

UTAH DIVISION OF AIR QUALITY
2014 Base Year Emissions Inventory
For the Provo, UT PM2.5 Nonattainment Area

May 1, 2018

Executive Summary

The following collection of documents presents a Base Year emissions inventory (EI) for the Provo, UT PM2.5 nonattainment area for the 2006 24-hour national ambient air quality standard (NAAQS). This EI was prepared to support a Serious Area Nonattainment Area State Implementation Plan (SIP). Within the context of such a SIP, this base year inventory would be accompanied by various episodic inventories and projection year inventories. Each would interface with an air quality model and together would allow for assessments of various control strategies in future years with respect to the NAAQS. Such an analysis is called an attainment demonstration.

This base year EI is, however, now presented by itself in a somewhat different context. The “Fine Particulate Matter NAAQS: SIP Requirements; Final Rule” (FR 81, 58010) affords an option, at 40 CFR 51.1015, for the EPA to determine that a PM2.5 nonattainment area has attained the NAAQS and to thereby suspend a state’s obligation to submit certain elements of the attainment plan typically required. The suspended elements include (for a Serious Area): the attainment demonstration, reasonable further progress plan, quantitative milestones and quantitative milestone reports, and contingency measures. This does leave, however, other plan elements that are not suspended. The elements a state must still submit include (for a Serious Area): the base year EI, Serious Area control strategy requirements, and plan requirements for nonattainment new source review.

To support the EPA in exercising this option for the Provo, UT PM2.5 nonattainment area, the Base Year emissions inventory is now presented as a “stand-alone” work product. Some further explanation is presented below to help the reader understand some of the work that may have otherwise seemed unnecessary as well as the organizational structure in which the various pieces are presented.

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SIP Inventory Overview

Much of the technical work done to support the modeled attainment demonstration of a State Implementation Plan (SIP) for PM_{2.5} is the collection of accurate emissions inventories.

There are essentially two such inventories: a base year inventory prepared to represent typical conditions at a recent point in time (2014 for this SIP), and a projection inventory that represents the bulk of assumptions concerning population growth and economic development as well as potential SIP control strategies. The air quality model then makes comparisons between the two at points in time represented by the projection years. The base year inventory is the basis for comparisons with all projections into the future.

The foundation of each of these specific inventories is the 2014 tri-annual inventory. This was the most recent comprehensive inventory submitted to EPA under subpart A of 40 CFR part 51. Each inventory utilized in the SIP is, however, tailored to address the seasonal nature of Utah's exceedances of the 24-hour PM_{2.5} NAAQS, and differs in that way from the tri-annual EI.

Each inventory includes estimates for the following pollutants: PM_{2.5}, SO_x, NO_x, VOC, and NH₃.

Each inventory also includes contribution from a number of sectors. The Utah Division of Air Quality (UDAQ) 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.

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

The inventory portion of the TSD is organized into the first three chapters; a General Chapter 1, a Chapter 2 for what would be the Episodic Inventories used to validate the air quality model, and a Chapter 3 which contains this 2014 Base Year EI and which would have also included the various projection year inventories. Chapter 3 is further organized into a General Section a. followed by Sections b. through e. which address the four source categories discussed above. The information presented below is therefore numbered specifically to fit within this structure, and will be presented in this stand-alone document in order.

In addition to an overall summary, Chapter 1 would also contain an Inventory Preparation Plan which is developed to guide the overall development of the EI within the context of the PM_{2.5} attainment SIP. While not actually required, it is a useful tool for those who prepare these inventories. It is also

probably informative enough to readers unfamiliar with this work that it has been included in this stand-alone presentation of the base year inventory, as Appendix 1.

For the 2014 baseline inventory an overall summary is provided and followed by information more specific to point, area on-road mobile sources, and non-road mobile sources.

2014 Baseline Year Inventory Overview

The baseline inventory should correspond to the period with a recently observed design value, and for a Serious PM2.5 nonattainment area, should belong to the span of data used to reclassify the area from Moderate to Serious. In the case of the Provo nonattainment area, this data set was 2013 – 2015. 2014 marks the center of this time-span. It also corresponds with the most recent tri-annual EI compiled for the area, and was for these reasons chosen as the baseline year for the purpose of SIP modeling.

The baseline inventory includes estimates of actual emissions for the following pollutants: PM2.5, SO2, NOx, VOC, and NH3.

It also includes contribution from a number of sectors. The Utah Division of Air Quality (UDAQ) 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.

To assist the reader, the baseline and projection-year inventory portion of the TSD is organized using the categorizations discussed above.

A summary table of base year emissions in 2014 is presented here in the overview. Following that is more in-depth information for point sources, area sources, on-road mobile sources and non-road mobile sources, including summary tables for each.

Summary of 2014 Base Year Emissions (tons per average episode day)

| Emissions [tons/day] | Region | Sector | PM2_5 | NOx | VOC | NH3 | SO2 |
|----------------------|--------------|-----------------|-------------|--------------|--------------|-------------|------------|
| 2014 | Salt Lake NA | Area Sources | 7.3 | 15.0 | 51.6 | 14.3 | 0.2 |
| | | Mobile Sources | 5.5 | 68.4 | 39.1 | 1.4 | 0.4 |
| | | NonRoad Sources | 1.2 | 18.2 | 9.2 | 0.0 | 0.3 |
| | | Point Sources | 3.2 | 18.2 | 4.7 | 0.7 | 5.2 |
| | | Total | 17.2 | 119.8 | 104.6 | 16.5 | 6.1 |
| | Provo NA | Area Sources | 2.1 | 5.2 | 14.6 | 6.6 | 0.1 |
| | | Mobile Sources | 1.9 | 22.7 | 11.8 | 0.5 | 0.1 |
| | | NonRoad Sources | 0.3 | 3.6 | 2.0 | 0.0 | 0.0 |
| | | Point Sources | 0.2 | 1.0 | 0.2 | 0.4 | 0.0 |
| | | Total | 4.5 | 32.5 | 28.6 | 7.5 | 0.2 |
| | Logan NA | Area Sources | 0.9 | 1.2 | 4.1 | 40.7 | 0.0 |
| | | Mobile Sources | 0.5 | 5.0 | 2.9 | 0.1 | 0.0 |
| | | NonRoad Sources | 0.1 | 0.9 | 2.3 | 0.0 | 0.0 |
| | | Point Sources | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | | Total | 1.5 | 7.1 | 9.3 | 40.8 | 0.1 |

Shaded area shows emissions from the Provo, UT PM2.5 nonattainment area

It is important to realize that the summary table presented below reports these emissions in units of tons per average episode day. This is a construct discussed in the PM Implementation Rule, and is most consistent with the nature of the 24-hour averaging period of the PM2.5 NAAQS for which the area has been designated nonattainment.

Nevertheless, as one reviews the various components of the inventory it becomes apparent that different units are utilized in calculating each of the various source categories. This would seem to make an overall aggregation of the EI a comparison of apples and oranges, but again each of these components was prepared for use in the air quality model, and it within this model, in an emissions pre-processor called SMOKE that each of the respective pieces is apportioned in space and time allowing for its overall compilation in consistent units.

There are also geographical differences between what is reported in the summary table vs. what is presented in some of the raw inventory work that follows. Area source emissions, for instance, are calculated for each specific county. Nonattainment area boundaries sometimes bisect county lines, and so the emissions pre-processor is able to more accurately describe the emissions distributed within each nonattainment area.

A discussion of what SMOKE actually does and how an average episode day has been defined is also included here as Appendix 2.

2014 Base Year Emissions, by Source Category:

Point Source Emissions

- Base Year Overview

Area Source Emissions

- Area Source Baseline Inventory

On-Road Mobile Source Emissions

- TSD for On-Road Mobile Sources: PM_{2.5} Emissions Inventory for Baseline Year of 2014 Covering Utah County

Non-road Mobile Source Emissions

- TSD for Non-Road Mobile Sources: PM_{2.5} Emissions Inventories for Serious PM_{2.5} SIP Base Year 2014 Clean Data Approach for Utah County

Appendix 1 – Inventory Preparation Plan

- UDAQ PM_{2.5} Emission Inventory Preparation Plan

Appendix 2 – Inventory Pre-processor (SMOKE)

- UDAQ SMOKE Emissions Processing