



# Draft Guidance on Developing Background Concentrations for Use in Modeling Demonstrations



EPA-454/P-23-001  
October 2023

Draft Guidance on Developing Background Concentrations for Use in Modeling  
Demonstrations

U.S. Environmental Protection Agency  
Office of Air Quality Planning and Standards  
Air Quality Assessment Division  
Research Triangle Park, NC

*This Page Intentionally Left Blank*

## Table of Contents

1. Introduction .....	1
2. Guidance Overview .....	6
2.1 Determining a Representative Background Concentration .....	7
2.2 Framework for Identifying a Representative Background Concentration .....	9
3. Application of Framework in Isolated Single Source Scenarios .....	16
3.1 Defining the Scope of the Cumulative Impact Analysis .....	16
3.2 Identifying Relevant and Available Emissions, Air Quality and Environmental Data..	17
3.3 Determining Representativeness of Ambient Monitoring Data .....	17
4. Application of Framework in Multi-source Areas .....	23
4.1 Defining the Scope of the Cumulative Impact Analysis .....	23
4.2 Identifying Relevant and Available Emissions, Air Quality and Environmental Data..	24
4.3 Determining Representativeness of Ambient Monitor Data .....	25
4.4 Determination of Nearby Sources to Explicitly Model.....	29
5. Additional Considerations .....	33
6. Summary.....	34
7. References .....	36
Appendix A: Detailed Table of Available Air Quality, Emissions, and Environmental Data ...	A-1

## **1. Introduction**

The U.S. Environmental Protection Agency (EPA) is providing this “Guidance on Developing Background Concentrations for Use in Modeling Demonstrations” to fulfill a need for additional guidance on developing a representative background concentration used as part of a cumulative impact analysis for National Ambient Air Quality Standards (NAAQS) implementation modeling demonstrations (*e.g.*, Prevention of Significant Deterioration (PSD) compliance demonstrations, State Implementation Plan (SIP) demonstrations for inert pollutants, and SO<sub>2</sub> designations). Due to the complex nature of determining a representative background concentration, the 2005 and 2017 versions of the *Guideline on Air Quality Models* (U.S. EPA, 2005, 2017; hereafter referred to as the 2005 and 2017 *Guideline*) provided recommendations to appropriately account for the background air quality near a new or modifying source as part of a cumulative impact analysis for both isolated single source and multi-source situations. This guidance provides a framework for those undertaking a cumulative impact assessment for NAAQS implementation modeling demonstrations to use in characterizing appropriately representative background concentrations for these situations with an emphasis on identifying what nearby sources to explicitly model.

Section 9.2.3 of the 2017 *Guideline* describes that a cumulative impact analysis may be required if the single-source impact analysis shows that the impact of the new or modifying source may equal or exceed the Significant Impact Level (SIL) for any criteria pollutant or if the permit authority deems it is necessary to meet the PSD compliance demonstration requirement. As such, a cumulative impact analysis needs to appropriately characterize the spatial nature of air quality near a new or modifying PSD source to identify the potential for NAAQS or PSD increment violations and inform the PSD compliance decisions. Characterization of local air

quality around a new or modifying source for each pollutant and averaging period necessitates a full and comprehensive account for all source contributions. A cumulative impact analysis should account for the combined impacts of all direct and precursor emissions of a pollutant from:

- the new or modifying source,
- direct emissions from nearby sources, and
- monitored background concentrations accounting for primary and/or secondary impacts from regional background sources and nearby sources not explicitly modeled<sup>1</sup>.

Appropriately accounting for all source contributions is an inherently discretionary exercise with use of best professional judgment in determining a representative background concentration and identifying nearby sources that need to be explicitly modeled.

Section 8 of the 2017 *Guideline* provides recommendations on how to identify and characterize nearby sources in modeling as part of a cumulative impact analysis for NAAQS compliance demonstrations and PSD permitting. Section 8.3 defines what nearby sources should be included and thus explicitly modeled in a cumulative impact analysis, while section 8.2.2 and Table 8-2 provide information on how nearby sources should be modeled. One primary focus of this guidance is on the process for identifying nearby sources in multi-source areas to determine an appropriately representative background concentration and the potential for modeled NAAQS or PSD increment violations in assessing whether a new or modifying source may cause or contribute to such violations. Recommendations made in both the 2005 and 2017 versions of the *Guideline* highlight the importance of the use of professional judgment in this process.

---

<sup>1</sup> For a more detailed explanation of sources that should be accounted for in a cumulative impact analysis, please see section II.5.1 of the Guidance for Ozone and Fine Particulate Matter Permit Modeling (U.S. EPA, 2022)

Does not represent final Agency action. Draft guidance for review and comment.

Section 8.2.3 of the 2005 *Guideline* recommended that in multi-source areas “all sources expected to cause a significant concentration gradient in the vicinity of the source or sources under consideration for emission limit(s) should be explicitly modeled. The number of such sources is expected to be small except in unusual situations” (U.S. EPA, 2005). The 2005 *Guideline* went on to recommend the exercise of professional judgment to identify nearby sources because no attempt was made to comprehensively define the term significant concentration gradient.

The 2017 revisions to the Background Concentration section (section 8.3) of the *Guideline* built upon the recommendations made in the 2005 *Guideline* by providing additional considerations emphasizing the use of significant concentration gradients to determine which nearby sources to explicitly model and the use of monitored background to adequately represent other sources. Section 8.3.3.a of the 2017 *Guideline* states that “[i]n multi-source areas, determining the appropriate background concentration involves: (1) Identification and characterization of contributions from nearby sources through explicit modeling, and (2) characterization of contributions from other sources through adequately representative ambient monitoring data.” In practice, the interconnectedness of these two components tends to be overlooked and determining the nearby sources to explicitly model using a significant concentration gradient analysis has proven to be problematic given the lack of clear definition of that term by EPA and concrete examples of applying it in PSD compliance demonstrations.

Thus, rather than continued reliance on the concept of significant concentration gradient, this guidance provides a framework that starts with a determination of the representativeness of the ambient monitoring data and then uses readily available data to inform the determination of those nearby sources to explicitly model to best characterize local air quality and to address the



potential NAAQS or PSD increment violations as part of a cumulative impact analysis. The framework was developed based on the underlying recommendations in the 2005 and 2017 versions of the *Guideline* and provides additional clarification to assist the permitting authority's and permit applicant's appropriate application of the inherent discretion under the *Guideline*. The framework outlines several qualitative and quantitative considerations for both isolated-single source and multi-source scenarios that are consistent with the recommendations made in section 8.3 of the 2023 proposed revisions of the *Guideline on Air Quality Models* (U.S. EPA, 2023; hereafter referred to as the 2023 proposed *Guideline*<sup>2</sup>). The intended effect of applying this framework is to assist permit applicants in identifying and documenting the determination of nearby sources to be explicitly modeled as part of a cumulative impact analysis and thereby improve their ability to adequately represent the local air quality near the project source under consideration. The analyses performed while applying this framework should be documented in the modeling protocol and permit record to justify the applicable NAAQS and PSD determinations. This document presents recommended procedures to those conducting a cumulative impact analysis to follow in developing an accurate representation of local air quality for sources under consideration for PSD and SIP compliance demonstrations (inert pollutants) and SO<sub>2</sub> designations. This document does not apply to those conducting SIP attainment demonstrations for ozone, PM<sub>2.5</sub>, and regional haze<sup>3</sup> since the emissions from nearby and other sources are included as inputs in the photochemical grid modeling and are fully accounted for in the predicted concentrations (2017 *Guideline*, section 8.3.1(c)).

---

<sup>2</sup> All references to the 2023 proposed *Guideline* will be changed to reference the 2024 *Guideline* after the proposed rule has been finalized.

<sup>3</sup> For more information on SIP attainment demonstrations for ozone, PM<sub>2.5</sub>, and regional haze please refer to the *Modeling Guidance for Demonstrating Air Quality Goals for Ozone, PM<sub>2.5</sub>, and Regional Haze* (EPA 454/R-18-009).

Does not represent final Agency action. Draft guidance for review and comment.

This document is not a rule or regulation, and the guidance it contains may not apply to a particular situation depending upon the individual facts and circumstances germane to the unique objectives of the modeling demonstration. This guidance does not change or substitute for any law, regulation, or any other legally binding requirement, may refer to regulatory provisions without repeating them in their entirety, and is not legally enforceable. The use of non-mandatory language such as “guidance”, “recommend”, “may”, “should”, and “can”, is intended to describe EPA policies and recommendations. Mandatory terminology such as “must” and “required” are used when describing requirements under the terms of the CAA and EPA regulations. This document does not establish or alter any legally binding requirements in and of itself.

This guidance does not create any rights or obligations enforceable by any party or impose binding, enforceable requirements. Since each regulatory action (*e.g.*, PSD permit, SIP revision, etc.) will be considered on a case-by-case basis, this document does not limit or restrict any justifiable approach that regulatory applications and authorities may take to conduct the required compliance demonstrations. Each individual decision must be supported by a record sufficient to demonstrate that the action will not cause or contribute to a violation of the applicable NAAQS and PSD increment. While this document illustrates a framework approach that EPA considers appropriate and acceptable as a general matter, all relevant information regarding air quality in the area of the regulatory action should be examined to determine whether alternative or additional analysis may be necessary in a given case to demonstrate that the appropriate regulatory criteria are satisfied. This document does not represent a conclusion or judgment by EPA that the technical approaches recommended in this document will be sufficient to make a successful compliance demonstration in every circumstance.

Does not represent final Agency action. Draft guidance for review and comment.

Regulatory authorities retain the discretion to address particular issues discussed in this document in a different manner than EPA recommends so long as the approach is adequately justified, supported by the permitting record and relevant technical literature, and consistent with the applicable requirements in the CAA and implementing regulations, including the terms of an approved State Implementation Plan (SIP) or Tribal Implementation Plan (TIP). Furthermore, this guidance is not a final agency action and does not determine applicable legal requirements or the approvability of any particular regulatory application.

## **2. Guidance Overview**

This guidance is appropriate for proposed new, modifying, or existing sources performing a cumulative impact analysis as part of a NAAQS implementation modeling demonstration (e.g., PSD compliance demonstrations, SIP demonstrations for inert pollutants, and SO<sub>2</sub> designations). It provides an EPA recommended framework with a logical progression of steps to identify a representative background concentration for the cumulative impact analysis in situations with an isolated single source (see section 3) and multi-source areas (see section 4). Since each modeling demonstration is considered on a case-by-case basis, this guidance does not limit or restrict any justifiable approach that the modeler and reviewing authority may take to conduct the required demonstrations. Those conducting NAAQS implementation modeling should recognize the importance of the consultation process with the appropriate reviewing authority. This process will help the applicant best work within the EPA's recommended framework and apply the most appropriate qualitative and quantitative considerations to characterize an adequately representative background concentration for cumulative impact analyses.

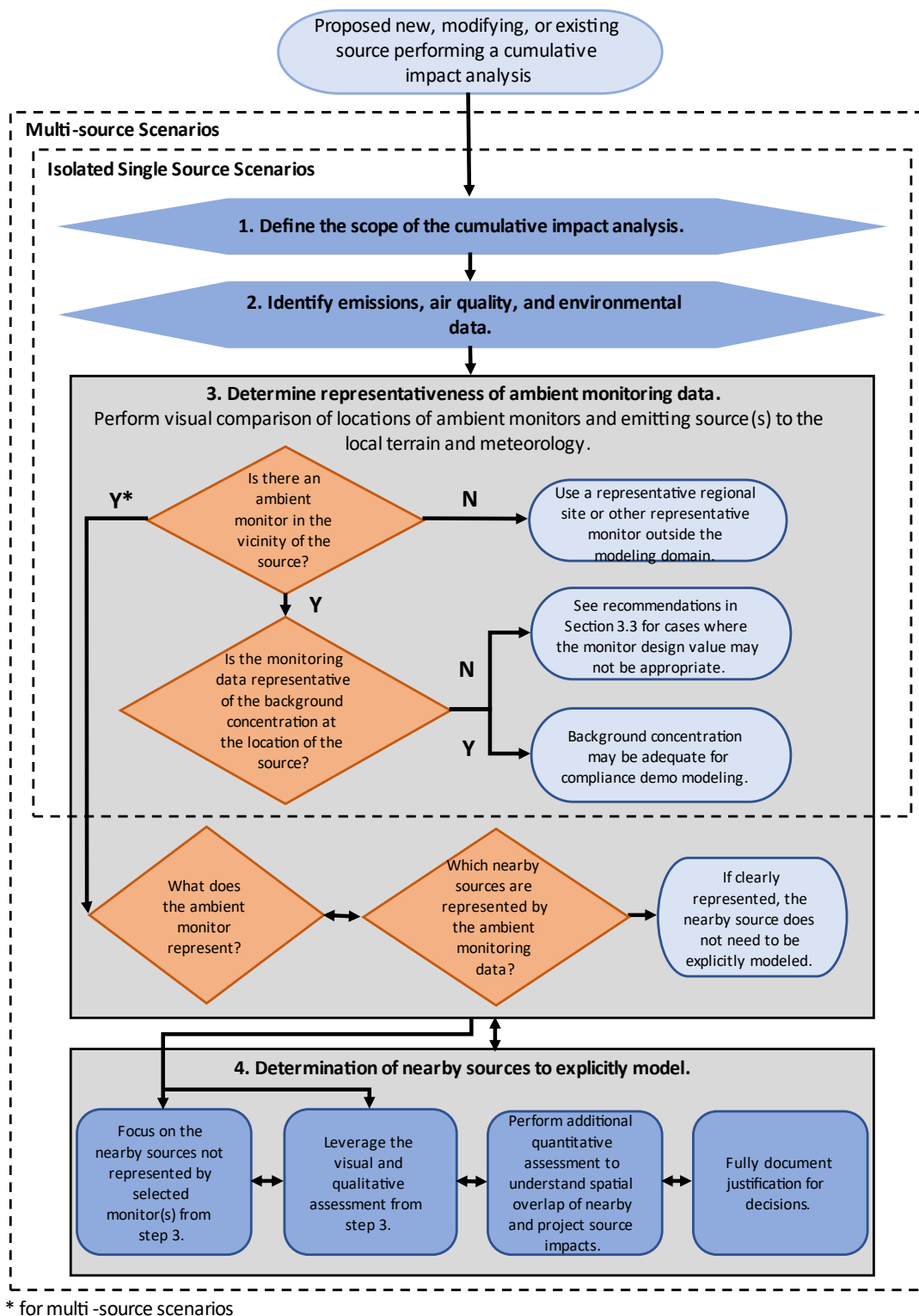
## **2.1 Determining a Representative Background Concentration**

Section 8.3 of the 2017 *Guideline* states that, “Background concentrations are essential in constructing the design concentration, or total air quality concentration, as part of a cumulative impact analysis for NAAQS and PSD increment (section 9.2.3). Background air quality should not include the ambient impacts of the project source under consideration.” Instead, it should include nearby sources, which may or may not be adequately represented by the ambient monitoring data. Background air quality should also include other sources such as natural sources, other unidentified sources (*e.g.*, decommissioned, new or modifying minor and major sources), and local transportation sources. To appropriately characterize background concentrations for cumulative impact assessments, as defined in the 2023 proposed *Guideline*, EPA is recommending a framework composed of the following steps:

1. Define scope of cumulative impact analysis for isolated or multi-source situations
2. Identify relevant and available emissions, air quality and environmental data
3. Determine representativeness of ambient monitoring data
4. Determine nearby sources to be explicitly modeled

This framework will facilitate applying best professional judgment to identify appropriately representative monitoring data and select nearby sources to explicitly model to inform a cumulative impact analysis that best represents the local air quality throughout the geographic scope of the analysis in particular near the project source(s) under consideration.

**Figure 1. EPA Recommended Framework for Characterizing Representative Background Concentrations for Cumulative Impact Assessments**



## **2.2 Framework for Identifying a Representative Background Concentration**

This section discusses each step of the framework as applied to isolated and multi-source scenarios and as applicable to each pollutant and averaging period being evaluated. As indicated in Figure 1, the first three steps of the framework are applicable to project sources located in an isolated location. If the project source is in a multi-source area, those first three steps are then followed by the fourth step to determine the nearby sources to explicitly model. The details and data considerations underlying each step of the framework relies heavily upon the expert judgment to work through each step and conduct a cumulative impact analysis that best characterizes local air quality and, for PSD permitting, inform determination of whether or not the project source will cause or contribute to a NAAQS or PSD increment violation. During the application of the framework, the scope of the cumulative assessment may change from an isolated source situation to a multi-source situation or vice versa if new permitting data is discovered or made available. If this occurs, each step of the framework should be reconsidered given the new scope of the cumulative impact assessment.

Under the EPA recommended framework, the characterization of background concentrations as part of the cumulative impact analysis for each pollutant should be developed according to the following steps:

- 1) Define scope of the cumulative impact analysis for isolated or multi-source situations.

This step involves defining and documenting the following factors<sup>4</sup>:

- a) Project source location relative to other sources/facilities (i.e., to define as an isolated or multi-source area)

---

<sup>4</sup> For more information on important aspects of PSD compliance demonstrations for NAAQS and PSD increment, please refer to EPA's Air Quality Analysis Checklist (U.S. EPA, 2016).

Does not represent final Agency action. Draft guidance for review and comment.

- i) The location of the project source should be mapped alongside other known sources or facilities in the area to determine whether the project source is an isolated source or located in a multi-source area. Emissions inventory lists made available by the state may be referenced to create an initial account of emitting sources within the modeling domain.
- b) Applicable NAAQS pollutants and averaging periods
  - i) The averaging period for the NAAQS pollutant should be considered when estimating the spatial extent of the emitted plume from the project or nearby sources. The dispersion of an emitted plume will differ for short term vs. annual standards and will therefore influence whether a monitor may be representative of impacts from those emitting sources.
- c) Scope of geographic area (i.e., modeling domain)
  - i) In situations where a single-source impact analysis is available, the 2017 *Guideline* defines the modeling domain as “the most distant location where air quality modeling predicts a significant ambient impact will occur” but this area is not to exceed 50 km from the proposed new or modifying source.
  - ii) In situations where a single-source impact analysis is not available and the reviewing authority requests a cumulative impact analysis, the 2017 *Guideline* defines the modeling domain to include “the nominal 50 km distance considered applicable for Gaussian dispersion models[.]”
- d) Dispersion environment (e.g., meteorology, terrain, land/water surface characteristics, urban or rural dispersion assumptions, etc.)

2) Identify relevant and available emissions, air quality, and environmental data.

This step involves identifying and gathering the relevant and available emissions, monitoring, and modeling data including but not limited to the following<sup>5</sup>:

- a) Ambient monitoring data located within the modeling domain of the project source and/or surrounding areas (e.g., ambient monitoring data from state and local agency's ambient air monitoring networks, pre- or post-construction monitoring from the project or any nearby sources, or an EPA ambient air monitoring network)
- b) Permit action or previous dispersion modeling for the project source (e.g., the single source impact analysis)
- c) Pre-existing dispersion modeling for potential nearby sources (e.g., from previous demonstrations or for similar type sources)
- d) Any other relevant emissions and air quality data:
  - i) Annual emissions data for potential nearby sources
  - ii) Active or pending PSD or minor source construction permits or applications for potential nearby sources
  - iii) Active or pending minor modification permit applications
  - iv) Title V, minor source operating permits and other state-only issued permits for potential nearby sources
- e) Environmental data for the modeling domain and/or surrounding area that might influence dispersion and transport of source plumes:
  - i) Meteorology (wind direction and speed)
  - ii) Terrain (flat, complex, particular terrain features)

---

<sup>5</sup> More information on where to retrieve relevant emissions, air quality, and environmental data can be found in Appendix A of this document.



iii) Land/water surface characteristics

These data will serve as the basis to inform the next two steps in determining representativeness of the ambient monitoring data and determining what nearby sources, if any, to explicitly model.<sup>6</sup>

3) Determine representativeness of ambient monitoring data

The key to determining the representativeness of available ambient air quality data is to consider the “extent to which ambient air impacts of emissions from [the project and] nearby sources are reflected in the available ambient measurements, and the degree to which emissions from those background sources during the monitoring period are representative of allowable emission levels under the existing permits” (U.S. EPA, 2010). This step involves determining what "source mix" the ambient monitor data represent, i.e., source contributions to pollutant concentrations, and how the monitor(s) may or may not represent the source mix near the project source. A spatial map should be created of the available monitor data and the location of the project source to visually and qualitatively compare the mix of emitting sources and the dispersion environment (i.e., terrain and wind rose data). The following factors should be considered when determining which ambient monitor data are representative of the air quality around the project source:

- a) The averaging time of the applicable NAAQS with regards to determining whether a monitor captures emissions from the project source or nearby sources during the applicable averaging time.

---

<sup>6</sup> There are a number of tools that are commonly used to visualize the location of the applicable data elements described in this section. Google Earth can be used to evaluate land use throughout the modeling domain, identify terrain features, as well as map out the locations of sources, weather stations and monitors. ESRI ArcGIS may be used to plot terrain data from the USGS National Map and the NLCD land cover data from the MRLC.

Does not represent final Agency action. Draft guidance for review and comment.

- b) The measurement scale (e.g., neighborhood, urban, regional scale, etc.) and monitoring objective (e.g., source oriented, population exposure, background, highest concentration, etc.) of each individual monitor<sup>7</sup>
- c) The mixture of emitting source(s) and their magnitude of emissions and release height (i.e., elevated stacks or ground level releases)
- d) Dispersion environment (e.g., meteorology, terrain, land/water surface characteristics, urban or rural dispersion assumptions, etc.)

The approach for making this determination will differ depending on whether the project source is an isolated source or located in a multi-source area. However, it relies on the same underlying data and principles of performing a spatial comparison of the project source and monitoring site location.

For isolated single sources, the cumulative impact analysis will rely largely, if not solely, on the available monitoring data to fully characterize the background concentrations near the project source. For these situations, a visual and qualitative assessment of the dispersion environment (e.g., the terrain and wind patterns) at the location of the ambient monitors should be performed to determine whether the ambient air at the location of the monitor is representative of the ambient air in the project area. The selected representative monitor should have terrain features and wind patterns similar to the project area, and represent pollutant transport into the modeling domain, i.e., background contributions from other sources. The representative monitor may not be the closest in proximity to the project source or even be located within the modeling domain.

---

<sup>7</sup> EPA provides an up-to-date monitor list of all monitors with data available in the AQS system. This list details the “measurement scale” and “monitoring objective” for each AQS monitor when available. This information should be used to inform the selection of a representative monitor. Monitors may be classified as micro-scale (0 m to 100 m), middle scale (100 m to 500 m), neighborhood scale (500 m to 4 km), urban scale (4 km to 50 km), and regional scale (50 km to hundreds of km). The link to this list can be found at: [https://aqs.epa.gov/aqsweb/airdata/download\\_files.html](https://aqs.epa.gov/aqsweb/airdata/download_files.html)

In situations where the monitored design value is not representative of the background concentration and/or the design value is overly biased due to impacts from the project and existing sources, one can consider modifying the design value data or using modeled estimates to best characterize background air quality levels in consultation with the appropriate reviewing authority. Further refinements to modeled estimates paired with design concentrations may be made based on model options controlling for downwind and upwind sectors.

For multi-source areas, the cumulative impact analysis should rely upon selected monitoring data as supplemented by explicit modeling of nearby sources, as appropriate, to fully characterize the background concentrations near the project source. For these situations, a visual and qualitative assessment of the ambient monitor locations should be performed to understand what they represent in terms of source mix. Similar to the isolated source situation, the dispersion environment at the locations of the monitor site(s) and the project source should be compared along with the emitting source locations and magnitude of emissions to understand the extent to which the ambient monitor may account for the impacts of these emitting sources. In addition to the area surrounding the project source, one should also focus on any areas where the single source impact analysis of the project source, if available<sup>8</sup>, indicates modeled exceedances of the SIL because nearby source contributions will be important in these areas to appropriately represent local air quality in such areas and the potential for NAAQS or PSD increment violations.

---

<sup>8</sup> Throughout this draft guidance, EPA will recommend using results from a single source impact analysis “if available”. In PSD permitting cases, there may be scenarios where the permit authority requests that the permit applicant skip performing a single source impact analysis first and move straight to performing a cumulative impact assessment. A cumulative impact assessment may also be performed for environmental justice purposes where a single source impact analysis may not be available for the applicable sources.

4) Determine nearby sources to be explicitly modeled.

This step is applicable to multi-source areas and involves determination of nearby sources to explicitly model in conjunction with the selected monitoring data to appropriately characterize the background concentration for the cumulative impact analysis. As noted in the *Guideline*, this step is interconnected to the selection of representative monitoring data since the sources deemed to be represented by the monitoring data in step 3 will help determine which sources should be explicitly modeled since they are not accounted for in the monitored background concentration. When determining what nearby sources to explicitly model, one should consider the following factors:

- a) The averaging time of the applicable NAAQS, i.e., spatial extent of the source impacts per plume travel time
- b) The measurement scale (e.g., neighborhood, urban, regional scale, etc.) and monitoring objective (e.g., source oriented, population exposure, background, highest concentration, etc.) of the selected monitor(s)
- c) The mixture of emitting source(s) and their magnitude of emissions and release height (i.e., elevated stacks or ground level releases) at the selected monitoring site, near the project source, and areas that the project source modeling shows impacts above the SIL
- d) Permit action or previous dispersion modeling for the project source (e.g., single source impact analysis)
- e) Pre-existing dispersion modeling for potential nearby sources (e.g., from previous permit actions or for similar type sources)
- f) Dispersion environment (e.g., meteorology, terrain, land/water surface characteristics, etc.) at the selected monitoring site and project source

Basically, to determine which nearby sources are not adequately accounted for by the selected monitoring data, one needs to consider the nature of sources near the project source as well as the areas within modeling domain where the project source has impacts equal to or above the SIL, if known. If a nearby source is not adequately accounted for by the selected monitoring data, then one should consider explicitly modeling those nearby sources to fully characterize air quality impacts and best account for potential NAAQS or PSD increment violations.

### **3. Application of Framework in Isolated Single Source Scenarios**

Section 8.3.2 of the 2023 proposed *Guideline* makes recommendations for isolated single source situations and provides the context, specificity, and flexibility sufficient to determine total air quality concentrations for modeling domains where only contributions from the project source and representative ambient monitoring data are necessary and deemed sufficient. Nearby or neighboring emission sources should not be considered under these isolated-source scenarios. The relative isolation of a particular project source should be based on professional judgment, and the pollutant species and averaging period being assessed. The flow-chart presented in Figure 1 therefore emphasizes the first three steps of the EPA recommended framework to determine representative ambient monitoring data as relevant for isolated source scenarios.

#### **3.1 Defining the Scope of the Cumulative Impact Analysis**

The first step is to develop an overall understanding of the project source and surrounding area that should be accounted for in the cumulative impact assessment. The location of the isolated project source should be mapped within the modeling domain alongside the relevant factors provided in section 2.2 that are gathered in step 2 with an emphasis on the monitoring data within the modeling domain. As stated earlier, in terms of geographic scope of the cumulative impact analysis, in situations where a single-source impact analysis is available, the

2017 *Guideline* defines the modeling domain as “the most distant location where air quality modeling predicts a significant ambient impact will occur” but this area is not to exceed 50 km from the proposed new or modifying source. When a single-source impact analysis for the project source is not available and the reviewing authority requests a cumulative impact analysis, the 2017 *Guideline* defines the modeling domain to include “the nominal 50 km distance considered applicable for Gaussian dispersion models[.]”

### **3.2 Identifying Relevant and Available Emissions, Air Quality and Environmental Data**

For areas with an isolated source(s), section 8.3.2(a) of the 2023 proposed *Guideline* states that “ . . . determining the appropriate background concentration should focus on characterization of contributions from all other sources through adequately representative ambient monitoring data.” So, the emphasis for isolated source situations is on the ambient monitoring data along with environmental data for the modeling domain and surrounding areas that will inform the next step of determining representative background concentrations based on the appropriate ambient monitoring data.

### **3.3 Determining Representativeness of Ambient Monitoring Data**

Section 8.3.2(b) of the 2023 proposed *Guideline* provides EPA’s recommendations for selecting representative ambient monitoring data to characterize the total air quality near an isolated single source. EPA recommends selecting “the most recent quality assured air quality monitoring data collected in the vicinity of the source to determine the background concentration for the averaging times of concern”. The ambient monitoring data may come from a number of sources such as a state and local ambient air monitoring network, an EPA ambient monitoring network, or any pre- or post-construction monitoring data that may be available. The selected ambient monitoring data should be current (i.e., measured in the previous three years) and meet

EPA's recommended methods for data collection and processing<sup>9</sup> in addition to the quality assurance, and quality control requirements<sup>10</sup>. EPA recognizes that the identification and determination of representativeness of ambient monitoring data may be an iterative process when all air quality data relevant to the modeling domain is assessed.

The cumulative impact assessment for isolated sources largely relies on the “characterization of contributions from all other sources through adequately representative ambient monitoring data,” as stated in the 2023 proposed *Guideline*. To identify whether there is ambient monitoring data in the vicinity of the source, EPA recommends visually and qualitatively assessing the modeling domain and its available characteristics (e.g., monitor locations and scales, terrain features, wind rose data, etc.). In cases where there are one or more monitors within the vicinity of the project area, one should exercise the use of professional judgment to determine whether the selected monitor is representative of the background concentration in the project area. EPA generally recommends using data from the closest upwind monitor to the project; however, one needs to assess the representativeness of the monitor location and not solely choose based on proximity. Permit applicants should gather data on the location (i.e., urban vs. rural), wind patterns, and terrain features at both the monitor and the project source to inform the selection of representative background concentration data. Any meteorological data used to identify an upwind monitor should be representative<sup>11</sup> of the area near the monitor and the nearby source affecting the monitor. Monitoring sites may have co-

---

<sup>9</sup> For PSD compliance demonstrations, the collection and processing of the ambient air data should follow the recommendations of the *Ambient Monitoring Guidelines for Prevention of Significant Deterioration* (EPA-450/4-87-007).

<sup>10</sup> The quality assurance and quality control methods for the selected ambient monitor should be consistent with the EPA's *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II – Ambient Air Quality Monitoring Program* (EPA-454/B-13-003).

<sup>11</sup> Additional information regarding determining representativeness of meteorological data can be found in EPA's *Meteorological Monitoring Guidance for Regulatory Modeling Applications* (EPA-454/R-99-005).

Does not represent final Agency action. Draft guidance for review and comment.

located wind field measurements; however, these measurements may not have undergone proper QA/QC to be suitable for this type of analysis.

The following questions should be considered when determining what the ambient monitor represents and how that may differ from the background air quality in the project area:

- Is the monitor located in an urban or rural setting similar to the project area?
- Are the wind and terrain patterns at the monitor consistent with the project area?
- Is the monitor representative of pollutant transport from other sources located outside of the modeling domain?
- Has ambient data from this monitor been used in previous cumulative impact analysis for the project area or surrounding areas?

In addition to these questions, one should keep in mind that the proximity of a monitor to the project source is not inherently linked to how representative that monitor may be of the background concentration in the project area. Therefore, it is critical to understand what the ambient monitor may be representing and how the dispersion environment around the monitor is similar to or differs from that of the project area. For isolated source locations, it is important to note the extent to which the monitor location in closest proximity to the project area differs from the project area, i.e., whether the monitor location is influenced by nearby source emissions outside of the project area, whether the monitor is in an urban area when the project is in a rural area or vice versa, or where the monitor is located in a different type of terrain from the project area, such as complex terrain or flat terrain. In such cases where the closest monitor(s) are not representative of the background concentration in the project area, it may be appropriate to identify monitors outside of the modeling domain. Any ambient monitor may be selected if there is reasonable evidence as to why the selected monitor is most representative of the background



concentration in the project area. If there are no monitors within the vicinity of the source, the 2023 proposed *Guideline* recommends that a regional site<sup>12</sup> monitor may be used to determine background concentrations. Alternatively, as listed in section 2(a) any pre-construction monitoring data that may be available for the project source may be considered as the ambient background monitor if the data is still representative of the project area. Finally, section 8.3.2(f) of the 2023 proposed *Guideline* recommends that “it may be appropriate to use results from a regional-scale photochemical grid model, or other representative model application” in consultation with the appropriate reviewing authority.

When determining an appropriate background concentration to be used in conjunction with the dispersion modeling for the cumulative impact analysis, it is important to consider how the monitor-based background contribution will be combined with the modeled impact from the project and other sources to represent the design concentration, or total air quality concentration. Section 8.2.3(c) of the 2023 proposed *Guideline* outlines several options that are available for the reviewing authority to consider. EPA recommends starting with the current design value from the selected monitor for the applicable NAAQS as a uniform monitored background contribution across the project area. However, given the case-by-case nature of this practice, the uniform background contribution may not be appropriate in all cases, and it may be necessary to modify the ambient data record in consultation with the appropriate reviewing authority. These cases may include but are not limited to the following scenarios:

- Under PSD permitting, if the project source is a modification where the existing facility’s emissions affect the ambient monitor(s), monitored values may be excluded from the design value calculation when the existing source is affecting the monitor. To identify

---

<sup>12</sup> The 2023 proposed *Guideline* defines a regional site as “one that is located away from the area of interest but is impacted by similar or adequately representative sources.”

Does not represent final Agency action. Draft guidance for review and comment.

values to exclude, one should first determine the area of impact for the existing source by comparing emissions information to the monitoring sites within a 90-degree sector downwind of the source in question. The existing source's emissions should then be paired with hourly wind rose data to identify specific hours the existing source is affecting the monitor.

- Data may also be modified or excluded from the ambient data record when the monitor is impacted by atypical activities<sup>13</sup> (i.e., impacts that will not occur again in the future). Examples of this may include but are not limited to construction, roadway repairs, forest fires, or unusual agricultural activities. In these cases, one should determine whether it is appropriate to scale the monitored concentrations by a factor, adjust the data by adding or subtracting a constant value from the monitored concentrations, or omit the specific hours or days of the atypical activity all together. The newly modified concentrations should be compared against a historical record of ambient data from the monitor to determine whether “such adjustments would make the monitored background concentrations more temporally and/or spatially representative of the area around the [project source] for the purposes of the regulatory assessment” (U.S. EPA, 2023).
- For demonstrations regarding short-term standards, the diurnal or seasonal patterns captured in the air quality monitoring data may differ significantly from the diurnal or seasonal patterns used to estimate modeled concentrations. When this occurs, one should

---

<sup>13</sup> For more information on modifying ambient data please refer to EPA's guidance on *Additional Methods, Determinations, and Analyses to Modify Air Quality Data Beyond Exceptional Events* (EPA-457/B-19-002).

Does not represent final Agency action. Draft guidance for review and comment.

pair the air quality monitoring data in a temporal manner that reflects these patterns and follows the recommendations provided for the specific standard<sup>14</sup>.

- When multiple monitors are present in the project area and monitored air quality concentrations appear to vary across the modeling domain, it may be appropriate to use data from multiple monitors within the project area. The manner in which data from multiple monitors may be analyzed and considered in the background concentration is a case-by-case determination based on factors unique to the project area.

These options provide flexibility to relieve challenges that may arise when combining the monitor-based background contribution with the modeled impacts from the project source and allows for the consideration of spatial and temporal variability throughout the modeling domain. However, given that these variabilities can occur on an hourly basis and the possible limitations of hourly observations from the ambient monitoring network, “the EPA does not recommend hourly or daily pairing of monitored background and modeled concentrations except in rare cases of relatively isolated sources where the available monitor can be shown to be representative of the ambient concentration levels in the areas of maximum impact from the proposed new source” (U.S. EPA, 2023). Hour-by-hour pairing is not recommended because this approach assumes that the hourly monitored background concentration is spatially uniform for the hour and that the monitored values are representative of background levels at each receptor. In the 2023 proposed *Guideline*, EPA recommends the use of seasonal or quarterly pairing of monitored and modeled

---

<sup>14</sup> The guidance on *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO<sub>2</sub> National Ambient Standard* recommends “that an appropriate methodology for incorporating background concentrations in the cumulative impact assessment for the 1-hour NO<sub>2</sub> standard would be to use multiyear averages of the 98<sup>th</sup> percentile of the available background concentrations by season and hour-of-day, excluding periods when the source in question is expected to impact the monitored concentration (which is only relevant for modified sources).” The 99<sup>th</sup>-percentile should be used for the 1-hour SO<sub>2</sub> standard.

concentrations as that should sufficiently capture situations where the modeled emissions are not temporally correlated with background monitored levels.

#### **4. Application of Framework in Multi-source Areas**

Section 8.3.3 of the 2023 proposed *Guideline* makes recommendations for multi-source areas and provides the context, specificity, and flexibility sufficient to determine total air quality concentrations for modeling domains that are adequately predicted by contributions from the project source, representative ambient monitoring data, and the explicit modeling of a few nearby sources. The determination of which nearby sources, if any, that will be explicitly modeled to fully characterize background air quality in a multi-source situation should be based on professional judgment consistent with EPA’s framework, and the pollutant species and averaging period being assessed. As highlighted in Section 8.3.3 of the 2023 proposed *Guideline*, “[a] key point here is the interconnectedness of each component in that the question of which nearby sources to include in the cumulative modeling is inextricably linked to the question of what the ambient monitoring data represents within the project area.” The flow-chart presented in Figure 1 adds this additional fourth step of “Determination of Nearby Sources to Explicitly Model” relevant to multi-source areas in applying the EPA recommended framework.

##### **4.1 Defining the Scope of the Cumulative Impact Analysis**

The goal of step 1 is to develop an overall understanding of the project source and surrounding area that should be accounted for in the cumulative impact assessment. The location of the project source should be mapped within the modeling domain alongside the relevant factors provided in section 2.2 that are gathered in step 2 with an emphasis on emission sources within the modeling domain in proximity to the project source and monitoring locations. As stated earlier, in terms of geographic scope of the cumulative impact analysis, in situations where

a single-source impact analysis is available, the 2023 proposed *Guideline* defines the modeling domain as “the most distant location where air quality modeling predicts a significant ambient impact will occur” but this area is not to exceed 50 km from the proposed new or modifying source. When a single-source impact analysis for the project source is not available and the reviewing authority requests a cumulative impact analysis, the 2023 proposed *Guideline* defines the modeling domain to include “the nominal 50 km distance considered applicable for Gaussian dispersion models[.]”

#### **4.2 Identifying Relevant and Available Emissions, Air Quality and Environmental Data**

For areas with multiple source(s), section 8.3.3(a) of the 2023 proposed *Guideline* states that “[...] determining the appropriate background concentration involves: (1) Identification and characterization of contributions from nearby sources through explicit modeling, and (2) characterization of contributions from other sources through adequately representative ambient monitoring data.” So, the emphasis for multi-source situations is on the emissions data and existing modeling for emitting sources and ambient monitoring data along with environmental data for the modeling domain and surrounding areas that will inform the next two steps of determining representative background concentrations and what nearby sources to explicitly model.

In multi-source situations, the added focus is in gathering the relevant data related to characterizing potential nearby sources in the areas near the monitor locations, project source, and areas for which the project source has modeled impacts above the SIL, if known. These data should include the location, release height, emissions rates, and any other available emissions data or observed meteorological data. The emissions data used for further analysis should be representative of “normal” operating conditions at the nearby source. A survey of multiple years

Does not represent final Agency action. Draft guidance for review and comment.

of emissions data may be necessary to identify any years of data that may not be representative of “normal” operating condition for the source. For PSD modeling demonstrations, the emissions data generally is available from the applicable operating permits. In addition, a PSD permit applicant should be aware of any of the following that may be present in the project area:

- Active or pending PSD or minor source construction permits or applications
- Active or pending minor modification permit applications
- Title V, minor source operating permits, and any other state-only issued permits for potential nearby sources

Documentation on these permit applications can usually be obtained through the applicable state environmental agency’s permitting website. Appendix A provides a more comprehensive list of the emissions, air quality, and environmental data to consider when determining an appropriate background concentration.

#### **4.3 Determining Representativeness of Ambient Monitor Data**

As highlighted in the 2023 proposed *Guideline*, for a project source located in a multi-source area, there is an interconnectedness between this step and the next step in that “the question of which nearby sources to include in the cumulative modeling is inextricably linked to the question of what the ambient monitoring data represents within the project area.” Thus, the review of the source emissions and monitoring data in this step is an iterative process with two main questions to consider: (1) what does the ambient monitor represent, and (2) which nearby sources are or are not represented by the ambient monitoring data? Working through the visual and qualitative assessment of these data with these questions in mind should help one account for the inherent interconnectedness in fully representing background concentrations for use in the cumulative impact analysis. For each ambient monitor in consideration here, determining which

nearby sources are or are not represented by that monitor will necessitate working through the qualitative considerations of the data gathered in step 2 and, as appropriate, quantitative analysis of the emissions, monitoring and pre-existing modeling data.

In multi-source situations, the visual and qualitative assessment should include maps of the monitor locations, environmental data such as terrain features and wind patterns, and the locations and magnitude of emitting sources within the first 10 to 20 km of the project source (2017 *Guideline*, section 8.3.3(b)(iii)) and, if available, the area where the project source impacts are greater than the SIL based on pre-existing modeling (i.e., the single source impact analysis)<sup>15</sup>. It is recommended to start with consideration of the closest monitors since the closer the monitor is to those sources, the more likely it is to be representative of the source mix in those areas. Focusing on monitors near the project source and the area with possible exceedances of the SIL is an appropriate narrowing of the scope to relevant nearby sources for consideration rather than looking across the entire modeling domain. The ambient concentration data at the selected monitor(s) along with the source and emissions data can be mapped with the wind patterns and terrain features to gain insights on the potential for these sources to be contributing to the monitor and the degree to which these contributions may be represented by the monitor data. Therefore, a visual assessment and qualitative comparisons of the data and their spatial patterns and relationships can be quite informative in understanding what sources are or are not represented by the monitoring data.

---

<sup>15</sup> The modeling results from the project source's single source impact analysis can be spatially plotted with EPA's AERPLOT tool to post-process any AERMOD dispersion modeling results that are available. The tool converts AERMOD plot file (.PLT) output to a .KMZ format for convenient plotting of the receptor field of ground level concentrations, contours, and concentration gradients. The executable for this tool can be found at: <https://www.epa.gov/scram/air-quality-dispersion-modeling-related-model-support-programs#aerplot>

For certain pollutants and averaging times, the dispersion of the emitted plume will play an influential role as to whether the source contributions may be accounted for by the monitoring data. As stated in section 8.3.3(b)(i) of the 2017 *Guideline*, “[t]he pattern of concentration gradients can vary significantly based on the averaging period being assessed. In general, concentration gradients will be smaller and more spatially uniform for annual averages than for short-term averages, especially for hourly averages. The spatial distribution of annual impacts around a source will often have a single peak downwind of the source based on the prevailing wind direction, except in cases where terrain or other geographic effects are important. By contrast, the spatial distribution of peak short-term impacts will typically show several localized concentration peaks with more significant gradient.” To qualitatively assess the potential contributions of emission sources to the monitor location, the source emissions data may be paired with wind rose data using the applicable averaging times (i.e., short term vs. long term) to understand the extent of plume dispersion and contributions to the monitor. As such, selecting a representative monitor for annual averaging times may be similar to the monitor selection in isolated source situations that reflect the uniform background contributions from other sources outside the modeling domain with some account for those smaller point and non-point sources within the project area. Alternatively, selecting a representative monitor for short-term averaging times should be based upon ambient monitoring data that reflects the higher variability expected from emission sources near the project source, while avoiding or minimizing a conservative account of such contributions if the number of such sources and their emissions are higher near the monitor than the project source. Selection of a representative short-term monitor could be expanded to more than one monitor based on consideration of realistic upwind sectors that would improve representation of higher variabilities and reduce conservatism from double counting of



Does not represent final Agency action. Draft guidance for review and comment.

modeled nearby sources. Note that emission inventories are generally made up of annual totals of source emissions. Information on the operating hours for a source or hourly emission rates may be more informative for shorter term standards (i.e., 1-hr CO, NO<sub>2</sub>, and SO<sub>2</sub>).

The dispersion environment is also important here because the impact from an emitted plume is heavily influenced by local meteorology and the presence of terrain, bodies of water, and land surface characteristics. Visual assessment of the situation using terrain maps and wind roses will be extremely valuable to the qualitative assessment of what nearby source impacts are expected to be reflected in the monitoring data. Depending on the geographic location (i.e., urban vs. rural) of the project source and the ambient monitor location, one should use professional judgment to consider upwind sector influences from urban or rural non-point sources and rule out any lower emitting sources with impacts that are likely reflected in the monitor data and therefore adequately represented in those measured concentration data.

While selecting the monitor data for use in a multi-source situation, keep in mind that a degree of conservatism may be used to select a monitor that is biased high with respect to the project area in cases where it is unclear or uncertain what source mix a monitor is representing. A conservative assumption may be selecting a monitor that is clearly impacted by a large emitting source or multiple sources that are not reflected in the source mix near the project source, or selecting a monitor located in an urban area when the project source is in a more rural location. In addition, the options for modifying the ambient data record detailed in section 3.3 also apply to multi-source situations; however, additional data analysis may be necessary to make these modifications given the added complexity of distinguishing source contributions in multi-source areas.

Does not represent final Agency action. Draft guidance for review and comment.

In summary, the visual and qualitative assessment of the available data described above should result in the selection of a monitor (or monitors) and a detailed understanding of what those monitoring data represent. The selected monitoring data should meet EPA's recommended methods for data collection and processing<sup>9</sup>, and the quality assurance and quality control requirements<sup>10</sup>. These monitoring data should generally represent contributions from other sources within and outside of the modeling domain, and the identified emission sources near the selected monitor. This full and documented understanding of what the selected monitor(s) represents should then inform and facilitate the next step of identification of those nearby sources that are not adequately represented by the monitored data and need to be explicitly modeled.

#### **4.4 Determination of Nearby Sources to Explicitly Model**

The fourth and final step of the framework, as applied to multi-source situations, is to determine which nearby sources to explicitly model. This step builds on the visual and qualitative review that is performed while selecting the monitor in step 3. As stated in the 2023 proposed *Guideline*, "Nearby sources not adequately represented by the ambient monitor through visual assessment should undergo further qualitative and quantitative analysis before being explicitly modeled." Thus, the nearby sources identified in step 3 that are not accounted for in the monitored data should be further analyzed to determine whether to explicitly model them as part of the cumulative impact analysis. The additional analysis in this step should build on the visual and qualitative assessment completed in step 3 with the result of this iterative process being the identification of few, if any, nearby sources whose contributions are not adequately represented by the selected ambient monitoring data. Note that there may be no nearby sources to explicitly model if they are all adequately represented in the background monitoring data.

Does not represent final Agency action. Draft guidance for review and comment.

The nearby sources under consideration will typically be within the first 10 to 20 km from the project source and the area where the project source's impacts equal or exceed the SIL. Those emission sources located in proximity to areas where the project source's single source impact analysis indicates modeled exceedances of the SIL are important to consider in order to appropriately represent local air quality for the cumulative impact analysis. This is especially true in PSD compliance demonstrations because identifying potential NAAQS and PSD increment violations is essential to determine if a new source may cause or contribute to such violations. An initial approach to determine whether to explicitly model those sources identified in step 3 as not being represented in the selected monitoring data that are in close proximity to the project source and the area where the project source impacts exceed the SIL. Such an approach would be the most straightforward determination consistent with the outcome of step 3 and not necessitate additional qualitative or quantitative analysis to inform the determination here.

However, if there is uncertainty as to whether the sources identified in step 3 should be modeled, this section provides information on how to further evaluate the spatial extent of these nearby source impacts to inform determining the need for explicit modeling of these sources to fully and credibly estimate background concentrations. The following questions will assist in assessing the representation and resulting dispersion of emissions from the nearby sources. In cases where existing modeling of the nearby source(s) may not be available, these questions should still be considered to understand the spatial nature of the emitted plumes from each source.

Does not represent final Agency action. Draft guidance for review and comment.

- How far are the nearby sources from the project source?
  - The 2017 Guideline states that “[i]n most cases, the few nearby sources will be located within the first 10 to 20 km from the source(s) under consideration.”
- What terrain features are present around the nearby sources and project source?
  - Terrain maps can show what features may influence overlapping project and nearby source impacts. For example, large terrain features that may obstruct the emissions from a nearby source from impacting the project source’s significant impact area.
- What are the wind patterns influencing plume dispersion from the nearby sources?
  - A wind rose may be useful for this question to assess the frequency that the prevailing wind blows from the nearby source toward the project source.
- If the nearby sources have stacks, what are the stack parameters (height, temperature, exit velocity, and diameter)?
  - A short stack (e.g., less than ~100 ft) may have localized impacts at the ambient air boundary (e.g., fenceline), while a tall stack (e.g., greater than ~100 ft) will likely have impacts farther away.
- Would downwash play a role in the dispersion of a pollutant from the nearby sources such that they may cause elevated concentrations in the vicinity of the project source?

Leveraging the visual and qualitative assessment completed in step 3, these questions should be used to further evaluate the relevant monitoring, emissions, and modeled data and help inform the determination in this step.

In cases where pre-existing modeling of a nearby source is available, post-processing and additional analysis of emissions data and existing modeling results can provide an understanding

of the spatial extent of each source's impacts and how they overlap with the project source's impacts. These modeling results may be available from previous permit actions through the state or local agency's inventory. If available, these results should be spatially plotted to visualize how those source impacts overlap with the project source's impacts and the selected monitor(s) from step 3. If modeling results are not available, existing dispersion modeling of similar types of sources (e.g., an elevated source in a rural, flat terrain area or a ground release in an urban area with a similar wind pattern) could provide insights on the potential dispersion of an emitted plume from a nearby source. The spatial plots generated from the project source and nearby source's dispersion modeling can be used to identify any areas where their concentration impacts overlap. If a monitor has been selected, one should combine the design value from the selected monitor, concentration impacts from the project source, and the estimated concentration impacts from the nearby source(s) to calculate a preliminary design concentration to see if the resulting air quality level may threaten or exceed the NAAQS or PSD increment. If impacts from the nearby source(s) contribute to estimated air quality levels that may threaten or exceed the NAAQS or PSD increment, then these nearby sources should be strongly considered for explicit modeling as part of the cumulative impact assessment. When using pre-existing modeling, one should use their best professional judgment to determine whether the nearby source and dispersion environment are properly represented in the modeling that was previously performed. In general, consideration of quantitative approaches to inform the determination of which nearby sources to explicit model should be determined in consultation with the appropriate reviewing authority and fully described in the modeling protocol and technical documentation of the cumulative impact analysis.

The visual, qualitative, and quantitative assessments completed as part of this step in determining those nearby sources to explicitly model should be fully documented to provide the basis for justification in the decisions. Such documentation will be particularly important for nearby sources that are not explicitly modeled, so EPA recommends including the rationale for that decision as well as for those nearby sources that are explicitly modeled.

In regard to the use of the explicit modeling of nearby sources in the cumulative impact analysis, unlike the recommendation to not hourly pair the monitoring data for this purpose, we do recommend hourly pairing on the explicit modeling of nearby sources with the project source modeling results because the use of the same meteorological inputs within the preferred air quality model provide a credible and appropriate basis to do so.

## **5. Additional Considerations**

Additional considerations in determining background concentrations may include accounting for at-risk communities in ensuring the adequacy of local air quality characterization in these communities, especially in the case of multi-source areas where there is the potential for modeled violations of the NAAQS or PSD increment as part of the cumulative impact assessment. The following tools may be used in defining those communities of focus here:

- EPA's Environmental Justice Screening and Mapping Tool<sup>16</sup>: EJScreen can be used to characterize the nature of the demographics for population living near the new or modifying source and use the demographic index (or other indicators) to define communities of concern that would be the focus of air quality impacts.

---

<sup>16</sup> For more information on EPA's Environmental Screening and Mapping Tool please refer to: [EJScreen: Environmental Justice Screening and Mapping Tool | US EPA](#)

Does not represent final Agency action. Draft guidance for review and comment.

- The Climate and Economic Justice Screening Tool<sup>17</sup>: CEJEST is a geospatial mapping tool that identifies areas across the nation where communities are faced with significant burdens. It can be used to identify communities in the project area that may be burdened by climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development.
- Any other tool that can be utilized to enhance understandings of nearby source control strategies and EJ intersections relevant to the project at hand, and whether to expand inclusion of certain nearby sources in multi-source areas. This can include tools developed by state and local air agencies.

These tools may be used to determine the overlap of such communities with the project source impacts, selected representative monitor location and/or determination of nearby sources to include in the cumulative impact assessment and confirm the adequacy of the characterization of background concentrations to represent local air quality in these communities.

## **6. Summary**

This guidance provides the EPA's recommended framework that offers clear and logical steps to be used with inherent professional judgment and discretion to develop a representative account for background concentration in the modeling domain of the source(s) under consideration. The framework should be applied in both isolated single source and multi-source area situations. Specifically in multi-source areas, the framework will assist in the identification of nearby sources that should be explicitly modeled as part of a cumulative impact assessment. The aim of this framework is to foster consistency across permit demonstrations with sufficient documentation to justify NAAQS and PSD determinations as part of the modeling protocol and

---

<sup>17</sup> For more information on the Climate and Economic Justice Screening Tool please refer to: [Climate and Economic Justice Screening Tool | U.S. Climate Resilience Toolkit](#)

Does not represent final Agency action. Draft guidance for review and comment.

permit record. Consistent with the EPA framework, permit applicants can consider qualitative and quantitative approaches that may not be explicitly noted in this guidance document to better inform their determination and EPA recommends such pursuit is done in consultation with the appropriate permit authority.

DRAFT



## 7. References

- U.S. EPA, 2005. Guideline on Air Quality Models. 40 CFR part 51 Appendix W (70 FR 68218, Nov. 9, 2005). [https://www.epa.gov/sites/default/files/2020-09/documents/appw\\_05.pdf](https://www.epa.gov/sites/default/files/2020-09/documents/appw_05.pdf).
- U.S. EPA, 2010. Applicability of Appendix W Modeling Guidance for the 1-hour SO<sub>2</sub> National Ambient Air Quality Standard. [https://www.epa.gov/sites/default/files/2020-10/documents/clarificationmemo\\_appendixw\\_hourly-so2-naaqs\\_final\\_08-23-2010.pdf](https://www.epa.gov/sites/default/files/2020-10/documents/clarificationmemo_appendixw_hourly-so2-naaqs_final_08-23-2010.pdf)
- U.S. EPA, 2016. Air Quality Analysis Checklist. [https://www.epa.gov/sites/default/files/2020-09/documents/air\\_quality\\_analysis\\_checklist-revised\\_20161220.pdf](https://www.epa.gov/sites/default/files/2020-09/documents/air_quality_analysis_checklist-revised_20161220.pdf).
- U.S. EPA, 2017. Guideline on Air Quality Models. 40 CFR part 51 Appendix W (82 FR 5182, Jan. 17, 2017). [https://www.epa.gov/sites/production/files/2020-09/documents/appw\\_17.pdf](https://www.epa.gov/sites/production/files/2020-09/documents/appw_17.pdf).
- U.S. EPA, 2022. Guidance for Ozone and Fine Particulate Matter Permit Modeling. July 29, 2022. Publication No. EPA 454/R-22-005. Office of Air Quality Planning and Standards, Research Triangle Park, NC. <https://www.epa.gov/system/files/documents/2022-08/2022%20Guidance%20O3%20and%20Fine%20PM%20Modeling.pdf>
- U.S. EPA, 2023. Proposed Revisions to the Guideline on Air Quality Models. 40 CFR part 51 Appendix W (October 2023). <https://www.epa.gov/scram/2023-appendix-w-proposed-rule>.

## Appendix A: Detailed Table of Available Air Quality, Emissions, and Environmental Data

### **Air Quality Data**

#### **Ambient monitoring data**

Ambient monitoring data can come from a number of different sources such as the applicable state and local agency's ambient air monitoring networks, pre- or post-construction monitoring, or an EPA ambient air monitoring network. Any data that is selected for use as the design concentration should meet the QA/QC requirements detailed in the *Ambient Monitoring Guidelines for Prevention of Significant Deterioration* (EPA-450/4-87-007).

Ambient monitoring data from state and local agencies may be made available through their websites or through contact with the appropriate reviewing authority. Additionally, the reviewing authority may have knowledge on any existing pre- or post-construction monitoring that is available for the project or nearby source.

EPA has various platforms to access ambient air monitoring data depending on the data needed based on the NAAQS pollutant standard. Please visit the following website for access and information to outdoor air monitoring data:

<https://www.epa.gov/outdoor-air-quality-data/what-best-way-access-outdoor-air-monitoring-data>

Information and access to air quality design value data for NAAQS pollutants can be found at:

<https://www.epa.gov/air-trends/air-quality-design-values#dvtool>

EPA's AirData Air Quality Monitors app – Interactive Map of Air Quality Monitors (active and inactive) (measurement scales: micro-scale (0 m to 100 m), middle scale (100 m to 500 m), neighborhood scale (500 m to 4 km), urban scale (4 km to 50 km), and regional scale (50 km to hundreds of km)):

<https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors>

## **Emissions Data**

### **Emissions information and modeling files for existing PSD sources**

The applicable state or local environmental agency may provide lists of all sources or air permits (e.g., Title V, minor source, and other state-only issued permits) in their jurisdiction or even have some sort of PSD inventory tool containing permit and modeling information. EPA recommends searching the state or local environmental agency's website first to investigate what information and tools may be available. One may also contact the appropriate reviewing authority (and potentially adjacent authority) to obtain additional data on nearby sources such as relevant modeling files and emissions and stack parameter data if they are tracked by the state or local agency. Emission inventories and modeled emission rates may also be constructed from nearby source air quality operating permits, recent permit applications, and appropriate emission limits. PSD permit applications for proposed or new sources should also be reviewed for any emissions data relevant to the cumulative modeling demonstration and nearby sources inventory.

Power plant NO<sub>x</sub> and SO<sub>2</sub> emissions data can be found at EPA's Clean Air Markets Program Data page:

<https://campd.epa.gov/>

Source operating hours and short-term emissions rates may be available through facility-level Continuous Emissions Monitoring Systems (CEMS) and EPA's Clean Air Market Division Field Audit Checklist Tool: <https://www.epa.gov/power-sector/field-audit-checklist-tool-fact>

Source emissions and stack information may be found in EPA's Emissions Inventory System (EIS): <https://www.epa.gov/air-emissions-inventories/emissions-inventory-system-eis-gateway>

## **Environmental Data**

### **Terrain data**

The primary site for accessing the most up-to-date elevation data is the USGS National Map. This data should be used to assess the presence of terrain features in the modeling domain that may affect the dispersion and potential overlap of emitted plumes from the project or nearby sources.

USGS National Map: <https://www.usgs.gov/programs/national-geospatial-program/national-map>

USGS National Map – Data Download Map: <https://apps.nationalmap.gov/viewer/>

Information on how the national elevation data can be converted for use in the AERMOD modeling system can be found at:  
[https://gaftp.epa.gov/Air/aqmg/SCRAM/models/related/aermap/Access\\_and\\_Conversion\\_of\\_Elevation\\_Data\\_for\\_AERMAP.pdf](https://gaftp.epa.gov/Air/aqmg/SCRAM/models/related/aermap/Access_and_Conversion_of_Elevation_Data_for_AERMAP.pdf).

### **Land use data**

Land cover data can be retrieved from the National Land Cover Database (NLCD). The primary site where you can get the most up-to-date information is the Multi-Resolution Land Characteristics (MRLC) Consortium website. NLCD data can be plotted or viewed using the MRLC's viewer to review the land cover characteristics for the modeling domain. Review of this data will provide knowledge on the location (urban vs. rural) of the project source and how the land use may impact surface characteristics and the dispersion of emitted plumes.

Multi-Resolution Land Characteristics (MRLC) Consortium: <https://www.mrlc.gov/>

Multi-Resolution Land Characteristics (MRLC) Consortium NLCD Viewer: <https://www.mrlc.gov/viewer/>

For more information on the use of land cover data in the AERMOD Modeling System:

[https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/AERMOD\\_Data\\_Resources.pdf](https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/AERMOD_Data_Resources.pdf)

### **Local meteorological data**

For the purposes of determining an appropriate background concentration, there are a number of meteorological datasets and resources that may be used (see section 8.4 of the Guideline). In some cases, there may be observed on-site or site-specific meteorological observations for the project source or nearby sources that can be accessed through the appropriate reviewing authority. The National Oceanic and Atmospheric Administration (NOAA) also have databases of hourly surface observations that are generally collected at airports by the National Weather Service and/or the Federal Aviation Administration (Integrated Surface Dataset). There are also datasets with 1-minute and 5-minute wind data from ASOS sites across the country. Finally, prognostic meteorology data generated by the Weather Research and Forecasting (WRF) model and processed for input to AERMET by the Mesoscale Model Interface Program (MMIF), may be used in cases where the monitored meteorological data is not representative of the project source area. Local meteorological data, more specifically wind speed and direction, may be used to estimate plume dispersion and determine monitor representativeness. Wind speed and direction data may be used to generate a wind rose using one of the many data visualization tools on the market including a tool from Iowa State University that quickly generates wind rose plots.

NOAA/NCEI Integrated Surface Dataset (ISD): <https://www1.ncdc.noaa.gov/pub/data/noaa/>

NOAA/NCEI 1-Minute ASOS Wind Data: <https://www.ncei.noaa.gov/data/automated-surface-observing-system-one-minute-pg1/access/>

NOAA/NCEI 5-Minute ASOS Wind Data: <https://www.ncei.noaa.gov/data/automated-surface-observing-system-five-minute/access/>

Iowa State University Wind Rose Tool: [https://mesonet.agron.iastate.edu/sites/locate.php?network=GA\\_ASOS](https://mesonet.agron.iastate.edu/sites/locate.php?network=GA_ASOS)

For more information on the use of meteorological data in the AERMOD Modeling System:

[https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/AERMOD\\_Data\\_Resources.pdf](https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/AERMOD_Data_Resources.pdf)

[https://gaftp.epa.gov/Air/aqmg/SCRAM/models/met/aermet/aermet\\_userguide.pdf](https://gaftp.epa.gov/Air/aqmg/SCRAM/models/met/aermet/aermet_userguide.pdf)

[https://gaftp.epa.gov/Air/aqmg/SCRAM/models/related/mmif/MMIF\\_Guidance.pdf](https://gaftp.epa.gov/Air/aqmg/SCRAM/models/related/mmif/MMIF_Guidance.pdf)

**Additional Useful Data**

**Information on demographic characteristics of population and/or existence of disadvantaged communities**

EPA's Environmental Justice Screening and Mapping Tool (EJScreen) and the Climate and Economic Justice Screening Tool (CEJEST) are two tools that can be used to collect information on the demographic characteristics and presence of disadvantaged communities in the project area. EJScreen is an environmental justice mapping and screening tool that provides a nationally consistent dataset and approach for combining environmental and demographic socioeconomic indicators. CEJEST has an interactive mapping tool that can be used to identify communities experiencing burdens in eight categories: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development.

EJScreen: <https://www.epa.gov/ejscreen>

CEJEST: <https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5>

Does not represent final Agency action. Draft guidance for review and comment.

---

United States  
Environmental Protection  
Agency

Office of Air Quality Planning and Standards  
Air Quality Assessment Division  
Research Triangle Park, NC

Publication No. EPA-454/P-23-001  
October 2023

---

DRAFT