" Perfect is the enemy of the good. "

-French philosopher Voltaire

Introduction

The Utah Division of Air Quality (UDAQ) recently implemented an online emissions inventory submittal system. This system is the State and Local Emissions Inventory System, also known as SLEIS.

In order to maintain the level of complexity and QA/QC in previously used inventory workbooks it was necessary to greatly enhance the calculation capabilities of SLEIS. This resulted in major enhancements to the WebFIRE table in order that SLEIS users have access to as many emission factors and formulas as possible.

Following are some, but certainly not all, of the many enhancements made by UDAQ to the WebFIRE table.

Development of Optional Throughput Units of Measure for Emission Factors

Various SCC's offered emission factors with incomplete options for units of throughput.

- Example:

  SCC = 20300101 Internal Combustion Engines Commercial/Institutional Distillate Oil (Diesel) Reciprocating. Original WebFIRE provides criteria emission factors in lb/1000 Gallons, but only provides emission factors in lb/mmbtu for HAP's. However, Table 3.3-1 in AP-42 also includes criteria emission factors in lb/hp-hr.

- Solution:

  Converted and included criteria emission factors in lb/mmbtu. Also included criteria emission factors from AP-42 in lb/hp-hr. Converted and included emission factors for HAP pollutants in lb/hp-hr and lb/1000 Gallons. The enhanced WebFIRE table now provides emission factors in lb/mmbtu, lb/hp-hr, and lb/1000 Gallons for all pollutants for this SCC.

Addition of Required Data for Valid SCC's Listed in EIS but not Listed in WebFIRE.

There were many valid SCC's listed in EIS that were not listed in the WebFIRE table. Also, these SCC's did not include all of the data required for use in SLEIS. UDAQ added the required data so that these SCC's would be available to SLEIS users.

- Example: SCC = 20100802 Internal Combustion Engines Electric Generation Landfill Gas. This is a valid EIS SCC but is not listed in WebFIRE.

- Solution: Required data was added to the enhanced WebFIRE table such as Control (UNCONTROLLED), ControlID (129), Measure (Million Btus), EIS Measure (E6BTU), Material (Heat), Action (Input), Mat I/O (Input), and Material I/O (PROCESS MATERIAL USED (INPUT)).

- This was necessary for 1000's of SCC's.

Development and Addition of PM$_{2.5}$ Emission Factors when not Provided

There were many instances in WebFIRE where only PM$_{10}$ emission factors were listed but emission factors for PM$_{2.5}$ were not provided.

- Example:

  AP-42 Chapter 11.19.2 Crushed Stone and Pulverized Mineral Processing. Table 11.19.2-2 lists PM$_{10}$ emission factors for various processing operations but No Data (ND) is listed for much of the PM$_{2.5}$ column. The listed PM$_{2.5}$ emission factors in WebFIRE were also found to be incomplete. Controlled factors were sometimes listed but uncontrolled factors were not, or vice versa.

- Solution:

  PM$_{2.5}$ emission factors were developed for these processing operations (controlled and/or uncontrolled) and added to the enhanced WebFIRE table. This required analysis of similar processes along with engineering judgement etc.

Formatting of all Formulas for use by SLEIS

All formulas needed to be rewritten and formatted in order to be useable by the SLEIS online system.

SCC = 10100212 External Combustion Boilers Electric Generation Bituminous/Subbituminous Coal.

▶ 1st Example:

PM_{10}-FIL (scrubber) = 4.2E-1*A

Where A = % Ash

▶ Solution:

PM_{10}-FIL (scrubber) = 0.42*A

▶ 2nd Example:

PM-CON (scrubber) = (1E-1*S-3E-2)*26

Where S = % Sulfur

▶ Solution:

PM-CON (scrubber) = ((0.1*Su)-0.03)*26

Note: The nomenclature changed from "S" to "Su" for % Sulfur…

Development of Unique Nomenclature for Formula Parameters

It became necessary to develop unique nomenclature for formula parameters provided in WebFIRE due to duplication.

▶ Example:

S = % Sulfur

s = % Silt

S = Mean Vehicle Speed (mph)

▶ Solution:

Development of unique nomenclature

Su = % Sulfur

S = % Silt

Smv = Mean Vehicle Speed (mph)

Unique Supplemental Parameters

A   =   % Ash

M   =   % Moisture

Ca   =   Molar Calcium

Smv =   Mean Vehicle Speed (mph)

Wmn=   Mean number of wheels

sL   =   Silt Loading

Ti   =   Total yeast action time (hrs)

Ts   =   Spiking time in hours

Sg   =   Sulfur content in gr/100 ft^3

Cl   =   Chlorine weight percent in fuel

Su   =   % Sulfur

S   =   % Silt

mSu =   Molar Sulfur

Wmv=   Mean Vehicle Weight (tons)

U   =   Wind speed (mph)

Dr   =   Drop height (ft)

Spk   =   Final (spike) baker's % of yeast

Yi   =   Initial baker's % of yeast

C   =   % Carbon

P   =   Number of days in a year with at least 0.254 mm (0.01 in) of precipitation

Ar   =   Horizontal area (ft^2) with blasting depth less than or equal to 70 ft.

Expanded Use of Paved and Unpaved Road Formulas

Formulas listed in AP-42 Section 13.2.1 (Paved), and Section 13.2.2 (Unpaved) were not associated with most of the SCC's for haul roads listed in WebFIRE.

- ▶ Example:

  SCC = 30502504 Industrial Processes Mineral Products Construction Sand & Gravel Hauling. WebFIRE only listed an old 1992 PM_{10} emission factor.

- ▶ Solution:

  UDAQ searched WebFIRE for haul road SCC's and included formulas from AP-42 Sections 13.2.1 and 13.2.2.

  Old PM_{10} emission factor for SCC = 30502504 was replaced with the options of Paved, Unpaved Industrial, and Unpaved Public formulas for PM_{10} and $PM_{2.5}$ from AP-42 Sections 13.2.1 and 13.2.2.

New Feature
Development of State Specific Non-Road Emission Factors

When inventorying a point source UDAQ is required to obtain the non-road tailpipe emissions mainly for modeling purposes. Therefore, UDAQ elected to develop state specific non-road tailpipe emission factors using outputs from the non-road portion of EPA's MOVES model.

- ► Example:

    Non-road tailpipe emissions from dozers, graders, and loaders at sand & gravel pits.

- ► Solution:

    Utah specific non-road tailpipe emission factors were developed using outputs from the non-road portion of EPA's MOVES model. These non-road emission factors along with their 10 digit SCC's were added to the enhanced WebFIRE table thereby making them available for use by sources in calculating non-road tailpipe emissions.

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