Technical Support Document (TSD)

Montana
Area Designations For the
2010 SO_2 Primary National Ambient Air Quality Standard

Summary

Pursuant to section 107(d) of the Clean Air Act (CAA), EPA must designate areas as either "nonattainment," "attainment," or "unclassifiable" for the 2010 1-hour sulfur dioxide (SO_2) primary national ambient air quality standard (NAAQS). The CAA defines a nonattainment area as one that does not meet the NAAQS or that contributes to poor air quality in a nearby area that does not meet the NAAQS. Table 1 below identifies the counties or portions of counties in Montana that EPA is designating "nonattainment" based on monitored violations. EPA is not yet prepared to designate other areas in Montana, and will address those areas and their sources in a future final designations action.

Table 1. Nonattainment Area Designations for Montana

Area	Montana's Recommended Designation of Area/County	EPA's Designation of Area/County
Billings, MT Yellowstone County (Partial)	Unclassifiable	Nonattainment

Background

On June 2, 2010, EPA revised the primary SO_2 NAAQS (75 FR 35520, June 22, 2010) by establishing a new 1-hour standard at a level of 75 parts per billion (ppb) which is met at an ambient air quality monitoring site when the 3-year average of the annual (99^{th} percentile) of the daily maximum 1-hour average concentrations does not exceed 75 ppb, as determined in accordance with Appendix T of 40 CFR part 50. 40 CFR 50.17(a)-(b). EPA has determined that this is the level necessary to provide protection of public health with an adequate margin of safety, especially for children, the elderly and those with asthma. These groups are particularly susceptible to the health effects associated with breathing SO_2. The Agency is revoking the two prior primary standards of 140 ppb evaluated over 24 hours, and 30 ppb evaluated over an entire year because the standards will not add additional public health protection given a 1-hour standard at 75 ppb.[1] Accordingly, EPA is not designating areas in this process on the basis of either of these two prior primary standards. Similarly, the secondary standard for SO_2 has not been revised, so EPA is not designating areas in this process on the basis of the secondary standard.

EPA's SO_2 Designation Approach

[1] Generally, the prior SO2 NAAQS will be revoked for areas one year after their designation under the 2010 NAAQS. However, for certain areas such as the Billings/Laurel, Montana area, EPA's rules provide that the prior NAAQS will continue to apply until that area submits, pursuant to CAA section 191, and EPA approves, an implementation plan providing for attainment of the 2010 NAAQS. 40 CFR 50.4(e); 75 FR at 35580, n.41.

Section 107(d) of the CAA provides that not later than 1 year after promulgation of a new or revised NAAQS, state Governors must submit their recommendations for designations and boundaries to EPA. This deadline was in June 2011. Section 107(d) also requires EPA to provide a notification to states of no less than 120-days prior to promulgating an initial area designation that is a modification of a state's recommendation. EPA reviewed the State's recommendations and has notified the State through a letter signed by the Regional Administrator on February 6, 2013, of any intended modifications. While language in section 107 specifically addresses states, we intend to follow the same process for tribal governments, pursuant to section 301(d) of the CAA and Tribal Authority Rule (40 CFR Part 49). If a State or tribal government does not submit designation recommendations, EPA will promulgate the designations that it deems appropriate. If a State or tribal government disagrees with EPA's intended area designations, it has an opportunity to demonstrate why any proposed modification is inappropriate.

The Crow Tribe of Montana's Reservation is located adjacent to the Billings, MT nonattainment area that we are initially designating. This area of Indian Country, and the majority of Yellowstone County, do not contain SO_2 emissions sources that we are currently prepared, based on monitoring data, to conclude are contributing to the design value at the violating monitor in Billings. Therefore, EPA is not including the Crow Tribe of Montana's areas of Indian Country or the majority of Yellowstone County in the initial Billings nonattainment area. EPA will further address these areas and their sources in a future round of final designations action.

Designations guidance was issued by EPA through a March 24, 2011, memorandum from Stephen D. Page, Director, U.S. EPA, Office of Air Quality Planning and Standards, to Air Division Directors, U.S. EPA Regions I-X. This memorandum identifies factors EPA intends to evaluate in determining boundaries for areas designated nonattainment. These 5 factors include: 1) air quality data; 2) emissions and emissions-related data (location of sources and potential contribution to ambient SO_2 concentrations); 3) meteorology (weather/transport patterns); 4) geography/topography (mountain ranges or other air basin boundaries); and 5) jurisdictional boundaries (e.g., counties, air districts, pre-existing nonattainment areas, reservations, metropolitan planning organizations), among any other information deemed relevant to establishing appropriate area designations and boundaries for the 1-hour SO_2 NAAQS.

The March 24, 2011, memo recommended that area boundaries be defaulted to the county boundary unless additional provided information justifies a larger or smaller boundary than that of the county. EPA believes it is appropriate to evaluate each potential area on a case-by-case basis, and to recognize that area-specific analyses conducted by States, tribal governments and/or EPA may support a different boundary than a default county boundary.

In this TSD, EPA discusses its review and technical analysis of the recommendations submitted by the State of Montana for designations of the 1-hour SO_2 standard and any modifications from these recommendations.

Definition of important terms used in this document:

1) **Designated "nonattainment" area –** an area which EPA has determined, based on a state recommendation and/or on the technical analysis included in this document, has violated the 2010 SO_2

NAAQS, based on the most recent three years of air quality monitoring data, or contributes to a violation in a nearby area.

2) **Recommended nonattainment area –** an area that a State or tribal government has recommended to EPA to be designated as nonattainment.

3) **Violating monitor –** an ambient air monitor meeting all methods, quality assurance and citing criteria and requirements whose valid design value exceeds 75 ppb, as described in Appendix T of 40 CFR part 50.

4) **2010 SO_2 NAAQS -** 75 ppb, national ambient air quality standard for SO_2 promulgated in 2010. Based on the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations

5) **Design Value** – a statistic that describes the air quality status of a given area relative to the level of the NAAQS.

Nonattainment Designations

Introduction

Montana submitted its original recommendations in a letter dated May 27, 2011. Montana recommended an "unclassifiable" designation for all counties in the state including Yellowstone County in that letter. In Montana's May 27, 2011 letter, it discussed why it believed Yellowstone County should be "unclassifiable" even though a violating monitor is located in the county. Montana concluded that SO_2 emissions during 2010 were not representative of future conditions and that initial designation with consideration of 2010 monitoring data would be inappropriate.

EPA Region 8 sent a "120-day letter" to Montana on February 7, 2013. The 120-day letter indicated EPA's preliminary decision to designate as nonattainment Yellowstone County. Montana and the public had 60 days to review the letter and provide EPA with information to support any further changes to EPA's preliminary decision. The comment period officially closed on April 8, 2013.

Montana reasserted in an April 3, 2013, response letter that SO_2 emissions in the Billings area during 2010 were not representative of normal or future conditions and that a designation that used 2010 monitoring data would be inappropriate. Montana based this assertion on catalyst testing conducted at ExxonMobil during 2010. It will be shown later in this TSD that this assertion is incorrect and that 2010 is a representative year and will be included in the 2009-2011 design value calculation.

The State of Montana also submitted in that April 3, 2013, letter a five-factor analysis for revising the nonattainment boundary from the default full county that EPA proposed in its February 6, 2013, 120-day letter. In this SO_2 designation for Montana, based on EPA's technical analysis of the State of Montana's five-factor analysis described below, EPA is finalizing a partial county initial nonattainment area boundary for a portion of Yellowstone County in Montana in agreement with Montana's recommended partial county boundary. EPA is not at this time, however, reaching final designations conclusions for

the remainder of Yellowstone County, and will address it and its source's in a future final designations action.

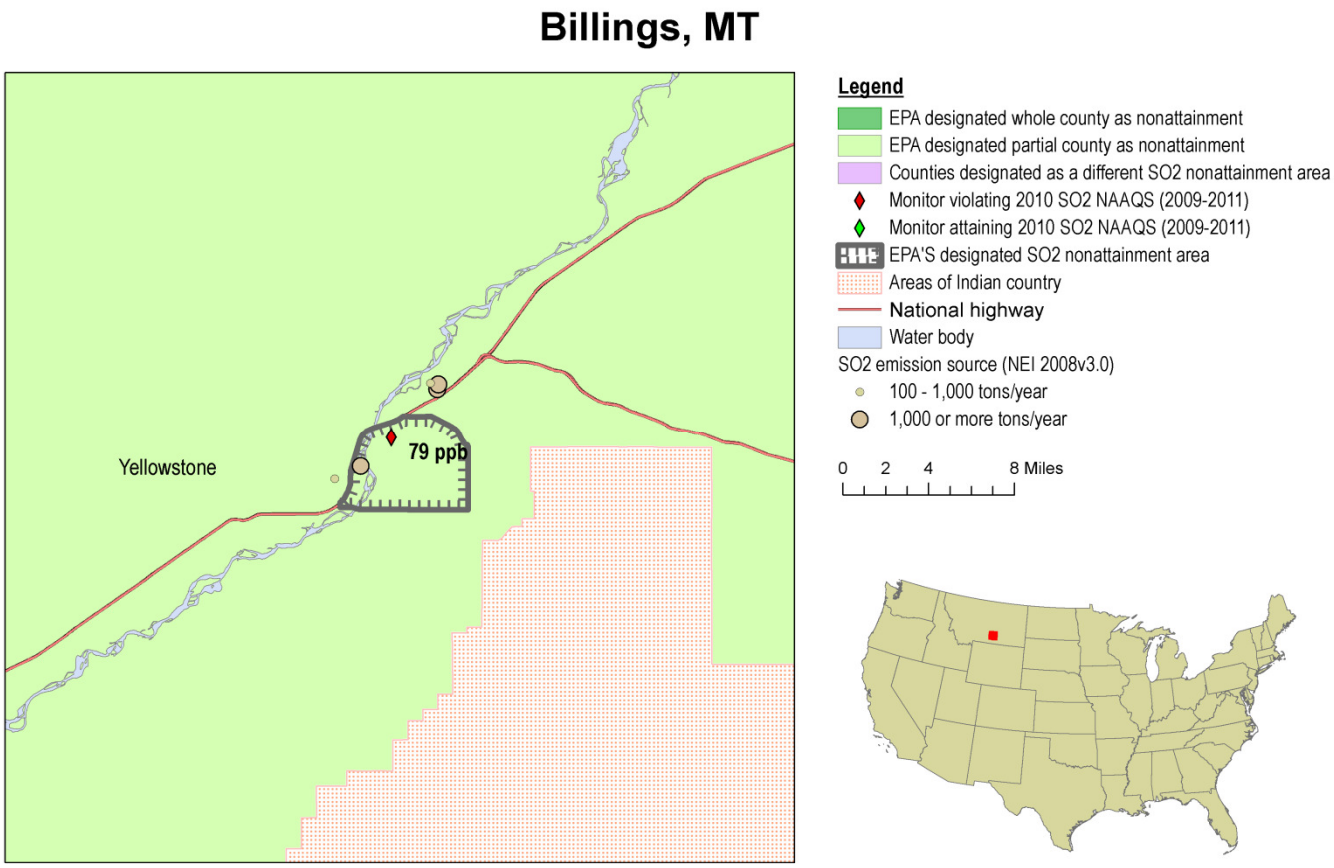
Nonattainment Designations

Technical Analysis for Yellowstone County, Montana

Introduction

The EPA reviewed and agrees with the five-factor analysis that was submitted by the State of Montana for a smaller initial nonattainment area boundary. The EPA also agrees with the physical description of the nonattainment boundary that Montana submitted with its analysis. Figure 1 is a map of the area in Yellowstone County that the EPA is initially designating nonattainment for the 2010 1-hour SO_2 NAAQS, including source information and the location of the monitor violating the standard.

Figure 1. Billings, MT 1-Hour SO_2 Nonattainment Area Boundary



The following technical analysis in this TSD compiles the State of Montana's and EPA's information on the five-factor analysis.

Detailed Assessment

Air Quality Data

The Air Quality Data factor considers SO_2 air quality monitoring data, including the design values (in ppb) calculated for all air quality monitors in the Yellowstone County and the surrounding area. This factor considered monitoring data for the 2008-2011 period.

The State of Montana's April 3, 2013 response and analysis were based on data from the Coburn Road monitor (Monitor ID: 30-111-0066), a Federal Equivalent Method (FEM) monitor located in Yellowstone County. The Coburn Road monitor is classified as a State and Local Air Monitoring Station (SLAMS). EPA and Montana additionally reviewed other monitors in the area that were non-regulatory monitors for use in advising on a boundary. These included: Johnson Lane, Brickyard, Lockwood (shut down in 2010), Laurel, and Pine Hills (operated from 1993-2010).

The majority of the monitored data in Table 2 below was provided by the State in its initial May 27, 2011 recommendation letter and TSD. The EPA added 2011 data to the table. The table shows a summary of the monitored NAAQS exceedances by quarter during the 2008-2011 time-period. The majority of exceedances occurred during the third and fourth calendar quarters of the 2008-2011 monitoring period.

Table 2. Coburn Road SLAMS Monitored NAAQS Exceedances 2008-2011

Calendar Year	Calendar Quarter	Number of Exceedances (> 75 ppb)
2008	1	0
	2	1
	3	2
	4	3
2008 Total Exceedances		**6**
2009	1	1
	2	0
	3	2
	4	0
2009 Total Exceedances		**3**
2010	1	1
	2	0
	3	4
	4	4
2010 Total Exceedances		**9**
2011	1	0
	2	0
	3	2
	4	1
2011 Total Exceedances		**3**

2008-2011 Total Exceedances	21

The State provided Table 3 below in its initial recommendation letter and TSD. The EPA added the 2011, 1-hour daily maximums. The table shows the Coburn Road monitor's 1-hour daily maximum SO_2 values, and these values were used to calculate the annual 99th percentile. The annual 99th percentile is highlighted in the table for each of the years 2008 through 2011.

Table 3. Coburn Road SLAMS 1-Hour Daily Maximum SO_2 Values 2008-2011

2008		2009		2010		2011	
Date	**ppb**	**Date**	**ppb**	**Date**	**ppb**	**Date**	**ppb**
8/24	119	9/22	107	7/8	111	9/5	142
10/28	112	2/5	83	12/24	101	9/11	113
10/27	95	9/25	83	7/9	92	10/30	85
6/14	**89***	1/20	**72***	2/10	**91***	9/30	**74***
10/1	77	8/12	69	10/22	89	11/20	66`

* 99th percentile (4th maximum)

The Coburn Road monitor's average of the 99th percentile values for 2008-2010 is 84 ppb and the average for 2009-2011 is 79 ppb. The averages are presented in Table 4. The results for both of these time-periods indicate violations of the 2010 1-hour SO_2 NAAQS at Coburn Road SLAMS. The data supports EPA's decision of designating a portion of Yellowstone County as a nonattainment area. The three-year average 99th percentile values for 2006-2008, 2007-2009, 2008-2010, and 2009-2011 are included in Table 4.

Table 4. Three-Year Average 99th Percentile Values for Coburn Road Monitor in Montana

County	State Recommended Nonattainment?	Monitor Name & System ID	Monitor Location	SO_2 Design Value, 2006-2008 (ppb)	SO_2 Design Value, 2007-2009 (ppb)	SO_2 Design Value, 2008-2010 (ppb)	SO_2 Design Value, 2009-2011 (ppb)
Yellowstone County, Montana	No	Coburn Road, 30-111-0066	½ mile south of I-94 Interchange on Coburn Road	73	73	84	79

The State provided 3-year averages for the monitors, including Coburn Road, in the area as found in Table 5 below and represented in Figure 2. These monitors, although non-regulatory with the exception of Coburn Road, provide information to support modifying the initial nonattainment area boundary from the proposed whole county to only a portion of the county. This data indicates that the Coburn Road monitor and the area it represents should be designated nonattainment.

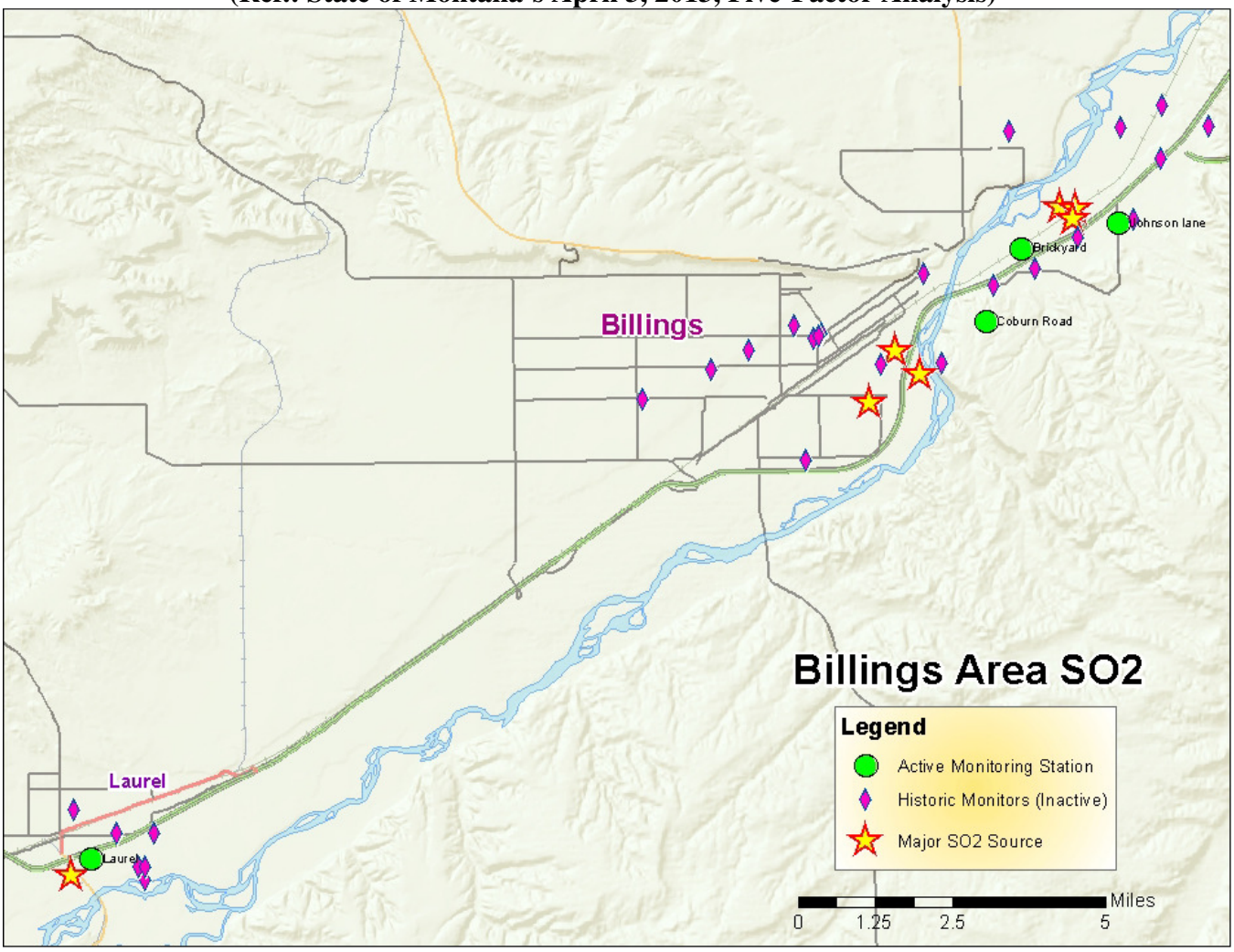
Table 5. Billings Area SO_2 Regulatory and Non-Regulatory Monitors 3-year Average Design Values for 2009-2011

Monitoring Location	**2009-2011 Design Value (ppb)**
Coburn Road	*79*

Johnson Lane	71
Brickyard	49
Lockwood*	67
Laurel	58

Italics: Regulatory Monitor
*Lockwood monitor suffered irreparable storm damage in 2011

Figure 2. Billings, MT Area SO_2 Major Sources, Historical and Active Monitoring Locations (Ref.: State of Montana's April 3, 2013, Five-Factor Analysis)



The State discussed that the increased SO_2 values in 2010 may have been the result of control measures taken at the ExxonMobil refinery. In 2010, the refinery installed and tested SO_2 reducing catalysts. Testing the catalyst resulted in a brief period of higher SO_2 emissions than expected. The State points out that it was a temporary situation and that the catalyst is now operating correctly resulting in lower SO_2 emissions at ExxonMobil. The Meteorology Section that follows on wind patterns will show this to be an inconsequential assertion.

The State asked EPA to delay its decision of nonattainment designation for the Billings area until more monitoring data could be collected while the catalyst was operating properly. However, additional

exceedances occurred during 2011 after ExxonMobil had fully implemented the catalyst controls. As explained below, EPA was not persuaded by the State's request to delay a designation decision for the area impacting the violating monitor, although we do agree that we are not yet prepared to take final action for the remainder of the County. The NAAQS exceedances, and subsequent 2009-2011 violation, at the Coburn Road monitor supported EPA's preliminary decision to designate the area as nonattainment. The exceedances at the Coburn Road monitor appear to be a result of emissions from PPL's Corette power plant, which was upwind of the monitor when exceedances were recorded. In the Meteorology section below, EPA discusses the correlation between wind direction and exceedances/violations.

Since the Coburn Road monitor in Yellowstone County shows a violation of the 2010 1-hour SO_2 NAAQS, reviews of the surrounding counties were also undertaken. The adjacent counties to Yellowstone County are: Musselshell, Rosebud, Treasure, Big Horn, Carbon, Stillwater, and Golden Valley. Of these seven adjacent counties, only Rosebud County had a regulatory SO_2 monitor. There were no exceedances found at the SO_2 monitor in Rosebud. Additionally, due to the geography/topography of the surrounding area around the Billings/Laurel area where the violating monitor is located, it is less likely that emissions from the facilities in Rosebud County are reaching the Coburn Road SLAMS monitor (see geographical/topographical section for discussion on geography and topography of Billings/Laurel area). The EPA also reviewed the five factors found in the March 24, 2011 guidance for each of the seven counties, and is not yet prepared to conclude that any of these counties' emissions are contributing to the violating monitor in Yellowstone County.
In a subsequent round of designations we will make final designations decisions for areas that are not currently included in the initial nonattainment area designation addressed in this TSD.

Emissions and Emissions-Related Data

Evidence of SO_2 emission sources near a violating monitor is an important factor for determining whether a nearby area is contributing to a monitored violation. For this factor, EPA evaluated county level emissions data for SO_2 and any growth in SO_2 emitting activities since the date represented by those emissions data.

Emissions

The major SO_2 emitting industries in the Billings area are the ConocoPhillips and ExxonMobil Petroleum Refineries; Western Sugar Company (sugarbeet processing plant); PPL Montana, LLC – J.E. Corette (PPL – Corette) coal-fired electrical generating station; Montana Sulphur Chemical Company (MSCC) (gas processing plant, sulfur recovery and sulfur products); and Yellowstone Energy Limited Partnership (YELP) (petroleum coke-fired electrical/steam co-generation facility.) The major SO_2 emitting industry in the Laurel area is the Cenex Harvest States, Inc. (CHS) Petroleum Refinery.

In Table 6 below, EPA calculated the average emissions in tons per year for each source for the periods 2006-2008, 2007-2009, 2008-2010 and 2009-2011.

Table 6. Billings/Laurel Area SO_2 Average Emissions.
(Ref.: Montana's May 27, 2011, Recommendation Letter & TSD)

County	Facility	Facility Location	2006-2008 SO_2 Average Emissions (tons/yr)	2007-2009 SO_2 Average Emissions (tons/yr)	2008-2010 SO_2 Average Emissions (tons/yr)	2009-2011 SO_2 Average Emissions (tons/yr)
Yellowstone County, Montana	PPL Montana – Corette	301 Charlene St. P.O. Box 30495 Billings, MT 59107	3,307	3,076	2,663	2,411
	ExxonMobil	700 ExxonMobil Rd, Billings, MT 59101	2,203	1,458	1,617	1,287
	*YELP	2215 N. Frontage Rd. Billings, MT 59101-7303	1,645	1,750	1,823	1,995
	**MSCC	627 ExxonMobil Rd. Billings, MT 59101	1,282	1,390	1,421	1,623
	***CHS	803 US Highway 212 S. Laurel, MT 59044	404	309	241	227
	Western Sugar	3020 State Ave. Billings, MT 59101	122	139	123	104
	ConocoPhilips (Phillips66)	401 S. 23rd St. Billings, MT 59101	201	169	103	86

*Yellowstone Energy Limited Partnership (YELP)
**Montana Sulphur & Chemical Company (MSCC)
***Cenex Harvest States, Inc (CHS)

In Table 7 below, Montana provided information on total emissions of SO_2 (given in tons per year) that were from 2008 through 2011 for sources in Yellowstone County (Billings/Laurel area). This table shows that 2009 emissions for ExxonMobil were low compared to years 2008 and 2010.

Table 7. Billings/Laurel Area SO_2 Emissions
(Ref.: Montana's May 27, 2011, Recommendation Letter & TSD)

County	Facility	Facility Location	2008 SO_2 Emissions (tons/yr)	2009 SO_2 Emissions (tons/yr)	2010 SO_2 Emissions (tons/yr)	2011 SO_2 Emissions (tons/yr)	Total SO_2 Emissions (tons)
Yellowstone County, Montana	PPL Montana – Corette	301 Charlene St. P.O. Box 30495 Billings, MT 59107	2,929	2,788	2,271	2,174	10,162
	ExxonMobil	700 ExxonMobil Rd, Billings, MT 59101	1,765	696	2,389	775	5,625
	*YELP	2215 N. Frontage Rd. Billings, MT 59101-7303	1,590	2,062	1,816	2,106	7,574
	**MSCC	627 ExxonMobil Rd. Billings, MT 59101	1,320	1,559	1,383	1,927	6,189
	***CHS	803 US Highway 212 S. Laurel, MT 59044	268	231	225	226	950
	Western Sugar	3020 State Ave. Billings, MT 59101	138	133	98	80	449
	ConocoPhilips	401 S. 23rd St. Billings, MT 59101	108	127	73	57	365

*Yellowstone Energy Limited Partnership (YELP)
**Montana Sulphur & Chemical Company (MSCC)
***Cenex Harvest States, Inc (CHS)

Table 8 below includes data the State provided for total SO_2 emissions (given in tons per year) for the years 2008, 2009, and 2010 and total emissions for all three years combined for sources within Yellowstone County that emit greater than 100 tons per year of SO_2 according to the State's emissions inventories. In addition, EPA included total SO_2 emissions (provided by Montana in tons per year) for 2011 in Table 8. From these data in Table 8 and also in Figure 3 below, which is based on total emissions from each individual source in the area, the 2009 and 2011 emissions appear to be below past emissions levels, while 2010 data appear more representative of emissions. This contrasts the State's conclusion that 2010 was abnormally high and that the monitored data from 2010 was inappropriate to use for initial designations. Therefore, from the emissions and monitored data provided by the State in its TSD and as stated above, we find that the 2010 emissions appear to be representative and thus the 2010 monitored data is appropriate to use for initial designations.

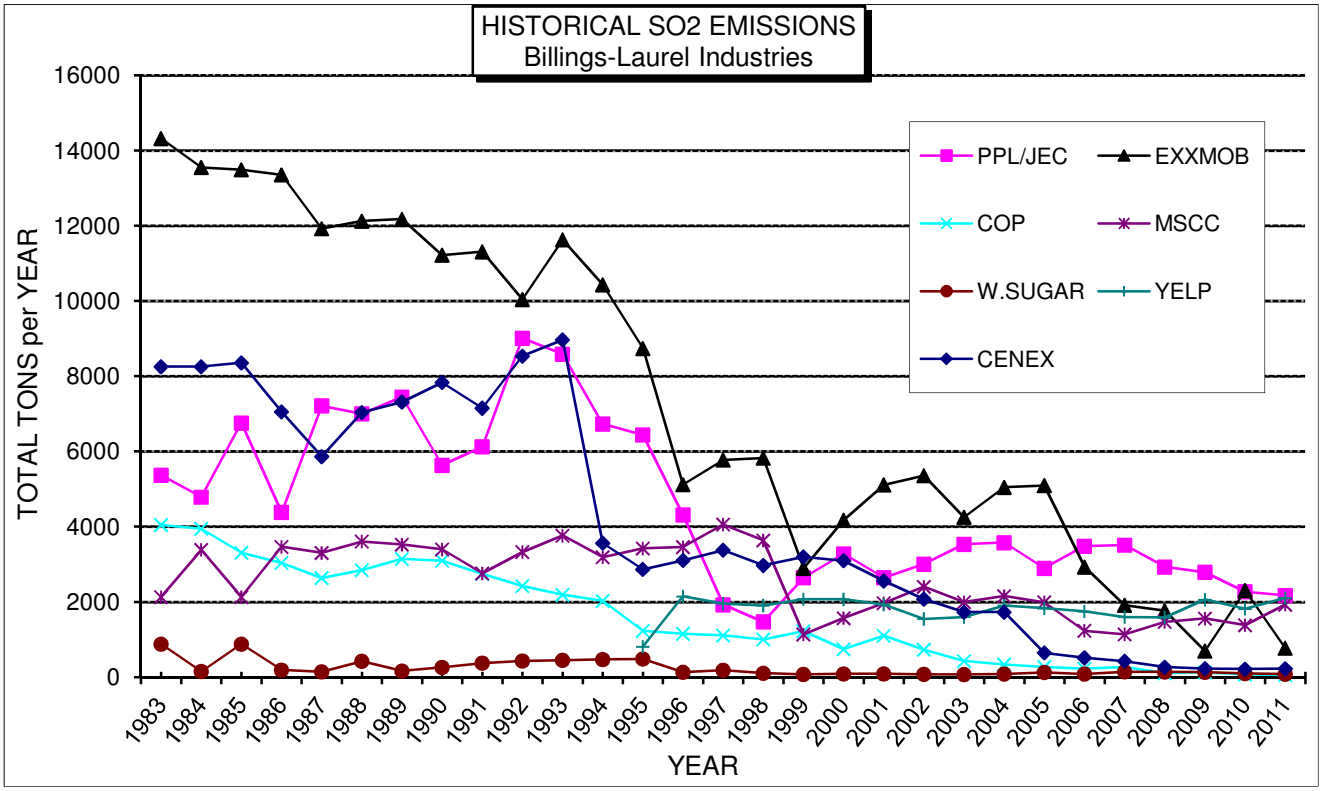
Table 8. Billings/Laurel Area Combined Industrial SO_2 Emissions (Ref.: Montana Recommendation Letter & TSD)

Emissions Year	Total SO_2 Emissions (tons/year)
2008	8,118
2009	7,595
2010	8,254
2011[1]	7,345
Total Emissions 2008-2011	**31,312 tons**

[1]EPA obtained the 2011 data from Montana for comparison.

The State additionally concluded that performance testing for catalysts at ExxonMobil was the primary source of the 1,600 tons per year increase from 696 tons per year in 2009 to 2,389 tons per year in 2010. Figure 3 shows historical SO_2 emissions for industries in the Billings/Laurel area using continuous emissions monitor (CEMs) data provided by the State. Figure 3 indicates a general decrease in emissions from ExxonMobil from 1995 through 2011. Also from Figure 3, the ExxonMobil data for 2009, and possibly for 2011, is low compared to the last 15 years of CEMs data.

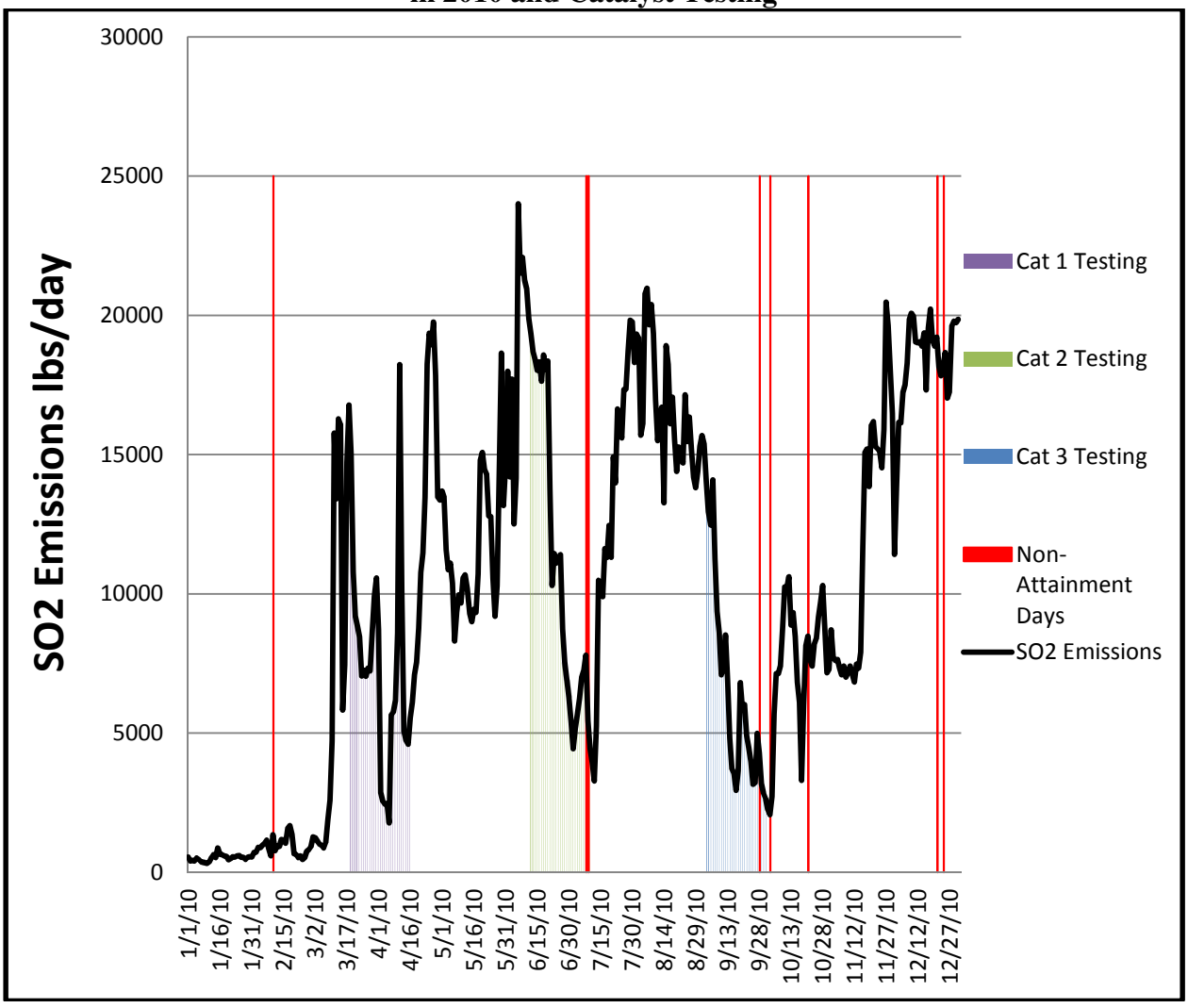
Figure 3. Historical SO_2 Emissions for Billings/Laurel Industries Using CEMS Data



In the Air Quality Data section of this TSD, ExxonMobil's installation of a catalyst was discussed. In Figure 4, below, the 2010 SO_2 CEMs data is shown for the ExxonMobil refinery. Specifically, the figure shows the daily SO_2 emissions (in lbs/day) and the days where catalyst testing occurred. The purple, green, and blue highlights in the figure indicate the first, second, and third catalyst, respectively

that ExxonMobil tested. Days when exceedances of the 75 ppb standard were monitored are shown as the red lines in the figure. This graph represents the relationship between the exceedances and the catalyst testing at ExxonMobil. Even when the catalysts were being tested, the exceedances occurred towards the end of the testing phase when it appears the company had optimized the operating conditions for maximum SO_2 control efficiency (as shown with the second and third catalyst tests in Figure 4). From this observation, the exceedances occurred during the times of relatively low controlled SO_2 emissions rates and there does not appear to be a correlation between the catalyst testing and the exceedances. ExxonMobil indicated in a memo that it intended to select the catalyst represented by the green highlighted area in the figure. From the figure below, even with the new catalyst operating at optimal conditions, NAAQS exceedances occurred with ExxonMobil's new and lower emissions.

Figure 4. CEMS SO_2 Data for ExxonMobil with Overlay of Exceedances in 2010 and Catalyst Testing



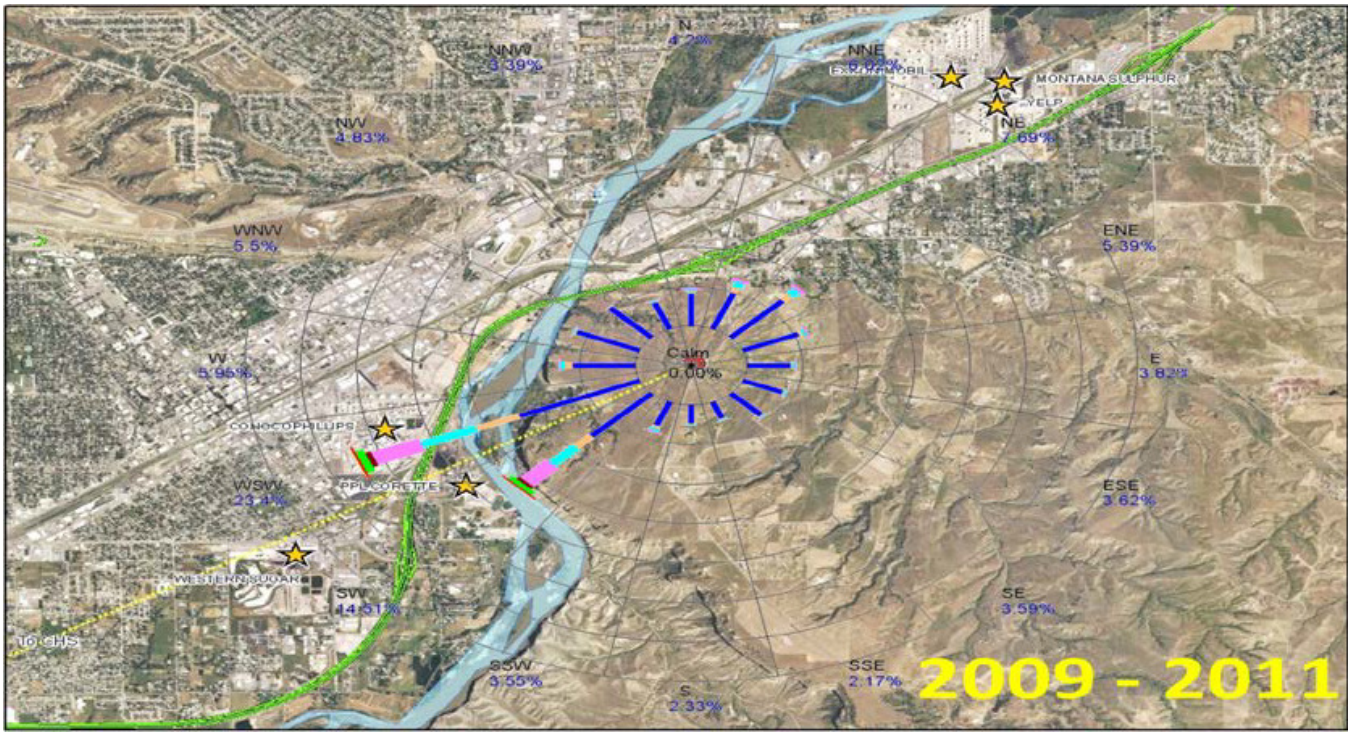
The State mentions that the Clean Air Act does not expect states to revise SIPs when federal requirements in the consent decree interfere with attainment of the NAAQS (42 USC §7410(a)(3)(C)). EPA concludes, based on Figure 4 above, that the SO_2 reduction catalyst testing did not interfere with

attainment of the 2010 SO_2 NAAQS since most of the exceedances occurred when catalyst operations were optimized at ExxonMobil. Therefore, EPA believes that the CAA 42 USC §7410(a)(3)(C), does not apply to this instance.

Additionally, the State discusses 40 CFR 52.21(b)(48)(iii), which provides a definition of "Baseline actual emissions" with the inclusion of the following sentence: "The Administrator shall allow the use of a different time period upon a determination that it is more representative of normal source operation." From the figures and tables presented in this TSD, EPA finds that the 2009-2011 time-period is representative.

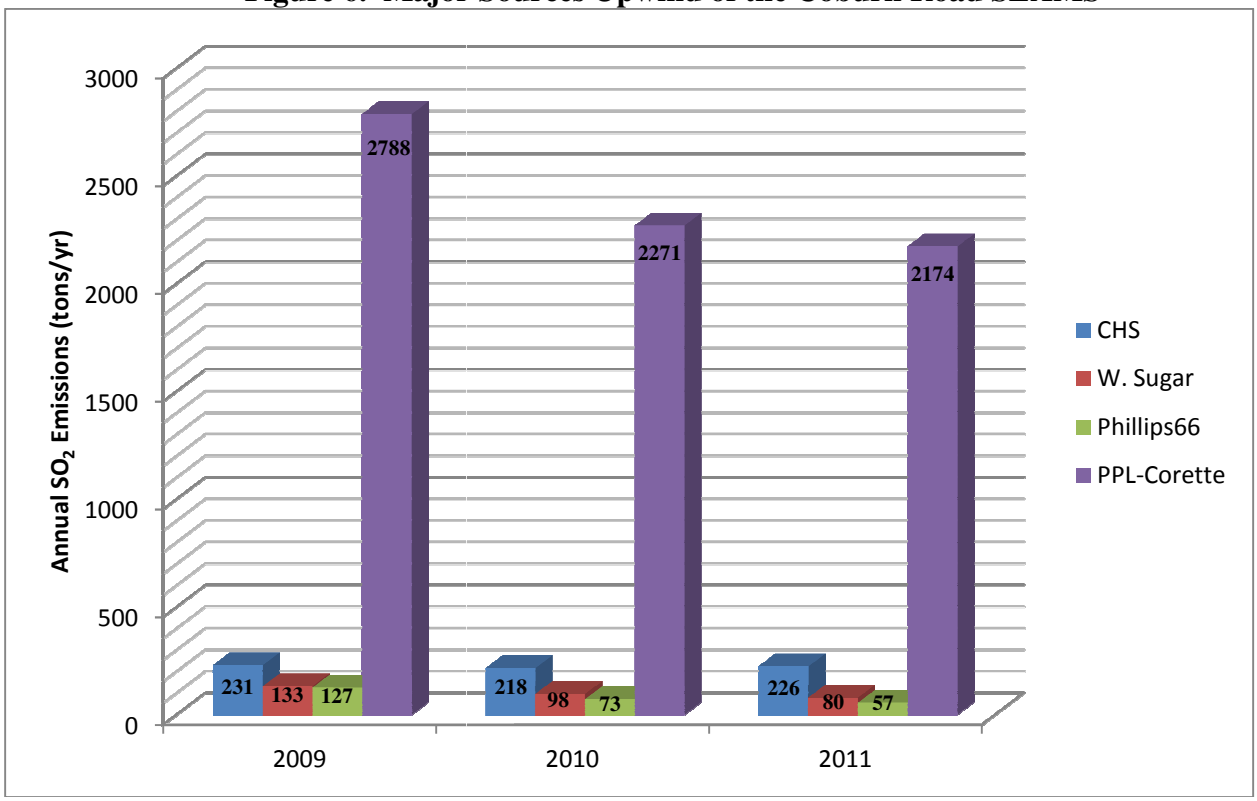
Figure 5 below is a pollution rose for the 2009-2011 design period, which shows the SO_2 concentrations correlated with wind direction. Since the new controls at the refinery will result in a reduction of SO_2, it appears that the upwind source, PPL's Corette power plant, is the key contributor to the exceedances, and thus to the 2009-2011 violation of the 1-hour standard, and this source will be included in the nonattainment area. Another commenter's analysis also showed that during the period 2009-2011 all concentrations above 75 ppb occurred from the west-southwest wind direction.

Figure 5. Coburn Road SLAMS Pollution Rose for 2009-2011
(Ref.: State of Montana's April 3, 2013, Five-Factor Analysis)



Since the prevailing winds are from the southwest, upwind sources were reviewed for inclusion in this initial nonattainment area designation. These sources include: Phillips66, PPL-Corette, Western Sugar, and CHS. The State provided information in its April 3, 2013, five-factor analysis, which reviewed these sources and their possible role in the exceedances at Coburn Road monitor. Figure 6 shows the annual emissions for the four major upwind sources during the 2009-2011 design period at Coburn Road monitor, indicating the largest and closest SO_2 source is PPL-Corette.

Figure 6. Major Sources Upwind of the Coburn Road SLAMS



The following Figures 7 and 8, included in the State of Montana's April 3, 2013 five-factor analysis, show the monitored values at the Coburn Road SLAMS site compared with operating differences of all upwind sources. The figures demonstrate a variety of operating scenarios where the average ambient SO_2 concentrations at Coburn Road monitor decreased by nearly 80% when PPL-Corette was not in operation.

Figure 7. Monitored Hourly Ambient Concentrations at the Coburn Road Monitor for Calendar Year 2010 (Ref.: State of Montana's April 3, 2013, Five-Factor Analysis)

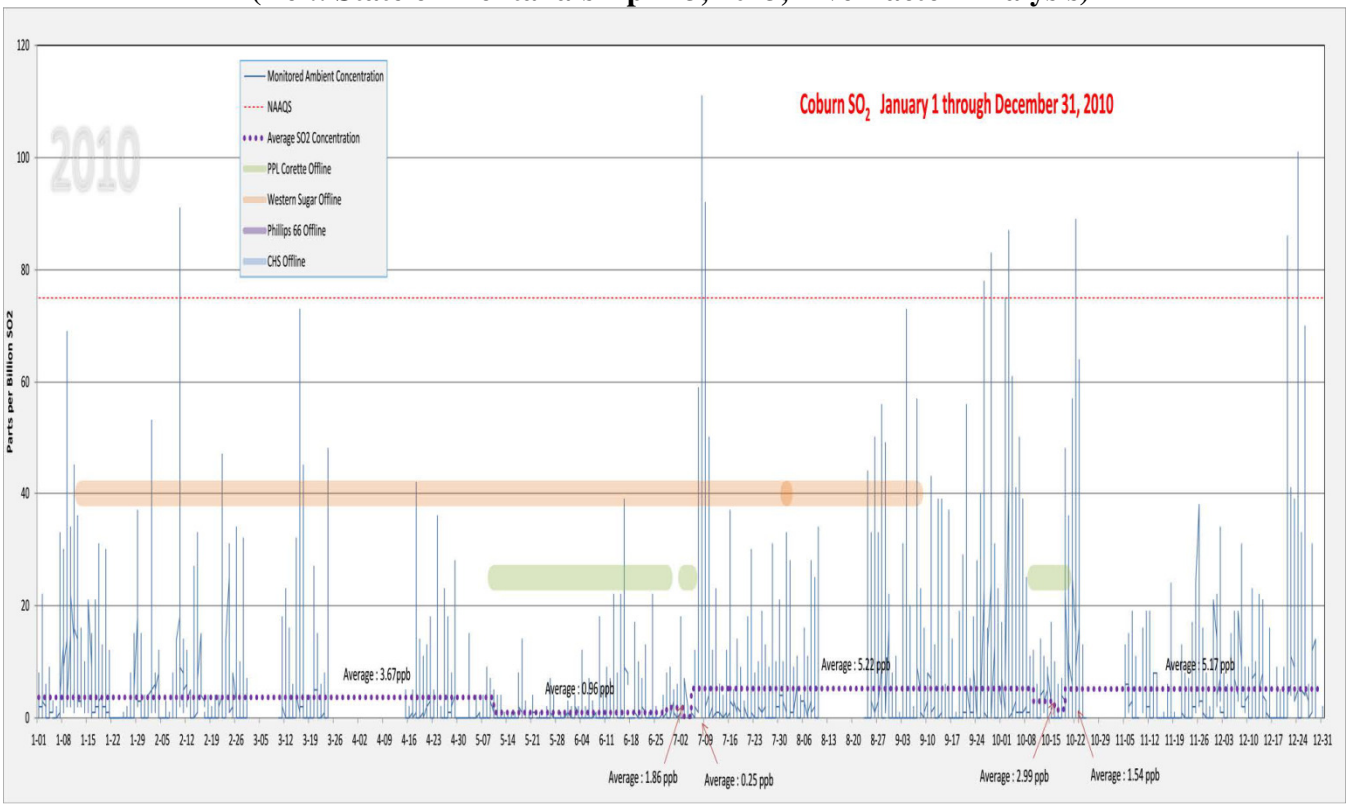
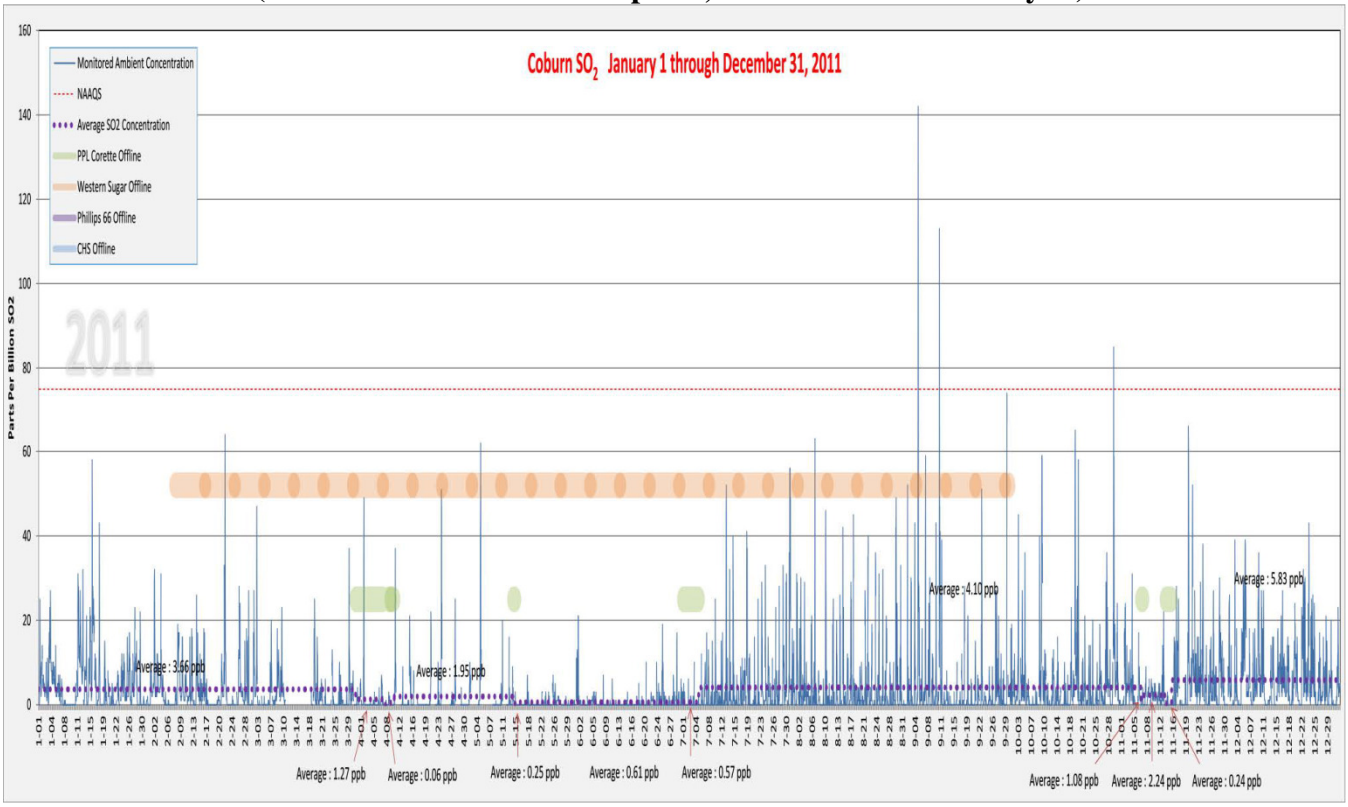


Figure 8. Monitored Hourly Ambient Concentration at the Coburn Road Monitor for Calendar Year 2011 (Ref.: State of Montana's April 3, 2013 Five-Factor Analysis)



From Figures 7 and 8 above, we note that monitored exceedances still occurred when Western Sugar was not in operation, and only when PPL-Corette was in operation. Additionally, when both PPL-Corette and Western Sugar were off-line and CHS and Phillips66 were on-line, there were no monitored exceedances.

Meteorology (weather/transport patterns)

For this factor, EPA considered meteorological data from the Billings Airport for six years (2006-2011). This data consisted of wind direction and wind speed, which included periods when exceedances were recorded at Coburn Road monitor. Meteorology data is shown in Tables 9, 10, 11, and 12. These data provide information related to the potential for SO_2 emissions sources located upwind of a violating monitor to contribute to the violation location.

According to the available data from the Billings International Airport, it appears that the exceedances shown in Tables 9, 10, 11, and 12 are primarily driven by emissions blown from the west-southwest, the predominate wind direction. Exceedances follow the trend as well, occurring mostly when the wind is blowing from the west-southwest. It should be noted that the Billings Airport is located on the opposite side of the valley from the Coburn Road Monitor, but both are on the northeast side of Billings and located above the valley floor. Additionally, ExxonMobil, MSCC, and YELP are located northeast of the Coburn Road Monitor and the Airport while PPL, Western Sugar, Phillips66, and CHS facilities are located to the southwest of the monitor. The State of Montana discussed that in 2008 initial catalyst

testing at ExxonMobil caused the data from that year to be unreliable and unrepresentative. However, from Table 9 below, the exceedances and wind direction do not correlate with the location of ExxonMobil facility in the northeast. Thus, EPA finds that 2008 is a representative year and exceedances were not caused by early catalyst testing at ExxonMobil.

Table 9. 2008 Exceedances (from AQS) with Wind Direction and Wind Speed

Date and Time (Military)	Value (ppb)	Wind Direction (degrees)	Wind Speed (Meters/s)
8/24 1:00	119	127	0.9
10/28 8:00	112	240	7.8
10/27 1:00	95	119	0.8
6/14 6:00	89	238	4.8
10/01 8:00	77	243	5.3

Table 10. 2009 Design Values (from AQS) with Wind Direction and Wind Speed

Date and Time (Military)	Value (ppb)	Wind Direction (degrees)	Wind Speed (Meters/s)
9/22 9:00	107	*239**	3.0
2/5 2:00	83	240	8.8
9/25 9:00	83	*239**	4.1
1/20 5:00	72	238	12

*Poor Quality Assurance Results; Wind Direction from MSCC's April 8, 2013 Five-Factor Analysis

Table 11. 2010 Exceedances (from AQS) with Wind Direction and Wind Speed

Date and Time (Military)	Value (ppb)	Wind Direction (degrees)	Wind Speed (Meters/s)
2/10 4:00	91	*202**	7.2
7/8 6:00	111	*242***	3.7
7/9 6:00	92	*245***	4.2
9/28 8:00	83	235	5.9
10/3 9:00	87	242	4.8
10/22 9:00	89	241	5.0
12/21 9:00	86	232	3.0
12/24 9:00	101	242	5.4

*Poor Quality Assurance Results; Wind direction from Brickyard Monitor (Ref.: MSCC's April 8, 2013 Five-Factor Analysis)
**Machine Malfunction; Wind direction from Brickyard Monitor (Ref.: MSCC's April 8, 2013 Five-Factor Analysis)

Table 12. 2011 Exceedances (from AQS) with Wind Direction and Wind Speed

Date and Time (Military)	Value (ppb)	Wind Direction (degrees)	Wind Speed (Meters/s)
9/5 8:00	142	248	14.2
9/11 7:00	113	242	12.7
10/30	85	238.6	12.1

Geography/Topography (mountain ranges or other air basin boundaries)

The dominant topographical feature to influence airflow in the Billings and Laurel areas is the Yellowstone River Valley. The terrain near Billings and Laurel is upland bench, which is steeply cut by the Yellowstone River and its tributaries. The bench lies at an elevation of 4,000 feet while the valley in Billings is approximately 3,000 feet above sea level and Laurel is approximately 3,300 feet above sea level. A constriction in the Yellowstone Valley occurs between central Billings and the Lockwood area located to the east. The valley is generally 3 or 4 miles wide but narrows to a little over a mile wide at the constriction. Nearby terrain, such as the Sacrifice Cliff to the southeast of Billings and the Rimrocks to the north, rises abruptly and is often higher than the tallest smoke stack. Laurel is located within the Yellowstone Valley approximately 15 miles southwest of Billings. The valley near Laurel is 3 or 4 miles wide. Nearby terrain to the northwest and southeast of Laurel rises abruptly and is often higher than the tallest smoke stack.

The geography/topography of the area has the possibility to restrict airflow and cause stagnation of an air mass. However, Tables 9, 10, 11, and 12 above, show that even though the terrain may be a cause of stagnation of airflow and inversion of the air mass, the wind speed does not stagnate and shows that there is continuous airflow. Additionally, the State of Montana discusses potential daylong stagnation events as rare and multi-day events as even rarer. During the winter of 2010-2011, the air shed saw only a three-day stagnation episode and only three other individual days when the inversions lasted more than 24 hours. Outside the winter season, stagnant periods that exceed 24 hours are very uncommon. However, inversion or stagnation episodes can occur and this should not be interpreted to signify that the Billings/Laurel area had or will not have any stagnation occurrences.

Jurisdictional Boundaries

The State of Montana requests, and EPA agrees, that the initial 2010 1-hour SO_2 standard nonattainment area boundary for Yellowstone County should be significantly smaller than the default county boundary. Montana submitted a potential boundary in its April 3, 2013 five-factor analysis, for a nonattainment area based on certain jurisdictional boundaries, which included roads and other permanent features (Sections and Townships).

Conclusion

The air quality monitor in Yellowstone County shows a violation of the 2010 1-hour SO_2 NAAQS, based on 2009-2011 air quality data. EPA is not yet prepared to conclude that the nearby counties of Musselshell, Rosebud, Treasure, Big Horn, Carbon, Stillwater, and Golden Valley contribute to the recorded violations of Coburn Road SLAMS monitor in Yellowstone County, and thus are not included in the initial nonattainment area but will be further addressed in a future final designations action. Based on the consideration of all the relevant and available information, as described above, EPA believes that the technical analysis prepared and submitted by the State of Montana to respond to EPA's preliminary nonattainment area proposal presents a reasonable and technically supported alternative initial nonattainment boundary. The State of Montana's technical analysis assess the five factors relevant to this monitored violation, including the air quality data, the emission information, the dominate wind

directions, the topography in the area and the jurisdictional considerations to make their boundary recommendation.

EPA has reviewed the information above and has determined that it is appropriate to initially designate a portion of Yellowstone County as "nonattainment" for the 2010 1-hour SO_2 NAAQS and agrees with the State of Montana's recommended boundary shown in Figure 10, and described as:

> The proposed NAA originates at the point defined as the southwest corner of Section 11, Township 1S, Range 26E. From that point the NAA boundary proceeds north along the western section line of Section 11 to the point of intersection with the midline of Interstate Highway 90. From that point the boundary follows the midline of Interstate Highway 90, across the Yellowstone River, to the point where the highway midline intersects the northern boundary of Section 35, Township 1N, Range 26E. From that point the boundary proceeds east along the northern section line of Sections 35 and 31 to the point where Old US 87/Hardin Road leaves the section line and turns southeast. The boundary follows the midline of Old US 87/Hardin Road southeast to the point where the road intersects the western boundary of the SE ¼ of the SE ¼ of Section 31, Township 1N, Range 27E. From that point the boundary proceeds south along the ¼ section line to the southern boundary of Township 1N, then east to the northeast corner of Section 5, Township 1S, Range 27E. The NAA boundary then proceeds south along the eastern section line of sections 5 and 9 to the southeast corner of Section 9, Township 1S, Range 27E, where it turns west and follows the south section line of Sections 9 and 7, Township 1S, Range 27E; and Sections 12 and 11, Township 1S, Range 26E, back to the point of origin.

Areas and sources in Yellowstone County or other counties in Montana that we are not yet prepared to conclude are contributing to the monitored violation or other possible violations are not included in this initial nonattainment area designation. In a subsequent round of designations we will further address such areas and sources and make final designations decisions for areas that are not currently included in the nonattainment area designation addressed in this TSD.