Memo

To: Ben Baker
Senior Environmental Project Leader
The Dow Chemical Company
Sustainable Development
1790 Building
Midland, MI 48674

From: Peter Adriaens, PhD

Date: June 9, 2009

RE: Response to Dow request for additional information on atmospheric deposition modeling (AERMOD)

The UMDES team received a request (dated 10/23/08) from the Dow Chemical Company (attached) pertaining to our atmospheric deposition modeling data and methods.

We are providing the input files for the air dispersion model, AERMOD with meteorological data from the Tri City – Midland Bay and Saginaw (MBS) airport during the 5 year period 2001-2005. The program input files are for 10 dioxin and furan congeners and for TEQ and can be run by AERMOD using two deposition algorithms, vapor phase and particle phase deposition, and by dry and wet deposition pathways. The list of files includes:

- Folder name **Application file** contains the executable file: **aermod.exe**
- Folder name: **Meteorological data inputs** which contains meteorological data produced by AERMET processor, including surface and profiling data of MBS and White Lake station in 2001-2005. The file names are : **MBS01-05.PFL** and **MBS01-05.SFC**
- Folder name: **Input files for gas phase deposition of congeners,** that contains 10 text files, each representing one dioxin or furan congener for AERMOD vapor phase deposition runs. They are:

  TCDD-GAS.txt; TeCDF-GAS.txt; OCDD-GAS.txt; OCDF-GAS.txt; 12378PeCDD-GAS.txt; 23478-PeCDF-GAS.txt; 123478HxCDD-GAS.txt; 123478HxCDF-GAS.txt; 1234678HpCDD-GAS.txt; 1234678HpCDF-GAS.txt

In this folder, there is also a file named Midland Land Cover 1992.doc explaining the land use and seasonal codes used in the above input file for the vapor phase deposition algorithm.

We do not model TEQ using the gas phase deposition algorithm as it is not applicable.

- Folder name: **Input files for particle deposition of congeners** which contains 10 text files, each representing one dioxin or furan congener, and one text file for TEQ for AERMOD particulate phase deposition runs. They are:

  TCDD_PART.txt; TeCDF_PART.txt; OCDD_PART.txt; OCDF_PART.txt; 12378PeCDD_PART.txt; 23478-PeCDF_PART.txt; 123478HxCDD_PART.txt; 123478HxCDF_PART.txt; 1234678HpCDD_PART.txt; 1234678HpCDF_PART.txt; and TEQ_PART.txt

- The air dispersion model is run on 3 nested grids with fine, medium and coarse grids up to 10 km out from the plant. Coordinates of the grid nodes are provided in the above program input files.

- We do not provide model output files as they would exceed the storage limits on our website. Instead, please see the instruction below to generate the model outputs, example for TEQ. A folder called AERMOD-DEMO was created containing all the necessary files to run with AERMOD.

Instructions to run AERMOD for TEQ as an example:

- Copy the following files into AERMOD-DEMO folder: aermod.exe; MBS01-05.SFC; MBS02-05.PFL and TEQ_PART.txt
- In the command window, direct the command cursor to the folder AERMOD-DEMO
- Copy TEQ_PART.txt into aermod.inp (this is required by AERMOD because the input file is named aermod.inp)
- Call the executable aermod.exe and aermod.inp
- The program will run for each day of the 5 years from 2001-2005.
- The program will generate a number of files, including the AERMOD.OUT and TEQ_PART.DAT which are the two data files for air concentration, dry and wet deposition fluxes estimated at each grid node.

This procedure can be applied for all other congeners and for both vapor and particulate phase deposition algorithms.

Command line:

C:\Users\...\AERMOD-DEMO>copy TEQ_PART.txt aermod.inp (enter)
1 file is copied.
C:\Users\...\AERMOD-DEMO>aermod.exe aermod.inp (enter)

Now Processing SETUP Information
Now Processing Data for Day No. 1 of 2001
Now Processing Data for Day No. 2 of 2001

Now Processing Data for Day No. 365 of 2005

Processing Data Outputs
C:\Users\...\AERMOD-DEMO>

Please note: Files with extension **.dat, .txt, .out** , **.sfc**, **.pfl** can be opened using Notepad or WordPad. Files with extension **.xls** are opened by Excel. For data visualization in Arc-GIS program, the projected system is found in **Projection.prj** (open using Notepad or WordPad).

The UMDES study investigators strive to respond to requests from stakeholders in an as complete and timely manner as possible. All requests will be subject to stringent adherence to our confidentiality requirements.