UTAH STATE IMPLEMENTATION PLAN

$PM_{2.5}$ Maintenance Provisions for the Salt Lake City, UT Nonattainment Area

SECTION IX.A.36

UTAH DEPARTMENT *of* ENVIRONMENTAL QUALITY

AIR QUALITY

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List of Acronyms and Abbreviations

BACM	Best Available Control Measure
BACT	Best Available Control Technology
BDV	Base Design Value
CAA	Clean Air Act
CDD	Clean Data Determination
CFR	Code of Federal Regulations
CAMx	Comprehensive Air Quality Model with Extensions
DAQ	Utah Division of Air Quality (also UDAQ)
EPA	Environmental Protection Agency
FDV	Future Design Value
FR	Federal Register
MOVES	Motor Vehicle Emission Simulator
MPO	Metropolitan Planning Organization
MVEB	Motor Vehicle Emissions Budget
$\mu g/m^3$	Micrograms Per Cubic Meter
Micron	One Millionth of a Meter
NAAQS	National Ambient Air Quality Standards
NH_3	Ammonia
NO_x	Nitrogen Oxides
NNSR	Nonattainment New Source Review
PM	Particulate Matter
PM_{10}	Particulate Matter Smaller Than 10 Microns in Diameter
$PM_{2.5}$	Particulate Matter Smaller Than 2.5 Microns in Diameter
R-307	Utah Administrative Code Air Quality Rules
RACM	Reasonably Available Control Measures
RACT	Reasonably Available Control Technology
RFP	Reasonable Further Progress
RRF	Relative Response Factor
SIP	State Implementation Plan
SLC NAA	Salt Lake City Nonattainment Area
SMAT	Software for Model Attainment Test
SMOKE	Sparse Matrix Operator Kernal Emissions
SO_2	Sulfur Dioxide
SO_x	Sulfur Oxides
TPY	Tons Per Year
TSD	Technical Support Document
UAC	Utah Administrative Code
UT	Utah
VMT	Vehicle Miles Travelled
VOC	Volatile Organic Compounds
WRF	Weather Research and Forecasting

Section IX.A.36
$PM_{2.5}$ Maintenance Provisions the for SLC, UT Nonattainment Area

IX.A.36.a Introduction

The Salt Lake City Nonattainment Area (SLC NAA) has attained the 2006 $PM_{2.5}$ 24-hour National Ambient Air Quality Standard (NAAQS). As a result, this Section has been added to the State Implementation Plan (SIP) to demonstrate that the SLC NAA is eligible for redesignation to attainment. Under Section 107(d)(3)(E) of the Clean Air Act (CAA or the Act), a nonattainment area is eligible for redesignation when the area has met the following requirements: (1) the area has attained the national ambient air quality standard, (2) the area has an Environmental Protection Agency (EPA) approved attainment SIP, (3) the improvement in air quality is due to permanent and enforceable reductions in emissions resulting from implementation of the SIP, (4) the State has met the SIP requirements of Section 110 and Part D of the Act, and (5) the area has an EPA approved Maintenance Plan.

As demonstrated in Subsection IX.A.36.b, the SLC NAA has satisfied the redesignation requirements of Section 107 and is eligible for redesignation pending the EPA's approval of the SLC NAA Maintenance Plan. The maintenance plan is included in Subsection IX.A.36.c and was written in compliance with Section 175A of the Act. The maintenance plan demonstrates that the SLC NAA will continue to maintain the 24-hour $PM_{2.5}$ NAAQS through at least the year 2035. The maintenance plan also includes contingency measures to assure that the State will promptly correct any violation of the standard that may occur after redesignation. Upon the EPA's approval of the maintenance plan, the State is requesting that the SLC NAA be redesignated to attainment for the 2006 $PM_{2.5}$ 24-hour NAAQS.[1]

a) Background

In October of 2006, EPA revised the 1997 NAAQS for $PM_{2.5}$. While the annual standard remained unchanged at 15 µg /m^3 until 2012, the 24-hr standard was lowered from 65 µg /m^3 to 35 µg /m^3. The Utah Division of Air Quality (UDAQ) has monitored $PM_{2.5}$ since 2000 and found that all areas have complied with the 1997 standards. Since the promulgation of the 2006 standard, all or parts of seven Utah counties have recorded monitoring data that was not in compliance with the new 24-hr standard. In 2012, EPA lowered the annual standard to 12 µg /m^3, and all areas of the state meet this new standard.

On November 13, 2009, EPA designated the SLC NAA as nonattainment for the 2006 24-hour $PM_{2.5}$ NAAQS under the Act's general provisions for nonattainment areas. On January 4, 2013, the D.C. Circuit Court of Appeals issued a decision holding that the specific provisions for PM_{10} nonattainment areas, which are found in Part D, Subpart 4 of the Act, also apply to $PM_{2.5}$ nonattainment areas. These provisions require EPA to classify a PM nonattainment area as "moderate" at the time it is designated nonattainment. If the area cannot attain the NAAQS by the attainment date, then EPA is required to

[1] Concurrent with the State's submittal of SIP Section IX.A.36 to the EPA, Governor Gary Herbert will submit a letter to EPA requesting that EPA approve the maintenance plan and redesignate the SLC NAA to attainment.

reclassify the area as “serious.” On June 2, 2014, the EPA classified the SLC NAA as a moderate nonattainment area with an attainment date of December 31, 2015.

The Act requires areas failing to meet the federal ambient $PM_{2.5}$ standard to develop a SIP with sufficient control requirements to expeditiously attain and maintain the standard. On December 22, 2014, UDAQ submitted a moderate area nonattainment SIP for the SLC NAA.[2] The modeled attainment demonstration underlying the moderate SIP assessed the likelihood of attainment by the applicable attainment date of December 31, 2015, and concluded that it would be impracticable to do so.

After reaching the statutory attainment date, the EPA was compelled to determine whether the area had or had not achieved compliance with the standard by evaluating the prior three years of quality assured data. On May 10, 2017, EPA determined that the SLC NAA did not reach attainment of the 2006 24-hour standard by the attainment date (89 FR 21711). EPA subsequently reclassified the SLC NAA from a moderate $PM_{2.5}$ nonattainment area to a serious $PM_{2.5}$ nonattainment area on June 9, 2017.

Under Subpart 4 of the Act, serious PM nonattainment areas require, in addition to the provisions submitted to meet the moderate area planning requirements, the submittal of a SIP revision that: 1) provides for attainment of the applicable NAAQS no later than the end of the 10th calendar year after the area’s designation as nonattainment (December 31, 2019, for the SLC NAA), and 2) includes provisions to assure that the best available control measures (BACM) for the control of $PM_{2.5}$ and its precursors shall be implemented no later than four years after the date the area is re-classified as a serious area (June 9, 2021, for the SLC NAA). To fulfill the Subpart 4 requirements, Utah submitted a serious SIP to EPA, including a BACM analysis, on February 15, 2019, that demonstrates attainment of the $PM_{2.5}$ NAAQS by December 31, 2019. EPA SIP approval is discussed in more detail in IX.A.36.b(2).

The statutory attainment date for the SLC NAA is December 31, 2019. Under the 24-hour $PM_{2.5}$ NAAQS, compliance is determined by the average of three years of 98th percentile values. On June 5, 2019 (84 FR 26053), the EPA published a proposed rule in the Federal Register based on the validated data from 2016-2018, that the SLC NAA attained the 2006 primary and secondary 24-hour $PM_{2.5}$ NAAQS prior to the 2019 attainment date. The purpose of this SIP submittal is to demonstrate that the SLC NAA is eligible for redesignation to attainment (IX.A.36.b) and document a ten-year maintenance plan (IX.A.36.c).

IX.A.36.b Redesignation Requirements

Section 107(d)(3)(E) of the Act outlines five requirements that a nonattainment area must satisfy before an area may be eligible for redesignation from nonattainment to attainment. Table IX.A.36.1 identifies the redesignation requirements as they are stated in Section 107(d)(3)(E) of the Act. Each element will be

[2] UDAQ. December 3, 2014. Utah State Implementation Plan. Control Measures for Area and Point Sources, Fine Particulate Matter, $PM_{2.5}$ SIP for the Salt Lake City, UT Nonattainment Area. Section IX. Part A.21. https://deq.utah.gov/legacy/laws-and-rules/air-quality/sip/docs/2014/12Dec/SIP%20IX.A.21_SLC_FINAL_Adopted%2012-3-14.pdf

addressed in turn, with the central element being the maintenance plan found in Subsection IX.A.36.c below.

Category	Requirement	Reference	Addressed in Section
Attainment of Standard	Three consecutive years of $PM_{2.5}$ monitoring data must show that violations of the standard are no longer occurring	CAA §107(d)(3)(E)(i)	IX.A.36.b(1)
Approved SIP	The attainment SIP for the area must be fully approved	CAA §107(d)(3)(E)(ii)	IX.A.36.b(2)
Permanent and Enforceable Emissions Reductions	The State must be able to reasonably attribute the improvement in air quality to emission reductions that are permanent and enforceable	CAA §107(d)(3)(E)(iii), Calcagni memo (Sect 3, para 2)	IX.A.36.b(3)
Section 110 and Part D requirements	The State must verify that the area has met all requirements applicable to the area under section 110 and Part D	CAA: §107(d)(3)(E)(v), §110(a)(2), Sec 171	IX.A.36.b(4)
Maintenance Plan	The Administrator has fully approved the Maintenance Plan for the area as meeting the requirements of CAA §175A	CAA: §107(d)(3)(E)(iv)	IX.A.36.b(5) and IX.A.36.c

Table IX.A.36. 1 Prerequisites to Redesignation in the Federal Clean Air Act

(1) The Area Has Attained the $PM_{2.5}$ NAAQS

CAA 107(d)(3)(E)(i) – *The Administrator determines that the area has attained the national ambient air quality standard*. To satisfy this requirement, the State must show that the area is attaining the applicable NAAQS. According to EPA's guidance[3] concerning area redesignations, there are generally two components involved in making this demonstration. The first relies upon ambient air quality data which should be representative of the area of highest concentration and should be collected and quality assured in accordance with 40 CFR 58. The second component relies upon supplemental air quality modeling. Each component will be addressed in turn.

a) Ambient Air Quality Data (Monitoring) and Utah's Monitoring Network

The NAAQS for $PM_{2.5}$ are listed in 40 CFR 50.13. The 2006 24-hour NAAQS is 35 micrograms per cubic meter (μg/m^3) for a 24-hour period and is met when the 98th percentile 24-hr concentration is less than or equal to 35 μg/m^3. Each year's 98th percentile is the daily value beneath which 98% of all daily values would fall. The procedure for evaluating $PM_{2.5}$ data with respect to the NAAQS is specified in Appendix N of 40 CFR Part 50. Generally speaking, the 24-hr $PM_{2.5}$ standard is met when a three-year average of 98th percentile values is less than or equal to 35 μg/m^3.

[3] John Calcagni. September 4, 1992. EPA Memorandum "Procedures for Processing Requests to Redesignate Areas to Attainment."

$PM_{2.5}$ has been monitored in Utah since 2000, following the promulgation of the 1997 $PM_{2.5}$ NAAQS. UDAQ’s monitors are appropriately located to assess concentration, trends, and changes in $PM_{2.5}$ concentrations. During Utah’s wintertime temperature inversions, daily sampling and real time monitoring are necessary for both public notification and to provide data for the air quality models.

The UDAQ Air Monitoring Section maintains an ambient air monitoring network in Utah in accordance with 40 CFR 58 that collects both air quality and meteorological data. Figure IX.A.36.1 on the following page shows the location of sites along the Wasatch Front and in the Cache Valley that collect $PM_{2.5}$ data. The ambient air quality monitoring network along Utah’s Wasatch Front and in the Cache Valley is routinely audited by the EPA, and meets the agency’s requirements for air monitoring networks.

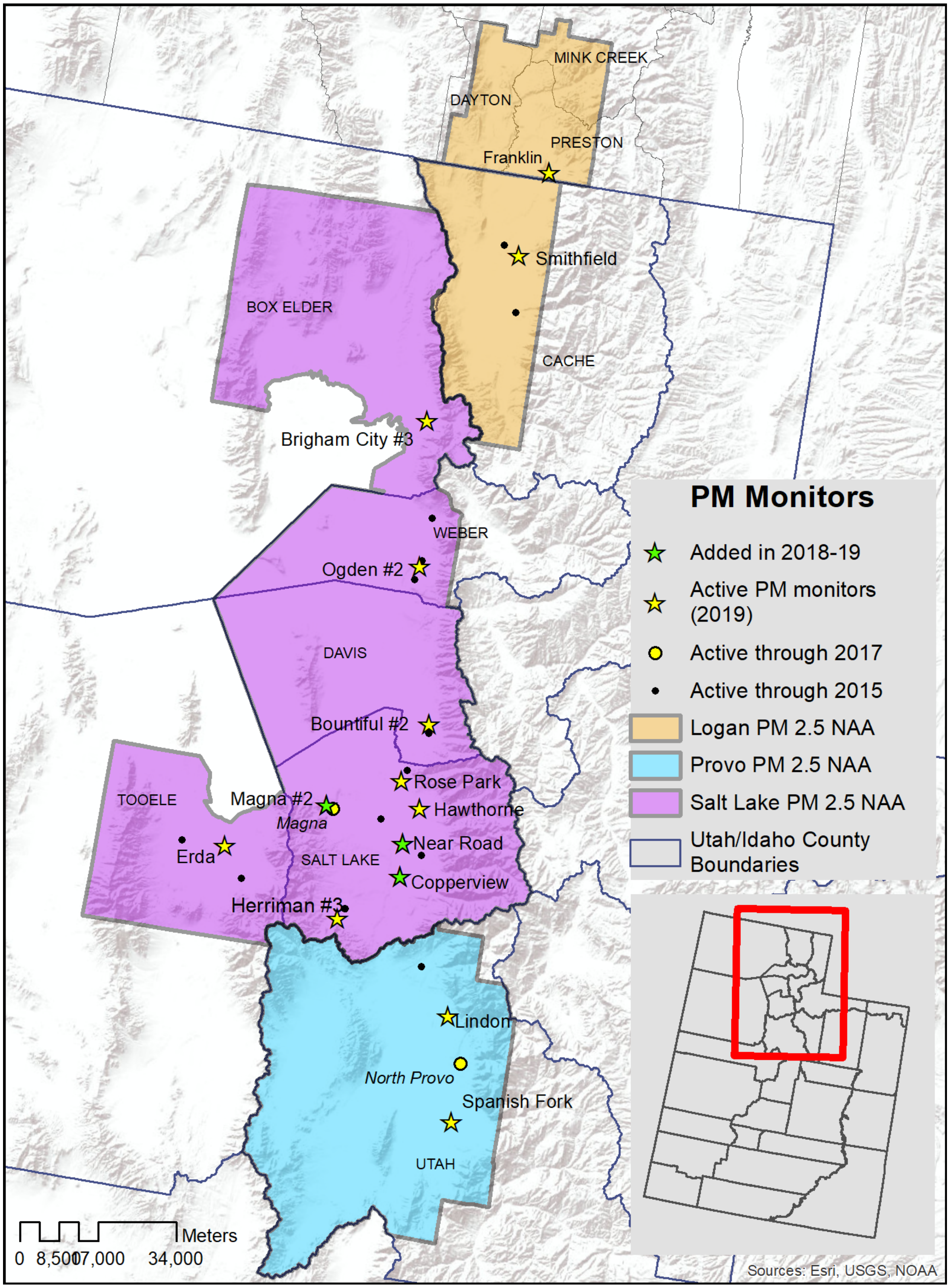

Figure IX.A.36. 1 Utah's $PM_{2.5}$ Monitoring Network

Data may be flagged when circumstances indicate that it would represent an event in the data set and not be indicative of the entire airshed or the efforts to reasonably mitigate air pollution within. 40 CFR 50.14, *Treatment of air quality monitoring data influenced by exceptional events*, anticipates this, and says that a State may request EPA to exclude data showing exceedances or violations of any national ambient air quality standard that are directly due to an exceptional event that affects air quality, is not reasonably controllable or preventable, is an event caused by human activity that is unlikely to recur at a particular location or a natural event, from use in determinations. The protocol for data handling dictates that flagging is initiated by the state or local agency, and then the EPA either concurs or indicates that it has not concurred.

Table IX.A.36.2 below shows the 98th percentile values in µg /m^3 for 2016, 2017, and 2018 as well as the three-year average of these values. The validated data in Table IX.A.36.2 excludes values at the Rose Park monitor from a firework event on July 4, 2017, and a wildfire exceptional event on September 6, 2017. On May 28, 2019, UDAQ received notice[4,5] that EPA concurred with the State's flag on both exceptional events. The three-year average, or design value from 2016-2018 was used by EPA in their proposed action of determination of attainment for the SLC NAA (84 FR 26053).

	2016	2017	2018	3-year average
Brigham City	35.0	36.2	26.2	32.4
Ogden 2	39.0	27.1	24.6	30.2
Bountiful	24.7	35.2	25.7	28.5
Hawthorne	38.4	35.7	26.2	33.4
Rose Park	43.2	32.4	29.2	34.9*
Herriman 3	24.9	28.2	29.0	27.3
Erda	25.1	20.9	30.6	25.5

Table IX.A.36. 2 Monitored Ambient 24-hr $PM_{2.5}$ Data

*data excludes values from exceptional events that received EPA concurrence

b) Modeling Element

EPA guidance[6] concerning redesignation requests and maintenance plans discusses the requirement that the area has attained the standard and notes that air quality modeling may be necessary to determine the representativeness of the monitored data. Areas that were designated nonattainment based on modeling will generally not be redesignated to attainment unless an acceptable modeling analysis indicates attainment. The SLC NAA was not designated based on modeling; therefore, additional modeling is not necessary to determine the representativeness of the monitored data. The SLC NAA clean data determination was made based on validated ambient monitored values. Consequently, modeling is not necessary to show attainment. However, modeling was conducted for the purpose of this maintenance demonstration to show continued compliance with the $PM_{2.5}$ NAAQS through the year 2035 (see section IX.A.36.c).

[4] EPA letter to UDAQ. Ref: 8ARD-PM. Concurrence on Exceptional Event Claim for July 4, 2017 $PM_{2.5}$ Data
[5] EPA letter to UDAQ. Ref: 8ARD-PM. Concurrence on Exceptional Event Claim for September 6, 2017 $PM_{2.5}$ Data
[6] Calcagni (n 3)

c) EPA Acknowledgement

The data presented in the preceding paragraphs demonstrates that the SLC NAA is attaining the 24-hr $PM_{2.5}$ NAAQS. On June 5, 2019, EPA published notice in the Federal Register (84 FR 26053) that pursuant to CAA section 199(b)(2), "the EPA is proposing to make a clean data determination for the 2006 24-hr fine particulate matter ($PM_{2.5}$) Salt Lake City, UT nonattainment area." This determination was based on quality-assured, quality-controlled, and validated ambient air monitoring data for 2016-2018.

(2) Fully Approved Attainment Plan for $PM_{2.5}$

CAA 107(d)(3)(E)(ii) - The Administrator has fully approved the applicable implementation plan for the area under section 110(k).

On February 15, 2019, Utah submitted a serious SIP[7] for the SLC NAA that demonstrated attainment of the $PM_{2.5}$ NAAQS by the attainment date, December 31, 2019.

Areas designated as nonattainment that attain the standard prior to the SIP submittal deadline, or prior to an area's approved attainment date, are eligible for reduced regulatory requirements as described in EPA's "Clean Data Policy."[8] Under the Clean Data Policy, the EPA issued a proposed clean data determination on June 5, 2019 (84 FR 26053) for the SLC NAA. The approval status of both the moderate and serious SLC SIPs is dependent on the clean data determination requirements as detailed in 40 CFR 51.1015. For a serious $PM_{2.5}$ nonattainment area, a clean data determination suspends the requirements for the state to submit an attainment demonstration, reasonable further progress (RFP) plans, quantitative milestones, and contingency measures until such time as: (1) the area is redesignated to attainment, after which such requirements are permanently discharged; or (2) the EPA determines that the area has re-violated the $PM_{2.5}$ NAAQS, at which time the state shall submit such attainment plan elements for the serious nonattainment area by a future date to be determined by the EPA. Table IX.A.36.3 details the EPA SIP approval status.

Additionally, EPA guidance[9] states that approval action on SIP elements and the redesignation request may occur simultaneously. Requirements listed in Table IX.A.36.3 that show pending approval may fall into this category.

Requirement	EPA Action & Date	FR Citation
Base Year and Projection Year Emission Inventories	Pending Approval	--
Modeled Attainment Demonstration	Clean Data Determination	84 FR 51055

[7] UDAQ. January 5, 2019. Utah State Implementation Plan. Control Measures for Area and Point Sources, Fine Particulate Matter, Serious Area $PM_{2.5}$ SIP for the Salt Lake City, UT Nonattainment Area. Section IX. Part A.31. https://documents.deq.utah.gov/air-quality/pm25-serious-sip/part-a/DAQ-2019-005386.pdf
[8] Steve Page, Director, EPA Office of Air Quality Policy Planning and Standard. December 14, 2004. EPA Memorandum to Air Division Directors, "Clean Data Policy for the Fine Particle National Ambient Air Quality Standards."
[9] Calcagni (n 3)

BACT	Pending Approval	--
On-Road Mobile BACM	Pending Approval	--
Non-Road Mobile BACM	Pending Approval	--
Area Source BACM	Pending Approval	--
MVEB	Clean Data Determination Approved on 09/27/2019	84 FR 510558
Nonattainment New Source Review (R307-403)	Approved on 7/25/2019	84 FR 510558
Reasonable Further Progress	Clean Data Determination Approved on 09/27/2019	84 FR 510558
Quantitative Milestones	Clean Data Determination Approved on 09/27/2019	84 FR 510558
Contingency Measures	Clean Data Determination Approved on 09/27/2019	84 FR 510558

Table IX.A.36. 3 SLC, UT Serious SIP Approval Status

The SIP elements still required under the clean data policy[10] include emission inventories, NNSR requirements, and BACM/BACT. The EPA approved R307-403, Permits: New and Modified Sources in Nonattainment Areas and Maintenance Areas on July 25, 2019 (84 FR 35832), which covers the NNSR requirement for the $PM_{2.5}$ attainment plans. The State has submitted the emission inventories, and BACM/BACT elements to the EPA, including the R307-300 series amendments and the point source BACT emission limitation and operating practices (Utah SIP Section IX.H). These SIP elements are still pending EPA approval.

While many of the moderate and serious SIP elements are suspended under the clean data determination, many of the moderate SIP elements have been approved. As part of the Utah moderate SIPs, 24 area source rules were either introduced or augmented to control $PM_{2.5}$ and $PM_{2.5}$ precursors. On February 25, 2016 (81 FR 9343) and October 19, 2016 (81 FR 71988), the EPA approved area source rule revisions and reasonably available control measures (RACM) analyses (where appropriate) for the majority of the R307-300 series. See Table IX.A.36.4 for details on rules, approval dates, and implementation schedules. For the SLC NAA, the BACM analysis resulted in revisions to 13 different area source rules which affect surface coating, graphic arts, and aerospace manufacture and rework facilities.

EPA-Approved/Conditionally Approved Control Measures for UT Moderate $PM_{2.5}$ SIPs	Implementation Schedule
R307-302 Solid Fuel Burning Devices [1] EPA conditionally approved* October 19, 2016 (81 FR 71988).	February 1, 2017

[10] Environmental Protection Agency. August 24, 2016. Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements; Final Rule. 82 FR 58128.

EPA-Approved/Conditionally Approved Control Measures for UT Moderate $PM_{2.5}$ SIPs	Implementation Schedule
R307-303 Commercial Cooking [1] EPA approved February 25, 2016 (81 FR 9343).	December 15, 2015
R307-304 Solvent Cleaning [1]	December 6, 2017
R307-307 Road Salting and Sanding EPA approved February 25, 2016 (81 FR 9343).	January 1, 2014
R307-309 Nonattainment and Maintenance Areas for PM_{10} and $PM_{2.5}$: Fugitive Emissions and Fugitive Dust [1] EPA proposed for approval September 14, 2017 (82 FR 43205).	Salt Lake County, Utah County, and the City of Ogden – January 1, 2013. Remaining NAAs – April 1, 2013. Amended August 4, 2017
R307-312 Aggregate Processing Operations for $PM_{2.5}$ Nonattainment Areas. EPA approved October 19, 2016 (81 FR 71988).	February 4, 2016
R307-335 Degreasing and Solvent Cleaning Operations [1] EPA approved February 25, 2016 (81 FR 9343).	All sources within Salt Lake and Davis Counties R307-335-3 through R307-335-6 – January 1, 2013. All other sources defined in R307-335-2 – September 1, 2013. All sources within Box Elder, Cache, Utah, Weber, and Tooele Counties R307-335-7 – August 1, 2014 Amended October 29, 2017, by removing sections 6 & 7 to for rule R307-304
R307-342 Adhesives & Sealants [1] EPA approved February 25, 2016 (81 FR 9343).	December 1, 2014
R307-343 Emissions Standards for Wood Furniture Manufacturing Operations [1] EPA approved February 25, 2016 (81 FR 9343)	Sources in Salt Lake and Davis Counties – September 1, 2013. Sources in Box Elder, Cache, Tooele, Utah, and Weber Counties – January 1, 2014. Amended December 6, 2017
R307-344 Paper, Film & Foil Coatings [1] EPA approved February 25, 2016 (81 FR 9343)	Sources in Salt Lake and Davis Counties – February 1, 2013. Sources in Box Elder, Cache, Tooele, Utah, and Weber Counties – January 1, 2014. Amended December 6, 2017

EPA-Approved/Conditionally Approved Control Measures for UT Moderate $PM_{2.5}$ SIPs	Implementation Schedule
R307-345 Fabric & Vinyl Coatings [1] EPA approved February 25, 2016 (81 FR 9343)	Sources in Salt Lake and Davis Counties – February 1, 2013. Sources in Box Elder, Cache, Tooele, Utah, and Weber Counties – January 1, 2011. Amended December 6, 2017
R307-346 Metal Furniture Surface Coatings [2] EPA approved February 25, 2016 (81 FR 9343)	Sources in Salt Lake and Davis Counties – February 1, 2013. Sources in Box Elder, Cache, Tooele, Utah, and Weber Counties – January 1, 2014. Amended December 6, 2017
R307-347 Large Appliance Surface Coatings [2] EPA approved February 25, 2016 (81 FR 9343)	Sources in Salt Lake and Davis Counties – February 1, 2013. Sources in Box Elder, Cache, Tooele, Utah, and Weber Counties – January 1, 2014. Amended December 6, 2017
R307-348 Magnet Wire Coatings [2] EPA approved February 25, 2016 (81 FR 9343)	Sources in Salt Lake and Davis Counties – February 1, 2013. Sources in Box Elder, Cache, Tooele, Utah, and Weber Counties – January 1, 2014. Amended December 6, 2017
R307-349 Flat Wood Panel Coatings [1] EPA approved February 25, 2016 (81 FR 9343)	Sources in Salt Lake and Davis Counties – February 1, 2013. Sources in Box Elder, Cache, Tooele, Utah, and Weber Counties – January 1, 2014. Amended December 6, 2017
R307-350 Miscellaneous Metal Parts and Products Coatings [1] EPA approved February 25, 2016 (81 FR 9343)	Sources in Salt Lake and Davis Counties – September 1, 2013. Sources in Box Elder, Cache, Tooele, Utah, and Weber Counties – January 1, 2014. Amended December 6, 2017
R307-351 Graphic Arts [1] EPA approved February 25, 2016 (81 FR 9343)	Sources in Salt Lake and Davis Counties – February 1, 2013. Sources in Box Elder, Cache, Tooele, Utah, and Weber Counties – January 1, 2014. Amended December 6, 2017

EPA-Approved/Conditionally Approved Control Measures for UT Moderate $PM_{2.5}$ SIPs	Implementation Schedule
R307-352 Metal Containers, Closure, and Coil Coatings [2] EPA approved February 25, 2016 (81 FR 9343)	January 1, 2014 Amended December 6, 2017
R307-353 Plastic Parts Coatings [1] EPA approved February 25, 2016 (81 FR 9343)	January 1, 2014 Amended December 6, 2017
R307-354 Automotive Refinishing Coatings [1] EPA approved February 25, 2016 (81 FR 9343)	January 1, 2014 Amended December 6, 2017
R307-355 Control of Emissions from Aerospace Manufacture and Rework Facilities [1] EPA approved February 25, 2016 (81 FR 9343)	January 1, 2014 Amended March 8, 2018
R307-356 Appliance Pilot Light [1] EPA approved February 25, 2016 (81 FR 9343)	January 1, 2013
R307-357 Consumer Products [1] EPA approved February 25, 2016 (81 FR 9343)	May 8, 2014
R307-361 Architectural Coatings [1] EPA approved February 25, 2016 (81 FR 9343)	October 31, 2013

Table IX.A.36. 4 Area Source Rules Implementation Schedule and EPA Approval Status

[1] control measure implementation schedule and confirmation that measures have been implemented

[2] control measure implementation schedule and review if any new sources located in the NAA

*UDAQ submitted the committed revisions on February 1, 2017, within the one-year conditional approval window

The clean data determination has suspended all other elements of the SLC NAA $PM_{2.5}$ attainment plan, including reasonable further progress (RFP) plans, quantitative milestones, and contingency measures at this time. Considering the suspended SIP elements through the clean data policy and the approval or expected approval of required elements, Utah has met requirement 107(d)(3)(E)(ii) for the SLC NAA.

(3) Improvements in Air Quality Due to Permanent and Enforceable Reductions in Emissions

CAA 107(d)(3)(E)(iii) - *The Administrator determines that the improvement in air quality is due to permanent and enforceable reductions in emissions resulting from implementation of the applicable implementation plan and applicable Federal air pollutant control regulations and other permanent and* *enforceable reductions.* Speaking further on the issue, EPA guidance[11] reads that the State must be able to reasonably attribute the improvement in air quality to emission reductions which are permanent and enforceable. In the following sections, both the improvement in air quality and the emission reductions themselves will be discussed.

a) Improvement in Air Quality

The improvement in air quality with respect to $PM_{2.5}$ can be shown in a number of ways. Improvement, in this case, is relative to the various control strategies that affected the airshed. For the SLC NAA, these control strategies were implemented as the result of both the moderate SIP and the serious SIP, submitted to EPA in December 2014 and February 2019, respectively. The various control measure effective dates are detailed in Tables IX.A.36.4 and IX.A.36.6.

An assessment of the ambient air quality data collected at monitors in the NAA from the year monitoring began to 2018 (the last year of validated data) shows an observable decrease in monitored $PM_{2.5}$ (see Figures IX.A.36.2 and IX.A.36.3). The SLC NAA is designated nonattainment only for the 24-hour health standard, not for the annual standard. However, it is useful to observe both the 98th percentile average of 24-hr data as well as the annual arithmetic mean to understand trends. Ambient concentrations in excess of the 24-hr standard are typically only incurred during winter months when cold-pool conditions drive and trap secondary $PM_{2.5}$. The actual cold-pool temperature inversions vary in strength and duration from year to year, and the $PM_{2.5}$ concentrations measured during those times reflect this variability far more than they reflect gradual changes in the emissions of direct $PM_{2.5}$ and $PM_{2.5}$ precursors. This variability is apparent in Figure IX.A.36.3. Despite the variability, if a line is fit through the 24-hr data, the trend is noticeably downward and indicates an improvement of approximately one µg /m^3 per year.

This episodic variability is reduced by looking at annual mean values of $PM_{2.5}$ concentrations shown in Figure IX.A.36.2. The data is still skewed more by winter data than summer data. It includes all of the high values identified as the 98th percentiles, as well as the values ranked even higher. Still, the trend is downward. Fitting a line through the data collected at the Hawthorne site (chosen because it has recorded, validated data since 2000 and consistently records the 2nd highest values after Rose Park) reveals a trend that noticeably decreases and indicates an improvement of approximately 4.3 µg /m^3 over the 18-year span.

Improvements must be considered in light of the attainment date as well as the date by which all controls must be implemented. For the SLC NAA, the attainment date is December 31, 2019; however, 40 CFR 51.1011 establishes that control measures must be implemented no later than the beginning of the year containing the applicable attainment date. Thus, for purposes of reasonable further progress and SIP credit, the deadline for control measure implementation is January 1, 2019. Any control measures implemented beyond such date are instead regarded as additional feasible measures (that other than timing, meet the definition of BACM). Thus, by the end of 2018, the control measure emission reduction will be reflected in the ambient data, while the additional feasible measures reduction will be reflected as

[11] Calcagni (n 3)

late as June 9, 2021 (four years after the date that the SLC NAA was redesignated as serious). The requirement to ensure BACM/BACT is in addition to the requirements from the moderate Area SIP, which included RACM and RACT.

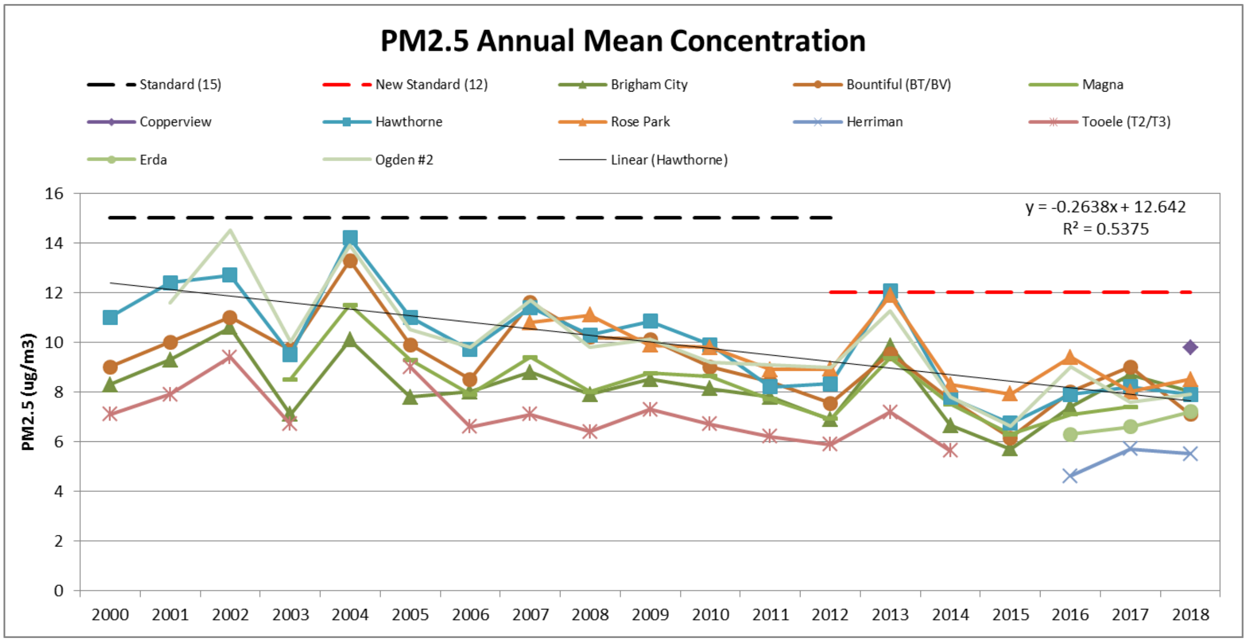

Figure IX.A.36. 2 SLC NAA $PM_{2.5}$ Annual Mean Concentration

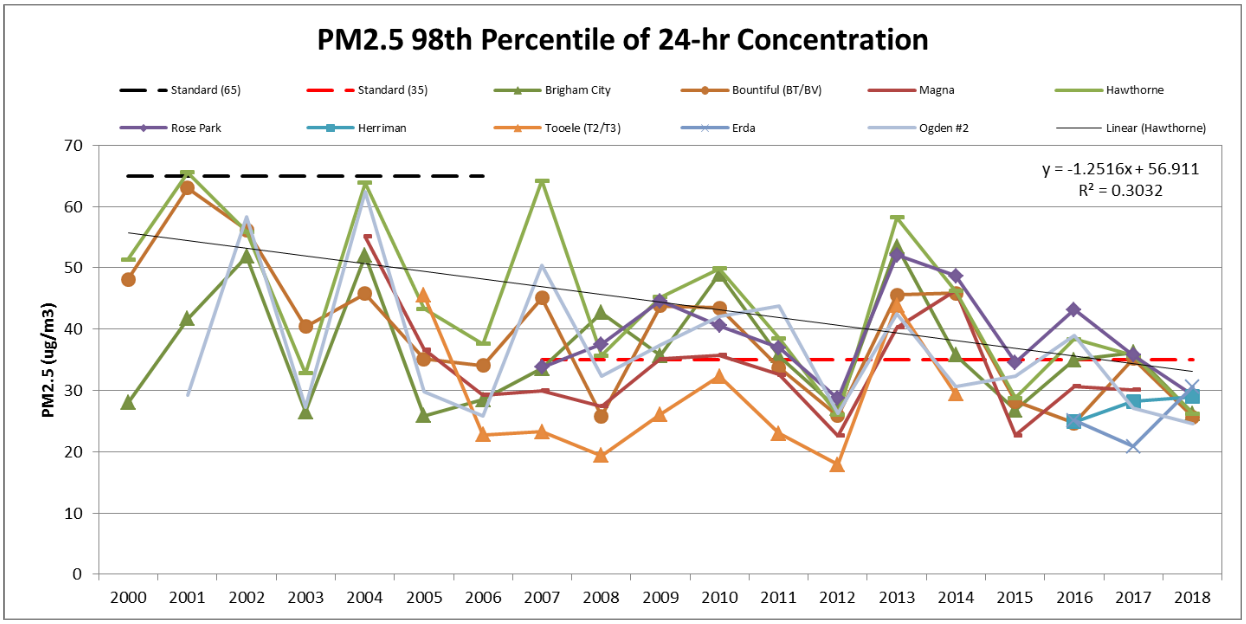

Figure IX.A.36. 3 SLC NAA $PM_{2.5}$ 98th Percentile of 24-hr Concentration

i. Reduction in Emissions

As stated above, EPA guidance[12] says that the State must be able to reasonably attribute the improvement in air quality to emission reductions that are permanent and enforceable. In making this showing, the State should estimate the percent reduction (from the year that was used to determine the design value) achieved by Federal measures such as motor vehicle control, as well as by control measures that have been adopted and implemented by the State.

As mentioned, the ambient air quality data presented in Subsection IX.A.36.b(3)(a) includes values prior to the nonattainment designation through 2018 to illustrate the lasting effect of the implemented control strategies. In discussing the effect of the controls, as well as the control measures themselves, however, it is important to keep in mind the time necessary for their implementation.

The moderate nonattainment SIP for the SLC NAA included a statutory date for the implementation of RACM/RACT of December 31, 2014. Thus, 2015 marked the first year in which RACM/RACT was reflected in the emissions inventories for the SLC NAA. Section 189(c) of the CAA identifies, as a required plan element, quantitative milestones which are to be achieved every three years, and which demonstrate reasonable further progress (RFP) toward attainment of the standard by the applicable date. As defined in CAA Section 171(1), the term reasonable further progress means “such annual incremental reductions in emissions of the relevant air pollutant as are required by this part or may reasonably be required by the Administrator for the purpose of ensuring attainment of the applicable national ambient air quality standard by the applicable date.” Hence, the milestone report must demonstrate that the control strategy is achieving reasonable progress toward attainment.

[12] Ibid

The RACM prescribed by the moderate nonattainment SIP and the subsequent implementation by the State is discussed in more detail in a milestone report submitted for the SLC NAA to EPA on March 23, 2018, within the 90-day post-milestone date required by CAA 189(c)(2) and 51.1013(b). On October 24, 2018, EPA sent Governor Gary Herbert a letter stating “The Environmental Protection Agency has determined that the 2017 Quantitative Milestone Reports are adequate. The basis for this determination is set forth in the enclosures. This determination is based on the EPA’s review of information contained in the Moderate Area Plans and additional information provided in the 2017 Quantitative Milestone Reports.” This approval letter is included in the TSD for this SIP submittal. Much of the downward trend in the ambient data as seen in Figures IX.A.36.2 and IX.A.36.3 is attributable to the controls implemented through the moderate SIP.

40 CFR 51.1011 establishes that control measures must be implemented no later than the beginning of the year containing the applicable attainment date, January 1, 2019, for the SLC NAA. Any control measures implemented beyond such date are instead regarded as additional feasible measures. Implementation schedules for point source control measures are included in Table IX.A.36.5. Emission reductions leading to lower ambient values can be observed in Figures IX.A.36.2 and IX.A.36.3, with further improvements expected beyond 2019 as a result of the more stringent BACM/BACT requirements.

Included in the serious SIP for the SLC NAA are additional BACT emission limits for eight stationary point sources. The changes in these requirements are reflected in Section IX, Part H (Emission Limits and Operating Practices) of the SIP.

Company	RACT Equipment Update(s)	BACT Requirement(s)	Implementation Schedule	Quantify Reduction (tons/yr)	Compliance Mechanism
ATK Launch Systems Inc.	Two (2) 25 MMBTU/hr Natural Gas Boilers	Ultra Low Nox Burners	31-Dec-24	NOx ~ 10.44 tons/yr	AO Issuance
Big West Oil Company	Hydrocarbon Flares	Limited routine flaring between Oct 1st and March 31st.	Date of SIP Approval	N/A	AO Issuance
	Carbon Canisters/Fire Pumps	Miscellaneous Carbon Canister and Fire Pump Changes	31-Dec-19	VOC ~ 15.4 tons/yr	AO Issuance
Chemical Lime Company	Lime Kiln	Selective Non-catalytic Reduction	Upon Source Start-up	N/A	AO Issuance
		New Baghouse	Upon Source Start-up	N/A	AO Issuance
Chevron Products Co.	Boilers/Compressor Drivers	Replacement of 4Placed limits on 3 Compressor Drivers	31-Dec-19	N/A	AO Issuance
	Tier 3 Fuels	Removal of Boilers 1, 2, & 4; Replacement with Boiler 7	31-Dec-19	N/A	AO Issuance
Compass Minerals	Boilers #1 & #2 - Required Nox Limitations	Ultra low Nox burners/Upgrades to Baghouses	31-Dec-19	NOx ~ 10 tons/yr	AO Issuance
	PM2.5 Filterable and Condensable emission				
	limits required for 14 emission points				
Hexel Corporation	Carbon Fiber Lines	Addition of Filter Boxes on Lines 13 & 14	31-Dec-19	PM 2.5 ~ 20 tons/yr	AO Issuance
		De-NOx Water Direct Fired Thermal Oxidizer on Lines 13, 14, 15 & 16	31-Dec-24	NOx ~ 75 tons/yr	AO Issuance
		Low-Nox Burners w/fuel gas re-circulation on Lines 3, 4, & 7	31-Dec-24	NOx ~ 25.5 tons/yr	AO Issuance
Hill Air Force Base	Painting and De-painting	VOC emission limitation for painting activities.	31-Dec-24	PM2.5 ~ 11.8 tons/yr	AO Issuance
	Boilers	Requirement that no boilers manufactured after January 1, 1989		NOx ~ 434.38 tons/yr	
		over 30 MMBtu/hr be operated.		VOC ~ 8.53 tons/yr	
Holly Corporation	Wet Gas Scrubber & Boiler	Installation of Wet Gas Scrubber and Boiler Replacement	N/A	N/A	N/A
Kennecott Utah Copper					
Mine	Mine	Mileage limitation and Required lower emission rate for in-pit crusher	Date of SIP Approval	PM2.5 ~ 4.33 tons/yr	AO Issuance
Power Plant	Power Plant upgrades	Unit #4: Installation of SCR and Overfired Air;	1-Jan-19	NOx ~ 1,268.8 tons/yr (8760 hrs of operation)	AO Issuance
		Unit #4: Lower ppm and lb/hr testing requirement.		NOx ~ 302.43 tons/yr (2088 hrs of operation)	AO Issuance
Smelter & Refinery	Smelter & Refinery upgrades	Replacement of one (1) 82 MMBtu/hr Tankhouse Boiler	1-Dec-20	NOx ~ 35.04 tons/yr (8760 hrs of operation)	AO Issuance
Nucor Steel Mills	No Changes	No BACT Changes	N/A	N/A	N/A
Pacificorp Energy					
Gadsby Power Plant	No Changes	No BACT Changes	N/A	N/A	N/A
Proctor & Gamble	Utility Boilers	PM2.5 Filterable and Condensable Limits & Nox Limits	N/A	N/A	AO Issuance
		Workload changes at facility			
Tesoro Refining	Refinery Operations	Installation of Wet Gas Scrubber	31-Oct-19	N/A	AO DAQE-103350075-18
University of Utah	Heating Plant	Replacement of Boiler #4. Installation of Boiler #9.	31-Dec-19	NOx ~ 44.29 tons/yr	AO Issuance
		Natural Gas limitations on Boilers #1, #3, & #4.	30-Sep-19	NOx ~ 4.27 tons/yr	AO Issuance
Utah Municipal Power Agency	Power Plant	No BACT required changes	N/A	N/A	N/A
Vulcraft	Steel Fabrication	No BACT required changes	N/A	N/A	N/A

Table IX.A.36. 5 Point Source Emission Control Measure Implementation Schedule and Compliance Mechanism

As part of the Utah moderate SIPs, 24 area source rules were either introduced or augmented to control $PM_{2.5}$ and $PM_{2.5}$ precursors. For the serious SIP area source BACM review, each of UDAQ's existing area source rules were re-evaluated to ensure that all appropriate source categories were addressed in rulemaking and that the level of control required is consistent with BACM. For newly identified controls or enhancement of existing controls, an evaluation was made to determine technological and economic feasibility. The BACM review resulted in revisions to 13 different area source rules which affect surface coating (for a variety of different surfaces), graphic arts, and aerospace manufacture & rework facilities. The rules and amendments are listed in Table IX.A.36.4. Table IX.A.36.6 shows the effectiveness of the area source rules within the SLC NAA.

SLC NAA	**Emissions Reduced in Pounds Per Day (lb/day)**									
Area Source Rule Name	**2016 Base Year**					**2017 Milestone Year**				
	NOx	**VOC**	**NH3**	**SO2**	**PM2.5**	**NOx**	**VOC**	**NH3**	**SO2**	**PM2.5**
R307-342 adhesive/sealants	0.0	869.9	0.0	0.0	0.0	0.0	1,176.6	0.0	0.0	0.0
R307-355 aerospace manufacture & rework										
R307-312 aggregate processing	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	5.6
R307-347 appliance surface coating										
R307-354 automotive refinishing	0.0	344.2	0.0	0.0	0.0	0.0	698.1	0.0	0.0	0.0
R307-352 metal container, closure & coil coating										
R307-303 commercial cooking	0.0	51.3	0.0	0.0	0.0	0.0	52.0	0.0	0.0	0.0
R307-357 consumer products	0.0	4,372.5	0.0	0.0	0.0	0.0	4,435.4	0.0	0.0	0.0
R307-335 degreasing & solvent cleaning										
R307-345 fabric & vinyl coatings										
R307-349 flat wood panel coatings										
R307-309 fugitive dust	0.0	0.0	0.0	0.0	1,442.4	0.0	0.0	0.0	0.0	1,455.7
R307-351 graphic arts										
R307-208 outdoor wood boilers	5.8	188.2	4.8	5.8	178.6	5.6	187.4	4.6	5.6	178.4
R307-221 landfill controls	0.0	276.5	0.0	0.0	0.0	0.0	281.9	0.0	0.0	0.0
R307-348 magnet wire coatings										
R307-346 metal furniture surface coating										
R307-350 misc metal parts & product coating										
R307-361 architectural coating	0.0	6,089.7	0.0	0.0	0.0	0.0	6,177.3	0.0	0.0	0.0
R307-344 paper/film/foil coating										
R307-356 appliance pilot light	3,383.8	198.0	0.0	21.6	15.5	4,511.6	264.0	0.0	28.8	20.6
R307-353 plastic parts coating										
R307-302 residential wood burning ban	1,344.8	10,436.3	389.1	133.9	9,046.5	1,339.2	10,406.0	386.3	133.3	9,019.9
R307-230 water heaters										
R307-343 wood furniture manufacturing										
Total Area Source Emissions Reduced	**4,734.4**	**22,826.6**	**393.9**	**161.3**	**10,688.6**	**5,856.4**	**23,678.5**	**390.9**	**167.7**	**10,680.2**

SLC NAA	Emissions Reduced in Pounds Per Day (lb/day)									
Area Source Rule Name	2019 Attainment Year					2020 Milestone Year				
	NOx	VOC	NH3	SO2	PM2.5	NOx	VOC	NH3	SO2	PM2.5
R307-342 adhesive/sealants	0.0	1,513.1	0.0	0.0	0.0	0.0	1,533.7	0.0	0.0	0.0
R307-355 aerospace manufacture & rework	0.0	28.7	0.0	0.0	0.0	0.0	43.1	0.0	0.0	0.0
R307-312 aggregate processing	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	5.6
R307-347 appliance surface coating	0.0	0.5	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0
R307-354 automotive refinishing	0.0	1,436.0	0.0	0.0	0.0	0.0	1,817.8	0.0	0.0	0.0
R307-352 metal container, closure & coil coating	0.0	83.6	0.0	0.0	0.0	0.0	125.0	0.0	0.0	0.0
R307-303 commercial cooking	0.0	53.6	0.0	0.0	0.0	0.0	54.3	0.0	0.0	0.0
R307-357 consumer products	0.0	4,559.9	0.0	0.0	0.0	0.0	4,625.3	0.0	0.0	0.0
R307-335 degreasing & solvent cleaning	0.0	1,014.9	0.0	0.0	0.0	0.0	1,527.9	0.0	0.0	0.0
R307-345 fabric & vinyl coatings	0.0	362.0	0.0	0.0	0.0	0.0	443.0	0.0	0.0	0.0
R307-349 flat wood panel coatings	0.0	11.4	0.0	0.0	0.0	0.0	17.1	0.0	0.0	0.0
R307-309 fugitive dust	0.0	0.0	0.0	0.0	1,484.0	0.0	0.0	0.0	0.0	1,497.1
R307-351 graphic arts	0.0	995.5	0.0	0.0	0.0	0.0	1,062.4	0.0	0.0	0.0
R307-208 outdoor wood boilers	5.8	186.6	4.8	5.8	177.0	5.8	186.0	4.8	5.8	176.6
R307-221 landfill controls	0.0	293.8	0.0	0.0	0.0	0.0	299.4	0.0	0.0	0.0
R307-348 magnet wire coatings	0.0	22.0	0.0	0.0	0.0	0.0	22.2	0.0	0.0	0.0
R307-346 metal furniture surface coating	0.0	167.1	0.0	0.0	0.0	0.0	249.5	0.0	0.0	0.0
R307-350 misc metal parts & product coating	0.0	273.8	0.0	0.0	0.0	0.0	411.4	0.0	0.0	0.0
R307-361 architectural coating	0.0	6,344.1	0.0	0.0	0.0	0.0	6,441.8	0.0	0.0	0.0
R307-344 paper/film/foil coating	0.0	97.9	0.0	0.0	0.0	0.0	147.6	0.0	0.0	0.0
R307-356 appliance pilot light	5,834.7	396.4	0.0	43.2	31.0	4,926.2	361.8	0.0	39.5	28.3
R307-353 plastic parts coating	0.0	189.3	0.0	0.0	0.0	0.0	222.4	0.0	0.0	0.0
R307-302 residential wood burning ban	1,332.3	10,343.1	385.7	132.0	8,964.8	1,327.6	10,311.5	384.5	131.7	8,939.5
R307-230 water heaters	1,396.8	0.0	0.0	0.0	0.0	1,632.5	0.0	0.0	0.0	0.0
R307-343 wood furniture manufacturing	0.0	604.1	0.0	0.0	0.0	0.0	910.9	0.0	0.0	0.0
Total Area Source Emissions Reduced	**8,569.5**	**28,977.4**	**390.5**	**181.0**	**10,662.3**	**7,892.1**	**30,814.8**	**389.3**	**177.0**	**10,647.1**

Table IX.A.36. 6 Area Source Rule Emissions Reduction in SLC NAA

In reality, the NAAs should expect to see continued improvement in the next five to ten years as a result of the phase-in period of a number of the area source rules and some additional feasible measures installed at point sources. For example, the gas-fired water heater rule R307-230 requires that only ultra-low NOx gas-fired water heaters be sold or installed after July 1, 2018, but it takes years for water heater turnover to occur. In addition, the 13 rules that were revised during the serious SIP BACM review were implemented at the state level in 2018 and have a five-year phase-in period, resulting in full emission reduction by 2023. Therefore, additional emissions reductions will be seen. These phase-in periods were considered in the inventories used for modeling in this SIP.

Existing controls not implemented through the SIP process also affect the emission rates from non-stationary source categories. The federal motor vehicle control program has been one of the most significant control strategies affecting emissions that produce $PM_{2.5}$. Tier 1 and 2 standards were implemented by 1997 and 2008 respectively. Tier 3 vehicle/engine standards were initiated with new vehicles coming to market in 2017 (25% of new sales) with full phase in by 2021 (100% of new sales). For gasoline, the five Wasatch Front refineries and the Sinclair refinery in Wyoming that also supplies gasoline to the Wasatch Front market, are considered small refineries by EPA's rule. As such, these refineries have a tier 3 delayed implementation date of January 1, 2020 to produce a tier 3 (10 ppm sulfur) gasoline product or produce a gasoline product (greater than 10 ppm sulfur) with compensating sulfur credits. Similarly, the Heavy-Duty Engine and Vehicle Standards took effect in 2007 and were fully phased in by 2010. Air quality benefits, particularly those stemming from the light-duty and heavy-duty vehicle standards, continue to be realized as older, higher-polluting vehicles are replaced by newer, cleaner vehicles.

To supplement the federal motor vehicle control program, Inspection and Maintenance Programs were implemented in Salt Lake, Davis, and Weber Counties. These programs have been effective in identifying vehicles that no longer meet the emission standards for their respective makes and models and in ensuring that those vehicles are repaired in a timely manner.

Emissions from non-road mobile emission sources also benefit from several significant regulatory programs enacted at the federal level. This category of emitters includes airplanes, locomotives, hand-held engines, and larger portable engines such as generators and construction equipment. The effectiveness of these controls has been incorporated into the "NONROAD" model UDAQ uses to compile the inventory information for this source category.

SLC NAA *Emissions by Year	Base Yr.	Projection Years with Growth & Controls			
	2016	2017	2019	2020	**RFP
$PM_{2.5}$	15.4	15.8	16.1	16.0	0.2
NOx	103.6	100.2	94.9	87.9	-2.9
SO2	5.6	5.6	4.9	4.9	-0.2
VOC	91.7	91.5	86.8	83.5	-1.6
NH3	16.0	16.0	16.0	15.9	0.0
$PM_{2.5}$ Precursors	216.9	213.2	202.6	192.2	-4.8
Total	232.3	229.0	218.7	208.2	-4.5

*Emissions are reported in tons per average-episode-day

**Emission change per year, (ton/day) averaged from Base Year (2016) through Attainment Year (2019)

Table IX.A.36. 7 Emission Reductions in SLC NAA from all Controls in Serious SIP

The cumulative effect of all permanent and enforceable emission reductions is represented in Table IX.A.36.7. The emissions reductions resulting from federal programs and the RACM/RACT plus BACM/BACT controls incorporated into the Utah SIP and promulgated at the State level, result in emission reductions that are consistent with the notion of permanent and enforceable improvements in air quality. Taken together with the trends in ambient air quality illustrated in the preceding paragraph, along with the continued implementation of the nonattainment SIP for the SLC NAA, they provide a reliable indication that these improvements in air quality reflect the application of permanent steps to improve the air quality in the region.

(4) State has Met Requirements of Section 110 and Part D

CAA 107(d)(3)(E)(v) - The State containing such area has met all requirements applicable to the area under section 110 and part D. Section 110 of the Act deals with the broad scope of state implementation plans and the capacity of the respective state agency to effectively administer such a plan. Part D deals specifically with plan requirements for nonattainment areas, including those requirements that are specific to $PM_{2.5}$.

a) Section 110

The State has met all requirements applicable to the SLC NAA under Section 110 of the Act. Section 110(a)(2) contains the general requirements or infrastructure elements necessary for EPA approval of the SIP. On September 21, 2010, the State submitted an Infrastructure SIP to EPA demonstrating compliance with the requirements of Section 110 that are applicable to the 2006 $PM_{2.5}$ NAAQS. EPA approved the State's Infrastructure SIP on November 25, 2013 (78 FR 63883) for all Section 110 requirements that are applicable to redesignation.

b) Part D Subpart 1 and 4

Part D of the Act addresses "Plan Requirements for Nonattainment Areas." Subparts 1 and 4 of Part D contain planning elements that must be included in the SIP. This includes the requirement to submit an attainment demonstration, reasonable further progress plans, quantitative milestones and milestone reports, a motor vehicle emission budget for the attainment year for the purposes of transportation conformity, and contingency measures for the area. However, upon EPA's issuance of a final clean data determination demonstrating that the SLC NAA has attained the standard, these requirements are suspended (40 C.F.R. § 51.1015(b) and 84 FR 26054).

The remaining Part D requirements that are relevant to redesignation are requirements that are independent of helping the area achieve attainment. This includes the requirement to have a nonattainment new source review ("NNSR") program, emissions inventory submission, and implementation of BACM/BACT. The State has satisfied these remaining requirements. Utah's NNSR program can be found in Utah Administrative Rule R307-403, Permits: New and Modified Sources in Nonattainment Areas and Maintenance Areas. EPA fully approved the current version of the NNSR program on July 25, 2019 (84 FR 35832). The BACM/BACT requirements and the emissions inventory were included in the serious SIP for the SLC NAA that the State submitted to the EPA on February 15, 2019. Upon EPA's approval of these elements prior to or concurrently with EPA's action on the maintenance plan/redesignation request, Utah will have complied with all applicable Part D requirements.

(5) Maintenance Plan for $PM_{2.5}$ Areas

As stated in the Act, an area may not be redesignated to attainment without first submitting and receiving EPA approval of a maintenance plan. The maintenance plan is a quantitative showing that the area will continue to attain the NAAQS for an additional 10 years (from EPA approval), accompanied by sufficient assurance that the terms of the numeric demonstration will be administered by the State and by the EPA in an oversight capacity. The maintenance plan is the central criterion for redesignation. It is contained in the following subsection.

IX.A.36.c Maintenance Plan

CAA 107(d)(3)(E)(iv) - The Administrator has fully approved a maintenance plan for the area as meeting the requirements of section 175A. An approved maintenance plan is one of several criteria necessary for area redesignation as outlined in Section 107(d)(3)(E) of the Act. The maintenance plan itself, as described in Section 175A of the Act and further addressed in EPA guidance[13] has its own list of required elements. The following table is presented to summarize these requirements. Each will then be addressed in turn.

Category	Requirement	Reference	Addressed in Section
Maintenance demonstration	Provide for maintenance of the relevant NAAQS in the area for at least 10 years after redesignation.	CAA: 175A(a)	IX.A.36.c (1)
Revise in 8 Years	The State must submit an additional revision to the plan, 8 years after redesignation, showing an additional 10 years of maintenance.	CAA: 175A(b)	IX.A.36.c (6)
Continued Implementation of Nonattainment Area Control Strategy	The Clean Air Act requires continued implementation of the NAA control strategy unless such measures are shown to be unnecessary for maintenance or are replaced with measures that achieve equivalent reductions.	CAA: 175A(c), 110(l), Calcagni memo	IX.A.36.c (5)
Contingency Measures	Areas seeking redesignation from nonattainment to attainment are required to develop contingency measures that include State commitments to implement additional control measures in response to future violations of the NAAQS.	CAA: Sec 175A(d)	IX.A.36.c (8)
Verification of Continued Maintenance	The maintenance plan must indicate how the State will track the progress of the maintenance plan.	Calcagni memo	IX.A.36.c (7)

Table IX.A.36. 8 CAA Maintenance Plan Requirements

(1) Demonstration of Maintenance - Modeling Analysis

CAA 175A(a) - Each State which submits a request under section 107(d) for redesignation of a nonattainment area as an area which has attained the NAAQS shall also submit a revision of the applicable implementation plan to provide for maintenance of the NAAQS for at least 10 years after the redesignation. The plan shall contain such additional measures, if any, as may be required to ensure such maintenance. The maintenance demonstration is discussed in EPA guidance[14] as one of the core provisions that should be considered by states for inclusion in a maintenance plan.

According to the EPA guidance, a State may generally demonstrate maintenance of the NAAQS by either showing that future emissions of a pollutant or its precursors will not exceed the level of the attainment inventory (discussed below) or by modeling to show that the future mix of sources and

[13] Ibid
[14] Ibid

emission rates will not cause a violation of the NAAQS. Utah has elected to make its demonstration based on air quality modeling.

(a) Introduction

The following chapter presents an analysis using observational datasets to detail the chemical regimes of Utah's NAAs. Prior to the develop of this maintenance plan, UDAQ conducted a technical analysis to support the development of the serious SIP for the SLC NAA. The analysis included preparation of emissions inventories and meteorological data, and the evaluation and application of a regional photochemical model. Part of this process included episode selection to determine the episode that most accurately replicates the photochemical formation of ambient $PM_{2.5}$ during a persistent cold air pool episode in the airshed. For this maintenance plan, UDAQ is using the same episode that was used for the serious SIP modeling.

(b) Photochemical Modeling

UDAQ used the Comprehensive Air Quality Model with Extensions (CAMx) version 6.30 for air quality modeling. CAMx v6.30 is a state-of-the-art air quality model that includes State of Utah funded enhancements for wintertime modeling. These enhancements include snow chemistry, topographical and surface albedo refinements. CAMx is an EPA approved model for use in SIP modeling. Its configuration for use in this SIP, with respect to model options and model adjustments, is discussed in the Technical Support Document.

i. Emissions Preparation

The emissions processing model used in conjunction with CAMx is the Sparse Matrix Operator Kernel Emissions Modeling System (SMOKE) version 3.6.5[15]. SMOKE prepares the annual emissions inventory for use in the air quality model. There are three aspects to the preparation of an annual emissions inventory for air quality modeling:

- Temporal: Convert emissions from annual to daily, weekly and hourly values.
- Spatial: Convert emissions from a county-wide average to gridded emissions.
- Speciation: Decompose $PM_{2.5}$ and VOC emissions estimates into individual subspecies using the latest Carbon Bond 6 speciation profiles.

The process of breaking down emissions for the air quality model was done with sets of activity profiles and associated cross reference files. These are created for point or large industrial source emissions, smaller area sources, and mobile sources. Direct $PM_{2.5}$ and $PM_{2.5}$ precursor estimates were modified via temporal profiles to reflect wintertime conditions.

Activity profiles and their associated cross reference files from the EPA's 2011v6[16] modeling platform were used. For stationary non-point and mobile sources, spatial surrogates from the EPA Clearinghouse

[15] https://www.cmascenter.org/smoke/
[16] https://www.epa.gov/air-emissions-modeling/2011-version-6-air-emissions-modeling-platforms

for Inventories and Emissions Factors (CHIEF[17]) were used to distribute emissions in space across the modeling domain. Emissions from large industrial sources (point sources) were placed at the location of the source itself. Where reliable local information was available (population density, traffic demand modeling, residential heating), profiles and surrogates were modified or developed to reflect that information.

ii. Photochemical Modeling Domains and Grid Resolution

The UDAQ CAMx v6.30 modeling framework consists of two spatial domains: a high-resolution 1.33 km domain nested inside of a coarser 4 km domain (see Figure IX.A.36.4). This configuration allows one to efficiently integrate regional effects with local impacts within the SLC NAA. Vertical resolution in the model consists of 41 layers extending to the top of the atmosphere.

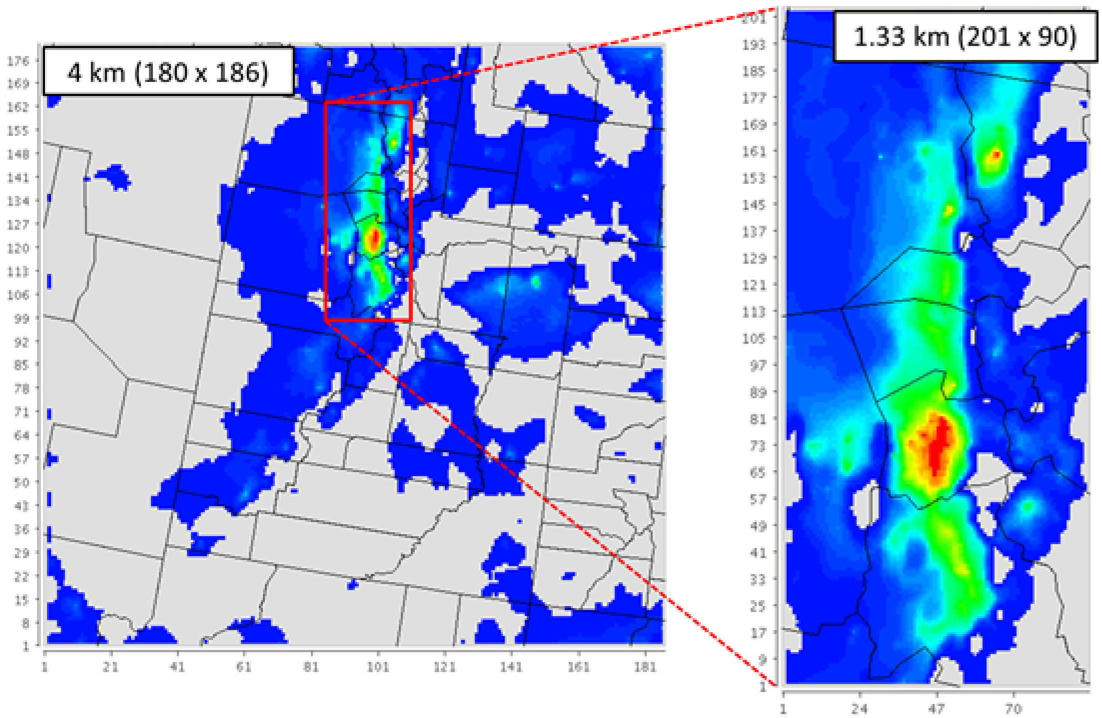

Figure IX.A.36. 4 CAMx Photochemical Modeling Domains in Two-Way Nested Configuration

The UDAQ 4 km coarse domain covers the entire state of Utah, a significant portion of Eastern Nevada (including Las Vegas), as well as smaller portions of Idaho, Wyoming, Colorado, and Arizona. The fine 1.33 km domain covers all of Utah's three $PM_{2.5}$ nonattainment areas, including the SLC NAA. Throughout this document, we will refer to the fine 1.33 km domain as the "modeling domain" when the coarse domain is not specified.

[17] https://www.epa.gov/chief

iii. Meteorological Data

Meteorological modeling was carried out by the University of Utah (University) with financial support from UDAQ.

Meteorological inputs were derived using the Weather Research and Forecasting[18] (WRF) Advanced Research WRF (WRF-ARW) model to prepare meteorological datasets for our use with the photochemical model. WRF contains separate modules to compute different physical processes such as surface energy budgets and soil interactions, turbulence, cloud microphysics, and atmospheric radiation. Within WRF, the user has many options for selecting the different schemes for each type of physical process. There is also a WRF Preprocessing System (WPS) that generates the initial and boundary conditions used by WRF, based on topographic datasets, land use information, and larger-scale atmospheric and oceanic models.

Model performance of WRF was assessed against observations at sites maintained by the University. WRF has reasonable ability to replicate the vertical temperature structure of the boundary layer (i.e., the temperature inversion), although it is difficult for WRF to reproduce the inversion when the inversion is shallow and strong (i.e., an 8-degree temperature increase over 100 vertical meters). A summary of the performance evaluation results for WRF is included in the TSD.

iv. Episode Selection

Part of the modeling exercise involves a test to see whether the model can successfully replicate the $PM_{2.5}$ mass and composition that was observed during prior episode(s) of elevated $PM_{2.5}$ concentration. The selection of an appropriate episode, or episodes, for use in this exercise requires some forethought and should determine the meteorological episode that helps produce the best air quality modeling performance.

EPA Guidance[19] identifies some selection criteria that should be considered for SIP modeling, including:

- Select episodes that represent a variety of meteorological conditions that lead to elevated $PM_{2.5}$.
- Select episodes during which observed concentrations are close to the baseline design value.
- Select episodes that have extensive air quality data bases.
- Select enough episodes such that the model attainment test is based on multiple days at each monitor violating NAAQS.

After careful consideration, the following meteorological episodes were selected as candidates for Utah's SIP modeling:

- January 1-10, 2011
- December 7-19, 2013

[18] https://www.mmm.ucar.edu/weather-research-and-forecasting-model

[19] Environmental Protection Agency. April 2007. Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze.

- February 1-16, 2016

In addition to the criteria identified in the modeling guidance, each of these candidate episodes may be characterized as having the following atmospheric conditions:

- Nearly non-existent surface winds
- Light to moderate winds aloft (wind speeds at mountaintop < 10-15 m/s)
- Simple cloud structure in the lower troposphere (e.g., consisting of only one or no cloud layer)
- Singular 24-hour $PM_{2.5}$ peaks suggesting the absence of weak intermittent storms during the episode

Previous work conducted by the University of Utah and UDAQ showed the four conditions listed above improve the likelihood for successfully simulating wintertime persistent cold air pools in the WRF model[20]. A comprehensive discussion of the meteorological model performance for all three episodes can be found in the meteorological modeling TSD[21].

a) Model Adjustments and Settings

In order to better simulate Utah's winter-time inversion episodes six different adjustments were made to CAMx input data:

1. Increased vertical diffusion rates (Kvpatch)
2. Lowered residential wood smoke emissions to reflect burn ban compliance during forecasted high $PM_{2.5}$ days (burn ban)
3. Ozone deposition velocity set to zero and increased urban area surface albedo (snow chemistry)
4. Cloud water content reduced during certain days (cloud adjustment)
5. Ammonia injection to account for missing ammonia sources in UDAQ's inventory. This is defined as artificially adding non-inventoried ammonia emissions to the inventoried emissions that are input into CAMx.
6. Reduced the dry deposition rate of ammonia by setting ammonia Rscale to 1. Rscale is a parameter in CAMx that reflects surface resistance.
7. Applied a 93% reduction to paved road dust emissions.

Depending on the episode, different adjustments were applied. All adjustments were applied to the January 2011 episode while select adjustments were applied to the other two episodes.

Kvpatch improved overall model performance by enhancing vertical mixing over urban areas. Snow chemistry modifications, which included reducing ozone deposition velocity and increasing surface

[20] https://www.mmm.ucar.edu/weather-research-and-forecasting-model
[21] https://documents.deq.utah.gov/air-quality/planning/technical-analysis/research/model-improvements/3-wintertime-episodes/DAQ-2017-014342.pdf

albedo over urban areas, helped improve the model performance by better representing secondary ammonium nitrate formation during winter-time inversion episodes in Utah.

Cloud adjustments were only applied to the January 2011 episode, which was characterized by cloud cover on January 6-8 over the Salt Lake and Utah valleys. This cloud cover led to a high bias in sulfate due to the effect of ammonia on the gas-to-particle partitioning of sulfate in clouds. Application of the cloud adjustment scheme helped reduce this bias.

Rscale modification and burn ban adjustments were also only applied to the January 2011 episode. The burn ban adjustments reflect the compliance rate with the state's two-stage policy ban on wood-burning.

A 93% reduction in paved road dust emissions was only applied to the January 2011 emissions. This adjustment helped improve the model performance for crustal material.

b) Episodic Model Performance

Shown below for each of three episodes are the CAMx performance results for total 24-hour $PM_{2.5}$ mass and $PM_{2.5}$ chemical species, including nitrate (NO_3), sulfate (SO_4), ammonium (NH_4), organic carbon (OC), elemental carbon (EC), chloride (Cl), sodium (Na), crustal material (CM) and other species (other mass).

January 1-10, 2011

A comparison of 24-hr modeled and observed $PM_{2.5}$ during January 1-10, 2011, at the Hawthorne monitoring station in the SLC NAA showed that overall the model captures the temporal variation in $PM_{2.5}$ well (Figure IX.A.36.5). The gradual increase in $PM_{2.5}$ concentration and its transition back to low levels are generally well reproduced by the model. An overestimation in $PM_{2.5}$ is observed on January 3rd, which is most likely related to the meteorological model performance on this day. Thin mid-level clouds, which were observed on January 3-4, were not simulated in the WRF model, leading to an increasingly stable low-level boundary layer, limiting the mixing of pollutants[22]. To help reduce this bias, Kvpatch was applied. The underestimation in $PM_{2.5}$ on January 5, 2011, at the Hawthorne station is also related to the meteorological model performance on this day, where the WRF model overestimated the wind shear near the mixing height[23].

[22]https://documents.deq.utah.gov/air-quality/planning/technical-analysis/research/model-improvements/3-wintertime-episodes/DAQ-2017-014342.pdf
[23]https://documents.deq.utah.gov/air-quality/planning/technical-analysis/research/model-improvements/3-wintertime-episodes/DAQ-2017-014342.pdf

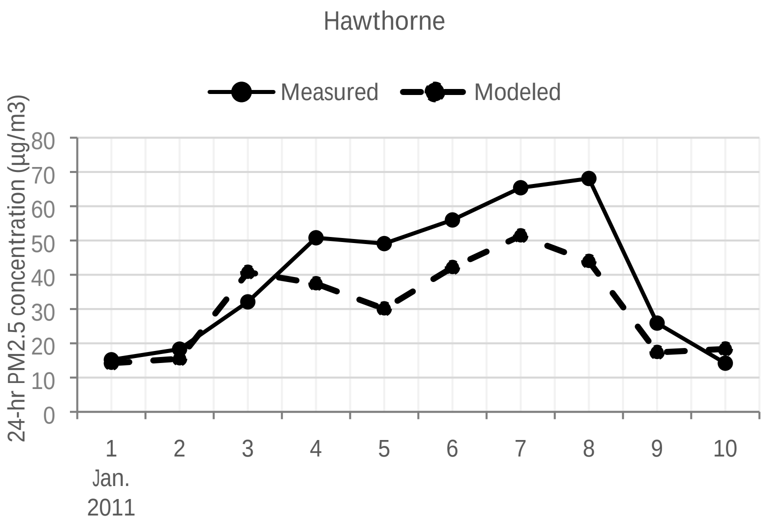

Figure IX.A.36. 5 Measured and Modeled 24-hr $PM_{2.5}$ Concentrations During January 1-10 2011 at Hawthorne Monitoring Station in SLC NAA

The model performance for $PM_{2.5}$ chemical species was also good for this episode. The chemical composition of modeled $PM_{2.5}$ on January 7, which corresponds to a $PM_{2.5}$ exceedance day, is similar to that of measured $PM_{2.5}$ with modeled secondary species, nitrate, ammonium and sulfate, accounting for over 50% of $PM_{2.5}$ mass, in agreement with measurements (IX.A.36.6). Ammonia injection helped improve the model performance for these species. The model also performed well for organic carbon (OC) while it overestimated crustal material and elemental carbon (EC), possibly due to an overprediction in their source emissions. While a 93% reduction in paved road dust emissions was applied, it is possible that further reduction was needed.

Overall, the model simulated well the timing of the capping inversion during this January episode. $PM_{2.5}$ chemical species, particularly nitrate, are also well simulated in the model, suggesting that this episode is suitable for modeling.

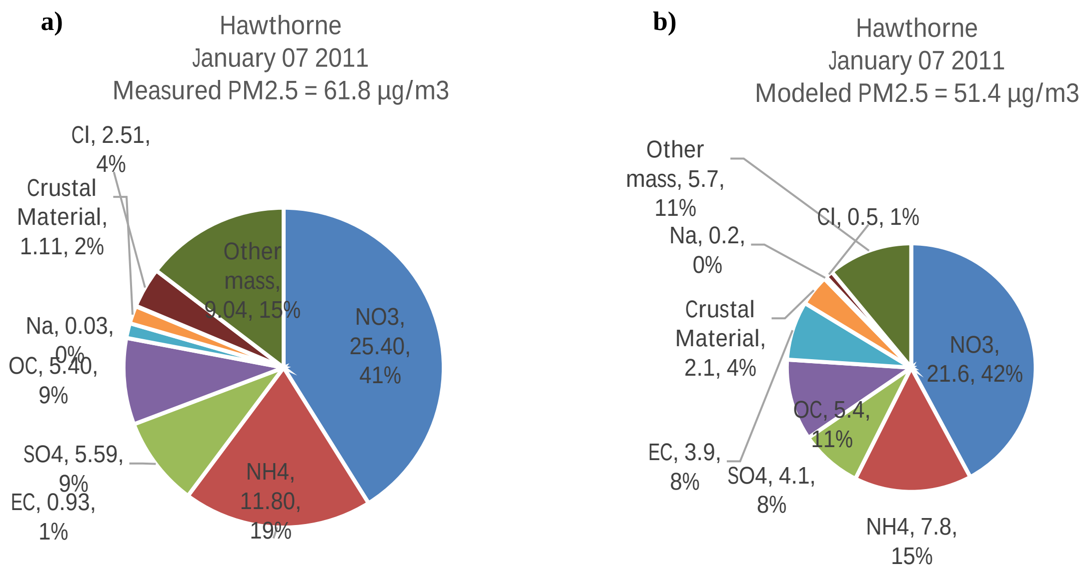

Figure IX.A.36. 6 a) Measured and b) Modeled Species Contribution (in µg/m^3 and %) to $PM_{2.5}$ at Hawthorne Monitoring Station in the SLC NAA on a Typical 24-hr $PM_{2.5}$ Exceedance Day

December 7-19, 2013

A comparison of modeled and measured 24-hr $PM_{2.5}$ at Hawthorne during the December 7-19, 2013, episode showed that the model did not represent well the temporal variation in $PM_{2.5}$ and the capping inversion (Figure IX.A.36.7). While observations show peak $PM_{2.5}$ concentrations during December 14-15, CAMx is simulating a drop in $PM_{2.5}$ levels. This can be attributed to the WRF model not properly capturing the cold overnight low temperatures that were observed on these days[24].

[24] https://documents.deq.utah.gov/air-quality/planning/technical-analysis/research/model-improvements/3-wintertime-episodes/DAQ-2017-014342.pdf.

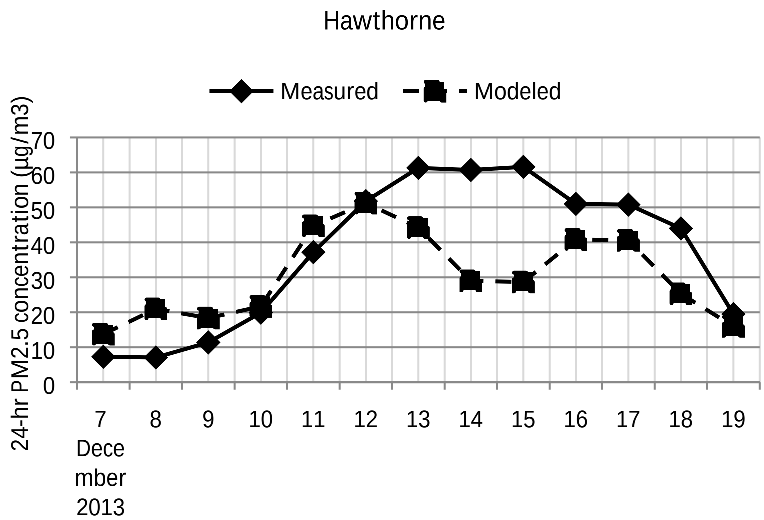

Figure IX.A.36. 7 Measured and Modeled 24-hr $PM_{2.5}$ Concentrations During December 7-19, 2013, at Hawthorne Monitoring Station in the SLC NAA

To further evaluate the model performance, modeled and measured $PM_{2.5}$ chemical species on December 15, which corresponds to a $PM_{2.5}$ exceedance day with available speciation measurements, were compared for Hawthorne (Figure IX.A.36.8). Nitrate and ammonium are both underpredicted in the model, which can be partly related to the meteorological model performance, where WRF overpredicted surface temperatures, leading to increased mixing. Moreover, similarly to the model performance for the January 2011 episode, crustal material is overpredicted in the model. An adjustment to paved road dust emissions was not applied for the December 2013 simulations. Chloride (Cl) was also underestimated in the model while the performance for sulfate and OC was acceptable.

Given that the strength of the capping inversion and timing of the $PM_{2.5}$ peaks were not well simulated, using the December 2013 episode for the modeling demonstration is not desirable.

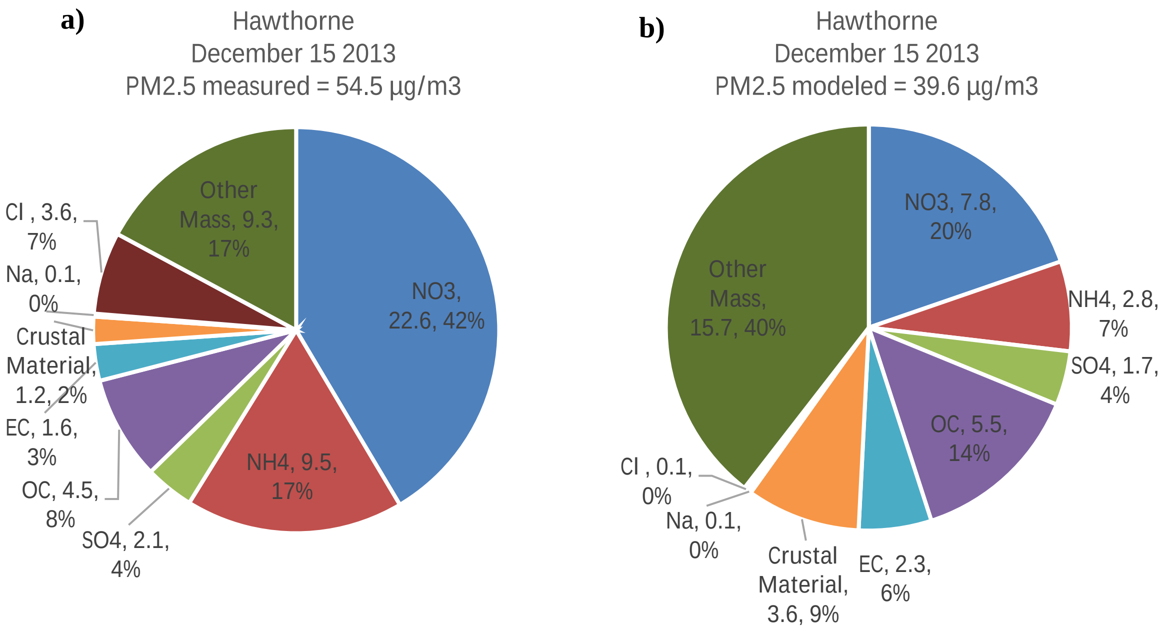

Figure IX.A.36. 8 a) Measured and b) Modeled Chemical Composition of 24-hr $PM_{2.5}$ in µg/m³ and % of $PM_{2.5}$ at Hawthorne Monitoring Station in SLC NAA on December 15, 2013

February 1-16, 2016

A comparison of modeled and measured 24-hr $PM_{2.5}$ at Hawthorne monitoring station (Figure IX.A.36.9) shows that $PM_{2.5}$ concentrations are generally biased low in the model and $PM_{2.5}$ drops off prematurely in the model. This can be related to the meteorological model performance, where the mixing height was overestimated due to performance issues related to clouds and fog formation. While fog and low clouds were observed during February 9-15, WRF was unable to properly capture the timing of the fog and clouds formation[25].

[25] https://documents.deq.utah.gov/air-quality/planning/technical-analysis/research/model-improvements/3-wintertime-episodes/DAQ-2017-014342.pdf.

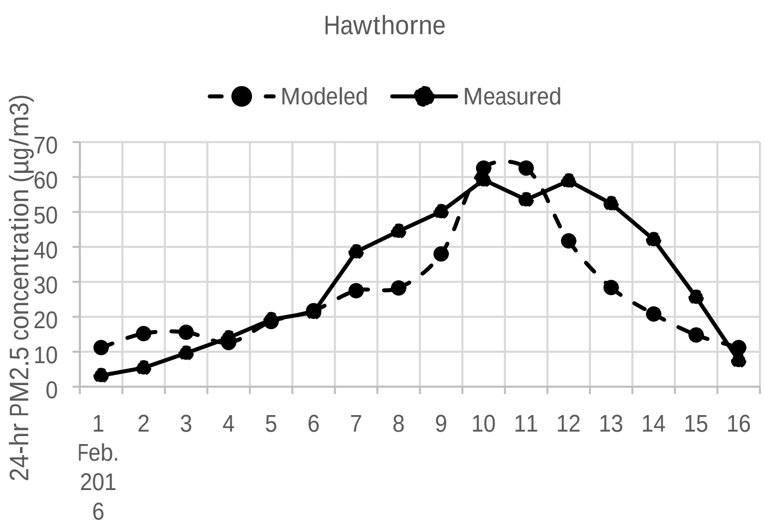

Figure IX.A.36. 9 Measured and Modeled 24-hr $PM_{2.5}$ Concentrations During February 1-16, 2016, at Hawthorne Monitoring Station in the SLC NAA

To further evaluate the model performance, modeled and measured $PM_{2.5}$ chemical species on February 12, which corresponds to a $PM_{2.5}$ exceedance day, were compared for Bountiful monitoring station (Figure IX.A.36.10). Complete speciation measurements were not available for Hawthorne. As can be seen, nitrate, ammonium and sulfate were underpredicted in the model. Moreover, similarly to the model performance for the two other episodes, EC and crustal material were overestimated in the model.

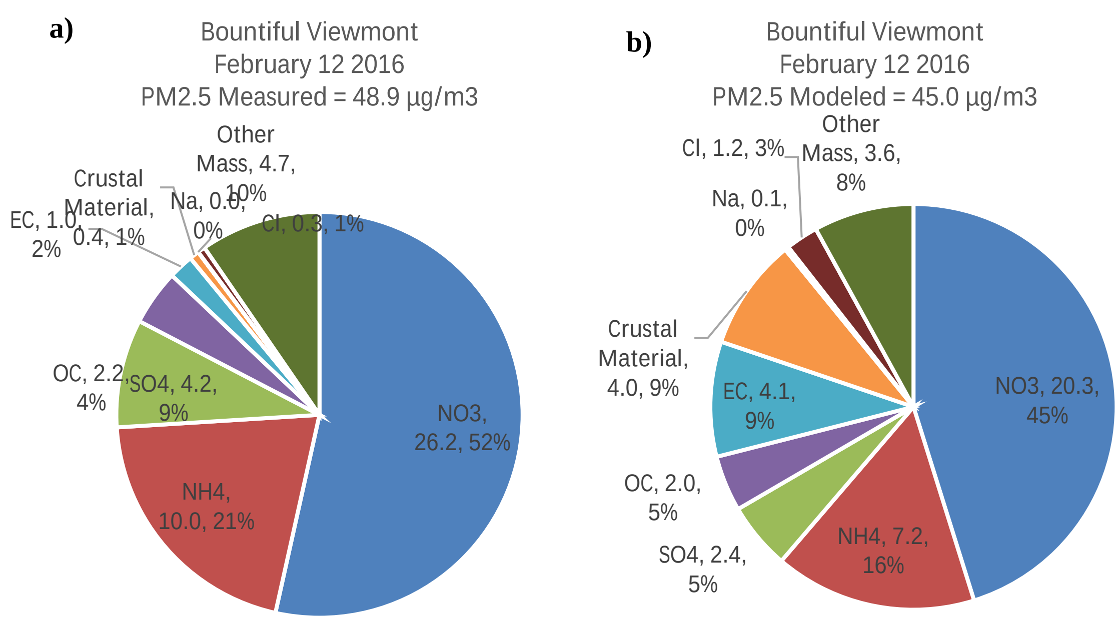

Figure IX.A.36. 10 a) Measured and b) Modeled Chemical Composition of 24-hour $PM_{2.5}$ in $\mu g/m^3$ and % of $PM_{2.5}$ at Bountiful monitoring Station on February 12, 2016

Given that the model is not able to sustain the observed $PM_{2.5}$ peaks, this episode is less suitable for modeling compared to the 2011 episode.

Conclusion

Examining the $PM_{2.5}$ model performance for all three episodes, it is clear that CAMx performed best when using the January 2011 WRF output, which was specifically calibrated to the meteorological conditions experienced during January 2011, a period that coincided with an exhaustive field campaign focused on the Salt Lake Valley (Persistent Cold Air Pool Study (PCAPS)[26]. The superior model performance for the January 2011 episode was further confirmed by a linear regression analysis that showed that modeled and measured $PM_{2.5}$ at Hawthorne monitoring station were more strongly correlated during the January 2011 episode (R^2 = 0.80) compared to the other episodes (R^2 = 0.54 and 0.69) (Figure IX.A.36.11).

Given that the January 2011 WRF data produced superior model performance when compared with the other two episodes, UDAQ selected the January 2011 episode to conduct its modeled maintenance demonstration work. A more thorough discussion is provided in the TSD.

[26] http://www.pcaps.utah.edu/

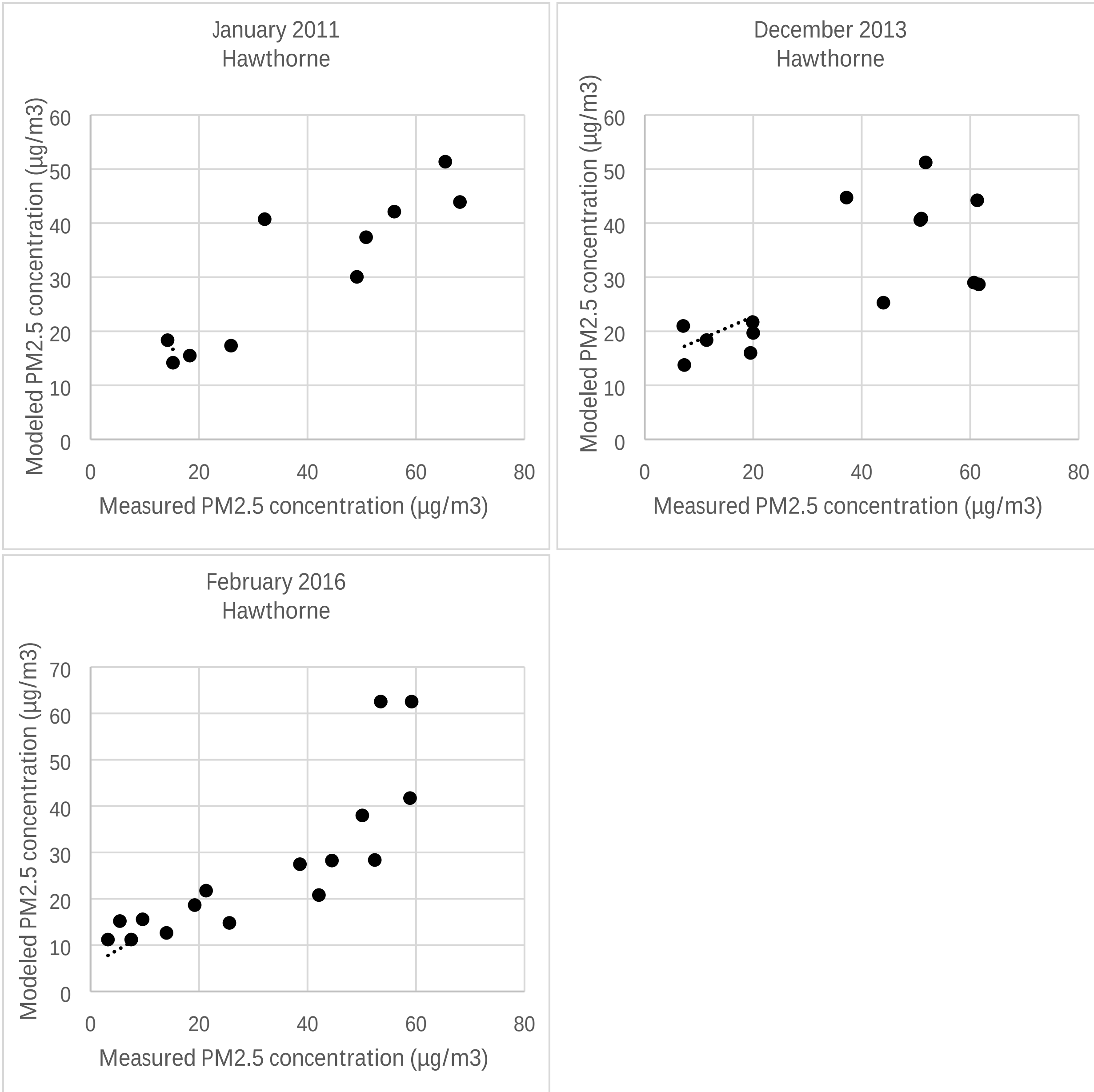

Figure IX.A.36. 11 Modeled versus measured 24-hr $PM_{2.5}$ at Hawthorne monitoring station for each of the three modeling episodes: January 2011, December 2013, and February 2016. Dots represent each individual day of the modeling episode. Linear regression fits (dashed line) and equation are shown for each episode.

c) Photochemical Model Performance Evaluation

Introduction

To assess how accurately the photochemical model predicts observed concentrations and to demonstrate that the model can reliably predict the change in pollution levels in response to changes in emissions, a model performance evaluation was conducted. This model performance evaluation also provides support for the model modifications and settings that were applied (ammonia injection, increase of surface resistance to ammonia, zeroing-out of ozone deposition velocity, reduction of cloud-water content, snow albedo enhancement, vertical diffusion modifications and paved road dust emissions adjustment) to more accurately reproduce winter-time inversion episodes. A detailed explanation of these model modifications is provided in the TSD.

Available ambient monitoring data were used for this photochemical model performance evaluation. Data included 24-hr total $PM_{2.5}$ and 24-hr chemically-speciated $PM_{2.5}$ measurements collected at the Hawthorne monitoring station in the SLC NAA. Ammonia measurements collected during special field studies were also used for this performance evaluation. The evaluation was based on the December 31-January 10, 2011, episode and the 2011 emissions inventory was used as input data for the model simulations. The evaluation focused on days with $PM_{2.5}$ concentration exceeding the NAAQS (> 35 µg/m^3). Results for December 31, which is a model spin-up day, are excluded from this evaluation.

A more detailed model performance evaluation that examines the model performance for gaseous species is provided in the TSD. More details on the model performance at various sites within the SLC NAA are also included in the TSD.

Daily $PM_{2.5}$ Concentrations

A comparison of 24-hr modeled and observed $PM_{2.5}$ during January 1-10, 2011, at the Hawthorne monitoring station in the SLC NAA showed that the model overall captures the temporal variation in $PM_{2.5}$ well (Figure IX.A.36.12). The gradual increase in $PM_{2.5}$ concentration and its transition back to low levels are generally well reproduced by the model. Moreover, with the exception of January 3 and 5, the bias between measured and modeled $PM_{2.5}$ is overall relatively small, particularly on $PM_{2.5}$ exceedance days. The biases observed on January 3 and 5 are largely related to the meteorological model performance on these days, as aforementioned.

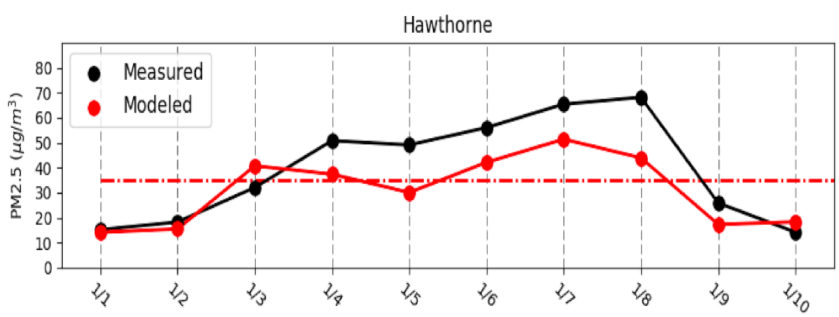

Figure IX.A.36. 12 Ten-day Time Series of Observed (black) and Modeled (red) 24-hr Average $PM_{2.5}$ Concentrations During January 1-10, 2011, at Hawthorne Monitoring Station in the SLC NAA. Dashed Red Line is NAAQS for 24-hr $PM_{2.5}$

$PM_{2.5}$ Chemical Speciation

To further investigate the model performance, measured and modeled $PM_{2.5}$ chemical species were compared at the Hawthorne monitoring site, which is part of EPA's Chemical Speciation Network (CSN). Figure IX.A.36.13 shows a comparison of the bulk chemical composition of measured and modeled $PM_{2.5}$ at Hawthorne on January 7, 2011, which corresponds to the only $PM_{2.5}$ exceedance day when measurement data are available. Chemical species, including nitrate (NO_3), sulfate (SO_4), ammonium (NH_4), organic carbon (OC), elemental carbon (EC), chloride (Cl), sodium (Na), crustal material (CM) and other species (other mass), were considered in this analysis. The model performance evaluation for non-$PM_{2.5}$ exceedance days is provided in the TSD.

The model performance for particulate nitrate, which is the major component of $PM_{2.5}$, was good, with both modeled and measured NO_3 accounting for similar contributions to $PM_{2.5}$ filter mass. Modeled and observed NO_3 concentrations were also comparable, with modeled concentration being biased low by about 15%. The model performance for particulate SO_4 was also reasonably good, with SO_4 being biased low in the model by about 27%. Similarly, to its performance for NO_3 and SO_4, the model was also biased low for NH_4 by about 34%. This underprediction in particulate NH_4 can be attributed to an underestimation in modeled HCl (more details are provided in the TSD). The model performance for OC was good for January 7, with modeled and observed concentrations being quite comparable. The model, on the other hand, overestimated EC and CM. The overprediction in these species on days when the simulated atmospheric mixing was particularly strong, suggests that this overestimation is potentially related to an overestimation in their source emissions.

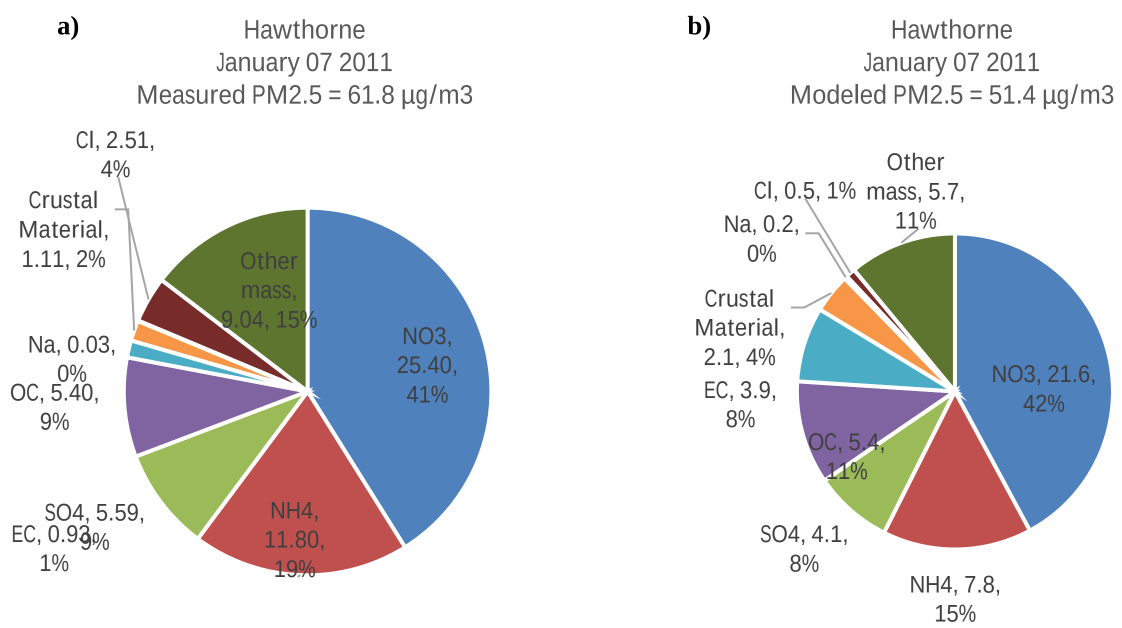

Figure IX.A.36. 13 a) Measured and b) Modeled Species Contribution (in µg/m³ and %) to $PM_{2.5}$ at Hawthorne Monitoring Station in the SLC NAA during a typical 24-hr $PM_{2.5}$ exceedance day

The model performance was also evaluated for ammonia (NH_3), which is an important precursor to the formation of ammonium nitrate, ammonium sulfate, and ammonium chloride, all of which are important $PM_{2.5}$ species accounting for over 50% of the $PM_{2.5}$ mass during winter-time inversion events.

Hourly modeled NH_3 (Figure IX.A.36.14) was compared to hourly NH_3 measurements (Figure IX.A.36.15) conducted at the Neil Armstrong Academy, located in West Valley City in the SLC NAA, during a special field study in winter 2016. Measurements from 2016 were considered since measurements of NH_3 were not available during 2011. Hourly measurements were also only available at the Neil Armstrong Academy. However, while these 2016 field study measurements cannot be directly compared to day-specific 2011 model simulations, the measurements are qualitatively useful to assess if the model predicts similar levels of NH_3 during strong inversion conditions.

Modeled NH_3 at Hawthorne and the Neil Armstrong Academy is well within the range observed in 2016. It also displays a similar behavior to measured NH_3, with the concentration dropping during peak $PM_{2.5}$ events.

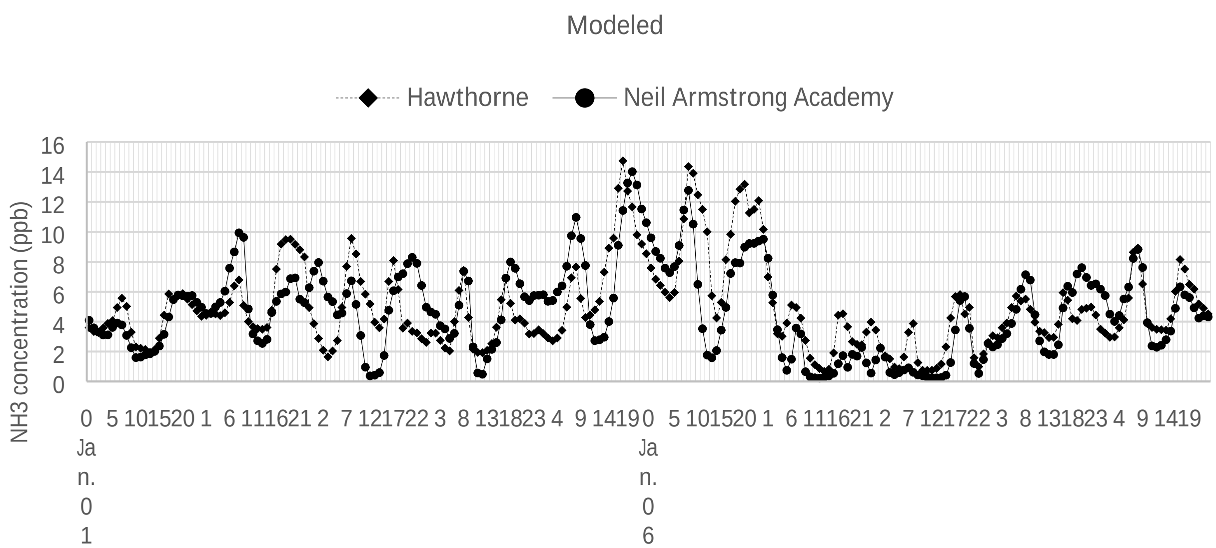

Figure IX.A.36. 14 Hourly Time Series of Modeled Ammonia (ppb) at Hawthorne and Neil Armstrong Academy during January 1 – 10, 2011

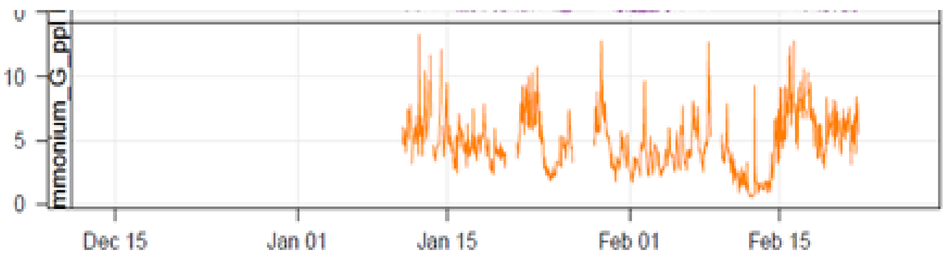

Figure IX.A.36. 15 Hourly Measured Ammonia on y-axis (ppb) at Neil Armstrong Academy in the SLC NAA during January – February 2016. Note that ammonia drops during the PCAP of February 7-14, 2016.

Summary of Model Performance

The model performance replicating the buildup and clear out of $PM_{2.5}$ is good overall. The model captures the temporal variation in $PM_{2.5}$ well. The gradual increase in $PM_{2.5}$ concentration and its transition back to low levels are generally well reproduced by the model. The model also predicts reasonably well $PM_{2.5}$ concentration on peak days. It also overall replicates well the composition of $PM_{2.5}$ on exceedance days, with good model performance for secondary nitrate and ammonium which account for over 50% of $PM_{2.5}$ mass. Simulated ammonia concentrations are also within the range of those observed, further indicating that the model overall performs well.

Several observations should be noted on the implications of these model performance findings on the attainment modeling presented in the following section. First, it has been demonstrated that model performance overall is good and, thus, the model can be used for air quality planning purposes. Second, consistent with EPA guidance, the model is used in a relative sense to project future year values. EPA suggests that this approach "should reduce some of the uncertainty attendant with using absolute model predictions alone."

d) Modeled Attainment Test

Introduction

With acceptable performance, the model can be utilized to make future-year attainment projections. For any given (future) year, an attainment projection is made by calculating a concentration termed the Future Design Value (FDV). This value is calculated for each monitor included in the analysis, and then compared to the NAAQS (35 µg/m^3). If the FDV at every monitor located within a NAA is less than the NAAQS, this demonstrates attainment for that area in that future year.

A maintenance plan must demonstrate continued attainment of the NAAQS for a span of ten years. This span is measured from the time EPA approves the plan, a date which is somewhat uncertain during plan development. To be conservative, attainment projections were made for 2035. An assessment was also made for 2026 as a "spot-check" against emission trends within the ten-year span.

$PM_{2.5}$ Baseline Design Values

For any monitor, the FDV is greatly influenced by existing air quality at that location. This can be quantified and expressed as a Baseline Design Value (BDV). The BDV is consistent with the form of the 24-hour $PM_{2.5}$ NAAQS, which is the 98th percentile value averaged over a three-year period. Quantification of the BDV for each monitor is included in the TSD, and is consistent with EPA guidance.

Relative Response Factors

In making future-year predictions, the output from the CAMx model is not considered to be an absolute answer. Rather, the model is used in a relative sense. In doing so, a comparison is made using the predicted concentrations for both the year in question and a pre-selected baseline year, which for this plan is 2017. This comparison results in a Relative Response Factor (RRF).

The UDAQ used the Software for Model Attainment Test - Community Edition (SMAT-CE) v. 1.01 utility from EPA[27] to perform the modeled attainment test for daily $PM_{2.5}$. SMAT is designed to interpolate the species fractions of the PM mass from the Speciation Trends Network (STN) monitors to the FRM monitors. It also calculates the relative response factor (RRF) for grid cells near each monitor and uses these to calculate a future year design value for these grid cells. A grid of 3-by-3 (9) cells surrounding the monitors was used as the boundary for RRF calculations.

The State of Utah operates three Chemical Speciation Network (CSN) monitors: Hawthorne, Bountiful, and Lindon. Hawthorne is located in Salt Lake County, the Bountiful monitor is in Davis to the north, and the Lindon monitor is located in Utah County to the south. Of the three, Hawthorne samples one out of three days, while the other two sample one in six days.

This mismatch in sampling frequency lead, initially, to interpolated speciation profiles that were unexpectedly non-uniform across the Salt Lake Valley. To create more realistic speciation profiles, the CSN data collected at the Hawthorne monitor were applied to all of the FRM sites in the SLC NAA. UDAQ believes this is a reasonable assumption that is supported by recently conducted special studies. Further discussion may be found in the TSD.

For each monitor, the FDV is calculated by multiplying the BDV by the relative response factor: **FDV = RRF * BDV**. These FDV's are compared to the NAAQS in order to determine whether attainment is predicted at that location or not. The results for each of the monitors are shown below in Table IX.A.36.9.

For all projected years and monitors, no FDV exceeds the NAAQS. Therefore, continued attainment is demonstrated for the SLC NAA.

[27] https://www.epa.gov/scram/photochemical-modeling-tools

Monitor Location	2016-2018 BDV	2026 FDV	2035 FDV*
Brigham City	32.4	27.5	27.5
Bountiful	28.5	28.1	28.2
Hawthorne	33.4	31.8	32.1
Rose Park	34.9	33.5	33.6
Ogden	30.2	28.8	28.9
Erda**	25.5	23.0	23.1

Table IX.A.36. 9 Baseline and Future Design Values (μg/m^3) at Monitors in SLC NAA

*These values include additional emissions added to the WFRC MVEB from the safety margin

**Erda site uses 2016 speciation data instead of 2011 like the other SLC NAA monitors because Erda was a new site starting in 2016

(2) Attainment Inventory

The attainment inventory is discussed in EPA guidance[28] as another one of the core provisions that should be considered by states for inclusion in a maintenance plan. According to the guidance, the stated purpose of the attainment inventory is to establish the level of emissions during the time periods associated with monitoring data showing attainment.

In cases such as this, where a maintenance demonstration is founded on a modeling analysis that is used in a relative sense, the modeled baseline inventory is used for comparison with every projection year model run. For this analysis, the State compiled a baseyear inventory for the year 2017. This year falls within the span of data representing current attainment of the $PM_{2.5}$ NAAQS. The guidance discusses the projection inventories as well, and notes that they should consider future growth, including population and industry, should be consistent with the baseyear inventory, and should document data inputs and assumptions. Any assumptions concerning emission rates must reflect permanent, enforceable measures.

Utah compiled projection inventories for use in the quantitative modeling demonstration. The years selected for projection include 2026 and 2035. The emissions contained in the inventories include sources located within the modeling domain encompassing all three $PM_{2.5}$ nonattainment areas, as well as a bordering region. See Figure IX.A.36.3.

Since this bordering region is so large, the State identified a “core area” within this domain wherein a higher degree of accuracy is important. Within this core area (which includes Weber, Davis, Salt Lake, Utah, Box Elder, Tooele, Cache, and Franklin, ID counties), SIP-specific inventories were prepared to include seasonal adjustments and forecasting to represent each of the projection years. In the bordering regions away from this core, the State used the most current (2014) National Emissions Inventory from EPA for the analysis.

There are four general categories of sources included in these inventories: point sources, area sources, on-road mobile sources, and non-road mobile sources. For each of these source categories, the pollutants that were inventoried includes: $PM_{2.5}$, SO_2, NO_X, VOC, and NH_3. The unit of measure for point and area

[28] Calcagni (n 3)

sources is the traditional tons per year. Mobile source emissions are reported in terms of tons per day. The pre-processing model, SMOKE, converts all emissions to daily, weekly, and hourly values.

Area source emissions were projected to 2017 from the 2014 triannual inventory. Growth data from appropriate data sources, including information from the Governor's Office of Management and Budget, was used to project inventories to 2026 and 2035. Point source emissions are represented as the actual emissions from the 2017 triannual emissions inventory. Point sources were grown to 2026 and 2035 on a case-by-case basis for the projection inventories.

On-road mobile source emissions were calculated for each year using MOVES2014b in conjunction with the appropriate estimates for vehicle miles traveled (VMT). VMT estimates for the urban counties were provided by the local metropolitan planning organizations (MPOs), including the Wasatch Front Regional Council, the Mountainland Association of Governments, and the Cache Metropolitan Planning Organization, and are based on their travel demand modeling for 2017, 2026, and 2035. Non-road mobile source emissions were calculated for each year using MOVES2014b. Growth data from appropriate data sources was used to project to 2026 and 2035. The Technical Support Documentation accompanying this SIP includes the Inventory Preparation Plan that details the growth factors used for each emissions source.

Source category emission inventories are expected to look quite different between 2017 and 2035. Population is expected to steadily increase between the 18-year span. On-road mobile emissions dominate the 2017 inventory; however, in 2035 area source emissions dominate the inventory. This is due to the tier 3 federal fuel standards and phase-in of newer cars driving on-road emission reductions. Area source emissions are relatively stable from 2017 to 2026 to 2035, besides a decrease in NOx from 2017 to 2026 due to the phase-in of area source rules.

Since this SIP subsection takes the form of a maintenance plan, it must demonstrate that the area will continue to attain the $PM_{2.5}$ NAAQS throughout a period of ten years from the date of EPA approval. It is also necessary to "spot check" this ten-year interval. Hence, projection inventories were prepared for 2026 and 2035. Table IX.A.36.10 below summarizes these inventories. As described, it represents point, area, on-road mobile, and non-road mobile sources in the modeling domain and includes $PM_{2.5}$, as well as the precursors SO_2, NO_X, VOC, and NH_3 as defined in 40 CFR Parts 50, 51, and 93.

More detail concerning any element of the inventory can be found in the appropriate section of the TSD. More detail about the general construction of the inventory can be found in the Inventory Preparation Plan.

Emissions (tons/day)	Sector	$PM_{2.5}$ Filterable	$PM_{2.5}$ Condensable	$PM_{2.5}$ Total	NOx	VOC	NH3	SO2
2017	Area Sources	5.02	1.11	6.13	13.55	45.98	14.21	0.21
	Mobile Sources	–	–	2.28	44.21	30.12	1.28	0.31
	NonRoad Sources	–	–	0.96	18.12	8.89	0.02	0.35
	Point Sources	2.97	0.97	3.94	17.01	6.52	0.34	3.78
	Total			13.31	92.89	91.51	15.85	4.65
2026	Area Sources	5.19	1.15	6.34	8.54	43.99	14.19	0.2
	Mobile Sources	–	–	1.34	19.63	15.96	1.09	0.16
	NonRoad Sources	–	–	0.72	14.64	8.85	0.02	0.44
	Point Sources	4.19	1.38	5.57	22.61	7.26	0.48	3.5
	Total			13.97	65.42	76.06	15.78	4.3
2035	Area Sources	5.37	1.19	6.56	8.69	47.17	14.21	0.2
	Mobile Sources	–	–	1.39	18.91	18.93	1.19	0.15
	NonRoad Sources	–	–	0.67	13.32	9.7	0.03	0.51
	Point Sources	4.19	1.38	5.57	22.62	7.26	0.48	3.5
	Total			14.15 14.19	62.21 63.54	83.06	15.91	4.36

Table IX.A.36. 10 Emissions Inventories in Tons per Average Episode Day by Year and Source Category

(3) Additional Controls for Future Years

Since the emission limitations discussed in subsection IX.A.36.b(3) are federally enforceable and, as demonstrated in IX.A.36.c(1) above, are sufficient to ensure continued attainment of the $PM_{2.5}$ NAAQS, there is no need to require any additional control measures to maintain the $PM_{2.5}$ NAAQS.

(4) Mobile Source Budget for Purposes of Conformity

The transportation conformity provisions of section 176(c)(2)(A) of the Act requires regional transportation plans and programs to show that "…emissions expected from implementation of plans and programs are consistent with estimates of emissions from motor vehicles and necessary emissions reductions contained in the applicable implementation plan…" EPA's transportation conformity regulation (40 CFR 93, Subpart A, last amended at 77 FR 14979, March 14 2012) also requires that motor vehicle emission budgets must be established for the last year of the maintenance plan, and may be established for any years deemed appropriate (see 40 CFR 93.118(b)(2)(i)).

For an MPO's Regional Transportation Plan, analysis years that are after the last year of the maintenance plan (in this case 2035), a conformity determination must show that emissions are less than or equal to the maintenance plan's motor vehicle emissions budget(s) for the last year of the implementation plan.

a) Mobile Source $PM_{2.5}$ Emissions Budgets

In this maintenance plan, Utah is establishing transportation conformity motor vehicle emission budgets (MVEB) for direct $PM_{2.5}$, NO_X, and VOC for 2035. The MVEBs are established for tons per average winter weekday for NO_x and VOC, and for direct $PM_{2.5}$ (primary exhaust $PM_{2.5}$ + brake and tire wear).

(i) Direct $PM_{2.5}$, NO_X, and VOC

Direct (or "primary") $PM_{2.5}$ refers to $PM_{2.5}$ that is not formed via atmospheric chemistry. Rather, direct $PM_{2.5}$ is emitted straight from a mobile or stationary source. With regard to the emission budget presented herein, direct $PM_{2.5}$ includes road dust, brake wear, and tire wear as well as $PM_{2.5}$ from exhaust. Through atmospheric chemistry, NO_X and VOC emissions can substantially contribute to secondary $PM_{2.5}$ formation. For this reason, NO_X and VOC are considered $PM_{2.5}$ precursors and are the only $PM_{2.5}$ precursors emitted at a significant level by on-road mobile, and therefore included in the MVEBs.

EPA's conformity regulation (40 CFR 93.124(a)) allows the implementation plan to quantify explicitly the amount by which motor vehicle emissions could be higher while still demonstrating compliance with the maintenance requirement. These additional emissions that can be allocated to the applicable MVEB are considered the "safety margin." As defined in 40 CFR 93.101, the safety margin represents the amount of emissions by which the total projected emissions from all sources of a given pollutant are less than the total emissions that would satisfy the applicable requirement for demonstrating maintenance. The implementation plan can then allocate some or all of this "safety margin" to the applicable MVEBs for transportation conformity purposes.

As presented in the TSD for on-road mobile sources, the estimated on-road mobile source emissions of direct $PM_{2.5}$, NOx, and VOC in 2035 for the SLC NAA, are listed in the first row (original MVEB) in Table IX.A.36.11. These mobile source emissions were included in the maintenance demonstration in Subsection IX.A.36.c.(1) which estimates a maximum $PM_{2.5}$ concentration of 33.2 $\mu g/m^3$ in 2035 within the SLC NAA portion of the modeling domain. These emissions numbers are considered the MVEB for the maintenance plan prior to the application of any amount of safety margin.

The safety margin for the SLC NAA portion of the domain equates to 1.8 $\mu g/m^3$ (the 2006 24-hr $PM_{2.5}$ standard of 35.0 $\mu g/m^3$ minus the initial 2035 FDV of 33.2 $\mu g/m^3$). To evaluate the portion of safety margin that could be allocated to the MVEBs, modeling was re-run for 2035 using the same emission projections for point, area and non-road mobile sources with additional emissions attributed to the on-road mobile source (see 2nd row of Table IX.A.36.11, Additional Tons Per Day from Safety Margin). The revised maintenance demonstration for 2035 still shows maintenance of the $PM_{2.5}$ standard. It estimates a maximum $PM_{2.5}$ concentration of 33.6 $\mu g/m^3$ in 2035 within the SLC NAA portion of the modeling domain, allocating .4 µg of the safety margin to on-road mobile emissions for the WFRC MVEB. The final 2035 MVEB for WFRC is listed in the last row of Table IX.A.36.11. The final WFRC MVEB is adjusted since Tooele and Box Elder counties are partially within the SLC NAA.

	Direct $PM_{2.5}$	NO_X	VOC	Design Value @ controlling monitor
Original NAA MVEB	1.04	16.33	14.07	33.2 μg/m^3
Additional Tons Per Day from Safety Margin	0.34	5.30	6.50	--
Final WFRC MVEB	1.38	21.63	20.57	33.6 μg/m^3

Table IX.A.36. 11 2035 Wasatch Front Regional Council Motor Vehicle Emissions Budget in Tons per Winter Weekday

It is important to note that the MVEBs presented in Table IX.A.36.11 are somewhat different from the on-road summary emissions inventory presented in Table IX.A.36.10.

Overall the emissions established as MVEBs are calculated using MOVES to reflect an average winter weekday. The totals presented in the summary emissions inventory (Table IX.A.36.11), however, represent an average-episode-day. The episode used to make this average (December 31, 2010 through January 10, 2011) includes seven such winter weekdays, but also includes two weekends. Emissions produced on weekdays are significantly larger than those produced on both Saturdays and Sundays. Therefore, the weighted average of daily emissions calculated for an episode-day will be less than that of a weekday.

There are also some conventions to be considered in the establishment of MVEBs. In particular, $PM_{2.5}$ in the summary emissions inventory totals includes direct exhaust, tire and brake wear, and fugitive dust. For the MVEBs, $PM_{2.5}$ includes direct exhaust, tire and brake but no fugitive dust. VOC emissions in the summary emissions inventory include refueling spillage and displacement vapor loss and are counted in the on-road mobile category. MVEBs for VOC do not include these emissions because, in this context, they are regarded as an area source.

40 CFR 93.118((b)(2)(i) also states “If the maintenance plan does not establish motor vehicle emissions budgets for any years other than the last year of the maintenance plan, the conformity regulation requires that a "demonstration of consistency with the motor vehicle emissions budget(s) must be accompanied by a qualitative finding that there are not factors which would cause or contribute to a new violation or exacerbate an existing violation in the years before the last year of the maintenance plan."

Considering this, it is useful to compare the projected future design values in 2026 at all monitors in the NAA to the on-road mobile emission inventory as well as the percent of the total inventory that the on-road mobile sector comprises. As can be seen in Table IX.A.36.9, the design values throughout the SLC NAA range from 23.0 to 33.5 μg/m^3. The Rose Park monitor shows the highest value at 33.5 μg/m^3, which is still 1.5 μg/m^3 below the standard. The on-road mobile source contribution to the overall inventory is shown in Table IX.A.36.12.

Emissions tons/day	**$PM_{2.5}$**	**NO_X**	**VOC**

2026 emission inventory total	14.16	62.21	83.05
2026 on-road mobile inventory	1.35	17.58	18.93
On-road mobile % of total inventory	9.53%	28.26%	22.79%

Table IX.A.36. 12 2026 On-Road Mobile Inventory Compared to Total 2026 Emissions Inventory

Since the projected design values are well below the standard, and the on-road budget is a relatively small percentage of the total inventory, UDAQ is confident that there will not be any on-road mobile factors that will cause or contribute to a new violation of the NAAQS.

(ii) Trading Ratios for Transportation Conformity

Per section 93.124 of the conformity regulations, for transportation conformity analyses using these budgets in analysis years beyond 2035, a trading mechanism is established to allow future increases in on-road direct $PM_{2.5}$ emissions to be offset by future decreases in plan precursor emissions from on-road mobile sources at appropriate ratios established by the air quality model. Future increases in on-road direct $PM_{2.5}$ emissions may be offset with future decreases in NO_x emissions from on-road mobile sources at a NO_x to $PM_{2.5}$ ratio of 6.3 to 1 and/or future decreases in VOC emissions from on-road mobile sources at a VOC to $PM_{2.5}$ ratio of 20.9 to 1. This trading mechanism will only be used if needed for conformity analyses for years after 2035. To ensure that the trading mechanism does not impact the ability to meet the NO_x or VOC budgets, the NO_x emission reductions available to supplement the direct $PM_{2.5}$ budget shall only be those remaining after the 2035 NO_x budget has been met, and the VOC emissions reductions available to supplement the direct $PM_{2.5}$ budget shall only be those remaining after the 2035 VOC budget has been met. Clear documentation of the calculations used in the trading should be included in the conformity analysis. The assumptions used to create the trading ratios can be found in the TSD.

(5) Nonattainment Requirements Applicable Pending Plan Approval

CAA 175A(c) - *Until such plan revision is approved and an area is redesignated as attainment, the requirements of CAA Part D, Plan Requirements for Nonattainment Areas, shall remain in force and effect.* The Act requires the continued implementation of the nonattainment area control strategy unless such measures are shown to be unnecessary for maintenance or are replaced with measures that achieve equivalent reductions. Utah will continue to implement the emissions limitations and measures from both $PM_{2.5}$ SIPs.

(6) Revise in Eight Years

CAA 175A(b) - Eight years after redesignation, the State must submit an additional plan revision which shows maintenance of the applicable NAAQS for an additional 10 years. Utah commits to submit a revised maintenance plan eight years after EPA takes final action redesignating the Salt Lake City area to attainment, as required by the Act.

(7) Verification of Continued Maintenance and Monitoring

Implicit in the requirements outlined above is the need for the State to determine whether the area is in fact maintaining the standard it has achieved. There are two complementary ways to measure this: 1) by monitoring the ambient air for $PM_{2.5}$; and 2) by inventorying emissions of $PM_{2.5}$ and its precursors from various sources.

The State will continue to maintain an ambient monitoring network for $PM_{2.5}$ in accordance with 40 CFR Part 58 and the Utah SIP. The State anticipates that the EPA will continue to review the ambient monitoring network for $PM_{2.5}$ each year, and any necessary modifications to the network will be implemented.

Additionally, the State will track and document measured mobile source parameters (e.g., vehicle miles traveled, congestion, fleet mix, etc.) and new and modified stationary source permits. If these and the resulting emissions change significantly over time, the State will perform appropriate studies to determine: 1) whether additional and/or re-sited monitors are necessary; and 2) whether mobile and stationary source emission projections are on target. The State will also continue to collect actual emissions inventory data from sources at thresholds defined in R307-150.

(8) Contingency Plan

CAA 175A(d) - Each maintenance plan shall contain contingency measures to assure that the State will promptly correct any violation of the standard which occurs after the redesignation of the area to attainment. Such provisions shall include a requirement that the State will implement all control measures which were contained in the SIP prior to redesignation.

Upon redesignation, this contingency plan for the SLC NAA supersedes Subsection IX.A.31.9, Contingency Measures, which is part of the serious SLC NAA $PM_{2.5}$ attainment SIP.

The contingency plan must also ensure that the contingency measures are adopted expeditiously once triggered. The primary elements of the contingency plan are: 1) the list of potential contingency measures; 2) the tracking and triggering mechanisms to determine when contingency measures are needed; and 3) a description of the process for recommending and implementing the contingency measures.

a) List of Potential Contingency Measures

Section 175(d) of the CAA requires the maintenance plan to include as potential contingency measures all of the $PM_{2.5}$ control measures contained in the attainment SIP that were relaxed or modified prior to redesignation. There were no control measures relaxed in the SLC NAA; however, below are potential contingency measure that will be evaluated. If it is determined through the triggering mechanism that additional emissions reductions are necessary, UDAQ will adopt and implement appropriate contingency measure as expeditiously as possible. The following are potential contingency measures that may be considered by UDAQ:

1. Measures to address emissions from residential wood combustion (i.e. emissions from fireplaces under the existing R307-302 rule), including re-evaluating the thresholds at which red or yellow burn days are triggered. Residential wood combustion represents 35.4% of direct $PM_{2.5}$ emissions in the 2017 county-wide inventory.
2. Measures to address fugitive dust from area sources. Fugitive dust represents 31.2% of direct $PM_{2.5}$ emissions in the 2017 county-wide inventory.
3. Additional measures to address other $PM_{2.5}$ sources identified in the emissions inventory such as on-road vehicles, non-road vehicles and engines, and industrial sources. These source categories

represent 35.8%, 13.0%, and 14.5%, respectively, of the overall 2017 baseyear emissions inventory.

In addition, UDAQ administers incentive and grant programs that reduce emissions in Utah's NAAs. The emissions reductions are not included in the quantitative maintenance demonstration; however, they are expected to contribute to the mitigation of $PM_{2.5}$ concentrations. Generally speaking, the programs target Utah nonattainment areas. The programs include approximately $25.5 million from the Volkswagen settlement and approximately $12.7 million to replace heavy-duty diesel trucks and buses that are operating under old emissions standards. Approximately $1.3 million will go towards upgrading non-road engines on the Wasatch Front. Another $3.8 million of the Volkswagen funding will go towards installing electric vehicle supply equipment in Utah. UDAQ is in the process of using approximately $9.6 million in federal funding to implement wood stove changeout programs throughout the three Utah $PM_{2.5}$ NAAs.

b) Tracking

The tracking plan for the three NAAs consists of monitoring and analyzing ambient $PM_{2.5}$ concentrations. In accordance with 40 CFR 58, the State will continue to operate and maintain an adequate $PM_{2.5}$ monitoring network in SLC, Provo, and Logan NAAs.

c) Triggering

Triggering of the contingency plan does not automatically require a revision to the SIP, nor does it mean that the area will automatically be redesignated once again to nonattainment. Instead, the State will have an appropriate timeframe to correct the potential violation with implementation of one or more adopted contingency measures. In the event that violations continue to occur, additional contingency measures will be adopted until the violations are corrected.

Upon notification of a potential violation of the $PM_{2.5}$ NAAQS, the State will develop appropriate contingency measures intended to prevent or correct a violation of the $PM_{2.5}$ standard. Information about historical exceedances of the standard, the meteorological conditions related to the recent exceedances, and the most recent estimates of growth and emissions will be reviewed. The possibility that an exceptional event occurred will also be evaluated.

Upon monitoring a potential violation of the $PM_{2.5}$ NAAQS, including exceedances flagged as exceptional events but not concurred with by EPA, the State will identify a means of corrective action within six months after a potential violation. The maintenance plan contingency measures will be chosen based on a consideration of cost-effectiveness, emission reduction potential, economic and social considerations, or other factors that the State deems appropriate.

The State will require implementation of such corrective action no later than one year after the violation is confirmed. Any contingency measures adopted and implemented will become part of the next revised maintenance plan submitted to the EPA for approval.