

## **Episodic PM<sub>2.5</sub> SIP Point Source Inventory**

The PM<sub>2.5</sub> SIP requires a point source inventory for episodes and projections. Episodic inventories are used to verify that the air quality model is working properly by replicating concentrations that were measured during the corresponding episode. The modeling analysis that supports this SIP evaluated four such episodes. The days selected included January 11, 2007 through January 21, 2007, February 14, 2008 through February 19, 2008; January 13, 2009 through January 24, 2009; and December 8, 2009 through January 21, 2010. For further information on how the specific days were determined, refer to the Representative Time Periods portion of this document.

As with all inventories collected for this analysis, the pollutants of concern included PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>x</sub>, NO<sub>x</sub>, VOC, CO, and NH<sub>3</sub> and the unit of measurement was tons per year (tpy).

### **Source Selection:**

Industrial point sources are one of the fundamental pieces to this inventory. As of the outset of this project the 2008 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<sub>10</sub> or ozone maintenance plans.

For the SIP base-year inventory, UDAQ and IDEQ used the definition of a major source under Title V of the Clean Air Act (as specified in 40 CFR 51.20) to define the thresholds for reporting actual emissions. These thresholds are the potential to emit annual emissions of 100 tons for all relevant criteria air pollutants except CO, for which it is 1000 tons. The 2008 periodic, three-year inventory was used to make this assessment. Emissions from sources under the above thresholds will be included in the area source base-year inventory.

It was determined that according to the above definition that 51 major sources were contained within the prescribed modeling domain, with an additional seven major sources in the Idaho portion of the domain. Table 1 lists the 51 major sources in Utah along with their annual emissions for PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>x</sub>, NO<sub>x</sub>, VOC, CO and NH<sub>3</sub>. It should be noted that Proctor & Gamble had not yet completed construction of their facility and therefore had no emissions for 2008.

### **Representative Time Periods:**

As indicated above, four distinct episodes of elevated PM<sub>2.5</sub> concentrations from 2007, 2008, 2009, and 2009-2010 were used in the modeling analysis. A representative inventory was developed for each period by projecting the 2008 inventory back to the 2007 episode and forward to the 2009 and 2009-2010 episodes using economic data from

the Bureau of Economic Analysis (BEA), and the Governor's Office of Planning and Budget (GOPB). The data from the BEA and the GOPB along with a description of how the projections and episode inventories were developed may be found in Appendix 1.

The 2008 inventory was reported and compiled in terms of tons per year (tpy). Since the PM<sub>2.5</sub> SIP is designed to protect the 24-hour standard, the model (CMAQ) evaluates emissions on an hourly basis. It uses a pre-processor called SMOKE in order to convert the annual inventory to a 24-hour basis (explained in further detail below.)

Because the model is evaluating the buildup of PM<sub>2.5</sub> concentrations over the span of multi-day episodes, an inventory worksheet was developed for each episode day. The entry for each of these days will generally be the same, although there are exceptions (see below.) This stands in contrast to the mobile source portion of the inventory wherein differences between weekdays and weekends (among other factors) will result in daily variations.

It was initially determined that three episodes would be included in the modeling analysis. These episodes included January 11, 2007 through January 21, 2007, February 14, 2008 through February 19, 2008, and January 13, 2009 through January 24, 2009. A questionnaire was sent to each of the Utah major point sources to determine if the operation of their facilities was different during these episodes when compared to normal operations during 2008. It was then determined by EPA that an additional episode comprising December 8, 2009 through January 21, 2010 needed to be included in the modeling analysis. An additional questionnaire was then sent to each of the Utah major point sources to determine if the operation of their facilities was different during this particular episode when compared to normal operations during 2008. Table 2 lists the sources that did not report any changes in production during any of the episodes. In the cases where operations were different, changes were made to the actual annual inventory emissions in order to replicate the way the sources operated during the episode days. This was done by determining the average percent change (+/-) in production reported by the source during the given episode and adjusting the annual emissions accordingly. Table 3 lists the sources that reported production changes for any of the episodes along with the average percent change for each. Questionnaires were also used by Utah sources to report any breakdown/excess emissions that occurred during any of the episodes. In cases where breakdown/excess emissions were reported, changes were made to the annual inventory emissions. This was done by adjusting any reported breakdown/excess emissions to annual values and then adding them to the annual emissions accordingly. Table 4 lists the sources that reported breakdown/excess emissions along with the pollutants reported for each episode. Copies of both form questionnaire letters may be found in Appendix 2. Episode production change calculations along with breakdown/excess emissions adjustments may also be found in Appendix 2. Questionnaire and workbook responses from each source are maintained at UDAQ and are available for inspection upon request.

Major sources located in the Idaho portion of the modeling domain were not resurveyed, as none fall directly within the Logan UT-ID PM<sub>2.5</sub> nonattainment area boundaries. These

facilities were “maxed-out” to their permitted limits to the Source Classification Code level for the projection years.

### **Data Collection and QA/QC**

The 2008 point source inventory data was collected in electronic and hard copy form during the spring of 2009. 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 our 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 database. UDAQ utilized inventory workbooks for 48 of the 51 major point sources contained in the prescribed modeling domain to collect the 2008 annual emissions inventory. The only exceptions were Geneva Rock Products (Point of the Mountain Facility), Hill Air Force Base (Main Base), and Proctor & Gamble (Paper Manufacturing Facility). Workbooks have not been completed for Geneva Rock Products (Point of the Mountain Facility) and Hill Air Force Base (Main Base). Proctor & Gamble (Paper Manufacturing Facility) had not yet begun operations at their site and therefore had not yet submitted an annual emissions inventory. It was estimated that these 48 inventory workbooks encompass approximately 99% of the total calculations for Utah’s 2008 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 48 major point source emissions inventory workbooks along with hard copy submittals from Geneva Rock Products (Point of the Mountain Facility), and Hill Air Force Base (Main Base) are maintained at UDAQ and are available for inspection upon request.

Idaho 2008 point source data was gathered between January and April of 2009. It was collected through direct survey using a Web application called the Point Source Survey Tool (POSST) to meet all Air Emissions Reporting Requirements (40 CFR Part 51). The data was quality assured in part by POSST as data entry took place and the remainder manually so that 100% of the data fields were reviewed and corrected as necessary. Idaho DEQ provided the data to UDAQ for joint modeling in Excel tables.

### **The SMOKE Emissions Model and Processor**

The emissions processing model 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<sub>10</sub> 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 created for area sources and mobile sources too.

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<sub>2.5</sub> and VOC emissions.

In the case of spatial processing, the emissions from large industrial sources are placed in the location of the source itself. As with area and mobile sources, the emissions from the smaller point sources are spatially distributed using various surrogates like population density.