Base Year $PM_{2.5}$ Serious 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 2016 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. The 2014 tri-annual inventory was used to develop the 2016 base year inventory. 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 areas however, a threshold for potential to emit annual emissions of 100 tons 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 53 major sources were contained within the prescribed modeling domain as of 2016. Additional sources contained in the prescribed modeling domain but located outside of Utah were also identified. Emissions from these 53 major sources support modeled attainment demonstration for the Salt Lake nonattainment. Table 1 lists the 53 major sources in the Salt Lake Nonattainment Area along with their 2016 base year emissions for PM_{10}, $PM_{2.5}$, SO_X, NO_X, VOC, CO and NH_3.

Table 1. Salt Lake $PM_{2.5}$ Serious SIP – 53 Major Point Sources with 2016 Base Year Emissions

Modeling Area	Count	Company Name	Site ID	Site Name	2016 Base Year Emissions (tons/yr)						
					PM10	PM25	SOX	NOX	VOC	CO	NH3
Provo Non-Attainment Area	1	Brigham Young University	10790	Main Campus	5.52	3.35	117.92	151.21	5.07	48.27	0.54
	2	Geneva Nitrogen Inc.	10825	Geneva Nitrogen Plant	31.95	28.28	0.00	109.14	0.02	0.31	2.70
	3	McWane Ductile	10794	Utah	18.04	13.34	3.90	38.60	29.55	18.03	0.50
	4	PacifiCorp Energy	13031	Lake Side Power Plant	64.98	58.39	10.58	246.67	38.59	210.01	152.04
				Subtotal:	120.48	103.36	132.40	545.62	73.23	276.62	155.77
Salt Lake Non-Attainment Area	5	ACH Foam Technologies	10420	Expanded Polystyrene Mfg. Plant	0.05	0.05	0.00	0.67	75.82	0.53	0.00
	6	ATK Launch Systems	10009	Promontory Plan	45.88	19.13	1.86	44.84	31.18	117.18	0.44
	7	Big West Oil	10122	Flying J Refinery	11.20	10.64	43.14	92.31	307.37	119.76	4.37
	8	Bimbo Bakeries USA	10369	Salt Lake City Plant	0.48	0.20	0.02	2.64	79.44	2.22	0.08
	9	Chevron Products Co	10119	Salt Lake Refinery	40.70	33.99	23.62	260.87	304.98	842.98	8.90
	10	Compass Minerals Ogden Inc.	10917	Production Plant	232.32	80.50	9.81	134.50	72.82	129.46	3.61
	11	Hexcel Corporation	11386	Salt Lake Operations	117.98	72.96	37.80	169.38	163.81	103.05	84.98
	12	Hill Air Force Base	10121	Main Base	13.40	8.45	4.01	151.42	126.36	147.54	1.45
	13	Holly Corp	10123	HRMC and HEP Woods Cross Operations	13.30	13.27	109.96	181.71	157.86	297.12	17.82
	14	Kennecott Utah Copper LLC	10571	Mine & Copperton Concentrator	1036.18	274.05	1.99	4199.63	213.70	1243.22	1.75
	15	Kennecott Utah Copper LLC	10572	Power Plant Lab Tailings Impoundment	126.83	71.78	1500.34	1322.52	8.21	65.70	0.24
	16	Kennecott Utah Copper LLC	10346	Smelter & Refinery	491.38	421.19	704.35	160.21	10.37	104.75	5.62
	17	Lhoist North America	10707	Grantsville Plant	3.35	0.25	0.02	0.21	0.14	2.03	0.00
	18	Nucor Steel	10008	Nucor Steel	52.00	37.47	135.01	156.77	31.72	685.12	1.92
	19	PacifiCorp Energy	10355	Gadsby Power Plant	28.81	16.86	1.52	117.39	9.57	70.83	13.15
	20	Procter and Gamble	14107	Paper Manufacturing Plant	39.13	38.94	0.30	27.23	18.58	26.81	0.17
	21	Snowbird Development Corporation	10406	Snowbird Ski and Summer Resort	3.52	3.52	1.48	93.33	12.11	58.15	0.64
	22	Tesoro Refining & Marketing Company LLC	10335	Salt Lake City Refinery	140.58	89.35	544.38	360.09	249.28	267.76	3.77
	23	University of Utah	10354	University of Utah facilities	15.45	15.28	0.80	73.25	10.49	57.12	3.38
	24	Utah Municipal Power Agency	12495	West Valley Power Plant	3.94	3.94	0.36	8.55	1.25	11.03	0.00
	25	Vulcraft - Division of Nucor Corporation	10028	Steel Products Manufacturing	31.92	9.68	0.50	6.68	44.91	10.34	0.04
	26	Wasatch Integrated Waste Mgt District	10129	County Landfill & Energy Recovery Facility	27.49	9.79	17.16	236.44	23.18	32.92	0.00
				Subtotal:	2475.90	1231.29	3138.43	7800.64	1953.14	4395.65	152.35
Surrounding Area	27	Ash Grove Cement Company	10303	Leamington Cement Plant	102.61	86.73	8.33	1063.18	51.44	5879.22	5.97
	28	CCI Paradox Mistream LLC	10034	Lisbon Natural Gas Processing Plant	59.76	58.03	506.13	191.03	48.25	183.82	1.56
	29	Clean Harbors Aragonite LLC	10725	Hazardous Waste Storage Incineration	6.37	4.15	29.31	144.56	7.55	60.29	0.01
	30	Dugway Proving Ground	10706	U.S. Army-Dugway Proving Ground	279.18	37.33	1.33	22.11	15.63	26.05	0.12
	31	EnerVest Operating LLC	12948	Dry Canyon Compressor Station	5.17	5.17	0.17	10.40	22.78	19.18	2.62
	32	EnerVest Operating LLC	13284	Interplanetary Compressor Station	4.48	4.48	0.15	50.44	85.07	22.64	3.27
	33	EnerVest Operating LLC	12929	Sage Brush Flat Compressor Station	4.14	4.14	0.13	27.96	59.98	10.30	1.95
	34	Genpak Corporation	11767	Polystyrene Foam Production Facility	0.59	0.59	0.01	1.81	108.97	0.77	0.35
	35	Graymont Western US Incorporated	10313	Cricket Mountain Plant	236.99	121.30	43.29	972.45	16.51	491.61	30.29
	36	Hill Air Force Base	11284	Utah Test and Training Range	144.25	101.48	0.32	17.90	2.85	6.22	0.05
	37	Holcim (US) Inc.	10007	Devil's Slide Plant	73.33	22.54	142.82	1358.70	49.67	615.48	3.64
	38	Intermountain Power Service Corporation	10327	Intermountain Generation Station	1671.73	1328.00	4389.18	23001.85	13.75	1350.07	1.77
	39	Kern River Gas Transmission Company	12512	Veyo Compressor Station	8.16	8.16	0.29	82.87	1.63	7.45	0.01
	40	Kinder Morgan Altamont LLC	10209	Altamont East Compressor Station	5.41	5.41	0.09	496.68	55.14	79.56	0.01
	41	Kinder Morgan Altamont LLC	10211	Altamont South Compressor Station	4.28	4.28	0.10	471.97	53.34	53.73	0.01
	42	Kinder Morgan Altamont LLC	10210	Altamont West Compressor Station	1.23	1.23	0.04	310.68	50.61	12.69	0.00
	43	Materion Natural Resources	10311	Delta Mill	26.65	10.61	4.31	26.84	5.24	13.84	83.64
	44	Northwest Pipeline GP	10259	Cisco Compressor Station	0.19	0.19	0.72	8.75	0.44	1.43	0.01
	45	Northwest Pipeline GP	10627	Moab Compressor Station	0.37	0.37	0.71	108.40	0.25	13.07	0.01
	46	PacifiCorp	12524	Currant Creek Power Plant	129.13	129.13	6.25	114.98	21.89	107.34	90.40
	47	PacifiCorp	10237	Hunter Power Plant	748.49	426.63	3944.89	11507.46	126.11	4349.56	1.40
	48	PacifiCorp	10238	Huntington Power Plant	756.44	325.47	2482.75	6881.32	81.28	2804.48	0.87
	49	Questar Pipeline Company	11532	Kastler Marushack Compressor Station	3.48	3.48	1.58	596.43	33.20	43.08	0.09
	50	St. George City Power	10892	Red Rock Power Generation Station	3.82	3.82	0.46	34.57	3.86	4.60	0.00
	51	Sunnyside Cogeneration Associates	10096	Sunnyside Cogeneration Facility	74.11	40.99	1065.00	352.31	11.96	83.12	0.15
	52	US Magnesium LLC	10716	Rowley Plant	1151.61	840.43	19.58	1149.31	698.39	334.04	2.16
	53	Utelite Corporation	10676	Shale Processing	76.68	37.41	98.18	150.37	1.71	6.87	0.01
				Subtotal:	5578.64	3611.55	12746.12	49155.34	1627.51	16580.51	230.33

Development of 2016 Base Year Inventory

As mentioned above the 2014 tri-annual inventory was used to develop the 2016 base year inventory. A description of how the emissions were developed for each source is listed below.

2014 Emissions Held Constant Through 2016

According to the UDAQ permit engineers the 2014 emissions were held constant through 2016 for the following sources located in the non-attainment area: ACH Foam Technologies, LLC – Expanded Polystyrene Mfg. Plant, Bimbo Bakeries USA, Inc. – Salt Lake City Bakery, Brigham Young University – Main Campus, Geneva Nitrogen Inc. – Geneva Nitrogen Plant, Hill Air Force Base – Main Base, Kennecott Utah Copper LLC – Power Plant Lab Tailings Impoundment, Lhoist North America – Grantsville Plant, Nucor Steel – Plymouth (Nucor), Pacificorp Energy – Gadsby Power Plant, Proctor & Gamble – Paper Manufacturing, Snowbird Resort LLC – Snowbird Ski and Summer Resort, Utah Municipal Power Agency – West Valley Power Plant, and Wasatch Integrated Mgt. District – Davis Landfill.

Emissions Projected from 2014 to 2016 using REMI

It was determined that data from the Regional Economic Models, Inc. (REMI) would be used to project 2014 tri-annual emissions to 2016 for all sources located in the surrounding areas of the modeling domain. Since REMI data did not exist for military installations it was determined that data from the Bureau of Economic Analysis (BEA) along with data from the Governor's Office of Management and Budget (GOMB) would be used for projecting emissions at military bases. The data from the REMI model and BEA & GOMB along with a description of how the projection data for military installations was developed may be found in Appendix 1.

Emissions Changes due to Installation or Updates of Equipment

Emissions changes from 2014 to 2016 resulted from the installation or update of equipment for the following sources in the non-attainment area: ATK Launch Systems – Promontory, Big West Oil, LLC – Big West Oil Refinery, Chevron Products Co – Salt Lake Refinery, Hexcel Corporation – Salt Lake Operations, Holly Corp – HRMC and HEP Woods Cross Operations, Kennecott Utah Copper LLC – Mine & Copperton Concentrator, Kennecott Utah Copper LLC – Smelter & Refinery, McWane Ductile – Utah, Pacificorp Energy – Lakeside Power Plant, Tesoro Refining & Marketing Company LLC – Salt Lake Refinery, University of Utah – University of Utah Facilities, and Vulcraft – Division of Nucor Corporation.

Emissions Changes Due to Other

Representatives of Compass Minerals Ogden Inc. – Production Plant developed and submitted an updated 2016 emissions inventory to the UDAQ permit engineer.

The 2016 inventory was reported and compiled in terms of tons per year (tpy). Since the $PM_{2.5}$ Serious 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.

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 49 of the 53 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 49 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 49 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 inventories submitted by the sources in 2014. As described above, electronic and hard copy versions of the emissions inventories 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.