Last modified 9/24/15

Inventory Overview
and Construction within the Modeling Domain

Overview:

Much of the technical work done to support the modeled demonstration of continued attainment within the nonattainment areas for PM_{10} involves the emissions inventories.

There are essentially two such inventories: one, a *baseline* inventory that represents typical conditions at a recent point in time during which the areas were monitoring attainment of the NAAQS (2011 for these Plans). Not only does this inventory serve as a reference point for comparison within the air quality modeling, it also serves as a platform from which inventories for other years are projected. The baseline inventory is often developed from a recent triannual inventory compiled as part of the Utah Division of Air Quality's (UDAQ's) routine work. These triannual inventories reflect a comprehensive, statewide effort and are prepared according to the reporting rules of 40 CFR 51, subpart A. They are delivered to EPA for its work in compiling a National Emissions Inventory (NEI). As such, the quality is already very good. Nevertheless, it is sometimes necessary to make adjustments (seasonal for example) to the triannual inventory when they are applied to specific situations common in SIP work.

The second type of inventory is a *projection* inventory that reflects the many assumptions concerning population growth, economic development, and various controls that will affect emission rates. Projection inventories are generally prepared for a number of years in the future that are selected to match the various planning requirements to be addressed in a SIP revision. For these PM_{10} Maintenance Plans, the years to be evaluated will be 2019, 2024, 2028, and 2030. As indicated before, these inventories are based largely on the triannual inventory developed for 2011. When the air quality model is run to make its projections with regard to PM_{10} concentrations, it is basically comparing the emissions in one of these projection inventories against the emissions from the baseline inventory.

There is actually a third inventory that is important from the standpoint of SIP development. This would be an *episodic* inventory that is used to validate the air quality model. This validation process makes an assessment of actual emissions, paired in time with the monitored episodes of elevated pollution. The model must perform well enough in its replication of the monitored air quality values that it may then be used as the basis for the subsequent demonstration of attainment and/or maintenance that underlies the plan revision. For these PM_{10} Maintenance Plans, UDAQ is relying on an air quality model that has already been validated as part of recent SIP work for the 24-hour $PM_{2.5}$ NAAQS in the same area. That validation process was part of the 2014 $PM_{2.5}$ SIPs for the Salt Lake City, UT, Provo, UT, and Logan UT-ID nonattainment areas. Though

submitted to EPA, the $PM_{2.5}$ SIPs have not yet been approved, so the episodic inventories used to validate the model have also been made part of this Technical Support Document.

Each inventory prepared for use includes estimates for the following pollutants: PM_{10}, SO_2, NO_X, VOC, CO, and ammonia (NH_3).

Each inventory also includes contributions from a number of sectors. The Utah Division of Air Quality routinely considers emissions from the following generalized source groupings:

- Large industrial *point sources*;
- *Area sources*, which include smaller, and more numerous, industrial sources as well as activities like space heating that may be well approximated by surrogate indicators such as population;
- *On-road mobile sources;* and
- *Non-road mobile sources*.

Construction within the Modeling Domain:

As noted before, the air quality model employed for use in these PM_{10} Maintenance Plans has been used before as the technical basis for $PM_{2.5}$ SIPs promulgated in 2014 by the Utah Air Quality Board (and submitted to EPA Region 8) for the Salt Lake City, UT, Provo, UT, and Logan UT-ID nonattainment areas. Collectively, these three nonattainment areas include all or parts of four counties along the Wasatch Front and also Cache County to the north. The air quality model was developed to describe a "modeling domain" large enough to include all these areas, with a sufficient margin in order to minimize any effects resulting from boundary conditions.

The PM_{10} nonattainment areas addressed in these Maintenance Plans (Utah County, Salt Lake County, and Ogden City) are similar in their geographic extent to the $PM_{2.5}$ nonattainment areas, though they do not include much of the area outlying the Wasatch Front, and they do not extend north into Cache Valley. Nevertheless, the modeling domain that had been described for $PM_{2.5}$ purposes will still be same for this analysis. There is no technical down-side to this approach, whereas the work necessary to down-size the domain would consume too much time and resource.

With this in mind, UDAQ has employed what might be described as a two-tiered approach to the emissions inventory in its support of the air quality modeling. The greater (rectangular) modeling domain may be thought to include a centralized core along the Wasatch Front. This core area includes (from south to north) Utah County, Salt Lake County, Davis County and Weber County.

Within this core area, the SIP-Specific inventories will be developed to a higher degree of accuracy.

- On-road mobile source emissions will be prepared specifically for each year by the Metropolitan Planning Organizations responsible in its various parts, and will be adjusted to reflect the winter-time seasonality of elevated PM_{10} concentrations.

- Emissions from area sources will be inventoried for each year in each county, and will be adjusted to reflect the winter-time seasonality of elevated PM_{10} concentrations.

- Emissions from off-road mobile sources will be inventoried for each year in each county using EPA's NonRoad model.

- Emissions from the large stationary sources located within one of the three nonattainment areas will be individually inventoried in Excel workbooks, and will include specific assumptions regarding emission control and economic growth.

    - This list will include all such sources located in Utah County (the Utah County nonattainment area), Salt Lake County (the Salt Lake County nonattainment area), several sources in Davis County that were included in the PM_{10} SIP for Salt Lake County (Big West, Chevron, Holly, and Bountiful City Power). The third PM_{10} nonattainment area is Ogden City, which lies within Weber County. There are no large stationary sources located within Ogden City.

    - All remaining large stationary sources within the core area will be treated like other large stationary sources outside the core area but within the greater modeling domain (see below). Collectively, the emissions from these sources represent less than 3% of the emissions within Davis or Weber Counties.

Outside of the core area, the NEI inventory for 2011 will be downloaded from EPA and used to fill in the surrounding modeling domain. As discussed above, this inventory is still of high quality, but it will not be seasonally adjusted and it will not be projected throughout the period of analysis. Still, given the stagnant air conditions that accompany episodes of elevated PM_{10} concentrations and the relative lack of emissions in this surrounding area, this is a good approximation that will have minimal influence on the concentrations predicted by the model within the nonattainment areas.

As mentioned, these inventories represent a great deal of the technical basis for the $PM_{2.5}$ SIPs. As such, they occupy a large portion of this Technical Support Document (TSD).

To assist the reader, the inventory portion of the TSD is organized using the categorizations discussed above.

The episodic inventory (from the prior $PM_{2.5}$ work) is presented first, beginning with summary tables and concluding with additional information concerning each of the various source groups. Note that episodes 1 and 2 (of the three) were not used to further validate the model for this PM_{10} analysis. Episode 3 was used for this purpose, so the information for episodes 1 and 2 has been omitted.

Next are the baseline and projection year inventories, and they have been organized in the same way.