Base Year PM$_{2.5}$ SIP Point Source Inventory

The PM$_{2.5}$ SIP requires a point source inventory for base year evaluation. Base year inventories are used to establish an inventory for the base year that can be compared to future-year inventories for the purpose of attainment. The base year inventory selected for this evaluation was the 2014 tri-annual inventory.

As with all inventories collected for this analysis, the pollutants of concern included PM$_{10}$, PM$_{2.5}$, SO$_X$, NO$_X$, VOC, CO, and NH$_3$ and the unit of measurement was tons per year (tpy).

Source Selection:

Industrial point sources are one of the fundamental pieces to this inventory. At the outset of this project the 2014 tri-annual inventory was the latest and most current inventory available for point sources. This included all major sources, Title V sources, and any sources included in the PM$_{10}$ or ozone maintenance plans.

For the SIP base year inventory, UDAQ used the definition of a major source under Title V of the Clean Air Act (as specified in 40 CFR 51.1000) to define the thresholds for the reporting of actual emissions for point sources in the nonattainment areas. These thresholds are 70 tons per year or more of direct PM$_{2.5}$ or any PM$_{2.5}$ precursor in a serious nonattainment area for the PM$_{2.5}$ NAAQS. For point sources located in the surrounding area however, a threshold for potential to emit annual emissions of 100 tons for any of the relevant criteria air pollutants was used. The 2014 tri-annual inventory was used to develop the base year inventory. Emissions from sources under the above thresholds were included in the area source base year inventory.

It was determined that according to the above definition that 54 major sources were contained within the prescribed modeling domain. Additional sources contained in the prescribed modeling domain but located outside of Utah were also identified. Emissions from these 54 sources would ordinarily support modeled attainment demonstration for each of Utah’s three nonattainment areas. However, the information listed below is presented within the context of a clean data determination for the Provo Nonattainment Area. Within this context it is only necessary to submit a base year inventory for the area. Table 1 lists the four major sources in the Provo Nonattainment Area along with their 2014 actual emissions for PM$_{10}$, PM$_{2.5}$, SO$_X$, NO$_X$, VOC, CO and NH$_3$. 

May 9, 2018
Table 1. Four Major Point Sources in the Provo Nonattainment Area with 2014 Actual Emissions (Condensables Included)

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Site ID</th>
<th>Site Name</th>
<th>PM10</th>
<th>PM25</th>
<th>SOX</th>
<th>NOX</th>
<th>VOC</th>
<th>CO</th>
<th>NH3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brigham Young University</td>
<td>10790</td>
<td>Main Campus</td>
<td>5.521</td>
<td>3.353</td>
<td>117.918</td>
<td>151.209</td>
<td>5.069</td>
<td>48.265</td>
<td>0.537</td>
</tr>
<tr>
<td>McWane Ductile</td>
<td>10794</td>
<td>Utah</td>
<td>17.246</td>
<td>12.546</td>
<td>3.901</td>
<td>38.597</td>
<td>29.548</td>
<td>18.034</td>
<td>0.497</td>
</tr>
<tr>
<td>PacifiCorp Energy</td>
<td>13031</td>
<td>Lake Side Power Plant</td>
<td>62.840</td>
<td>56.473</td>
<td>10.231</td>
<td>238.562</td>
<td>37.319</td>
<td>203.100</td>
<td>147.042</td>
</tr>
<tr>
<td>Geneva Nitrogen Inc.</td>
<td>10825</td>
<td>Geneva Nitrogen Plant</td>
<td>31.947</td>
<td>28.276</td>
<td>0.002</td>
<td>109.137</td>
<td>0.020</td>
<td>0.312</td>
<td>2.695</td>
</tr>
<tr>
<td><strong>Subtotal:</strong></td>
<td></td>
<td></td>
<td>117.553</td>
<td>100.648</td>
<td>132.052</td>
<td>537.504</td>
<td>71.957</td>
<td>269.712</td>
<td>150.773</td>
</tr>
</tbody>
</table>

Data Collection and QA/QC

The 2014 point source emissions inventory data was collected in electronic and hard copy form in the spring of 2015. Data collected electronically was uploaded via an electronic upload-program into the UDAQ TEMPO database. Summary data for hard-copy inventories were entered by hand into the database by UDAQ inventory staff.

UDAQ has constructed Microsoft Excel inventory workbooks for most of the larger point sources. These workbooks provide a better interface with sources, a more thorough quality assurance/quality control (QA/QC), and allow for seamless upload to the TEMPO database. Construction of these workbooks required a very careful evaluation of the emissions calculations and their representativeness of each particular facility. After receiving completed workbooks from the sources they were individually inspected and updated to reflect any necessary changes requested by the sources before being uploaded into the TEMPO database. UDAQ utilized inventory workbooks for 50 of the 54 major point sources contained in the prescribed modeling domain to collect the 2014 annual emissions inventory. The only exceptions were ACH Foam Technologies – Expanded Polystyrene Mfg. Plant, Bimbo Bakeries USA – Salt Lake City Plant, Hill Air Force Base – Main Base, and Snowbird Development Corporation – Snowbird Ski and Summer Resort. The 50 inventory workbooks encompass over 90% of the total calculations for Utah’s 2014 major point source SIP emissions inventory thereby greatly surpassing EPA guidance requiring 10% QA/QC as the minimum criteria necessary for a SIP inventory QA/QC check. Electronic versions of the 50 major point source emissions inventory workbooks along with hard copy submittals from ACH Foam Technologies – Expanded Polystyrene Mfg. Plant, Bimbo Bakeries USA – Salt Lake City Plant, Hill Air Force Base – Main Base, and Snowbird Development Corporation – Snowbird Ski and Summer Resort are maintained at UDAQ and are available on a CD titled “2014 Point Source Emissions Inventories.”

Emissions data for any additional sources contained in the prescribed modeling domain but located outside of Utah was obtained from the EPA National Emission Inventory (NEI) database (2014 NEI v2).

May 9, 2018
Condensable Particulate Emissions:

Condensable particulate matter (PM) is material that is vapor phase at stack conditions, but which condenses and/or reacts upon cooling and dilution in the ambient air to form solid or liquid PM after discharge from the stack. Note that all condensable PM, if present, is typically in the PM$_{2.5}$ size fraction, and therefore all of it is a component of both primary PM$_{2.5}$ and primary PM$_{10}$.

Condensable emissions were included in the workbook inventories submitted by the sources in 2014 as well as the hard copy inventory submitted by Hill Air Force Base (Main Base). Electronic versions of the emissions inventory workbooks along with the hard copy inventory submitted by Hill Air Force Base (Main Base) are maintained at UDAQ and are available on a CD titled “2014 Point Source Emissions Inventories.”

The SMOKE Emissions Model and Processor

The emissions processing model, SMOKE, takes the annual, county wide emissions inventory prepared by UDAQ and reformulates it for use in the air quality model. There are three aspects to this reformulation of the inventory that, in the end, produces a refined version of the inventory. These include temporal processing, spatial processing, and speciation. Temporal processing converts emissions from annual to daily and hourly values. Spatial processing locates emissions from the county to specific grid cells within the modeling domain. Speciation breaks PM and VOC emissions into their component subspecies.

The emissions processing for air quality modeling is done with sets of activity profiles based on various Source Classification Codes (SCCs) and associated cross reference files developed using source provided temporal data. This feature essentially establishes the level of detail required of the point source inventories, wherein each “source component” has with it an associated SCC. These SCCs and the cross reference files are also created for area sources and mobile sources.

Once developed, these activity profiles serve to establish the temporal allocation of emissions within the model (e.g. 8-hour workdays), and also determine the speciation of PM and VOC emissions.