Site Specific Background Concentration Data

IOWA DNR

IOWA DEPARTMENT OF NATURAL RESOURCES

Summary

Background concentrations in ambient air represent the contributions from natural sources, non-industrial human activities, and distant industrial facilities. The background concentrations are added to dispersion modeling results for comparison to the National Ambient Air Quality Standards (NAAQS). This document contains information supporting, the use of site specific backgrounds.

Proposing a Site Specific Background Concentrations

In some cases, an applicant may wish to propose a background concentration from site specific monitoring data that is more representative of their location.

The use of any site specific background concentration will require approval by the DNR. There are no specific criteria required for approval, and the information needed to adequately justify an alternate background will vary from case to case. The justification should be a well-reasoned weight-of-evidence approach that supports the chosen background concentration(s). The following are examples of the types of information that could be used to support an alternative background concentration:

- Monitor location
- Source of the data
- Proximity of chosen monitor to other sources of the applicable pollutant(s)
- Proximity of the facility in question to other sources of the applicable pollutant(s) (excluding any sources being explicitly modeled)
- Quantity of emissions of the applicable pollutant(s) in the vicinity of the chosen monitor
- Quantity of emissions of the applicable pollutant(s) in the vicinity of the facility in question (excluding any sources being explicitly modeled)
- Land use & topography
- Prevailing wind direction & local meteorology

There is no required screening distance when evaluating information from sources "in the vicinity." However, distances ranging from a 10 km radius to county-wide are generally appropriate.
The following sources may be helpful in developing justification for an alternative background:

- Construction Permit Search
- Operating Permits
- Ambient Air Monitoring Data

Background values at specific monitors for PM_{10}, $PM_{2.5}$, NO_2, and CO are provided below for the period of 2021-2023. SO_2 data has not been included because the entire state is represented using the isolated monitor at Lake Sugema.

Wildfire Removal

The PM_{10} and $PM_{2.5}$ background values listed below have had wildfire impacts removed. Please refer to the wildfire TSD for more information on how data was removed.

6-10-2024

Particulate Matter (10 microns or less)

Table 1. PM$_{10}$ Monitor Design Values (2021-2023)

City/Site	24-hour ($\mu g/m^3$)
Cedar Rapids	51
Davenport	36
Des Moines	50
Lake Sugema	35

Particulate Matter (2.5 microns or less)

Table 2. PM$_{2.5}$ Monitor Design Values (2021-2023)

City/State	24-hour ($\mu g/m^3$)	Annual ($\mu g/m^3$)
Cedar Rapids	18	8.0
Clinton	17	7.7
Council Bluffs	19	8.1
Davenport	17*	8.1*
Des Moines	18	7.6
Emmetsburg	17	7.0
Iowa City	18	7.7
Lake Sugema	15	7.0
Muscatine	16	7.8
Sioux City	17	7.7
Viking Lake State Park	16	6.8
Waterloo	18	7.8
*Average of design concentrations from multiple monitors at this location.		

Seasonal background concentrations were also calculated for the 24-hour averaging period at each site. The approach in Section IV.3 and Appendix E of EPA's Guidance for PM$_{2.5}$ Permit Modeling (May 20, 2014) was used to determine the seasonal concentrations for each site. The seasonal values for the two Davenport monitors were averaged to arrive at a single value. Table 3 summarizes the seasonal concentrations for all 12 sites.

Table 3. Seasonal PM$_{2.5}$ 24-hr Site-Specific Background Concentrations (2021-2023)

Site	Concentration (µg/m^3)			
	Winter	Spring	Summer	Autumn
Cedar Rapids	18	16	16	16
Clinton	17	13	14	14
Council Bluffs	18	14	14	15
Davenport	17	15	15	14
Des Moines	18	17	15	15
Emmetsburg	16	16	12	12
Iowa City	17	15	15	17
Lake Sugema	15	12	14	11
Muscatine	16	15	14	13
Sioux City	17	14	14	13
Viking Lake State Park	16	13	14	11
Waterloo	17	14	14	14

The use of these seasonal background concentrations should be acceptable in most cases. However, per section 3.3.8.2 of the User's Guide for the AMS/EPA Regulatory Model – AERMOD (dated August 2019), background concentrations that are input into the model may be underestimated in short-term averaging periods if calm winds are present during the period being evaluated. This will be evaluated on a case-by-case basis, and if it is found that the background contribution is under-estimated the analysis may need to be reevaluated.

Carbon Monoxide

Table 4. CO Monitor Design Values (2021-2023)

City/State	1-hour (µg/m^3)	8-hour (µg/m^3)
Davenport	1,309	878

Nitrogen Dioxide

Table 5. NO$_2$ Monitor Design Values (2021-2023)

City/State	1-hour (µg/m^3)	Annual (µg/m^3)
Des Moines	65	11
Lake Sugema	14	3