Quantification of Contingency Reductions for the *2008 PM2.5 Plan*

Section 1: Introduction

The San Joaquin Valley Air District's (District) *2008 PM2.5 Plan* is a comprehensive and innovative strategy demonstrating expeditious attainment of the U.S. Environmental Protection Agency's (EPA) 1997 air quality standards for PM2.5 (particulate matter that is 2.5 microns or less in diameter). On November 9, 2011, EPA approved this plan and related submittals, with the exception of the plan's contingency measures[1]. This contingency disapproval triggers Clean Air Act (CAA) sanction clocks running from the effective date of the final Federal Register action (January 9, 2012). The goal of this document is to demonstrate sufficient contingency measure emissions reductions to meet federal requirements and stop the sanction clock.

Contingency measures are extra emissions reductions that go into effect without further regulatory action[2]. In an attainment plan, the measures must be "extra" in the sense that the reductions are not accounted for in reasonable further progress (RFP) or in the attainment demonstration. The purpose of contingency measures is to continue progress in reducing emissions should the State Implementation Plan (SIP) need to be revised to meet a missed RFP milestone or correct continuing nonattainment.

Contingency measure emissions reductions are demonstrated for the RFP milestone years and for the attainment year. The discussion in EPA's PM2.5 implementation rule suggests that the amount of contingency reductions should be equivalent to about one year of reductions needed for RFP[3], although this is not embodied in regulatory requirements related to contingency measures (40 CFR 51.1012 or in CAA §172(c)(9)). For the 1997 PM2.5 standard, this is based on the overall level of reductions needed to demonstrate attainment divided by the number of years between the base year (2005) and the attainment year (2014) (9-year timespan). Table 1 shows the resulting contingency need for each pollutant for the *2008 PM2.5 Plan*.

[1] EPA, Approval and Promulgation of Implementation Plans; California; 2008 San Joaquin Valley PM2.5 Plan and 2007 State Strategy; Final Rule. 76 Fed. Reg. 217, pg 69896-69926. (2011, November 9). Retrieved from http://www.gpo.gov/fdsys/pkg/FR-2011-11-09/pdf/2011-27232.pdf
[2] Clean Air Act Section 172(c)(9), 40 CFR 51.1012.
[3] EPA, Clean Air Fine Particle Implementation Rule [PM2.5 Implementation Rule]. 72 Fed. Reg. 79, pp. 20586–20667. At 20642-43. (2007, April 25). Retrieved from http://www.gpo.gov/fdsys/pkg/FR-2007-04-25/pdf/E7-6347.pdf#page=1

Table 1: Contingency Reductions Target (in tons per day, or tpd)

	Contingency Target = "One year's worth of RFP"[4]
PM2.5	2.5
NOx	31.6
SO2	0.2

Section 2: RFP milestone years

RFP contingencies are used if planned emissions controls fail to reach the emissions targets specified in the SIP for RFP. The need to implement RFP contingencies is based on the emissions occurring in the RFP milestone year. For the *2008 PM2.5 Plan*, the RFP milestone years are 2009 and 2012; however, EPA noted that only 2012 needed to be evaluated for purposes of correcting the contingency disapproval. If the 2012 RFP targets were met, then 2012 contingency reductions are not needed.

All control measure commitments from the *2008 PM2.5 Plan* have been adopted by the District and ARB except one: Rule 4905 (Natural, gas-fired, fan-type residential central furnaces) is to be amended in 2014, but emissions reductions from this rule amendment were not quantified or credited in the *2008 PM2.5 Plan*.

Table 2 is based on the most recent annual planning inventories available, from ARB's 2011 RFP tables for the Valley with updates from EPA's September 2011 TSD. Since the actual 2012 emissions levels are at or below the approved RFP levels, RFP was met for 2012, and contingencies for the RFP year are not needed.

Table 2: 2012 RFP Benchmarks[5]

	Approved RFP Level	**Actual 2012 emissions**	**RFP benchmark met?**
PM2.5	71	70	Yes
NOx	336	336	Yes
SOx	20	20	Yes

[4] This data is consistent with EPA's determination in its September 20, 2011 Technical Support Document and Responses to Comments, Final Rule on the San Joaquin Valley 2008 PM2.5 State Implementation Plan, page 132. http://www.regulations.gov/#!documentDetail;D=EPA-R09-OAR-2010-0516-0175

[5] Based on EPA's September 2011 TSD, page 120. http://www.regulations.gov/#!documentDetail;D=EPA-R09-OAR-2010-0516-0175

Section 3: Attainment year

Attainment contingencies are implemented if a region fails to attain a federal standard by the final attainment date[6]. The need to implement attainment contingencies is based on ambient air quality data as of the end of the attainment year. This is contrasted against RFP contingencies, which are needed if emissions reductions targets are not met. The District and ARB have already adopted all plan control measures that included emissions reductions commitments to assure that the emissions levels needed for attainment will be achieved in 2014.

However, if EPA finds that an area fails to attain a standard on time, contingency reductions must be implemented automatically. An area often must adopt a new attainment plan, and sometimes other penalties apply as well, depending on the requirements associated with the standard in question.

3.1 What Qualifies as a Contingency Measure?

As noted in the introduction (Section 1 of this document), contingency measures are extra emissions reductions that go into effect without further regulatory action. The amount of contingency reductions should be equivalent to about one year of reductions needed for RFP[7]. The plan should contain trigger mechanisms and a schedule for the contingency measure implementation. Contingency measures can include measures already adopted and scheduled for implementation, as long as these measures are not relied on to provide emissions reductions needed to provide for RFP or expeditious attainment.

Based on these general contingency requirements, the District is utilizing three types of contingency measures in this contingency quantification:

- Surplus reductions from implementation of traditional regulations
- Regulations with a contingency trigger
- SIP-creditable incentive-based emissions reductions

Each of these contingency measures was discussed in either Chapter 9 of the *2008 PM2.5 Plan*[8] or ARB's resolution adopting the plan.[9] As such, this

[6] However, Clean Air Act Section 172(a)(2)(C) and EPA's Fine Particle Implementation Rule allow for two one-year attainment date extensions in the event that there is "clean data" in the attainment year, but not in the preceding two years that also factor into the three-year average attainment determinations.

[7] EPA, Clean Air Fine Particle Implementation Rule [PM2.5 Implementation Rule]. 72 Fed. Reg. 79, pp. 20586–20667. At 20642-43. (2007, April 25). Retrieved from http://www.gpo.gov/fdsys/pkg/FR-2007-04-25/pdf/E7-6347.pdf#page=1

[8] District's (April 30, 2008) *2008 PM2.5 Plan*, Chapter 9, pages 9-7 through 9-9. http://www.valleyair.org/Air_Quality_Plans/docs/AQ_Final_Adopted_PM2.5/13%20Chapter%209.pdf

[9] ARB (May 22, 2008). Resolution adopting the *2008 PM2.5 Plan*, page 6. http://www.arb.ca.gov/planning/sip/sjvpm25/resolution_sjv08.pdf

document is not adding new contingency measures to the plan, but is more accurately quantifying the benefit of these measures to demonstrate that sufficient contingency reductions are being achieved.

3.1.1 Surplus Reductions from Implementation of Traditional Regulations

The year 2014 was modeled for attainment in the *2008 PM2.5 Plan*. As the attainment contingency need would not occur until 2015 (since attainment would be based on air quality data collected through the end of 2014), the additional reductions occurring between 2014 and 2015 due to further implementation of adopted controls and fleet turn-over can serve as attainment contingencies (Table 3). ARB documented the emissions reductions occurring between 2014 and 2015 in its May 18, 2011 letter to EPA, and EPA acknowledges this data in its contingency quantification in its TSD[10].

Table 3: Attainment Contingencies from Traditional Regulatory Reductions: additional reductions in 2015 (tpd)

	Contingency
NOx	21
PM2.5	0
SOx	3

3.1.2 Regulations with Contingency Trigger

The District's 2008 Amendment to Rule 4901 (Wood Burning Fireplaces and Wood Burning Heaters) included a contingency provision (Section 5.6.5 of Rule 4901) that would lower the mandatory wood burning curtailment threshold if the Valley fails to attain the 1997 PM2.5 standard by April 2015. The contingency, if implemented, would lower the curtailment level from a forecast 24-hour level PM2.5 level of 30 µg/m³ to 20 µg/m³. This would result in more "No Burn" days and more PM2.5 and NOx emissions reductions from residential wood combustion. The trigger for this measure is that the lower threshold would become effective 60 days after final EPA rulemaking that the Valley failed to attain the federal annual PM2.5 standard set in 1997 by the applicable attainment deadline (April 2015, based on 2012-2014 data).

As part of the *2012 PM2.5 Plan* adopted by the District Governing Board in December 2012, the District has made a local commitment to lower the wood burning curtailment in 2014, with implementation starting November 1, 2014.

[10] EPA, September 20, 2011 Technical Support Document and Responses to Comments, Final Rule on the San Joaquin Valley 2008 PM2.5 State Implementation Plan, page 135, "New" Post Attainment Year Reductions. http://www.regulations.gov/#!documentDetail;D=EPA-R09-OAR-2010-0516-0175

This proactive strengthening of the rule does not change the status of the current Rule 4901 contingency, as these additional reductions were not relied upon to demonstrate attainment in the *2008 PM2.5 Plan*.

The emissions reductions that would be achieved by this contingency measure are based on the:

- Total emissions reductions that would be achieved by Rule 4901, as an annual average day, under implementation of the contingency level
- *Minus* the annual average emissions reduction plan commitment for Rule 4901 in 2014 without the contingency, and which was accounted for in the RFP demonstration and the attainment plan modeling.

Based on Tables 4 and 5 below, the emissions reduction attributable to the Rule 4901 contingency is, as an annual average, **3.12 tpd of PM2.5 and 0.32 tpd of NOx**. This is higher than estimates previously supplied to EPA and noted in its September 20, 2011 Technical Support Document, page 135. However, previous estimates were based on 2006 air quality data, whereas the analysis presented here is based on 2009-2013 air quality data (during which the 2008 amendment to Rule 4901 has been fully implemented). Also, the previous estimate did not accurately account for the 2014 emissions reductions commitment from pre-contingency Rule 4901.

This conservative calculation is just one way to calculate the contingency benefit. However, this calculation greatly understates the full impact of Rule 4901 “No burn” days, which reduce some of the most harmful species of particulates in the times and places where air quality is forecast to reach unhealthy levels. The contingency achieves the greatest benefit during the winter, when PM2.5 is highest. **A Valley-wide no-burn day achieves a direct PM2.5 emission reduction of 16 tons**. No other single regulation achieves this level of effectiveness.

Table 4: PM2.5 emissions reductions, Rule 4901 contingency

Column 1	Column 2	Column 3	Column 4
County	**Total "No Burn" days at contingency level, based on 2009-2013 wood-burning seasons**	**Direct PM2.5 emissions subject to the rule, tons/day**	**PM2.5 emissions prevented during contingency, tons (Column 2 x Column 3)**
Fresno	**85**	5.40	459.34
Kern (Valley portion)	**78**	3.58	278.93
Kings	**69**	0.52	35.95
Madera	**65**	1.90	123.70
Merced	**55**	1.43	78.87
San Joaquin	**49**	3.51	172.04
Stanislaus	**74**	3.07	227.18
Tulare	**67**	2.29	153.10
Total tons of direct PM2.5 prevented			1529.1 tons
As an annual average day (divide by 365)			4.2 tpd
Minus the annual average emissions reductions commitment accounted for in the EPA's TSD[11]			-1.08
Rule 4901 Contingency Benefit, annual average			**3.12 tpd**

Table 5: NOx emissions reductions, Rule 4901 contingency

Column 1	Column 2	Column 3	Column 4
County	**Total "No Burn" days at contingency level, based on 2009-2013 wood-burning seasons**	**Direct NOx emissions subject to the Rule, tons/day**	**NOx emissions prevented during contingency, tons (Column 2 x Column 3)**
Fresno	**85**	0.57	48.37
Kern (Valley portion)	**78**	0.37	28.47
Kings	**69**	0.05	3.52
Madera	**65**	0.23	14.63
Merced	**55**	0.14	7.92
San Joaquin	**49**	0.35	16.95
Stanislaus	**74**	0.31	22.64
Tulare	**67**	0.28	19.03
Total tons of direct NOx prevented			161.53
As an annual average day (divide by 365)			0.44
Minus the annual average emissions reductions commitment accounted for in the EPA's TSD[12]			-0.12 tpd
Rule 4901 Contingency Benefit, annual average			**0.32 tpd**

[11] EPA, Technical Support Document and Responses to Comments, Final Rule on the San Joaquin Valley 2008 PM2.5 State Implementation Plan, page 93 (2011, September 20). http://www.regulations.gov/#!documentDetail;D=EPA-R09-OAR-2010-0516-0175

[12] Ibid.

3.1.3 SIP-Creditable Incentive-Based Emissions Reductions

The District's successful incentive-based measures have been reducing pollutant emissions above and beyond reductions being achieved through traditional regulations. Historically, EPA has not granted credit for incentive-based reductions for use in SIPs to meet Clean Air Act obligations. New District Rule 9610 will establish appropriate mechanisms for the District to take SIP credit for eligible incentive programs achieving surplus, quantifiable, and enforceable emissions reductions. Once given credit, SIP-creditable, incentive-based emissions reductions will be used alongside regulatory measures to meet federal Clean Air Act requirements, such as requirements for contingency reductions. These criteria and the District incentive programs that meet these criteria are more fully discussed in draft District Rule 9610 and the accompanying staff report.

The 2013 Annual Demonstration Report shows emissions reductions being achieved across several applicable incentive programs. A total of 10.9 tpd of NOx and 0.44 tpd of PM2.5 is available for contingency through Carl Moyer, Prop 1B, and NRCS. This total amount of reductions surpasses the amount needed in this quantification:**4.15 tpd of NOx reductions and 0.10 tpd of PM2.5 reductions** of SIP-creditable incentive based emissions reductions.

Under Section 7.0 of Proposed Rule 9610, the District must make several commitments for each SIP submission in which the District relies on Rule 9610 reductions:

- **Identify incentive program guidelines (as specified in Section 3.0) used to generate projected SIP-creditable emission reductions. (Section 7.1)**

  The District is using guidelines specifically included in Section 3.1 of Rule 9610, the 2013 Annual Demonstration Report, and the Manual of Procedures.

- **Identify emission reductions not to exceed the amount projected to be achieved through the use of secured or reasonably anticipated incentive program funding and the estimated availability of emission reductions projects and willing participants, based on historical participation and estimates of remaining equipment. (Section 7.2)**

  Whereas some SIP commitments will be based on projections of expected funding and participation, the SIP-creditable incentive-based emissions reductions for this contingency demonstration relies only on already-executed, legally binding contracts. Therefore, the emissions reductions commitment here does not exceed the amount achieved through actual incentive program funding and actual program participation.

- **Be specifically adopted by the District as a part of the SIP and accounted for in the annual demonstration report as SIP-creditable emission reductions are achieved through provisions of this rule. (Section 7.3)**

  The District adopted the use of incentive program reductions for contingency as part of the SIP in the *2008 PM2.5 Plan*. And now, this Rule 9610 emissions reductions commitment is to be adopted by the District as part of the SIP at the June 2013 public hearing, and is specifically accounted for in the 2013 Annual Demonstration Report.

- **State that if either the District or EPA finds that there is a SIP shortfall for a particular year, the District will adopt and submit to EPA, by specified dates, substitute rules and measures that will achieve equivalent emission reductions as expeditiously as practicable and no later than any applicable implementation deadline in the Clean Air Act or EPA's implementing regulations. (Section 7.4)**

  Whereas some SIP commitments will be based on projections of expected funding and participation, the SIP-creditable incentive-based emissions reductions for this contingency demonstration relies only on already-executed, legally binding contracts. Since the reductions relied upon in this contingency quantification and documented in the 2013 Annual Demonstration Report are based on legally-binding contracts and corresponding already-implemented emissions reductions, there is no shortfall. In fact, the 2013 Annual Demonstration Report quantifies more than double the total emissions reductions needed for this contingency demonstration. In addition, contracts executed between now and the end of 2014 will provide additional emissions reductions for 2015. The District's ongoing project tracking of executed agreements ensures that no shortfall results as these projects continue to be implemented. The District would remedy any shortfall in a timely manner, per Section 7.4.

3.2 Sufficient Contingency Reductions

Areas like the Valley that have significant nonattainment challenges have developed several generations of aggressive and far-reaching emission reduction measures to meet various Clean Air Act requirements. The result of this "no stone left unturned" policy is that when viable emission reductions are identified, they are implemented to contribute to expeditious attainment. Reductions are not usually held in reserve to be used only if an area fails to meet a milestone. As a result, contingency measure demonstrations in the Valley have been a challenge, historically.

However, this document has outlined three types of contingency measures being used to meet the contingency reductions required for the *2008 PM2.5 Plan*:

- Surplus from traditional regulations (see Section 3.1.1)
- Regulations with contingency trigger (see Section 3.1.2)
- SIP-creditable incentives (see Section 3.1.3)

Table 6 shows how these approaches together generate enough emissions reductions to meet the contingency reductions required for this plan.

Table 6: Demonstration of Sufficient Contingency Reductions

	2015
PM2.5	
Contingency reductions required	***2.5***
Demonstration of contingencies achieved	
Surplus from traditional regulations	0.0
Regulations with contingency trigger (Rule 4901)	3.12
SIP-creditable incentives ***(up to 0.44 tpd available)***	0.10
*Subtract PM2.5 reductions, trade for NOx**	-0.72
Total contingency reductions achieved	**2.5**
Contingency need met?	**Yes**
NOx	
Contingency reductions required	**31.6**
Demonstration of contingencies achieved	
Surplus from traditional regulations	21.0
Regulations with contingency trigger (Rule 4901)	0.3
SIP-creditable incentives ***(up to 10.9 tpd available)***	4.15
*Substitute PM2.5**	6.48
Total contingency reductions achieved	**31.93**
Contingency need met?	**Yes**
SOx	
Contingency reductions required	**0.2**
Demonstration of contingencies achieved	
Surplus from traditional regulations	3.0
Regulations with contingency trigger	0.0
SIP-creditable incentives	0.0
Total contingency reductions achieved	**3.0**
Contingency need met?	**Yes**
* 1 ton of direct PM2.5 emissions reductions is equivalent to 9 tons of NOx reductions in the *2008 PM2.5 Plan.* See Appendix A to this contingency quantification document	

Appendix A
9:1 Trading Ratio, NOx:PM2.5

ARB provided the following "Attachment 3" to EPA on May 18, 2011 to document inter-pollutant trading ratios that depict the relative effectiveness of reductions in different precursors contributing to ambient PM2.5 levels in the San Joaquin Valley Air Basin (as well as South Coast). In the *2008 PM2.5 Plan*, as approved by EPA, the 9:1 trading ratio was used only for transportation conformity purposes[13], because that was the need at that time. However, the analysis generating this trading ratio was based on the emissions inventory as a whole, and not just mobile source emissions, as described in "Attachment 3." Since EPA has already accepted this non-source-specific demonstration, the resulting trading ratio is available for use beyond transportation conformity.

[13] ARB, 2011 PM2.5 SIP Revisions, Appendix D: Transportation Conformity Budgets, page 2 (2011, March 29). Retrieved from http://www.arb.ca.gov/planning/sip/sjvpm25/appd.pdf

Attachment 3

Precursor Effectiveness

In order to understand the relative effectiveness of reductions in different precursors contributing to ambient $PM_{2.5}$, staff of the Air Resources Board (ARB) and the South Coast Air Quality Management District (SCAQMD) conducted air quality modeling sensitivity runs using the modeling conducted for the attainment demonstrations. These relative effectiveness ratios were used to guide control strategy development as well as to normalize the benefits of multiple precursors so they can be reflected in terms of a single equivalent precursor. This method also provides a uniform metric for tracking progress relative to the attainment emissions targets. Documentation on the methodologies used for calculating the effectiveness ratios in each area is provided below.

South Coast

A description of the methodology used by SCAQMD staff is provided in Appendix C of ARB's staff report on the SCAQMD 2007 State Implementation Plan which can be found at:

http://www.arb.ca.gov/planning/sip/2007sip/southcoast/staffrepappc.pdf

San Joaquin Valley

In order to evaluate precursor effectiveness, ARB staff focused on the response in the Bakersfield metropolitan area where the highest $PM_{2.5}$ concentrations in the San Joaquin Valley occur. Staff conducted two grid-based modeling sensitivity runs where the NOx and primary $PM_{2.5}$ emissions were reduced, one at a time, by 10% relative to the future-year modeled attainment scenario. From these sensitivity runs we calculated a future year modeled design value reflecting the further 10% emission reduction assumptions. The difference between the attainment scenario (before 10% reduction in emissions) and adjusted (after 10% reduction in emissions) design values were then compared. Table 1 shows results for NOx and primary $PM_{2.5}$ emission reductions as well as the efficacy of reducing primary $PM_{2.5}$ relative to that for NOx.

The 1st column of Table 1 lists the Bakersfield area monitoring sites and the 2nd column contains the monitored 2006 design value for those sites. The 3rd column contains the 2014 modeled design values taking into account all of the reductions in the attainment strategy. The 4th and 5th columns list the adjusted 2014 design values with additional 10% emissions reductions for NOx, and primary $PM_{2.5}$, respectively. The 6th column lists the effectiveness of controlling primary $PM_{2.5}$ relative to that of controlling NOx. This analysis showed that controlling primary $PM_{2.5}$ is approximately nine times more effective than controlling NOx based on the average across the three Bakersfield area sites.

Attachment 3

The precursor effectiveness values were calculated by determining the difference between the modeled 2014 attainment design value (3rd column) and the design value of the sensitivity run (4th or 5th columns). This difference was then divided by the tonnage of each precursor corresponding to a 10% domain-wide reduction in emissions to develop the respective precursor effectiveness ratios. The $PM_{2.5}$ effectiveness value was then divided by the NOx effectiveness value to determine a relative ratio (6th column).

Table 1: The effectiveness of precursor controls on the 2014 design value.

Site	Measured 2006 Design Value (ug/m3)	Modeled 2014 Design Value With SIP Attainment Strategy (ug/m3)	Modeled 2014 Design Value With Additional 10% NOx Reduction (ug/m3)	Modeled 2014 Design Value With Additional 10% $PM_{2.5}$ Reduction (ug/m3)	$PM_{2.5}$ Effectiveness Relative to NOx
Site 1 (Bakersfield-California	18.5	14.3	14.1	13.6	8.7
Site 2 (Bakersfield-Planz)	18.9	14.7	14.6	14.0	9.3
Site 3 (Bakersfield-Golden)	18.6	14.4	14.2	13.7	8.6