Developing Background Concentrations for use in Air Modeling Demonstrations

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Joseph A. Stolle, PE
Email jstolle@ramboll.com

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Basic Air Modeling Steps

1. Significant impact analysis
   i. Emissions from the project only
   ii. Results compared to Significant Impact Levels (SILs)
   iii. 1-3% of NAAQS, <SIL project unlikely to contribute to NAAQS exceedance
2. Cumulative Impact Analysis
   i. Includes project level emissions
   ii. Other existing facility sources
   iii. Explicitly modeled near-by sources
   iv. Background concentrations
   v. Results compared to the NAAQS

- Very important that the background concentration is characterized correctly

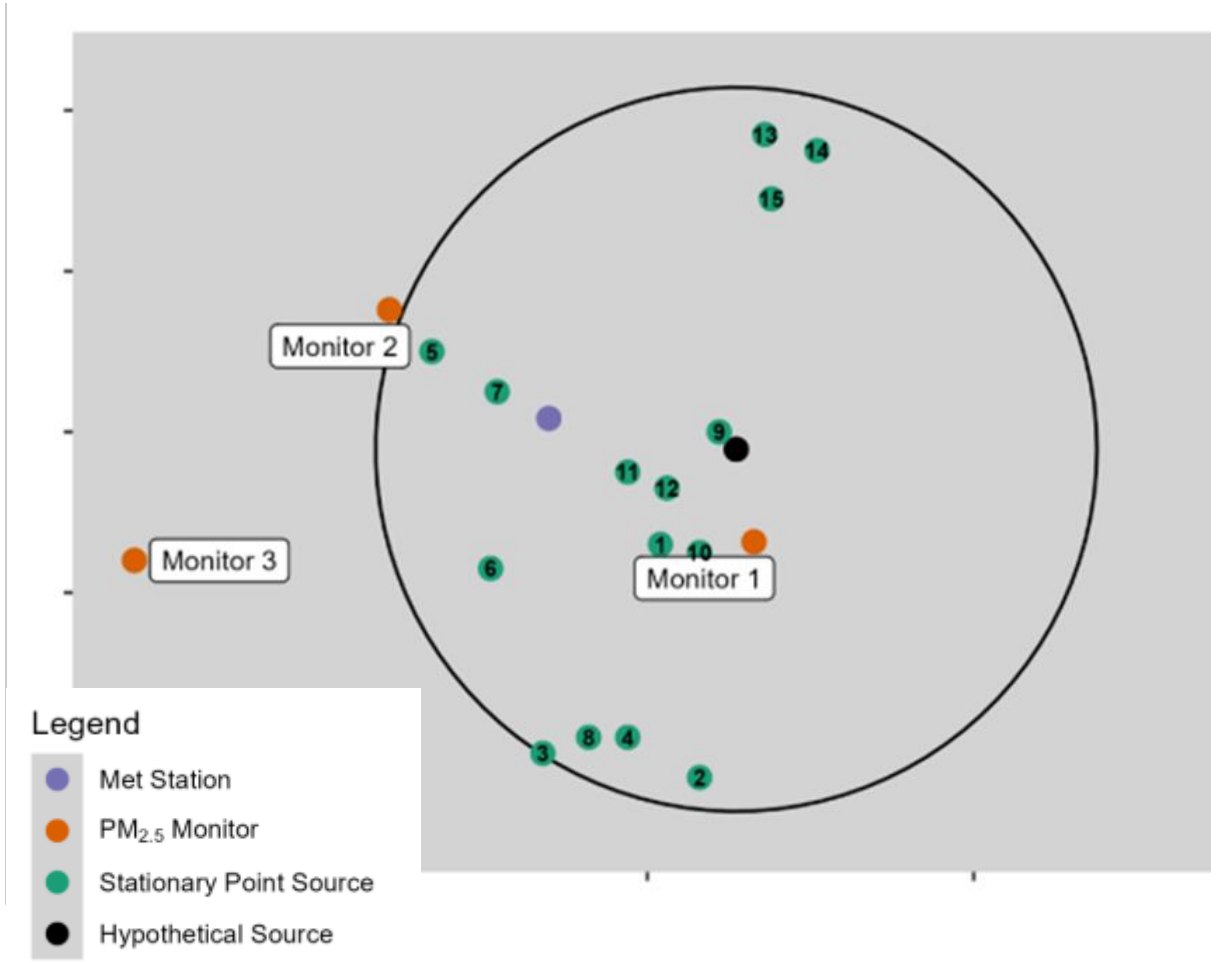
Steps to Characterize Background Concentrations

4 steps to characterize:

1. Define scope of the 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 monitor data
4. Determine nearby sources to explicitly model

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

- The location of the source(s) under consideration should be mapped alongside other known sources or facilities in the area to determine whether the source(s) under consideration is an:
  i. Isolated source or
  ii. 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
- In cases where the source(s) under consideration is undergoing modification, nearby sources should include parts of the existing facility that are not affected in the modification



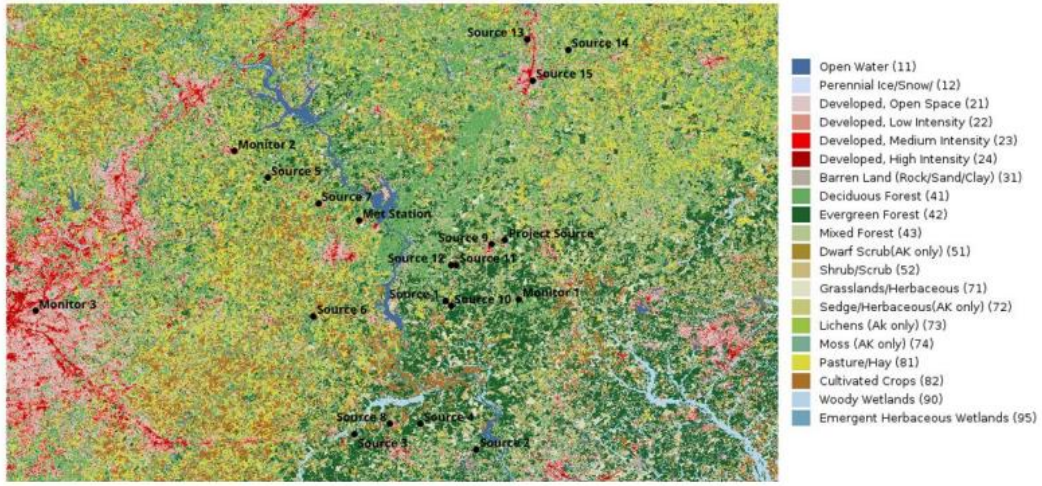
Define scope of the cumulative impact analysis for isolated or multi-source situations (Continued)

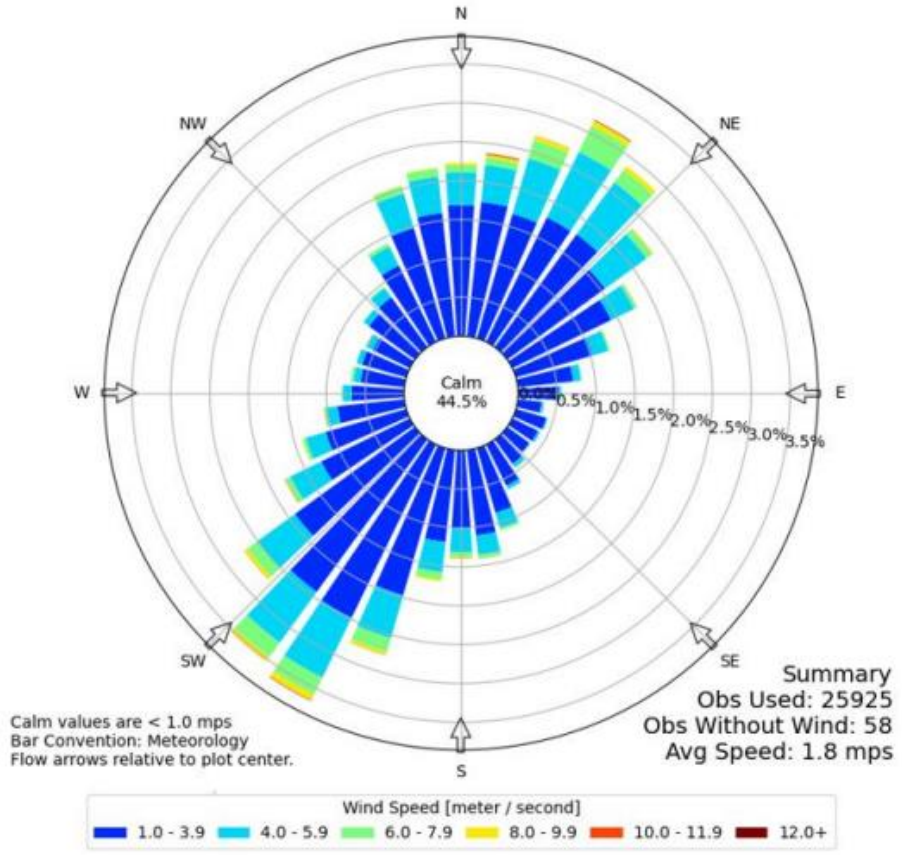
- Averaging period for the NAAQS pollutant should be considered when estimating the spatial extent of the emitted plume from the project or nearby sources.
- The dispersion of an emitted plume will differ for short term vs. annual standards
- Will influence whether a monitor may be representative of impacts from those emitting sources.
    i. Annual impacts much more influenced by predominant/prevailing wind directions than short term

Pollutant	Averaging Period	NAAQS
CO	8-hour	9 ppm
CO	1-hour	35 ppm
Lead	Rolling 3-month	0.15 µg/m^3
NO_2	1-hour	100 ppb
NO_2	1-year	53 ppb
Ozone	8-hour	0.070 ppm
$PM_{2.5}$	1-year	9 µg/m^3
$PM_{2.5}$	24-hour	35 µg/m^3
PM_{10}	24-hour	150 µg/m^3
SO_2	1-hour	75 ppb

Define scope of the cumulative impact analysis for isolated or multi-source situations (Continued)

- Dispersion environment should be considered
  i. meteorology
  ii. terrain
  iii. land/water surface characteristics
  iv. urban or rural dispersion assumptions





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

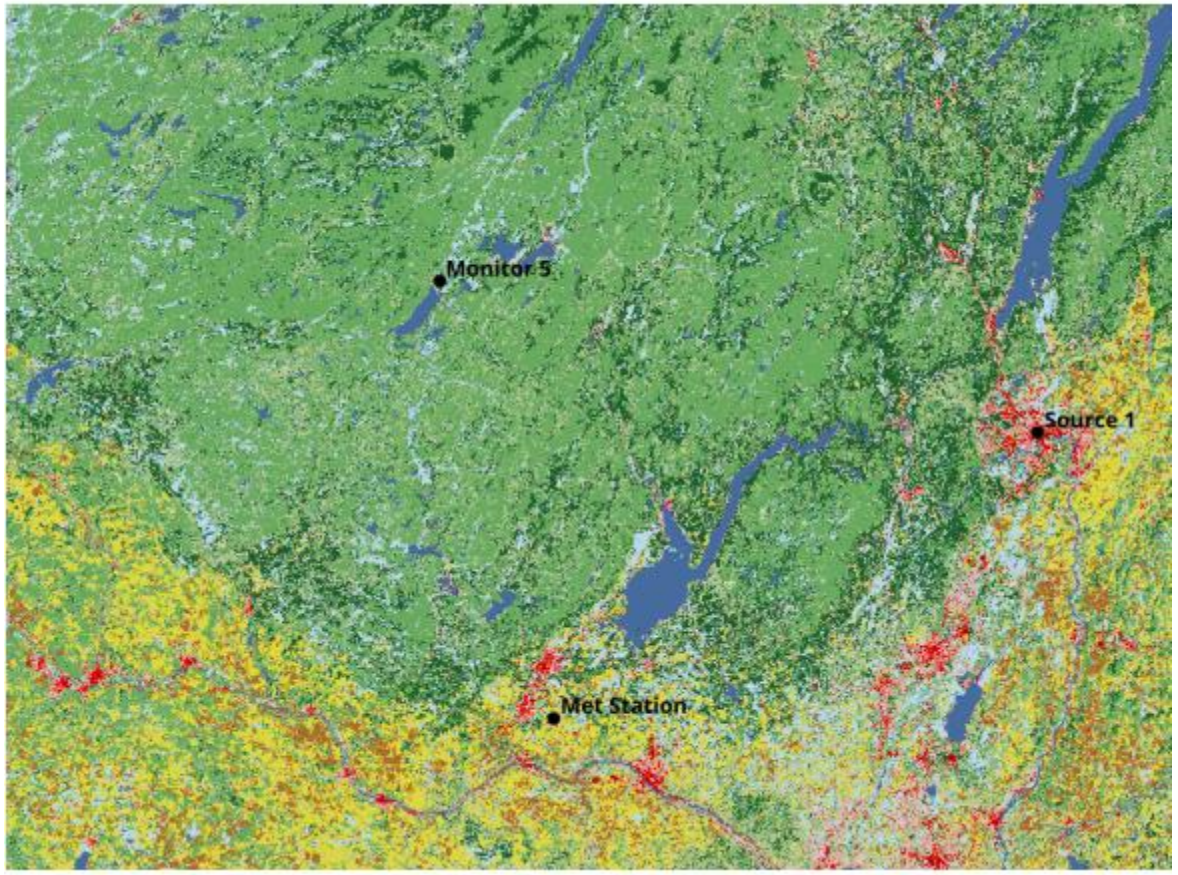
- Ambient monitoring data located within the modeling domain of the source(s) under consideration and/or surrounding areas (e.g., ambient monitoring data from state and local agency's ambient air monitoring networks, pre- or post-construction monitoring from the project or any nearby sources, or an EPA ambient air monitoring network)
- Permit action or previous dispersion modeling for the source(s) under consideration
- Pre-existing dispersion modeling for potential nearby sources (e.g., from previous demonstrations or for similarly situated sources

Identify relevant and available emissions, air quality and environmental data (Continued)

- 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
  iii. potential nearby sources
  iv. Active or pending minor modification permit applications
  v. Title V, minor source operating permits and other state-only issued permits for potential nearby sources

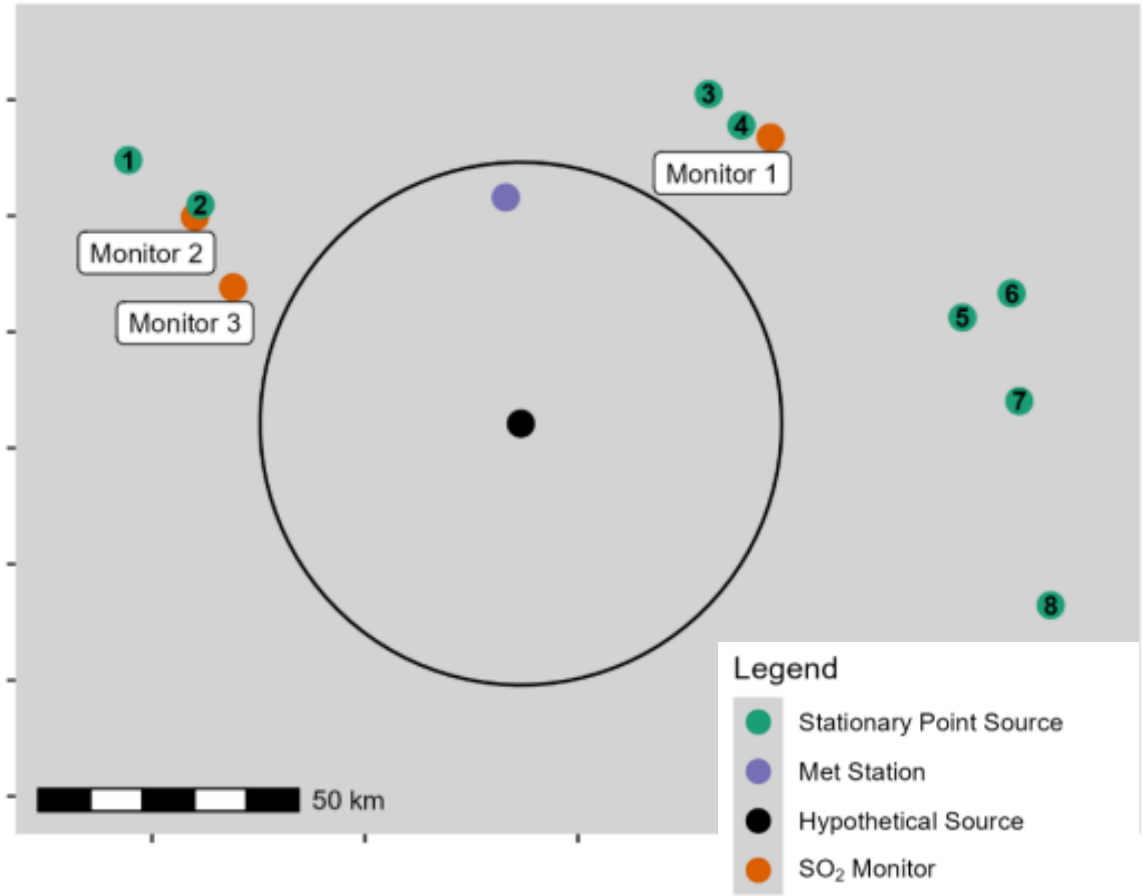
Step 3. Determine representativeness of ambient monitor data

- The following factors should be considered:
  i. The averaging time of the applicable NAAQS
  ii. 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
  iii. The mixture of emitting source(s) (e.g., permitted sources, roadway emissions, natural sources, other unpermitted sources, etc.) and their magnitude of emissions and release height (i.e., elevated stacks or ground level releases)
  iv. Dispersion environment (e.g., meteorology, terrain, land/water surface characteristics, urban or rural dispersion assumptions, etc.)



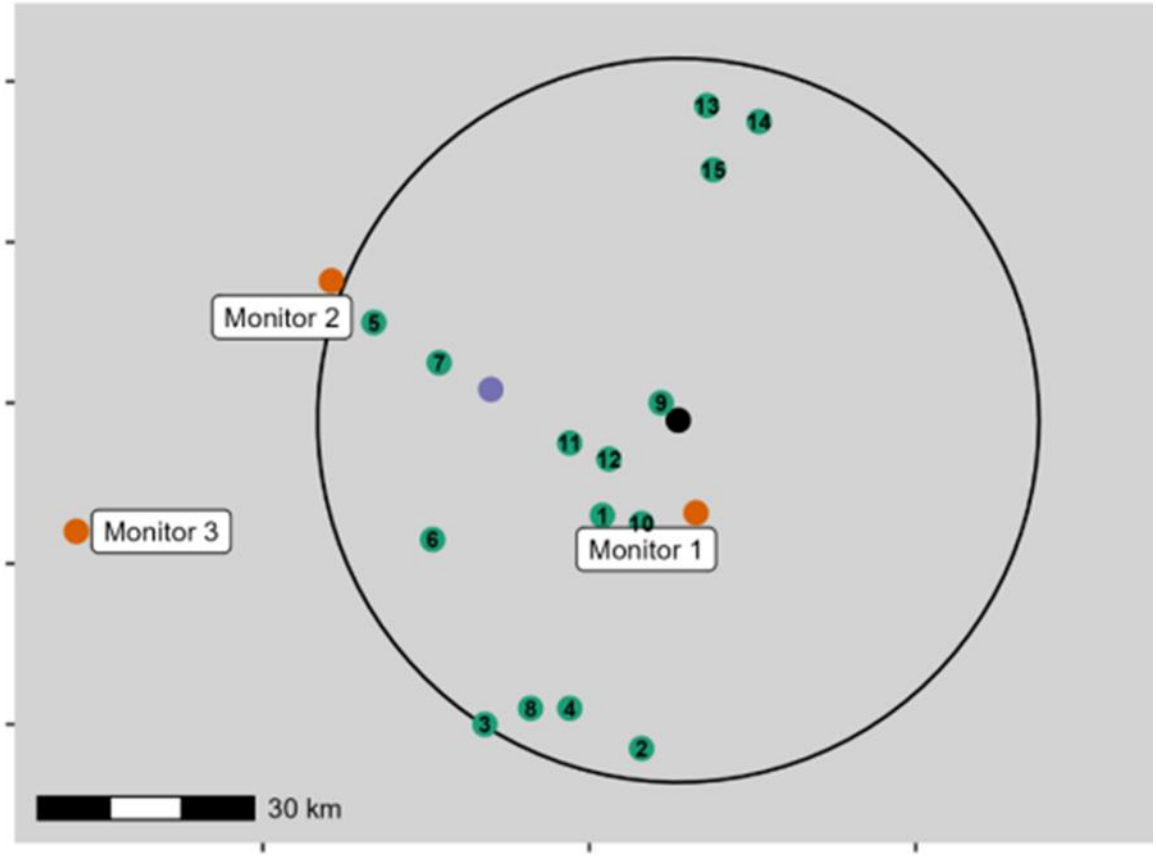
Determine representativeness of ambient monitor data (Continued)

- Approach for making this determination should differ depending on whether it is an isolated source or multi-source situation.
- For isolated single sources, the cumulative impact analysis should rely largely on the available monitoring data to fully characterize the background concentrations near the source(s) under consideration
- Selected representative monitor should have terrain features and wind patterns similar to the project area, and represent pollutant transport into the modeling domain,
- May not be the closest in proximity to the source(s) under consideration or even be located within the modeling domain



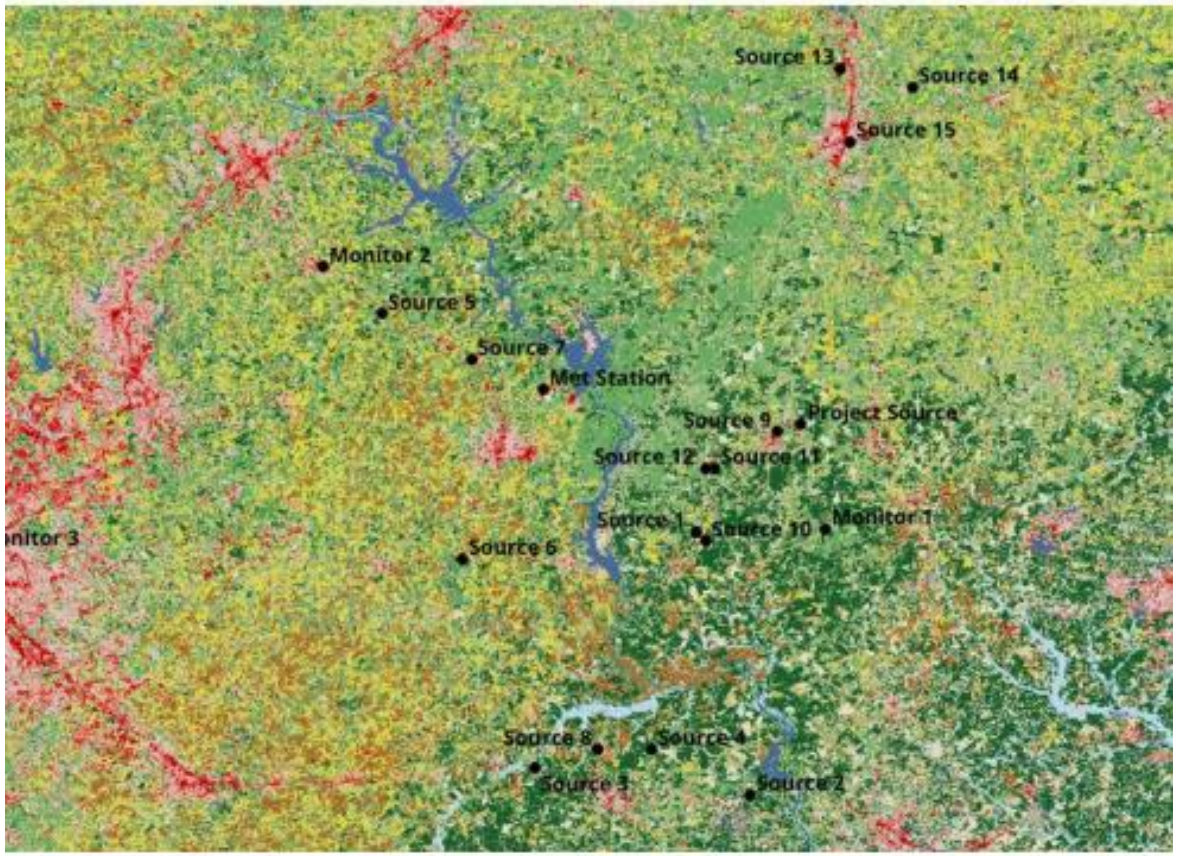
Determine representativeness of ambient monitor data (Continued)

- 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 source(s) under consideration.
- Should also focus on any areas where the single source impact analysis of the source(s) under consideration indicates modeled exceedances of the SIL because nearby source contributions will be important in these areas to appropriately represent local air quality



Step 4. Determine nearby sources to explicitly model (Multi-source only)

- When determining what nearby sources to explicitly model, one should consider the following factors:
  i. The averaging time of the applicable NAAQS, i.e., spatial extent of the source impacts per plume travel time.
  ii. 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).
  iii. 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 source(s) under consideration, and areas that the source(s) under consideration's modeling shows impacts above the SIL.



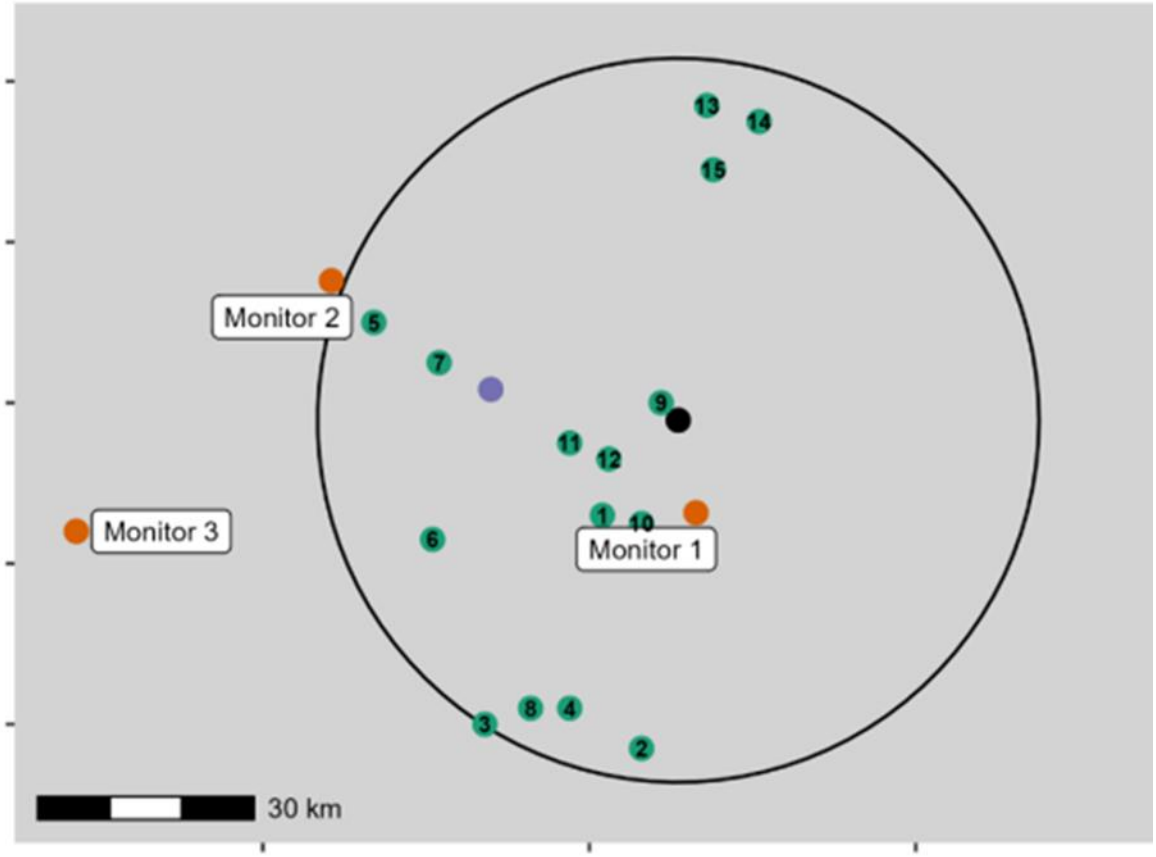
Determine nearby sources to explicitly model (Continued)

iv. Permit action or previous dispersion modeling for the source(s) under consideration (e.g., single source impact analysis).

v. Pre-existing dispersion modeling for potential nearby sources (e.g., from previous permit actions or for similar type sources).

vi. Dispersion environment (e.g., meteorology, terrain, land/water surface characteristics, etc.) at the selected monitoring site and source(s) under consideration

- 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



Conclusion

- Run the cumulative analysis
- Background can be further refined, if needed
  i. Wildfire smoke
  ii. Other atypical events
  iii. Diurnal considerations (hour of day)
  iv. Seasonal variation
  v. Exclude source impacts

- **Questions?**