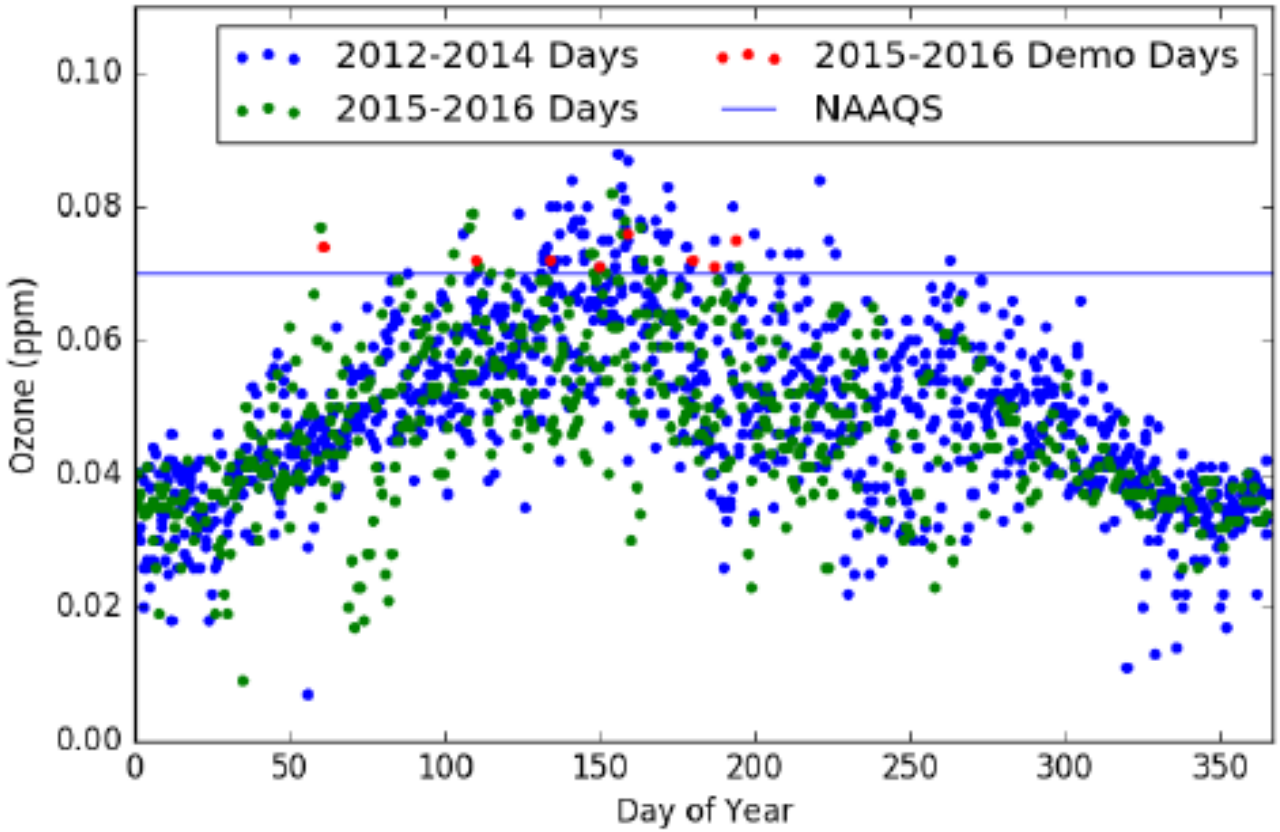
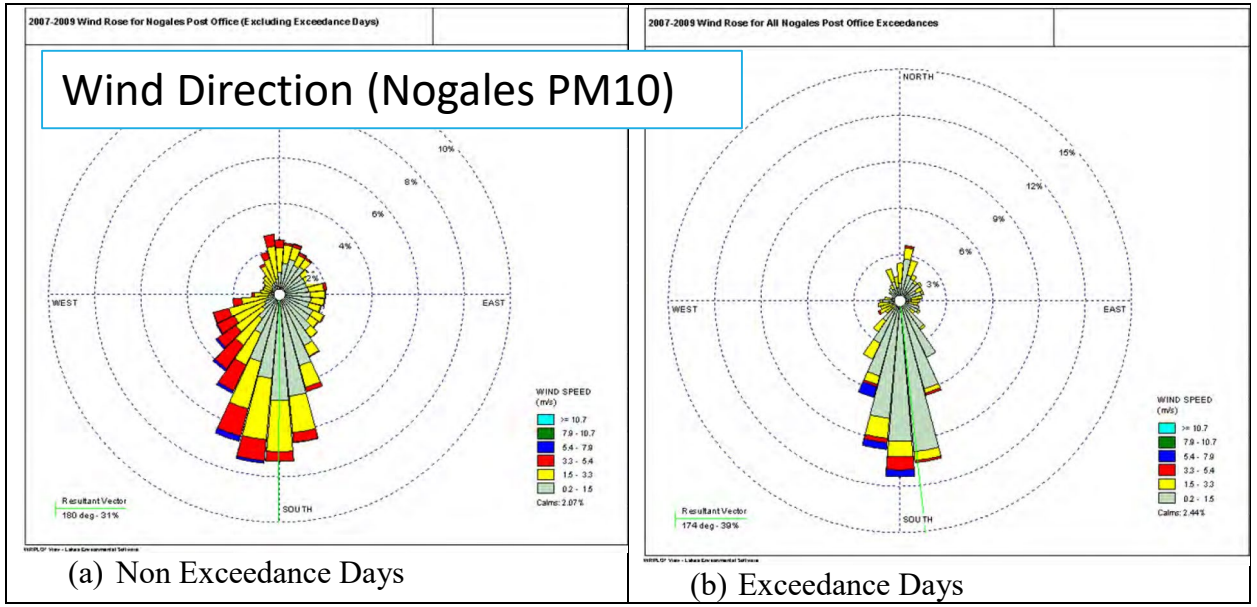


Figure 6. Measured O_3 as a function of day-of-year with example days highlighted as influenced by international sources marked in red and other days marked in green.

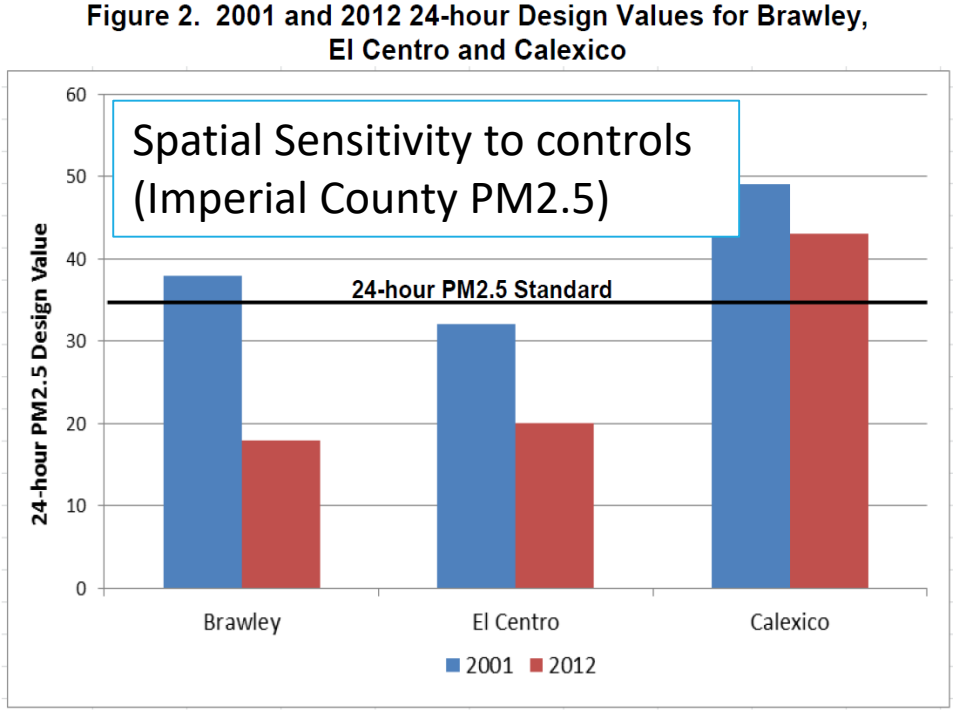
Additional Examples from Previous Demonstrations

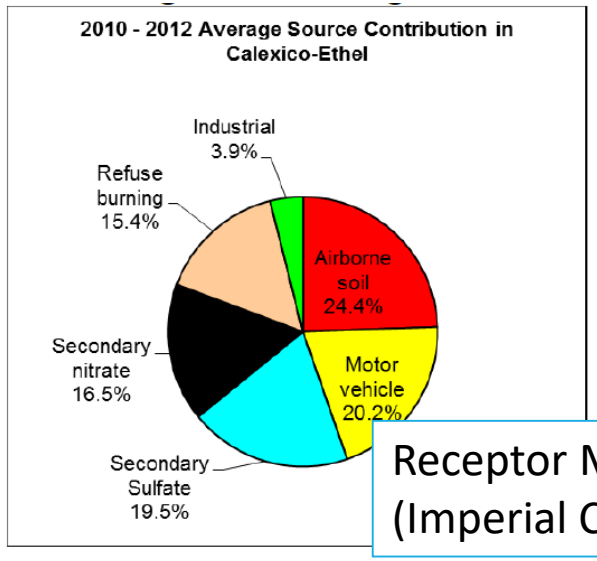
- Nogales PM10
- Imperial Valley PM2.5

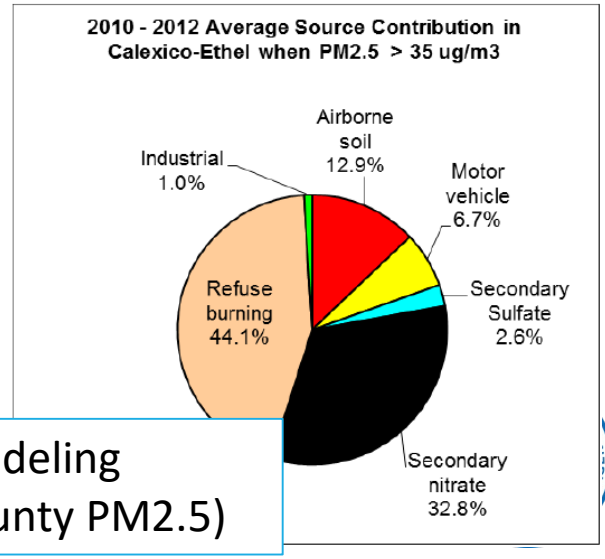


(a) Non Exceedance Days (b) Exceedance Days

Figure 1 Nogales, AZ PM10 nonattainment area: wind roses for non-exceedance and exceedance days (ADEQ, 2012, pp. Appendix A, Figure 9)







Receptor Modeling (Imperial County PM2.5)

Comprehensive Emissions Analysis

- What emission sources currently exist, and what is the magnitude of domestic versus international emissions?
- What controls are in place currently for the international sources (where available)?
- What change in international emissions is expected in the foreseeable future (where available)?
- Are there international agreements that are already addressing these emissions?

Comprehensive Emissions Analysis Example

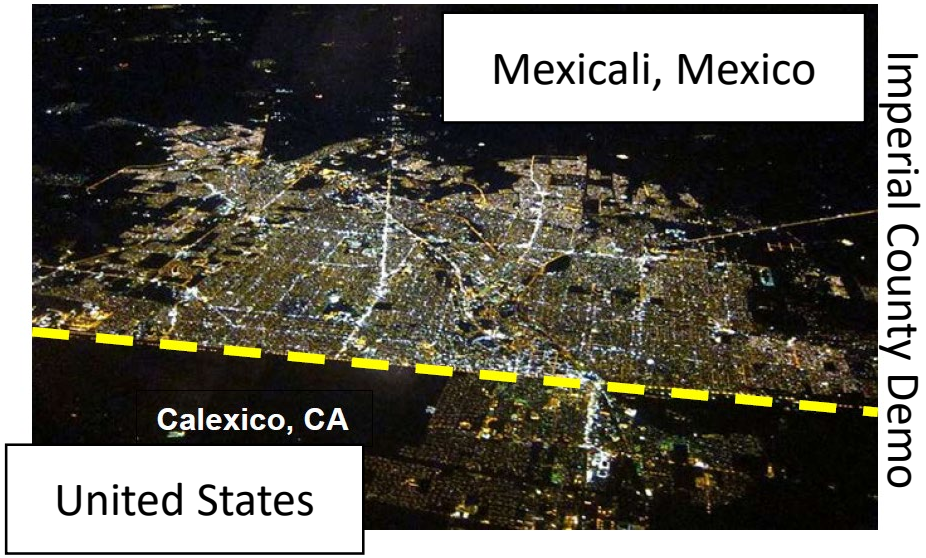
Table 5: Annual Emission Inventories for Nogales, Arizona, and Nogales, Sonora, Mexico. Adapted from ADEQ (2012) Appendix A Clean Air Act Section 179B Attainment Determination for the Nogales, Arizona, PM_{10} Nonattainment Area; Tables 6-9.

	2008		2011	
	PM_{10}	**Percent**	**PM_{10}**	**Percent**
Nogales NAA, Arizona	1,531	18-36.1%	1,528	17.1-35.7%
Nogales Municipality, Mexico	[2,713-6,987]	[63.9-82]%	[2,757-7,420]	[64.3-82.9]%
Total	4,244-8,518	100%	4,285-8,948	100%

When the emissions inventory shows large emissions in a nearby international metropolitan area (large both in total and relative to local emissions), this can support a weight of evidence that international emissions are contributing to exceedances.

Modeling Analysis

- Photochemical Grid Modeling
  - Most generally applicable technique (primary, secondary, near or far distance)
  - Attribution by zero-out simulations or source apportionment technologies
  - When internationally attributed concentrations are large compared to US contributions, these results support the weight of evidence.
- Dispersion Modeling
  - Useful when a single or few nearby international sources contribute inert pollutants (e.g., primary PM)
  - Attribution from single source concentration estimates
  - When cumulative international contributions are large compared to US sources, these results support the weight of evidence.
- Receptor Modeling
  - Useful for $PM_{2.5}$ when an international source has a distinct chemical profile.
  - Attribution via Chemical Mass Balance or Principal Component Analysis
  - When chemical fingerprints support international sources that are distinct from local sources, these results support the weight of evidence.



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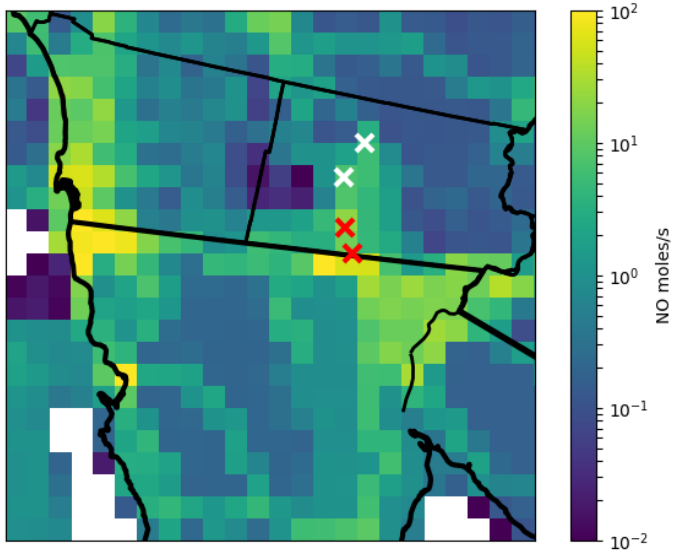

2016fe NO Emissions

Less Complex Along the Border

- Less complex conceptual model
  - For example, Mexicali emissions create enhanced concentrations in Calexico
- Expected Demonstration:
  - Observational analysis
  - Existing Mexico and California inventories (left bottom)
  - Trajectories or backward dispersion link high days to ***Mexicali*** emissions.
    - Influenced days ideally standout
    - Influenced days are relevant to standard
  - *"Adjusted"* design values (e.g., excluding Mexicali days) show attainment.
  - Confirmed with pre-existing photochemical grid modeling (e.g., EPA's)

Meteorology Analysis: Less Complex

- Air parcel history analysis
  - Back trajectories
  - Backward dispersion
- Paired with anthropogenic emission maps
  - Normalized Potential Emission Sensitivity (NPES) = fx/sum(fx) where e.g., fx = counts by cell
  - Normalized Potential Source Contribution (NPSC) = fxEx/sum(fxEx)
- Hourly analysis matching hours in NAAQS metric
  - E.g., MDA8 for ozone : 8-hours in the average
  - Does a large majority (e.g. 75%) of the hours pass over nearby international anthropogenic emissions?

"When a large majority of NPSC are from a source region (here Mexico), these results could be part of a weight of evidence that these days have international influence. When the fraction of NPSC is substantially larger on exceedance days than typical days, this strengthens the weight of evidence."

(Draft Guidance, pg 34)

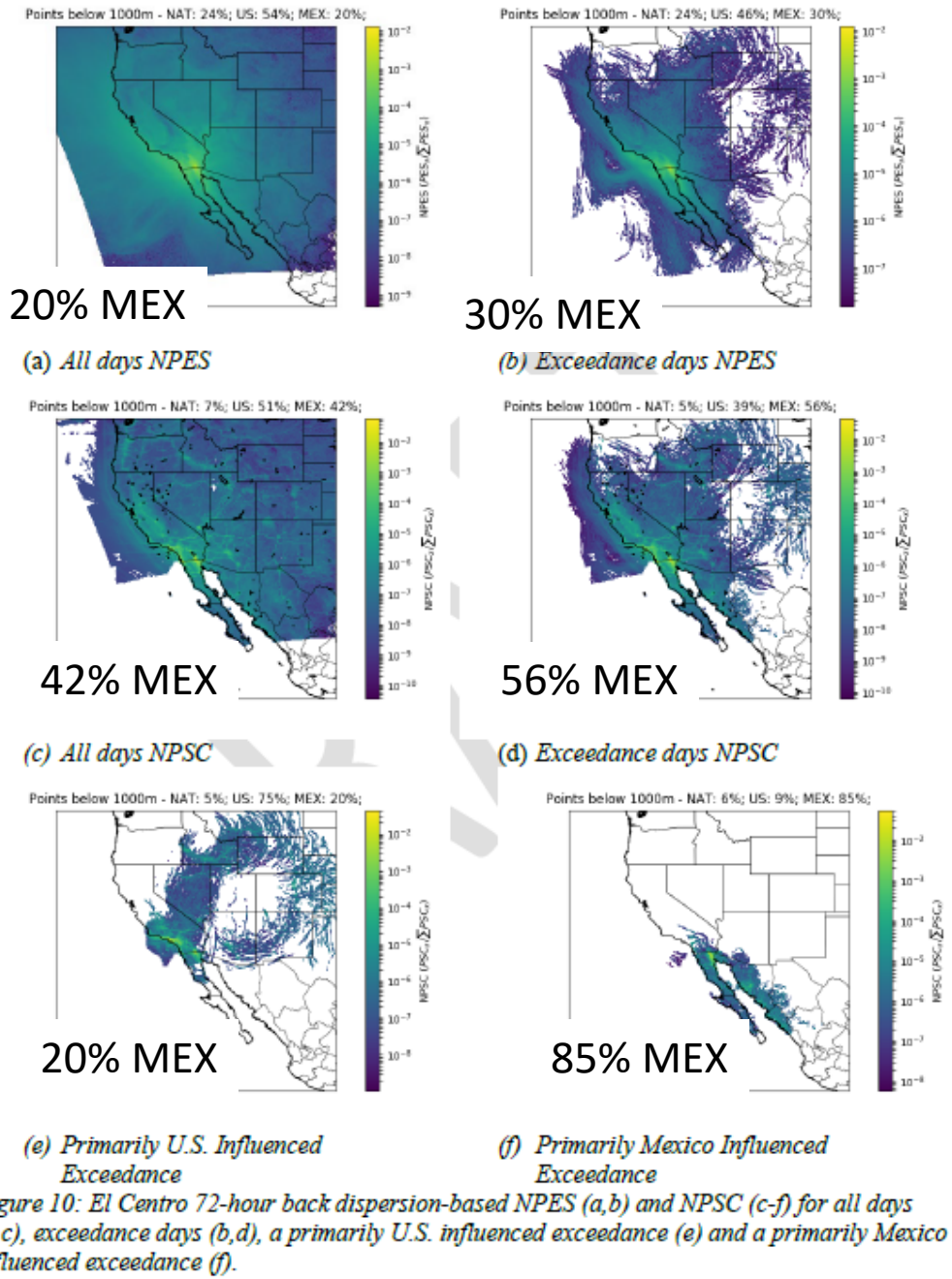

Figure 10: El Centro 72-hour back dispersion-based NPES (a,b) and NPSC (c-f) for all days (a,c), exceedance days (b,d), a primarily U.S. influenced exceedance (e) and a primarily Mexico influenced exceedance (f).

Modeling Example: Less Complex

- Confirm backward trajectory or dispersion with existing model results (e.g., modeling done for a SIP or EPA's publicly available OSAT)
- In practice, section 179B(a) or 179B(b) demonstrations may leverage photochemical modeling used for other related planning purposes

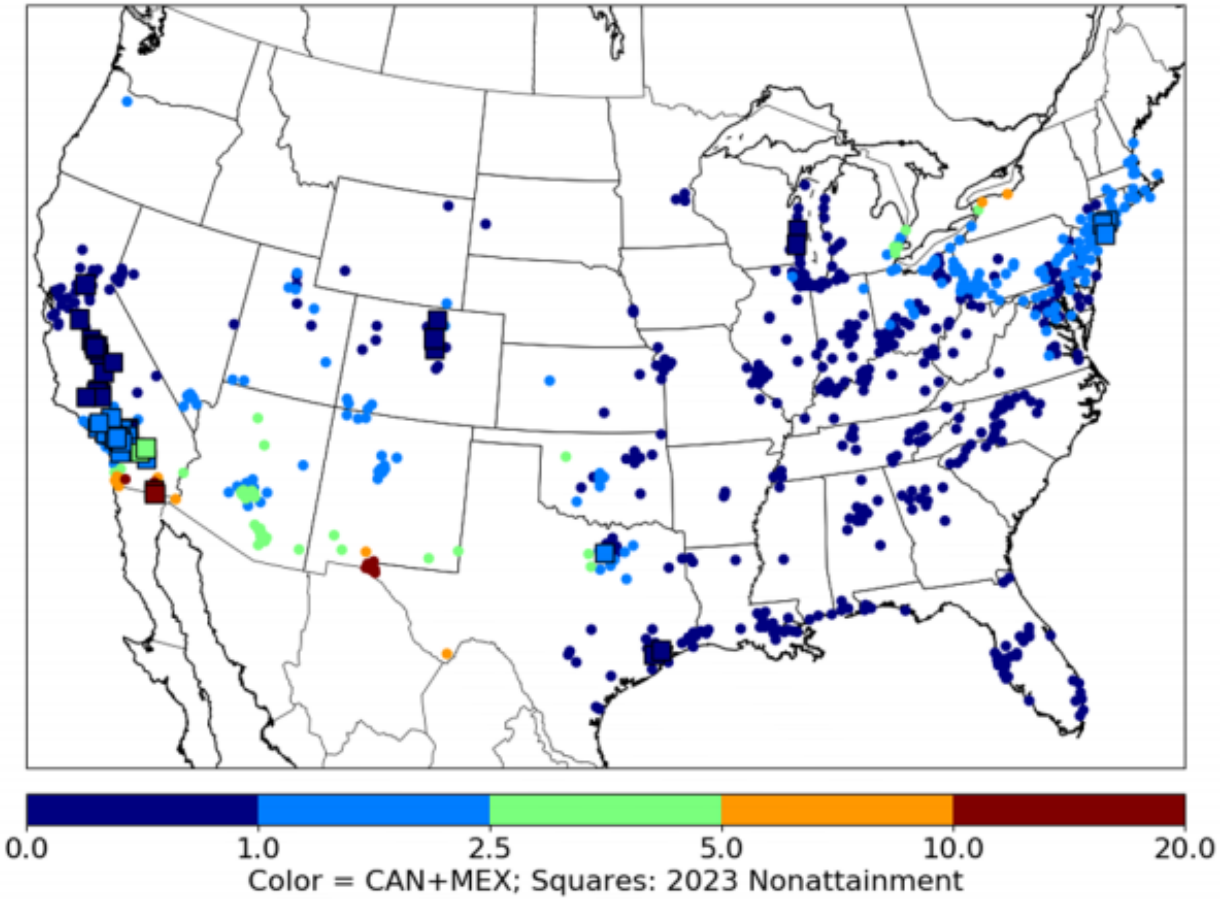

Figure 3 O_3 (fourth highest maximum daily 8-hour average) contributions from in-domain Mexican and Canadian anthropogenic emissions at AQS monitors in 2023 projections. Monitors that are projected as nonattainment in 2023 are outlined squares and all other monitors are smaller circles.

Modeling Example: More Complex

- Chemical Transport Modeling (CTM) is the preferred approach for quantifying international contribution for pollutants with a secondary component (such as O3 and PM2.5).
  - For prospective demonstrations, the modeling should use the same base case and future year, consistent with the SIP modeling.
  - For retrospective demonstrations, the modeling should focus on years used in the attainment evaluation.
  - Long-range impacts evaluation of international emissions will typically include a global simulation and a regional simulation.
- Quantifying the impact from international sources may be done using a combination of sensitivity and/or source apportionment model runs.
- When the international emissions of focus cross scales (global to regional), the emissions should be consistent between the two scales and the sensitivity or source apportionment modeling must also cross scales.

How to Comment on Draft Section 179B Demonstration Guidance

- EPA will accept feedback on the draft guidance through **March 10, 2020**.
- Interested stakeholders can submit comments to:
Docket ID No. EPA-HQ-OAR-2019-0668
- Specifically request input on areas that could use further explanation or clarification
- Slides will be posted on EPA website after webinar
https://www.epa.gov/ground-level-ozone-pollution/international-transport-air-pollution

QUESTIONS?

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