

Base Year PM_{2.5} Maintenance SIP Point Source Inventory

The PM_{2.5} Maintenance 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 2017 inventory.

As with all inventories collected for this analysis, the pollutants of concern included PM₁₀, PM_{2.5}, SO₂, NO_x, VOC, CO, and NH₃ 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 maintenance SIP project the 2017 triannual 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 PM₁₀ 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 areas however, a threshold for potential to emit annual emissions of 100 tons or more for any of the relevant criteria air pollutants was used. 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 modeling domain as of 2017. Of the 54 major sources located in the modeling domain the following four sources were located in the Provo Nonattainment Area: Brigham Young University – Main Campus, Geneva Nitrogen Inc. – Geneva Nitrogen Plant, McWane Ductile – Utah, and Pacificorp Energy – Lakeside Power Plant. Additional sources contained in the modeling domain but located outside of Utah were also identified. Emissions from the 54 major sources support modeled attainment demonstration for the Provo Nonattainment Area. Table 1 lists the 54 major sources in the modeling domain along with their 2017 base year emissions for PM₁₀, PM_{2.5}, SO₂, NO_x, VOC, CO and NH₃.

Table 1. Provo PM_{2.5} Maintenance SIP - 54 Major Point Sources with 2017 Base Year Emissions

Modeling Area	Count	Company Name	Site ID	Site Name	2017 Base Year Emissions (tons/yr)							
					PM ₁₀	PM _{2.5}	SO ₂	NO _x	VOC	CO	NH ₃	
Provo Non-Attainment Area	1	Brigham Young University	10790	Main Campus	2.57	2.48	0.34	66.92	5.54	25.88	0.94	
	2	Geneva Nitrogen Inc.	10825	Geneva Nitrogen Plant	1.98	0.66	0.03	2.68	0.29	4.50	0.17	
	3	McWane Ductile	10794	Utah	15.95	12.21	8.66	34.42	26.80	12.44	0.75	
	4	PacifiCorp Energy	13031	Lakeside Power Plant	65.08	65.08	7.60	207.06	26.26	917.07	110.35	
Subtotal:					85.57	80.43	16.63	311.08	58.89	959.89	112.21	
Salt Lake Non-Attainment Area	5	ACH Foam Technologies, LLC	10420	Expanded Polystyrene Mfg. Plant	0.06	0.06	0.00	0.73	88.42	0.61	0.02	
	6	ATK Launch Systems	10009	Promontory	75.77	53.12	0.79	35.83	29.93	36.59	5.70	
	7	Big West Oil, LLC	10122	Big West Oil Refinery	25.14	16.44	33.03	115.15	676.59	235.13	6.69	
	8	Bimbo Bakeries USA, Inc.	10369	Salt Lake City Bakery	0.44	0.18	0.01	2.43	71.75	2.04	0.01	
	9	Chevron Products Co.	10119	Salt Lake Refinery	39.94	27.83	32.38	253.64	363.88	245.94	7.71	
	10	Compass Minerals International	10917	Production Plant	221.10	104.53	1.18	68.42	34.01	90.10	0.71	
	11	Hexcel Corporation	11386	Salt Lake Operations	130.69	85.28	33.14	189.68	151.11	105.03	69.35	
	12	Hill Air Force Base	10121	Main Base	12.92	7.63	1.58	101.43	140.24	104.80	1.72	
	13	Holly Corp	10123	HRMC and HEP Woods Cross Operations	18.17	18.17	44.35	170.51	217.45	404.25	14.14	
	14	Kennecott Utah Copper LLC	10572	Power Plant Lab Tailings Impoundment	72.97	34.81	1036.37	460.80	6.59	36.12	1.21	
	15	Kennecott Utah Copper LLC	10346	Smelter & Refinery	692.99	608.35	587.95	134.16	10.82	92.03	4.80	
	16	Kennecott Utah Copper LLC	10571	Mine & Copperton Concentrator	1096.41	273.71	2.70	4209.19	210.03	1357.04	1.78	
	17	Lhoist North America	10707	Grantsville Plant	7.57	1.10	0.00	0.11	0.07	0.06	0.00	
	18	Nucor Steel	10008	Nucor Steel	45.90	32.49	80.17	182.41	31.49	688.01	2.24	
	19	Pacificorp Energy	10355	Gadsby Power Plant	8.15	5.02	0.46	38.81	2.26	27.08	4.72	
	20	Procter and Gamble	14107	Paper Manufacturing Plant	40.91	40.69	0.38	28.31	17.30	28.18	1.21	
	21	Snowbird Resort LLC	10406	Snowbird Ski and Summer Resort	2.01	1.94	0.29	88.16	42.46	136.58	0.08	
	22	Tesoro Refining & Marketing Company LLC	10335	Salt Lake City Refinery	160.32	99.66	499.46	313.27	230.77	255.07	3.35	
	23	University of Utah	10354	University of Utah facilities	10.85	10.85	0.59	41.65	8.13	38.02	2.57	
	24	Utah Municipal Power Agency	12495	West Valley Power Plant	4.63	4.63	0.36	10.09	1.47	14.37	0.00	
	25	Vulcraft - Division of Nucor Corporation	10028	Steel Products Manufacturing	17.94	7.90	0.25	6.15	42.92	6.38	0.00	
	26	Wasatch Integrated Waste Mgt District	10129	County Landfill & Energy Recovery Facility	12.84	5.50	6.47	91.82	23.72	34.98	0.00	
	Subtotal:					2697.71	1439.89	2361.92	6542.75	2401.42	3938.41	128.02
	Surrounding Area	27	Ash Grove Cement Company	10303	Leamington Cement Plant	116.96	100.80	19.05	1192.02	53.01	6278.88	58.77
		28	CCI Paradox Midstream LLC	10034	Lisbon Natural Gas Processing Plant	14.69	13.58	78.49	242.38	18.49	401.94	1.30
		29	Clean Harbors Aragonite LLC	10725	Hazardous Waste Storage Incineration	3.73	1.78	23.87	126.60	5.87	43.53	0.00
30		Dugway Proving Ground U.S. Army	10706	Dugway Proving Ground	677.71	71.01	0.85	13.55	10.12	102.88	0.13	
31		Energy Fuels Resources (USA) Inc.	14010	Tony M. Mine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
32		EnerVest Operating	12929	Sage Brush Flat Compressor Station	2.41	2.41	0.14	15.28	20.74	3.05	0.00	
33		EnerVest Operating L.L.C.	12948	Dry Canyon Compressor Station	2.53	2.53	0.08	7.40	14.34	9.79	0.04	
34		EnerVest Operating L.L.C.	13284	Interplanetary Compressor Station	3.38	3.38	0.11	5.13	13.30	7.13	0.00	
35		Genpak Corporation	11767	Polystyrene Foam Production Facility	0.56	0.56	0.01	1.08	71.08	0.46	0.21	
36		Graymont Western US Incorporated	10313	Cricket Mountain Plant	277.29	135.63	17.56	568.99	12.34	278.82	25.82	
37		Hill Air Force Base	11284	Utah Test and Training Range	170.44	62.62	0.83	14.17	3.52	5.04	0.08	
38		Holcim (US) Inc.	10007	Devil's Slide Plant	72.09	15.53	196.24	1426.83	45.11	1059.51	3.95	
39		Intermountain Power Service Corporation	10327	Intermountain Generation Station	983.45	923.90	2483.62	9333.37	9.65	964.59	1.65	
40		Kern River Gas Transmission Company	12512	Veyo Compressor Station	7.02	7.02	0.25	70.83	5.51	11.47	0.01	
41		Kinder Morgan Altamont LLC	10209	Altamont East Compressor Station	6.71	6.71	0.18	451.58	55.90	84.66	0.01	
42		Kinder Morgan Altamont LLC	10210	Altamont West Compressor Station	1.50	1.50	0.05	312.56	34.66	20.65	0.00	
43		Kinder Morgan Altamont LLC	10211	Altamont South Compressor Station	5.41	5.41	0.15	397.14	41.60	64.38	0.00	
44		Materion Natural Resources	10311	Delta Mill	22.78	4.44	0.44	13.70	6.21	8.86	82.50	
45		Northwest Pipeline GP	10259	Cisco Compressor Station	0.08	0.08	0.28	2.56	0.04	1.09	0.00	
46		Northwest Pipeline GP	10627	Moab Compressor Station	0.60	0.60	0.21	34.48	1.31	4.94	0.00	
47		PacifiCorp Energy	12524	Currant Creek Power Plant	24.23	24.23	2.74	157.68	10.02	297.96	40.91	
48		PacifiCorp	10237	Hunter Power Plant	503.92	385.33	3511.61	9776.71	119.75	3158.09	1.36	
49		PacifiCorp	10238	Huntington Power Plant	474.01	218.81	2280.98	5934.58	74.78	5107.68	0.82	
50		Questar Pipeline LLC	11532	Kastler Marushack Compressor Station	4.37	4.37	0.72	639.15	44.79	28.03	2.85	
51		St. George City Power	10892	Red Rock Power Generation Station	3.32	3.32	0.36	15.99	2.85	6.01	0.00	
52		Sunnyside Cogeneration Associates	10096	Sunnyside Cogeneration Facility	60.53	39.87	477.05	430.77	25.39	42.76	0.15	
53		US Magnesium LLC	10716	Rowley Plant	824.69	621.84	6.79	1061.59	660.26	323.05	1.82	
54		Utelite Corporation	10676	Shale Processing	89.27	37.69	137.22	211.45	2.32	9.27	0.03	
Subtotal:					4353.66	2694.96	9239.88	32457.54	1362.95	18324.51	222.38	

Data Collection and QA/QC

UDAQ has recently improved emissions inventory data management with the development and implementation of the State and Local Emissions Inventory System (SLEIS). This new system has established an online emissions inventory system, whereby point sources can submit their air emissions inventories to UDAQ. SLEIS includes extensive built-in calculation capabilities which simplify the process and reduce the workload for point sources required to submit an emissions inventory. SLEIS also contains extensive QA/QC which guides point sources as they submit their data, thereby greatly reducing oversight required by UDAQ staff. The 2017 triannual emissions inventory was submitted to UDAQ by point sources using the SLEIS online system. The submitted emissions inventories were thoroughly reviewed using additional QA/QC by UDAQ staff before being finalized. The extensive QA/QC contained in the SLEIS online system along with the review performed by UDAQ staff greatly surpasses EPA guidance requiring 10% QA/QC as the minimum criteria necessary for a SIP inventory. It should be noted that CCI Paradox – Lisbon Natural Gas Processing Plant which is located in the Surrounding Area did not operate and therefore submitted an inventory listing zero emissions for calendar year 2017. This was due to reconstruction and equipment installation at the facility which then began operating again in 2018. However, the facility was operating during 2016 which was also the base year for the PM_{2.5} Serious SIP. Therefore, it was determined that the 2016 emissions inventory for CCI Paradox – Lisbon Natural Gas Processing Plant would be used in lieu of their 2017 emissions inventory for the PM_{2.5} Maintenance SIP 2017 base year. It should be noted that Energy Fuel Resources (USA) Inc. – Tony M. Mine which is located in the surrounding area has not operated since 2012. UDAQ staff anticipated that the facility would eventually shut down according to past communication with source representatives. However, the source submitted a notice of intent and the Approval Order (AO) for Energy Fuel Resources (USA) Inc. – Tony M. Mine was updated in 2018. At that time representatives for the source indicated that start-up of the mine was a possibility at some point in the future. Therefore, since the source did not operate in 2017 UDAQ used zero emissions for Energy Fuel Resources (USA) Inc. – Tony M. Mine for the 2017 base year. The 2017 triannual point source emissions inventory data from SLEIS is contained in the PM_{2.5} Maintenance SIP workbooks. The 2016 emissions inventory for CCI Paradox – Lisbon Natural Gas Processing Plant is contained in a separate electronic workbook. This data is available in electronic format upon request.

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

The 2017 inventory was reported and compiled in terms of tons per year (tpy). Since the PM_{2.5} Maintenance SIP is designed to protect the 24-hour standard, the model (CAMx) 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_{2.5} concentrations over the span of multi-day episodes, an (annual) inventory worksheet was used to develop each episode day. 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.

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 PM₁₀. Condensable emissions were included in the inventories submitted by the sources in 2017.

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.