



State of Utah

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Department of
Environmental Quality

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DIVISION OF AIR QUALITY
Bryce C. Bird
Director

DAQ-047-15

MEMORANDUM

TO: Air Quality Board

THROUGH: Bryce C. Bird, Executive Secretary

FROM: Bill Reiss, Environmental Engineer

DATE: August 21, 2015

SUBJECT: PROPOSE FOR PUBLIC COMMENT: [Repeal of Existing SIP Subsection IX.A10 and Re-enact with SIP Subsection IX.A.10: PM₁₀ Maintenance Provisions for Salt Lake County.](#)

Introduction:

This item concerns a proposed State Implementation Plan (SIP) revision to address Utah's three nonattainment areas for PM₁₀. These areas have been attaining the PM₁₀ standard for a long time, and this revision demonstrates that they will continue to do so through the year 2030.

The revision is structured as a maintenance plan, which will allow Utah to request that EPA change the area designations back to attainment for PM₁₀. These areas include Salt Lake County, Utah County, and Ogden City.

The existing SIP for PM₁₀ affecting Salt Lake and Utah Counties was adopted in 1991 and resulted in attainment of the 1987 National Ambient Air Quality Standards (NAAQS) in both areas by 1996. Since that time, PM_{2.5} has supplanted PM₁₀ as the indicator of fine particulate matter. Though PM₁₀ also includes the coarse fraction of PM, Utah's difficulties with PM₁₀ were characterized by the same winter time episodes that lead to elevated PM_{2.5} levels.

Essentially, this SIP revision would close the book on PM₁₀ and allow Utah to focus on meeting the PM_{2.5} standard. All three of the affected areas are currently designated nonattainment for PM_{2.5}.

Scope:

There are two parts to the SIP revision. (This) Section IX. Part A is the SIP document itself, and addresses

the criteria necessary to request redesignation. It includes the actual Maintenance Plan, which includes the quantitative demonstration of continued attainment.

Some of the items addressed in Part A include:

- monitored attainment of the PM₁₀ NAAQS
- establishment of motor vehicle emission budgets for purposes of transportation conformity
- consideration of emission reduction credits, and
- contingency measures

The second piece is SIP Section IX, Part H. It includes the emission limits for certain specific stationary sources. Including these limits in the SIP makes them federally enforceable.

The list of stationary sources to be included in Part H was updated as part of this proposal. It includes sources located in any of the nonattainment areas with actual emissions (in 2011), or potentials to emit, that are at least 100 tons per year for PM₁₀, SO₂, or NO_x.

Using these criteria means that some sources will not be retained in the revised Part H, while other new sources, that did not exist when the original SIP was written, will be added.

SIP Organization:

As originally written in 1991, the PM₁₀ nonattainment SIP for Salt Lake and Utah Counties resides at Section IX.A. 1-8 of the Utah SIP. This plan had projected attainment of the NAAQS through the year 2003.

In 2005, Utah prepared a revision to the plan that showed continued attainment in [Salt Lake County](#) through the year 2017. This revision, also structured as a maintenance plan, was placed into the SIP at Section [IX.A.10](#). Subsections IX.A.11 and 12 were also added as the maintenance plan provisions for Utah County and Ogden City respectively.

At this time, DAQ staff is proposing to replace each of these three subsections of the SIP in separate actions. Since there is a large amount of redundant material in the three documents, they have been prepared using color coding to denote which parts of each plan are specific to the respective nonattainment areas. In reviewing the proposals, the reader should note that [blue text](#) is specific to the [Salt Lake County](#) nonattainment area. Likewise, [green text](#) and [purple text](#) are specific to Utah County and Ogden City respectively.

Staff Recommendation: Staff recommends that the Board propose for public comment to repeal existing SIP Subsection [IX.A.10](#), and re-enact with SIP Subsection [IX.A.10](#): PM₁₀ Maintenance Provisions for [Salt Lake County](#), as proposed.

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UTAH

PM₁₀ Maintenance Provisions for Salt Lake County

Section IX.A.10

Adopted by the Air Quality Board
December 2, 2015

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Section IX.A. 10 PM₁₀ Maintenance Provisions for Salt Lake County

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IX.A.10.a Introduction

7 The State of Utah is requesting that the U.S. Environmental Protection Agency (EPA) redesignate
8 the [Salt Lake County](#) nonattainment area to attainment status for the 24-hour PM₁₀ National
9 Ambient Air Quality Standard (NAAQS).

10
11 The foregoing Subsections 1-9 of Part IX.A of the Utah State Implementation Plans (SIP) were
12 written in 1991 to address violations of the NAAQS for PM₁₀ in both Utah County and Salt Lake
13 County. These areas were each classified as Initial Moderate PM₁₀ Nonattainment Areas, and as
14 such required “nonattainment SIPs” to bring them into compliance with the NAAQS by a
15 statutory attainment date. The control measures adopted as part of those plans have proven
16 successful in that regard, and at the time of this writing (2015) each of these areas continues to
17 show compliance with the federal health standards for PM₁₀.

18
19 This [Subsection 10](#) of Part IX.A of the Utah SIP represents the second chapter of the PM₁₀ story
20 for [Salt Lake County](#), and demonstrates that the area has achieved compliance with the PM₁₀
21 NAAQS and will continue to maintain that standard through the year 2030. As such, it is written
22 in accordance with Section 175A (42 U.S.C. 7505a) of the federal Clean Air Act (the Act), and
23 should serve to satisfy the requirement of Section 107(d)(3)(E)(iv) of the Act.

24
25 This section is hereafter referred to as the “Maintenance Plan” or “the Plan,” and contains the
26 maintenance provisions of the PM₁₀ SIP for [Salt Lake County](#).

27
28 While the Maintenance Plan could be written to replace all that had come before, it is presented
29 herein as an addendum to Subsections 1-9 in the interest of providing the reader with some sense
30 of historical perspective. Subsections 1-9 are retained for historical purposes, while existing
31 subsection 10 (transportation conformity for Utah County) [is herein replaced](#). [A more current](#)
32 [evaluation of transportation conformity for Utah County is presented in Section IX.A.11](#).

33
34 In a similar way, any references to the Technical Support Document (TSD) in this section means
35 actually Supplement IV-15 to the Technical Support Document for the PM₁₀ SIP.

36
37
38 **Background**

39
40 The Act requires areas failing to meet the federal ambient PM₁₀ standard to develop SIP revisions
41 with sufficient control requirements to expeditiously attain and maintain the standard. On July 1,
42 1987, EPA promulgated a new NAAQS for particulate matter with a diameter of 10 microns or
43 less (PM₁₀), and listed [Salt Lake County](#) as a Group I area for PM₁₀. This designation was based
44 on historical data for the previous standard, total suspended particulate, and indicated there was a
45 95% probability the area would exceed the new PM₁₀ standard. Group I area SIPs were due in
46 April 1988, but Utah was unable to complete the SIP by that date. In 1989, several citizens
47 groups sued EPA (*Preservation Counsel v. Reilly*, civil Action (No. 89-C262-G (D, Utah)) for
48 failure to implement a Federal Implementation Plan (FIP) under provisions of §110(c)(1) of the
49 Clean Air Act (42 U.S.C. 7410(c)(1)).

1
2 A settlement agreement in January 1990 called for Utah to submit a SIP and for EPA to approve
3 it by December 31, 1991. In August 1991, the parties voluntarily agreed to dismiss the lawsuit
4 and the complaint and vacate the settlement agreement.
5

6 The Clean Air Act Amendments of November 1990 redesignated Group I areas as initial
7 moderate nonattainment areas and required that SIPs be submitted by November 15, 1991. These
8 moderate area SIPs were to require installation of Reasonably Available Control Measures
9 (RACM) on industrial sources by December 10, 1993 and a demonstration the NAAQS would be
10 attained no later than December 31, 1994.
11

12 **(1) The PM₁₀ SIP**

13
14 On November 14, 1991, Utah submitted a SIP for Salt Lake and Utah Counties that demonstrated
15 attainment of the PM₁₀ standards in Salt Lake and Utah Counties for 10 years, 1993 through
16 2003. EPA published approval of the SIP on July 8, 1994 (59 FR 35036).
17

18 **(2) Supplemental History of SIP Approval - PM₁₀**

19
20 Utah's SIP included two provisions that promised additional action by the state: 1) a road salting
21 and sanding program, and 2) a diesel vehicle emissions inspection and maintenance program.
22

23 On February 3, 1995, Utah submitted amendments to the SIP to specify the details of the road
24 salting and sanding program promised as a control measure. EPA published approval of the road
25 salting and sanding provisions on December 6, 1999 (64 FR 68031).
26

27 On February 6, 1996, Utah submitted to EPA a new SIP Section XXI, a diesel vehicle inspection
28 and maintenance program.
29

30 Also, in April 1992, EPA published the "General Preamble," describing EPA's views on
31 reviewing state SIP submittals. One of the requirements was that moderate nonattainment area
32 states must submit contingency plans by November 15, 1993.
33

34 On July 31, 1994, Utah submitted an amendment to the PM₁₀ SIP that required lowering the
35 threshold for calling no-burn days as a contingency measure for Salt Lake, Davis and Utah
36 Counties.
37

38 On July 18, 1997, EPA promulgated a new form of the PM₁₀ standard. As a way to simplify
39 EPA's process of revoking the old PM₁₀ standard, EPA requested on April 6, 1998, that Utah
40 withdraw its submittals of contingency measures. Utah submitted a letter requesting withdrawal
41 on November 9, 1998, and EPA returned the submittals on January 29, 1999.
42

43 **(3) Attainment of the PM₁₀ Standard and Reasonable Further Progress**

44
45 By statute, EPA was to determine whether Initial Moderate Areas were attaining the standard as
46 of December 31, 1994. This determination requires an examination of the three previous calendar
47 years of monitoring data (in this case 1992, 1993 and 1994). The 24-hour NAAQS allows no
48 more than three expected exceedances of the 24-hour standard at any monitor in this 3-year
49 period. Since the statutory deadline for the implementation of RACM was not until the end of
50 1993, it was reasonable to presume that the area might not be able to show attainment with a 3-
51 year data set until the end of 1996 even if the control measures were having the desired effect.
52 Presumably for this reason, Section 188(d) of the Act, (42 U.S.C. 7513(d)) allows a state to

1 request up to two 1-year extensions of the attainment date. In doing so, the state must show that
2 it has met all requirements of the SIP, that no more than one exceedance of the 24-hour PM₁₀
3 NAAQS has been observed in the year prior to the request, and that the annual mean
4 concentration for such year is less than or equal to the annual standard.

5
6 EPA's Office of Air Quality Planning and Standards issued a guidance memorandum concerning
7 extension requests (November 14, 1994), clarifying that the authority delegated to the
8 Administrator for extending moderate area attainment dates is discretionary. In exercising this
9 discretionary authority, it says, EPA will examine the air quality planning progress made in the
10 area, and in addition to the two criteria specified in Section 188(d), EPA will be disinclined to
11 grant an attainment date extension unless a state has, in substantial part, addressed its moderate
12 PM₁₀ planning obligations for the area. The EPA will expect the State to have adopted and
13 substantially implemented control measures submitted to address the requirement for
14 implementing RACM/RACT in the moderate nonattainment area, as this was the central control
15 requirement applicable to such areas. Furthermore it said, "EPA believes this request is
16 appropriate, as it provides a reliable indication that any improvement in air quality evidenced by a
17 low number of exceedances reflects the application of permanent steps to improve the air quality
18 in the region, rather than temporary economic or meteorological changes." As part of this
19 showing, EPA expected the State to demonstrate that the PM₁₀ nonattainment area has made
20 emission reductions amounting to reasonable further progress (RFP) toward attainment of the
21 NAAQS, as defined in Section 171(1) of the Act.

22
23 On May 11, 1995, Utah requested one-year extensions of the attainment date for both Salt Lake
24 and Utah Counties. On October 18, 1995, EPA sent a letter granting the requests for extensions,
25 and on January 25, 1996, sent a letter indicating that EPA would publish a rulemaking action on
26 the extension requests.

27
28 Along with the extension requests in 1995, Utah submitted a milestone report as required under
29 Section 172(1) of the Act, (42 U.S.C. 7501(1)) to assess progress toward attainment. This
30 milestone report addressed two issues: 1) that all control measures in the approved plan had been
31 implemented, and 2) that reasonable further progress (RFP) had been made toward attainment of
32 the standard in terms of reducing emissions. As defined in Section 171(1), RFP means such
33 annual incremental reductions in emissions of the relevant air pollutant as are required to ensure
34 attainment of the applicable NAAQS by the applicable date.

35
36 On June 18, 2001, EPA published notice in the Federal Register (66 FR 32752) that Utah's
37 extension requests were granted, that Salt Lake County attained the PM₁₀ standard by December
38 31, 1995, and that Utah County attained the standard by December 31, 1996. The notice stated
39 that these areas remain moderate nonattainment areas and are not subject to the additional
40 requirements of serious nonattainment areas.

41 42 43 44 **IX.A.10.b Pre-requisites to Area Redesignation**

45
46 Section 107(d)(3)(E) of the Act outlines five requirements that must be satisfied in order that a
47 state may petition the Administrator to redesignate a nonattainment area back to attainment.
48 These requirements are summarized as follows: 1) the Administrator determines that the area has
49 attained the applicable NAAQS, 2) the Administrator has fully approved the applicable
50 implementation plan for the area under §110(k) of the Act, 3) the Administrator determines that
51 the improvement in air quality is due to permanent and enforceable reductions in emissions

1 resulting from implementation of the applicable implementation plan ... and other permanent and
 2 enforceable reductions, 4) the Administrator has fully approved a maintenance plan for the area
 3 as meeting the requirements of §175A of the Act, and 5) the State containing such area has met
 4 all requirements applicable to the area under §110 and Part D of the Act.

5
 6 Each of these requirements will be addressed below. Certainly, the central element from this list
 7 is the maintenance plan found at Subsection IX.A.10.c below. Section 175A of the Act contains
 8 the necessary requirements of a maintenance plan, and EPA policy based on the Act requires
 9 additional elements in order that such plan be federally approvable. Table IX.A.10. 1 identifies
 10 the prerequisites that must be fulfilled before a nonattainment area may be redesignated to
 11 attainment under Section 107(d)(3)(E) of the Act.

12
 13
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Table IX.A.10. 1 Prerequisites to Redesignation in the federal Clean Air Act (CAA)			
Category	Requirement	Reference	Addressed in Section
Attainment of Standard	Three consecutive years of PM ₁₀ monitoring data must show that violations of the standard are no longer occurring.	CAA §107(d)(3)(E)(i)	IX.A.10.b(1)
Approved State Implementation Plan	The SIP for the area must be fully approved.	CAA §107(d)(3)(E)(ii)	IX.A.10.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.10.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.10.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.10.b(5) and IX.A.10.c

15
 16
 17 **(1) The Area Has Attained the PM₁₀ NAAQS**

18 CAA 107(d)(3)(E)(i) - *The Administrator determines that the area has attained the national*
 19 *ambient air quality standard.* To satisfy this requirement, the State must show that the area is
 20 attaining the applicable NAAQS. According to EPA's guidance concerning area redesignations
 21 (Procedures for Processing Requests to Redesignate Areas to Attainment, John Calcagni to
 22 Regional Air Directors, September 4, 1992 [or, Calcagni]), there are generally two components
 23 involved in making this demonstration. The first relies upon ambient air quality data which
 24 should be representative of the area of highest concentration and should be collected and quality
 25 assured in accordance with 40 CFR 58. The second component relies upon supplemental air
 26 quality modeling. Each will be discussed in turn.

27 **(a) Ambient Air Quality Data (Monitoring)**
 28

29 In 1987 EPA promulgated the National Ambient Air Quality Standard (NAAQS) for PM₁₀. The
 30 NAAQS for PM₁₀ is listed in 40 CFR 50.6 along with the criteria for attaining the standard. The

1 24-hour NAAQS is 150 micrograms per cubic meter (ug/m^3) for a 24-hour period, measured from
2 midnight to midnight. The 24-hour standard is attained when the expected number of days per
3 calendar year with a 24-hour average concentration above $150 \text{ ug}/\text{m}^3$, as determined in
4 accordance with Appendix K to that part, is equal to or less than one. In other words, each
5 monitoring site is allowed up to three expected exceedances of the 24-hour standard within a
6 period of three calendar years. More than three expected exceedances in that three-year period is
7 a violation of the NAAQS.

8
9 There also had been an annual standard of $50 \text{ ug}/\text{m}^3$. The annual standard was attained if the
10 three-year average of individual annual averages was less than $50 \text{ ug}/\text{m}^3$. Utah never violated the
11 annual standard at any of its monitoring stations, and the annual average was not retained as a
12 PM_{10} standard when the NAAQS was revised in 2006. Nevertheless, an annual average still
13 provides a useful metric to evaluate long-term trends in PM_{10} concentrations here in Utah where
14 short-term meteorology has such an influence on high 24-hour concentrations during the winter
15 season.

16
17 40 CFR 58 Appendix K, Interpretation of the National Ambient Air Quality Standards for
18 Particulate Matter, acknowledges the uncertainty inherent in measuring ambient PM_{10}
19 concentrations by specifying that an *observed exceedance* of the ($150 \text{ ug}/\text{m}^3$) 24-hour health
20 standard means a daily value that is above the level of the 24-hour standard after rounding to the
21 nearest $10 \text{ ug}/\text{m}^3$ (e.g., values ending in 5 or greater are to be rounded up).

22
23 The term *expected exceedance* accounts for the possibility of missing data. Missing data can
24 occur when a monitor is being repaired, calibrated, or is malfunctioning, leaving a time gap in the
25 monitored readings. EPA discounts these gaps if the highest recorded PM_{10} reading at the
26 affected monitor on the day before or after the gap is not more than 75 percent of the standard,
27 and no measured exceedance has occurred during the year.

28
29 Expected exceedances are calculated from the Aerometric Information and Retrieval System
30 (AIRS) data base according to procedures contained in 40 CFR Part 50, Appendix K. The State
31 relied on the expected exceedance values contained in the AIRS Quick Look Report (AMP 450)
32 to determine if a violation of the standard had occurred.

33
34 Data may also be flagged when circumstances indicate that it would represent an outlier in the
35 data set and not be indicative of the entire airshed or the efforts to reasonably mitigate air
36 pollution within. Appendix N to Part 50 – “Interpretation of the National Ambient Air Quality
37 Standards for Particulate Matter” anticipates this and states: “Data resulting from uncontrollable
38 or natural events, for example structural fires or high winds, may require special consideration.
39 In some cases, it may be appropriate to exclude these data because they could result in
40 inappropriate values to compare with the levels of the PM standards.” The protocol for data
41 handling dictates that flagging is initiated by the state or local agency, and then the EPA either
42 concurs or indicates that it has not concurred. Some discussion will be provided to help the
43 reader understand the occasional occurrence of wind-blown dust events that affect these
44 nonattainment areas, and how the resulting data should be interpreted with respect to the control
45 measures enacted to address the 24-hour NAAQS.

46
47 Using the criteria from 40 CFR 58 Appendix K, data was compiled for all PM_{10} monitors
48 within the [Salt Lake County](#) nonattainment area that recorded a four-year data set comprising
49 the years 2011 – 2014. For each monitor, the number of expected exceedances is reported for
50 each year, and then the average number of expected exceedances is reported for the overlapping
51 three-year periods. If this average number of expected exceedances is less than or equal to 1.0,
52 then that particular monitor is said to be in compliance with the 24-hour standard for PM_{10} . In

1 order for an area to be in compliance with the NAAQS, every monitor within that area must be in
 2 compliance.

3
 4 As illustrated in the table below, the results of this exercise show that the Salt Lake County
 5 PM₁₀ nonattainment area is presently attaining the NAAQS.

6
 7 **Table IX.A.10. 2 PM₁₀ Compliance in Salt Lake County, 2011-2014**
 8

Hawthorne 49-035-3006	24-hr Standard	3-Year Average
	No. Expected Exceedances	No. Expected Exceedances
2011	0.0 / 0.0*	
2012	0.0 / 0.0*	
2013	0.0 / 0.0*	0.0 / 0.0*
2014	0.0 / 0.0*	0.0 / 0.0*

9

North Salt Lake 49-035-0012	24-hr Standard	3-Year Average
	No. Expected Exceedances	No. Expected Exceedances
2011	0.0 / 0.0*	
2012	0.0 / 0.0*	
2013	0.0 / 0.0*	0.0 / 0.0*
2014	NA**	NA**

10

Magna 49-035-1001	24-hr Standard	3-Year Average
	No. Expected Exceedances	No. Expected Exceedances
2011	0.0 / 0.0*	
2012	0.0 / 0.0*	
2013	0.0 / 0.0*	0.0 / 0.0*
2014	0.0 / 0.0*	0.0 / 0.0*

11
 12 * The second set of numbers shows what would be the effect of including all of the data that has
 13 been flagged by DAQ and not yet concurred with by EPA.

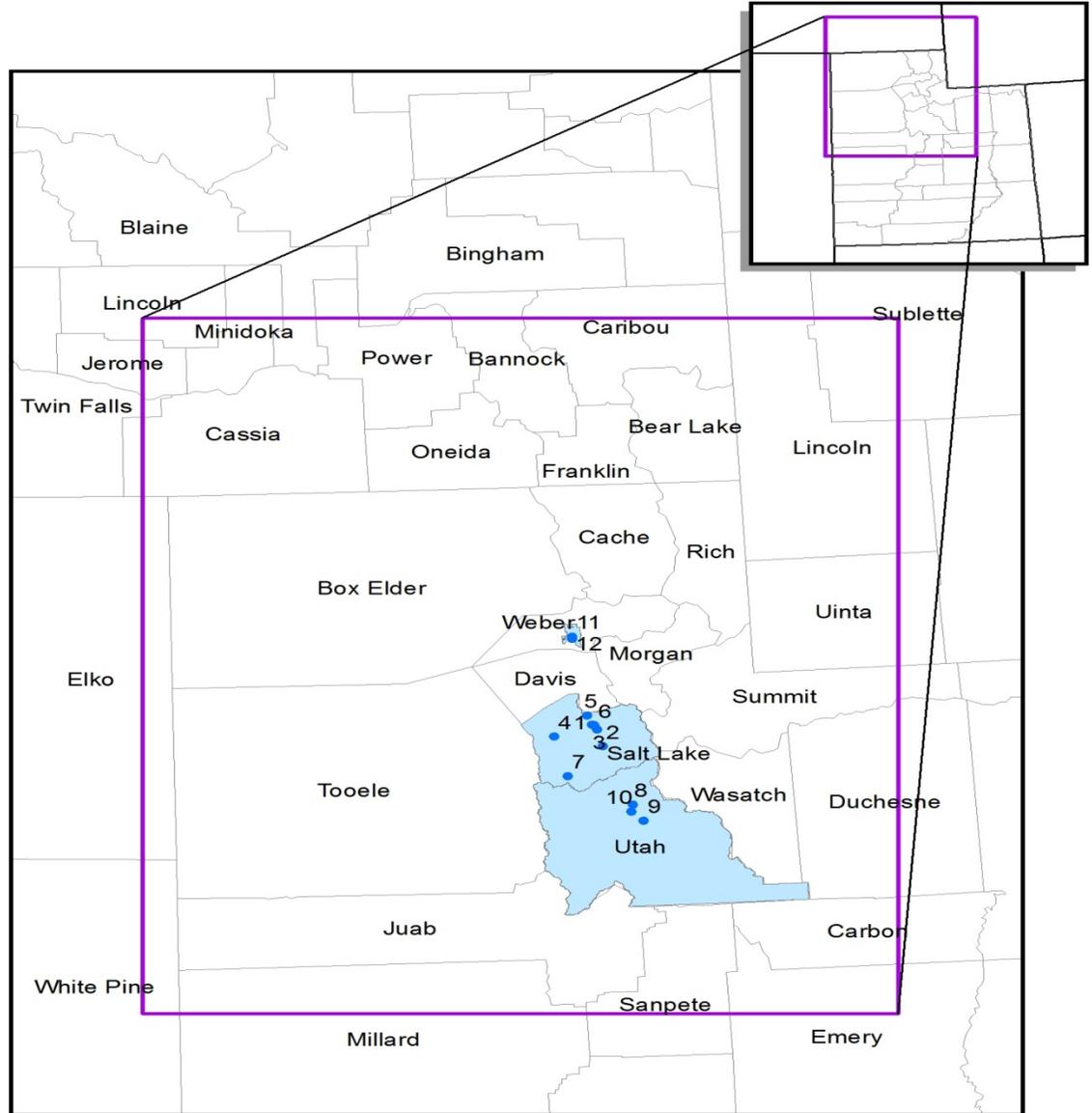
14
 15 ** The North Salt Lake monitor was closed in September of 2013.

16
 17
 18 **(b) PM₁₀ Monitoring Network**
 19

20 The overall assessments made in the preceding paragraph were based on data collected at
 21 monitoring stations located throughout the nonattainment area. The Utah DAQ maintains a
 22 network of PM₁₀ monitoring stations in accordance with 40 CFR 58. These stations are referred
 23 to as SLAMS sites, meaning that they are State and Local Air Monitoring Stations. In
 24 consultation with EPA, an Annual Monitoring Network Plan is developed to address the
 25 adequacy of the monitoring network for all criteria pollutants. Within the network, individual
 26 stations may be situated so as to monitor large sources of PM₁₀, capture the highest
 27 concentrations in the area, represent residential areas, or assess regional concentrations of PM₁₀.
 28 Collectively, these monitors make up Utah's PM₁₀ monitoring network. The following
 29 paragraphs describe the network in each of Utah's three nonattainment areas for PM₁₀.
 30

1 Provided in Figure IX.A.10. 1 is a map of the modeling domain that shows the existing PM₁₀
2 nonattainment areas and the locations of the monitors therein. Some of the monitors at these
3 locations are no longer operational, but they have been included for informational purposes.
4

5 **Figure IX.A.10. 1 Modeling Domain**



6
7 The following PM₁₀ monitoring stations operated in the Salt Lake County PM₁₀ nonattainment
8 area from 1985 through 2015. They are numbered as they appear on the map:
9

- 10 1. Air Monitoring Center (AMC) (AIRS number 49-035-0010): This site was located in an
11 urban city center, near an area of high vehicle use. It was closed in 1999 when DAQ lost
12 its lease on the building.
13

- 1 2. Cottonwood (AIRS number 49-035-0003): This site was located in a suburban
2 residential area. It collected data from 1986 - 2011. It was closed in 2011 due to siting
3 criteria violations as well as safety concerns.
4
- 5 3. Hawthorne (AIRS number 49-035-3006): This site is located in a suburban residential
6 area. It began collecting data in 1997, and is the NCORE site for Utah.
7
- 8 4. Magna (AIRS number 49-035-1001): This site is located in a suburban residential area.
9 It was historically impacted periodically by blowing dust from a large tailings
10 impoundment, and as such is anomalous with respect to the typical wintertime scenario
11 that otherwise characterizes the nonattainment area. It has been collecting data since
12 1987.
13
- 14 5. North Salt Lake (AIRS number 49-035-0012): This site was located in an industrial area
15 that is impacted by sand and gravel operations, freeway traffic, and several refineries. It
16 was near a residential area as well. It collected data from 1985 - 2013. The monitor was
17 situated over a sewer main, and service of that main required its removal in September
18 2013 and following the service, the site owner did not allow the monitor to return.
19
- 20 6. Salt Lake City (AIRS number 49-035-3001): This site was situated in an urban city
21 center. It was discontinued in 1994 because of modifications that were made to the air
22 conditioning on the roof-top.
23
- 24 7. Herriman #3 (AIRS number 49-035-3012): This site is located in a suburban residential
25 area. It began collecting data in 2015.
26
27

28 The following PM₁₀ monitoring stations operated in the Utah County PM₁₀ nonattainment area
29 from 1985 through 2015. They are numbered as they appear on the map:
30

- 31 8. Lindon (AIRS number 49-049-4001): This site is designed to measure population
32 exposure to PM₁₀. It is located in a suburban residential area affected by both industrial
33 and vehicle emissions. PM₁₀ has been measured at this site since 1985, and the readings
34 taken here have consistently been the highest in Utah County. Area source emissions,
35 primarily wood smoke, also affect the site.
36
- 37 9. North Provo (AIRS number 49-049-0002): This is a neighborhood site in a mixed
38 residential-commercial area in Provo, Utah. It began collecting data in 1986.
39
- 40 10. West Orem (AIRS number 49-049-5001): This site was originally located in a residential
41 area adjacent to a large steel mill which has since closed. It is a neighborhood site. It
42 was situated based on computer modeling, and has historically reported high PM₁₀
43 values, but not consistently as high as those observed at the Lindon site. The site was
44 closed at the end of 1997 for this reason.
45

46 The following PM₁₀ monitoring stations operated in the Ogden City PM₁₀ nonattainment area
47 from 1986 through 2015. They are numbered as they appear on the map:
48

- 49 11. Ogden 1 (AIRS number 49-057-0001): This site was situated in an urban city center. It
50 was discontinued in 2000 because DAQ lost its lease on the building.
51

1 12. Ogden 2 (AIRS number 49-057-0002): This site began collecting data in 2001, as a
2 replacement for the Ogden 1 location. It, too, is situated in an urban city center.
3

4 **(c) Modeling Element**
5

6 EPA guidance concerning redesignation requests and maintenance plans (Calcagni) discusses the
7 requirement that the area has attained the standard, and notes that air quality modeling may be
8 necessary to determine the representativeness of the monitored data.
9

10 Information concerning PM₁₀ monitoring in Utah is included in the Annual Monitoring Network
11 Review and The 5 Year Network Plan. Since the early 1980's, the network review has been
12 updated annually and submitted to EPA for approval. EPA has concurred with the annual
13 network reviews and agreed that the PM₁₀ network is adequate. EPA personnel have also visited
14 the monitor sites on several occasions to verify compliance with federal siting requirements.
15 Therefore, additional modeling will not be necessary to determine the representativeness of the
16 monitored data.
17

18 The Calcagni memo goes on to say that areas that were designated nonattainment based on
19 modeling will generally not be redesignated to attainment unless an acceptable modeling analysis
20 indicates attainment.
21

22 Though none of Utah's three PM₁₀ nonattainment areas was designated based on modeling,
23 Calcagni also states that (when dealing with PM₁₀) dispersion modeling will generally be
24 necessary to evaluate comprehensively sources' impacts and to determine the areas of expected
25 high concentrations based upon current conditions. Air quality modeling was conducted for the
26 purpose of this maintenance demonstration. It shows that all three nonattainment areas are
27 presently in compliance, and will continue to comply with the PM₁₀ NAAQS through the year
28 2030.
29

30 **(d) EPA Acknowledgement**
31

32 The data presented in the preceding paragraphs shows quite clearly that the [Salt Lake County](#)
33 PM₁₀ nonattainment area is attaining the NAAQS. As discussed before, the EPA acknowledged
34 in the Federal Register that both Utah County and Salt Lake County had already attained.
35

36 On June 18, 2001, EPA published notice in the Federal Register (66 FR 32752) that Utah's
37 extension requests were granted, [\[and\] that Salt Lake County attained the PM₁₀ standard by](#)
38 [December 31, 1995](#). The notice stated that the area would remain a moderate nonattainment
39 area and would not be subject to the additional requirements of serious nonattainment areas.
40
41

42 **(2) Fully Approved Attainment Plan for PM₁₀**

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

45 On November 14, 1991, Utah submitted a SIP for Salt Lake and Utah Counties that demonstrated
46 attainment for Salt Lake and Utah Counties for 10 years, 1993 through 2003. EPA published
47 approval of the SIP on July 8, 1994 (59 FR 35036).
48

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

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

11
12 **(a) Improvement in Air Quality**

13
14 The improvement in air quality with respect to PM₁₀ can be shown in a number of ways.
15 Improvement, in this case, is relative to the various control strategies that affected the airshed.

16
17 For the [Salt Lake County nonattainment area](#), these control measures were implemented as the
18 result of the nonattainment PM₁₀ SIP promulgated in 1991. As discussed below, the actual
19 implementation of the control strategies required therein first exhibits itself in the observable data
20 in 1994. The ambient air quality data presented below includes values prior to 1994 in order to
21 give a representation of the air quality prior to the application of any control measures. It then
22 includes data collected from then until the present time to illustrate the effect of these controls. In
23 considering the data presented below, it is important to keep this distinction in mind: data through
24 1993 represents pre-SIP conditions, and data collected from 1994 through the present represents
25 post-SIP conditions.

26
27 Additionally, a downturn in the economy is clearly not responsible for the improvement in
28 ambient particulate levels in Salt Lake County, Utah County, and Ogden City areas. From 2001
29 to present, the areas have experienced strong growth while at the same time achieving continuous
30 attainment of the 24-hour and annual PM₁₀ NAAQS. Data was analyzed for the Salt Lake City
31 Metropolitan Statistical Area from the US Department of Commerce, Bureau of Economic
32 Analysis. According to this data, job growth from 2011 through 2013 increased by 5.5 percent,
33 population increased by 3 percent, and personal income increased by approximately 10 percent.
34 The estimated VMT increase was 12 percent from 2011 to present.

35
36 Expected Exceedances – Referring back to the discussion of the PM₁₀ NAAQS in Subsection
37 IX.A.10.b(1), it is apparent that the number of expected exceedances of the 24-hour standard is an
38 important indicator. As such, this information has been tabulated for each of the monitors located
39 in each of the nonattainment areas. The data in Table IX.A.10. 3 below reveals a marked decline
40 in the number of these expected exceedances, and therefore that the [Salt Lake County](#) PM₁₀
41 nonattainment area has experienced significant improvements in air quality. The gray cells
42 indicate that the monitor was not in operation. This improvement is especially revealing in light
43 of the significant growth experienced during this same period in time.

1 **Table IX.A.10. 3 Salt Lake County: Expected Exceedances Per-Year, 1985-2014**
 2

Salt Lake County Nonattainment Area					
Monitor:	Cottonwood	AMC	North Salt Lake	Magna	Hawthorne
1986	0.0				
1987	0.0		0.0	2.4	
1988	0.0		5.8	2.2	
1989	0.0	8.7	3.3	0.0	
1990	0.0	0.0	0.0	0.0	
1991	6.0	15.9	13.5	0.0	
1992	0.0	8.6	3.2	0.0	
1993	0.0	0.0	0.0	0.0	
1994	0.0	1.0	8.6	0.0	
1995	0.0	0.0	0.0	0.0	
1996	0.0	0.0	2.3	0.0	
1997	0.0	0.0	0.0	0.0	0.0
1998	0.0	0.0	0.0	0.0	0.0
1999	0.0	0.0	0.0	0.0	0.0
2000	0.0		0.0	0.0	0.0
2001	0.0		0.0	6.4	0.0
2002	0.0		0.0	0.0	0.0
2003	0.0		3.1	1.6	2.1
2004	0.0		1.0	0.0	0.0
2005	0.0		0.0	3.4	0.0
2006	0.0		2.2	0.0	0.0
2007	0.0		4.3	0.0	0.0
2008	3.6		2.1	0.0	2.0
2009	0.0		1.0	0.0	0.0
2010			2.0	3.0	2.1
2011			0.0	0.0	0.0
2012			0.0	0.0	0.0
2013			0.0	0.0	0.0
2014				0.0	0.0

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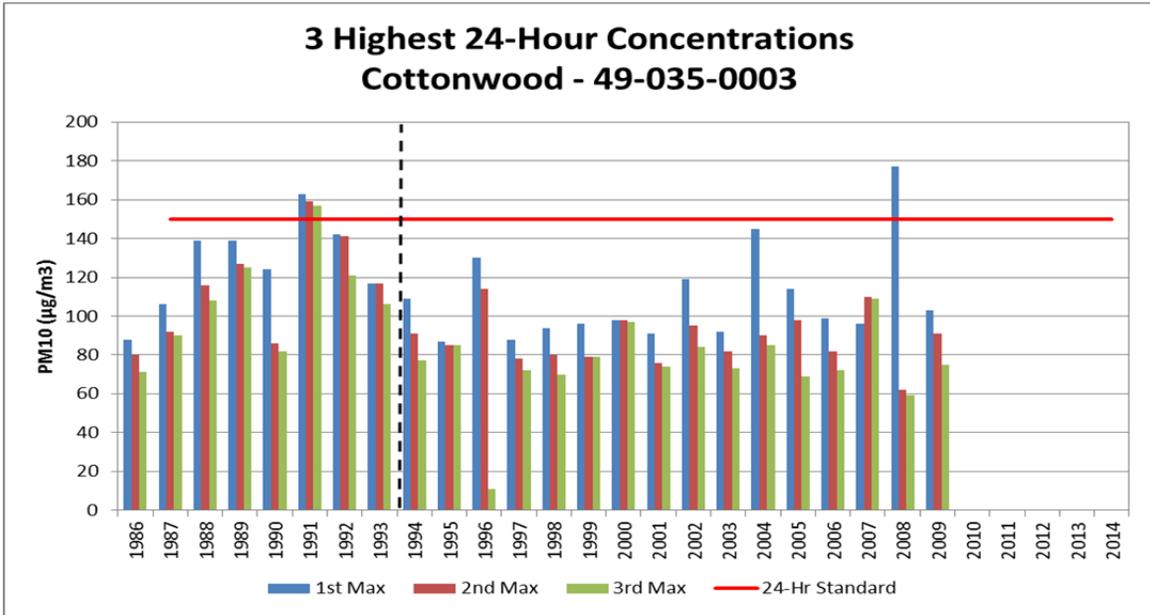
As discussed before in section IX.A.10.b(1), the number of expected exceedances may include data which had been flagged by DAQ as being influenced by an exceptional event; most typically, a wind-blown dust event. Data is flagged when circumstances indicate that it would represent an outlier in the data set and not be indicative of the entire airshed or the efforts to reasonably mitigate air pollution within.

As such, two things should be noted: 1) The focus of the control strategy developed for the 1991 PM₁₀ SIP was directed at episodes characterized by wintertime temperature inversions, elevated concentrations of secondary aerosol, and low wind speed. Under these conditions, blowing dust is generally nonexistent. Therefore, in evaluating the effectiveness of these types of controls, the inclusion of several high wind events may bias the conclusion. 2) Even with the inclusion of these values, the conclusion remains essentially the same; that since 1994 when the 1991 SIP controls were fully implemented, there has been a marked improvement in monitored air quality.

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Highest Values – Also indicative of improvement in air quality with respect to the 24-hour standard, is the magnitude of the excessive concentrations that are observed. This is illustrated in Figures IX.A.10. 2 - 6, which show the three highest 24-hour concentrations observed at each monitor in a particular year.

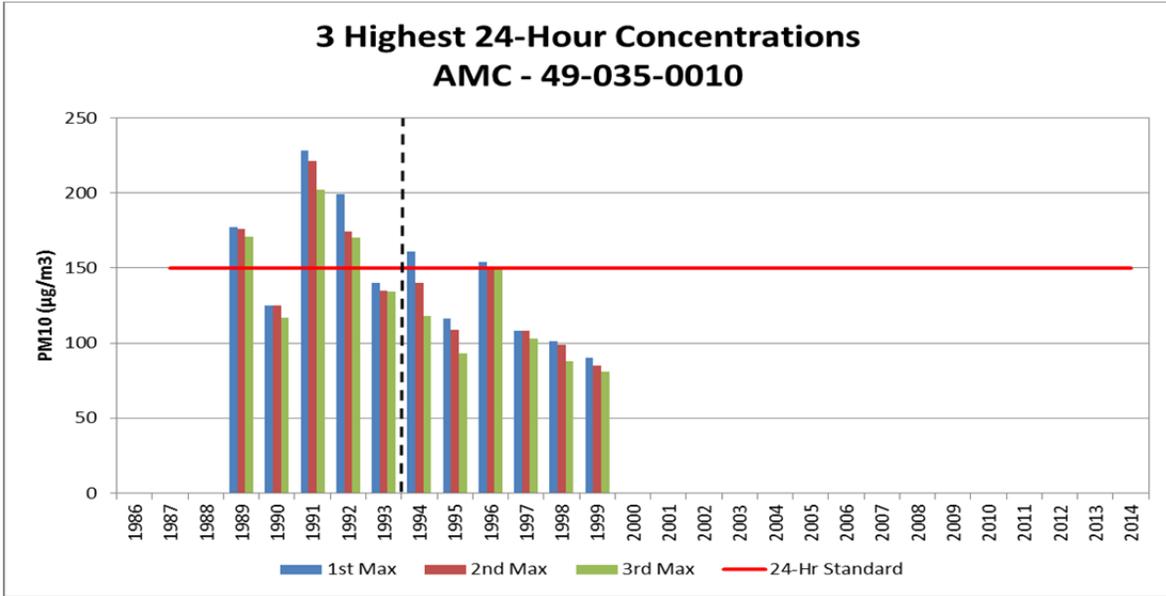
Figure IX.A.10. 2 3 Highest 24-hr PM₁₀ Concentrations; Cottonwood



(Vertical dotted line indicates complete implementation of 1991 SIP control measures.)

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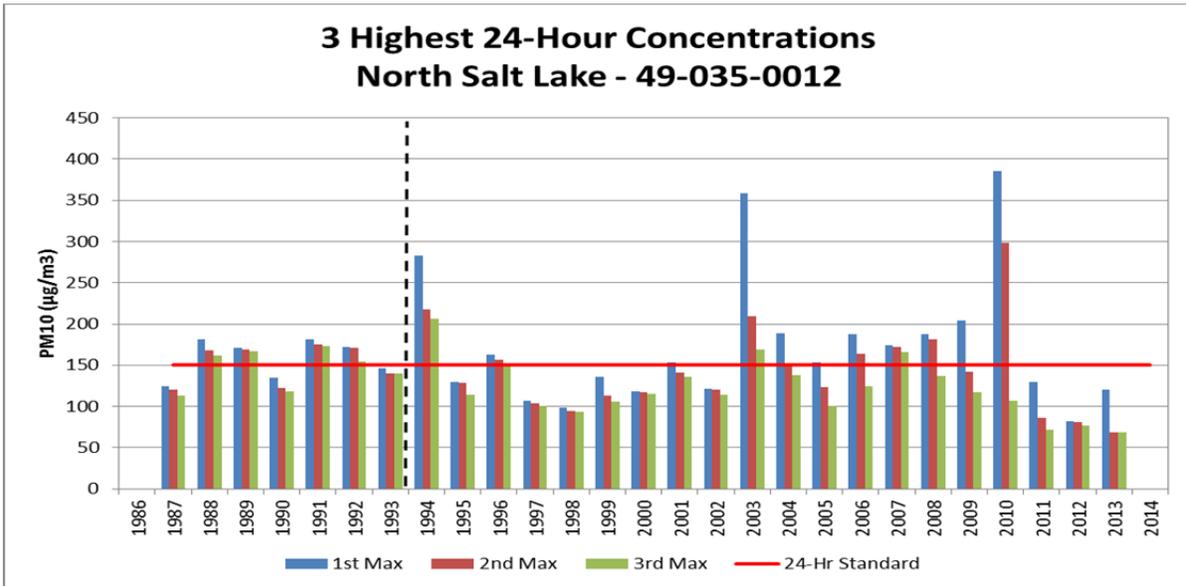
1 **Figure IX.A.10.3 3 Highest 24-hr PM₁₀ Concentrations; AMC**
 2



(Vertical dotted line indicates complete implementation of 1991 SIP control measures.)

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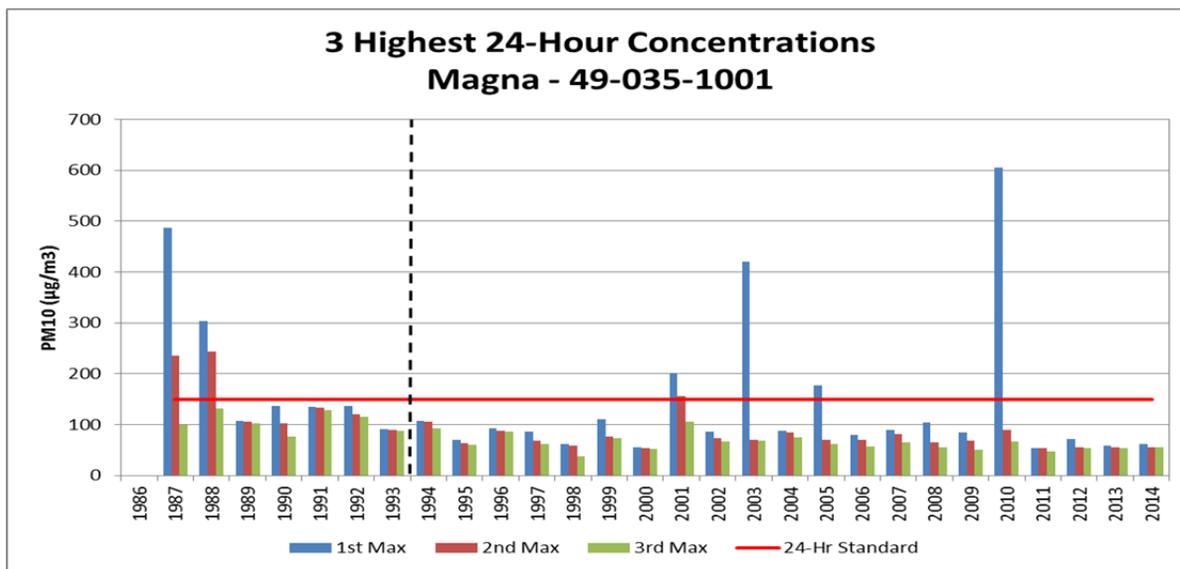
Figure IX.A.10.4 3 Highest 24-hr PM₁₀ Concentrations; North Salt Lake



(Vertical dotted line indicates complete implementation of 1991 SIP control measures.)

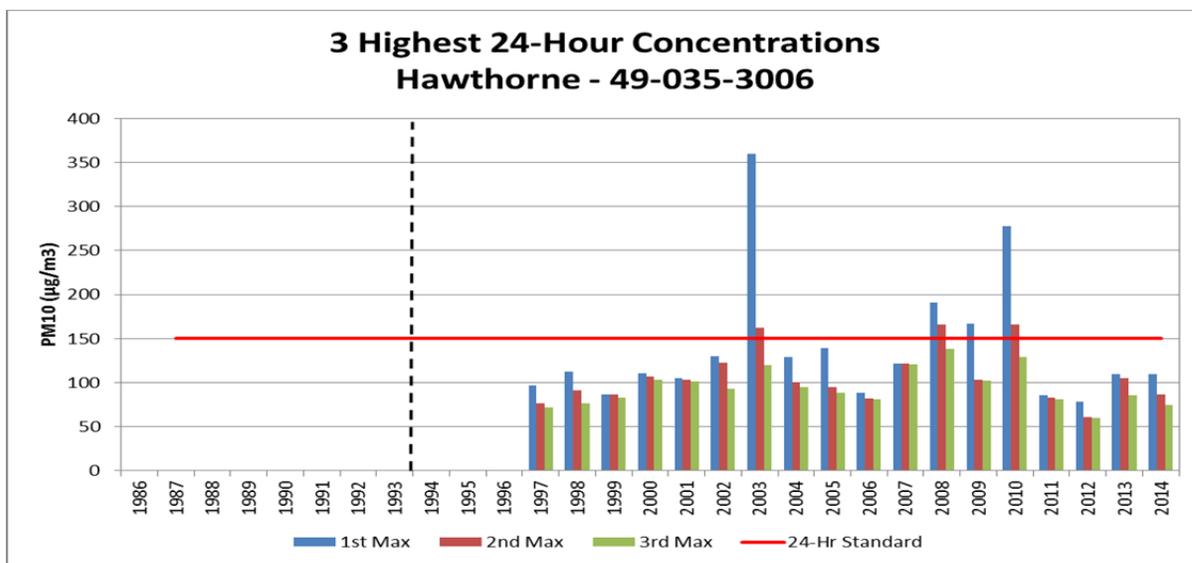
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Figure IX.A.10. 5 3 Highest 24-hr PM₁₀ Concentrations; Magna



(Vertical dotted line indicates complete implementation of 1991 SIP control measures.)

Figure IX.A.10. 6 3 Highest 24-hr PM₁₀ Concentrations; Hawthorne

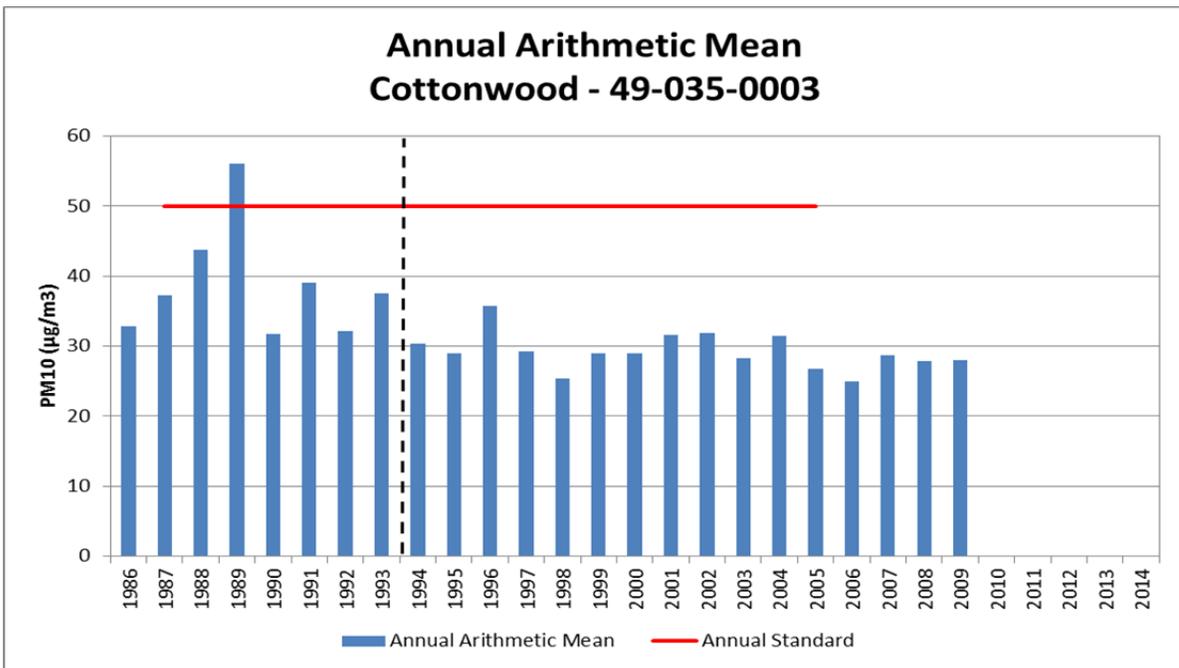


(Vertical dotted line indicates complete implementation of 1991 SIP control measures.)

Again there is a noticeable improvement in the magnitude of these concentrations. It must be kept in mind, however, that some of these concentrations may have resulted from windblown dust events that occur outside of the typical scenario of wintertime air stagnation. As such, the effectiveness of any control measures directed at the precursors to PM₁₀ would not be evident.

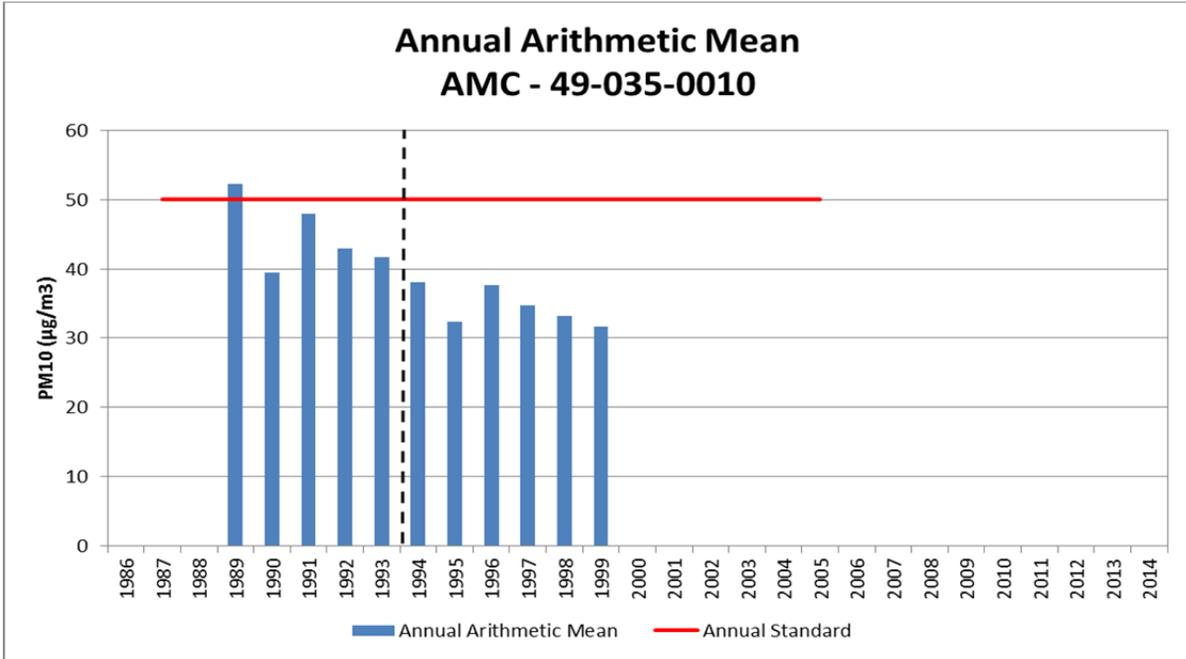
1 Annual Mean – Although there is no longer an annual PM₁₀ standard, the annual arithmetic mean
2 is also a significant parameter to consider. This is especially so given one of the assumptions
3 made in the original nonattainment SIP for **Salt Lake County**. The SIP was developed to address
4 the 24-hour standard for PM₁₀, but it was assumed that by controlling for the wintertime 24-hour
5 standard, the annual arithmetic mean concentrations would also be reduced such that the annual
6 standard would be protected (even though it had never been violated). Annual arithmetic means
7 have been plotted in **Figures IX.A.10 7 - 11**, and the data reveals a noticeable decline in the
8 values of these annual means. This supports the validity of the assumption made in the SIP, and
9 indicates that there have been significant improvements in air quality in the **Salt Lake County**
10 nonattainment area.

11
12
13 **Figure IX.A.10.7 Annual Arithmetic Mean; Cottonwood**



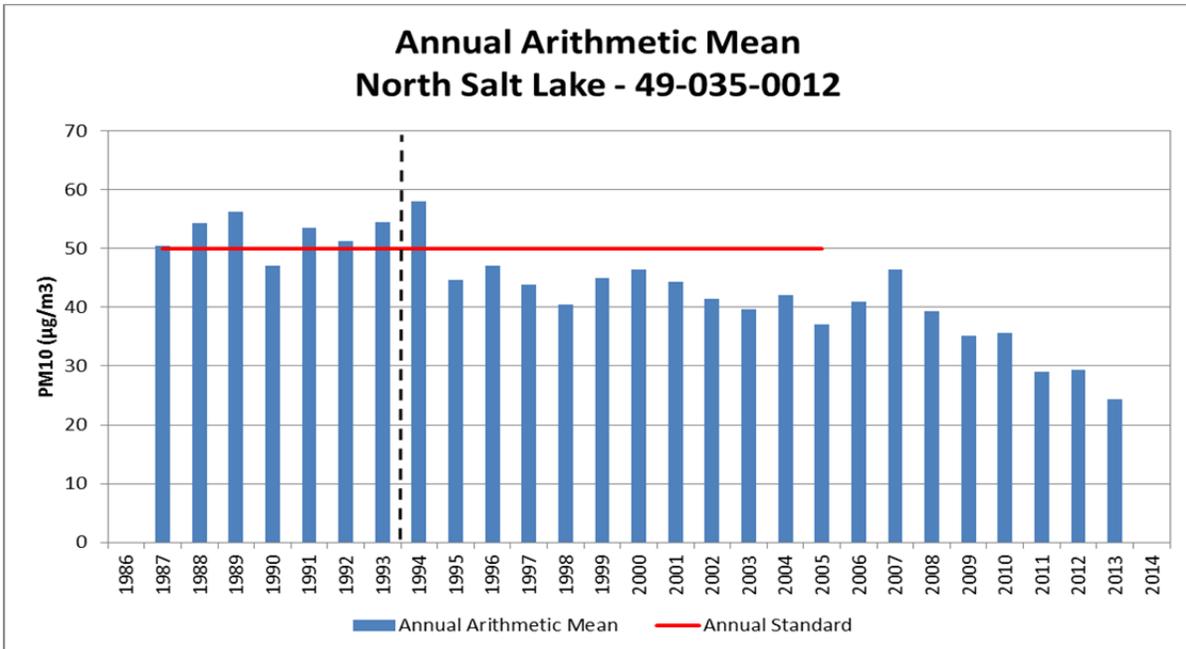
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18 (Vertical dotted line indicates complete implementation of 1991 SIP control measures.)
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1 **Figure IX.A.10.8 Annual Arithmetic Mean; Cottonwood**
2



3 (Vertical dotted line indicates complete implementation of 1991 SIP control measures.)
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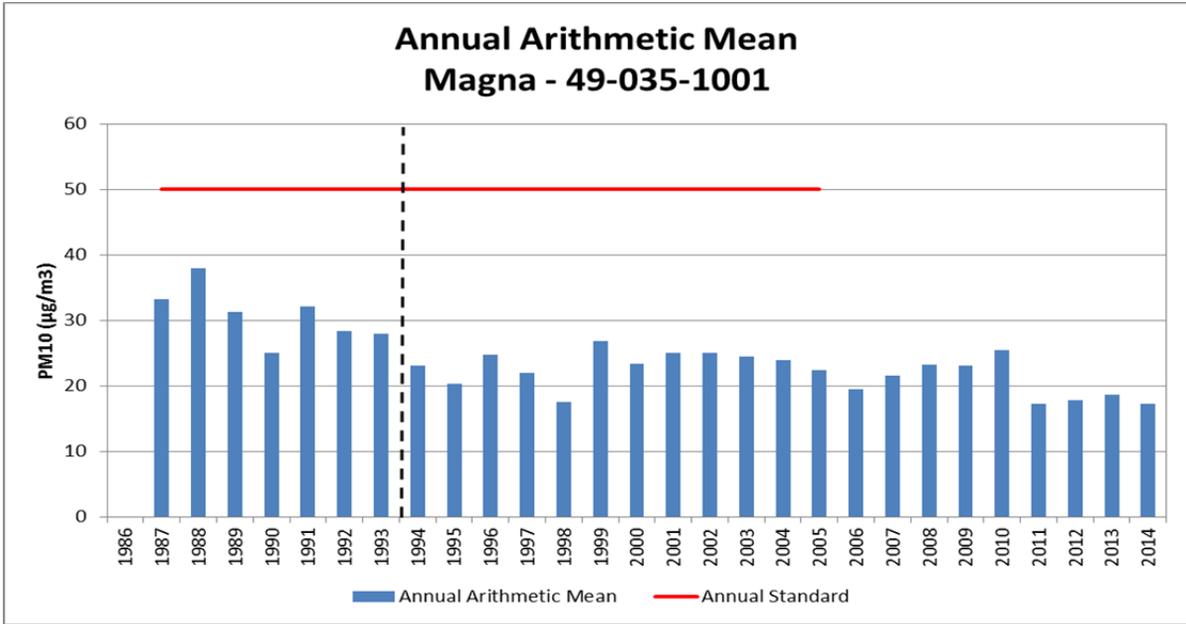
10
11 **Figure IX.A.10.9 Annual Arithmetic Mean; North Salt Lake**
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13



14 (Vertical dotted line indicates complete implementation of 1991 SIP control measures.)
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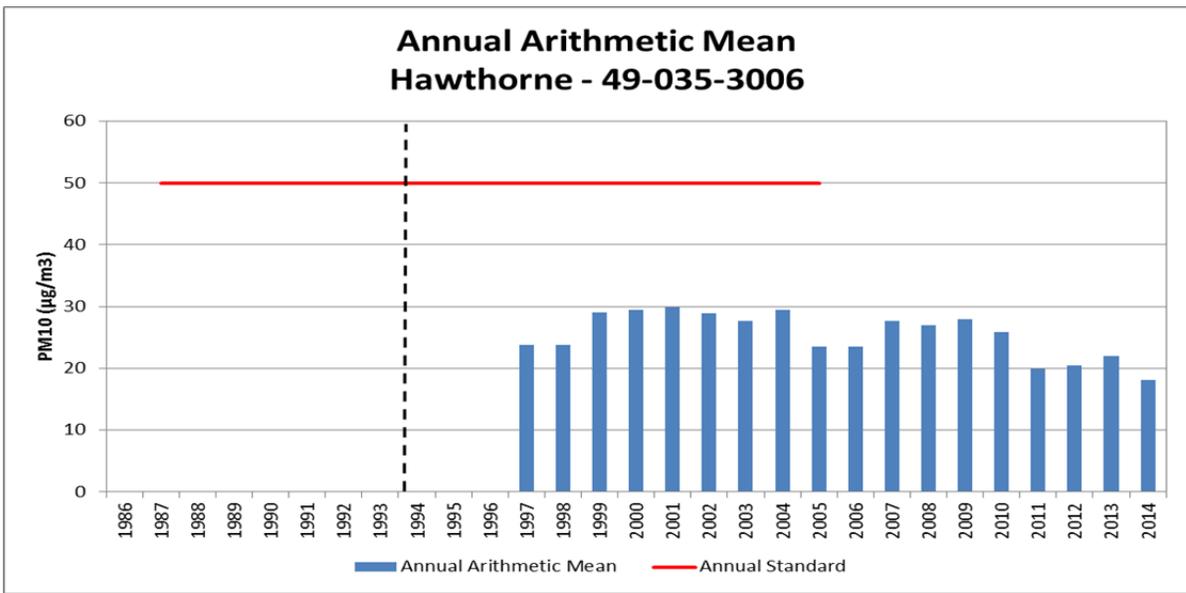
Figure IX.A.10. 10 Annual Arithmetic Mean; Magna



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(Vertical dotted line indicates complete implementation of 1991 SIP control measures.)

Figure IX.A.10. 11 Annual Arithmetic Mean; Hawthorne



14
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16
17
18

(Vertical dotted line indicates complete implementation of 1991 SIP control measures.)

1 As with the number of expected exceedances and the three highest values, the data in Figures
2 [IX.A.10. 7 - 11](#) may include data which had been flagged by DAQ as being influenced by wind-
3 blown dust events. Nevertheless, the annual averaging period tends to make these data points less
4 significant. The downward trend of these annual mean values is truly indicative of improvements
5 in air quality, particularly during the winter inversion season.

6
7
8 **(b) Reduction in Emissions**
9

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

15
16 In [Salt Lake County](#), the design values at each of the representative monitors were measured in
17 1988 or 1989 (see SIP Subsections IX.A.3-5).

18
19 As mentioned before, the ambient air quality data presented in Subsection IX.A.10.b(3)(a) above
20 includes values prior to these dates in order to give a representation of the air quality prior to the
21 application of any control measures. It then includes data collected from then until the present
22 time to illustrate the lasting effect of these controls. In discussing the effect of the controls, as
23 well as the control measures themselves, however, it is important to keep in mind the time
24 necessary for their implementation.

25
26 The nonattainment SIPs for all initial moderate PM₁₀ nonattainment areas included a statutory
27 date for the implementation of reasonably available control measures (RACM), which includes
28 reasonably available control technologies (RACT). This date was December 10, 1993 (Section
29 189(a) CAA). Thus, 1994 marked the first year in which these control measures were reflected in
30 the emissions inventories for [Salt Lake County](#).

31
32 The nonattainment SIP for the [Salt Lake County](#) PM₁₀ nonattainment area included control
33 strategies for stationary sources and area sources (including controls for woodburning, mobile
34 sources, and road salting and sanding) of primary PM₁₀ emissions as well as sulfur oxide (SO_x)
35 and nitrogen oxide (NO_x) emissions, which are secondary sources of particulate emissions. This
36 is discussed in SIP Subsection IX.A.6, and was reflected in the attainment demonstration
37 presented in Subsection [IX.A.5](#).

38
39 The RACM control measures prescribed by the nonattainment SIP and their subsequent
40 implementation by the State were discussed in more detail in a milestone report submitted for the
41 area.

42
43 Section 189(c) of the CAA identifies, as a required plan element, quantitative milestones which
44 are to be achieved every 3 years, and which demonstrate reasonable further progress (RFP)
45 toward attainment of the standard by the applicable date. As defined in CAA Section 171(1), the
46 term *reasonable further progress* has the meaning of such annual incremental reductions in
47 emissions of the relevant air pollutant as are required by Part D of the Act for the purpose of
48 ensuring attainment of the NAAQS by the applicable date.

49
50 Hence, the milestone report must demonstrate that all measures in the approved nonattainment
51 SIP have been implemented and that the milestone has been met. In the case of initial moderate
52 areas for PM₁₀, this first milestone had the meaning of all control measures identified in the plan

1 being sufficient to bring the area into compliance with the NAAQS by the statutory attainment
2 date of December 31, 1994.

3
4 Section 188(d) of the Act allows States to petition the Administrator for up to two one-year
5 extensions of the attainment date, provided that all SIP elements have been implemented and that
6 the ambient data collected in the area during the year preceding the extension year indicates that
7 the area is on-target to attain the NAAQS. Presumably this is because the statutory attainment
8 date for initial moderate PM₁₀ nonattainment areas occurred only one year after the statutory
9 implementation date for RACM, the central control element of all implementation plans for such
10 areas, and because three consecutive years of clean ambient data are needed to determine that an
11 area has attained the standard. Because the milestone report and the request for extension of the
12 attainment date both required a demonstration that all SIP elements had been implemented, as
13 well as a showing of RFP, Utah combined these into a single analysis.

14
15 Utah's actions to meet these requirements and EPA's subsequent review thereof are discussed in
16 a Federal Register notice from Monday, June 18, 2001 (66 FR 32752). In this notice, EPA
17 granted a one-year extension of the attainment date for the Salt Lake County PM₁₀ nonattainment
18 area and determined that the area had attained the PM₁₀ NAAQS by December 31, 1995. The key
19 elements of that FR notice are reiterated below.

20
21 On May 11, 1995, Utah submitted a milestone report as required by sec.189(c)(2). On Sept.29,
22 1995, Utah submitted a revised version of the milestone report. It estimated current emissions
23 from all source categories covered by the SIP and compared those to actual emissions from 1988.
24 Based on information the State submitted in 1995, EPA believes that Utah was in substantial
25 compliance with the requirements and commitments in the SIP for the Salt Lake County PM₁₀
26 nonattainment area. The milestone report indicates that Utah had implemented most of its
27 adopted control measures and had, therefore, substantially implemented the RACM/RACT
28 requirements applicable to moderate PM₁₀ nonattainment areas. It showed that in Salt Lake
29 County, emissions of PM₁₀, SO₂ and NO_x had been reduced by approximately 60,752 tpy (from
30 150,292 down to 89,540). The effect of these emission reductions appears to be reflected in
31 ambient measurements at the monitoring site [and] is evidence that the State's implementation of
32 the PM₁₀ SIP control measures resulted in emission reductions amounting to RFP in the Salt Lake
33 County PM₁₀ nonattainment area.

34
35 This Federal Register notice (66 FR 32752) and the milestone report from September 29, 1995
36 have been included in the TSD.

37
38 Furthermore, since these control measures are incorporated into the Utah SIP, the emission
39 reductions that resulted are consistent with the notion of permanent and enforceable
40 improvements in air quality. Taken together, the trends in ambient air quality illustrated in the
41 preceding paragraph, along with the continued implementation of the nonattainment SIP for the
42 Salt Lake County nonattainment area, provide a reliable indication that these improvements in air
43 quality reflect the application of permanent steps to improve the air quality in the region, rather
44 than just temporary economic or meteorological changes.

45
46
47 **(4) State has Met Requirements of Section 110 and Part D**

48
49 CAA 107(d)(3)(E)(v) - The State containing such area has met all requirements applicable to the
50 area under section 110 and part D. Section 110(a)(2) of the Act deals with the broad scope of
51 state implementation plans and the capacity of the respective state agency to effectively
52 administer such a plan. Sections I through VIII of Utah's SIP contain information relevant to

1 these criteria. Part D deals specifically with plan requirements for nonattainment areas, and
2 includes the requirements for a maintenance plan in Section 175A.

3
4 Utah currently has an approved SIP that meets the requirements of section 110(a)(2) of the Act.
5 Many of these elements have been in place for several decades. In the March 9, 2001 approval of
6 Utah's Ogden City Maintenance Plan for Carbon Monoxide, EPA stated:

7
8 On August 15, 1984, we approved revisions to Utah's SIP as meeting the
9 requirements of section 110(a)(2) of the CAA (see 45 FR 32575). Although
10 section 110 of the CAA was amended in 1990, most of the changes were not
11 substantial. Thus, we have determined that the SIP revisions approved in 1984
12 continue to satisfy the requirements of section 110(a)(2). For further detail, see
13 45 FR 32575 dated August 15, 1984 (Volume 49, No. 159) or 66 FR 14079 dated
14 March 9, 2001 (Volume 66, No. 47.)
15

16 Part D of the Act addresses "Plan Requirements for Nonattainment Areas." Subpart 1 of Part D
17 includes the general requirements that apply to all areas designated nonattainment based on a
18 violation of the NAAQS. Section 172(c) of this subpart contains a list of generally required
19 elements for all nonattainment plans. Subpart 1 is followed by a series of subparts (2-5) specific
20 to various criteria pollutants. Subpart 4 contains the provisions specific to PM₁₀ nonattainment
21 areas. The general requirements for nonattainment plans in Section 172(c) may be subsumed
22 within or superseded by the more specific requirements of Subpart 4, but each element must be
23 addressed in the respective nonattainment plan.
24

25 One of the pre-conditions for a maintenance plan is a fully approved (non)attainment plan for the
26 area. This is also discussed in section IX.A.10.b(2).
27

28 Other Part D requirements that are applicable in nonattainment and maintenance areas include the
29 general and transportation conformity provisions of Section 176(c) of the Act. These provisions
30 ensure that federally funded or approved projects and actions conform to the PM₁₀ SIPs and
31 Maintenance Plans prior to the projects or actions being implemented. The State has already
32 submitted to EPA a SIP revision implementing the requirement of Section 176(c).
33

34 For [Salt Lake County](#), the Part D requirements for PM₁₀ were addressed in an attainment SIP
35 approved by EPA on [July 8, 1994 \(59 FR 35036\)](#).
36
37

38 **(5) Maintenance Plan for PM₁₀ Areas**

39

40 As stated in the Act, an area may not request redesignation to attainment without first submitting,
41 and then receiving EPA approval of, a maintenance plan. The plan is basically a quantitative
42 showing that the area will continue to attain the NAAQS for an additional 10 years (from EPA
43 approval), accompanied by sufficient assurance that the terms of the numeric demonstration will
44 be administered by the State and by the EPA in an oversight capacity. The maintenance plan is
45 the central criterion for redesignation. It is contained in the following subsection.
46

47 **IX.A.10.c Maintenance Plan**

48 *CAA 107(d)(3)(E)(iv) - The Administrator has fully approved a maintenance plan for the area as*
49 *meeting the requirements of section 175A. An approved maintenance plan is one of several*

1 criteria necessary for area redesignation as outlined in Section 107(d)(3)(E) of the Act. The
 2 maintenance plan itself, as described in Section 175A of the Act and further addressed in EPA
 3 guidance (Procedures for Processing Requests to Redesignate Areas to Attainment, John Calcagni
 4 to Regional Air Directors, September 4, 1992; or for the purpose of this document, simply
 5 “Calcagni”), has its own list of required elements. The following table is presented to summarize
 6 these requirements. Each will then be addressed in turn.

Table IX.A.10. 4 Requirements of a Maintenance Plan in the Clean Air Act (CAA)			
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: Sec 175A(a)	IX.A.10.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: Sec 175A(b)	IX.A.10.c(8)
Continued Implementation of Nonattainment Area Control Strategy	The Clean Air Act requires 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.	CAA: Sec 175A(c), CAA Sec 110(l), Calcagni memo	IX.A.10.c(7)
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.10.c(10)
Verification of Continued Maintenance	The maintenance plan must indicate how the State will track the progress of the maintenance plan.	Calcagni memo	IX.A.10.c(9)

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(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 (Calcagni) as one of the core provisions that should be considered by states for inclusion in a maintenance plan.

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

1
2 **(a) Introduction**

3
4 The following chapter presents an analysis using observational datasets to detail the chemical
5 regimes of Utah's Nonattainment areas.

6
7 Prior to the development of this PM₁₀ maintenance plan, UDAQ conducted a technical analysis to
8 support the development of Utah's 24-hr State Implementation Plan for PM_{2.5}. That analysis
9 included preparation of emissions inventories and meteorological data, and the evaluation and
10 application of a regional photochemical model.

11
12 Outside of the springtime high wind events and wildfires, the Wasatch Front experiences high 24-
13 hr PM₁₀ concentrations under stable conditions during the wintertime (e.g., temperature
14 inversion). These are the same episodes where the Wasatch Front sees its highest concentrations
15 of 24-hr PM_{2.5} that sometimes exceed the 24-hr PM_{2.5} NAAQS. Most (60% to 90%) of the PM₁₀
16 observed during high wintertime pollution days consists of PM_{2.5}. The dominant species of the
17 wintertime PM₁₀ is secondarily formed particulate nitrate, which is also the dominant species of
18 PM_{2.5}.

19
20 Given these similarities, the PM_{2.5} modeling analysis was utilized as the foundation for this PM₁₀
21 Maintenance Plan.

22
23 The CMAQ model performance for the PM₁₀ Maintenance Plan adds to the detailed model
24 performance that was part of the UDAQ's previous PM_{2.5} SIP process. Utah DAQ used the same
25 modeling episode that was used in the PM_{2.5} SIP, which is the 45-day modeling episode from the
26 winter of 2009-2010. The modeled meteorology datasets from the Weather Research and
27 Forecasting (WRF) model for the PM₁₀ Plan are the same datasets used for the PM_{2.5} SIP. Also,
28 the CMAQ version (4.7.1) and CMAQ model setup (i.e., vertical advection module turned off)
29 for the PM₁₀ modeling matches the PM_{2.5} SIP setup.

30
31 For this reason, much of the information presented below pertains specifically to the PM_{2.5}
32 evaluation. This is supplemented with information pertaining to PM₁₀, most notably with respect
33 to the PM₁₀ model performance evaluation.

34
35 The additional PM₁₀ analysis is also presented in the Technical Support Document.

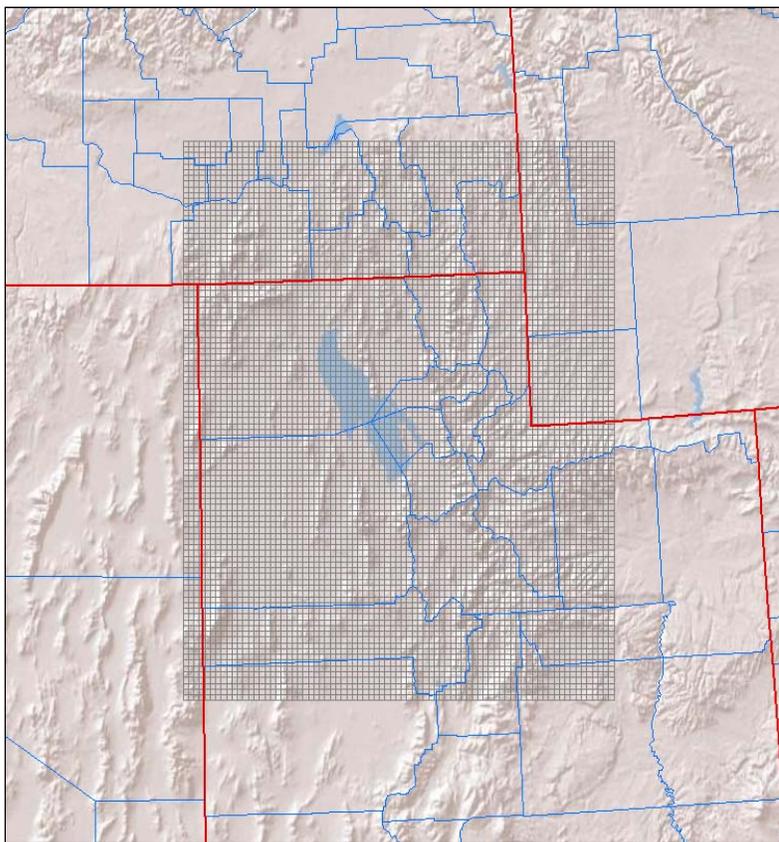
36
37 **(b) Photochemical Modeling**

38
39 Photochemical models are relied upon by federal and state regulatory agencies to support their
40 planning efforts. Used properly, models can assist policy makers in deciding which control
41 programs are most effective in improving air quality, and meeting specific goals and objectives.
42 The air quality analyses were conducted with the Community Multiscale Air Quality (CMAQ)
43 Model version 4.7.1, with emissions and meteorology inputs generated using SMOKE and WRF,
44 respectively. CMAQ was selected because it is the open source atmospheric chemistry model co-
45 sponsored by EPA and the National Oceanic Atmospheric Administration (NOAA), and thus
46 approved by EPA for this plan.

47
48 **(c) Domain/Grid Resolution**

49
50 UDAQ selected a high resolution 4-km modeling domain to cover all of northern Utah including
51 the portion of southern Idaho extending north of Franklin County and west to the Nevada border
52 (Figure IX.A.10. 12). This 97 x 79 horizontal grid cell domain was selected to ensure that all of

1 the major emissions sources that have the potential to impact the nonattainment areas were
2 included. The vertical resolution in the air quality model consists of 17 layers extending up to 15
3 km, with higher resolution in the boundary layer.
4



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Figure IX.A.10. 12 Northern Utah photochemical modeling domain.

10 **(d) Episode Selection**

11
12 According to EPA's April 2007 "Guidance on the Use of Models and Other Analyses for
13 Demonstrating Attainment of Air Quality Goals for Ozone, PM_{2.5}, and Regional Haze," the
14 selection of SIP episodes for modeling should consider the following 4 criteria:

- 15
16 1. Select episodes that represent a variety of meteorological conditions that lead to elevated
17 PM_{2.5}.
18
19 2. Select episodes during which observed concentrations are close to the baseline design
20 value.
21
22 3. Select episodes that have extensive air quality data bases.
23
24 4. Select enough episodes such that the model attainment test is based on multiple days at
25 each monitor violating NAAQS.
26

27 In general, UDAQ wanted to select episodes with hourly PM_{2.5} concentrations that are reflective
28 of conditions that lead to 24-hour NAAQS exceedances. From a synoptic meteorology point of

1 view, each selected episode features a similar pattern. The typical pattern includes a deep trough
2 over the eastern United States with a building and eastward moving ridge over the western United
3 States. The episodes typically begin as the ridge begins to build eastward, near surface winds
4 weaken, and rapid stabilization due to warm advection and subsidence dominate. As the ridge
5 centers over Utah and subsidence peaks, the atmosphere becomes extremely stable and a
6 subsidence inversion descends towards the surface. During this time, weak insolation, light
7 winds, and cold temperatures promote the development of a persistent cold air pool. Not until the
8 ridge moves eastward or breaks down from north to south is there enough mixing in the
9 atmosphere to completely erode the persistent cold air pool.

10
11 From the most recent 5-year period of 2007-2011, UDAQ developed a long list of candidate
12 PM_{2.5} wintertime episodes. Three episodes were selected. An episode was selected from January
13 2007, an episode from February 2008, and an episode during the winter of 2009-2010 that
14 features multi-event episodes of PM_{2.5} buildup and washout.

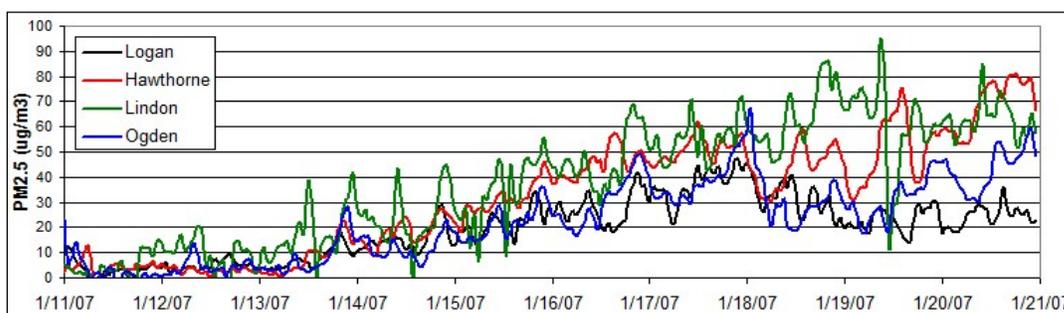
15
16 As noted in the introduction, these episodes were also ideal from the standpoint of characterizing
17 PM₁₀ buildup and formation.

18
19 Further detail of the episodes is below:

20
21 • **Episode 1: January 11-20, 2007**

22
23 A cold front passed through Utah during the early portion of the episode and brought very cold
24 temperatures and several inches of fresh snow to the Wasatch Front. The trough was quickly
25 followed by a ridge that built north into British Columbia and began expanding east into Utah.
26 This ridge did not fully center itself over Utah, but the associated light winds, cold temperatures,
27 fresh snow, and subsidence inversion produced very stagnant conditions along the Wasatch Front.
28 High temperatures in Salt Lake City throughout the episode were in the high teens to mid-20's
29 Fahrenheit.

30
31 Figure IX.A.10. 13 shows hourly PM_{2.5} concentrations from Utah's 4 PM_{2.5} monitors for January
32 11-20, 2007. The first 6 to 8 days of this episode are suited for modeling. The episode becomes
33 less suited after January 18 because of the complexities in the meteorological conditions leading
34 to temporary PM_{2.5} reductions.



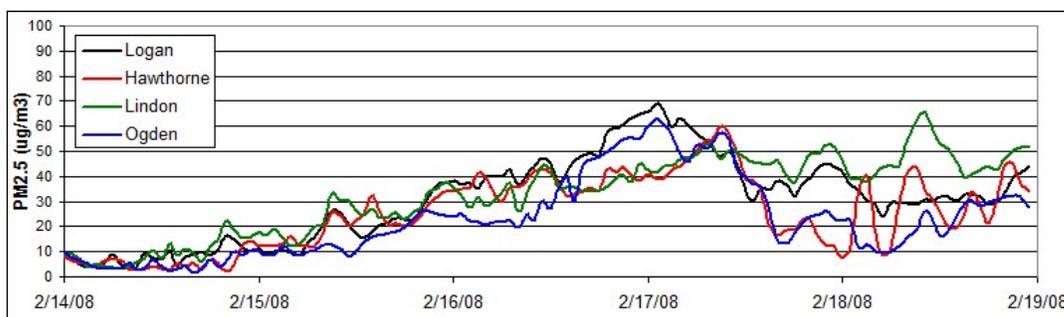
36
37
38 **Figure IX.A.10. 13 Hourly PM_{2.5} concentrations for January 11-20, 2007**

39
40
41 • **Episode 2: February 14-18, 2008**

42
43 The February 2008 episode features a cold front passage at the start of the episode that brought
44 significant new snow to the Wasatch Front. A ridge began building eastward from the Pacific

1 Coast and centered itself over Utah on Feb 20th. During this time a subsidence inversion lowered
 2 significantly from February 16 to February 19. Temperatures during this episode were mild with
 3 high temperatures at SLC in the upper 30's and lower 40's Fahrenheit.
 4

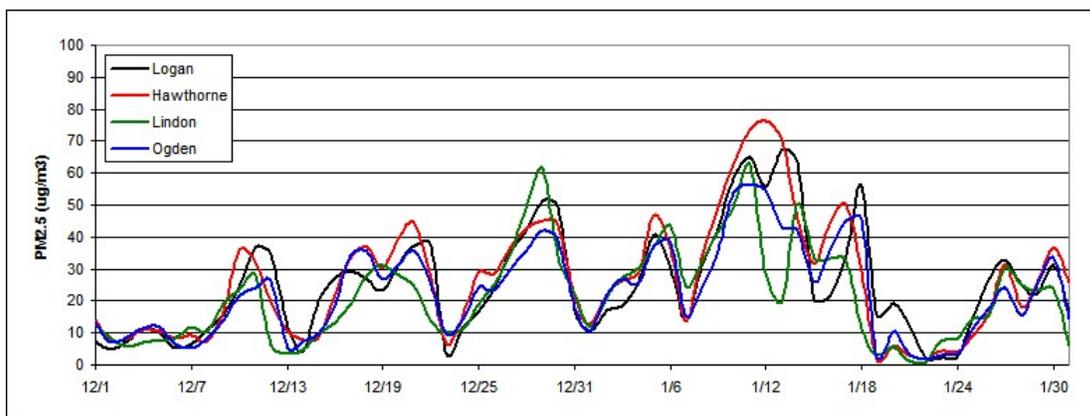
5 The 24-hour average PM_{2.5} exceedances observed during the proposed modeling period of
 6 February 14-19, 2008 were not exceptionally high. What makes this episode a good candidate for
 7 modeling are the high hourly values and smooth concentration build-up. The first 24-hour
 8 exceedances occurred on February 16 and were followed by a rapid increase in PM_{2.5} through the
 9 first half of February 17 (Figure IX.A.10. 14). During the second half of February 17, a subtle
 10 meteorological feature produced a mid-morning partial mix-out of particulate matter and forced
 11 24-hour averages to fall. After February 18, the atmosphere began to stabilize again and resulted
 12 in even higher PM_{2.5} concentrations during February 20, 21, and 22. Modeling the 14th through
 13 the 19th of this episode should successfully capture these dynamics. The smooth gradual build-up
 14 of hourly PM_{2.5} is ideal for modeling.
 15



16
 17
 18 **Figure IX.A.10. 14 Hourly PM_{2.5} concentrations for February 14-19, 2008**
 19
 20

21 **• Episode 3: December 13, 2009 – January 18, 2010**
 22

23 The third episode that was selected is more similar to a “season” than a single PM_{2.5} episode
 24 (Figure IX.A.10. 15). During the winter of 2009 and 2010, Utah was dominated by a semi-
 25 permanent ridge of high pressure that prevented strong storms from crossing Utah. This 35 day
 26 period was characterized by 4 to 5 individual PM_{2.5} episodes each followed by a partial PM_{2.5} mix
 27 out when a weak weather system passed through the ridge. The long length of the episode and
 28 repetitive PM_{2.5} build-up and mix-out cycles makes it ideal for evaluating model strengths and
 29 weaknesses and PM_{2.5} control strategies.
 30



31
 32

1 **Figure IX.A.10. 15 24-hour average PM_{2.5} concentrations for December-January, 2009-10**

2
3
4 **(e) Meteorological Data**

5
6 Meteorological inputs were derived using the Advanced Research WRF (WRF-ARW) model
7 version 3.2. WRF contains separate modules to compute different physical processes such as
8 surface energy budgets and soil interactions, turbulence, cloud microphysics, and atmospheric
9 radiation. Within WRF, the user has many options for selecting the different schemes for each
10 type of physical process. There is also a WRF Preprocessing System (WPS) that generates the
11 initial and boundary conditions used by WRF, based on topographic datasets, land use
12 information, and larger-scale atmospheric and oceanic models.

13
14 Model performance of WRF was assessed against observations at sites maintained by the Utah
15 Air Monitoring Center. A summary of the performance evaluation results for WRF are presented
16 below:

- 17
18 • The biggest issue with meteorological performance is the existence of a warm bias in
19 surface temperatures during high PM_{2.5} episodes. This warm bias is a common trait of
20 WRF modeling during Utah wintertime inversions.
- 21
22 • WRF does a good job of replicating the light wind speeds (< 5 mph) that occur during
23 high PM_{2.5} episodes.
- 24
25 • WRF is able to simulate the diurnal wind flows common during high PM_{2.5} episodes.
26 WRF captures the overnight downslope and daytime upslope wind flow that occurs in
27 Utah valley basins.
- 28
29 • WRF has reasonable ability to replicate the vertical temperature structure of the
30 boundary layer (i.e., the temperature inversion), although it is difficult for WRF to
31 reproduce the inversion when the inversion is shallow and strong (i.e., an 8 degree
32 temperature increase over 100 vertical meters).
- 33

34
35 **(f) Photochemical Model Performance Evaluation**

36
37 PM_{2.5} Results

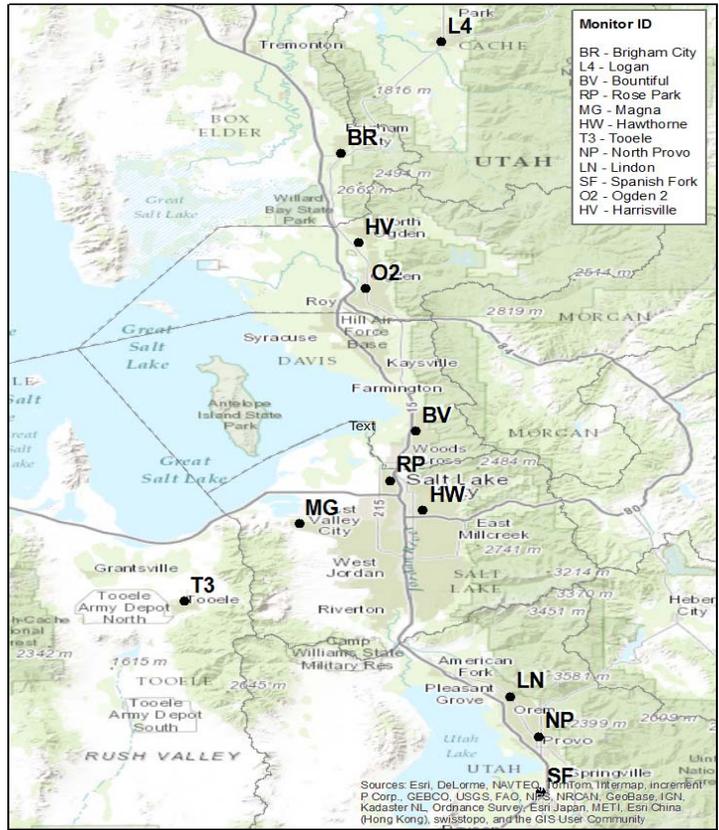
38
39 The model performance evaluation focused on the magnitude, spatial pattern, and temporal
40 variation of modeled and measured concentrations. This exercise was intended to assess whether,
41 and to what degree, confidence in the model is warranted (and to assess whether model
42 improvements are necessary).

43
44 CMAQ model performance was assessed with observed air quality datasets at UDAQ-maintained
45 air monitoring sites (Figure IX.A.10. 16). Measurements of observed PM_{2.5} concentrations along
46 with gaseous precursors of secondary particulate (e.g., NO_x, ozone) and carbon monoxide are
47 made throughout winter at most of the locations in the figure . PM_{2.5} speciation performance was
48 assessed using the three Speciation Monitoring Network Sites (STN) located at the Hawthorne
49 site in Salt Lake City, the Bountiful site in Davis County, and the Lindon site in Utah County.

50
51 PM₁₀ data is also collected at Logan, Bountiful, Ogden2, Magna, Hawthorne, North Provo, and
52 Lindon.

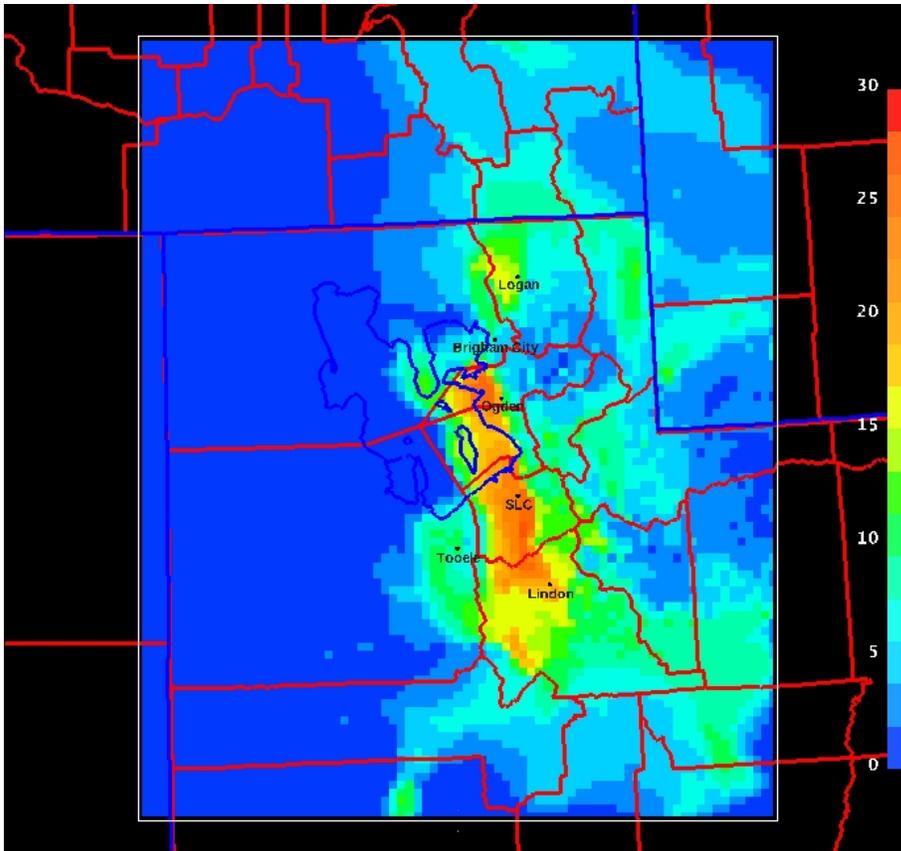
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PM₁₀ filters were collected at Bountiful, Hawthorne and Lindon, and analyzed with the goal comparing CMAQ modeled speciation to the collected PM₁₀ filters. While analyzing the PM₁₀ filters, most of the secondarily chemically formed particulate nitrate had been volatilized, and thus could not be accounted for. This is most likely due to the age of the filters, which were collected over five years ago. Thus, a robust comparison of CMAQ modeled PM₁₀ speciation to PM₁₀ filter speciation could not be made for this modeling period.



9
10 **Figure IX.A.10.16 UDAQ monitoring network.**

1 A spatial plot is provided for modeled 24-hr PM_{2.5} for 2010 January 03 in Figure IX.A.10. 17.
2 The spatial plot shows the model does a reasonable job reproducing the high PM_{2.5} values, and
3 keeping those high values confined in the valley locations where emissions occur.
4
5



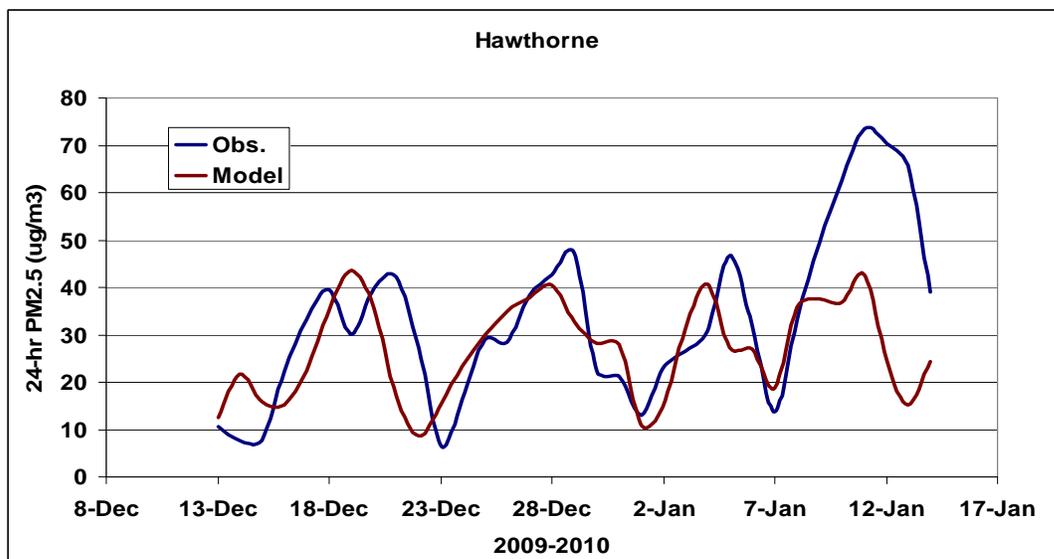
6
7 **Figure IX.A.10. 17 Spatial plot of CMAQ modeled 24-hr PM_{2.5} (µg/m³) for 2010 Jan. 03.**
8

9 Time series of 24-hr PM_{2.5} concentrations for the 13 Dec. 2009 – 15 Jan. 2010 modeling period
10 are shown in Figs. IX.A.10. 18 - 21 at the Hawthorne site in Salt Lake City, the Ogden site in
11 Weber County, the Lindon site in Utah County, and the Logan site in Cache County. For the
12 most part, CMAQ replicates the buildup and washout of each individual episode. While CMAQ
13 builds 24-hr PM_{2.5} concentrations during the 08 Jan. – 14 Jan. 2010 episode, it was not able to
14 produce the > 60 µg/m³ concentrations observed at the monitoring locations.
15

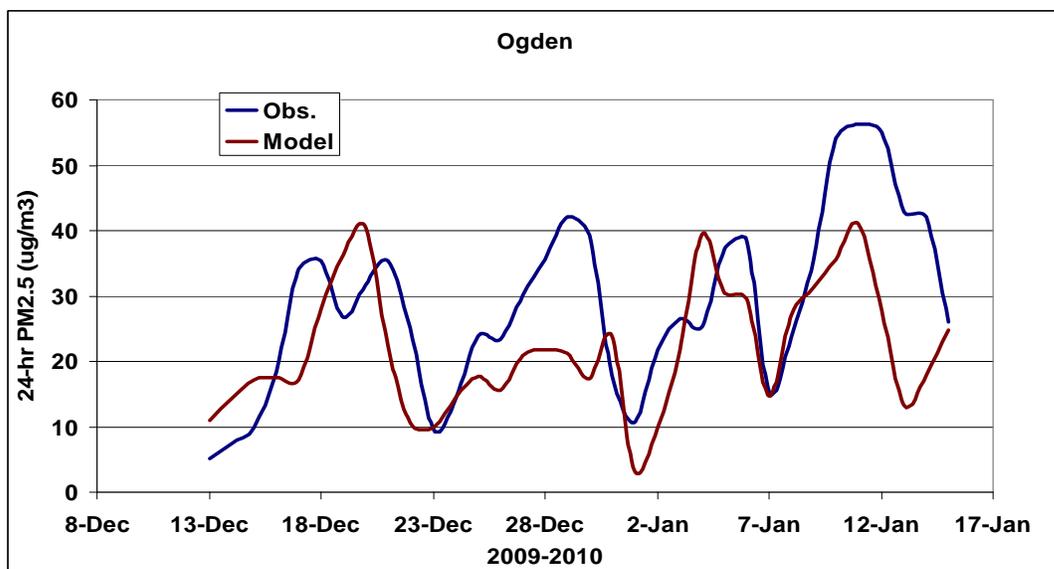
16 It is often seen that CMAQ “washes” out the PM_{2.5} episode a day or two earlier than that seen in
17 the observations. For example, on the day 21 Dec. 2009, the concentration of PM_{2.5} continues to
18 build while CMAQ has already cleaned the valley basins of high PM_{2.5} concentrations. At these
19 times, the observed cold pool that holds the PM_{2.5} is often very shallow and winds just above this
20 cold pool are southerly and strong before the approaching cold front. This situation is very
21 difficult for a meteorological and photochemical model to reproduce. An example of this
22 situation is shown in Fig. IX.A.10. 22, where the lowest part of the Salt Lake Valley is still under
23 a very shallow stable cold pool, yet higher elevations of the valley have already been cleared of
24 the high PM_{2.5} concentrations.
25

26 During the 24 – 30 Dec. 2009 episode, a weak meteorological disturbance brushes through the
27 northernmost portion of Utah. It is noticeable in the observations at the Ogden monitor on 25
28 Dec. as PM_{2.5} concentrations drop on this day before resuming an increase through Dec. 30. The

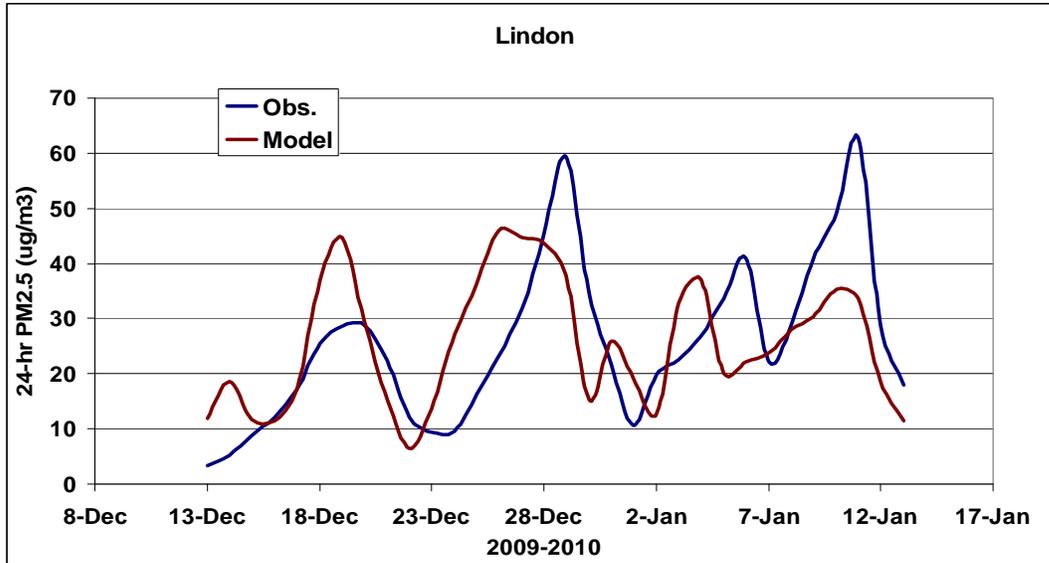
1 meteorological model and thus CMAQ correctly pick up this disturbance, but completely clears
 2 out the building $PM_{2.5}$; and thus performance suffers at the most northern Utah monitors (e.g.
 3 Ogden, Logan). The monitors to the south (Hawthorne, Lindon) are not influence by this
 4 disturbance and building of $PM_{2.5}$ is replicated by CMAQ. This highlights another challenge of
 5 modeling $PM_{2.5}$ episodes in Utah. Often during cold pool events, weak disturbances will pass
 6 through Utah that will de-stabilize the valley inversion and cause a partial clear out of $PM_{2.5}$.
 7 However, the $PM_{2.5}$ is not completely cleared out, and after the disturbance exits, the valley
 8 inversion strengthens and the $PM_{2.5}$ concentrations continue to build. Typically, CMAQ
 9 completely mixes out the valley inversion during these weak disturbances.
 10



11
 12 **Figure IX.A.10.18 24-hr $PM_{2.5}$ time series (Hawthorne). Observed 24-hr $PM_{2.5}$**
 13 **(blue trace) and CMAQ modeled 24-hr $PM_{2.5}$ (red trace).**
 14
 15

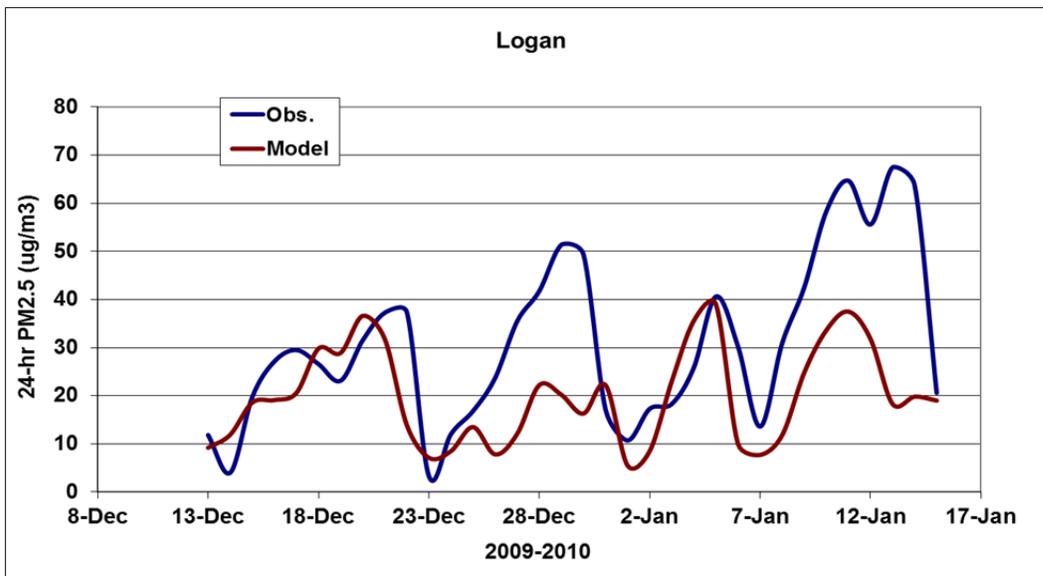


16
 17 **Figure IX.A.10.19 24-hr $PM_{2.5}$ time series (Ogden). Observed 24-hr $PM_{2.5}$**
 18 **(blue trace) and CMAQ modeled 24-hr $PM_{2.5}$ (red trace).**
 19



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Figure IX.A.10. 20 24-hr PM_{2.5} time series (Lindon). Observed 24-hr PM_{2.5} (blue trace) and CMAQ modeled 24-hr PM_{2.5} (red trace).



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Figure IX.A.10. 21 24-hr PM_{2.5} time series (Logan). Observed 24-hr PM_{2.5} (blue trace) and CMAQ modeled 24-hr PM_{2.5} (red trace).



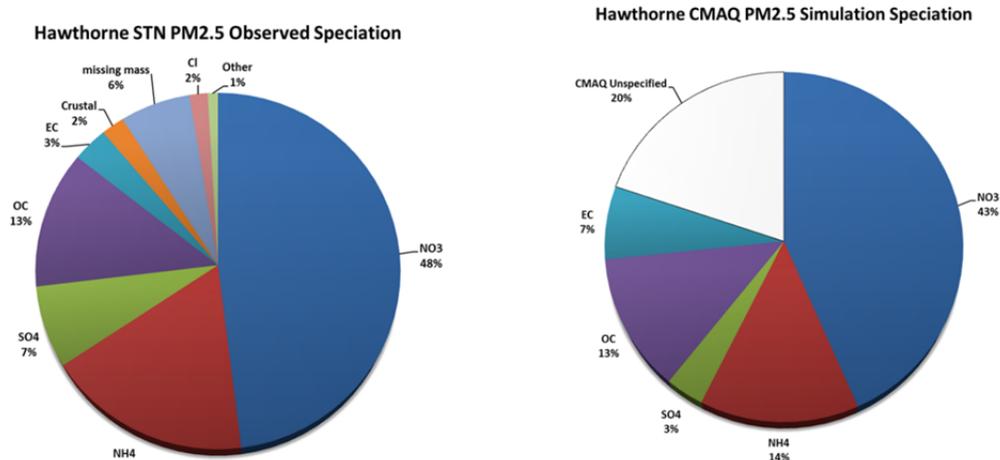
1
2 **Figure IX.A.10. 22 An example of the Salt Lake Valley at the end of a high PM_{2.5} episode.**
3 **The lowest elevations of the Salt Lake Valley are still experiencing an inversion and**
4 **elevated PM_{2.5} concentrations while the PM_{2.5} has been ‘cleared out’ throughout the rest of**
5 **the valley. These ‘end of episode’ clear out periods are difficult to replicate in the**
6 **photochemical model.**

7
8 Generally, the performance of CMAQ to replicate the buildup and clear out of PM_{2.5} is good.
9 However, it is important to verify that CMAQ is replicating the components of PM_{2.5}
10 concentrations. PM_{2.5} simulated and observed speciation is shown at the 3 STN sites in Figures
11 IX.A.10. 23 -25. The observed speciation is constructed using days in which the STN filter 24-hr
12 PM_{2.5} concentration was > 35 µg/m³. For the 2009-2010 modeling period, the observed
13 speciation pie charts were created using 8 filter days at Hawthorne, 6 days at Lindon, and 4 days
14 at Bountiful.

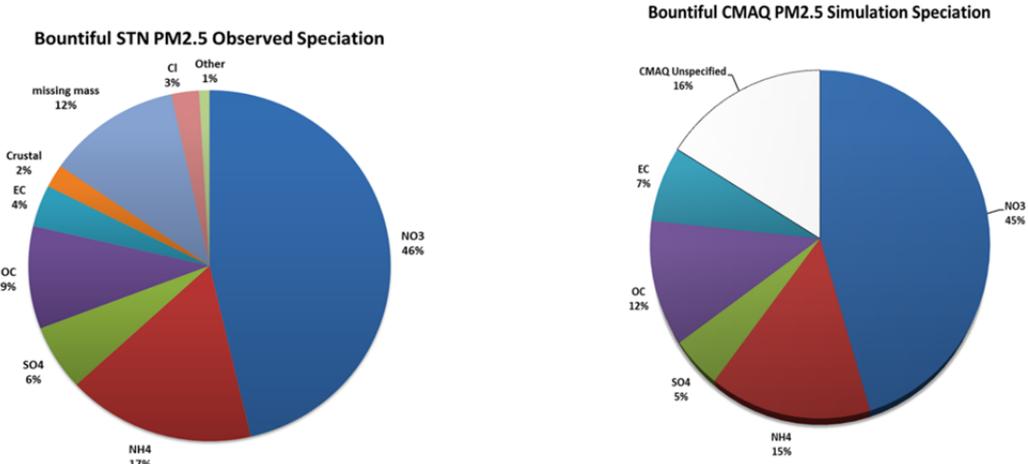
15
16 The simulated speciation is constructed using modeling days that produced 24-hr PM_{2.5}
17 concentrations > 35 µg/m³. Using this criterion, the simulated speciation pie chart is created from
18 18 modeling days for Hawthorne, 14 days at Lindon, and 14 days at Bountiful.
19 At all 3 STN sites, the percentage of simulated nitrate is greater than 40%, while the simulated
20 ammonium percentage is at ~15%. This indicates that the model is able to replicate the
21 secondarily formed particulates that typically make up the majority of the measured PM_{2.5} on the
22 STN filters during wintertime pollution events.

23
24 The percentage of model simulated organic carbon is ~13% at all STN sites, which is in
25 agreement with the observed speciation of organic carbon at Hawthorne and slightly
26 overestimated (by ~3%) at Lindon and Bountiful.

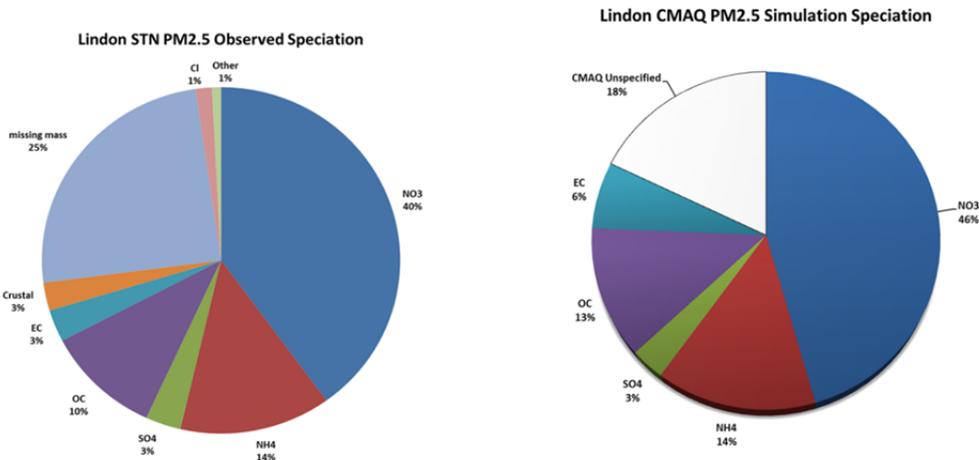
27
28 There is no STN site in the Logan nonattainment area, and very little speciation information
29 available in the Cache Valley. Figure IX.A.10. 26 shows the model simulated speciation at
30 Logan. Ammonium (17%) and nitrate (56%) make up a higher percentage of the simulated PM_{2.5}
31 at Logan when compared to sites along the Wasatch Front.



1
2 **Figure IX.A.10. 23** The composition of observed and model simulated average 24-hr PM_{2.5}
3 speciation averaged over days when an observed and modeled day had 24-hr concentrations
4 > 35 µg/m³ at the Hawthorne STN site.
5

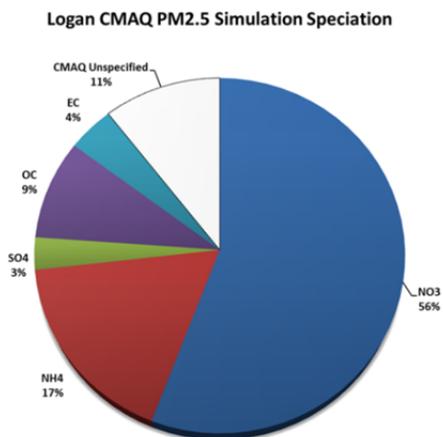


6
7 **Figure IX.A.10. 24** The composition of observed and model simulated average 24-hr PM_{2.5}
8 speciation averaged over days when an observed and modeled day had 24-hr concentrations
9 > 35 µg/m³ at the Bountiful STN site.
10
11



12

1 **Figure IX.A.10. 25 The composition of observed and model simulated average 24-hr PM_{2.5}**
2 **speciation averaged over days when an observed and modeled day had 24-hr concentrations**
3 **> 35 µg/m³ at the Lindon STN site.**
4

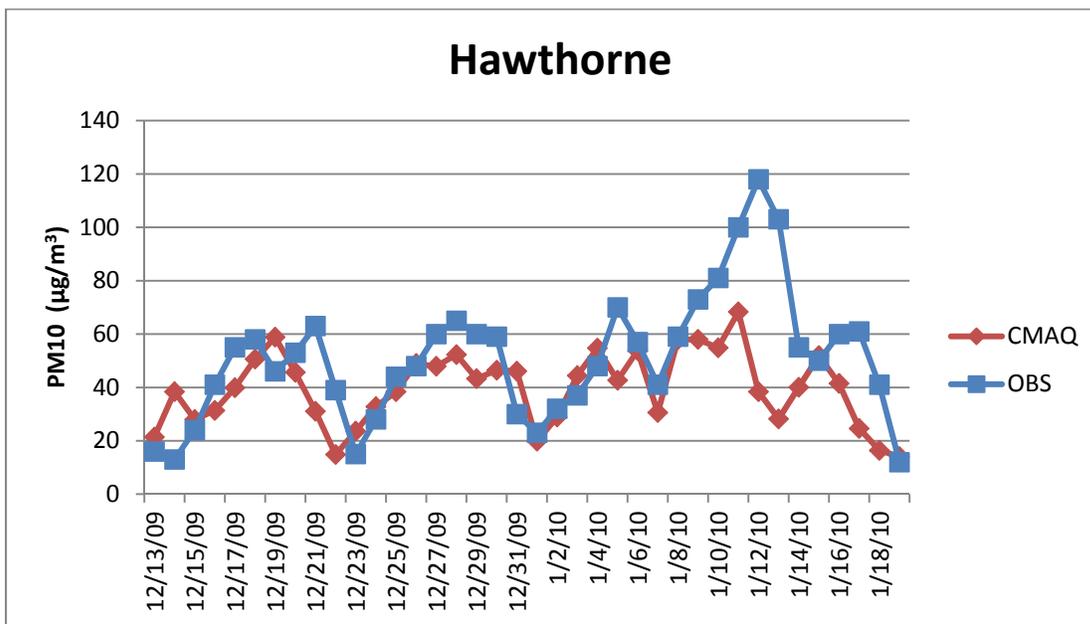


5
6 **Figure IX.A.10. 26 The composition of model simulated average 24-hr PM_{2.5} speciation**
7 **averaged over days when a modeled day had 24-hr concentrations > 35 µg/m³ at the Logan**
8 **monitoring site. No observed speciation data is available for Logan.**
9

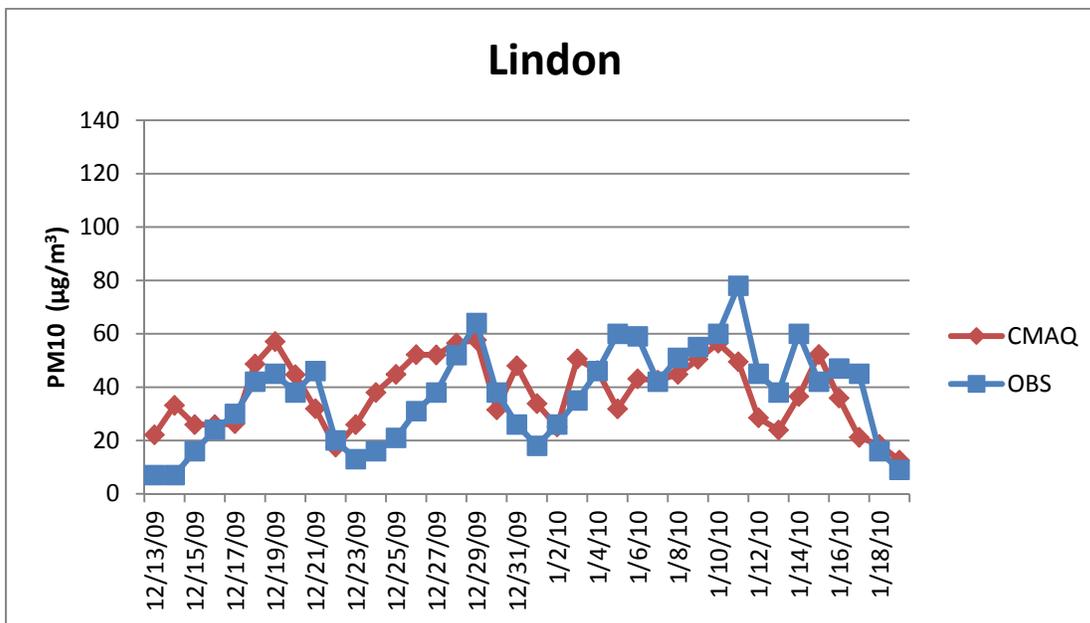
10 PM₁₀ Results

11
12 As mentioned previously, the bulk of the performance for CMAQ modeled Particulate Matter
13 (PM) for the 2009 – 2010 episode was done for the 24-hr PM_{2.5} SIP. The detailed model
14 performance was shown using time series, statistical metrics, and pie charts. For the CMAQ
15 performance of PM₁₀ in particular, UDAQ has updated the model versus observations time series
16 plots to show PM₁₀, in addition to the prior times series using PM_{2.5}. For the 2009 – 2010
17 episode, UDAQ collected PM₁₀ observational data at Hawthorne and Magna in Salt Lake County;
18 Lindon and North Provo in Utah County; and for Ogden City.
19

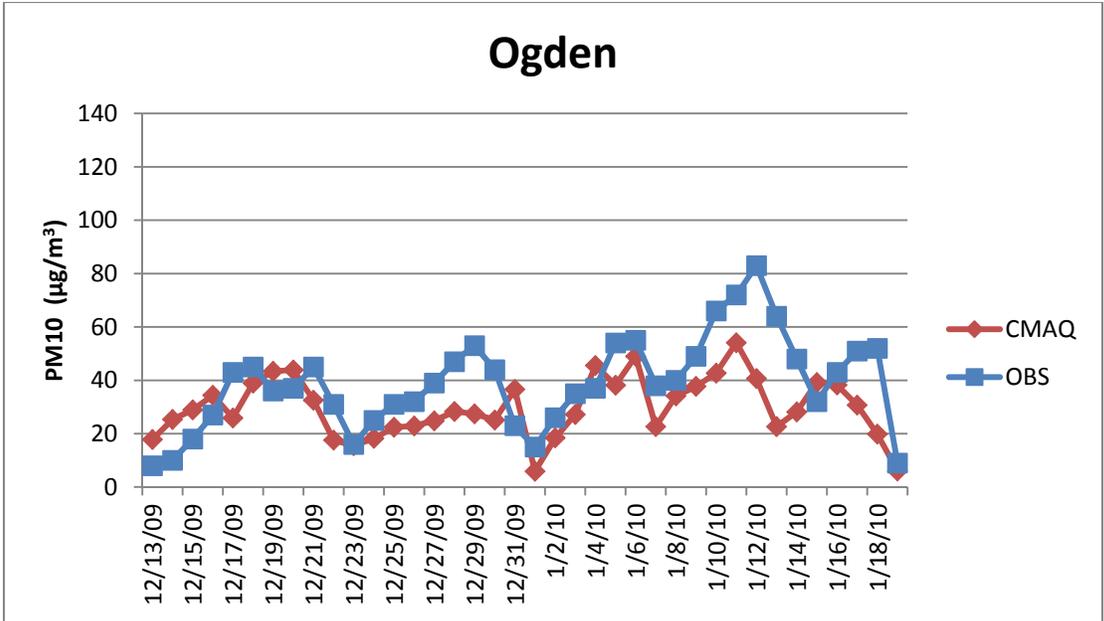
1 The PM₁₀ model versus observation time series is shown in Figures IX.A.10. 27 - 32.
 2



3
 4
 5 **Figure IX.A.10. 27 Time Series of total PM10 (ug/m3) for Hawthorne for the 2009-2010**
 6 **modeling. CMAQ results are shown in the red trace and the observations are the blue**
 7 **trace.**
 8
 9

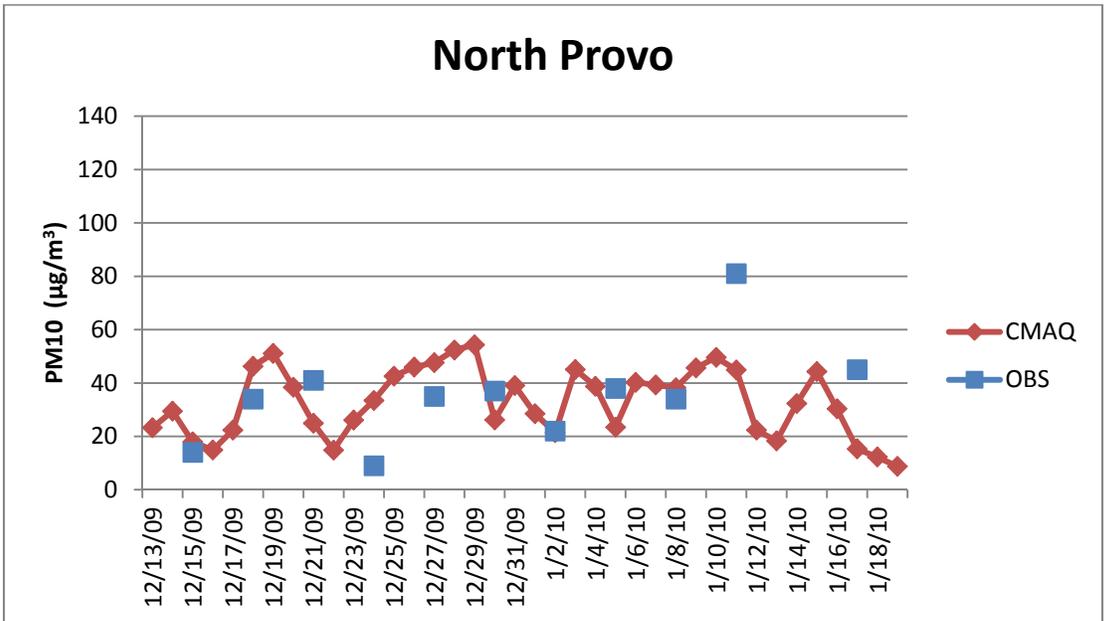


10
 11
 12 **Figure IX.A.10. 28 Time Series of total PM10 (ug/m3) for Lindon for the 2009-2010**
 13 **modeling. CMAQ results are shown in the red trace and the observations are the blue**
 14 **trace.**
 15
 16
 17



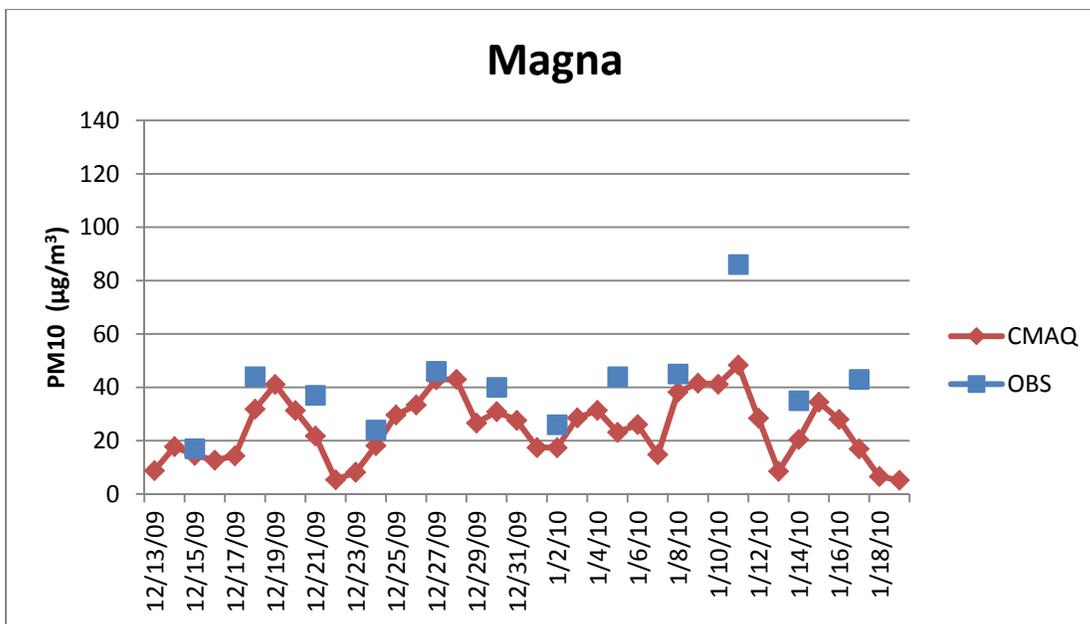
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Figure IX.A.10. 29 Time Series of total PM10 (ug/m3) for Ogden for the 2009-2010 modeling. CMAQ results are shown in the red trace and the observations are the blue trace.



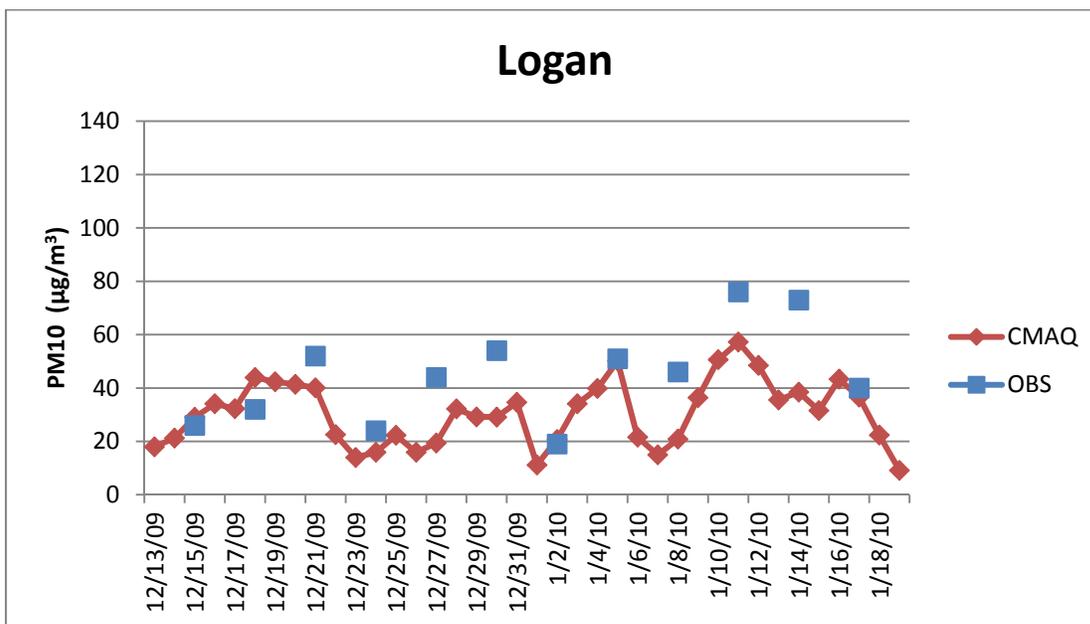
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Figure IX.A.10. 30 Time Series of total PM10 (ug/m3) for North Provo for the 2009-2010 modeling. CMAQ results are shown in the red trace and the observations are the blue trace.



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Figure IX.A.10.31 Time Series of total PM10 (ug/m3) for Magna for the 2009-2010 modeling. CMAQ results are shown in the red trace and the observations are the blue trace.



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Figure IX.A.10.32 Time Series of total PM10 (ug/m3) for Logan for the 2009-2010 modeling. CMAQ results are shown in the red trace and the observations are the blue trace.

14 As noted before, a robust comparison of CMAQ modeled PM₁₀ speciation to PM₁₀ filter
15 speciation could not be made for this modeling period because most of the secondarily chemically
16 formed particulate nitrate had been volatilized from the PM₁₀ filters and thus could not be
17 accounted for. It should be noted that CMAQ was able to produce the secondarily formed nitrate

1 when compared to PM_{2.5} filters during the previous PM_{2.5} SIP work. Therefore, UDAQ feels
2 CMAQ shows good replication of the species that make up PM₁₀ during wintertime pollution
3 events.
4

5 6 **(g) Summary of Model Performance**

7
8 Model performance for 24-hr PM_{2.5} is good and generally acceptable and can be characterized as
9 follows:

- 10
11 • Good replication of the episodic buildup and clear out of PM_{2.5}. Often the model will
12 clear out the simulated PM_{2.5} a day too early at the end of an episode. This clear out time
13 period is difficult to model (i.e., Figure IX.A.10. 22).
14
- 15 • Good agreement in the magnitude of PM_{2.5}, as the model can consistently produce the
16 high concentrations of PM_{2.5} that coincide with observed high concentrations.
17
- 18 • Spatial patterns of modeled 24-hr PM_{2.5}, show for the most part, that the PM_{2.5} is being
19 confined in the valley basins, consistent to what is observed.
20
- 21 • Speciation and composition of the modeled PM_{2.5} matches the observed speciation quite
22 well. Modeled and observed nitrate are between 40% and 50% of the PM_{2.5}. Ammonium
23 is between 15% and 20% for both modeled and observed PM_{2.5}, while modeled and
24 observed organic carbon falls between 10% to 13% of the total PM_{2.5}.
25

26 For PM₁₀ the CMAQ model performance is quite good at all locations along Northern Utah.
27 CMAQ is able to re-produce the buildup and washout of the pollution episodes during the 2009 –
28 2010 winter. CMAQ is also able to re-produce the peak PM₁₀ concentrations during most
29 episodes. The exception being the 2010 Jan. 08 – 14 episode, where CMAQ fails to build to the
30 extremely high PM₁₀ concentration (>80 ug/m³) seen at the monitors. This episode in particular
31 featured an “early model washout,” and these results are similar to the results found in PM_{2.5}
32 modeling.
33

34 Several observations should be noted on the implications of these model performance findings on
35 the attainment modeling presented in the following section. First, it has been demonstrated that
36 model performance overall is acceptable and, thus, the model can be used for air quality planning
37 purposes. Second, consistent with EPA guidance, the model is used in a relative sense to project
38 future year values. EPA suggests that this approach “should reduce some of the uncertainty
39 attendant with using absolute model predictions alone.”
40

41 **(h) Modeled Attainment Test**

42 43 • **Introduction**

44
45 With acceptable performance, the model can be utilized to make future-year attainment
46 projections. For any given (future) year, an attainment projection is made by calculating a
47 concentration termed the Future Design Value (FDV). This calculation is made for each monitor
48 included in the analysis, and then compared to the NAAQS (150 µg/m³). If the FDV at every
49 monitor located within a nonattainment area is smaller than the NAAQS, this would demonstrate
50 attainment for that area in that future year.
51

1 A maintenance plan must demonstrate continued attainment of the NAAQS for a span of ten
 2 years. This span is measured from the time EPA approves the plan, a date which is somewhat
 3 uncertain during plan development. To be conservative, attainment projections were made for
 4 2019, 2028, and 2030. An assessment was also made for 2024 as a “spot-check” against emission
 5 trends within the ten year span.

6
 7 • **PM₁₀ Baseline Design Values**
 8

9 For any monitor, the FDV is greatly influenced by existing air quality at that location. This can
 10 be quantified and expressed as a Baseline Design Value (BDV). The BDV is consistent with the
 11 form of the 24-hour PM₁₀ NAAQS; that is, that the probability of exceeding the standard should
 12 be no greater than once per calendar year. Quantification of the BDV for each monitor is
 13 included in the TSD, and is consistent with EPA guidance.

14
 15 Hourly PM₁₀ observations are taken from FRM filters spanning five monitors in three
 16 maintenance areas: Salt Lake County, Utah County, and the city of Ogden.

17
 18 In Table IX.A.10. 5, baseline design values are given for Ogden, Hawthorne, Magna, Lindon, and
 19 North Provo. These values were calculated based on data collected during the 2011-2014 time
 20 period.

21
 22 **Table IX.A.10. 5 Baseline design values listed for each monitor.**
 23

Site	Maintenance Area	2011-2014 BDV
Ogden	Ogden City	88.2 µg/m ³
Hawthorne	Salt Lake County	100.9 µg/m ³
Magna	Salt Lake County	70.5 µg/m ³
Lindon	Utah County	111.4 µg/m ³
North Provo	Utah County	124.4 µg/m ³

24
 25
 26 • **Relative Response Factors**
 27

28 In making future-year predictions, the output from the CMAQ 4.7.1 model is not considered to be
 29 an absolute answer. Rather, the model is used in a relative sense. In doing so, a comparison is
 30 made using the predicted concentrations for both the year in question and a pre-selected base-
 31 year, which for this plan is 2011. This comparison results in a Relative Response Factor (RRF).
 32 RRFs are calculated as follows:
 33

- 34 1) Modeled PM₁₀ concentrations are calculated for each grid cell in the modeling domain
 35 over the 39-day wintertime 2009-2010 episode. Of particular interest are the nine grid
 36 cells (3x3 window) that are collocated with each monitor. The monitor, itself is located in
 37 the window’s center cell.
- 38 2) For every simulated day, the maximum daily PM₁₀ concentration for each of these nine-
 39 cell windows is identified.
- 40 3) For each monitor, the top 20% of these 39 values are averaged to formulate a modeled
 41 PM₁₀ peak concentration value (PCV).
- 42 4) At each monitor, the RRF is calculated as the ratio between future-year PCV and base-
 43 year PCV: **RRF = FPCV / BPCV**
 44
 45
 46

• **Future Design Values and Results**

Finally, for each monitor, the FDV is calculated by multiplying the baseline design value 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.10. 6.

Table IX.A.10. 6 Baseline design values, relative response factors, and future design values for all monitors and future years. Units of design values are $\mu\text{g}/\text{m}^3$, while RRF's are dimensionless.

Monitor	2011 BDV	2019 RRF	2019 FDV	2024 RRF	2024 FDV	2028 RRF	2028 FDV	2030 RRF	2030 FDV
Ogden	88.2	1.05	92.6	1.04	91.7	1.02	90.0	1.05	92.6
Hawthorne	100.9	1.09	110.0	1.09	110.0	1.09	110.0	1.12	113.0
Magna	70.5	1.14	80.4	1.13	79.7	1.11	78.3	1.15	81.1
Lindon	111.4	1.16	129.2	1.12	124.8	1.11	123.7	1.16	129.2
North Provo	124.4	1.15	143.1	1.12	139.3	1.10	136.8	1.15	143.1

For all future-years and monitors, no FDV exceeds the NAAQS. Therefore continued attainment is demonstrated for all three maintenance areas.

(2) Attainment Inventory

The attainment inventory is discussed in EPA guidance (Calcagni) as another one of the core provisions that should be considered by states for inclusion in a maintenance plan.

According to Calcagni, 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 baseline inventory modeled as the basis for comparison with every projection year model run is best suited to act as the attainment inventory. For this analysis, a baseline inventory was compiled for the year 2011. This year also falls within the span of data representing current attainment of the PM_{10} NAAQS.

Calcagni speaks about the projection inventory as well, and notes that it should consider future growth, including population and industry, should be consistent with the base-year attainment 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 included 2019, 2024, 2028, and 2030. The emissions contained in the inventories include sources located within a regional area called a modeling domain. The

1 modeling domain encompasses all three areas within the state that were designated as
2 nonattainment areas for PM₁₀: Salt Lake County, Utah County, and Ogden City, as well as a
3 bordering region see Figure IX.A.10 1.

4
5 Since this bordering region is so large (owing to its creation to assess a much larger region of
6 PM_{2.5} nonattainment), a “core area” within this domain was identified wherein a higher degree of
7 accuracy would be important. Within this core area (which includes Weber, Davis, Salt Lake,
8 and Utah Counties), SIP-specific inventories were prepared to include seasonal adjustments and
9 forecasting to represent each of the projection years. In the bordering regions away from this
10 core, the 2011 National Emissions Inventory was downloaded from EPA and inserted to the
11 analysis. It remained unchanged throughout the analysis period.

12
13 There are four general categories of sources included in these inventories: large stationary
14 sources, smaller area sources, on-road mobile sources, and off-road mobile sources.

15
16 For each of these source categories, the pollutants that were inventoried included: particulate
17 matter with an aerodynamic diameter of ten microns or less (PM₁₀), sulfur dioxide (SO₂), oxides
18 of nitrogen (NO_x), volatile organic compounds (VOC), and ammonia. SO₂ and NO_x are
19 specifically defined as PM₁₀ precursors, that is, compounds that, after being emitted to the
20 atmosphere, undergo chemical or physical change to become PM₁₀. Any PM₁₀ that is created in
21 this way is referred to as secondary aerosol. The CMAQ model also considers ammonia and
22 VOC to be contributing factors in the formation of secondary aerosol.

23
24 The unit of measure for point and area sources is the traditional tons per year, but the CMAQ
25 model includes a pre-processor that converts these emission rates to hourly increments throughout
26 each day for each episode. Mobile source emissions are reported in terms of tons per day, and are
27 also pre-processed by the model.

28
29 The basis for the point source and area inventories, for the base-year attainment inventory as well
30 as all future-year projection inventories, was the 2011 tri-annual inventory of actual emissions
31 that had already been compiled by the Division of Air Quality.

32
33 Area sources, off-road mobile sources, and generally also the large point sources were projected
34 forward from 2011, using population and economic forecasts from the Governor’s Office of
35 Management and Budget.

36
37 Mobile source emissions were calculated for each year using MOVES2010 in conjunction with
38 the appropriate estimates for vehicle miles traveled (VMT). VMT estimates for the urban
39 counties were based on a travel demand model that is only run periodically for specific projection
40 years. VMT for intervening years were estimated by interpolation.

41
42 Since this SIP subsection takes the form of a maintenance plan, it must demonstrate that the area
43 will continue to attain the PM₁₀ NAAQS throughout a period of ten years from the date of EPA
44 approval. It is also necessary to “spot check” this ten-year interval. Hence, projection inventories
45 were prepared for the following years: 2019, 2024, 2028, (the ten-year mark from anticipated
46 EPA approval), and 2030. 2011 was established as the baseline period.

47
48 The following tables are provided to summarize these inventories. As described, they represent
49 point, area, on-road mobile, and off-road mobile sources in the modeling domain. They include
50 PM₁₀, SO₂, NO_x, VOC, and ammonia.

51

Table IX.A.10. 7 shows the baseline emissions for each of the areas within the modeling domain. Table IX.A.10. 8 is specific to this nonattainment area, and shows the emissions from the baseline through the projection years.

Table IX.A.10. 7 Baseline Emissions throughout the Modeling Domain

2011 Baseline	NA-Area	Source Category	PM10	SO2	NOx	VOC	NH3
2011 Baseline Sum of Emissions (tpd)	Ogden City NA-Area	Area Sources	0.85	0.08	2.12	5.67	0.86
		NonRoad	0.90	0.00	1.32	0.91	0.00
		Point Source	0.00	0.00	0.00	0.00	0.00
		Mobile Sources	2.09	0.05	12.18	8.58	0.22
		Provo NA Total	3.84	0.13	15.62	15.16	1.08
	Salt Lake County NA-Area	Area Sources	4.61	0.05	0.73	32.62	1.53
		NonRoad	7.12	0.32	11.71	6.38	0.00
		Point Source	4.04	8.90	15.56	2.97	0.20
		Mobile Sources	10.95	0.28	57.96	35.35	1.14
		Salt Lake City NA Total	26.72	9.55	85.96	77.32	2.87
	Utah County NA-Area	Area Sources	2.19	0.02	0.22	1.16	0.83
		NonRoad	3.53	0.02	4.24	2.31	0.00
		Point Source	0.28	0.29	1.03	0.18	0.18
		Mobile Sources	4.90	0.13	24.64	11.89	0.49
		Surrounding Areas Total	10.90	0.46	30.13	15.54	1.50
	Surrounding Areas	Area Sources	537.49	13.60	228.31	629.52	331.22
		NonRoad	34.53	0.10	60.77	72.57	0.01
		Point Source	17.64	283.15	538.86	63.96	6.08
		Mobile Sources	22.80	193.52	434.92	6.47	1.67
		Surrounding Areas Total	612.46	490.37	1262.86	772.52	338.98
	2011 Total	653.92	500.51	1394.57	880.54	344.43	

Table IX.A.10. 8 Salt Lake County Nonattainment Area; Actual Emissions for 2011 and Emission Projections for 2019, 2024, 2028, and 2030.

Year	NA-Area	Source Category	PM10	SO2	NOx	VOC	NH3
2011 Baseline	Salt Lake County NA-Area	Area Sources	4.61	0.05	0.73	32.62	1.53
		NonRoad	7.12	0.32	11.71	6.38	0.00
		Point Source	4.04	8.90	15.56	2.97	0.20
		Mobile Sources	10.95	0.28	57.96	35.35	1.14
		2011 Total	26.72	9.55	85.96	77.32	2.87
2019	Salt Lake County NA-Area	Area Sources	4.61	0.05	0.73	32.62	1.53
		NonRoad	8.28	0.36	9.11	5.94	0.01
		Point Source	11.29	7.72	22.17	3.77	0.26
		Mobile Sources	10.88	0.31	25.79	21.16	0.89
	2019 Total	35.06	8.44	57.80	63.49	2.69	
2024	Salt Lake County NA-Area	Area Sources	4.61	0.05	0.73	32.62	1.53
		NonRoad	8.83	0.40	8.48	6.22	0.01
		Point Source	11.52	8.16	22.36	3.86	0.29
		Mobile Sources	11.28	0.29	17.16	16.63	0.89
	2024 Total	36.24	8.90	48.73	59.33	2.72	
2028	Salt Lake County NA-Area	Area Sources	4.61	0.05	0.73	32.62	1.53
		NonRoad	9.27	0.44	8.43	6.54	0.01
		Point Source	11.72	8.57	0.00	3.95	0.31
		Mobile Sources	11.82	0.28	13.88	13.94	0.91
	2028 Total	37.42	9.34	23.04	57.05	2.76	
2030	Salt Lake County NA-Area	Area Sources	4.61	0.05	0.73	32.62	1.53
		NonRoad	9.52	0.46	8.50	6.72	0.01
		Point Source	11.83	8.82	22.68	4.00	0.32
		Mobile Sources	12.07	0.28	12.59	13.34	0.93
	2030 Total	38.03	9.61	44.50	56.68	2.79	

1
2 More detail concerning any element of the inventory can be found at the appropriate section of
3 the Technical Support Document (TSD). More detail about the general construction of the
4 inventory may be found in the Inventory Preparation Plan.
5

6 7 **(3) Emissions Limitations**

8
9 As discussed above, the larger sources within the nonattainment areas were individually
10 inventoried and modeled in the analysis.
11

12 A subset of these “large” sources was subsequently identified for the purpose of establishing
13 emission limitations as part of the Utah SIP. This subset includes any source located within any
14 of the three current nonattainment areas for PM₁₀: Salt Lake County, Utah County, or Ogden City
15 whose actual emissions of PM₁₀, SO₂, or NO_x exceeded 100 tons in 2011, or who had the
16 potential to emit 100 tpy of any of these pollutants. A source might also be included in the subset
17 if it was currently regulated for PM₁₀ under section IX, Part H of the Utah SIP. There were
18 several sources in Davis County that were close enough to the border so as to have originally
19 been included in the original PM₁₀ SIP.
20

21 As discussed before, the emission limits for these sources had already been reflected in the
22 projected emissions inventories used in the modeling analysis. Only those limits for which credit
23 is being taken in the SIP have been incorporated specifically into the SIP. Many of these limits
24 appear in state issued Approval Orders or Title V Operating Permits. Such regulatory documents
25 typically include many emission limits and operating restrictions. However, the limits found in
26 the SIP cannot be changed unless the State provides, and EPA approves, a SIP revision.
27

28 These limits are incorporated in the Utah SIP at Section IX, Part H (formerly Sections 1 and 2 of
29 Appendix A to Section IX, Part A), and as such are federally enforceable.
30

31 These conditions support a demonstration of maintenance through 2030.
32
33

34 **(4) Emission Reduction Credits**

35
36 Under Utah’s new source review rules in R307-403-8, banking of emission reduction credits
37 (ERCs) is permitted to the fullest extent allowed by applicable Federal Law as identified in 40
38 CFR 51, Appendix S, among other documents. Under Appendix S, Section IV.C.5, a permitting
39 authority may allow banked ERCs to be used under the preconstruction review program (R307-
40 403) as long as the banked ERCs are identified and accounted for in the SIP control strategy.
41

42 Existing Emission Reduction Credits, for PM₁₀, SO₂, and NO_x, were included in the modeled
43 demonstration of maintenance outlined in Subsection IX.A.10.c(1).
44

45 The subsequent crediting of any emission reduction of PM₁₀, or precursors thereto, whether pre-
46 existing or established subsequent to the approval of this SIP revision, remains permissible. In
47 general, credits must be in excess and must be established by actual, verifiable, and enforceable
48 reductions in emissions. Additionally, these ERCs cannot be used to offset major new sources or
49 major modifications at existing sources in PM_{2.5} nonattainment areas.
50

1 Once Salt Lake County is redesignated to attainment for PM₁₀, permitting new PM₁₀ sources or
2 major modifications to existing PM₁₀ sources will be conducted under the rules of the Prevention
3 of Significant Deterioration program.
4
5
6

7 **(5) Additional Controls for Future Years**
8

9 Since the emission limitations discussed in subsection IX.A.10.c.(3) are federally enforceable
10 and, as demonstrated in IX.A.10.c(1) above, are sufficient to ensure continued attainment of the
11 PM₁₀NAAQS, there is no need to require any additional control measures to maintain the PM₁₀
12 NAAQS.
13
14

15 **(6) Mobile Source Budget for Purposes of Conformity**
16

17 The transportation conformity provisions of section 176(c)(2)(A) of the Clean Air Act (CAA)
18 require regional transportation plans and programs to show that "...emissions expected from
19 implementation of plans and programs are consistent with estimates of emissions from motor
20 vehicles and necessary emissions reductions contained in the applicable implementation plan..."
21 EPA's transportation conformity regulation (40 CFR 93, Subpart A, last amended at 77 FR 14979,
22 March 14 2012) also requires that motor vehicle emission budgets must be established for the
23 last year of the maintenance plan, and may be established for any years deemed appropriate (see
24 40 CFR 93.118(b)(2)(i)). If the maintenance plan does not establish motor vehicle emissions
25 budgets for any years other than the last year of the maintenance plan, the conformity regulation
26 requires that a "demonstration of consistency with the motor vehicle emissions budget(s) must be
27 accompanied by a qualitative finding that there are not factors which would cause or contribute to
28 a new violation or exacerbate an existing violation in the years before the last year of the
29 maintenance plan." The normal interagency consultation process required by the regulation (40
30 CFR 93.105) shall determine what must be considered in order to make such a finding.
31

32 Thus, for a Metropolitan Planning Organization's (MPO's) Regional Transportation Plan (RTP),
33 analysis years that are after the last year of the maintenance plan (in this case 2030), a conformity
34 determination must show that emissions are less than or equal to the maintenance plan's motor
35 vehicle emissions budget(s) for the last year of the implementation plan.
36

37 EPA's MOVES2014 was used to calculate mobile source emissions, and road dust projections
38 were calculated using the January 2011 update to AP-42 Method for Estimating Re-Entrained
39 Road Dust from Paved Roads (Chapter 13, released 76 FR 6329 February 4, 2011).
40

41 Utah has determined that mobile sources are not significant contributors of SO₂ for this
42 maintenance plan. As such, this maintenance plan does not establish a motor vehicle emissions
43 budget for SO₂.
44

45 **(a) Salt Lake County Mobile Source PM10 Emissions Budgets**
46

47 In this maintenance plan, Utah is establishing transportation conformity motor vehicle emission
48 budgets (MVEB) for PM₁₀ (direct) and NO_x for 2030.
49

50 **(i) Direct PM10 Emissions Budget**
51

1 Direct (or “primary”) PM₁₀ refers to PM₁₀ that is not formed via atmospheric chemistry. Rather,
2 direct PM₁₀ is emitted straight from a mobile or stationary source. With regard to the emission
3 budget presented herein, direct PM₁₀ includes road dust, brake wear, and tire wear as well as
4 PM₁₀ from exhaust.

5
6 As presented in the Technical Support Document for on-road mobile sources, the estimated on-
7 road mobile source emissions for Salt Lake County, in 2030, of direct sources of PM₁₀ (road dust,
8 brake wear, tire wear, and exhaust particles) were 12.07 tons per winter-weekday. These mobile
9 source PM₁₀ emissions were included in the maintenance demonstration in Subsection
10 IX.A.10.c.(1) which estimates a maximum PM₁₀ concentration of 113.0 µg/m³ in 2030 within the
11 Salt Lake County portion of the modeling domain. The above PM₁₀ mobile source emission
12 figure of 12.07 tons per day (tpd) would traditionally be considered as the MVEB for the
13 maintenance plan. However, and as discussed below, the modeled concentration is 37.0 µg/m³
14 below the NAAQS of 150 µg/m³, and represents potential PM₁₀ emissions that may be considered
15 for allocation to the PM₁₀ MVEB.

16
17 EPA's conformity regulation (40 CFR 93.124(a)) allows the implementation plan to quantify
18 explicitly the amount by which motor vehicle emissions could be higher while still demonstrating
19 compliance with the maintenance requirement. These additional emissions that can be allocated
20 to the applicable MVEB are considered the “safety margin.” As defined in 40 CFR 93.101,
21 safety margin represents the amount of emissions by which the total projected emissions from all
22 sources of a given pollutant are less than the total emissions that would satisfy the applicable
23 requirement for demonstrating maintenance. The implementation plan can then allocate some or
24 all of this "safety margin" to the applicable MVEBs for transportation conformity purposes.

25
26 The safety margin for the Salt Lake County portion of the domain equates to 37.0 µg/m³.

27
28 To evaluate the portion of safety margin that could be allocated to the PM₁₀ MVEB, modeling
29 was re-run for 2030 with additional emissions attributed to the on-road mobile sources.

30
31 Using the same emission projections for point and area and non-road mobile sources, the
32 SMOKE 3.6 emissions model was re-run using 24.00 tons of PM₁₀ per winter-weekday for
33 mobile sources (and 21.00 tons/winter-weekday of NO_x). The revised maintenance
34 demonstration for 2030 still shows maintenance of the PM₁₀ standard.

35
36 It estimates a maximum PM₁₀ concentration of 120.1 µg/m³ in 2030 within the Salt Lake County
37 portion of the modeling domain. This value is 29.9 µg/m³ below the NAAQ Standard of 150
38 µg/m³, but 7.1 µg/m³ higher than the previous value.

39
40 This shows that the safety margin is at least 11.93 tons/day of PM₁₀ (24.00 tons/day minus 12.07
41 tons/day) and 8.41 tons/day of NO_x (21.00 tons/day minus 12.59 tons/day). This maintenance
42 plan allocates this portion of the safety margin to the mobile source budgets for Salt Lake County,
43 and thereby sets the direct PM₁₀ MVEB for 2030 at 24.00 tons/winter-weekday.

44 45 46 **(ii) NO_x Emissions Budget**

47
48 Through atmospheric chemistry, NO_x emissions can substantially contribute to secondary PM₁₀
49 formation. For this reason, NO_x is considered a PM₁₀ precursor.

50
51 As presented in the Technical Support Document for on-road mobile sources, the estimated on-
52 road mobile source NO_x emissions for Salt Lake County in 2030 were 12.59 tons per winter-

1 weekday. These mobile source PM₁₀ emissions were included in the maintenance demonstration
2 in Subsection IX.A.10.c.(1) which estimates a maximum PM₁₀ concentration of 113.0 µg/m³ in
3 2030 within the Salt Lake County portion of the modeling domain. The above NO_x mobile
4 source emission figure of 12.59 tons per day (tpd) would traditionally be considered as the
5 MVEB for the maintenance plan. However, and as discussed below, the modeled concentration
6 is 37.0 µg/m³ below the NAAQS of 150 µg/m³, and represents potential NO_x emissions that may
7 be considered for allocation to the NO_x MVEB.

8
9 EPA's conformity regulation (40 CFR 93.124(a)) allows the implementation plan to quantify
10 explicitly the amount by which motor vehicle emissions could be higher while still demonstrating
11 compliance with the maintenance requirement. These additional emissions that can be allocated
12 to the applicable MVEB are considered the "safety margin." As defined in 40 CFR 93.101,
13 safety margin represents the amount of emissions by which the total projected emissions from all
14 sources of a given pollutant are less than the total emissions that would satisfy the applicable
15 requirement for demonstrating maintenance. The implementation plan can then allocate some or
16 all of this "safety margin" to the applicable MVEBs for transportation conformity purposes.

17
18 The safety margin for the Salt Lake County portion of the domain equates to 37.0 µg/m³.

19
20 To evaluate the portion of safety margin that could be allocated to the PM₁₀ MVEB, modeling
21 was re-run for 2030 with additional emissions attributed to the on-road mobile sources.

22
23 Using the same emission projections for point and area and non-road mobile sources, the
24 SMOKE 3.6 emissions model was re-run using 21.00 tons of NO_x per winter-weekday for on-
25 road mobile sources (and 24.00 tons/winter-weekday of PM₁₀). The revised maintenance
26 demonstration for 2030 still shows maintenance of the PM₁₀ standard.

27
28 It estimates a maximum PM₁₀ concentration of 120.1 µg/m³ in 2030 within the Salt Lake County
29 portion of the modeling domain. This value is 29.9 µg/m³ below the NAAQ Standard of 150
30 µg/m³, but 7.1 µg/m³ higher than the previous value.

31
32 This shows that the safety margin is at least 8.41 tons/day of NO_x (21.00 tons/day minus 12.59
33 tons/day) and 11.93 tons/day of PM₁₀ (24.00 tons/day minus 12.07 tons/day). This maintenance
34 plan allocates this portion of the safety margin to the mobile source budgets for Salt Lake County,
35 and thereby sets the NO_x MVEB for 2030 at 21.00 tons/winter-weekday

36 37 38 **(b) Net Effect to Maintenance Demonstration**

39
40 Using the procedure described above, some of the identified safety margin indicated earlier in
41 Subsection IX.A.10.c(6) has been allocated to the mobile vehicle emissions budgets. The results
42 of this modification are presented below.

43 44 **(i) Inventory: The emissions inventory was adjusted as shown below:**

45
46 in 2030: PM₁₀ was adjusted by adding 11.93 ton/day (tpd) of safety margin to
47 12.07 tpd inventory for a total of 24.00 tpd, and

48
49 NO_x was adjusted by adding 8.41 tpd of safety margin to 12.59 tpd
50 inventory for a total of 21.00 tpd,
51
52

(ii) Modeling:

The effect on the modeling results throughout the domain is summarized in the following Table IX.A.10. 9 (which shows predicted concentrations in $\mu\text{g}/\text{m}^3$). It demonstrates that with the allocation of the safety margin, the NAAQS is still maintained through 2030 in all areas.

Table IX.A.10. 9 Modeling of Attainment in 2030, Including the Portion of the Safety Margin Allocated to Motor Vehicles

Air Quality Monitor	Predicted Concentrations in 2030 $\mu\text{g}/\text{m}^3$	
	A	B
Hawthorne	113.0	120.1
Magna	81.1	82.5

Notes: Column A shows concentrations presented previously as part of the modeled attainment test. Column B shows concentrations resulting from allocation of a portion of the safety margin.

(7) 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 the PM_{10} SIP.

(8) 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 County area to attainment, as required by the Act.

(9) Verification of Continued Maintenance

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_{10} , and 2) by inventorying emissions of PM_{10} and its precursors from various sources.

The State will continue to maintain an ambient monitoring network for PM_{10} in accordance with 40 CFR Part 58 and the Utah SIP. The State anticipates that the EPA will continue to review the

1 ambient monitoring network for PM₁₀ each year, and any necessary modifications to the network
2 will be implemented.

3
4 Additionally, the State will track and document measured mobile source parameters (e.g., vehicle
5 miles traveled, congestion, fleet mix, etc.) and new and modified stationary source permits. If
6 these and the resulting emissions change significantly over time, the State will perform
7 appropriate studies to determine: 1) whether additional and/or re-sited monitors are necessary,
8 and 2) whether mobile and stationary source emission projections are on target.

9
10 The State will also continue to collect actual emissions inventory data from all sources of PM₁₀,
11 SO₂, and NO_x in excess of 25 tons (in aggregate) per year, as required by R307-150.

12 13 14 15 **(10) Contingency Measures**

16
17 *CAA 175A(d) - Each maintenance plan shall contain contingency measures to assure that the*
18 *State will promptly correct any violation of the standard which occurs after the redesignation of*
19 *the area to attainment. Such provisions shall include a requirement that the State will implement*
20 *all control measures which were contained in the SIP prior to redesignation.*

21
22 Utah has implemented all measures contained in the nonattainment plan, however for the
23 purposes of this maintenance plan the list of stationary sources included in SIP Section IX. Part
24 H. was updated. Some of the sources identified in the nonattainment SIP are no longer
25 operational or no longer rise to the emission thresholds established for such inclusion. In such
26 instances, the emission limits belonging specifically to these sources were not carried forward.
27 Where such a source is still operational, the prior SIP limits from the nonattainment plan are
28 identified below as potential contingency measures. Some of the specific limits within may no
29 longer apply and would need to be reevaluated at that time.

30
31 This Contingency Plan for [Salt Lake County](#) supersedes Subsection IX.A.8, Contingency
32 Measures, which is part of the original PM₁₀ SIP.

33
34 The contingency plan must also ensure that the contingency measures are adopted expeditiously
35 once triggered. The primary elements of the contingency plan are: 1) the list of potential
36 contingency measures, 2) the tracking and triggering mechanisms to determine when
37 contingency measures are needed, and 3) a description of the process for recommending and
38 implementing the contingency measures.

39 40 **(a) Tracking**

41
42 The tracking plan for the Salt Lake County, Utah County, and Ogden City areas consists of
43 monitoring and analyzing PM₁₀ concentrations. In accordance with 40 CFR 58, the State will
44 continue to operate and maintain an adequate PM₁₀ monitoring network in Salt Lake County,
45 Utah County, and Ogden City.

46 47 48 **(b) Triggering**

49
50 Triggering of the contingency plan does not automatically require a revision to the SIP, nor does
51 it necessarily mean the area will be redesignated once again to nonattainment. Instead, the State
52 will normally have an appropriate timeframe to correct the potential violation with

1 implementation of one or more adopted contingency measures. In the event that violations
2 continue to occur, additional contingency measures will be adopted until the violations are
3 corrected.

4
5 Upon notification of a potential violation of the PM₁₀ NAAQS, the State will develop appropriate
6 contingency measures intended to prevent or correct a violation of the PM₁₀ standard.
7 Information about historical exceedances of the standard, the meteorological conditions related to
8 the recent exceedances, and the most recent estimates of growth and emissions will be reviewed.
9 The possibility that an exceptional event occurred will also be evaluated.

10
11 Upon monitoring a potential violation of the PM₁₀ NAAQS, including exceedances flagged as
12 exceptional events but not concurred with by EPA, the State will take the following actions.

- 13
14 • The State will identify the source(s) of PM₁₀ causing the potential violation, and report
15 the situation to EPA Region VIII within four months of the potential violation.
- 16
17 • The State will identify a means of corrective action within six months after a potential
18 violation. The maintenance plan contingency measures to be considered and selected
19 will be chosen from the following list or any other emission control measures deemed
20 appropriate based on a consideration of cost-effectiveness, emission reduction potential,
21 economic and social considerations, or other factors that the State deems appropriate:
 - 22
 - 23 - Re-evaluate the thresholds at which a red or yellow burn day is triggered, as
24 established in R307-302;
 - 25
 - 26 - Further controls on stationary sources; to include the prior SIP controls at the
27 following sources listed below:
 - 28
 - 29

30 **Prior SIP Source**
31 **Controls**

Reference to Prior SIP

32		
33	Crysen Refining (now Silver Eagle)	IX.H.2.b.L
34	Hercules (now ATK/Bacchus)	IX.H.2.b.S
35	Interstate Brick	IX.H.2.b.U
36	Kennecott / Barney's Canyon	IX.H.2.b.AA
37	LDS Welfare Square	IX.H.2.b.CC
38	LDS Hospital	IX.H.2.b.DD
39	Mountain Bell	IX.H.2.b.HH
40	Mountain Fuel, 100 S. 1078 W. (now Questar)	IX.H.2.b.II
41	Murray City Power	IX.H.2.b.KK
42	Utah Metal Works	IX.H.2.b.ZZ
43	V.A. Hospital	IX.H.2.b.CCC
44		
45		
46		

47 The State will then hold a public hearing to consider the contingency measures identified to
48 address the potential violation. The State will require implementation of such corrective action
49 no later than one year after a violation is confirmed. Any contingency measures adopted and
50 implemented will become part of the next revised maintenance plan submitted to the EPA for
51 approval.

1 It is also possible that contingency measures may be pre-implemented, where no violation of the
2 2006 PM₁₀ NAAQS has yet occurred.
3
4