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Technology Transfer Network

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Record Details

Model Clearinghouse Information Storage and Retrieval System Record Details

Alternative Model Techniques to Address Two Issues with Modeling Buoyant Line Sources in AERMOD

Record No: 18-IV-01 Last Update: 08/07/2018

<i>EPA Region:</i>	4	<i>Fiscal Year:</i>	2018
<i>States:</i>	SC		
<i>Record Type:</i>	Action		
<i>Pollutants:</i>	NO2	<i>Sources:</i>	Steel Facility
<i>Models:</i>	AERMOD	<i>Urban/Rural:</i>	Both Urban & Rural
<i>Terrain:</i>	Both High & Low	<i>Regulations:</i>	PSD
<i>Guideline:</i>	Guideline	<i>Database:</i>	Both
<i>Oral/Written:</i>	Written	<i>Involvement:</i>	Review and Comment
<i>Subjects:</i>	Emissions Characterization Technical Credibility of Nonguideline Techniques		
<i>Comments:</i>			

Issue: Region IV is seeking concurrence from the Model Clearinghouse on the use of an approach proposed by the State of South Carolina Department of Health and Environmental Control (SCDHEC) on behalf of Nucor Steel in Darlington, South Carolina, to address two issues within AERMOD (version 16216r) related to buoyant line sources. Region IV staff have reviewed the proposed approach and corresponding equivalency demonstration submitted by SCDHEC and has determined that it is justifiable and appropriate.

C/H Response: The Model Clearinghouse has reviewed Region 4's technical summary and recommendations for approving the use of an alternative model technique proposed by the SCDHEC to address two identified issues with modeling buoyant line sources using the preferred near-field model, AERMOD for the PSD compliance demonstration of the Nucor Steel facility in Darlington, South Carolina. First, the current version of AERMOD, version 16216r, is limited to a single group of buoyant line sources that are described with identical characteristics (e.g., requires an average building width, line length, and buoyancy parameter and assumes all lines are parallel to each other with an average separation distance), which creates a limitation in modeling a facility with multiple buoyant line sources with dissimilar characteristics in one model run. Second, the modeling consultant for the Nucor Steel facility identified a coding issue or bug within AERMOD that adds the modeled NO2 impacts from buoyant

lines sources to other modeled NO₂ impacts after the Tier 2 and 3 NO₂ methodologies are applied to the modeled NO_x concentrations from other source types. This results in an inappropriate NO_x to NO₂ conversion calculations for the modeling simulation. Both of these modeling issues are subsequently addressed through a multi-step alternative modeling technique using the AERPOST program as summarized by Region IV in your concurrence memorandum and more fully described in the documentation and equivalency demonstration provided by the SCDHEC. Considering that both Region IV and the Model Clearinghouse found equivalency consistent with Appendix W, Section 3.2.2(b)(1) for the alternative modeling technique proposed by the SCDHEC, we concur with Region IV on the alternative model approval.

Memoranda:

Memo: Model Clearinghouse Review of Alternative Model Techniques to Address Two Issues with Modeling Buoyant Line Sources in AERMOD for the PSD Compliance Demonstration of the Nucor Steel Facility in Darlington, South Carolina

Dated: March 13, 2018

From: George Bridgers, Model Clearinghouse Director
Air Quality Modeling Group, EPA

To: Christopher M. Howard, Physical Scientist
Air Analysis and Support Branch, Region 4

Memo: Model Clearinghouse Concurrence Request - AERMOD Buoyant Line Source Issue Resolution and Model Equivalency Demonstration Nucor Steel, Darlington, South Carolina PSD Air Quality Modeling

Dated: February 27, 2018

From: Christopher M. Howard, Physical Scientist
Air Data and Analysis Section
Air Analysis and Support Branch
Air, Pesticides & Toxics Management Division
US EPA Region 4

To: George Bridgers, Director
Model Clearinghouse
Air Quality Modeling Group
Office of Air Quality Planning and Standards
US EPA

Memo: Proposed Workaround Related to Buoyant Line Source Implementation Issues in AERMOD

Dated: December 13, 2017

From: Richard Hamel
Environmental Resources Management (ERM)

To: John Glass
South Carolina Department of Health and Environmental Control (SCDHEC)

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