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Chapter Three – Summary of Emission Reductions Achieved (40 CFR 51.308(g)(2))

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3.1 Status Summary

Chapter Three discusses the emission reductions achieved as a result of implementation of control measures outlined in Nevada's 2009 RH SIP toward achieving Nevada's reasonable progress goal. SO_2 and NO_x emissions have decreased substantially in Nevada due to the implementation of these control measures and other noteworthy changes in source activity. Emission reductions have occurred in Nevada as a result of implementation of federal and state measures, closure of a large coal-fired power plant, as well as the withdrawal of permit applications that were included in the original 2018 emissions inventory. Since the baseline inventory, Nevada has reduced EGU emissions of SO_2 by more than 40,000 tons and emissions of NO_x by more than 37,000 tons. SO_2 point source emissions alone decreased by 78 percent between the baseline and 2008 inventories, while NO_x point source emissions decreased by over 50 percent. The majority of these decreases were due to the closure of the Mohave Generating Station, but as can be seen in Figure 3-1, there has been a steady continued decrease in SO_2 and NO_x emissions since the shutdown, as well.

3.2 Overall NO_x and SO_2 Emission Reductions

40 CFR 51.308(g)(2) requires "[a] summary of the emissions reductions achieved throughout the State through implementation of the measures described in paragraph (g)(1)" and discussed in Chapter Two of this progress report. This chapter discusses the emission reductions due to these control measures, specifically the reduction of controllable anthropogenic emissions of SO_2 and NO_x. Since the submittal of Nevada's RH SIP in November 2009, the most significant decrease in emissions of SO_2 and NO_x has resulted from the closure of the Mohave. Other reductions stem from federal and state programs, cancellations of proposed coal-fired power plants, and BART upgrades at the Tracy and Fort Churchill power plants.

> *51.308(g) . . . Periodic progress reports must contain at a minimum . . .*
>
> *(2) A summary of the emissions reductions achieved throughout the State through implementation of the measures described in paragraph (g)(1) of this section.*

3.3 NO_x and SO_2 Emission Reductions from Federal Programs

Emission reductions will be seen as a result of several federal programs. However, these emissions are not easily quantified. As described in Chapter Two, these federal programs include:

- The Heavy-Duty Highway regulation, which focused on reducing PM, NO_x, and non-methane hydrocarbons from new heavy duty engines. It also mandated a reduction in

sulfur content in fuel by 97 percent. These regulations were phased in between 2006 for sulfur and 2007 for NO_x.

- The Tier 2 Vehicle and Gasoline Sulfur Program, which requires average NO_x emissions below a specified limit on the mix of vehicles that a manufacturer sells each year and realizes a reduction in VOC and other emissions, as well.
- The Non-road Mobile Diesel Emissions Program, which focuses on reducing emissions of NO_x, hydrocarbons and CO. This rule set standards that reduced emissions by more than 90 percent with full implementation by 2012. Beginning in 2007, the rule also reduced the level of sulfur in non-road diesel fuel by 99 percent with full implementation by 2012.
- Maximum Achievable Control Technology Programs. As noted in Chapter Two, these programs were not estimated as part of the PRP18a emission inventory due to the substantial effort required to gather necessary data. However, these MACT programs will result in a reduction of emissions beyond projections that were made for the 2018 inventory. These programs are difficult to quantify due the sheer number of programs.
- The Mercury and Air Toxics Rule, which was finalized by USEPA in December 2011 to reduce mercury and air toxics from coal and oil-fired power plants. USEPA projects that this rule will also reduce sulfur emissions from power plants. These emission reductions are expected by 2016.
- Revised NAAQS, including the SO_2, NO_2 and $PM_{2.5}$ NAAQS. The SO_2 and NO_2 NAAQS were both revised in 2010 to add a 1-hour standard. Additionally, the annual $PM_{2.5}$ NAAQS was strengthened in 2012. These new and revised standards must be taken into account when permitting new or modified major sources resulting in additional reductions in emissions of these pollutants.
- The Tier 3 Vehicle Emission and Fuel Standards Program, which imposes stronger tailpipe and evaporative emissions standards, as well as a lower sulfur content for gasoline. These tighter standards will result in lower sulfur emissions from motor vehicles beginning in 2017.

3.4 EGU NO_x and SO_2 Emission Reductions due to State Measures other than BART

3.4.1 Emission Reductions due to Closures and Cancellations

As discussed in Section 2.4.1, the PRP18a inventory included estimates of emissions from Mohave, which was permanently closed at the end of 2005. This closure resulted in the elimination of 19,595 tpy of NO_x and 8,701 tpy of SO_2. Emissions from Mohave represented 19 percent of the projected PRP18a statewide SO_2 emissions and 14 percent of projected statewide NO_x emissions.

Five proposed power plants were also included in the projected PRP18a inventory (Table 3-1), however, three of these proposed plants withdrew their permit applications. The SO_2 and NO_x

emissions projected for the three plants were 5,814 tons and 6,136 tons, respectively. Additionally, the two power plants that began operating actually emitted fewer total tons per year of NO_x, PM_{10} and SO_2 combined than was projected. The two plants operated at a combined total of 472 tons of NO_x and 244 tons of SO_2 for 2012. This is 766 tons of NO_x and 431 tons of SO_2 less than projected for the PRP18a inventory. Total emissions of SO_2 and NO_x overestimated in the PRP18a inventory from these five power plants was 14,946 tons and 26,497 tons, respectively. These reductions would certainly result in lower modeled visibility impacts for the 2018 plan year, particularly at Class I areas adjacent to southern and eastern Nevada.

Table 3-1. Proposed 2018 EGUs and Current Permit Activity (shading indicates the project was withdrawn)

PROPOSED EGUS IN 2018 EMISSION INVENTORY (PRP18a)	NO_x (tpy)	PM_{10} (tpy)	SO_2 (tpy)
Future Coal EGU (Newmont TS Power Plant, 241 MW - Northern Nevada Energy) (*actual 2012 emissions*)	499 (*254*)	89 (*189*)	670 (*213*)
Future Natural Gas EGU (Copper Mountain - Sempra Energy)	887	71	6
Future Natural Gas EGU (Chuck Lenzie, 1,102 MW - NV Energy) (*actual 2012 emissions*)	739 (*218*)	59 (*185*)	5 (*31*)
Future Coal EGU (White Pine Energy Associates/LS Power)	3,909	670	4,356
Future Coal EGU (A)	1,340	261	1,452
Total Emissions from proposed 2018 EGUs	7,374	1,150	6,489
2018 Emissions Reductions due to Cancellations	6,136	5,814	5,814

Source: Modified from Table 3-5 in *Nevada Regional Haze State Implementation Plan, October* 2009 (2009 RH SIP), page 3-8.

3.4.2 Emission Reductions from EGUs

To account for year-to-year changes in emissions, annual emission totals for Nevada EGUs are presented in Table 3-2. EGU emissions are consistently reported and tracked in the USEPA's Air Markets Program Database for permitted Title V facilities in the state. http://ampd.epa.gov/ampd/, last viewed 9/2/2014. RHR implementation plans are required to pay specific attention to certain major stationary sources, including EGUs, built between 1962 and 1977.

Table 3-2 and Figure 3-1 depict annual EGU emissions of NO_x and SO_2 for Nevada EGU sources between 1995 and 2013, as reported in USEPA's Clean Air Markets Division (CAMD) Acid Rain Program. While these types of facilities are targeted for controls in state RH SIPs, it should be noted that many of the controls planned for EGUs in the WRAP states had not taken place yet in 2010, while other controls separate from the RHR may have been implemented. The

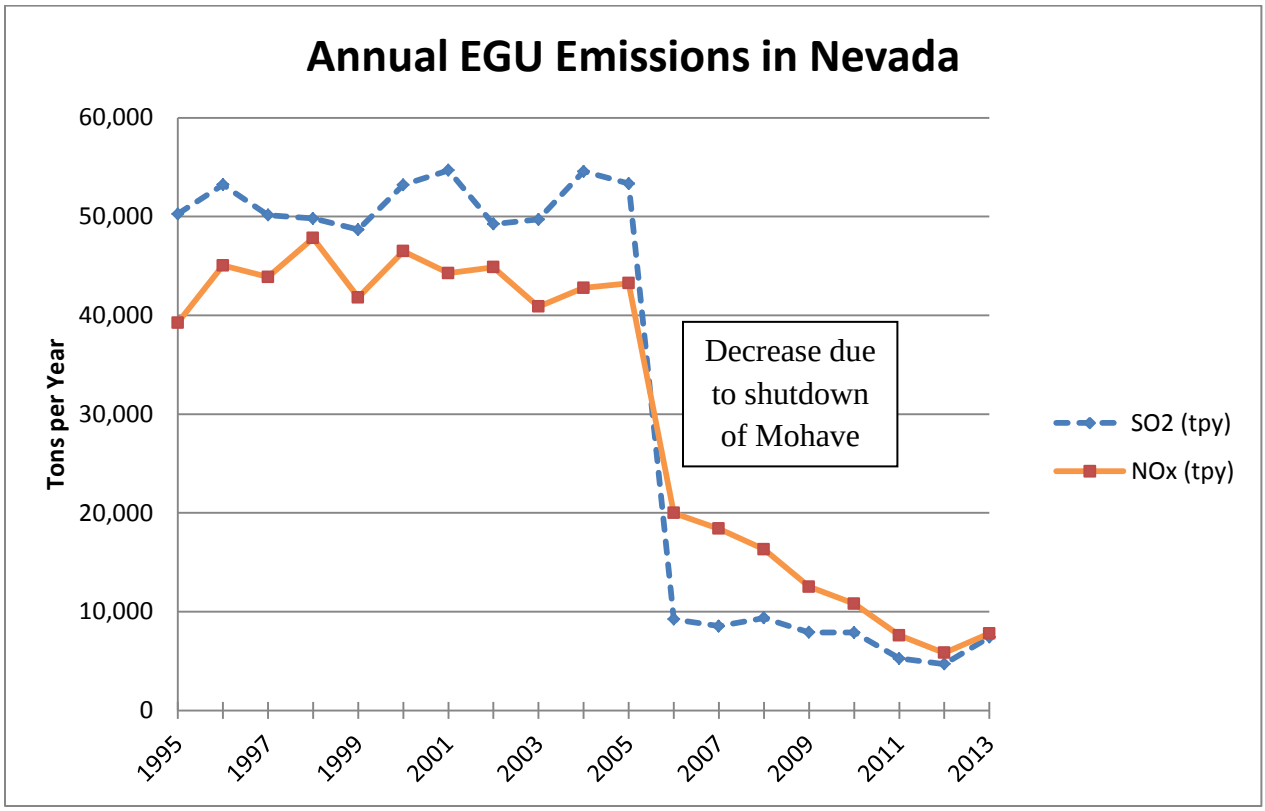
CAMD data show a sharp decline for SO_2 and NO_x between 2005 and 2006, mainly due to the closure of the Mohave Generating Station in Clark County, eliminating approximately 20,000 tpy of NO_x and 41,000 tpy of SO_2 emissions. Further discussion later in this section details the continued decreases in NO_x and SO_2 at Reid Gardner, Fort Churchill and Tracy, three of Nevada's subject-to-BART facilities. Table 3-2 shows that since the closure of Mohave on December 31, 2005, SO_2 emissions have continued to decline, while NO_x emissions have decreased by over 10,000 tpy.

Table 3-2. Nevada Acid Rain CAMD Data - Annual EGU Emissions of SO_2 and NO_x

Reporting Year	SO_2 (tpy)	NO_x (tpy)		Reporting Year	SO2 (tpy)	NOx (tpy)
1995	50,262	39,249		2005	53,346	43,242
1996	53,234	45,054		2006	9,239	19,985
1997	50,153	43,886		2007	8,545	18,405
1998	49,813	47,822		2008	9,365	16,306
1999	48,673	41,806		2009	7,913	12,514
2000	53,203	46,492		2010	7,889	10,812
2001	54,688	44,262		2011	5,272	7,598
2002	49,240	44,871		2012	4,691	5,832
2003	49,719	40,880		2013	7,427	7,796
2004	54,564	42,781				

Source: USEPA Air Markets Program Database (http://ampd.epa.gov/ampd/, last viewed 9/2/2014)

Figure 3-1. EGU Emissions of SO_2 and NO_x Reported in the CAMD Acid Rain Database between 1995 and 2013



Reid Gardner and Tracy are baseload power plants. Baseload plants are the production facilities used to meet some or all of a region's continuous energy demand. They produce energy at a constant rate and typically run at all times of the year except in case of repairs or scheduled maintenance. Fort Churchill is a peaking plant. Peaking power plants generally run only when there is a high demand for electricity.

Figure 3-2 and Figure 3-3 present CAMD Acid Rain data for SO_2 and NO_x, respectively, at Reid Gardner from 1995 through 2013. Data from Units 1, 2 and 3 are shown here, as they were the units that were identified as subject-to-BART. These units are scheduled to be retired by December 31, 2014. Appendix B, Section 3.3. Assuming emission levels based on the most recent year of Acid Rain data (2013), this would result in the immediate reduction of 721 tpy of SO_2 and 924 tpy of NO_x. If Unit 4 were to be retired by December 2017 (Appendix B, Section 3.3), this would result in an additional decrease in SO_2 of 533 tpy and NO_x of 924 tpy. In contrast, emission projections for the PRP18a inventory for Reid Gardner were 1,758 tons of SO_2 and 8,893 tons of NO_x. The closure of these units will eliminate all emissions of SO_2 and NO_x. Nevertheless, even without the closures, there has been a steady decrease in SO_2 and NO_x emissions since the baseline period.

Figure 3-2. CAMD Acid Rain Database SO_2 EGU Emissions for Reid Gardner 1995 - 2013

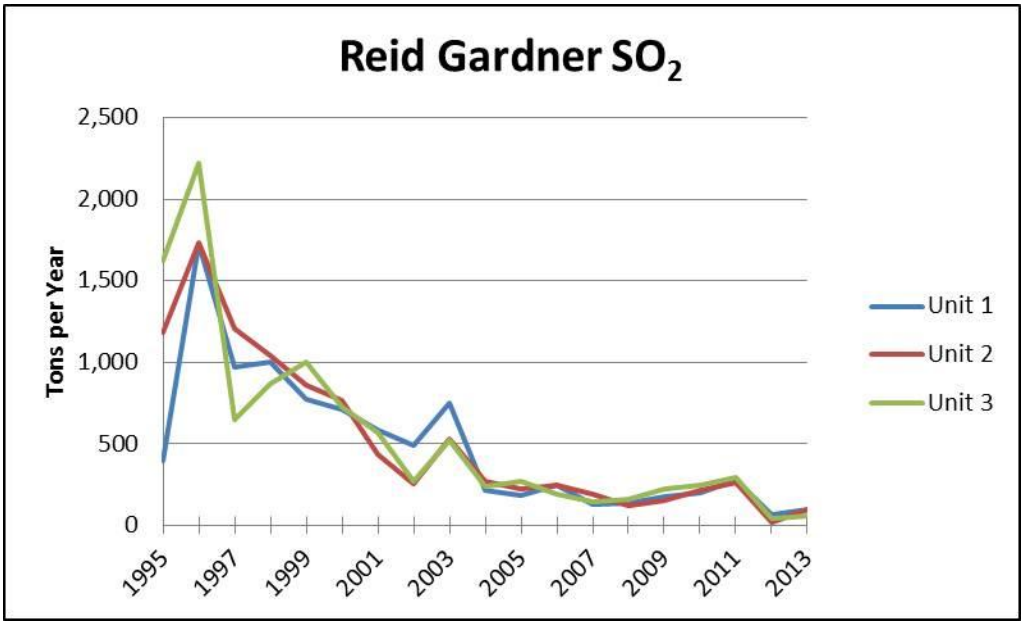


Figure 3-3. CAMD Acid Rain Database NO_x EGU Emissions for Reid Gardner 1995 - 2013

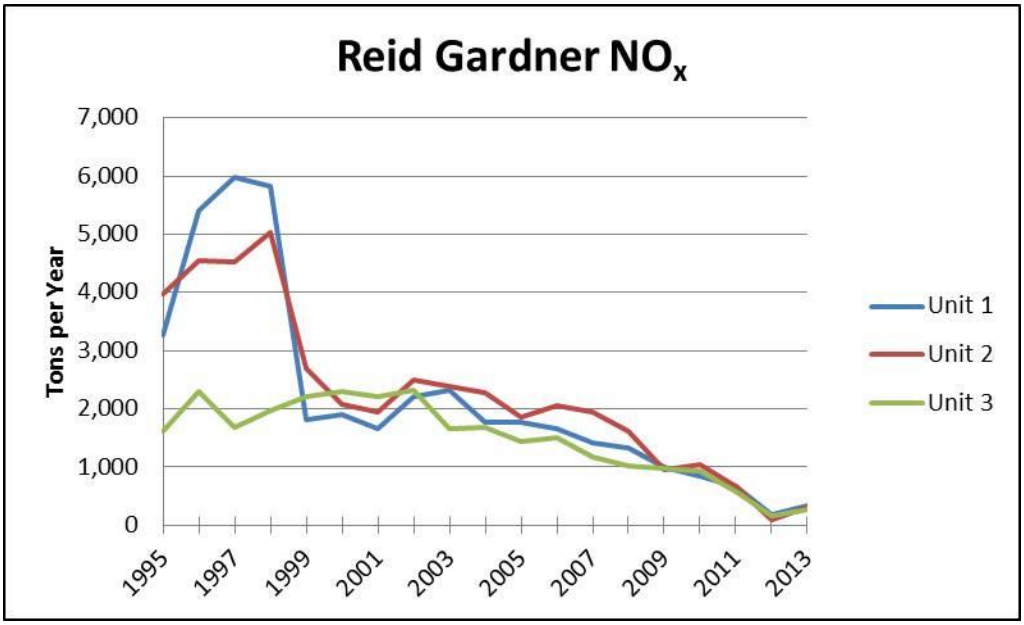


Figure 3-4 and Figure 3-5 show CAMD Acid Rain data for SO_2 and NO_x, respectively, at Tracy for years 1995 through 2013. Units 1, 2 and 3 are presented here because these units were identified as being subject-to-BART.

The Western U.S. Energy Crisis of 2000-2001 resulted in a shortage of electricity supply caused by a shortage of generating capacity, bottlenecks in related markets, wholesale generator market power, regulatory missteps, and faulty market design. Weare 2003. Responding to the energy crisis and high natural gas prices, Tracy combusted significant amounts of residual fuel oil in

2001, and all three units ran a significant number of hours during that year. Appendix B, Section 1.8. This resulted in greater than 2,500 percent increase in SO_2 emissions from 2000 to 2001. In 2002, after the energy crisis, SO_2 emissions dropped back to levels seen in 1999, a decrease of 99 percent. For NO_x, emissions increased seven percent from 2000 to 2001 and decreased by 52 percent from 2001 to 2002.

Tracy Units 1 and 2 will be retired by the end of 2014, and BART upgrades at Unit 3 will not allow for the continued use of oil-firing capacity beyond December 31, 2014. Appendix B, Sections 3.1 and 3.2.

Figure 3-4. CAMD Acid Rain Database SO_2 EGU Emissions at Tracy 1995 - 2013

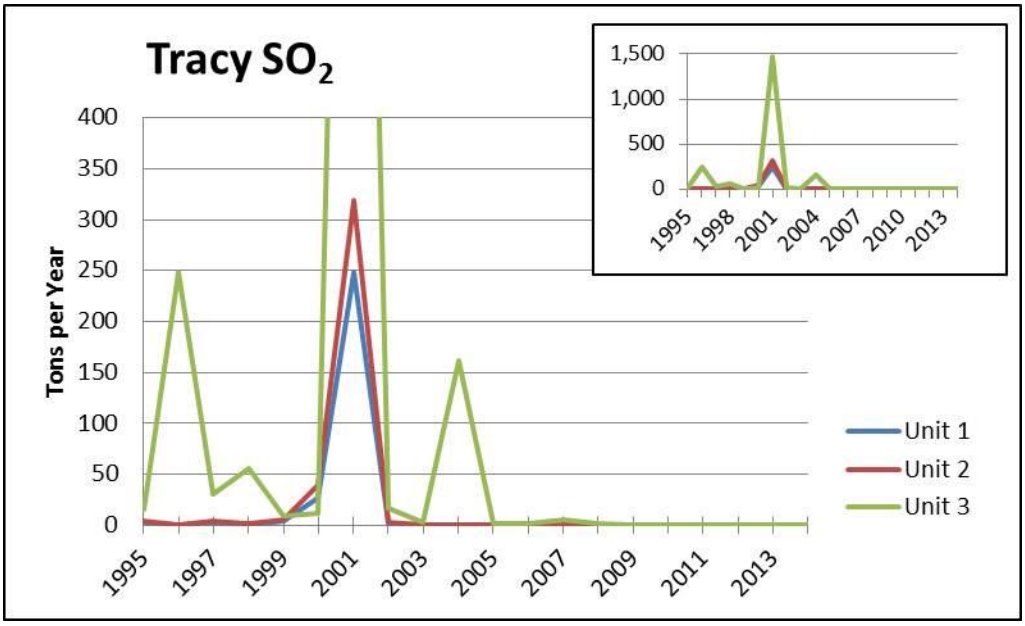


Figure 3-5. CAMD Acid Rain Database NO_x EGU Emissions at Tracy 1995 - 2013

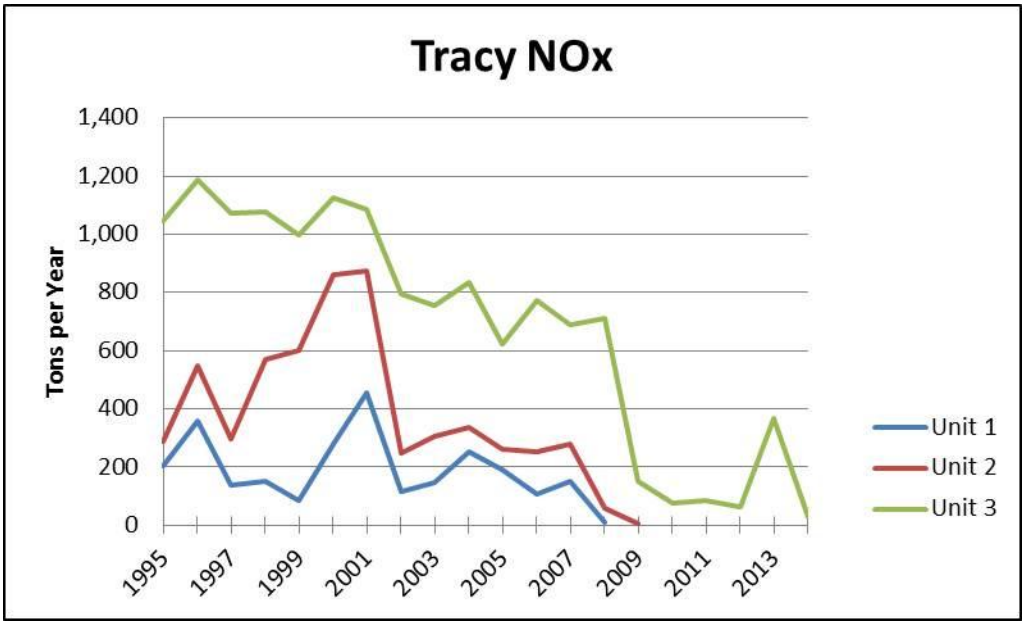


Figure 3-6 and Figure 3-7 represent CAMD Acid Rain data for SO_2 and NO_x at Fort Churchill (a peaking plant) for Units 1 and 2 for years 1995 through 2013. Like Tracy, the Western Energy Crisis affected fuel use at Fort Churchill. Fort Churchill combusted a significant amount of residual fuel oil and ran many hours over historical use in 2001. Appendix B, Section 1.8. Anomalously high values of SO_2 and NO_x are shown in both figures for 2001. This resulted in more than a 2,000 percent increase in SO_2 emissions and a 38 percent increase in NO_x emissions from 2000 to 2001.

In 2002, after the energy crisis, Fort Churchill reverted to primarily using pipeline natural gas, resulting in significant decreases in both SO_2 (74 percent) and NO_x (16 percent) below 1999 emission levels. Beginning in 2007, there was a notable decline in fuel oil use at Fort Churchill; in 2007, fuel oil was used a total of only 14 hours in Units 1 and 2. Since 2007, the sole source of fuel has been from pipeline natural gas. Appendix B, Section 1.8. Essentially, conversion to pipeline natural gas has already been implemented at Fort Churchill. Moreover, BART upgrades at Units 1 and 2 will not allow for the continued use of oil-firing capacity beyond December 31, 2014. Appendix B, Section 3.2. As can be seen in Figure 3-6 and Figure 3-7, there has been a steady decrease in SO_2 and NO_x emissions since the baseline period.

Figure 3-6. CAMD Acid Rain Database SO_2 EGU Emissions at Fort Churchill 1995 - 2013

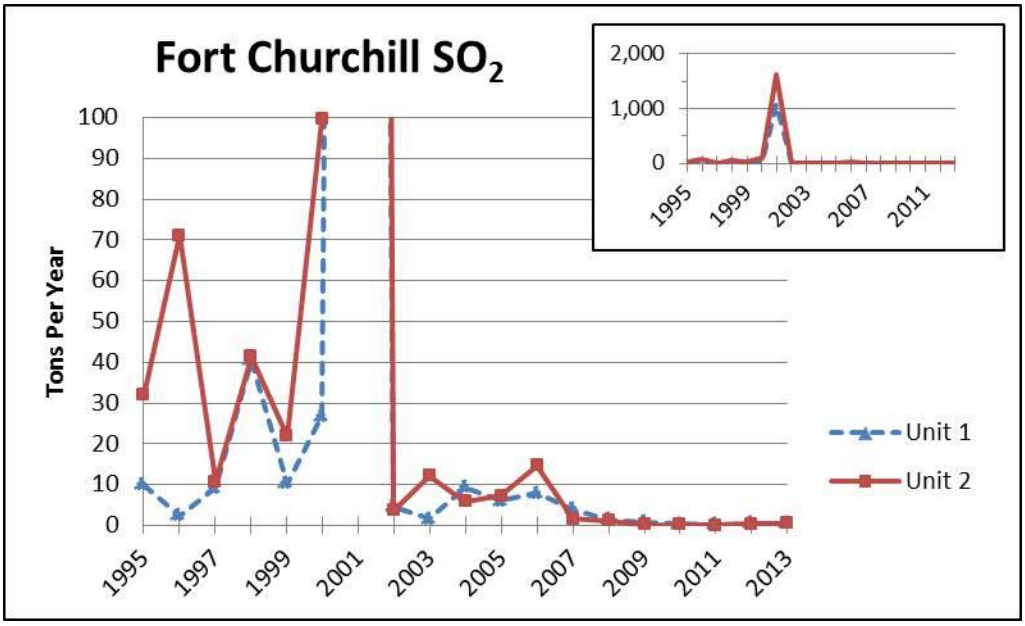
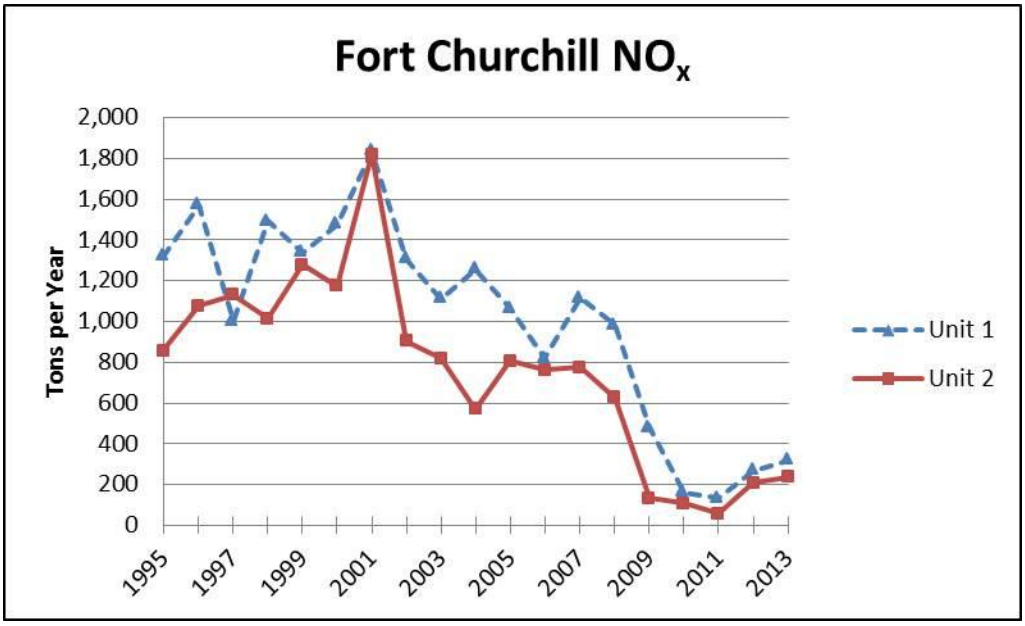


Figure 3-7. CAMD Acid Rain Database NO_x EGU Emissions at Fort Churchill 1995 - 2013



In summary, Nevada has shown evidence of a decrease in emissions of SO_2 and NO_x due to control measures implemented per Nevada's 2009 RH SIP, the closure of an entire coal-fired power plant and other State measures. In addition, future reductions will occur due to anticipated closure of specific EGUs.