April 8, 2019

I appreciate the opportunity to comment on the May 2018 modeling protocol for the USG Interiors facility (USG), located in Red Wing, MN. The list of comments below is focused on the modeling input and methodology sections of the protocol.

Background

In May 2018, USG's consultant (Barr Engineering) developed a modeling protocol for the use of CTDMPlus and AERMOD in modeling emissions from the Red Wing USG facility. USG is located in the Mississippi River valley among modestly complex terrain. A meteorological tower, with multiple levels of collected data, located approximately 50km to the west of Red Wing, is being proposed for use with AERMOD and CTDMPlus. The primary source of sulfur dioxide emissions from USG come from the tallest stack (approximately 55m) which serves two cupolas. Two modeling scenarios are being proposed. The first would be conducted according to EPA Data Requirements Rule modeling guidance for purposes of designation classification determination. The second analysis would be conducted in accordance with 40 Code of Federal Regulations, Part 51, Appendix W modeling guidance for setting emission limits needed to show attainment of the applicable sulfur dioxide (SO2) National Ambient Air Quality Standards (NAAQS). This facility has historically been modeled using AERMOD.

Comments in order as the appear in the protocol

1) Section 2.0, Page 5: The second parenthetical states that a NAAQS analysis will be conducted using representative, allowable emissions. It's unclear what is meant by the word "representative" in this context. Modeling conducted to evaluate emission limits against the NAAQS uses allowable emissions for the source of interest per either Table 8-1 or Table 8-2 in Appendix W, 40 Code of Federal Regulations, Part 51.

2) Section 3.1.2, Page 11, First Paragraph: Just for clarification, CTDMPlus will be used for all receptors above the height of the cupola stack. AERMOD will be used for all receptors at or below cupola stack height. This means complex terrain relative to the furnace stacks will be modeled using both AERMOD and CTDMPlus.

3) Section 3.2, Page 12, Second Paragraph: The text states that elevations rise to 320-330m, at a distance of 200-500m from the cupola stack. Using Google Earth Pro, I don't find those elevations at distances that close to the stack. Terrain does reach that height further out from the stack.

4) Page 17, Starting with Second Complete Paragraph: This section discusses the representativeness of the UMORE Park meteorological station. It discusses the importance of using meteorology most representative of plume level conditions and proceeds to discuss similarities between modeled wind roses at the UMORE Park site and the USG site at upper levels. While upper level winds are important, lower level characterization is also important. The protocol includes qualitative comparisons of the UMORE Park tower data and the USG site at lower levels. Information such as wind directions and wind speeds at lower levels heights should also be included in the evaluation of the representativeness of the UMORE Park tower.

5) Page 17, Last Paragraph: Similar to the above comment, this section mentions the AWS Truepower modeling comparing modeled predictions at the USG site with UMORE tower upper level measurements. Can the AWS Truepower modeling run comparisons at lower levels such as 10m and 50m?

6) Section 4.2,1, Page 22, Table 4-3: I don't understand how the cupola 1 and 2 totals noted in the last paragraph on the page were calculated. The methodology is understandable, but I can't duplicate the melt tonnage totals.

7) Section 4.2.1, Page 24: 2017 emissions data were likely not available when the draft protocol was developed last year. However, based on EIS information, 2017 tons of SO_2/year emissions appear to be approximately 15% higher than the average of the 2014-2016 period. The latest emissions should be included in a 3-year inventory or at least considered, based on the Data Requirements Rule ongoing assessment requirement.

8) Section 4.2.2., Page 25, First Paragraph: The Title V permit for USG – Red Wing (#04900007-003, issued in 2007), found on the MPCA permit database website, lists a 1-hr SO2 state-only limit on the combined cupolas of 371 lb/hr using a 1-hour average. Additionally, it lists a state-only limit on the combined blow chambers of 19.4 lb/hr. It's not clear what the basis is for the emissions in Table 4-6.

9) Section 4.3, Page 25, First Paragraph: The receptor grid used in the AERMOD modeling that influenced the "Unclassified" designation was deemed appropriate for that designation decision. The AERMOD receptor grid proposed for use in this analysis may be adequate but, depending on the location of peak AERMOD predictions, additional receptors may be needed. The receptor grid proposed for use in CTDMPlus needs separate examination given the refined nature of the terrain/receptor/plume interaction.

10) Section 4.5, Page 26, First Paragraph: This paragraph states that the UMORE met data has been used in other air quality analyses. Were these other analyses reviewed by MPCA and/or EPA? Also, will the raw data used to generate the hourly met files and the QA documentation be available/provided to EPA and MPCA?

11) Section 4.5.3, Page 29, First Paragraph: This paragraph discusses the representativeness of the 80m and 128m data at UMORE with that predicted at the USG Red Wing site. As noted above, comparisons of available lower level winds, e.g, at the Red Wing Airport, to those at the UMORE tower should also be examined. This provides a more complete picture of the representativeness of the UMORE tower site compared to Red Wing.

12) Section 5.4.1, Page 35: The protocol states that collected turbulence data will not be used in the AERMET/AERMOD analysis. Measured turbulence measurements should be used in AERMET for the AERMOD run. Accordingly, to avoid double-counting turbulence, the adjusted U* option should not be implemented in AERMET when measured turbulence values are used. The collected data is the best available turbulence information and using the data is consistent with the approach being used for CTDMPlus.

13) Section 5.5, Page 36, Last Sentence: As with earlier comments, it's not clear what is meant by representative, allowable SO2 emissions.

14) Section 6.1, Page 37: What is the CTDMPlus receptor network? It's not clear in Section 6.1.? If the current CTDMPlus receptor grid is presented in Figure 13, the grid should be supplemented around the area(s) ultimately showing maximum impacts.

15) Section 6.2, Page 37: This section discusses the lateral and vertical spacing of contours used to describe each hill (i.e., 50m and 10m, respectfully). How many contours were used to characterize each hill?

16) Section 6.2, Page 37: Given the potential importance of the bluff located just a few hundred meters due north of the facility (especially in the AERMOD modeling), should it be included in CTDMPlus as a separate hill? My concern is that it's difficult to see how that hill feature is characterized and as part of the larger idealized Hill #1, the important bluff feature may get smoothed out. However, Figure 2-39 from the CTDMPlus User's Guide seems to speak to this issue and perhaps it's addressed in the model but it's not clear to me.

17) Section 6.4, Page 39-40: Regarding surface roughness, the section discusses determining the surface roughness of each hill that generates the highest concentration. It then discusses refining those values later on if needed. Any roughness values should be agreed upon up front and subsequently used in the analysis.

18) General: Further comments may stem from subsequent review of the protocol and any updates and review of the actual input files used in the CTDMPlus modeling process.

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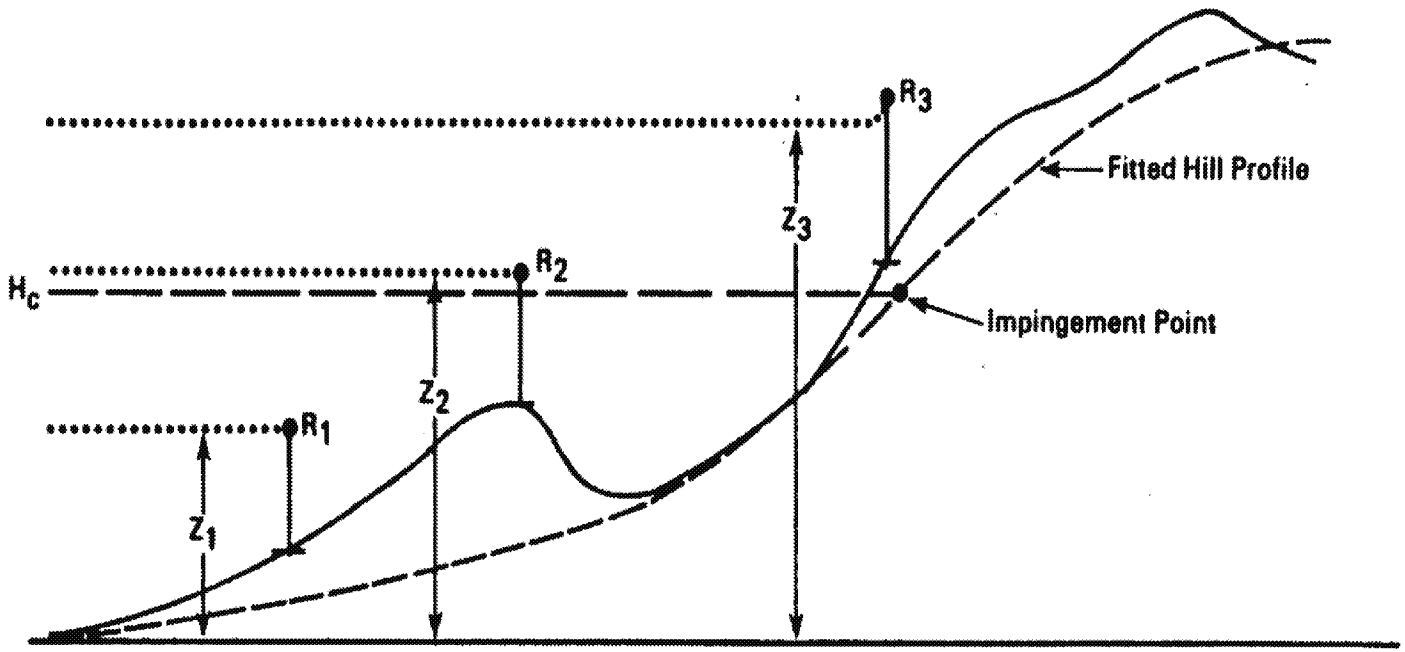

Figure 2-11. Treatment of receptors upwind of the impingement point. Receptors 1 and 2 sit above terrain that lies below H_c . Both are modeled as "receptors-on-poles", preserving their actual height (Z_1 and Z_2) above the reference plane. Receptor 3 is above terrain that exceeds H_c in elevation, so that the flow above H_c follows the surface of the hill. Therefore, the height of the "pole" Z_3 is less than the actual elevation of the receptor above the plane.

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