Appendix 20C1   AERMOD Equivalency Model Demonstration

This appendix was added after publication of the RDEIR/SDEIS. Because it is a new appendix, it does not include a vertical line in the margin to identify changes from the RDEIR/SDEIS.

Appendix 20C1 AERMOD Equivalency Model Demonstration

The U.S. Environmental Protection Agency (USEPA) released a new version of AERMOD (version 21112) in late May 2021. This release occurred while most of the modeling was conducted for the Sites Reservoir Project (Project). Based on the Model Change Bulletin (U.S. Environmental Protection Agency 2021), the updates to the new model version consisted of bug fixes and nonregulatory options. Therefore, the regulatory settings used for the Ambient Air Quality Analysis and Health Risk Assessment of the Project should not have any effect on the modeled concentrations.

To demonstrate this, the Glenn-Colusa Irrigation District Improvements A Project component model run is conducted with both AERMOD version 19191 and 21112 to show equivalency between versions. The same input files (e.g., meteorological data, emissions) are used. The only difference is the AERMOD executable. Table 20C1-1 summarizes the results for all criteria pollutants based on the national ambient air quality standard rank for each pollutant and averaging period.

Lakes Environmental provides a multicore processor version of AERMOD, called AERMOD MPI, that splits up the receptor grid and significantly improves the run-time of the model. Given the large number (20,000+) of on-site volume sources to be modeled at Golden Gate Dam, Sites Dam, Funks Reservoir, and Terminal Regulating Reservoir Plant the AERMOD MPI software is used. The MPI is currently available with AERMOD version 19191. A second equivalency test is modeled to show the concentrations are equal between the regulatory and MPI versions of the AERMOD model.

Table 20C1-1. Summary of AERMOD Concentrations, Version 19191 vs. 21112 and MPI

Pollutant	Averaging Period	Rank	AERMOD 19191	AERMOD 21112	AERMOD MPI 19191
			NAAQS Conc. ($\mu g/m^3$)		
Sulfur dioxide (SO$_2$)	1-hour	4th High	0.04244	0.04244	0.04244
	3-hour	2nd High	0.02861	0.02861	0.02861
	24-hour	2nd High	0.00741	0.00741	0.00741
	Annual	1st High	0.00166	0.00166	0.00166
Carbon monoxide (CO)	1-hour	2nd High	25.04324	25.04324	25.04324
	8-hour	2nd High	8.90363	8.90363	8.90363

Pollutant	Averaging Period	Rank	AERMOD 19191	AERMOD 21112	AERMOD MPI 19191
			NAAQS Conc. ($\mu g/m^3$)		
Nitrogen dioxide (NO_2)	1-hour	8th High	6.37398	6.37398	6.37398
	Annual	1st High	0.26994	0.26994	0.26994
Particulate matter (PM_{10})	24-hour	2nd High	0.29552	0.29552	0.29552
Fine particulate matter ($PM_{2.5}$)	24-hour	8th High	0.09169	0.09169	0.09169
	Annual	1st High	0.02331	0.02331	0.02331

Notes: NAAQS = national ambient air quality standard; $\mu g/m^3$ = microgram per cubic meter.

The results from the equivalency demonstration between USEPA's regulatory version of AERMOD version 19191, version 21112, and Lakes Environmental AERMOD MPI (using AERMOD version 19191) show that modeled concentrations are equal across all three models. Therefore, the use of 19191 (including the MPI) should be acceptable as it produces the same results as the latest release of the model.

20C1.1 References Cited

U.S. Environmental Protection Agency. 2021 (May). Model Change Bulletin (MCB) 15. AERMOD version 21112. Accessed June 2021. https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/aermod_mcb15_v21112.pdf.