UTAH

PM10 Maintenance Provisions for Ogden City

Section IX.A.12

Adopted by the Air Quality Board
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IX.A.12.a Introduction

The foregoing Subsections 1-9 of Part IX.A of the Utah State Implementation Plans (SIP) were written in 1991 to address violations of the National Ambient Air Quality Standards (NAAQS) for PM_{10} in both Utah County and Salt Lake County. These areas were each classified as Initial Moderate PM_{10} Nonattainment Areas, and as such required "nonattainment SIPs" to bring them into compliance with the NAAQS by a statutory attainment date. The control measures adopted as part of those plans have proven successful in that regard, and at the time of this writing (2005) each of these areas has a substantial record of continued compliance with the federal health standards for PM_{10}.

Subsections 10 and 11 of Part IX.A of the Utah SIP represent the second chapter of the PM_{10} story for these areas, and demonstrate that they have achieved compliance with the PM_{10} NAAQS and will continue to maintain that standard through the year 2017. As such, Subsections 10 and 11 are written in accordance with Section 175A (42 U.S.C. 7505a) of the Act, and should serve to satisfy the requirement of Section 107(d)(3)(E)(iv), should Utah pursue the option of petitioning the EPA to ultimately redesignate any of its current nonattainment areas.

This Subsection 12 makes the same demonstration with respect to Ogden City, and is structured in the same way. It is hereafter referred to as the "Maintenance Plan" or "the Plan," and contains the PM_{10} maintenance provisions for Ogden City. This area was effectively designated to nonattainment for PM_{10} on September 26, 1995.

Any references to the Technical Support Document (TSD) in this section means actually Supplement III-05 to the Technical Support Document for the PM_{10} SIP.

Background

The federal Clean Air Act requires areas failing to meet the federal ambient PM_{10} standard to develop SIP revisions with sufficient control requirements to expeditiously attain and maintain the standard. On July 1, 1987, EPA promulgated a new NAAQS for particulate matter with a diameter of 10 microns or less (PM_{10})

Ogden City was designated from unclassifiable to nonattainment on September 26, 1995. This was due to a total of six exceedances of the 24-hour standard recorded between January 1991 and January 1993. Along with redesignation came the requirement for a nonattainment SIP, due in 18 months, and an attainment date of December 31, 2001.

However, in 1997 a new standard for PM_{10} was promulgated by the EPA, and, based on the revised form of this new standard, Ogden City would never have been found to be in noncompliance.

In an effort to transition to the new form of the PM10 standard, EPA issued its Interim Implementation Guidance (IIG) on December 23, 1997. This, in conjunction with additional guidance (5/8/98 memorandum from Sally L. Shaver to all Regional Air Directors) identified two steps necessary to revoke the old standard for areas like Ogden City that were presently (as of

September 16, 1997) attaining the standard. The State would need to: 1) codify into its SIP any existing controls that were implemented at the state level, and 2) demonstrate the state's capacity to implement the revised PM_{10} standards with respect to the Clean Air Act (CAA) requirements found at Section 110.

By letter of March 27, 1998, Utah declared it could meet the second of these requirements for all areas of the state. A second letter (June 25, 1998) addressed the first requirement, and requested that the old PM_{10} standard be revoked and that the outstanding Part D requirement be waived for Ogden City.

EPA responded in a letter dated August 12, 1999 that the rationale for revoking the old standard would no longer apply because the United States D.C. Circuit Court of Appeals had, on May 14, 1999, vacated the 1997 PM_{10} NAAQS. This meant that Utah's obligation to satisfy the Part D requirements with respect to the pre-1997 NAAQS was still outstanding.

In the wake of the ruling by the D.C. Circuit, EPA (on October 18, 1999) made available its PM_{10} Clean Data Areas Approach, providing areas like Ogden City with another avenue by which to satisfy any outstanding Part D requirements. This applied EPA's clean data policy concept for ozone to selected PM_{10} nonattainment areas with simple PM_{10} source problems such as residential wood combustion and fugitive dust. The area would have to: 1) be attaining the NAAQS with the three most recent years of quality assured air quality data, 2) continue to operate an appropriate PM_{10} monitoring network in order to verify the attainment status of the area, and 3) the control measures responsible for bringing the area into attainment must be approved by EPA. EPA would also need to find that the area had adopted RACM/RACT, and make a finding that the area attained the 24-hour and annual PM_{10} NAAQS. Should these criteria be met, the area would no longer have to meet the criteria for developing RFP demonstrations, and contingency measures would be waived. Also any sanction clocks that may have been running would be stopped.

Utah addressed these criteria for Ogden City in a letter dated March 30, 2000. In particular, it identified a number of control measures that applied to nonattainment areas in general and were at least partly responsible for bringing the area into compliance with the PM_{10} NAAQS. Since these measures (open burning rule, visible emissions rule, fugitive dust rule, and vehicle I/M) were incorporated into the Utah SIP, and since the IIG had indicated that it would be inappropriate to require any new control measures, it could be concluded that the Part D planning requirements for Ogden City had been satisfied. The March 30, 2000, letter cited agreement between the respective agencies on these three criteria, and accordingly petitioned EPA to note in the Federal Register that the Part D planning requirements for Ogden City had in fact been satisfied. It also acknowledged that such action would not constitute a redesignation under CAA Section 107, and that if the State wished to request that Ogden City be redesignated to attainment, then subsequent action must be taken under CAA Section 175[A].

Also acknowledged was the obligation to produce a basic emissions inventory for Ogden City to the satisfaction of EPA Region VIII. After a period of public review and comment, the inventory was transmitted to EPA on August 9, 2001. The State identified this inventory as the only remaining element among the criteria outlined in the PM_{10} Clean Data Areas Approach, and again requested that EPA find in the Federal Register that Utah had fulfilled its planning requirements for Ogden City, under Part D of the CAA.

Utah had been collecting ambient PM_{10} data at the Ogden site (AIRS # 49-057-0001) since April of 1987, and had no intentions of discontinuing data collection at that site. However, in February of 2000 the structure on which the monitor was situated was demolished, and it was not until July 1, 2001 that collection could resume at a new location (AIRS # 49-057-0002). Unfortunately, this meant that EPA could take no action. Although Utah was again meeting the second criteria of the PM_{10} Clean Data Areas Approach (to continue monitoring), the first criterion was now called into question. Although the data collected from 1994 through February of 2000 showed continued compliance with the NAAQS, Utah did not have data for the three most recent years.

This was addressed in a letter to EPA dated November 6, 2001. Attached to that letter was an analysis intended to provide both EPA and the public that the ambient air within Ogden City had remained within the standards set for public health. This quantitative analysis, based on a surrogate monitor, concluded that the likelihood of having violated the PM_{10} NAAQS in Ogden City during that time was less than one in 1,500. It was suggested that EPA could use this information to help conclude that Ogden City was attaining the PM_{10} NAAQS as of its statutory attainment date (December 31, 2001), and was attaining the PM_{10} NAAQS to the extent that it would remain eligible for the PM_{10} Clean Data Areas Approach.

As of the date of this writing (2005), Utah has collected three full calendar years of ambient data at the new Ogden site (2002, 2003, and 2004). Based on this 3-year data set, Ogden City is attaining the PM_{10} NAAQS. Utah has once again (by letter of February 15, 2005) petitioned EPA to find in the Federal Register that it has satisfied its planning obligation under Part D of the CAA for Ogden City.

IX.A.12.b Pre-requisites to Area Redesignation

The Clean Air Act §107(d)(3)(E) outlines five requirements that must be satisfied in order that a state may petition the Administrator to redesignate a nonattainment area back to attainment. These requirements are summarized as follows: 1) the Administrator determines that the area has attained the applicable NAAQS, 2) the Administrator has fully approved the applicable implementation plan for the area under §110(k), 3) the Administrator determines that the improvement in air quality is due to permanent and enforceable reductions in emissions resulting from implementation of the applicable implementation plan … and other permanent and enforceable reductions, 4) the Administrator has fully approved a maintenance plan for the area as meeting the requirements of §175A, and 5) the State containing such area has met all requirements applicable to the area under §110 and Part D.

Each of these requirements will be addressed below. Certainly, the central element from this list is the maintenance plan found at Subsection IX.A.12.c below. Section 175A of the Act contains the necessary requirements of a maintenance plan, and EPA policy based on the Act requires additional elements in order that such plan be federally approvable. Table IX.A.41 identifies the prerequisites that must be fulfilled before a nonattainment area may be redesignated to attainment under Section 107(d)(3)(E).

Table IX.A.41 Prerequisites to Redesignation			
Category	**Requirement**	**Reference**	**Addressed in Section**
Attainment of Standard	Three consecutive years of PM10 monitoring data must show that violations of the standard are no longer occurring.	CAA §107(d)(3)(E)(i)	IX.A.12.b(1)
Approved State Implementation Plan	The SIP for the area must be fully approved.	CAA §107(d)(3)(E)(ii)	IX.A.12.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.12.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.12.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.12.b(5) and IX.A.12.c

(1) The Area Has Attained the PM_{10} NAAQS

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

(a) Ambient Air Quality Data (Monitoring)

In 1987 EPA promulgated the National Ambient Air Quality Standard (NAAQS) for PM_{10}. The NAAQS for PM_{10} is listed in 40 CFR 50.6 along with the criteria for attaining the standard. The 24-hour NAAQS is 150 micrograms per cubic meter (ug/m^3) for a 24-hour period, measured from midnight to midnight. The 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 ug/m^3, as determined in accordance with Appendix K to that part, is equal to or less than one. In other words, each monitoring site is allowed up to three expected exceedances of the 24-hour standard within a period of three calendar years. More than three expected exceedances in that three-year period is a violation of the NAAQS. There is also an annual standard of 50 ug/m^3. The annual standard is attained if the three-year average of individual annual averages is less than 50 ug/m^3. Three consecutive years of PM_{10} monitoring data must show that violations of the 24-hour and annual standard are no longer occurring in order for an area to be considered to be attaining the NAAQS.

40 CFR 58 Appendix K, Interpretation of the National Ambient Air Quality Standards for Particulate Matter, acknowledges the uncertainty inherent in measuring ambient PM_{10} concentrations by specifying that an *observed exceedance* of the (150 ug/m^3) 24-hour health

standard means a daily value that is above the level of the 24-hour standard after rounding to the nearest 10 ug/m^3 (e.g., values ending in 5 or greater are to be rounded up).

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

Expected exceedances are calculated from the Aerometric Information and Retrieval System (AIRS) data base according to procedures contained in 40 CFR Part 50, Appendix K. The State relied on the expected exceedance values contained in the AIRS Quick Look Report (AMP 450) to determine if a violation of the standard had occurred. In compiling the data to be evaluated herein, any data which had been flagged by DAQ and which had not yet been concurred with by EPA was not considered. 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. Appendix N to Part 50 – "Interpretation of the National Ambient Air Quality Standards for Particulate Matter" anticipates this and states: "Data resulting from uncontrollable or natural events, for example structural fires or high winds, may require special consideration. In some cases, it may be appropriate to exclude these data because they could result in inappropriate values to compare with the levels of the PM standards." The protocol for data handling dictates that flagging is initiated by the state or local agency, and then the EPA either concurs or indicates that it has not concurred. When data is flagged, it is generally not used for planning purposes because it is not indicative of either the assumptions upon which airshed management decisions are made or the ultimate effects of those decisions. Nevertheless, some discussion will be provided that indicates what the ramifications of this data would be if it were to have been included.

Using this criteria, data was compiled for the Ogden City PM_{10} monitor comprising the years 2002, 2003 and 2004. The number of expected exceedances is reported for each year, and then the average number of expected exceedances is reported for the three-year period. If this average number of expected exceedances is less than or equal to 1.0, then the monitor is said to be in compliance with the 24-hour standard for PM_{10}.

In a similar way, the annual arithmetic mean concentrations of PM_{10} are reported for each year, and then averaged to produce the result that is compared with the annual PM_{10} standard of 50 ug/m^3.

As illustrated in the table below, the results of this exercise show that the Ogden City PM_{10} nonattainment area is presently attaining the NAAQS.

Table IX.A.42 PM10 Compliance in Ogden, 2002-2004

Ogden2 49-057-0001	**24-hr Standard**	**Annual Standard**
	No. Expected Exceedances	Annual Arithmetic Mean
2002	1.0	34.7
2003	1.0/2.0*	28.7/29.3*
2004	0.0	28.2
3-Year Average	**0.7/1.0***	**30.5/30.7***

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

Additional information presented in Subsection IX.A.12.b(3) shows that the Ogden City PM_{10} nonattainment area has not exceeded the 24-hour standard since 1993. It actually attained the standard as of December 31, 1996, and has remained in compliance with the PM_{10} NAAQS through 2004. The annual standard was never violated.

At the Ogden2 monitor - there was one day in 2003 (229 ug/m3 on April 1) that was flagged by DAQ because of high winds. On this day, the Wasatch Front experienced a very dusty wind event due to a dry frontal passage, and elevated concentrations were observed and flagged at other monitor locations. This event has been included in the proposed Natural Events Action Plan (NEAP) as typifying the circumstances under which it would be appropriate to attach a flag to the data. DAQ expects that the EPA will concur with the flag when it approves the NEAP. Such concurrence would indicate that, despite regional control measures and mitigative action to address fugitive dust, the wind-speeds were such that it would be unreasonable to expect that high concentrations of blowing dust could have been prevented.

There were also two other exceedances that were flagged on the 4^{th} of July; one in 2002 (163 ug/m3) and the other in 2003 (204 ug/m3). In both cases, EPA has not concurred with the flags. Investigation by DAQ found that they were both caused by a local neighborhood fireworks celebration in the same parking lot where the monitor is located. Even though DAQ does not believe that the high concentrations there were indicative of the entire Ogden area, there does not exist (in the protocol) an appropriate reason to flag the data. Therefore, EPA did not concur.

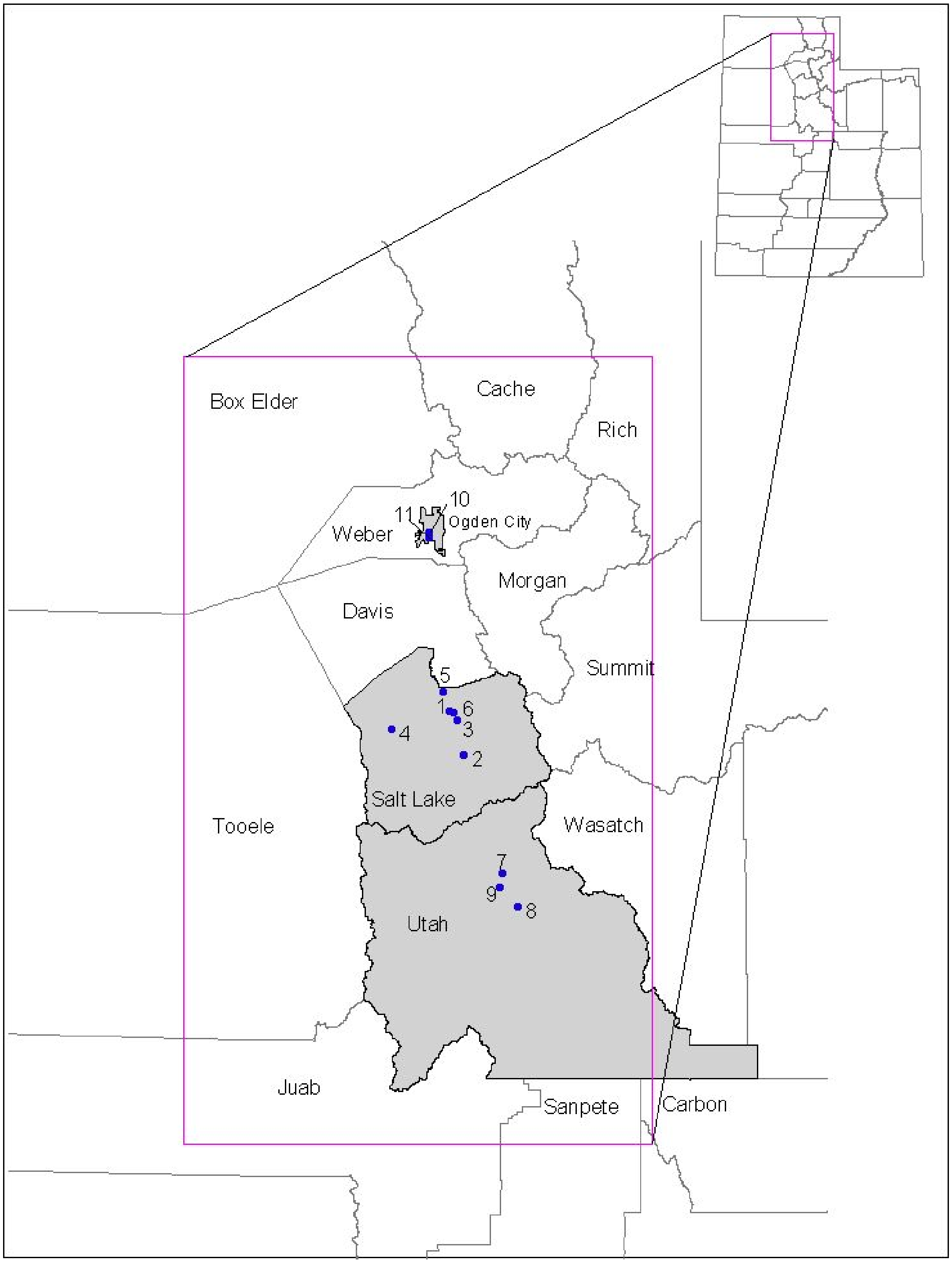
Nevertheless, even if EPA were to not concur with the high wind flag from 2003, the 3-year average of expected exceedances at Ogden would not exceed 1.0, and the 3-year average of annual arithmetic mean concentrations would be less than 50. Therefore, the overall conclusion would remain the same. Ogden City is attaining the PM_{10} NAAQS with the three most recent years of air quality data.

(b) PM10 Monitoring Network

The overall assessments made in the preceding paragraph were based on data collected at monitoring stations located throughout the nonattainment areas. The Utah DAQ maintains a network of PM_{10} monitoring stations in accordance with 40 CFR 58. These stations are referred to as SLAMS sites, meaning that they are State and Local Air Monitoring Stations. In consultation with EPA, an Annual Monitoring Network Review is developed to address the adequacy of the monitoring network for all criteria pollutants. Within the network, individual stations may be situated so as to monitor large sources of PM_{10}, capture the highest concentrations in the area, represent residential areas, or assess regional concentrations of PM_{10}. Collectively, these monitors make up Utah's PM_{10} monitoring network. The following paragraphs describe the network in each of Utah's three nonattainment areas for PM_{10}.

Provided in Figure IX.A.45 is a map of the modeling domain that shows the existing PM_{10} nonattainment areas and the locations of the monitors therein. Some of the monitors at these locations are no longer operational, but they have been included for informational purposes.

Figure IX.A.45 Modeling Domain



The following PM_{10} monitoring stations operated in the Salt Lake County PM_{10} nonattainment area from 1985 through 2004. They are numbered as they appear on the map:

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

2. Cottonwood (AIRS number 49-035-0003): This site is located in a suburban residential area. It has been collecting data since 1986.
3. Hawthorne (AIRS number 49-035-3006): This site is located in a suburban residential area. It began collecting data in 1997.
4. Magna (AIRS number 49-035-1001): This site is located in a suburban residential area. It is largely impacted (at times) by blowing dust from a large tailings impoundment, and as such is anomalous with respect to the typical wintertime scenario that otherwise characterizes the nonattainment area. It has been collecting data since 1987.
5. North Salt Lake (AIRS number 49-035-0012): This site is located in an industrial area that is impacted by sand and gravel operations, freeway traffic, and several refineries. It is situated near a residential area as well. It has been collecting data since 1985.
6. Salt Lake City (AIRS number 49-035-3001): This site was situated in an urban city center. It was discontinued in 1994 because of modifications that were made to the air conditioning on the roof-top.

The following PM_{10} monitoring stations operated in the Utah County PM_{10} nonattainment area from 1985 through 2004. They are numbered as they appear on the map:

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

The following PM_{10} monitoring stations operated in the Ogden City PM_{10} nonattainment area from 1986 through 2004. They are numbered as they appear on the map:

10. Ogden 1 (AIRS number 49-057-0001): This site was situated in an urban city center. It was discontinued in 2000 because DAQ lost its lease on the building.
11. Ogden 2 (AIRS number 49-057-0002): This site began collecting data in 2001, as a replacement for the Ogden 1 location. It too is situated in an urban city center.

(c) Modeling Element

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

Information concerning PM_{10} monitoring in Utah is included in the Annual Monitoring Network Review. Since the early 1980's, the network review has been updated annually and submitted to EPA for approval. EPA has concurred with the annual network reviews and agreed that the network is adequate. EPA personnel have also visited the monitor sites on several occasions to verify compliance with federal siting requirements.

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

Though none of Utah's three PM_{10} nonattainment areas was designated based on modeling, it is still worth pointing out that an air quality modeling analysis was conducted for the purpose of this maintenance demonstration. It shows that all three nonattainment areas are presently in compliance, and will continue to comply with the PM_{10} NAAQS through the year 2017.

(d) EPA Acknowledgement

The data presented in the preceding paragraphs shows quite clearly that the Ogden City PM_{10} nonattainment area has attained the NAAQS. An acknowledgement to that effect was to have been made in the Federal Register for Ogden City by June 30, 2002.

(2) Fully Approved Attainment Plan for PM_{10}

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

As discussed in the IX.A.12.a(4) above, there is no approved SIP for Ogden City. Nevertheless, at the time of this writing, it is anticipated that the planning requirements under Part D of the CAA will be found by EPA to have been satisfied via its PM_{10} Clean Data Areas Approach (October 18, 1999).

(3) Improvements in Air Quality Due to Reductions in Emissions

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

(a) Improvement in Air Quality

The improvement in air quality with respect to PM_{10} can be shown in a number of ways. Improvement, in this case, is relative to the various control strategies that affected the airshed.

In the case of Ogden City, there were a number of control measures incorporated into the Utah SIP on either a state-wide basis or as applicable to nonattainment areas in general. As discussed in Subsection IX.A.12.a(1) above, these measures were at least partly responsible for bringing the area into compliance with the PM_{10} NAAQS. The introduction of these measures (open burning rule, visible emissions rule, fugitive dust rule, and vehicle I/M) was not so abrupt as was the case in the other two nonattainment areas, but Vehicle I/M did begin in 1990 which is relatively coincident with the peak of measured concentrations for the area. Its effectiveness is seen in all subsequent years.

Referring back to the discussion of the PM_{10} NAAQS in Subsection IX.A.12.b(1), it is apparent that the number of expected exceedances of the 24-hour standard is an important indicator. As such, this information has been tabulated for each of the monitors located in each of the nonattainment areas. The data in Table IX.A.43 below reveals a marked decline in the number of these expected exceedances. This decline is especially revealing in light of the significant growth experienced during this same period in time.

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 Figure IX.A.38 which shows the three highest 24-hour concentrations observed in a particular year. 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, any control measures directed at the precursors to PM_{10} would not be evident.

In considering the annual PM_{10} standard, the value of the annual arithmetic mean is clearly the most significant parameter to consider. Annual arithmetic means have been plotted in Figure IX.A.47.

As discussed before in section IX.A.12.b(1), any data which had been flagged by DAQ and which had not yet been concurred with by EPA was not considered for the purpose of this discussion. 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. Nevertheless, some discussion will be provided that indicates what the ramifications of this data would be if it were to have been included in the discussion concerning improvements in air quality due to permanent and enforceable reductions in emissions.

As illustrated in Table IX.A.43 below, the results of this exercise show that the Ogden City PM_{10} nonattainment area has experienced significant improvements in air quality with respect to PM_{10}. The gray cells indicate that the monitor was not in operation.

Table IX.A.43 Ogden City Expected Exceedances per Year, 1985-2004

Monitors	Ogden1	Ogden2
1985		
1986	0	
1987	0	
1988	0	
1989	0	
1990	0	
1991	2.1	
1992	2.1	
1993	2.1	
1994	0	
1995	0	
1996	0	
1997	0	
1998	0	
1999	0	
2000	0	
2001		0
2002		1.0
2003		1.0 / 2.0*
2004		0

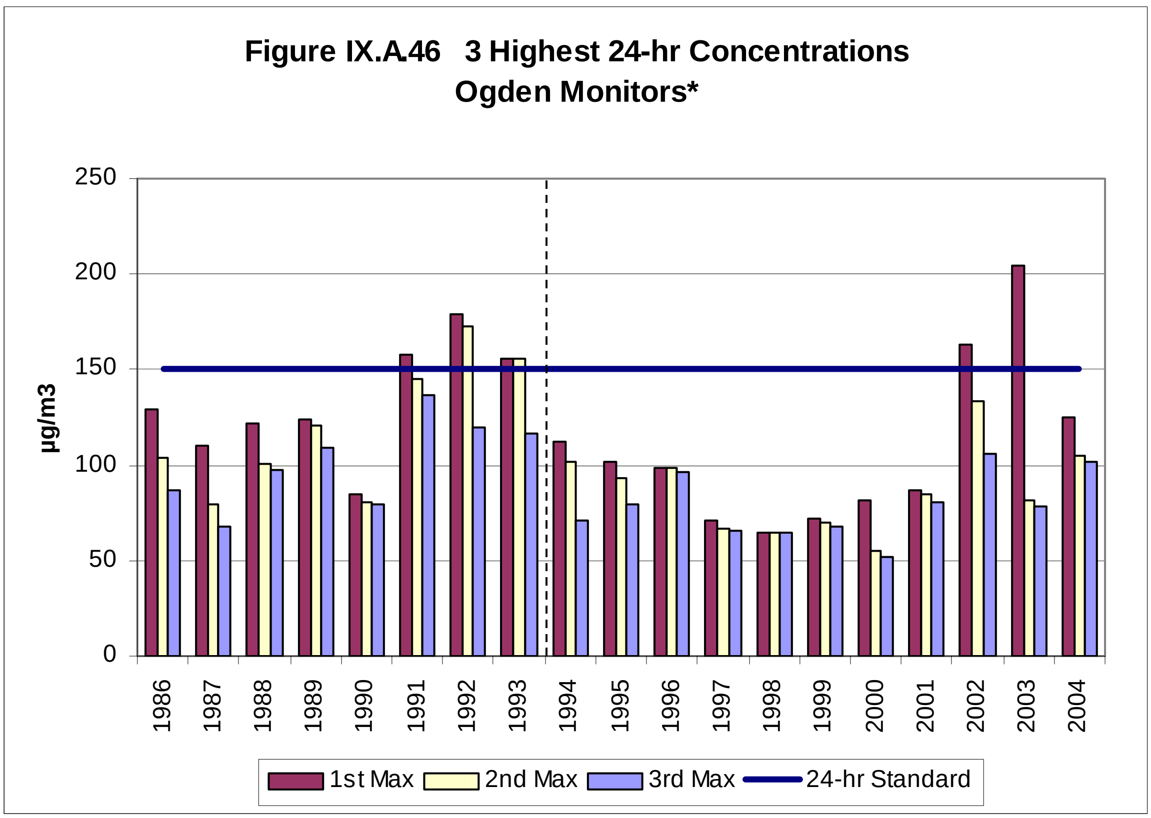
* The second set of numbers shows what would be the effect of including all of the data that has been flagged by DAQ and not yet concurred with by EPA.

As discussed before, such data is not necessarily considered representative of airshed management, and as such it should be noted that the focus of the control strategies included in the

Utah SIP for the Ogden City area did include measures to control fugitive dust, it was most certainly not directed at neighborhood fireworks displays. Therefore, in the context of evaluating the effectiveness of these controls, the inclusion of several fireworks events will absolutely mislead the reader. Taken with the fact that the site of PM_{10} monitoring in Ogden City was moved to this particular neighborhood in 2001, the inclusion of this data is not appropriate for the analysis of long term trends of ambient air quality representing Ogden City at large.

The data that has been flagged by DAQ, and has not or not yet been concurred with by EPA includes the following:

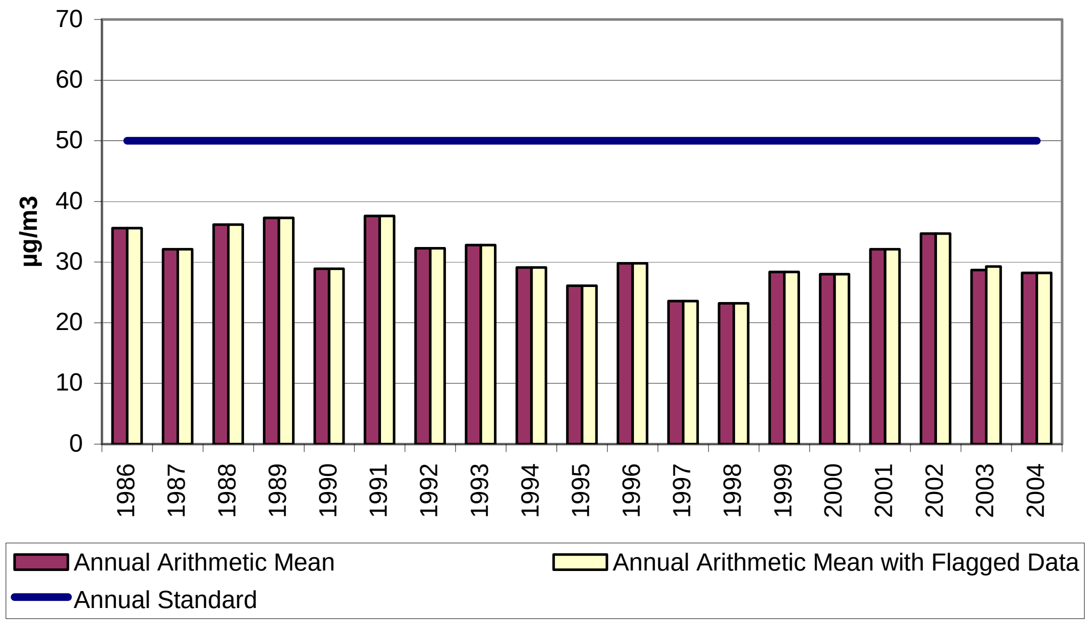
At the Ogden2 monitor - there was one day in 2003 (229 ug/m3 on April 1) that was flagged by DAQ because of high winds, and two other exceedances that were flagged on the 4^{th} of July; one in 2002 (163 ug/m3) and the other in 2003 (204 ug/m3). EPA did not concur with the flags on the 4^{th} of July (for either 2002 or 2003).



* 2000 and 2001 reflect only partial-year data. See Subsection IX.A.12.a for explanation. (Vertical dotted line indicates complete implementation of 1991 SIP control measures.)

Note that the location of the Ogden monitor changed in 2001. Also, as discussed before in section IX.A.12.b(1), any data which had been flagged by DAQ and which had not yet been concurred with by EPA was not considered in preparing Figure IX.A.42. 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. The data that was flagged has already been discussed, and the values were provided so that an additional Figure is not necessary.

Figure IX.A.47 Annual Arithmetic Mean
Ogden Monitors*



* 2000 and 2001 reflect only part-year data. See Subsection IX.A.12.a for explanation. (Vertical dotted line indicates complete implementation of 1991 SIP control measures.)

Note that the location of the Ogden monitor changed in 2001. Also, as discussed before in Section IX.A.12.b(1), any data which had been flagged by DAQ and which had not yet been concurred with by EPA was generally not considered in preparing the maintenance plan. 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. Nonetheless, Figure IX.A.47 also indicates what the annual arithmetic mean PM_{10} concentration would be if the flagged event from 2003 were to eventually be "not concurred with" by EPA. Inclusion of the flagged data has no discernable effect on the trend shown by the figure.

(b) Reduction in Emissions

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

Ogden City was designated nonattainment based on data collected in 1991 through 1993.

As mentioned before, the ambient air quality data presented in Subsection IX.A.12.b(3)(a) above includes values prior to these dates in order to give a representation of the air quality prior to the application of any control measures. It then includes data collected from then until the present time to illustrate the lasting effect of these controls. In discussing the effect of the controls, as well as the control measures themselves, however, it is important to keep in mind the time necessary for their implemention.

For Ogden City, the statutory date for RACM implementation was four years after designation, or September 26, 1999. Its attainment date was December 31, 2001. As discussed earlier, there was no nonattainment SIP for Ogden City, but there were a number of control measures that applied to nonattainment areas in general and were at least partly responsible for bringing the area into compliance with the PM_{10} NAAQS.

Since these control measures (open burning rule, visible emissions rule, fugitive dust rule, and vehicle I/M) were incorporated into the Utah SIP, the emission reductions that resulted are consistent with the notion of permanent and enforceable improvements in air quality. Taken together, the trends in ambient air quality illustrated in the preceding paragraph, along with the continued implementation of these control measures, provide a reliable indication that these improvements in air quality reflect the application of permanent steps to improve the air quality in the region, rather than just temporary economic or meteorological changes.

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

CAA 107(d)(3)(E)(v) - The State containing such area has met all requirements applicable to the area under section 110 and part D. Section 110 of the CAA deals with the broad scope of state implementation plans and the capacity of the respective state agency to effectively administer such a plan. Sections I through VIII of Utah's SIP contain information relevant to these criteria. Part D deals specifically with plan requirements for nonattainment areas, and includes the requirements for a maintenance plan in Section 175A.

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

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

Part D of the Clean Air Act addresses "Plan Requirements for Nonattainment Areas". One of the pre-conditions for a maintenance plan is a fully approved attainment plan for the area. This is also discussed in section IX.A.12.b(2).

For Ogden City, it is anticipated that the Part D requirements for PM_{10} will be found to have been satisfied via EPA's Clean Data Areas Approach (October 18, 1999).

(5) Maintenance Plan for PM_{10} Areas

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

IX.A.12.c Maintenance Plan

CAA 107(d)(3)(E)(iv) - The Administrator has fully approved a maintenance plan for the area as meeting the requirements of section 175A. An approved maintenance plan is one of several criteria necessary for area redesignation as outlined in CAA 107(d)(3)(E). The maintenance plan itself, as described in Section 175A of the CAA and further addressed in EPA guidance (Procedures for Processing Requests to Redesignate Areas to Attainment, John Calcagni to Regional Air Directors, September 4, 1992; or for the purpose of this document, simply "Calcagni"), has its own list of required elements. The following table is presented to summarize these requirements. Each will then be addressed in turn.

Table IX.A.44 Requirements of a Maintenance Plan

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.12.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.12.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.12.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.12.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.12.c(9)

(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. The guidance goes on to say that, in cases where a nonattainment SIP was based on air quality modeling, the maintenance plan should be based upon the same level of modeling used before. Furthermore, it says, such modeling should be consistent with current EPA modeling guidance.

The existing PM_{10} nonattainment SIP demonstrations for both Salt Lake and Utah Counties were based on a statistical modeling approach called chemical mass balance (CMB). This is a receptor based model that does not directly factor meteorology or dispersion characteristics into its predictions. Furthermore, CMB is limited in its treatment of secondary aerosol formation, which has historically accounted for between 65% and 85% of the overall PM_{10} collected at the monitoring stations. While the success of these nonattainment SIPs is more or less an endorsement of the CMB modeling upon which they were founded, EPA felt that any subsequent demonstration of maintenance should rely instead on a model that is more comprehensive in its assumptions.

In consultation with EPA Region VIII, DAQ decided to base the new Maintenance Plan upon a grid-based aerosol model called UAM-AERO. This model is an extension of the widely used photochemical model, the Urban Airshed Model (UAM) Version IV, which has been adapted to treat aerosol processes. DAQ established a UAM-AERO modeling domain that included each of Utah's three PM_{10} nonattainment areas. This single comprehensive modeling analysis serves as the basis for the maintenance demonstration for each area.

The model was applied to address elevated 24-hour concentrations of PM_{10} along the Wasatch Front (WF). These develop during winter-time episodes of regional scale high pressure and associated valley temperature inversions. The inversions promote the accumulation of PM_{10} and PM_{10} precursor gases that lead to significant secondary aerosol formation. Before the nonattainment SIPs were implemented, these ambient values often exceeded the 24-hour health standard for PM_{10}.

In this analysis, DAQ has employed UAM-AERO to evaluate the airshed under worst case winter-time inversion conditions. In order to do so, the model considers two historical episodes: 1) January 1-10, 2001 and 2) February 1-8, 2002. Episode selection was based on criteria that included meteorology, observed PM_{10} concentrations, and data availability. Further discussion concerning episode selection can be found in Section 2 of the modeling portion of the technical support document (TSD).

Despite numerous severe inversion episodes during the past decade, PM_{10} concentrations have not been sufficient to cause a violation of the NAAQS. Consequently, the two selected episodes do not represent NAAQS violations, but do capture elevated PM_{10} concentrations, worst-case meteorology, and current emission levels. Therefore, by modeling these episodes and projecting emissions into future years, the analysis should accurately reflect the ability of the nonattainment areas to maintain the PM_{10} NAAQs over the next 10 years.

The DAQ modeling analysis requires two main inputs: meteorological data and emissions data. The applications of these inputs are discussed below.

(a) Meteorological data

Recent UDAQ meteorological modeling projects using advanced "state of the science" prognostic meteorological models have proven unsuccessful in simulating highly variable Wasatch Front meteorology during inversion conditions. These problems led UDAQ to choose a diagnostic meteorological model called the Diagnostic Wind Model (DWM) model for the January 2001 and

February 2002 episodes to avert many of the past modeling problems. The DWM assimilates actual observations of wind speed and direction to diagnose and construct a consistent wind field.

UDAQ embarked on a 4-phase modeling approach in order to develop the most realistic wind fields possible. Each phase of the 4-phase modeling approach utilized unique combinations of observed meteorological data for each analysis. Each of the 4 phases is described below:

Phase 1

The DWM model was run utilizing 60-100 surface observing stations, two radiosondes, and two SODARs per day. The surface station data was taken from the University of Utah MESOWEST database and included a wide variety of station types. Phase 1 of modeling utilized only surface stations with an elevation of 5,500ft or lower. The National Weather Service Salt Lake City radiosonde data was used along with two DAQ SODAR units operated in Utah and Salt Lake valleys. It was thought that the multitude of available data would allow DWM to produce representative wind fields.

UAM-AERO results showed modeled PM_{10} values that were only 40-50% of the observed values. Model output evaluation showed that PM_{10} was being advected out of the Salt Lake Valley (SLV) and the model domain to the SE. Afternoon up-valley NW winds moved PM_{10} into the mountains to the SE of the SLV. At night, winds became light and variable at most surface stations and as a result were unable to return the PM_{10} back to the SLV. Additionally, DAQ's hypothesized benefit of having a multitude of surface stations actually induced unrealistic vertical motions due to surface convergence of widely varying wind directions.

Phase 2

The failings of phase 1 encouraged DAQ to be more selective of the surface stations used in DWM. First, the Salt Lake Valley SODAR was discarded due to observations that were incongruent with the Utah Valley SODAR and the Salt Lake City radiosonde. Second, DAQ selected only the DAQ operated surface stations. These surface stations are situated in strategic locations across the Wasatch Front. 11 DAQ stations were used. The phase 2 hypothesis was that the more selective set of surface stations might produce a wind field with less convergence and resultant vertical motions.

DAQ found that the phase 2 wind fields produce periods of daytime NW winds that advected pollutants out of the SLV. The nocturnal and morning winds were light and variable and were unable to return the pollutants to the SLV. Most of the observations within the SLV show a trend of daytime up-valley flow and nighttime weak variable flow. In reality, the daytime flown re-circulates within the boundaries of the inversion but in UAM-AERO the continuous grid network cannot retain the flow within the open sided grid cells of the SLV.

Phase 3

Phase 2 results showed transport of PM_{10} out of the SLV. Model evaluation clearly showed a direct link with the observation wind direction and speeds. Phase 3 tested the possibility that a single station located in SLV might produce a wind field that has a more even distribution of wind direction and speeds. In other words, is there a station in SLV that is representative of the valley but where daytime winds and nighttime winds balance each other? If so, developing a wind field from a single station may reduce advection out of the SLV.

Three separate wind fields were developed in phase 3. These wind fields utilized the centrally located and well sited DAQ Hawthorne and West Valley monitors as well as another well sited but southeasterly located DAQ Cottonwood station. The results of phase 3 modeling again showed advection out of the SLV and the domain. Stronger daytime NW winds compared to nighttime light and variable winds again forced the loss of PM_{10}.

Phase 4

Phases 1-3 clearly demonstrated the inability of the DWM model to accurately represent the conceptual understanding of inversion conditions. The model deficiencies arise from the model grid-cell structure. The model grid cells are continuous and are unable to "trap" or contain air within an inversion layer. The real wind observations in the SLV do have advective properties that would allow the pollutants to move beyond the boundaries of the SLV under non-inversion conditions. However, under inversion conditions the advective properties of the real wind observations are negated by a forced recirculation of air within the inversion layer by the containing boundaries of the inversion.

In phase 4, a purely idealized flow was created in the attempt to retain pollutants in the SLV. A bimodal wind direction field was created using an afternoon NW wind (330) and an evening, night, and morning SE wind (140). These directions correspond to daytime up-valley flow and nighttime down-valley flow. Wind speeds were chosen so that advection was limited to within the boundaries of the SLV. This wind field, while idealized, fits the conceptual understanding of inversion conditions. Phase 4 modeling retains PM_{10} within the SLV and UAM-AERO PM_{10} results show excellent agreement with the observations.

(b) Emissions Data

Area, point, and mobile emissions inventories were compiled for all sources within the modeling domain. Inventories included primary PM_{10}, sulfur dioxide (SO_2), oxides of nitrogen (NO_X), carbon monoxide (CO), and volatile organic compounds (VOC). In addition, an ammonia (NH_3) inventory was estimated for area and mobile sources. Estimates of biogenic emissions were not included in the analysis because the episodes occurred in January and February when biogenic emissions are negligible. Other seasonal adjustments were also made to the inventory (adjustments are described in the modeling portion of the TSD). Base-year and projection inventories are also described in more detail in the TSD.

Emission inventories are processed and spatially placed in the modeling domain by the Sparse Matrix Operator Kernel Emission (SMOKE) modeling system. SMOKE was developed by EPA for integration into the Models-3 Air Quality Modeling System and has been used in many air quality studies. To ensure that the model represents actual emissions during each model episode day, SMOKE uses source specific Source Classification Codes to chemically speciate and temporally allocate emissions. In addition, SMOKE uses other emission characteristics, such as stack height, exit velocity, and plume temperature to place emissions in the correct vertical layer of UAM-AERO. Mobile and other area source emissions are treated as ground level emissions and input into the lowest model layer.

(c) Modeling Results

Projection year modeling was completed for the years 2005, 2008, 2011, 2014, 2015, and 2017. EPA's most current modeling guidance recommends that model predictions be used in a relative sense rather than an absolute sense. Applying the model this way is done by calculating a "relative reduction factor" (RRF) for grid cells that are co-located with a PM_{10} monitor. RRF values were computed for each day of the base-case modeling years (January 2001 and February 2002) and subsequently applied to the future year predictions. The technique for creating the individual RRF is described in section 7 of the modeling TSD.

Results demonstrated that modeled PM_{10} concentrations are highest in 2005. From there they decline until reaching a minimum value in 2011 or 2014, and then increase again through 2017. No PM_{10} values greater than 150 ug/m3 were modeled for any *ambient air* using either episode. Ambient air means anywhere that would be accessible to the general public. There were two grid cells which showed predicted concentrations in excess of 150 ug/m[3,] but they are both located on the property of Kennecott Utah Copper Corp. The general public does not have access to this area, and so these grid-cells do not represent ambient air. Results of the modeling analysis are presented below for each of Utah's three PM_{10} nonattainment areas.

Figure IX.A.48. Highest Predicted 24-hr Concentration Salt Lake County

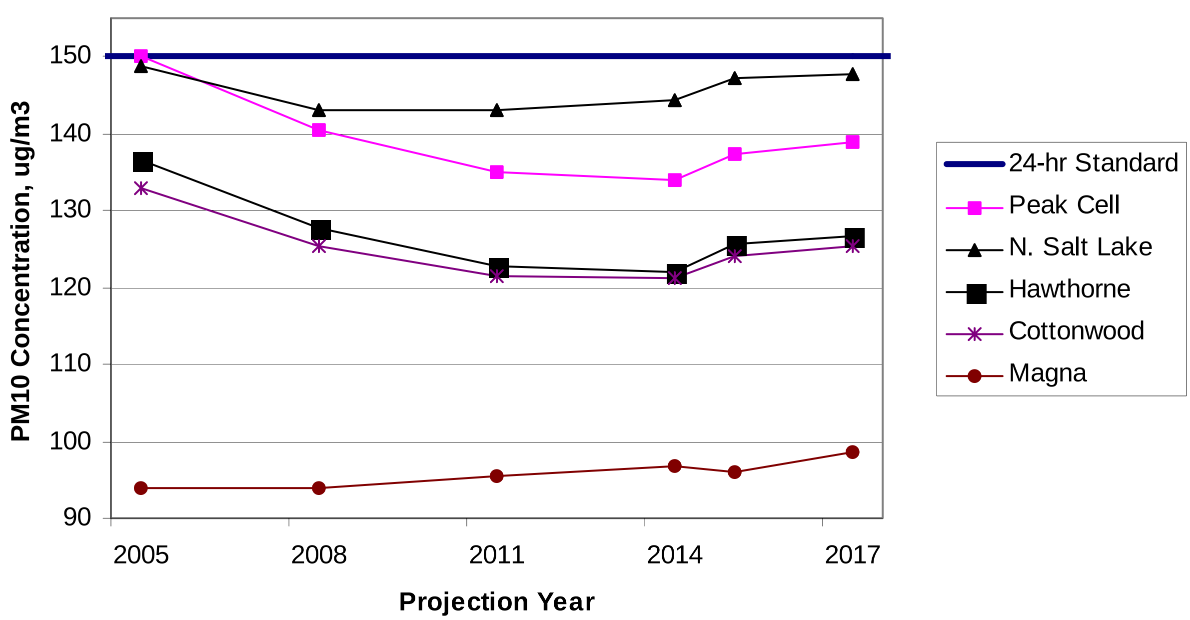


Figure IX.A.48 above illustrates the trend of predicted concentrations at the monitoring stations and the highest modeled grid cells in the Salt Lake County PM_{10} nonattainment area and the entire domain. The peak cell is near the Cottonwood monitor. These data reflect the modeled PM_{10} concentrations after application of the RRF.

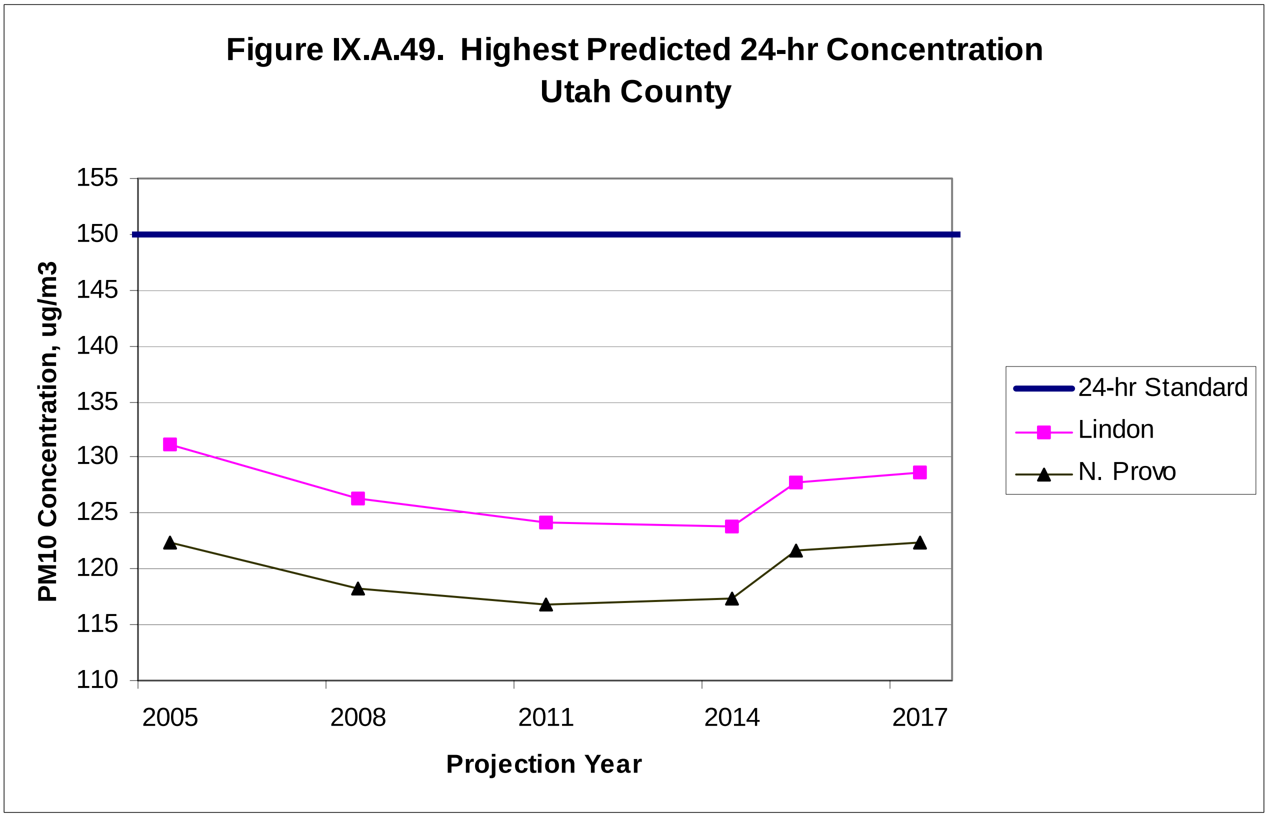


Figure IX.A.49 above illustrates the trend of predicted concentrations at the highest modeled grid-cells in the Utah County PM_{10} nonattainment area. The highest grid cell is located near the Lindon monitor. The data reflects the modeled PM_{10} concentrations after application of the RRF. The model predicts a significant margin of "safety" with respect to the health standard throughout the projection years.

Figure IX.A.50. Highest Predicted 24-hr Concentration Ogden City

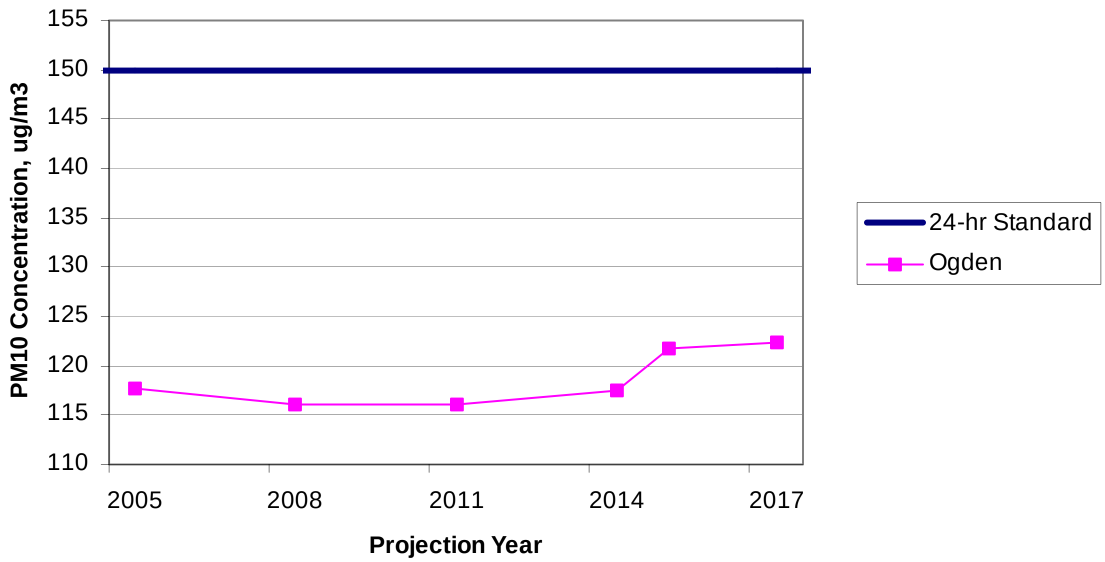


Figure IX.A.50 above illustrates the trend of predicted concentrations at the highest modeled grid cells in the Ogden City PM_{10} nonattainment area. The monitor is located in this highest grid cell. The data reflects the modeled PM_{10} concentrations after application of the RRF. The model predicts a significant margin of "safety" with respect to the health standard throughout the projection years.

(d) Annual Standard

As presented above, the modeled demonstration of maintenance was designed to address the 24-hour standard for PM_{10} during the winter conditions that drive secondary aerosol formation. This scenario has historically led to elevated concentrations of PM_{10} along the Wasatch Front.

The attainment demonstrations in the 1991 PM_{10} SIP for Salt Lake and Utah Counties were also designed to address the 24-hour standard, based on EPA guidance which states that "The SIP related emission limits should be based on the NAAQS (annual or 24-hour) which result in the most stringent control requirements" (see Subsection IX.A.9). As stated (by EPA or in that version of the SIP), it was assumed that "the application of many of the control strategies that are being implemented to reduce the 24-hour PM_{10} concentrations will also result in a reduction of the annual PM_{10} concentrations even though they are designed to reduce wintertime 24-hr concentrations." Due to the disparity in concentrations observed during the remainder of the year, "the winter season is the period that has the greatest impact on the annual average (see Table IX.A.24), and controlling PM_{10} concentrations during the winter will have the greatest impact on the annual average."

The annual PM_{10} standard was never violated in Ogden City. In fact the highest single value ever recorded (37.6 ug/m3 in 1991) was only 75% of the standard. Furthermore, as shown in Figure IX.A.47, the general trend in the annual arithmetic mean concentrations observed since 1986 is downward. As explained in section IX.A.12.b(3)(b)(iii), this trend is reflective of permanent and enforceable control measures that were incorporated into the Utah SIP. The continued implementation of these control measures provides a reliable indication that the annual mean concentrations of PM_{10} will remain well within the standard of 50 ug/m3.

(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, the attainment inventory is necessary to validate the model with respect to the ambient measurements that were made at the air monitoring locations during the commensurate period in time. For this analysis, base-year attainment inventories were compiled for 2001 and 2002.

Continued attainment is then demonstrated by running an air quality model, which considers factors related to meteorology, topography, and certain stack characteristics as well as the emissions of an air contaminant. After evaluating all of these factors, the model predicts concentrations of the air contaminant that are then compared to the health standard.

This implies that the analysis will require additional projection year inventories. Calcagni speaks to this as well, noting that the projection inventory 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 has compiled both attainment and projection inventories for use in a quantitative modeling demonstration. The emissions contained in the inventories include sources located within a regional area called a modeling domain. The modeling domain encompasses all three areas within the state that were designated as nonattainment areas for PM_{10}: Salt Lake County, Utah County, and Ogden City, as well as a bordering region see Figure IX.A.45.

There are three general categories of sources included in these inventories: industrial point sources, smaller area sources, and mobile sources.

For each of these source categories, the pollutants that were inventoried included: particulate matter with an aerodynamic diameter of ten microns or less (PM_{10}), sulfur dioxide (SO_2), oxides of nitrogen (NO_X), carbon monoxide (CO), and volatile organic compounds (VOC). SO_2 and NO_X are specifically defined as PM_{10} precursors, that is, compounds that, after being emitted to the atmosphere, undergo chemical or physical change to become PM_{10}. Any PM_{10} that is created in this way is referred to as secondary aerosol. The UAM-AERO model also considers ammonia, CO and VOC to be contributing factors in the formation of secondary aerosol.

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

The basis for the point source and area inventories, for both the base-year attainment inventories as well as all future-year projection inventories, was the 2001 inventory of actual emissions that had already been compiled by the Division of Air Quality.

Area sources, as well as the smaller point sources, were projected forward from 2001, using population and economic forecasts from the Governor's Office of Planning and Budget.

The larger point sources - those whose emissions could exceed 100 tons per year (tpy) of PM_{10}, 200 tpy NO_X, or 250 tpy SO_2 - were projected somewhat differently. These sources were evaluated at their maximum emission rates, based on existing regulatory conditions of operation and construction. Furthermore, they were evaluated on their capability to emit on a short-term basis. As such, the projected emissions from these large sources reflect enforceable emission limits that are pertinent to the protection of public health with respect to a 24-hour standard for PM_{10}. Point source projections also include any current emission reduction credits (banked emissions).

Mobile source emissions were calculated for each year using MOBILE6.1/6.2 in conjunction with the appropriate estimates for vehicle miles traveled (VMT). VMT estimates for the urban counties were based on a travel demand model that is only run periodically for specific projection years. VMT for intervening years were estimated by interpolation.

Since this SIP subsection takes the form of a maintenance plan, it must demonstrate that the area will continue to attain the PM_{10} NAAQS throughout a period of ten years from the date of EPA approval. It is also necessary to "spot check" this ten-year interval. Hence, projection inventories were prepared for the following years: 2005, 2008, 2011, 2014, and 2017 (the ten-year mark from anticipated EPA approval). 2015 was also projected as possible planning year for the purpose of future transportation conformity analyses.

The following table is provided to summarize these inventories. As described, they represent point, area, and mobile sources in the modeling domain. They include PM_{10}, SO_2, NO_X, CO and VOC, and they span from the base-years (2001 and 2002) through the projection years of 2005, 2008, 2011, 2014, and 2017.

Table IX.A.45 Emission Inventories for the Modeling Domain. Actual Emissions for 2001-2002; Emission Projections for 2005-2017

Input

CO	2001	2002	2005	2008	2011	2014	2015	2017
Point (Tons/Year) *	30,850.43	25,237.47	63,184.04	64,254.04	65,401.66	66,512.50	66,882.78	67,590.87
Area (Tons/Year)	184,125.74	186,748.59	195,132.88	203,263.30	211,525.98	219,584.84	222,202.47	227,463.10
On-Road (Tons/Day) **	1,801.72	1,935.13	2,327.33	1,987.96	1,896.95	1,832.70	1,808.67	1,824.95

NOx	2001	2002	2005	2008	2011	2014	2015	2017
Point (Tons/Year) *	17,263.27	15,606.80	37,618.03	37,947.67	38,290.32	38,614.84	38,722.94	38,918.61
Area (Tons/Year)	31,822.89	31,665.83	31,555.39	31,043.87	30,622.93	30,660.63	30,756.97	31,044.91
On-Road (Tons/Day) **	160.57	161.19	181.55	145.70	117.38	90.91	84.96	82.75

PM10	2001	2002	2005	2008	2011	2014	2015	2017
Point (Tons/Year) *	7,418.19	6,818.33	14,436.83	14,612.90	14,779.78	14,938.94	14,991.99	15,077.57
Area (Tons/Year)	16,314.20	16,231.96	16,347.93	16,595.09	16,974.18	17,365.87	17,484.59	17,692.48
On-Road (Tons/Day) **	51.30	52.33	71.02	75.85	81.16	90.00	104.84	105.38

SOx	2001	2002	2005	2008	2011	2014	2015	2017
Point (Tons/Year) *	8,884.91	6,048.77	35,494.35	35,550.44	35,607.07	35,659.65	35,677.17	35,703.41
Area (Tons/Year)	2,134.56	2,149.09	2,219.34	2,294.93	2,370.11	2,441.92	2,465.20	2,510.63
On-Road (Tons/Day) **	5.32	5.46	7.29	7.43	8.04	8.63	8.83	8.83

VOC	2001	2002	2005	2008	2011	2014	2015	2017
Point (Tons/Year) *	5,309.57	5,183.67	8,034.87	8,206.38	8,379.58	8,545.44	8,600.73	8,696.39
Area (Tons/Year)	150,738.67	150,585.37	151,664.80	153,339.12	156,232.05	159,330.42	160,290.66	162,032.65
On-Road (Tons/Day) **	89.16	89.44	88.80	71.74	60.37	51.39	49.96	49.77

* Point source totals for 2001 & 2002 include slight variations between specific episode days.
The numbers reported in this table reflect the highest number for each pollutant.
Banked emissions are included in all projection year inventories (2005 forward).

** On-Road source totals for every year include slight variations between specific episode days.
The numbers reported in this table reflect the episode day on which the NOx and the PM10 were the highest.

More detail concerning any element of the inventory can be found at the appropriate section of the Technical Support Document (TSD). More detail about the general construction of the inventory may be found in the Inventory Preparation Plan at Section 1.a of the TSD. Discussion concerning any adjustments that were made to the inventoried emissions prior to use in the UAM-AERO model may be found in the modeling section of the TSD.

(3) Emissions Limitations

As discussed above, there was a distinction made in the modeling of projected emissions for the point source category. The larger sources within the modeling domain were modeled at their maximum allowable emissions, as determined on a 24-hour basis.

A subset of these “large” sources was subsequently identified for the purpose of establishing emission limitations as part of the Utah SIP. This subset includes any large source located within any of the three current nonattainment areas for PM_{10}: Salt Lake County, Utah County, or Ogden City. A source was also included in the subset if it was currently regulated for PM_{10} under section IX, Part H of the Utah SIP. There were several sources in Davis County that were close enough to the border so as to have originally been included in the original PM_{10} SIP.

As discussed before, the emission limits for these sources had already been reflected in the projected emissions inventories used in the modeling analysis. Many of these limits appear in State issued Approval Orders or Title V Operating Permits. Such regulatory documents typically include many emission limits and operating restrictions. Only those limits that are truly significant from an airshed management perspective have been incorporated specifically into the SIP.

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

These conditions demonstrate maintenance through 2017 see subsections IX.A.12.c.(1) and (2).

(4) Emission Reduction Credits

Existing Emission Reduction Credits on file with the Utah Division of Air Quality were included in the modeled demonstration of maintenance outlined in Subsection IX.A.12.c(1). Concerning the subsequent banking of any emission reduction credits for PM_{10}, or precursors thereto, the emission levels contained in the modeled demonstration of maintenance outlined in Subsection IX.A.12.c(1), or incorporated into the Utah SIP at Section IX, Part H (formerly Appendix A to Section IX, Part A,) should serve to establish a baseline for the emission rates relied upon by this maintenance plan. These emission reduction credits, whether pre-existing or established subsequent to the approval of this SIP revision, are allowed to the extent that they are established by actual, verifiable, and enforceable reductions in emissions.

(5) Additional Controls for Future Years

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

(6) Mobile Source Budget for Purposes of Conformity

The transportation conformity provisions of section 176(c)(2)(A) of the Clean Air Act (CAA) require regional transportation plans and programs to show that "…emissions expected from implementation of plans and programs are consistent with estimates of emissions from motor vehicles and necessary emissions reductions contained in the applicable implementation plan…" EPA's transportation conformity regulation (40 CFR 93.118, last amended at 69 FR 40072, July 1, 2004) also requires that motor vehicle emission budgets must be established for the last year of the maintenance plan, and may be established for any years deemed appropriate. If the maintenance plan does not establish motor vehicle emissions budgets for any years other than the last year of the maintenance plan, the conformity regulation requires that a "demonstration of consistency with the motor vehicle emissions budgets must be accompanied by a qualitative finding that there are not factors which would cause or contribute to a new violation or exacerbate an existing violation in the years before the last year of the maintenance plan." The normal interagency consultation process required by the regulation shall determine what must be considered in order to make such a finding.

Road dust projections were estimated using the EPA PART5 particulate emissions model. However, prior to applying these emission estimates in an attainment demonstration using the UAM-AERO model, the road dust inventory was discounted by 75% as part of the attainment modeling method to more accurately reflect the conventional understanding of the relationship of modeled road dust emissions and actual fugitive dust measurements recorded by the State air quality monitoring network. The mobile source budgets set forth in this Plan for direct PM_{10} (including road dust) are based on the unmodified estimates from the PART5 model, and as such, no discount adjustments should be applied as part of the regional emissions analysis for future conformity determinations.

For transportation plan analysis years after the last year of the maintenance plan (in this case 2017), a conformity determination must show that emissions are less than or equal to the maintenance plan's motor vehicle emissions budget(s) for the last year of the implementation plan.

Mobile sources are not significant contributors of SO_2. This SIP does not establish a motor vehicle emissions budget for SO_2.

(a) Ogden City Mobile Source PM_{10} Emissions Budgets

In this maintenance plan, the State is establishing transportation conformity motor vehicle emission budgets (MVEB) for 2015 and 2017.

(i) Direct PM_{10} Emissions Budget

As presented in the TSD (Ogden City SMOKE Formats), estimated on-road mobile source emissions in 2015 and 2017 of primary sources of PM_{10} (road dust, brake wear, tire wear, and exhaust particles) were 3.10 tons per winter weekday. The maintenance demonstration in Subsection IX.A.12.c(1) estimates a maximum PM_{10} concentration of 122.3 ug/m^3 in 2017 within the Ogden City portion of the modeling domain. This is 27.7 ug/m^3 below the NAAQS of 150 ug/m^3.

EPA's conformity regulation (40 CFR 93.124) also allows the implementation plan to quantify explicitly the amount by which motor vehicle emissions could be higher while still demonstrating compliance with the maintenance requirement. The implementation plan can then allocate some or all of this additional "safety margin" to the emissions budgets for transportation conformity purposes. In this case, the safety margin equates to 27.7 ug/m^3.

Using the same emission projections for point and area and non-road mobile sources, the UAM-AERO model was re-run using 4.00 tons of PM_{10} per winter weekday for mobile sources (and 2.00 tons/winter weekday of NO_X). The revised maintenance demonstration for 2015 and 2017 still shows maintenance of the PM_{10} standard. It estimates a maximum PM_{10} concentration of 133.2 ug/m^3 in 2017 within the Ogden City portion of the modeling domain. This value is 16.8 ug/m^3 below the NAAQS of 150 ug/m^3. This maintenance plan allocates 10.9 ug/m^3 of the safety margin to the transportation MVEB, and thereby sets the direct PM_{10} MVEB for 2015 and 2017 at 4.00 tons/winter weekday.

In terms of emissions, the safety margin can be described as follows: Using 4.00 tons per day of PM_{10} and 2.00 tons per day of NO_X when modeling mobile source emissions in 2015 and 2017, the highest predicted concentration of PM_{10} was 133.2 µg/cubic meter within the Ogden City portion of the modeling domain. This shows that the safety margin is at least 0.90 tons per day of

PM_{10} (4.00 tons per day minus 3.10 tons per day) and 0.15 tons per day of NO_X (2.00 tons per day minus 1.85 tons per day). This maintenance plan allocates a portion of the safety margin to the mobile source budgets.

Mobile sources are not significant contributors of direct SO_4 exhaust particulates. This SIP does not establish a separate MVEB for SO_4.

(ii) NO_X Emissions Budget

NOx emissions indirectly contribute to PM_{10} concentrations through secondary chemical reactions and for this reason are sometimes referred to as indirect or secondary PM_{10}. As presented in the TSD (Ogden City SMOKE Formats), estimated on-road mobile source NO_X emissions in 2015 and 2017 were 1.85 tons per winter weekday. The maintenance demonstration in Subsection IX.A.12.c(1) estimates a maximum PM_{10} concentration of 122.3 ug/m^3 in 2017 within the Ogden City portion of the modeling domain. This is 27.7 ug/m^3 below the NAAQS of 150 ug/m^3.

EPA's conformity regulation (40 CFR 93.124) also allows the implementation plan to quantify explicitly the amount by which motor vehicle emissions could be higher while still demonstrating compliance with the maintenance requirement. The implementation plan can then allocate some or all of this additional "safety margin" to the emissions budgets for transportation conformity purposes. In this case, the safety margin equates to 27.7 $ug/m^{3.}$

Using the same emission projections for point and area and non-road mobile sources, the UAM-AERO model was re-run using 2.00 tons of NO_X per winter weekday for mobile sources (and 4.00 tons/winter weekday of PM_{10}). The revised maintenance demonstration for 2015 and 2017 still shows maintenance of the PM_{10} standard. It estimates a maximum PM_{10} concentration of 133.2 ug/m^3 in 2017 within the Ogden City portion of the modeling domain. This value is 16.8 ug/m^3 below the NAAQ Standard of 150 ug/m3. This maintenance plan allocates 10.9 ug/m^3 of the safety margin to the transportation MVEB, and thereby sets the NO_X MVEB for 2015 and 2017 at 2.00 tons/winter weekday.

In terms of emissions, the safety margin can be described as follows: Using 4.00 tons per day of PM_{10} and 2.00 tons per day of NO_X when modeling mobile source emissions in 2015 and 2017, the highest predicted concentration of PM_{10} was 133.2 µg/cubic meter within the Ogden City portion of the modeling domain. This shows that the safety margin is at least 0.90 tons per day of PM_{10} (4.00 tons per day minus 3.10 tons per day) and 0.15 tons per day of NO_X (2.00 tons per day minus 1.85 tons per day). This maintenance plan allocates a portion of the safety margin to the mobile source budgets.

(b) Net Effect to Maintenance Demonstration

Using the procedure described above, some of the safety margin indicated earlier in Subsection IX.A.12.c.(6) has been allocated to the mobile vehicle emissions budgets. The results of this modification are presented below.

(i) Inventory: The emissions inventory was adjusted by adding the following sums to the on road mobile source emissions totals for the entire modeling domain:

in 2015:	4.04 ton/day PM_{10}	and	0.19 ton/day NO_X
in 2017:	5.41 ton/day PM_{10}	and	2.49 ton/day NO_X

(ii) Modeling:

The effect on the modeling results throughout the domain is summarized in the following table (which shows predicted concentrations in ug/m^3). It demonstrates that with the allocation of the safety margin, the NAAQS is still maintained through 2017 in all areas.

Table 46 Modeling of Attainment, 2005 - 2017, Including the Portion of the Safety Margin Allocated to Motor Vehicles

							Plus Safety Margin	
2001 Base Year Episode	**2005**	**2008**	**2011**	**2014**	**2015**	**2017**	**2015**	**2017**
Cottonwood	91.45	89.13	88.57	89.92	93.40	93.69	95.35	95.63
Hawthorne	124.17	121.71	119.76	120.84	125.60	125.97	127.95	128.32
Magna	81.33	80.32	80.11	80.52	80.44	81.91	82.24	82.54
N. Salt Lake	144.05	143.07	142.96	144.37	147.27	147.71	148.09	148.53
Ogden	113.19	113.04	113.75	116.62	121.75	122.31	133.20	133.23
Lindon	78.82	81.00	82.97	84.79	90.16	90.35	91.95	92.14
N. Provo	62.04	62.22	63.50	65.11	69.68	69.87	71.45	71.63

							Plus Safety Margin	
2002 Base Year Episode	**2005**	**2008**	**2011**	**2014**	**2015**	**2017**	**2015**	**2017**
Cottonwood	132.83	125.45	121.54	121.08	124.04	125.23	125.38	126.56
Hawthorne	136.60	127.78	122.80	122.03	125.35	126.61	126.73	127.98
Magna	93.92	94.03	95.34	96.73	96.00	98.47	96.60	99.07
N. Salt Lake	148.77	139.92	134.87	133.19	136.01	137.27	137.41	138.66
Peak Cell (near Cottonwood)	149.97	140.36	134.92	133.85	137.43	138.75	139.08	140.39
Ogden	117.70	116.09	116.02	117.59	121.20	122.12	126.60	127.51
Lindon	131.09	126.27	124.12	123.87	127.71	128.62	129.79	130.69
N. Provo	122.46	118.22	116.74	117.34	121.60	122.34	123.58	124.31

(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 Clean Air 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 agrees to fulfill this obligation at the appropriate point in time.

(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 ambient monitoring network for PM_{10} each year, and any necessary modifications to the network will be implemented.

The State will also continue to collect actual emissions inventory data from all sources of PM_{10}, SO_2, and NO_X in excess of 25 tons (in aggregate) per year, as required by R307-150.

(10) Contingency Measures

CAA 175A(d) - Each maintenance plan shall contain contingency measures to assure that the State will promptly correct any violation of the standard which occurs after the redesignation of the area to attainment. Such provisions shall include a requirement that the State will implement all control measures which were contained in the SIP prior to redesignation. As discussed in subection 12.b(3), there were a number of measures incorporated into the Utah SIP, on either a state-wide basis or as applicable to nonattainment areas in general, that were at least partly responsible for bringing Ogden City into compliance with the PM_{10} NAAQS. Utah has implemented all of these measures, and will continue to do so even after redesignation. This revision need only address such contingency measures as may be necessary to mitigate any future violation of the standard.

The State will rely upon ambient PM_{10} monitoring to determine whether a violation has occurred in Ogden City. Upon monitoring a violation of the PM_{10} NAAQS, the State will take the following actions.

- The State will identify the source(s) of PM_{10} causing the violation, and report the situation to EPA Region VIII within four months.

- The State will identify a means of corrective action within six months. The maintenance plan contingency measures to be considered and selected will be chosen from the following list or any other emission control measures deemed appropriate based on a consideration of cost-effectiveness, emission reduction potential, economic and social considerations, or other factors that the State deems appropriate:

  - Re-evaluate the thresholds at which a red or yellow burn day is triggered, as established in R307-302;

  - Further controls on stationary sources;

- Expand the road salting and sanding program in R307-307 to include Weber County.

The State will require implementation of such corrective action no later than one year after the violation was confirmed.