Appendix W-Section 8 Webinar Logistics

- Webinar audio is available via:
  - Your computer speakers (*preferred option*)
  - or by dialing 1-866-299-3188 and using the conference code 9195411850#.
  - If using the conference line option, please mute your line (your mute button or *6) and do not put your phone on hold… simply hang up and dial back when you want to rejoin.

- A copy of the webinar presentation is available via:
  - https://www3.epa.gov/ttn/scram/appendix_w/2016/Appendix_W-Section8-WebinarPresentation.pdf

- Questions will be accepted through the webinar chat window and answered later in the webinar or offline afterwards.

Appendix W – Section 8

Modeling Domain, Source Data, and Background Concentrations

US EPA

Office of Air Quality Planning & Standards

Webinar

August 3, 2017

Webinar Outline

- Plug for 2017 RSL Modelers' Workshop
- Modeling Domain
- Source Data
- Background Concentrations
- Source/Cumulative Impact Analyses
- Question and Answer Session

2017 Regional, State, and Local (RSL) Modelers' Workshop

- The 2017 RSL Modelers' Workshop has been scheduled for Monday, September 25th and Tuesday, September 26th at the EPA Campus in RTP, NC.
  - Monday is a "stakeholder" day open to everyone.
  - Tuesday is reserved for the co-regulating agencies only.

- Please visit the informational webpage on SCRAM for registration information and a draft agenda.

  https://www.epa.gov/scram/2017-regional-state-and-local-modelers-workshop

Upfront Disclaimer

- The EPA continues to caution against the literal and uncritical application of very prescriptive procedures for conducting NAAQS and PSD increments modeling compliance demonstrations as described in Chapter C of the 1990 *draft* New Source Review Workshop Manual (a.k.a. the *draft* Puzzle Book).
  - Following such procedures in a literal and uncritical manner has led to practices that are overly conservative and unnecessarily complicate the permitting process.
- The EPA provided a renewed emphasis on the development and vetting of a modeling protocol with the appropriate reviewing authority to discuss aspects of the input data and assessment technique, to identify potential issues, and to help streamline the entire compliance demonstration process.
  - To assist with model protocol development, we revised the Air Quality Analysis Checklist and will continue to update based on Regional Office and reviewing authority feedback.

Modeling Domain

Section 8.1

Modeling Domain

- Over the years, the EPA observed that modeling domains for compliance demonstrations had been expanding and often reaching well beyond 50km… sometimes including sources over 100km away with representative ambient monitoring between the distant source and the project location.
  - The EPA no longer endorses the overly conservative practices described in Chapter C, IV.B (Determining the Impact Area) of the *draft* Puzzle Book.

- The inclusion of larger and larger domains and more and more "nearby" sources added unnecessary burden and was/is inappropriate.
  - What may have "worked" under older and much less stringent NAAQS does not "work" with the implementation of the 2010 1-hour NO_2 and SO_2 NAAQS.

Modeling Domain *(Cont)*

- The modeling domain or proposed project's impact area is defined as an area with a radius extending from the new or modifying source to:

  (1) The most distant location where air quality modeling predicts a significant ambient impact will occur, or

  (2) the nominal 50 km distance considered applicable for Gaussian dispersion models, ***whichever is less***.

  - In most situations, the extent to which a significant ambient impact could occur from a new or modifying source likely will be *considerably less* than 50 km, *i.e.*, no more than 10-20km.

  - The intent is to focus the source and cumulative impact analyses on addressing the real air quality issues of the new or modifying source under PSD and other CAA programs.

Modeling Domain *(Cont)*

- An expanded discussion on the establishment of receptor sites (density and location) in the modeling domain is provided in Section 9 to prevent issues with numerous and unreasonable successive revisions of the receptor network.
  - Emphasis is placed on receptor density and location, not total number of receptors.
  - Case-by-case determination with density of receptors sites progressively more resolved near the new or modifying source, areas of interest, and areas with the highest concentrations with sufficient detail to determine where possibly violations of a NAAQS or PSD increment are most likely to occur.
  - A two-step iterative process is recommended in Section 9.2.2(d).
  - The EPA neither anticipates nor encourages numerous/multiple iterations of modeling runs to continually refine receptor placement as described in Chapter C, IV.D.2 (Receptor Network) of *draft* Puzzle Book.

Source Data

Section 8.2

- The discussion in Section 8.2 focuses only on the source(s) under consideration for emissions limits, *i.e.*, the project source, and is summarized in Tables 8-1 and 8-2.

- Of note to avoid further confusion, Tables 8-1 and 8-2 cover treatment of all sources, including nearby and other sources, which will be covered in the next portion of today's webinar regarding Background Concentrations (Section 8.3).

Source Data: SIP Demonstrations

- For the purposes of SIP attainment demonstrations for ozone, $PM_{2.5}$ and regional haze purposes, new language is included under Section 8.2.2(a) for the appropriate establishment of base and future year emissions.
  - Base year emissions should be reflective of actual emissions in that particular year.
  - Future year emissions should consider projected future growth (increase/decrease activity), expected emissions controls (due to regulations, settlement agreements, or consent decrees), fuel switches, and any other relevant information.

Source Data: SIP Revisions and PSD

- For the purposes of SIP revisions and demonstrating NAAQS compliance relative to inert pollutants for stationary source(s) subject to compliance evaluation, the input of "allowable" emissions are required for the regulatory dispersion modeling.
  - Section 8.2.2(b) – References Table 8-1 for SIP revisions.
  - Section 8.2.2(c) – References Table 8-2 for NAAQS compliance.

- Revised language is also included in Section 8.2.2(e) regarding the emissions from mobile sources with appropriate references for more detailed information and data requirements in the user's manuals for each of the applicable models for mobile sources.

Table 8-1. - Point Source Model Emission Inputs for SIP Revisions of Inert Pollutants[1]

Averaging time	Emissions limit (lb/MMBtu)[2]	X	Operating level (MMBtu/hr)[2]	X	Operating factor (*e.g.*, hr/yr, hr/day)
Stationary Point Source(s) Subject to SIP Emissions Limit(s) Evaluation for Compliance with Ambient Standards *(Including Areawide Demonstrations)*					
Annual & quarterly	Maximum allowable emission limit or federally enforceable permit limit.		Actual or design capacity (whichever is greater), or federally enforceable permit condition.		Actual operating factor averaged over the most recent 2 years.[3]
Short term (≤ 24 hours)	Maximum allowable emission limit or federally enforceable permit limit.		Actual or design capacity (whichever is greater), or federally enforceable permit condition.[4]		Continuous operation, i.e., all hours of each time period under consideration (for all hours of the meteorological database).[5]
Nearby Source(s)[6]					
Annual & quarterly	Maximum allowable emission limit or federally enforceable permit limit.[6]		Annual level when actually operating, averaged over the most recent 2 years.[3]		Actual operating factor averaged over the most recent 2 years.[3,8]
Short term (≤ 24 hours)	Maximum allowable emission limit or federally enforceable permit limit.[6]		Temporally representative level when actually operating, reflective of the most recent 2 years.[3,7]		Continuous operation, i.e., all hours of each time period under consideration (for all hours of the meteorological database).[5]
Other Source(s)[6,9]					

The ambient impacts from Non-nearby or Other Sources (*e.g.*, natural sources, minor sources and ,distant major sources, and unidentified sources) can be represented by air quality monitoring data unless adequate data do not exist.

1. For purposes of emissions trading, NSR, or PSD, other model input criteria may apply. See Section 8.2 for more information regarding attainment demonstrations of primary PM2.5.
2. Terminology applicable to fuel burning sources; analogous terminology (*e.g.*, lb/throughput) may be used for other types of sources.
3. Unless it is determined that this period is not representative.
4. Operating levels such as 50 percent and 75 percent of capacity should also be modeled to determine the load causing the highest concentration.
5. If operation does not occur for all hours of the time period of consideration (*e.g.*, 3 or 24-hours) and the source operation is constrained by a federally enforceable permit condition, an appropriate adjustment to the modeled emission rate may be made (*e.g.*, if operation is only 8 a.m. to 4 p.m. each day, only these hours will be modeled with emissions from the source. Modeled emissions should not be averaged across non-operating time periods.)
6. See Section 8.3.3.
7. Temporally representative operating level could be based on Continuous Emissions Monitoring (CEM) data or other information and should be determined through consultation with the appropriate reviewing authority (Paragraph 3.0(b)).
8. For those permitted sources not in operation or that have not established an appropriate factor, continuous operation (i.e., 8760) should be used.
9. See Section 8.3.2.

Table 8-1

- For the source(s) under consideration for emissions limits (project source), the use of maximum allowable or federally enforceable emissions limits and operating level is required.

- No change in this portion of the table since the 2005 version of Appendix W.

Table 8-2. - Point Source Model Emission Inputs for NAAQS Compliance in PSD Demonstrations

Averaging time	Emissions limit (lb/MMBtu)[1]	X	Operating level (MMBtu/hr)[2]	X	Operating factor (*e.g.*, hr/yr, hr/day)
Proposed Major New or Modified Source					
Annual & quarterly	Maximum allowable emission limit or federally enforceable permit limit.		Design capacity or federally enforceable permit condition.		Continuous operation (i.e., 8760 hours).[2]
Short term (≤ 24 hours)	Maximum allowable emission limit or federally enforceable permit limit.		Design capacity or federally enforceable permit condition.[3]		Continuous operation, i.e., all hours of each time period under consideration (for all hours of the meteorological database).[2]
Nearby Source(s) [4,5]					
Annual & quarterly	Maximum allowable emission limit or federally enforceable permit limit.[5]		Annual level when actually operating, averaged over the most recent 2 years.[6]		Actual operating factor averaged over the most recent 2 years.[6,8]
Short term (≤ 24 hours)	Maximum allowable emission limit or federally enforceable permit limit.[5]		Temporally representative level when actually operating, reflective of the most recent 2 years.[6,7]		Continuous operation, i.e., all hours of each time period under consideration (for all hours of the meteorological database).[2]
Other Source(s) [5,9]					

The ambient impacts from Non-nearby or Other Sources (*e.g.*, natural sources, minor sources and ,distant major sources, and unidentified sources) can be represented by air quality monitoring data unless adequate data do not exist.

1. Terminology applicable to fuel burning sources; analogous terminology (*e.g.*, lb/throughput) may be used for other types of sources.
2. If operation does not occur for all hours of the time period of consideration (*e.g.*, 3 or 24-hours) and the source operation is constrained by a federally enforceable permit condition, an appropriate adjustment to the modeled emission rate may be made (*e.g.*, if operation is only 8 a.m. to 4 p.m. each day, only these hours will be modeled with emissions from the source. Modeled emissions should not be averaged across non-operating time periods.
3. Operating levels such as 50 percent and 75 percent of capacity should also be modeled to determine the load causing the highest concentration.
4. Includes existing facility to which modification is proposed if the emissions from the existing facility will not be affected by the modification. Otherwise use the same parameters as for major modification.
5. See Section 8.3.3.
6. Unless it is determined that this period is not representative.
7. Temporally representative operating level could be based on Continuous Emissions Monitoring (CEM) data or other information and should be determined through consultation with the appropriate reviewing authority (Paragraph 3.0(b)).
8. For those permitted sources not in operation or that have not established an appropriate factor, continuous operation (*i.e.*, 8760) should be used.
9. See Section 8.3.2.

Table 8-2

- For the source(s) under consideration for emissions limits (project source), the use of maximum allowable or federally enforceable emissions limits and operating level is required.

- No change in this portion of the table since the 2005 version of Appendix W.

Background Concentrations

Section 8.3

- Section 8.3 discusses the appropriate background concentrations to include with the Source Data (Section 8.2) in Cumulative Impact Analyses (CIA) only. This Section does not apply to Source Impact Analyses (SIA). Background concentrations can include ambient monitoring data, nearby sources, and other sources, as described in the next few slides.

Background Concentrations: Ambient Data

- In the final rule, there is an increased emphasis on understanding and appropriately accounting for background concentrations.
  - In many case, numerous “other” sources in proximity to the new or modifying source are represented with background monitoring data.
  - In many cases, the design value for the applicable NAAQS set as an uniform monitored background contribution is the best starting point for defining the appropriate metric to characterize background.
  - There should be considerations and/or appropriately justified adjustments made to the ambient monitoring data for times when the project source is impacting the ambient monitor or other circumstances when the ambient monitor is impacted by activities that are not typical or not expected to occur again in the future.

Background Concentrations: Ambient Data *(Cont)*

- For the short-term NAAQS, it may be appropriate to pair the ambient monitoring data in a temporal manner that is reflective of seasonal or other patterns (*e.g.*, pairing by season and/or hour of day), but daily or hourly pairing is not recommended by the EPA except in very rare and well justified circumstances (Section 8.3.2(e)).

- For situations where monitored air quality concentrations vary across the modeling domain, it may also be appropriate to consider air quality monitoring data from multiple monitors within the project area.

- A brief discussion (Section 8.3.1(c) and 8.3.2(f)) on the use of photochemical grid modeling to appropriately characterize background concentrations in certain situations has also been added.

Background Concentrations: Nearby Sources

- All sources in the vicinity of the source(s) under consideration for emissions limits that are not adequately represented by ambient monitoring data should be explicitly modeled as "nearby" sources.
  - Sources that cause a significant concentration gradient in the vicinity of the sources(s) under consideration for emissions limits are not likely to be adequately characterized by monitoring data.
    - The discussion of significant concentrations gradient is expanded to help better identify the "nearby" source(s) that should also be explicitly modeled in the compliance demonstration.
    - There is need for continued sharing of best practices and real-world examples of the use of significant concentrations gradients (*e.g.*, Showa Denko, SCDHEC/Region 4) in compliance demonstrations.
    - The EPA signaled in the preamble of the final rule that it would continue to work with the stakeholder community to clarify and improve upon the existing technical guidance with respect to the development and analysis of significant concentration gradients from nearby sources.

Background Concentrations: Nearby Sources *(Cont)*

- Of considerable note, Tables 8-1 and 8-2 have been revised as proposed to *require* modeling of nearby sources using "typical / representative actual" emissions (adjusted by operating level) based on the most recent 2-years of normal source operation.

- The 2017 revision of Appendix W replaces the discussion in Chapter C, IV.D.4 (Source Data) of the *draft* Puzzle Book that states all nearby sources must be explicitly modeled using maximum allowable values for the emissions limit and operating level.

- This "maximum allowable" *draft* Puzzle Book language regarding the operating level for nearby sources propagated into Appendix W through the years and was a *recommendation* in the 2005 version which the 2017 revision replaces.

Table 8-1. - Point Source Model Emission Inputs for SIP Revisions of Inert Pollutants[1]

Averaging time	Emissions limit (lb/MMBtu)[2]	X	Operating level (MMBtu/hr)[2]	X	Operating factor (*e.g.*, hr/yr, hr/day)
Stationary Point Source(s) Subject to SIP Emissions Limit(s) Evaluation for Compliance with Ambient Standards *(Including Areawide Demonstrations)*					
Annual & quarterly	Maximum allowable emission limit or federally enforceable permit limit.		Actual or design capacity (whichever is greater), or federally enforceable permit condition.		Actual operating factor averaged over the most recent 2 years.[3]
Short term (≤ 24 hours)	Maximum allowable emission limit or federally enforceable permit limit.		Actual or design capacity (whichever is greater), or federally enforceable permit condition.[4]		Continuous operation, i.e., all hours of each time period under consideration (for all hours of the meteorological database).[5]
Nearby Source(s)[6]					
Annual & quarterly	Maximum allowable emission limit or federally enforceable permit limit.[6]		Annual level when actually operating, averaged over the most recent 2 years.[3]		Actual operating factor averaged over the most recent 2 years.[3,8]
Short term (≤ 24 hours)	Maximum allowable emission limit or federally enforceable permit limit.[6]		Temporally representative level when actually operating, reflective of the most recent 2 years.[3,7]		Continuous operation, i.e., all hours of each time period under consideration (for all hours of the meteorological database).[5]
Other Source(s)[6,9]					

The ambient impacts from Non-nearby or Other Sources (*e.g.*, natural sources, minor sources and ,distant major sources, and unidentified sources) can be represented by air quality monitoring data unless adequate data do not exist.

1. For purposes of emissions trading, NSR, or PSD, other model input criteria may apply. See Section 8.2 for more information regarding attainment demonstrations of primary PM2.5.
2. Terminology applicable to fuel burning sources; analogous terminology (*e.g.*, lb/throughput) may be used for other types of sources.
3. Unless it is determined that this period is not representative.
4. Operating levels such as 50 percent and 75 percent of capacity should also be modeled to determine the load causing the highest concentration.
5. If operation does not occur for all hours of the time period of consideration (*e.g.*, 3 or 24-hours) and the source operation is constrained by a federally enforceable permit condition, an appropriate adjustment to the modeled emission rate may be made (*e.g.*, if operation is only 8 a.m. to 4 p.m. each day, only these hours will be modeled with emissions from the source. Modeled emissions should not be averaged across non-operating time periods.)
6. See Section 8.3.3.
7. Temporally representative operating level could be based on Continuous Emissions Monitoring (CEM) data or other information and should be determined through consultation with the appropriate reviewing authority (Paragraph 3.0(b)).
8. For those permitted sources not in operation or that have not established an appropriate factor, continuous operation (i.e., 8760) should be used.
9. See Section 8.3.2.

Table 8-1

- For the “few” nearby sources to be explicitly modeled, typical / representative actual emissions (adjusted by operating level) should be used.

- Of note for short-term demonstrations, continuous operations does not need to include all hours/year if there are defined period when the nearby facility is not in operation.

Table 8-2. - Point Source Model Emission Inputs for NAAQS Compliance in PSD Demonstrations

Averaging time	Emissions limit (lb/MMBtu)[1]	X	Operating level (MMBtu/hr)[2]	X	Operating factor (*e.g.*, hr/yr, hr/day)
Proposed Major New or Modified Source					
Annual & quarterly	Maximum allowable emission limit or federally enforceable permit limit.		Design capacity or federally enforceable permit condition.		Continuous operation (i.e., 8760 hours).[2]
Short term (≤ 24 hours)	Maximum allowable emission limit or federally enforceable permit limit.		Design capacity or federally enforceable permit condition.[3]		Continuous operation, i.e., all hours of each time period under consideration (for all hours of the meteorological database).[2]
Nearby Source(s)[4,5]					
Annual & quarterly	Maximum allowable emission limit or federally enforceable permit limit.[5]		Annual level when actually operating, averaged over the most recent 2 years.[6]		Actual operating factor averaged over the most recent 2 years.[6,8]
Short term (≤ 24 hours)	Maximum allowable emission limit or federally enforceable permit limit.[5]		Temporally representative level when actually operating, reflective of the most recent 2 years.[6,7]		Continuous operation, i.e., all hours of each time period under consideration (for all hours of the meteorological database).[2]
Other Source(s)[5,9]					

The ambient impacts from Non-nearby or Other Sources (*e.g.*, natural sources, minor sources and ,distant major sources, and unidentified sources) can be represented by air quality monitoring data unless adequate data do not exist.

1. Terminology applicable to fuel burning sources; analogous terminology (*e.g.*, lb/throughput) may be used for other types of sources.
2. If operation does not occur for all hours of the time period of consideration (*e.g.*, 3 or 24-hours) and the source operation is constrained by a federally enforceable permit condition, an appropriate adjustment to the modeled emission rate may be made (*e.g.*, if operation is only 8 a.m. to 4 p.m. each day, only these hours will be modeled with emissions from the source. Modeled emissions should not be averaged across non-operating time periods.
3. Operating levels such as 50 percent and 75 percent of capacity should also be modeled to determine the load causing the highest concentration.
4. Includes existing facility to which modification is proposed if the emissions from the existing facility will not be affected by the modification. Otherwise use the same parameters as for major modification.
5. See Section 8.3.3.
6. Unless it is determined that this period is not representative.
7. Temporally representative operating level could be based on Continuous Emissions Monitoring (CEM) data or other information and should be determined through consultation with the appropriate reviewing authority (Paragraph 3.0(b)).
8. For those permitted sources not in operation or that have not established an appropriate factor, continuous operation (*i.e.*, 8760) should be used.
9. See Section 8.3.2.

Table 8-2

- For the “few” nearby sources to be explicitly modeled, typical / representative actual emissions (adjusted by operating level) should be used.

- Of note for short-term demonstrations, continuous operations does not need to include all hours/year if there are defined period when the nearby facility is not in operation.

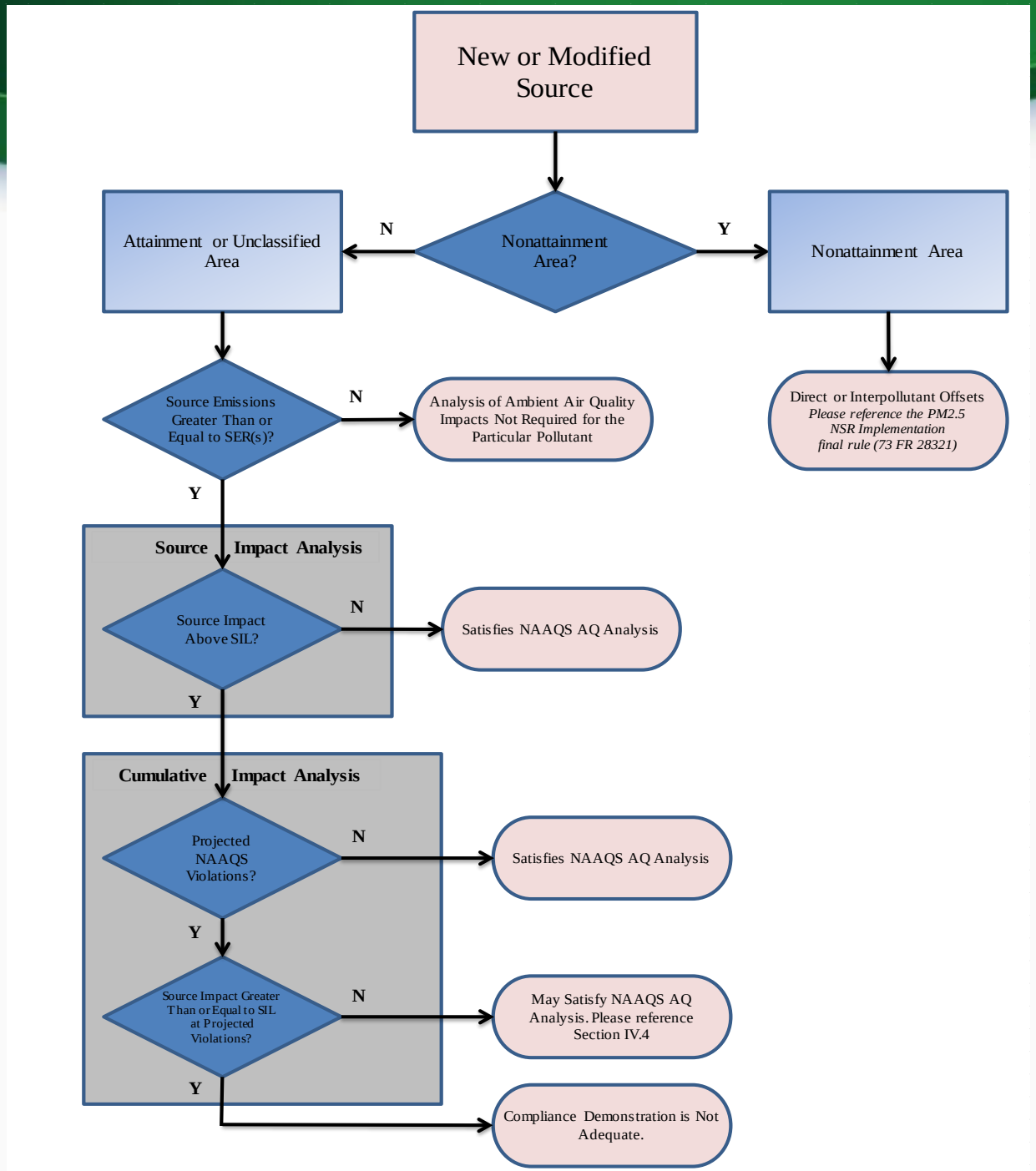
Background Concentrations: Other Sources

- That portion of the background attributable to all other sources (*e.g.*, natural sources, minor and distant major sources) should be accounted for through use of ambient monitoring data and determined by procedures found in Section 8.3.2 in keeping with eliminating or reducing the source-oriented impacts from nearby sources to avoid potential double-counting of modeled and monitored contribution.

Source Impact and Cumulative Impact Analyses

Source/Cumulative Impact Analyses

- The EPA updated the recommendations in Section 9.2.3 (NAAQS and PSD Increment Compliance Demonstrations for New or Modifying Sources) to more clearly and accurately reflect the longstanding practice of performing:
  - a Source Impact Analysis (SIA) as a first stage of the NAAQS and PSD increments compliance demonstration and, as necessary,
  - conducting a more comprehensive Cumulative Impact Analysis (CIA) as the second stage.
- Each stage should involve increasing complexity and details, as required, to fully demonstrate that a new or modifying source will not cause or contribute to a violation of any NAAQS or PSD increment.
- The appropriate considerations and applications of screening and/or refined model are described in each stage throughout Section 9.2.3.



- Source Impact Analysis (SIA) is the first stage of the NAAQS and PSD increments compliance demonstration

- As necessary, the permit applicant may conduct a more comprehensive Cumulative Impact Analysis (CIA) as the second stage.

Design Concentrations

- The definition and discussion of design concentrations was substantially updated from the previous version of Appendix W and unified in Section 9.2.2.
  - For NAAQS assessments, the design concentration is the combination of the appropriate background concentration (Section 8.3) with the estimated modeled impact of the proposed source.
  - For PSD increment assessments, the design concentration includes impacts occurring after the appropriate baseline date from all increment-consuming and increment-expanding sources.
  - For many cases, the best starting point would be use of the current design value for the applicable NAAQS as a uniform monitored background contribution across the project area. However, there are cases in which the current design value may not be appropriate.

Design Concentrations *(Cont)*

- EPA does not recommend hourly or daily pairing of monitored background and modeled concentrations except in rare cases.

- The seasonal (or quarterly) pairing of monitored and modeled concentrations should sufficiently address situations to which the impacts from modeled emissions are not temporally correlated with background monitored levels.

- In all situations, additional considerations for the calculation of design concentrations should be discussed with the appropriate reviewing authority.

Question and Answer Session

- Please use the chat window within the webinar interface to submit questions. We will attempt to answer as many questions as possible and follow-up with others offline.

- For questions regarding the Appendix W final rule after the webinar, please contact:

George Bridgers
OAQPS/AQAD/AQMG
bridgers.george@epa.gov
(919) 541-5563