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.

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

Company Name	Site ID	Site Name	2014 Base Year Emissions (tons/yr)						
			PM10	PM25	SOX	NOX	VOC	CO	NH3
Brigham Young University	10790	Main Campus	5.521	3.353	117.918	151.209	5.069	48.265	0.537
McWane Ductile	10794	Utah	17.246	12.546	3.901	38.597	29.548	18.034	0.497
PacifiCorp Energy	13031	Lake Side Power Plant	62.840	56.473	10.231	238.562	37.319	203.100	147.042
Geneva Nitrogen Inc.	10825	Geneva Nitrogen Plant	31.947	28.276	0.002	109.137	0.020	0.312	2.695
		Subtotal:	117.553	100.648	132.052	537.504	71.957	269.712	150.771

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).

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.