Site-Specific Background Concentration Data 2025

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). The DNR provides both default and site-specific background concentrations for use in modeling analyses. Default values are pre-approved for use in any modeling analysis and can be found on the DNR's Background Data webpage. This document includes site-specific backgrounds and information related to their use.

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 a site-specific 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 a site-specific 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. This document and the following resources may be helpful in developing justification for a site-specific background:

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

Once a site-specific monitor has been approved by the DNR the applicant may continue to use that monitor in future projects by referring to the original justification and approval.

Monitors

Background values at specific monitors are provided below for the period of 2022-2024. A summary of monitors included in this document is provided in Table 1. Source-oriented monitors, and others that are likely influenced by local emissions, are excluded from this document.

Table 1. Monitors

State	City	Site	AQS ID
IA	Cedar Rapids	Linn County Public Health	191130040
	Clinton	Rainbow Park	190450021
	Council Bluffs	Franklin School	191550009
	Davenport	Hayes School	191630020
		Jefferson School	191630015
	Des Moines	Polk County Health Department	191530030
	Emmetsburg	Iowa Lakes Community College	191471002
	Iowa City	Hoover School	191032001
	Keosauqua	Lake Sugema	191770006
	Muscatine	Greenwood	191390016
	Sioux City	Irving School	191930021
	Stanton	Viking Lake State Park	191370002
	Waterloo	Water Tower	190130009
NE	Omaha	Douglas County Hospital	310550019
		7747 Dodge St	310550056
SD	Sioux Falls	University of South Dakota	460990009

Particulate Matter

The PM_{10} and $PM_{2.5}$ background values listed below have had the impacts from smoke events removed. As such, the background concentrations for these pollutants will differ from the reported values at each monitor. Please refer to the document "Removal of Smoke Events from Particulate Background Concentration Data" document for more information on how data was adjusted.

PM_{10}

Table 2. PM10 Site-Specific Background Concentrations

City/Site	**24-hour** ($\mu g/m^3$)
Cedar Rapids	49
Davenport	34
Des Moines	47
Lake Sugema	29

$PM_{2.5}$

Table 3. PM2.5 Site-Specific Background Concentrations

City/State	24-hour ($\mu g/m^3$)	Annual ($\mu g/m^3$)
Cedar Rapids	16	7.4
Clinton	15	7.1
Council Bluffs	18	7.8
Davenport*	16	7.5
Des Moines	15	7.1
Emmetsburg	14	6.5
Iowa City	16	7.2
Lake Sugema	14	6.5
Muscatine	15	7.3
Sioux City	15	7.3
Viking Lake	14	6.3
Waterloo	16	7.2

*Average from multiple monitors in this city (see Table 1).

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 (with the additional step of removing the influence from smoke events).

Table 4. Seasonal PM2.5 24-hour Site-Specific Background Concentrations

Site	Winter ($\mu g/m^3$)	Spring ($\mu g/m^3$)	Summer ($\mu g/m^3$)	Fall ($\mu g/m^3$)
Cedar Rapids	16	14	15	15
Clinton	15	12	13	14
Council Bluffs	16	13	14	15
Davenport*	16	14	15	14
Des Moines	15	13	14	14
Emmetsburg	14	13	11	12
Iowa City	16	15	14	16
Lake Sugema	13	11	13	11
Muscatine	14	14	13	13
Sioux City	15	13	14	13
Viking Lake State Park	13	13	13	11
Waterloo	15	13	14	14

*Average from multiple monitors in this city (see Table 1).

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 November 2024), 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.

Nitrogen Dioxide

Table 5. NO2 Site-Specific Background Concentrations

City/State	1-hour ($\mu g/m^3$)	Annual ($\mu g/m^3$)
Davenport	NA*	9
Des Moines	NA*	NA*
Lake Sugema	13	4
Sioux Falls, SD	58	11

*A valid design value is not available

Sulfur Dioxide

Table 6. SO2 Site-Specific Background Concentrations

City/State	1-hour ($\mu g/m^3$)	3-hour* ($\mu g/m^3$)	Annual ($\mu g/m^3$)
Cedar Rapids	29	29	1**
Davenport	10	10	1**
Lake Sugema	8	8	1**
Omaha, NE	47	47	1**
Sioux Falls, SD	3	3	1**

*Design values are not available for the 3-hour averaging period. Assumed equal to 1-hour.
**Design value is rounded to nearest ppb, resulting in a value of 0 (with no decimals available for conversion to $\mu g/m^3$). Assumed equal to 1 $\mu g/m^3$.

Carbon Monoxide

Table 7. CO Site-Specific Background Concentrations

City/State	1-hour ($\mu g/m^3$)	8-hour ($\mu g/m^3$)
Davenport	1,500	1,300
Omaha, NE*	5,600	2,500
Sioux Falls, SD	800	600

*Average from multiple monitors in this city (see Table 1).