Wyodak Power Plant

Chapter 6, Section 2
Construction Permit Application

Submitted to the Wyoming Air Quality Division
And Prepared by

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March 2008

1.0 Introduction

PacifiCorp Energy proposes to add new air pollution control devices that will significantly lower emissions of particulate matter (PM_{10}), sulfur dioxide (SO_2) and nitrogen oxides (NO_X) at the Wyodak Power Plant located near Gillette, in Campbell County, Wyoming. The installation of this pollution control equipment requires an analysis of the air quality impacts of the projects and submittal of this construction permit application to the Wyoming Air Quality Division. Through this application, PacifiCorp Energy is seeking to:

- Obtain a Chapter 6, Section 2 construction permit for proposed Wyodak Plant projects including the installation of new pollution control devices.

- Establish plantwide applicability limits for nitrogen oxides (NO_X) and sulfur dioxide (SO_2). The plantwide applicability limits (PALs) will allow the facility to conduct ongoing plant maintenance while ensuring the facility remains in compliance with New Source Review requirements. The requested PALs include:

    - Establishing a NO_X PAL of 5,078.0 tons/year at issuance of the construction permit
    - Establishing a NO_X PAL of 4,775.5 tons/year following completion of the Wyodak boiler low-NO_X projects
    - Establishing an SO_2 PAL of 7,893.5 tons/year at issuance of the construction permit.
    - Establishing an SO_2 PAL of 3,333.8 tons/year following completion of the Wyodak fabric filter baghouse installation.

- Obtain lower particulate matter emission rate limits for the Wyodak boiler. The requested PM_{10} limit includes:
    - Establishment of a PM_{10} limit of 71 lb/hour following installation of the fabric filter baghouse

- Obtain a lower NO_X emission rate limit for the Wyodak boiler. The requested NO_X limit includes:
    - Establishment of a boiler NO_X limit of 0.23 lb/MMBtu on a 12-month rolling average following installation of the low-NO_X system

- Obtain a lower SO_2 emission rate limit for the Wyodak boiler. The requested SO_2 limit includes:
    - Establishment of a boiler SO_2 limit of 0.16 lb/MMBtu on a 12-month rolling average following installation of the fabric filter baghouse
    - Establishment of a boiler SO_2 limit of 2,115 lb/hour (0.45 lb/MMBtu x 4,700 MM/hour) on a fixed 3-hour average basis following installation of the fabric filter baghouse

- Because the installation of the low-NO_X control system may increase emissions of carbon monoxide, and because the emissions evaluation indicates that the future potential CO emissions increase is above the PSD significance threshold of 100 tons/year, PacifiCorp requests that a CO limit be established for the Wyodak boiler. The requested limit is based on carbon monoxide emission rates utilizing good combustion control methods on the boiler following the low-NO_X control system installation. The requested carbon monoxide limit includes:

    - Establishment of a CO limit of 0.25 lb/MMBtu, 1,175 lb/hour, on a 30-day rolling average following completion of the low-NO_X control system

The planned Wyodak pollution control equipment projects are identified in the following table:

Table 1.0: Wyodak Pollution Control Equipment Projects

Wyodak Boiler
Installation of a fabric filter baghouse to replace an electrostatic precipitator
Installation of a low-NO_X control system

1.1 Existing Operations

PacifiCorp Energy is 80 percent owner as well as the operator of the Wyodak Power Plant which consists of one 335 net MW (nominal) electric generating unit. The Wyodak plant went into commercial operation in September 1978. The Wyodak Power Plant is an existing major stationary source of air emissions under both the New Source Review and Title V programs. The Wyodak boiler has a maximum heat input rate of 4,700 MMBtu/hour.

1.2 Emissions Analysis

The emission control projects proposed in this construction permit application include the installation of fabric filter baghouse to replace the existing electrostatic precipitator and the installation of a low-NO_X control system. The installation of the fabric filter baghouse will allow increased sulfur dioxide (SO_2) removal rates from the existing flue gas desulfurization system. These projects will result in improved particulate matter removal rates, reduced SO_2 emission rates and reduced NO_X emission rates for the Wyodak facility.

To establish a clear baseline for determining when PSD requirements may be triggered in the future, PacifiCorp is proposing to establish plantwide applicability limits for SO_2 and NO_X that would limit plantwide emissions of these pollutants at the facility to the "past actual baseline emissions" as defined by the Environmental Protection Agency's (EPA) "past actual to future actual emissions test." The plantwide applicability limits would be in addition to the new, lower unit-specific limits to be established as a result of adding the proposed air pollution control devices. Establishing plantwide limits for SO_2 and NO_X

will ensure that any proposed project will not cause an associated emissions increase of these specific pollutants.

1.3 Prevention of Significant Deterioration Review

The Wyodak Plant is located in an area classified as attainment for all criteria pollutants and is a listed PSD Source Category; therefore, the requirements of the federal PSD program, as administered by the Wyoming Department of Environmental Quality and the Wyoming Division of Air Quality will apply to the projects specified in this Chapter 6, Section 2 construction permit application.

As a result of the PSD review described in more detail below, PacifiCorp has concluded that there will not be a "significant net emissions increase" as defined in 40 CFR Part 52 and WAQSR Chapter 6 Section 4 for SO_2, NO_X, PM_{10}, lead, hydrogen fluoride, sulfuric acid, or VOCs; therefore, a BACT review for these pollutants will not be required. PacifiCorp has included a BACT review for carbon monoxide.

1.4 Compliance with National Ambient Air Quality Standards for Class I and Class II Areas and NSPS

After completing the planned projects the Wyodak Power Plant will meet all National Ambient Air Quality Standards (NAAQS) and the Class I and Class II PSD increments in the vicinity of the facility. A dispersion modeling analysis will be performed for CO which has the potential of a significant net emissions increase. At the request of the Wyoming Department of Environmental Quality a NAAQS impact analysis for all criteria pollutants will be performed including SO_2, NO_X, HF, CO, PM_{10} and lead at post-pollution control equipment project emission rates. The facility will meet the applicable New Source Performance Standards (NSPS) defined in the federal regulations at 40 CFR 60 Subpart D and Wyoming Air Quality Standard and Regulations Chapter 5, Section 2.

2.0 Project Description

PacifiCorp plans to install pollution control equipment and implement other plant projects between January 2009 and December 2011 as reflected in the project timeline shown in Table 2.1. These projects are listed in Appendix A. The projects identified are based on current plans and may be refined as overhaul schedules and equipment status change. Additional information will be provided to the Wyoming Division of Air Quality as PacifiCorp further refines the project schedule and scope.

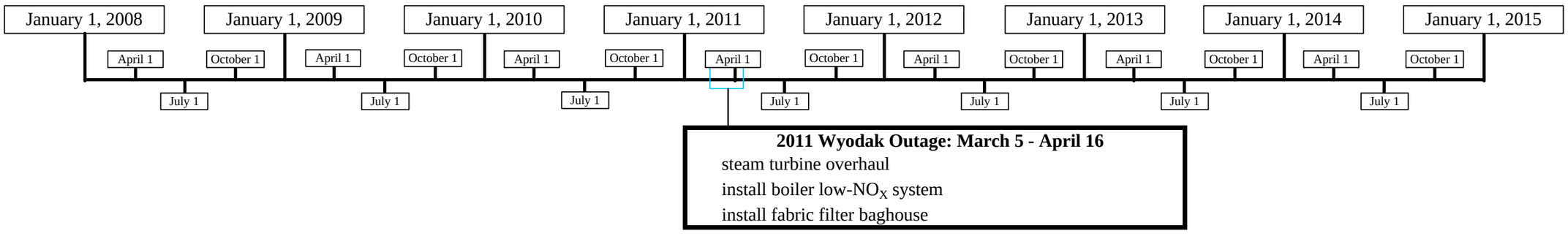
The planned Wyodak Plant projects are summarized as follows:

Wyodak Projects

- Installation of a fabric filter baghouse to replace the existing electrostatic precipitator
- Installation of a boiler low-NO_X control system
- Steam turbine overhaul
- Plant projects listed in Appendix A

Table 2.1 contained on the following page identifies the planned Wyodak Power Plant project schedule from 2008 through 2014. Table 2.1 includes major plant maintenance projects as well as pollution control equipment installations.

Table 2.1: Wyodak Project Schedule



Major 2009 Projects

Install Bottom Ash Pond

Install Reverse Osmosis Skid

Major 2011 Activities

Overhaul HP/IP/LP Steam Turbine

Rewind Generator

Install Fabric Filter Baghouse

Install Low-NO_X System

3.0 List of Potential Air Emission Points and Air Contaminants Emissions Summary

The Wyodak Power Plant currently operates under Title V operating permit 3-1-101-1. The operating permit has incorporated all applicable requirements contained in the following permits: MD-1177, MD-1079, waiver AP-3436, and the Chapter 6, Section 2 waivers issued January 19, 1996 and October 5, 1997. The facility's Title V permit identifies the facility's emission points and potential air contaminants.

4.0 Evaluation of Historic and Future Emission Rates

4.1 Project Description

This section presents the method for conducting various PSD evaluations, including:

- A determination of baseline actual emissions for SO_2, NO_X, PM_{10}, CO, ozone (as non-methane VOCs), fluoride (as hydrogen fluoride), lead, and sulfuric acid.
- A determination of projected actual emissions of SO_2, NO_X, PM_{10}, CO, VOCs, fluorides, lead, and sulfuric acid.
- A comparison between the CO, PM, VOCs, fluorides, lead, and sulfuric acid past actual baselines and future potential emissions to determine if PSD significance levels are triggered.

This section also sets forth the proposed plantwide applicability limits for SO_2 and NO_X.

The evaluation of historic (baseline) and future potential pollutant emission rates are contained in Appendix B of this permit application.

4.2 Baseline Actual Emissions

The pollutants of interest for this review are SO_2, NO_X, PM_{10}, CO, VOCs, fluorides, lead, and sulfuric acid.

4.2.1 Calculation of Baseline Actual Emissions

40 CFR 52.21(b)(48)(i) describes baseline actual emissions for the Wyodak Power Plant as follows:

Baseline actual emissions means the rate of emissions, in tons per year, of a regulated NSR pollutant, as determined in accordance with paragraphs (b)(48)(i) through (iv) of this section.

(i) For any existing electric utility steam generating unit, baseline actual emissions means the average rate, in tons per year, at which the unit actually emitted the pollutant during any consecutive 24-month period selected by the owner or operator within the 5-year period immediately preceding when the owner or operator begins actual construction of the project. The Administrator shall allow the use of a different time period upon a determination that it is more representative of normal source operation.

(*a*) The average rate shall include fugitive emissions to the extent quantifiable, and emissions associated with startups, shutdowns, and malfunctions.

(*b*) The average rate shall be adjusted downward to exclude any non-compliant emissions that occurred while the source was operating above any emission limitation that was legally enforceable during the consecutive 24-month period.

(*c*) For a regulated NSR pollutant, when a project involves multiple emissions units, only one consecutive 24-month period must be used to determine the baseline actual emissions for the emissions units being changed. A different consecutive 24-month period can be used for each regulated NSR pollutant.

(*d*) The average rate shall not be based on any consecutive 24-month period for which there is inadequate information for determining annual emissions, in tons per year, and for adjusting this amount if required by paragraph (b)(48)(i)(*b*) of this section.

To identify and calculate baseline actual emissions, PacifiCorp has used data from the EPA Clean Markets Division's emissions data base. In order to comply with the EPA's acid rain program, PacifiCorp utilizes continuous emissions monitors (CEMs) to report hourly SO_2 and NO_X emissions for the boiler at the Wyodak facility. CEMs are also used to obtain and report the hourly heat input rate into the Wyodak boiler. The hourly emissions and heat input data is submitted to the EPA on a quarterly basis and is readily available on the EPA's website located at http://cfpub.epa.gov/gdm/. For purposes of this review the 5-year evaluation period is from January 2003 through December 2007. The baseline actual emissions are summarized in Table 4.2.

SO_2 Emissions

Appendix B, Table WYO-1 identifies the monthly SO_2 emissions for the relevant time period. This data was obtained from the Environmental Protection Agency's (EPA) Acid Rain Emissions database for stack emissions and from the Wyodak Plant's annual emissions inventory for non-stack emissions. The monthly data and emissions inventory data was used to calculate the maximum past actual annual plant SO_2 emission rate of 7,853.5 tons/year. The maximum past actual Wyodak stack SO_2 emission rate of 7,853.5 tons/year does not include any SO_2 emissions in excess of the applicable 3-hour limit of 0.5 lb/MMBtu during the 24-month evaluation period from May 2004 through April 2006.

NO_X Emissions

Appendix B, Table WYO-3 identifies the monthly NO_X emissions for the relevant time period. This data was obtained from the Environmental Protection Agency's (EPA) Acid Rain Emissions database for stack emissions and from the Wyodak Plant's annual emissions inventory for non-stack emissions. The monthly data and emissions inventory data was used to calculate the maximum past actual annual plant NO_X emission rate of 5,038.0 tons/year. There were no NO_X emissions in excess of the applicable 3-hour limit of 0.70 lb/MMBtu during the 24-month evaluation period from May 2004 through April 2006.

Particulate Matter Emissions

Appendix B, Table WYO-7 identifies the monthly PM_{10} emissions for the relevant time period. The facility PM_{10} emission rates are based on annual stack test data, in units of lb/MMBtu multiplied by the monthly boiler heat input values identified in the EPA's Acid Rain Emissions database to calculate the stack emission rate. The Wyodak Plant's annual emissions inventory database was used to identify the maximum non-stack emission rate. As indicated in Table WYO-7, the Wyodak Plant had a maximum past actual 5-year PM_{10} emission rate of 374.0 tons/year.

Carbon Monoxide

Carbon monoxide emissions for the boiler have been determined by multiplying the past annual coal consumption (Appendix B, Table WYO-6) by the AP-42 emission factor for carbon monoxide emissions from coal fired boilers. The maximum non-stack carbon monoxide emission rates were obtained from the Wyodak Plant's annual emissions inventory database. The maximum past actual total Wyodak CO emission rate was 510.3 tons/year. The results of the past actual CO emissions evaluation is contained in Appendix B, Table WYO-15.

Volatile Organic Compounds

Volatile organic compound emissions for the boiler have been determined by multiplying the past annual coal consumption (Appendix B, Table WYO-6) by the AP-42 emission factor for volatile organic compounds emissions from coal fired boilers. The maximum non-stack VOC emission rates were obtained from the Wyodak Plant's annual emissions inventory database. The maximum past actual total Wyodak VOC emission rate was 61.2 tons/year. The results of the past actual VOC emissions evaluation is contained in Appendix B, Table WYO-17.

Lead Emissions

Lead emissions have been determined from the average past annual lead concentration of the coal burned, the average past annual coal ash concentration, the annual particulate matter emission rate, the annual boiler heat input rate (Appendix B, Table WYO-5) and the Method specified in AP-42 for determining lead emissions from coal fired boilers. The maximum past actual Wyodak emission rate was 0.05 tons/year. The result of the past actual lead emissions evaluation is contained in Appendix B, Table WYO-13.

Fluoride Emissions

Fluoride emissions, as hydrogen fluoride, have been determined from the 5-year average annual fluorine concentrations contained in coal burned at the Wyodak Plant and from the past actual annual coal burn rate as indicated in Table WYO-6. The Electric Power Research Institute (EPRI) LARK-TRIPP method for the determination of hydrogen fluoride (HF) emissions was used to calculate the maximum past actual annual HF emission rate of 13.0 tons/year as indicted in Table WYO-9.

Sulfuric Acid Emissions

Sulfuric acid emissions are calculated using past actual annual coal sulfur concentrations, past actual annual heat input rates (WYO-5) and Electric Power Research Institute's *Estimating Total Sulfuric Acid Emissions from Stationary Power Plants, Technical Update, April 2007* method for calculating H_2SO_4 emissions. The maximum past actual Wyodak sulfuric acid emission rate was 0.3 tons/year. The result of the past actual sulfuric acid emissions evaluation is contained in Appendix B, Table WYO-11.

Table 4.2 indicates the annual past actual baseline emission rates for the Wyodak Plant pollutants identified above.

Table 4.2: Summary of Wyodak Baseline (Past Actual) Emissions

Wyodak	SO_2 tons/year	NO_X tons/year	PM_{10} tons/year	HF tons/year	H_2SO_4 tons/year	Lead tons/year	CO tons/year	VOC tons/year
Boiler Stack Emissions	7,853.5	5,038.0	374.0	13.0	0.3	0.05	510.3	61.2

4.3 Projected Actual Emissions for Prevention of Significant Deterioration Pollutants

The next step in the emission rate evaluation is to projected actual emission rates for each pollutant. This is accomplished by determining the projected actual emissions based on coal quality, unit utilization, addition of pollution controls and expected emission rates.

Projected actual emissions are defined as follows:

> 40 CFR 52.21(b)(41)(i) *Projected actual emissions* means the maximum annual rate, in tons per year, at which an existing emissions unit is projected to emit a regulated NSR pollutant in any one of the 5 years (12-month period) following the date the unit resumes regular operation after the project, or in any one of the 10 years following that date, if the project involves increasing the emissions unit's design capacity or its potential to emit that regulated NSR pollutant and full utilization of the unit would result in a significant emissions increase or a significant net emissions increase at the major stationary source.
>
> (ii) In determining the projected actual emissions under paragraph (b)(41)(i) of this section (before beginning actual construction), the owner or operator of the major stationary source:
>
> (*a*) Shall consider all relevant information, including but not limited to, historical operational data, the company's own representations, the company's expected business activity and the company's highest projections of business activity, the company's filings with the State or Federal regulatory authorities, and compliance plans under the approved State Implementation Plan; and
>
> (*b*) Shall include fugitive emissions to the extent quantifiable and emissions associated with startups, shutdowns, and malfunctions; and
>
> (*c*) Shall exclude, in calculating any increase in emissions that results from the particular project, that portion of the unit's emissions following the project that an existing unit could have accommodated during the consecutive 24-month period used to establish the baseline actual emissions under paragraph (b)(48) of this section and that are also unrelated to the particular project, including any increased utilization due to product demand growth; or
>
> (*d*) In lieu of using the method set out in paragraphs (a)(41)(ii)(a) through (c) of this section, may elect to use the emissions unit's potential to emit, in tons per year, as defined under paragraph (b)(4) of this section.

PacifiCorp has proposed to accept plantwide applicability limits (PALs) for SO_2 and NO_X which are based on the Wyodak Plant's past actual baseline emission rates and on future potential emission rates based on new, lower SO_2 and NO_X emission limitations. With

these caps in place there is no potential that future emissions will be greater than past actual emissions, and no additional evaluation of future emissions is required.

4.3.1 Calculation Projected Annual Emissions

Under the provisions of 40 CFR 52.21(b)(41)(ii)(d) PacifiCorp has elected to determine the future emission rates of SO_2, NO_X, PM_{10}, fluoride (as HF), sulfuric acid, lead, CO and VOCs based on the facility's potential to emit these pollutants. The future annual emission rates are based on applicable pollutant emission limitations – at existing or requested future emission limits – as well as on a maximum annual boiler operating time of 8,760 hours/year and a boiler heat input rate of 4,700 MMBtu/hour. The facility's average 5-year unit-specific coal heating values, in units of Btu/lb are used to calculate the maximum annual coal burn rates based on the maximum 4,700 MMBtu boiler heat input rate indicated above. Finally, where applicable, EPA AP-42 emission factors are used to calculate future potential pollutant emission rates.

Boiler Heat Input

The boiler heat input rate is used to calculate future potential emission rates at applicable pollutant emission limitations or, where appropriate, using EPA AP-42 emission factors. Other valid emission calculation methods, such as LARK-TRIPP was used to calculate HF and H_2SO_4 emission rates. A review of the EPA's Clean Air Markets Acid Rain database was used to identify the Wyodak Plant's maximum boiler heat input rates for the 5-year evaluation period used for this construction permit application. An evaluation of the Acid Rain database indicates a maximum boiler heat input rate of 4,700 MMBtu/hour.

Coal Burn

The Boiler coal burn rates are used to calculate some future potential emission rates – such as hydrogen fluoride and carbon monoxide – using appropriate AP-42 emission factors. The maximum future potential coal burn rate was calculated based on the 5-year average coal heating content values and in the maximum boiler heat input rate of 4,700 MMBtu/hour identified above. A 5-year review of the Wyodak Plant's most recent (2002-2006) coal heating content data indicates that the boiler had an average coal heating value of 8,029.2 Btu/lb. The maximum future annual coal burn rate can then be calculated using the average coal heating content value of 8,029.2 Btu/lb; the maximum boiler heat input rate of 4,700 MMBtu/hour; and a maximum annual boiler operating time of 8,760 hours/year. Using these data and appropriate conversion factors provides a maximum future annual boiler coal burn rate of 2,563,892 tons/year as indicated in Table WYO-10.

Sulfur Dioxide (SO_2) Emissions

In this construction permit application PacifiCorp is requesting that a PAL be established for SO_2 at issuance of the construction permit equivalent to the maximum past actual baseline emission rate of 7,853.5 tons/year plus the PSD significance threshold of 40 tons/year. Thus, an SO_2 PAL of 7,893.5 tons/year is requested at issuance of the construction permit. Furthermore, PacifiCorp requests that a new SO_2 PAL equivalent to 3,333.8 tons/year be established following construction of the fabric filter baghouse and implementation of the requested 12-month rolling average SO_2 emission limit of 0.16 lb/MMBtu. The future potential SO_2 emission rate of 0.16 lb/MMBtu; the maximum boiler heat input rate of 4,700 MMBtu/hour; the maximum past actual non-stack emission rate of 0.0 tons/year; and the PSD significance level of 40 tons/year were used to establish the requested SO_2 PAL value of 3,333.8 tons/year as indicated in Table WYO-2.

Nitrogen Oxides (NO_X) Emissions

In this construction permit application PacifiCorp is requesting that a PAL be established for NO_X at issuance of the construction permit equivalent to the maximum past actual baseline emission rate of 5,038.0 tons/year plus the PSD significance threshold of 40 tons/year. Thus, a NO_X PAL of 5,078.0 tons/year is requested at issuance of the construction permit. Furthermore, PacifiCorp requests that a new NO_X PAL equivalent to 4,775.5 tons/year be established following installation of the low-NO_X burner system and implementation of the requested 12-month rolling average NO_X emission limit of 0.23 lb/MMBtu. The future potential NO_X emission rate of 0.23 lb/MMBtu; the maximum boiler heat input rate of 4,700 MMBtu/hour; the maximum past actual non-stack emission rate of 0.8 tons/year; and the PSD significance level of 40 tons/year were used to establish the requested NO_X PAL value of 4,775.5 tons/year as indicated in Table WYO-4.

Particulate Matter Emissions

The post-pollution control fabric filter baghouse project PM_{10} emission limit of 0.015 lb/MMBtu and boiler heat input value 4,700 MMBtu/hour was used to calculate the future potential exhaust stack particulate matter emission rate of 308.8 tons/year as indicated in Table WYO-8. Following installation of the requested fabric filter baghouse Wyodak will have a boiler PM_{10} limit of 71 lb/hour (based on an emission rate of 0.015 lb/MMBtu at a boiler heat input rate of 4,700 MMBtu/hour).

Issuance of the requested PM_{10} emission limit, on a lb/hour basis, will ensure that future potential PM_{10} emissions are equal-to-or-less-than the maximum past actual emission rate of 327.5 tons/year identified in the 5-year emissions evaluation performed for this construction permit application as indicated in Table WYO-7.

Following installation of the fabric filter baghouse, the Wyodak boiler will have a future potential PM_{10} emission rate of 308.8 tons/year based on a boiler heat input of 4,700 MMBtu/hour and an emission limit of 0.015 lb/MMBtu. The boiler stack PM_{10} emission rate of 308.8 tons/year and the maximum non-stack PM_{10} emission rate of 46.5 tons/year provide a future total particulate matter emission rate of 355.3 tons/year as indicated in Table WYO-8.

Carbon Monoxide Emissions

PacifiCorp is requesting that a Wyodak carbon monoxide (CO) emission limit of 0.25 lb/MMBtu be established following installation of a low-NO_X control system on the facility boiler. A maximum future potential CO emission rate of 5,146.6 tons/year was calculated based on the requested emission limit of 0.25 lb/MMBtu, boiler heat input rate of 4,700 MMBtu/hour and maximum non-stack emission rate of 0.1 tons/year as identified in Table WYO-16.

Volatile Organic Compound Emissions

The maximum future potential volatile organic compound (VOC) emission rate was calculated based on the applicable AP-42 emission factor; on the maximum future potential coal burn rate; and on non-stack VOC emission rates. The applicable VOC emission factor for coal-fired boilers is equivalent to 0.06 lb/ton of coal burned; the maximum future potential Wyodak coal burn rate is equivalent to 2,563,892 tons/year; and the maximum non-stack VOC emission rate is 0.0 tons/year. Multiplying the 0.06 lb/ton VOC emission factor by the maximum coal burn rate and adding the non-stack emission rate establishes a maximum future potential Wyodak Plant stack VOC emission rate of 76.9 tons/year as indicated in Table WYO-18.

Lead Emissions

The maximum future potential lead emission rate was calculated based on the applicable AP-42 emission factor for coal-fired boilers and on 5-year average Wyodak data including coal lead concentrations, coal ash concentrations, the post-pollution control project PM_{10} emission rate, and on the future potential boiler heat input rate.

Utilizing the appropriate AP-42 emission factor from EPA Table 1.1-16 and an average coal lead concentration of 3.60 ppm; average coal ash content of 7.01%; PM_{10} emission rate of 0.015 lb/MMBtu; and future potential heat input rate of 41,172,000 MMBtu/year establishes a maximum future potential Wyodak lead emission rate of 0.06 tons/year as indicated in Table WYO-14.

Fluoride Emissions

The maximum future potential fluoride emission rate, as hydrogen fluoride, has been determined from the Wyodak Plant's 5-year average annual coal fluoride concentration, from the elimination of SO_2 scrubber bypass following installation of the fabric filter baghouse, and from the maximum future potential annual coal burn rate. The EPRI LARK-TRIPP method was used to calculate the maximum future potential HF emission rate of 10.7 tons/year as indicated in Table WYO-10.

Sulfuric Acid Emissions

EPRI's *Estimating Total Sulfuric Acid Emissions from Stationary Power Plants, Technical Update, April 2007* method was used to calculate the Wyodak Plant's maximum future potential H_2SO_4 emission rate. The future potential sulfuric acid emission rate was calculated based on the 5-year average annual coal sulfur concentration; the future potential boiler heat input value as indicated in Table WYO-10; and the installation of a fabric filter baghouse. Using the EPRI calculation method and future potential heat input value and average 5-year coal sulfur concentration provides a maximum future potential Wyodak Plant H_2SO_4 emission rate of 0.0 tons/year as indicated in Table WYO-12.

Table 4.3 indicates the annual future potential emission rates for the Wyodak Plant pollutants identified above.

Table 4.3: Summary of Wyodak Future Potential Emissions

Wyodak	SO_2 tons/year	NO_X tons/year	PM_{10} tons/year	HF tons/year	H_2SO_4 tons/year	Lead tons/year	CO tons/year	VOC tons/year
Boiler Stack Emissions	3,293.8	4,735.5	355.3	10.7	0.0	0.06	5,146.6	76.9

4.3.2 Prevention of Significant Deterioration Significance Determination

In order to determine if a Prevention of Significant Deterioration (PSD) significance level has been reached the past actual baseline emissions for each pollutant is subtracted from the projected annual emissions. If a significance level has been exceeded for a pollutant then a Prevention of Significant Deterioration review must be performed for that pollutant.

PacifiCorp is requesting that the "past actual to future potential actual" emissions test specified in the December 2002 revisions to the New Source Review rules [40 CFR 52.21(aa) and WAQSR Chapter 6, Section 4] be used to establish Plantwide Applicability Limitations (PALs) for SO_2 and NO_X at the Wyodak Plant. These plantwide annual emission limits will be imposed to assure, through federal enforceability, that the future Potential to Emit for the facility, as a whole, will be no greater than historical emissions. Therefore, there will be no net emissions increase of sulfur dioxide or nitrogen oxides as defined as "significant" [40 CFR 52.21(b)(23)] with respect to PSD review of these pollutants under the provisions of a PSD "major modification" [40 CFR 52.21(b)(2)(i)]. PSD review will apply to the other regulated pollutants for which there is a net increase defined as significant [40 CFR 52.21(b)(23)].

As noted in Section 1.0, at issuance of the construction permit PacifiCorp requests that NO_X and SO_2 PALs be established at values equivalent to the maximum past actual emission rates plus 40 ton/year PSD significance thresholds. Thus, at issuance of the construction permit a NO_X PAL of 5,078.0 tons/year and an SO_2 PAL of 7,893.5 tons/year year is requested for the Wyodak Plant. Furthermore, following completion of the fabric filter baghouse installation and low-NO_X burner project PacifiCorp requests that new NO_X and SO_2 PALs be implemented at values established from the 12-month rolling average SO_2 emission limit of 0.16 lb/MMBtu, NO_X limit of 0.23 lb/MMBtu, maximum boiler heat input rate of 4,700 MMBtu/hour; maximum past actual non-stack emission rates; and PSD significance thresholds of 40 tons/year. Thus, following completion of the fabric filter baghouse installation and low-NO_X burner project, PacifiCorp requests that a NO_X PAL of 4,775.5 tons/year and an SO_2 PAL of 3,333.8 tons/year be established at the Wyodak Plant.

In order to determine if a Prevention of Significant Deterioration significance level has been reached the past actual baseline emissions for each pollutant is subtracted from the projected annual emissions. If a significance level has been exceeded for a pollutant then a Prevention of Significant Deterioration review must be performed for that pollutant.

4.3.3 Contemporaneous Period and Pre-Project Actual Emissions

4.3.3.1 Definition of a "Major Modification"

An existing major source is subject to Prevention of Significant Deterioration review only if it undertakes a "major modification" [40 CFR 52.21(b)(2)(i)] and WAQSR Chapter 6, Section 2]. "Major modification" is defined as "any physical change in or change in the method of operation of a major stationary source that would result in a significant net emissions increase of any pollutant subject to regulation under Clean Air Act" [40 CFR 52.21(b)(23) and WAQSR Chapter 6, Section 2]. A major modification does not include: routine maintenance, repair and replacement [40 CFR 52.21(b)(2)(iii)(a) and WAQSR Chapter 6, Section 2] or an increase in the hours of operation or in the production rate [40 CFR 52.21(b)(2)(iii)(f) and WAQSR Chapter 6, Section 2].

To determine if a Prevention of Significant Deterioration significance level has been reached the baseline actual emissions are subtracted from the projected actual emissions. The results of this evaluation for each pollutant are shown in Table 4.3.

Table 4.4: Evaluation of Significance Level by Pollutant

Pollutant	Past Actual (Baseline) Emissions tons/year	Projected Actual (Future Annual) Emissions tons/year	Projected Actual minus Past Actual Emissions (Emission Increase) tons/year	PSD Review Significance Level tons/year	Is Emission Increase greater than PSD Significance Level
SO_2	7,853.5	3,293.8	-4,559.7	40	No
NO_X	5,038.0	4,735.5	-302.4	40	No
PM_{10}	374.0	355.3	-18.8	15	No
Hydrogen Fluoride (HF)	13.0	10.7	-2.3	3	No
Sulfuric Acid (H_2SO_4)	0.3	0.0	-0.2	7	No
Lead	0.05	0.06	0.01	0.6	No
Carbon Monoxide (CO)	510.3	5,146.6	4,636.3	100	Yes
VOC	61.2	76.9	15.7	40	No

4.3.3.2 Determination of Major Modification

Although the proposed projects may constitute a physical change at the plant, they will not result in significant net emissions increases of SO_2, NO_X, particulate matter, hydrogen fluoride, sulfuric acid, lead or VOCs and therefore are not major modifications for these pollutants. The results of the emissions evaluation indicate that future potential emissions of CO may increase above the PSD significance level.

4.4 Requested Emission Rate Limits

This section identifies the requested emission rate limits for the Wyodak Plant following completion of the proposed pollution control equipment projects.

Particulate matter = 10 microns (filterable):

- 71 lb/hour, annual average (4,700 MMBtu/hr x 0.015 lb/ MMBtu)

This limit will go into effect within 90 days following completion of the installation of the fabric filter baghouse. The fabric filter baghouse installation is planned to occur in 2011.

Sulfur dioxide:

- 0.16 lb/MMBtu, 12-month rolling average
- 2,115 lb/hour, fixed 3-hour basis

These limits will go into effect within 90 days after the fabric filter baghouse has been completed and deemed commercial. The expected commercial date is 2011. After successful testing the equipment will be deemed commercial.

Nitrogen oxides:

- 0.23 lb/MMBtu, annual average

This limit will go into effect within 90 days after the low-NO_X burners have been installed, tested and deemed commercial. The expected installation date is 2011. After successful testing the equipment will be deemed commercial.

Carbon monoxide:

- 0.25 lb/MMBtu, 1,175 lb/hour, 30-day rolling average

This limit will go into effect within 90 days after the low-NO_X burners have been installed, tested and deemed commercial. The expected installation date is 2011. After successful testing the equipment will be deemed commercial.

Plantwide Applicability Limitations

As indicated in Section 1.0 of this application, PacifiCorp Energy is requesting that SO_2 and NO_X Plantwide Applicability Limitations (PALs) be established at the Wyodak Plant following issuance of the requested construction permit.

The following federally enforceable annual plantwide emission limits are requested for SO_2 and NO_X. These limits are based on the highest 24 consecutive month average NO_X and SO_2 emission rate in the previous 60 month period, future potential NO_X and SO_2 emission rates; and NO_X and SO_2 PSD significance threshold values of 40 tons/year.

- At issuance of the construction permit it is requested that a NO_X Plantwide Applicability Limitation of 5,078.0 tons/year be established at the facility. At issuance of the requested PAL the 5,078.0 ton/year NO_X limitation will be validated monthly on a 12-month rolling average basis.

- Following completion and certification of the boiler low-NO_X project it is requested that a NO_X PAL be established at a rate of 4,775.5 tons/year.

- At issuance of the construction permit it is requested that an SO_2 Plantwide Applicability Limitation of 7,893.5 tons/year be established at the facility. At issuance of the requested PAL the 7,893.5 ton/year SO_2 limitation will be validated monthly on a 12-month rolling average basis.

- Following completion and certification of the fabric filter baghouse it is requested that an SO_2 PAL be established at a rate of 3,333.8 tons/year.

The following page containing Table 4.5 summarizes the emissions data and PSD significance values used to establish the requested NO_X and SO_2 PAL values for the Wyodak Power Plant.

Table 4.6 contained on page 21 provides a summary of the past actual and future potential stack emission rates for NO_X, SO_2, PM_{10}, HF, H_2SO_4, lead, CO and VOC and includes a chronology of the requested emission limits to be implemented at the Wyodak Plant.

Table 4.5: Wyodak Plant NO_X and SO_2 PAL Evaluation

Pollutant	Maximum Past Actual Emission Rate tons/year	Boiler Heat Input MMBtu/hour	Emission Limit lb/MMBtu	Future Potential Emissions tons/year	PSD Significance Level tons/year	Requested PAL tons/year	Notes
NO_X	5,038.0				40	5,078.0	PacifiCorp requests that a NO_X PAL of 5,078.0 tons/year be implemented at issuance of the construction permit.
NO_X		4,700	0.23	4,735.5	40	4,775.5	PacifiCorp requests that a NO_X PAL of 4,775.5 tons/year be implemented following completion of the low-NO_X burner project.
SO_2	7,853.5				40	7,893.5	PacifiCorp requests that an SO_2 PAL of 7,893.5 tons/year be implemented at issuance of the construction permit.
SO_2		4,700	0.16	3,293.8	40	3,333.8	PacifiCorp requests that an SO_2 PAL of 3,333.8 tons/year be implemented following completion of the fabric filter baghouse installation.

Table 4.6: Wyodak Emissions Summary – Past Actual vs. Future Potential and Emission Limit Chronology

Pollutant/Parameter	Table Reference	Maximum Past Actual Rate		Maximum Future Potential Rate		Emission Rate Increase/Decrease		PSD Significance Level	Is PSD Triggered
SO_2	Tables WYO-1, WYO-1a and WYO-2	7,853.5	tons/year	3,293.8	tons/year	-4,559.7	tons/year	40 tons/year	No
NO_X	Tables WYO-3 and WYO-4	5,038.0	tons/year	4,735.5	tons/year	-302.4	tons/year	40 tons/year	No
Heat Input	Tables WYO-5 and WYO-10	33,919,881	MMBtu/year	41,172,000	MMBtu/year				
Coal Burn	Tables WYO-6 and WYO-10	2,040,782	tons/year	2,563,892	tons/year				
Particulate Matter (Stack and Non-Stack)	Tables WYO-7 and WYO-8	374.0	tons/year	355.3	tons/year	-18.8	tons/year	25 tons/year (15 tons/year for PM_{10})	No
Hydrogen Fluoride	Tables WYO-9 and WYO-10	13.0	tons/year	10.7	tons/year	-2.3	tons/year	3 tons/year (fluoride)	No
Sulfuric Acid	Tables WYO-11 and WYO-12	0.3	tons/year	0.0	tons/year	-0.2	tons/year	7 tons/year	No
Lead	Tables WYO-13 and WYO-14	0.05	tons/year	0.06	tons/year	0.01	tons/year	0.6 tons/year	No
Carbon Monoxide	Tables WYO-15 and WYO-16	510.3	tons/year	5,146.6	tons/year	4,636.3	tons/year	100 tons/year	Yes
VOC	Tables WYO-17 and WYO-18	61.2	tons/year	76.9	tons/year	15.7	tons/year	40 tons/year	No

Note: Carbon monoxide is the only pollutant that has a post-project emission increase above its PSD significance level.

Permit Assumption Timeline:

2008: Upon Issuance of Construction Permit

(a) A 5,078.0 ton/year NO_X Plantwide Applicability Limit (PAL) becomes effective at issuance of construction permit.

(b) A 7,893.5 ton/year SO_2 Plantwide Applicability Limit (PAL) becomes effective at issuance of construction permit.

2011: Upon Certification of Pollution Control Equipment

(a) Wyodak will be subject to a 12-month rolling average NO_X limitation of 0.23 lb/MMBtu

(b) Wyodak will be subject to a 12-month rolling average SO_2 limitation of 0.16 lb/MMBtu

(c) Wyodak will be subject to a 3-hour fixed block average SO_2 limitation of 2,115 lb/hour

(d) Wyodak will be subject to a CO limitation of 0.25 lb/MMBtu, 1,175 lb/hour on a 30-day rolling average

(e) The Wyodak Plant will be subject to a NO_X PAL of 4,775.5 tons/year

(f) The Wyodak Plant will be subject to an SO_2 PAL of 3,333.8 tons/year

(g) The Wyodak Plant will be subject to a PM_{10} limitation of 71 lb/hour (0.015 lb/MMBtu) within 90 days following the completion of the fabric filter baghouse installation

5.0 Description of Pollution Control Equipment

5.1 Sulfur Dioxide

5.1.1 Fabric Filter Baghouse

PacifiCorp will replace the existing electrostatic precipitator in 2011 with a fabric filter baghouse. The installation of the fabric filter baghouse will eliminate flue gas desulfurization system (FGD) bypass and result in increased sulfur dioxide removal rates. Additionally, the fabric filter baghouse will tolerate lower flue gas approach temperatures as compared to the electrostatic precipitator, allowing increased SO_2 removal rates in the Wyodak dry FGD scrubber. In this application PacifiCorp requests that a 0.16 lb/MMBtu emission limit, on a 12-month rolling average basis, be implemented following construction of the fabric filter baghouse. Furthermore, a 3-hour fixed block average limit of 2,115 lb/hour is requested for the Wyodak Plant following completion of the fabric filter baghouse installation.

5.2 Nitrogen Oxides

5.2.1 Low-NO_X Burners

PacifiCorp will install a new generation low-NO_X boiler burner system on the Wyodak boiler in 2011 which will be used to control nitrogen oxides (NO_X) emissions. In this application PacifiCorp requests that a 0.23 lb/MMBtu emission limit, on a 12-month rolling average basis, be implemented at Wyodak following construction of the low-NO_X system.

5.3 Particulate Matter

5.3.1 Fabric Filter Baghouse

PacifiCorp requests that a 71 lb/hour PM_{10} limit be established at the Wyodak Plant following completion of construction of the fabric filter baghouse.

6.0 Best Available Control Technology Determination

The Clean Air Act's PSD program provides that a Best Available Control Technology analysis must be conducted if a proposed project will result in a significant increase of a PSD pollutant.

Applicability

PacifiCorp has determined that the projects proposed for the Wyodak Power Plant may result in a significant increase (as determined by the thresholds established in the regulations) of carbon monoxide (CO). Therefore, PacifiCorp has conducted a Best Available Control Technology analysis for CO in this construction permit application.

The EPA has developed a process for conducting Best Available Control Technology analyses. This method is referred to as the "top-down" method. The steps to conducting a "top-down" analysis are listed in Environmental Protection Agency's *New Source Review Workshop Manual"* Draft, October 1990. The steps are:

- Step 1 – Identify All Control Technologies
- Step 2 – Eliminate Technically Infeasible Options
- Step 3 – Rank Remaining Control Technologies by Control Effectiveness
- Step 4 – Evaluate Most Effective Controls and Document Results
- Step 5 – Select Best Available Control Technology

Carbon Monoxide Best Available Control Technology Analysis

Combustion controls designed to reduce NO_X emissions may increase carbon monoxide by creating oxygen deficient combustions zones in the boiler. These controls are balanced to provide the maximum NO_X reduction while minimizing carbon monoxide emission increases.

Step 1 - Identify All Control Technologies

Only two control technologies have been identified for control of carbon monoxide.

- Catalytic oxidation
- Combustion controls

The catalytic oxidation is a post-combustion control device that would be applied to the combustion system exhaust, while combustion controls are part of the combustion system design of the boiler.

Step 2 - Eliminate Technically Infeasible Options

Catalytic oxidation has been used to obtain the most stringent control of carbon monoxide emissions from combustion turbines firing natural gas. This alternative, however, has never been applied to a coal-fired boiler and has not been demonstrated to be a practical technology in this application.

For sulfur-containing fuels such as coal, an oxidation catalyst will convert SO_2 to SO_3, resulting in unacceptable levels of corrosion to the flue gas system as SO_3 is converted to H_2SO_4. Generally, oxidation catalysts are designed for a maximum particulate loading of 50 milligrams per cubic meter. The Wyodak Plant has particulate matter loadings upstream of its particulate matter control devices in excess of 5,000 milligrams per cubic meter. In addition, trace elements present in coal, particularly chlorine, are poisonous to oxidation catalysts. Catalysts have not been developed that have or can be applied to coal-fired boilers due to the high levels of particulate matter and trace elements present in the flue gas.

Although the catalyst could be installed downstream of the particulate matter pollution control device (dry scrubber and fabric filter baghouse), the flue gas temperature at that point will be less than 300º F, which is well below the minimum temperature required (600ºF) for the operation of the oxidation catalyst. Utilization of a catalyst would require the flue gas to be reheated, resulting in significant negative energy and economic impacts.

For these reasons, as well as the low levels of CO in coal-fired units, no pulverized-coal-fired boilers have been equipped with oxidation catalysts. Use of an oxidation catalyst system is thus considered technically infeasible and this system cannot be considered to represent Best Available Control Technology for control of carbon monoxide.

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

Based on the Step 2 analysis, combustion control is the only remaining technology for this application.

Step 4 - Evaluate Most Effective Controls and Document Results

There are no environmental or energy costs associated with combustion controls.

Step 5 - Select Best Available Control Technology

The EPA New Source Review, RACT, BACT, LAER Clearinghouse database for comparable sources related to CO is shown in Table 6.1. The final step in the top-down Best Available Control Technology analysis process is to select Best Available Control Technology. Based on the above analysis, good combustion control for CO is chosen as Best Available Control Technology for these projects. Because there is a balance between reducing NO_X emissions with advanced combustion controls and increasing CO emissions, i.e., the lower the NO_X emissions the greater the potential for an increase in CO emissions, a 30-day rolling average emission limit of 0.25 lb/MMBtu for CO is recommended for the Wyodak Plant.

References

U.S. Environmental Protection Agency, 2007, RACT/BACT/LAER Clearinghouse Database http://cfpub1.epa.gov/rblc/htm/bl02.cfm.

Wyoming Department of Environmental Quality, Air Quality Division Standards and Regulations, Chapter 6 Permitting Requirements

Table 6.1: Review of EPA RACT/BACT/LAER Clearinghouse (RBLC) for Carbon Monoxide Emission Limits

Company	Plant	Heat Input	CO Emission Limit	Averaging Time	Boiler Construction Date/Permit Date	Emission Control Description	RBLC ID
[1]MidAmerican Energy Co., Iowa	George Neal North-Neal 1 Boiler	1,363 MMBtu / hr	1.26 lb / MMBtu	3-hour average	1961 01 / 17 / 2006	Good Combustion Practices	IA-0081
[2]MidAmerican Energy Co., Iowa	Neal Energy Center South-Unit 4 Boiler	6,900 MMBtu / hr	0.42 lb / MMBtu	1 calendar day	1977 / 2001 26 / 2006	Good Combustion Practices	IA-0080
[3]Reliant Energy, Texas	Washington Parish Electric Generating Station Unit 7	6,700 MMBtu / hr	0.33 lb / MMBtu	Unknown	Unknown 01 / 04 / 2005	Combustion Control	TX-0358

[1] CO was the only pollutant with a projected increase in emissions in the change to add an over fire air system, date of determination BACT-PSD 01 / 17 / 2006
[2] CO was the only pollutant with a projected increase in emissions in the change for installation of a new low NOx burner and the addition of over fire air system, date of determination BACT-PSD 01 / 26 / 2006
[3] Case-by-case BACT PSD

7.0 Regulatory Review

The Clean Air Act's PSD program provides that a Best Available Control Technology analysis must be conducted if a proposed project will result in a significant increase

This section provides a regulatory review of the applicability of state and federal air quality permitting requirements for the addition of the emission controls and other plant projects.

State of Wyoming Air Permitting Requirements

The State of Wyoming has been granted authority to implement and enforce the federal Clean Air Act (CAA) [pursuant to the State Implementation Plan review and approval process] and federal air permitting requirements which are embodied within the state rules. The Plant is a major stationary source of air emissions, as defined within Wyoming Air Quality Standards and Regulations (WAQSR), 40 CFR 70 (Title V Operating Permits) and 40 CFR Part 52.21 (PSD Program Requirements). The Wyoming Department of Environmental Quality, Air Quality Division, has previously issued permits and permit revisions as appropriate for existing Plant facilities. The general requirements for permits and permit revisions are codified under Chapter 6 of Wyoming Air Quality Standards and Regulations.

Construction Permit Requirements (WAQSR Chapter 6)

The replacement, addition or upgrade of existing emissions controls, including the low-NO_X burners will result in an increase of some air pollutant emissions, necessitating the issuance of a construction permit pursuant to WAQSR Chapter 6, Section 2; Permit Requirements for construction, modification and operation. PacifiCorp is required by WAQSR Chapter 6, Section 2 to obtain a construction permit from the State of Wyoming, Department of Environmental Quality, prior to any work at the facility. Appendices contained in this construction permit application include appropriate construction permit forms as required by WAQSR Chapter 6, Section 2.

Operating Permit Requirements (WAQSR Chapter 6)

The federal operating permit program (Title V) is implemented by regulations codified at 40 CFR Part 70 and 71. The State of Wyoming has been granted authority to implement and enforce the federal Title V program through state regulations outlined under WAQSR Chapter 6, Section 3. PacifiCorp currently has a Department of Environmental Quality issued Title V Operating Permit (Permit No. 3-1-101-1) for the Wyodak Power Plant. The replacement, addition of, or upgrade to existing air emissions controls and other plant projects constitute a significant modification to the Plant and will therefore require a modification of the existing Title V permit.

Prevention of Significant Deterioration (WAQSR Chapter 6, Section 2)

Within the federal NSR regulations, a subset of rules, which apply to major sources and major modifications within attainment areas, is referred to as the PSD program. Since the planned projects are at a current PSD source, located in an area classified as attainment for all criteria pollutants, the PSD program will apply to the permitting of these projects. Wyoming Department of Environmental Quality has been delegated full authority from EPA for administering the federal PSD rules; consequently, these requirements are codified within the state's permitting rules at WAQSR Chapter 6, Section 4.

The PSD program defines a major stationary source as:

1. Any source type belonging to one of the 28 listed source categories that has a potential-to-emit (PTE) of 100 tons per year or more of any criteria pollutant regulated under the CAA, or

2. Any other (non-categorical) source type with a PTE of 250 tpy of any pollutant regulated under the CAA.

The Wyodak Power Plant facility belongs to one of the 28 listed source categories (fossil fuel-fired steam electric plants of more than 250 million Btu/hour heat input) and is considered an existing major stationary source because the PTE for CO and sulfuric acid mist all exceed the limits listed in this section.

Modifications to an existing major source are considered major and subject to PSD review if the resulting net emissions increase is equal to or greater than the corresponding significant emissions increase threshold for each respective pollutant. A net emissions increase includes both of the following:

- The potential increase in emissions due to the modifications itself; and
- Contemporaneous net emissions increases and decreases of regulated air pollutants, under the PSD program

An emissions increase is considered significant if emissions meet or exceed any of the following rates:

- CO, 100 tpy
- NO_X, 40 tpy
- SO_2, 40 tpy
- PM_{10}, 15 tpy
- Particulate matter, 25 tpy
- Ozone, 40 tpy of VOCs
- Lead, 0.6 tpy
- Fluorides, 3 tpy

- Hydrogen sulfide, 10 tpy

The basic PSD permitting requirements and conditions for issuing a construction permit that must be met for a major modification include:

- The degree of pollution control for emissions, to include fugitive emissions and fugitive dust, is at least BACT, except as otherwise provided in Chapter 6, Section 2 [WAQSR Chapter 6, Section 2(c)(v)]
- Performing ambient air quality impacts analysis – air dispersion modeling [WAQSR Chapter 6, Section 4(b)(i)(A)(I)]
- Analysis of impact to soils, vegetation, and visibility
- Analysis of Class I area impacts

New and Modified Sources in Non-attainment Areas and Maintenance Areas

The plant is not located in a non-attainment or maintenance area. Therefore, a non-attainment New Source Review analysis is not required.

Emissions Impact Analysis (WAQSR Chapter 6, Section 2)

Because the addition of the low-NO_X burners may result in an increase in some emissions, PacifiCorp will conduct a comprehensive air quality modeling analysis for all criteria pollutants including SO_2, NO_X, PM_{10}, lead, hydrogen fluoride, CO and H_2SO_4.

Monitoring and Reporting

After a construction permit is received, PacifiCorp will be required to conduct monitoring, submit emission reports, ensure that equipment meets certain specifications, and conduct other activities as the Wyoming Department of Environmental Quality requests. Some of these requirements are enumerated below:

- Meet the reporting requirements specified in WAQSR Chapter 7 in the event of an unavoidable breakdown.
- Submit and retain air emission inventory and perform testing and monitoring as required in WAQSR Chapter 7.

Appendix A: Wyodak Projects

Year	Project
2009	Construct new bottom ash collection pond
2009	Install reverse osmosis skid
2009	Install variable frequency drives
2009	Air cooled condenser vibration mitigation project
2009	Switchgear remote racking project
2009	Pulverizer combustion improvements
2010	Coal pipe replacement
2011	Boiler feed pump motor replacement
2011	Boiler safety valve rebuilds
2011	Major steam turbine overhaul
2011	Install low-NO_X control system
2011	Install fabric filter baghouse (replace electrostatic precipitator)
2011	Rewind generator
2011	Replace boiler slope tubes
2011	Replace boiler water wall and arch tubes
2011	Replace bottom ash hopper refractory
2011	Replace boiler superheater tubes
2011	Rebuild main steam valves
2011	Replace bottom ash hopper refractory
2011	Diesel storage tank coating
2011	Upgrade and replace motor control centers
2011	Rebuild redler conveyors
2011	Coal pipe replacement
2011	Rebuild emergency diesel generator
2011	Rebuild primary air fan

Appendix B: Emissions Calculations

This appendix contains maximum past actual and future potential annual emission rates for SO_2, NO_X, PM_{10}, HF, H_2SO_4, lead, CO and VOCs. Appendix B also contains maximum past actual and future potential boiler heat input rates and coal burn rates for the Wyodak boiler for use in applicable pollutant emission rate calculations.

Wyodak Emissions Summary

Past Actual vs. Future Potential Emissions Evaluation

Pollutant/Parameter	Table Reference	Maximum Past Actual Rate		Maximum Future Potential Rate		Emission Rate Increase/Decrease		PSD Significance Level	Is PSD Triggered
SO_2	Tables WYO-1, WYO-1a and WYO-2	7,853.5	tons/year	3,293.8	tons/year	-4,559.7	tons/year	40 tons/year	No
NO_X	Tables WYO-3 and WYO-4	5,038.0	tons/year	4,735.5	tons/year	-302.4	tons/year	40 tons/year	No
Heat Input	Tables WYO-5 and WYO-10	33,919,881	MMBtu/year	41,172,000	MMBtu/year				
Coal Burn	Tables WYO-6 and WYO-10	2,040,782	tons/year	2,563,892	tons/year				
Particulate Matter (Stack and Non-Stack)	Tables WYO-7 and WYO-8	374.0	tons/year	355.3	tons/year	-18.8	tons/year	25 tons/year (15 tons/year for PM_{10})	No
Hydrogen Fluoride	Tables WYO-9 and WYO-10	13.0	tons/year	10.7	tons/year	-2.3	tons/year	3 tons/year (fluoride)	No
Sulfuric Acid	Tables WYO-11 and WYO-12	0.3	tons/year	0.0	tons/year	-0.2	tons/year	7 tons/year	No
Lead	Tables WYO-13 and WYO-14	0.05	tons/year	0.06	tons/year	0.01	tons/year	0.6 tons/year	No
Carbon Monoxide	Tables WYO-15 and WYO-16	510.3	tons/year	5,146.6	tons/year	4,636.3	tons/year	100 tons/year	Yes
VOC	Tables WYO-17 and WYO-18	61.2	tons/year	76.9	tons/year	15.7	tons/year	40 tons/year	No

Note: Carbon monoxide is the only pollutant that has a post-project emission increase above its PSD significance level.

Permit Assumption Timeline:

2008: Upon Issuance of Construction Permit

(a) A 5,078.0 ton/year NO_X Plantwide Applicability Limit (PAL) becomes effective at issuance of construction permit.

(b) A 7,893.5 ton/year SO_2 Plantwide Applicability Limit (PAL) becomes effective at issuance of construction permit.

2011: Upon Certification of Pollution Control Equipment

(a) Wyodak will be subject to a 12-month rolling average NO_X limitation of 0.23 lb/MMBtu

(b) Wyodak will be subject to a 12-month rolling average SO_2 limitation of 0.16 lb/MMBtu

(c) Wyodak will be subject to a 3-hour fixed block average SO_2 limitation of 2,115 lb/hour

(d) Wyodak will be subject to a CO limitation of 0.25 lb/MMBtu, 1,175 lb/hour on a 30-day rolling average

(e) The Wyodak Plant will be subject to a NO_X PAL of 4,775.5 tons/year

(f) The Wyodak Plant will be subject to an SO_2 PAL of 3,333.8 tons/year

(g) The Wyodak Plant will be subject to a PM_{10} limitation of 71 lb/hour (0.015 lb/MMBtu) within 90 days following the completion of the fabric filter baghouse installation

Table WYO - 0

Wyodak Past Actual Non-Stack Emissions Evaluation

PM (TSP) Emissions (tons/year)	Source ID	2	3	4	5	6	7	8	9	10	11	FUG01	Insig (a)	Insig (b)	Insig (c)	Insig (d)	Insig (e)	Insig (f)	Insig (g)	Insig (h)	Insig (i)	Insig (j)	Insig (k)	Insig (l)	Total Annual Non-Stack PM Emissions (tons/year)	
Year																										Year
2002		0.0	2.3	11.0	21.2	3.9	2.3	0.0	0.7	0.5	2.9		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	44.7	2002
2003		0.0	2.3	11.0	23.4	3.9	2.3	0.0	0.7	0.5	3.3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	47.3	2003
2004		0.0	2.3	11.0	8.8	3.9	2.3		0.7	5.7	2.7		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	37.3	2004
2005		0.0	2.3	11.0		2.6	1.5		0.7	5.4	3.3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	26.7	2005
2006		0.0	2.3	11.0					0.6	4.8	2.8		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	21.5	2006

Maximum Past Actual Non-Stack PM Emissions (tons/year)
47.3

PM_{10} Emissions (tons/year)	Source ID	2	3	4	5	6	7	8	9	10	11	FUG01	Insig (a)	Insig (b)	Insig (c)	Insig (d)	Insig (e)	Insig (f)	Insig (g)	Insig (h)	Insig (i)	Insig (j)	Insig (k)	Insig (l)	Total Annual Non-Stack PM_{10} Emissions (tons/year)	
Year																										Year
2002		0.0	2.3	11.0	21.2	3.9	2.3	0.0	0.2	0.1	2.9		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	43.8	2002
2003		0.0	2.3	11.0	23.4	3.9	2.3	0.0	0.2	0.1	3.3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	46.5	2003
2004		0.0	2.3	11.0	8.8	3.9	2.3		0.2	1.1	2.7		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	32.3	2004
2005		0.0	2.3	11.0		2.6	1.5		0.2	1.0	3.3		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	21.9	2005
2006		0.0	2.3	11.0					0.2	0.9	2.8		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	17.2	2006

Maximum Past Actual Non-Stack PM_{10} Emissions (tons/year)
46.5

SO_2 Emissions (tons/year)	Source ID	2	3	4	5	6	7	8	9	10	11	FUG01	Insig (a)	Insig (b)	Insig (c)	Insig (d)	Insig (e)	Insig (f)	Insig (g)	Insig (h)	Insig (i)	Insig (j)	Insig (k)	Insig (l)	Total Annual Non-Stack SO_2 Emissions (tons/year)	
Year																										Year
2002													0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	0.0	2002
2003													0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	0.0	2003
2004													0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	0.0	2004
2005													0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	0.0	2005
2006													0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	0.0	2006

Maximum Past Actual Non-Stack SO_2 Emissions (tons/year)
0.0

NO_X Emissions (tons/year)	Source ID	2	3	4	5	6	7	8	9	10	11	FUG01	Insig (a)	Insig (b)	Insig (c)	Insig (d)	Insig (e)	Insig (f)	Insig (g)	Insig (h)	Insig (i)	Insig (j)	Insig (k)	Insig (l)	Total Annual Non-Stack NO_X Emissions (tons/year)	
Year																										Year
2002													0.2	0.0	0.0	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	NA	0.8	2002
2003													0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	0.5	2003
2004													0.2	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	NA	0.5	2004
2005													0.2	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	NA	0.6	2005
2006													0.2	0.0	0.0	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	NA	0.6	2006

Maximum Past Actual Non-Stack NO_X Emissions (tons/year)
0.8

VOC Emissions (tons/year)	Source ID	2	3	4	5	6	7	8	9	10	11	FUG01	Insig (a)	Insig (b)	Insig (c)	Insig (d)	Insig (e)	Insig (f)	Insig (g)	Insig (h)	Insig (i)	Insig (j)	Insig (k)	Insig (l)	Total Annual Non-Stack VOC Emissions (tons/year)	
Year																										Year
2002													0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	0.0	2002
2003													0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	0.0	2003
2004													0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	0.0	2004
2005													0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	0.0	2005
2006													0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	0.0	2006

Maximum Past Actual Non-Stack VOC Emissions (tons/year)
0.0

Table WYO - 0 (continued)

Wyodak Past Actual Non-Stack Emissions Evaluation

CO Emissions (tons/year)	Source ID	2	3	4	5	6	7	8	9	10	11	FUG01	Insig (a)	Insig (b)	Insig (c)	Insig (d)	Insig (e)	Insig (f)	Insig (g)	Insig (h)	Insig (i)	Insig (j)	Insig (k)	Insig (l)	Total Annual Non-Stack CO Emissions (tons/year)	
Year																										Year
2002													0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	0.1	2002
2003													0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	0.1	2003
2004													0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	0.1	2004
2005													0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	0.1	2005
2006													0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	0.1	2006

Maximum Past Actual Non-Stack CO Emissions (tons/year)
0.1

Source ID Description

2	T-1 Transfer House (emergency coal backup handling system)
3	T-2 Transfer House
4	Silo Methane Purge Exhauster
5	Dust Extractor Unit
6	Station Coal Transfer House (removed from service)
7	Station Coal Silo Exhauster (removed from service)
8	Recycle Ash Bin (SDA System) (removed from service)
9	Fly Ash Silo (fugitve emissions from truck loading)
10	Fly Ash Haul Road
11	Peerless Pit Secondary Crusher
FUG01	Passive Enclosure Dust Control System (PECS)
Insignificant (a)	Emergency Diesel Generator Engine
Insignificant (b)	Emergency Diesel Fire Pump Engine
Insignificant (c)	Standby Diesel Fire Pump Engine
Insignificant (d)	Propane-Fired Space Heater (coal handling)
Insignificant (e)	Propane-Fired Space Heater (main coal silo)
Insignificant (f)	Propane-Fired Space Heater (main coal silo)
Insignificant (g)	Propane-Fired Space Heater (boiler building)
Insignificant (h)	Propane-Fired Space Heater (boiler building)
Insignificant (i)	Propane-Fired Space Heater (turbine building)
Insignificant (j)	Propane-Fired Space Heater (water treatment building)
Insignificant (k)	Propane-Fired Space Heater (new maintenance shop)
Insignificant (l)	Propane-Fired Space Heater (old maintenance shop) Note: has been relocated to main coal silo (Insignificant Source (f))

Note: Non-stack emission rates were obtained from 2002 through 2006 annual emission inventories.

Table WYO - 1

Wyodak Past Actual SO_2 Stack Emissions Evaluation

Past Actual Monthly SO_2 Emissions from CEMs/Clean Air Markets (tons/month)

UNIT NAME	Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	Aug-04
Wyodak	731.8	589.7	598.9	697.6	652.9	592.8	668.3	705.5	646.4	701.8	580.5	644.2	608.5	645.9	698.1	398.2	645.4	662.4	690.3	608.4
Excess Emissions																10.5	12.0	4.9	1.2	4.4
Net Emissions	731.8	589.7	598.9	697.6	652.9	592.8	668.3	705.5	646.4	701.8	580.5	644.2	608.5	645.9	698.1	387.7	633.4	657.4	689.1	604.0

Past Actual Annual SO_2 Emission Rate Based on Rolling 24-Month Period (tons/year)

UNIT NAME	Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	Aug-04
Wyodak	This is based on a 24-month rolling average so there are no valid averages until December 2004																			

Table WYO - 1 (continued)

Wyodak Past Actual SO_2 Stack Emissions Evaluation

Past Actual Monthly SO_2 Emissions from CEMs/Clean Air Markets (tons/month)

Sep-04	Oct-04	Nov-04	Dec-04	Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06
675.8	750.7	735.0	743.0	669.1	524.9	533.8	679.6	641.7	665.2	662.9	679.2	653.0	659.3	670.5	692.7	653.5	644.9	677.1	584.3	243.6
2.9	0.0	0.0	1.0	12.4	3.8	4.8	4.8	1.9	2.9	2.1	3.1	3.6	1.4	0.3	0.0	5.9	0.6	10.7	11.1	2.7
672.8	750.7	735.0	742.0	656.7	521.1	529.0	674.9	639.8	662.3	660.7	676.2	649.3	657.9	670.2	692.7	647.6	644.3	666.5	573.2	240.9

Past Actual Annual SO_2 Emission Rate Based on Rolling 24-Month Period (tons/year)

Sep-04	Oct-04	Nov-04	Dec-04	Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06
			7,818	7,780	7,746	7,711	7,699	7,693	7,728	7,724	7,709	7,711	7,689	7,734	7,758	7,777	7,777	7,761	7,853	7,657

Table WYO - 1 (continued)

Wyodak Past Actual SO_2 Stack Emissions Evaluation

Past Actual Monthly SO_2 Emissions from CEMs/Clean Air Markets (tons/month)

Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
31.5	603.4	545.4	611.5	614.5	649.6	654.6	556.9	498.5	660.1	625.1	720.1	678.9	678.9	706.1	664.7	705.0	610.1	737.1
15.1																		
16.4	603.4	545.4	611.5	614.5	649.6	654.6	556.9	498.5	660.1	625.1	720.1	678.9	678.9	706.1	664.7	705.0	610.1	737.1

Past Actual Annual SO_2 Emission Rate Based on Rolling 24-Month Period (tons/year)

Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
7,337	7,294	7,265	7,234	7,166	7,123	7,079	7,029	7,018	7,084	7,059	7,099	7,107	7,116	7,131	7,139	7,163	7,133	7,155

Maximum Past Actual Annual SO_2 Stack Emissions (tons/year) 7,853.5

Emissions Source	Maximum Past Actual Non-Stack Emission Rate (tons/year)
Emergency Diesel Generator Engine	0.0
Emergency Diesel Fire Pump Engine	0.0
Standby Diesel Fire Pump Engine	0.0
Propane-Fired Space Heater (coal handling)	0.0
Propane-Fired Space Heater (main coal silo)	0.0
Propane-Fired Space Heater (main coal silo)	0.0
Propane-Fired Space Heater (boiler building)	0.0
Propane-Fired Space Heater (boiler building)	0.0
Propane-Fired Space Heater (boiler building)	0.0
Propane-Fired Space Heater (turbine building)	0.0
Propane-Fired Space Heater (water treatment building)	0.0
Propane-Fired Space Heater (new maintenance shop)	0.0
Propane-Fired Space Heater (old maintenance shop)	0.0
Total Maximum Non-Stack SO_2 Emission Rate (tons/year)	0.0

Total Maximum Past Actual SO_2 Emission Rate Stack and Non-Stack Emissions (tons/year)	7,853.5

Note:
The maximum past actual Wyodak stack SO_2 emission rate of 7,853.5 tons/year does not include SO_2 emissions in excess of the 3-hour average limit of 0.5 lb/MMBtu.

Table WYO-1a indicates the monthly SO_2 emissions in excess of the 0.5 lb/MMBtu 3-hour limit that were subtracted from the monthly CEM-measured SO_2 stack emissions during the 24-month evaluation period from May 2004 through April 2006.

Table WYO - 1a
Wyodak Past Actual Sulfur Dioxide Emissions in Excess of Allowable Limit

SO_2 Emissions in Excess of 0.5 lb/MMBtu Limit during 24-Month Evaluation Period from May 2004 through April 2006:

Date and Time	Excess Emission Rate (lb/MMBtu)	Duration of Excess Emissions (hours)	Heat Input (MMBtu/hour)	Excess Emissions Above 0.5 lb/MMBtu Limit (lbs)
4/2/04 21:00	0.77	3.0	2,762.5	2,204.5
4/13/04 21:00	1.14	3.0	2,816.0	5,372.9
4/14/04 0:00	0.66	3.0	3,571.7	1,682.3
4/14/04 3:00	0.63	3.0	3,633.5	1,460.7
4/14/04 6:00	0.55	3.0	3,019.4	471.0
4/17/04 0:00	1.21	3.0	1,220.5	2,607.0
4/17/04 12:00	0.78	3.0	1,164.9	968.0
4/17/04 15:00	0.63	3.0	1,125.2	452.3
4/18/04 0:00	0.69	3.0	2,315.1	1,291.8
4/18/04 18:00	0.91	3.0	3,609.5	4,428.9
5/10/04 9:00	0.95	3.0	2,467.7	3,294.4
5/10/04 12:00	0.81	3.0	3,872.9	3,601.8
5/11/04 0:00	0.67	3.0	3,857.4	1,932.6
5/11/04 21:00	0.64	3.0	1,924.7	819.9
5/18/04 15:00	0.55	3.0	4,215.1	644.9
5/19/04 0:00	1.29	3.0	1,918.1	4,545.8
5/19/04 3:00	1.30	3.0	1,099.4	2,625.4
5/19/04 6:00	1.27	3.0	1,075.0	2,470.4
5/19/04 9:00	0.55	3.0	1,112.2	173.5
5/19/04 12:00	0.86	3.0	3,550.3	3,834.3
6/17/04 15:00	0.55	3.0	2,670.6	416.6
6/26/04 3:00	1.24	3.0	1,910.2	4,229.1
6/26/04 18:00	0.79	3.0	1,464.6	1,252.2
6/26/04 21:00	0.88	3.0	3,468.5	3,974.9
7/2/04 0:00	1.89	3.0	0.0	0.0
7/2/04 15:00	0.78	3.0	2,866.1	2,424.7
8/28/04 0:00	0.69	3.0	1,340.5	760.1
8/28/04 3:00	1.09	3.0	2,225.5	3,932.5
8/28/04 6:00	0.90	3.0	3,457.9	4,149.5
9/16/04 21:00	0.67	3.0	4,009.6	2,032.9

Month	Monthly SO_2 Emissions in Excess of 3-hour SO_2 limit of 0.5 lb/MMBtu (tons)
Apr-04	10.5
May-04	12.0
Jun-04	4.9
Jul-04	1.2
Aug-04	4.4
Sep-04	2.9
Oct-04	0.0
Nov-04	0.0
Dec-04	1.0
Jan-05	12.4
Feb-05	3.8
Mar-05	4.8
Apr-05	4.8
May-05	1.9
Jun-05	2.9
Jul-05	2.1
Aug-05	3.1
Sep-05	3.6
Oct-05	1.4
Nov-05	0.3
Dec-05	0.0
Jan-06	5.9
Feb-06	0.6
Mar-06	10.7
Apr-06	11.1
May-06	2.7
Jun-06	15.1

Table WYO - 1a (continued)
Wyodak Past Actual Sulfur Dioxide Emissions in Excess of Allowable Limit

Date and Time	Excess Emission Rate (lb/MMBtu)	Duration of Excess Emissions (hours)	Heat Input (MMBtu/hour)	Excess Emissions Above 0.5 lb/MMBtu Limit (lbs)
9/21/04 0:00	1.43	3.0	0.0	0.0
9/22/04 0:00	1.05	3.0	2,339.7	3,825.4
12/4/04 6:00	0.94	3.0	1,551.7	2,052.9
1/1/05 21:00	0.62	3.0	3,018.9	1,123.0
1/2/05 21:00	1.20	3.0	1,977.2	4,128.4
1/14/05 0:00	0.56	3.0	3,954.3	747.4
1/15/05 6:00	0.62	3.0	0.0	0.0
1/15/05 9:00	0.90	3.0	0.0	0.0
1/30/05 3:00	0.66	3.0	1,098.9	520.9
1/31/05 15:00	1.02	3.0	2,933.0	4,557.9
1/31/05 18:00	1.00	3.0	4,307.7	6,487.4
1/31/05 21:00	1.14	3.0	3,734.6	7,192.8
2/1/05 0:00	0.58	3.0	3,763.5	869.4
2/19/05 0:00	1.01	3.0	1741.9	2,686.0
2/19/05 3:00	0.62	3.0	3082.6	1,109.7
2/20/05 6:00	0.67	3.0	1256	644.3
2/20/05 9:00	0.84	3.0	1346.4	1,373.3
2/20/05 12:00	0.58	3.0	3807.6	913.8
3/1/05 0:00	0.55	3.0	2841.4	431.9
3/1/05 3:00	0.78	3.0	1488.6	1,263.8
3/8/05 21:00	1.11	3.0	1504.6	2,735.4
3/9/05 0:00	0.88	3.0	3269.3	3,727.0
3/9/05 3:00	0.66	3.0	3215.4	1,495.2
4/25/05 12:00	0.56	3.0	4038.8	666.4
4/28/05 6:00	0.62	3.0	2575.97	958.3
4/29/05 9:00	1.26	3.0	3458.6	7,885.6
5/5/05 18:00	0.58	3.0	3880.9	931.4
5/28/05 3:00	0.82	3.0	3109.3	2,938.3
6/12/05 18:00	1.02	3.0	2867.5	4,435.4
6/24/05 0:00	0.64	3.0	3508.2	1,452.4
7/26/05 3:00	0.92	3.0	3349.2	4,260.2
8/18/05 18:00	0.73	3.0	1205.2	831.6

Table WYO - 1a (continued)
Wyodak Past Actual Sulfur Dioxide Emissions in Excess of Allowable Limit

Date and Time	Excess Emission Rate (lb/MMBtu)	Duration of Excess Emissions (hours)	Heat Input (MMBtu/hour)	Excess Emissions Above 0.5 lb/MMBtu Limit (lbs)
8/18/05 21:00	0.88	3.0	2264.7	2,602.1
8/19/05 0:00	0.60	3.0	3663.7	1,099.1
8/19/05 12:00	0.64	3.0	3923.9	1,612.7
9/3/05 0:00	1.03	3.0	1546.5	2,449.7
9/3/05 21:00	0.88	3.0	3215.8	3,656.4
9/6/05 15:00	0.60	3.0	3999.7	1,139.9
10/3/05 0:00	0.62	3.0	1584.9	565.8
10/3/05 3:00	0.71	3.0	3619.5	2,226.0
11/4/05 3:00	0.56	3.0	3588.97	635.2
1/8/06 12:00	0.83	3.0	1740.4	1,702.1
1/8/06 15:00	0.65	3.0	3260.9	1,506.5
1/10/06 3:00	0.92	3.0	2233.6	2,794.2
1/11/06 0:00	1.15	3.0	1266.1	2,461.3
1/11/06 3:00	1.07	3.0	2892.5	4,954.9
2/16/06 12:00	0.60	3.0	4019.9	1,230.1
3/3/06 6:00	0.61	3.0	3199.6	1,046.3
3/11/06 0:00	1.21	3.0	1591.5	3,370.8
3/11/06 18:00	0.85	3.0	1298.9	1,348.3
3/11/06 21:00	0.70	3.0	3260.4	1,975.8
3/16/06 12:00	0.59	3.0	4059.4	1,120.4
3/18/06 0:00	2.04	3.0	2026.1	9,342.3
3/18/06 15:00	0.65	3.0	1226.3	559.2
3/18/06 18:00	0.80	3.0	2867.4	2,537.6
4/3/06 18:00	0.89	3.0	1854.6	2,169.9
4/4/06 12:00	0.71	3.0	3445.6	2,150.1
4/14/06 21:00	0.67	3.0	3660	1,910.5
4/17/06 9:00	0.72	3.0	2243.4	1,494.1
4/19/06 12:00	0.84	3.0	3685.7	3,715.2
4/20/06 18:00	1.02	3.0	3301.1	5,110.1
4/28/06 9:00	0.58	3.0	2811.6	683.2
4/29/06 15:00	0.95	3.0	3109.3	4,178.9
4/30/06 18:00	0.57	3.0	3992.8	850.5

Table WYO - 1a (continued)
Wyodak Past Actual Sulfur Dioxide Emissions in Excess of Allowable Limit

Date and Time	Excess Emission Rate (lb/MMBtu)	Duration of Excess Emissions (hours)	Heat Input (MMBtu/hour)	Excess Emissions Above 0.5 lb/MMBtu Limit (lbs)
5/7/06 6:00	0.58	3.0	1720.2	387.0
5/7/06 9:00	0.80	3.0	3979.7	3,617.5
5/12/06 21:00	0.71	3.0	2168.5	1,353.1
6/27/06 12:00	0.81	3.0	977.9	897.7
6/28/06 6:00	0.63	3.0	1475.5	575.4
6/28/06 9:00	1.30	3.0	1679.9	4,046.9
6/28/06 12:00	1.32	3.0	1662.7	4,075.3
6/28/06 15:00	1.12	3.0	1826.73	3,375.8
6/28/06 18:00	0.93	3.0	1906.2	2,459.0
6/30/06 0:00	1.08	3.0	1513.7	2,633.8
6/30/06 3:00	1.13	3.0	1913.4	3,587.6
6/30/06 15:00	0.60	3.0	1082.9	337.9
6/30/06 18:00	1.13	3.0	1381.9	2,595.2
6/30/06 21:00	1.25	3.0	2468.4	5,553.9

Note: Excess emissions above the 3-hour SO_2 standard of 0.5 lb/MMBtu were subtracted from the monthly SO_2 emission rates during the 24-month evalution period that was used to identify the maximum Wyodak past actual SO_2 emission rate of 7,853.5 tons/year. (Reference: Table WYO-1)

The maximum SO_2 annual emission rate of 7,853.5 tons/year was established during the 24-month evaluation period from May 2004 through April 2006. (Reference Table WYO-1)

The maximum past actual annual stack SO_2 emission rate of 7,853.5 tons/year, maximum non-stack SO_2 emission rate of 0.0 tons/year and PSD significance level of 40 tons/year is used to establish the requested initial PAL value of 7,893.5 tons/year.

Table WYO - 2

Wyodak Future Potential Sulfur Dioxide Emission Evaluation

Step 1: Calculate future potential SO_2 emissions based on emission limit

	Maximum Boiler Heat Input (MMBtu/hour)	Post-Project Sulfur Dioxide Emission Limit (lb/MMBtu)	Maximum Annual Boiler Operational Time (hours/year)	Post-Project Annual Sulfur Dioxide Stack Emission Rate (tons/year)
Wyodak	4,700	0.16	8,760	3,293.8

Non-Stack SO_2 Emission Rate:	0.0	tons/year
Total Future Potential SO_2 Emission Rate	3,293.8	tons/year
PSD SO_2 Significance Threshold:	40	tons/year
Post-Scrubber Upgrade SO_2 PAL:	3,333.8	tons/year

Table WYO - 3

Wyodak Past Actual NO_X Emissions Evaluation

Past Actual Monthly NO_X Emissions from CEMs/Clean Air Markets (tons/month)

UNIT NAME	Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	Aug-04
Wyodak	413.9	357.8	346.9	395.9	393.8	361.6	427.0	418.2	408.0	400.5	354.3	385.1	367.7	370.7	393.2	254.1	437.4	467.2	467.6	415.4

Past Actual Annual NO_X Emission Rate Based on Rolling 24-Month Period (tons/year)

UNIT NAME	Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	Aug-04
Wyodak	This is based on a 24-month rolling average so there are no valid averages until December 2004																			

Table WYO - 3 (continued)

Wyodak Past Actual NO_X Emissions Evaluation

Past Actual Monthly NO_X Emissions from CEMs/Clean Air Markets (tons/month)

Sep-04	Oct-04	Nov-04	Dec-04	Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06
415.1	451.5	456.4	456.0	402.0	332.0	323.6	422.8	398.6	397.5	442.0	436.5	439.5	450.3	443.9	457.5	428.7	396.4	394.7	341.9	141.7

Past Actual Annual NO_X Emission Rate Based on Rolling 24-Month Period (tons/year)

Sep-04	Oct-04	Nov-04	Dec-04	Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06
			4,808	4,802	4,788.7	4,777.1	4,790.5	4,792.9	4,810.8	4,818.4	4,827.5	4,843.3	4,868.2	4,913.0	4,949.2	4,979.7	4,992.6	4,993.3	5,037.2	4,889.4

Table WYO - 3 (continued)

Wyodak Past Actual NO_X Emissions Evaluation

Past Actual Monthly NO_X Emissions from CEMs/Clean Air Markets (tons/month)

Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
12.1	333.2	296.2	333.6	387.2	395.1	393.8	305.0	279.5	379.2	372.5	432.7	421.3	427.5	396.2	401.5	397.3	340.0	442.0

Past Actual Annual NO_X Emission Rate Based on Rolling 24-Month Period (tons/year)

Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
4,661.9	4,594.7	4,535.1	4,494.3	4,462.2	4,431.5	4,400.4	4,351.9	4,325.6	4,353.4	4,328.3	4,345.3	4,357.3	4,350.0	4,329.8	4,310.7	4,284.3	4,232.3	4,224.6

Maximum Past Actual Annual Stack NO_X Emissions (tons/year)	**5,037.2**

Maximum Past Actual Non-Stack NO_X Emissions

Emissions Source	Maximum Past Actual Non-Stack Emission Rate (tons/year)
Emergency Diesel Generator Engine	0.2
Emergency Diesel Fire Pump Engine	0.0
Standby Diesel Fire Pump Engine	0.0
Propane-Fired Space Heater (coal handling)	0.4
Propane-Fired Space Heater (main coal silo)	0.1
Propane-Fired Space Heater (main coal silo)	0.0
Propane-Fired Space Heater (boiler building)	0.0
Propane-Fired Space Heater (boiler building)	0.0
Propane-Fired Space Heater (turbine building)	0.0
Propane-Fired Space Heater (water treatment building)	0.0
Propane-Fired Space Heater (new maintenance shop)	0.0
Propane-Fired Space Heater (old maintenance shop)	NA
Total Maximum Non-Stack NO_X Emission Rate (tons/year)	0.8

Total Maximum Past Actual NO_X Emission Rate Stack and Non-Stack Emissions (tons/year)	5,038.0

* Note that Wyodak had no NO_X emissions in excess of the applicable 3-hour limit of 0.70 lb/MMBtu during the 24-month evaluation period from May 2004 through April 2006.

Table WYO - 4

Wyodak Future Potential Nitrogen Oxides Emission Evaluation

Step 1: Calculate future potential NO_X emissions based on post-low-NO_X project emission limits

	Maximum Boiler Heat Input (MMBtu/hour)	Post-Project Nitrogen Oxides Emission Limit (lb/MMBtu)	Maximum Annual Boiler Operational Time (hours/year)	Post-Project Annual Nitrogen Oxides Stack Emission Rate (tons/year)
Wyodak	4,700	0.23	8,760	4,734.8

Non-Stack NO_X Emission Rate:	0.8	tons/year
Total Future Potential NO_X Emission Rate	4,735.5	tons/year

PSD NO_X Significance Threshold:	40	tons/year
Post-Low-NO_X Burner Installation NO_X PAL:	4,775.5	tons/year

Table WYO - 5
Wyodak Past Actual Heat Input Evaluation

Past Actual Monthly Heat Input from CEMs/Clean Air Markets (MMBtu/month)

UNIT NAME	Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	Aug-04
Wyodak	3,150,461	2,636,347	2,747,598	2,995,293	2,804,539	2,550,483	2,970,100	2,957,345	2,802,480	2,933,706	2,574,419	2,838,981	2,736,756	2,845,632	3,108,684	1,691,746	2,722,187	2,823,583	2,989,266	2,676,730

Past Actual Annual Heat Input Rate Based on Rolling 24-Month Period (MMBtu/year)

UNIT NAME	Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	Aug-04
Wyodak	This is based on a 24-month rolling average so there are no valid averages until December 2004																			

Table WYO - 5 (continued)
Wyodak Past Actual Heat Input Evaluation

Past Actual Monthly Heat Input from CEMs/Clean Air Markets (MMBtu/month)

Sep-04	Oct-04	Nov-04	Dec-04	Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06
2,834,223	3,180,642	3,111,045	3,157,515	2,758,441	2,206,840	2,273,363	2,828,357	2,760,228	2,818,040	2,817,180	2,837,389	2,770,839	2,856,638	2,918,473	3,006,285	2,766,719	2,696,745	2,801,037	2,444,546	1,034,435

Past Actual Annual Heat Input Rate Based on Rolling 24-Month Period (MMBtu/year)

Sep-04	Oct-04	Nov-04	Dec-04	Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06
			33,919,881	33,723,871	33,509,117	33,272,000	33,188,532	33,166,376	33,300,155	33,223,695	33,163,717	33,147,896	33,109,362	33,281,389	33,365,041	33,380,023	33,305,579	33,151,756	33,528,156	32,684,280

Table WYO - 5 (continued)
Wyodak Past Actual Heat Input Evaluation

Past Actual Monthly Heat Input from CEMs/Clean Air Markets (MMBtu/month)

Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
167,563	2,633,301	2,563,455	2,723,811	2,638,858	2,762,614	2,767,740	2,406,814	2,101,831	2,855,299	2,647,405	3,038,535	2,908,793	2,948,656	3,000,205	2,829,394	2,951,129	2,561,569	3,054,970

Past Actual Annual Heat Input Rate Based on Rolling 24-Month Period (MMBtu/year)

Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
31,356,270	31,178,287	31,121,650	31,066,444	30,795,552	30,621,336	30,426,449	30,250,635	30,198,131	30,489,099	30,398,623	30,537,776	30,583,153	30,648,891	30,730,299	30,759,576	30,806,821	30,628,369	30,652,712

Maximum Past Actual Annual Heat Input (MMBtu/year) 33,919,881

Table WYO - 6

Wyodak Past Actual Coal Burn Evaluation

Past Actual Monthly Coal Burn (tons/month)

UNIT NAME	Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	Aug-04
Wyodak	187,474	161,747	167,461	179,840	170,469	154,296	185,020	182,795	171,278	177,461	153,811	173,992	163,119	169,154	184,560	100,555	162,363	170,555	183,222	164,499

Past Actual Annual Coal Burn Rate Based on Rolling 24-Month Period (tons/year)

UNIT NAME	Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	Aug-04
Wyodak	This is based on a 24-month rolling average so there are no valid averages until December 2004																			

Table WYO - 6 (continued)

Wyodak Past Actual Coal Burn Evaluation

Past Actual Monthly Coal Burn (tons/month)

Sep-04	Oct-04	Nov-04	Dec-04	Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06
169,698	184,870	180,910	182,415	158,770	130,433	131,190	169,604	165,100	170,706	171,276	167,117	165,035	162,456	171,967	174,297	163,970	159,860	165,022	145,424	62,545

Past Actual Annual Coal Burn Rate Based on Rolling 24-Month Period (tons/year)

Sep-04	Oct-04	Nov-04	Dec-04	Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06
			2,040,782	2,026,430	2,010,773	1,992,638	1,987,520	1,984,835	1,993,040	1,986,168	1,978,329	1,975,208	1,967,705	1,976,783	1,976,936	1,977,361	1,972,714	1,962,945	1,985,380	1,935,471

Table WYO - 6 (continued)

Wyodak Past Actual Coal Burn Evaluation

Past Actual Monthly Coal Burn (tons/month)

Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
4,416	158,054	153,601	171,177	161,198	175,319	176,676	176,950	162,309	167,324	161,321	187,012	171,745	174,817	180,175	169,593	180,349	151,557	185,660

Past Actual Annual Coal Burn Rate Based on Rolling 24-Month Period (tons/year)

Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
1,852,401	1,839,817	1,834,368	1,835,108	1,823,272	1,820,476	1,817,607	1,826,697	1,842,635	1,860,702	1,856,560	1,867,516	1,868,036	1,869,806	1,876,335	1,878,614	1,887,561	1,877,356	1,883,037

Maximum Past Actual Annual Coal Burn Rate (tons/year) 2,040,782

Table WYO - 7

Wyodak Past Actual Particulate Matter Emission Evaluation

Past Actual Monthly Heat Input from CEMs/Clean Air Markets (MMBtu/month)

UNIT NAME	Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04
Wyodak	3,150,461	2,636,347	2,747,598	2,995,293	2,804,539	2,550,483	2,970,100	2,957,345	2,802,480	2,933,706	2,574,419	2,838,981	2,736,756	2,845,632	3,108,684	1,691,746	2,722,187	2,823,583	2,989,266

Past Actual Monthly Particulate Matter Emission Rate from Annual Stack Testing (lb/MMBtu)

UNIT NAME	Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04
Wyodak	0.006	0.006	0.006	0.006	0.006	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.007	0.007	0.007

Monthly Particulate Matter Emission Rate (obtained by multiplying monthly heat input times particulate matter emission rate) tons/month

UNIT NAME	Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04
Wyodak	9.6	8.0	8.4	9.1	8.6	31.9	37.1	37.0	35.0	36.7	32.2	35.5	34.2	35.6	38.9	21.1	9.5	9.9	10.5

Past Actual Annual Particulate Matter Emission Rate Based on Rolling 24-Month Period (tons/year)

UNIT NAME	Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04
Wyodak	This is based on a 24-month rolling average so there are no valid averages until December 2004																		

Table WYO - 7 (continued)

Wyodak Past Actual Particulate Matter Emission Evaluation

Past Actual Monthly Heat Input from CEMs/Clean Air Markets (MMBtu/month)

Aug-04	Sep-04	Oct-04	Nov-04	Dec-04	Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06
2,676,730	2,834,223	3,180,642	3,111,045	3,157,515	2,758,441	2,206,840	2,273,363	2,828,357	2,760,228	2,818,040	2,817,180	2,837,389	2,770,839	2,856,638	2,918,473	3,006,285	2,766,719	2,696,745	2,801,037	2,444,546

Past Actual Monthly Particulate Matter Emission Rate from Annual Stack Testing (lb/MMBtu)

Aug-04	Sep-04	Oct-04	Nov-04	Dec-04	Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06
0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014

Monthly Particulate Matter Emission Rate (obtained by multiplying monthly heat input times particulate matter emission rate) tons/month

Aug-04	Sep-04	Oct-04	Nov-04	Dec-04	Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06
9.4	9.9	11.1	10.9	11.1	9.7	7.7	8.0	9.9	19.3	19.7	19.7	19.9	19.4	20.0	20.4	21.0	19.4	18.9	19.6	17.1

Past Actual Annual Particulate Matter Emission Rate Based on Rolling 24-Month Period (tons/year)

Aug-04	Sep-04	Oct-04	Nov-04	Dec-04	Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06
				250.5	250.6	250.4	250.2	250.6	256.0	249.9	241.2	232.6	224.8	216.5	210.6	203.4	196.0	187.6	178.0	176.0

Table WYO - 7 (continued)
Wyodak Past Actual Particulate Matter Emission Evaluation

Past Actual Monthly Heat Input from CEMs/Clean Air Markets (MMBtu/month)

May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
1,034,435	167,563	2,633,301	2,563,455	2,723,811	2,638,858	2,762,614	2,767,740	2,406,814	2,101,831	2,855,299	2,647,405	3,038,535	2,908,793	2,948,656	3,000,205	2,829,394	2,951,129	2,561,569	3,054,970

Past Actual Monthly Particulate Matter Emission Rate from Annual Stack Testing (lb/MMBtu)

May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.007	0.007	0.007	0.007	0.007	0.007	0.007

Monthly Particulate Matter Emission Rate (obtained by multiplying monthly heat input times particulate matter emission rate) tons/month

May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
15.0	2.4	38.2	37.2	39.5	38.3	40.1	40.1	34.9	30.5	41.4	38.4	44.1	10.2	10.3	10.5	9.9	10.3	9.0	10.7

Past Actual Annual Particulate Matter Emission Rate Based on Rolling 24-Month Period (tons/year)

May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
178.7	175.0	188.8	202.7	217.5	231.1	245.7	260.2	272.8	284.2	300.9	315.2	327.5	322.8	318.1	313.4	308.6	303.8	298.1	292.9

Maximum Past Actual Annual Stack Particulate Matter Emissions (tons/year) **327.5**

Maximum Past Actual Non-Stack PM_{10} Emissions

Emissions Source	Maximum Past Actual
T-1 Transfer House (emergency coal backup handling system)	0.0
T-2 Transfer House	2.3
Silo Methane Purge Exhauster	11.0
Dust Extractor Unit	23.4
Station Coal Transfer House (removed from service)	3.9
Station Coal Silo Exhauster (removed from service)	2.3
Recycle Ash Bin (SDA System) (removed from service)	0.0
Fly Ash Silo (fugitve emissions from truck loading)	0.2
Fly Ash Haul Road	0.1
Peerless Pit Secondary Crusher	3.3
Passive Enclosure Dust Control System (PECS)	
Emergency Diesel Generator Engine	0.0
Emergency Diesel Fire Pump Engine	0.0
Standby Diesel Fire Pump Engine	0.0
Propane-Fired Space Heater (coal handling)	0.0
Propane-Fired Space Heater (main coal silo)	0.0
Propane-Fired Space Heater (main coal silo)	0.0
Propane-Fired Space Heater (boiler building)	0.0
Propane-Fired Space Heater (boiler building)	0.0
Propane-Fired Space Heater (turbine building)	0.0
Propane-Fired Space Heater (water treatment building)	0.0
Propane-Fired Space Heater (new maintenance shop)	0.0
Propane-Fired Space Heater (old maintenance shop)	
Total Maximum Non-Stack PM_{10} Emission Rate (tons/year)	46.5

Total Maximum Past Actual PM_{10} Emission Rate Stack and Non-Stack Emissions (tons/year)	374.0	(Past actual stack emission rate of 327.5 tons/year plus non-stack emission rate of 46.5 tons/year)

Table WYO - 8

Wyodak Future Potential Particulate Matter Emission Evaluation

	Maximum Boiler Heat Input (I) (MMBtu/hour)	Post-Project Particulate Matter Emission Limit* (lb/MMBtu)	Post-Project Particulate Matter Emission Limit* (lb/hour)	Maximum Annual Boiler Operational Time (hours/year)	Future Potential Annual Particulate Matter Emission Rate (tons/year)
Stack	4,700	0.02	71	8,760	308.8
Non-Stack	NA	NA	NA	NA	46.5
Wyodak Total (post-project PM_{10} rate):					355.3

* Particulate Matter Emission Limit Following Installation of Fabric Filter Baghouse

Table WYO - 9

Wyodak Past Actual Hydrogen Fluoride Emission Evaluation

$M_{HF} = F_{comb} \times 2000 \text{ lb/ton} \times C_{HF} \times 1/10^6 \times F_{acid}$

Where:

Mfg_{HF} = Manufacture of Hydrogen Fluoride, lb/year

F_{comb} = Coal combustion, tons/year

F_{comb} = 2,040,782 tons/year

Note: Maximum annual coal burn rate from December 2004; Table WYO-6

C_{HF} = 50.47 Average fluoride concentration in coal, ppm

F_{Bypass} = 0.07 7.2% Wyodak scrubber bypass

F_{acid} = M_{HF}/M_F Acid conversion factor: ratio of molecular weights, compound/parent chemical

M_F = 18.9984 Molecular weight of fluorine

M_{HF} = 20.0063 Molecular weight of hydrogen fluoride

F_{acid} = 1.053054

AR = Annual release of hydrogen fluoride, lb/year

EF_{FGD} = 6% HF emission factor for FGD systems

$EF_{No\ FGD}$ = 50% HF emission factor without FGD

$AR = Mfg * (EF/100)$

$AR_{FGD\ Removal} = (1.0 - F_{Bypass}) \times E_{FGD} \times M_{HF}$

$AR_{Bypass} = F_{Bypass} \times EF_{NoFGD} \times M_{HF}$

$AR_{Total} = AR_{FGD\ Removal} + AR_{Bypass}$

Calculation Method:

EPRI LARK-TRIPP *Calculation and Methods for Threshold Determination and Release Estimates*

HF Emission Factor with FGD System: 6%

Subbituminous Coal Emission Factor: 50%

(Table 5-1 Emission Factors for HCL and HF)

Table WYO - 9 (continued)

Wyodak Past Actual Hydrogen Fluoride Emission Evaluation

Historical Coal Fluoride Concentrations (Parts Per Million)

	2002	2003	2004	2005	2006	Average 2002-2006 Fluoride Concentration ppm
Wyodak	72.25	64.50	66.00	78.50	48.62	65.97

Mfg_{HF} = (Coal, tons/year)*(2000 lb/ton)*(C_{HF} ppm)*($1/10^6$) F_{acid}

Mfg_{HF} = 283,563.3 lbs/year (quantity of HF manufactured through coal combustion)

$AR_{FGD\ Removal}$ = (1.0 - F_{Bypass}) x EF_{FGD} x Mfg_{HF}

$AR_{FGD\ Removal}$ = (1.0 - 0.072) x (0.06) x (283,563.3) lbs/year

$AR_{FGD\ Removal}$ = 15,788.8 lbs/year (stack air release considering FGD removal, lbs.)

AR_{Bypass} = (0.072) x (0.50) x (283,563.3) lbs/year

AR_{Bypass} = 10,208.3 lbs/year (stack air release considering FGD bypass, lbs.)

AR_{Total} = $AR_{FGD\ Removal}$ + AR_{Bypass} (total stack air release, lbs.)

AR_{Total} = (15,788.8 + 10,208.3) lbs/year

AR_{Total} = 25,997.1 lbs/year

Maximum Past Actual Wyodak HF Emissions =	25,997.1 lb/year 13.0 tons/year

Table WYO - 10

Wyodak Future Potential Coal Burn and Hydrogen Fluoride Emission Evaluation

	Annual Average Coal Heating Value (Btu/lb)					Average Coal Heating Value (Btu/lb)
	2002	2003	2004	2005	2006	
Wyodak	8,110	8,057	8,019	7,980	7,980	8,029

Maximum Potential Annual Coal Burn Rate

	Maximum Boiler Heat Input (MMBtu/hour)	Maximum Annual Heat Input at 8760 hours/year* (MMBtu/year)	Average 2002-2005 Coal Heating Value (Btu/lb)	Maximum Potential Annual Coal Burn* (tons/year)
Wyodak	4,700	41,172,000	8029	2,563,892

* Maximum potential annual heat input and coal burn rates used in future potential H_2SO_4, lead and HF emission calculations

Table WYO - 10 (continued)

Wyodak Future Potential Coal Burn and Hydrogen Fluoride Emission Evaluation

$M_{HF} = F_{comb} \times 2000 \text{ lb/ton} \times C_{HF} \times 1/10^6 \times F_{acid}$

Where:	Mfg_{HF} =	Manufacture of Hydrogen Fluoride, lb/year	
	F_{comb} =	Coal combustion, tons/year	
	F_{comb} =	2,563,892	tons/year (Wyodak future potential coal burn rate)
	C_{HF} =	50.47	Average Wyodak fluoride concentration in coal, ppm (FGD scrubber, no bypass)
	F_{Bypass} =	0.00	0% Wyodak scrubber bypass
	F_{acid} =	M_{HF}/M_F	Acid conversion factor: ratio of molecular weights, compound/parent chemical
	M_F =	18.9984	Molecular weight of fluorine
	M_{HF} =	20.0063	Molecular weight of hydrogen fluoride
	F_{acid} =	1.05305393	
	AR =	Annual release of hydrogen fluoride, lb/year	
	EF_{FGD} =	6%	HF emission factor for FGD systems
	$EF_{No\ FGD}$ =	50%	HF emission factor without FGD

$AR = Mfg * (EF/100)$

$AR_{FGD\ Removal} = (1.0 - F_{Bypass}) \times E_{FGD} \times M_{HF}$

$AR_{Bypass} = F_{Bypass} \times EF_{NoFGD} \times M_{HF}$

$AR_{Total} = AR_{FGD\ Removal} + AR_{Bypass}$

Calculation Method:

EPRI LARK-TRIPP *Calculation and Methods for Threshold Determination and Release Estimates*

HF Emission Factor with FGD System: 6%

Subbituminous Coal Emission Factor: 50%

(Table 5-1 Emission Factors for HCL and HF)

Table WYO - 10 (continued)

Wyodak Future Potential Coal Burn and Hydrogen Fluoride Emission Evaluation

Historical Coal Fluoride Concentrations (Parts Per Million)

	2002	2003	2004	2005	2006	Average 2002-2006 Fluoride Concentration ppm
Wyodak	72.25	64.50	66.00	78.50	48.62	65.97

Mfg_{HF} = (Coal, tons/year)*(2000 lb/ton)*(C_{HF} ppm)*($1/10^6$) F_{acid}

Mfg_{HF} = 356,248.6 lbs/year (quantity of HF manufactured through coal combustion)

$AR_{FGD\ Removal}$ = (1.0 - F_{Bypass}) x EF_{FGD} x Mfg_{HF}

$AR_{FGD\ Removal}$ = (1.0 - 0.0) x (0.06) x (356,248.6) lbs/year

$AR_{FGD\ Removal}$ = 21,374.9 lbs/year (stack air release considering FGD removal, lbs.)

AR_{Bypass} = (0.00) x (0.50) x (356,248.6) lbs/year

AR_{Bypass} = 0.0 lbs/year (stack air release considering FGD bypass, lbs.)

AR_{Total} = $AR_{FGD\ Removal}$ + AR_{Bypass} (total stack air release, lbs.)

AR_{Total} = (21,374.9 + 0.0) lbs/year

AR_{Total} = 21,374.9 lbs/year

Maximum Future Potential Wyodak HF Emissions =	21,374.9 lb/year 10.7 tons/year

Table WYO - 11

Wyodak Past Actual Sulfuric Acid Emission Evaluation

Sulfuric Acid Mist Manufactured from Combustion (EPRI LARK-TRIPP method used to calculate sulfuric acid emission rate)

$EM_{Comb} = K*F1*E2$

Where:	EM_{Comb} =	total H_2SO_4 manufactured from combustion, lbs/year
	K =	molecular weight and units conversion constant = (98.07)/(64.04) * 2000
		98.07 = Molecular weight of H_2SO_4
		64.04 = Molecular weight of SO_2
	K =	3,063
	F1 =	Fuel Impact Factor
	F1 =	0.0018 (Subbituminous/PRB coal)
	E2 =	SO_2 mass rate, tons/year

E2 = K1 * K2 * C1 * S1

Where:	K1 =	molecular weight and units conversion constant = (64.04)/(100*32.06)
		64.04 = Molecular weight of SO_2
		32.06 = Molecular weight of S
		100 = conversion of % S to fraction
	K1 =	0.02
	K2 =	Sulfur conversion to SO_2; implicit from EPA AP-42
	K2 =	0.875 (Subbituminous coal)
	C1 =	Coal burn, tons/year
	C1 =	2,040,782 tons/year (max from WYO-6; December 2004)
	S1 =	Coal sulfur weighted, %

Table WYO - 11 (continued)

Wyodak Past Actual Sulfuric Acid Emission Evaluation

	Annual Average Coal Sulfur Concentration (percent)					Average Coal Sulfur Concentration (percent)
	2002	2003	2004	2005	2006	
Wyodak	0.61	0.58	0.64	0.63	0.65	0.62

S1 = 0.62

E2 = K1 * K2 * C1 * S1

E2 = (0.02) x (0.875) x (2,040,782) x (0.62) SO_2 emissions tons/year

E2 = 22,214 tons/year

EM_{Comb} = K*F1*E2

EM_{Comb} = (3,063) x (0.0018) x (22,214) lbs/year

EM_{Comb} = 122,474 lbs/year

Table WYO - 11 (continued)

Wyodak Past Actual Sulfuric Acid Emission Evaluation

$EM_{FGC} = K_e * B * f_e * I_s$ Total H_2SO_4 manufactured from flue gas conditioning system, lbs/year

Where:

EM_{FGC} = Total H_2SO_4 manufactured from flue gas conditioning system, lbs/year

K_e = 3,799 conversion factor

B = Coal burn in TBtu/year

B = 33.9 TBtu/year (From WYO-5; December 2004)

f_e = Operating factor of flue gas conditioning system (generally = 0.8)

f_e = 0 (Wyodak does not use flue gas conditioning)

I_s = SO_3 injection rate in ppmv at 6% O_2, wet;

I_s = 0 ppmv (flue gas conditioning is not used at Wyodak)

EM_{FGC} = (3,799) x (33.9) x (0.8) x (0) lbs/year

EM_{FGC} = 0 lbs/year (Sulfuric Acid Manufactured from Flue Gas Conditioning)

$ER_{Comb} = EM_{Comb} * F2$ (all that apply)

ER_{Comb} = Sulfuric acid released from combustion

F2 = Technology Impact Factors

F2 = 0.56 (Air Heater Removal of Sulfuric Acid - PRB Coal; Applicable to Wyodak Boiler)

F2 = 0.73 (Cold-side ESP - Subbituminous (PRB) Coal; Applicable to Wyodak Boiler)

F2 = 0.01 (Dry FGD - PRB Coal; Applicable to Wyodak)

ER_{Comb} = (122,474) x (0.56) x (0.73) x (0.01) lbs/year

Table WYO - 11 (continued)

Wyodak Past Actual Sulfuric Acid Emission Evaluation

ER_{Comb} =	501	lbs/year (Sulfuric Acid Released from Combustion)

$ER_{FGC} = [EM_{FGC} - (K_e * B * f_e * I_{NH3})] * F3_{FGC} * F2$ Total H_2SO_4 released from flue gas conditioning

Where:

ER_{FGC} = Sulfuric Acid Released from Flue Gas Conditioning

EM_{FGC} = Sulfuric acid manufactured from flue gas conditioning

EM_{FGC} = 0 lbs/year

K_e = 3,799 conversion factor

B = Coal burn in TBtu/year

B = 33.9 TBtu/year (From WYO-5; December 2004)

f_e = 0 (Wyodak does not use flue gas conditioning)

I_{NH3} = NH_3 injection for dual flue gas conditioning, ppmv at 6% O_2, wet;

I_{NH3} = 0 ppmv Wyodak

$F3_{FGC}$ = Technology Impact Factors for FGC

$F3_{FGC}$ = 0.02 (Subbituminous coal with FGC injection downstream of APH)

Table WYO - 11 (continued)

Wyodak Past Actual Sulfuric Acid Emission Evaluation

F2 = Technology Impact Factors

F2 = 0.56 (Air Heater Removal of Sulfuric Acid - PRB Coal; Applicable to Wyodak)

F2 = 0.73 (Cold-side ESP - Subbituminous (PRB) Coal; Applicable to Wyodak)

F2 = 0.01 (Dry FGD - PRB Coal; Applicable to Wyodak)

ER_{FGC} = [0 - (3,799 x 33.9 x 0.8 x 0)] x 0.02 x 0.01 (Use F2 factor for equipment after the ESP)

ER_{FGC} =	0 lbs/year (Wyodak Sulfuric Acid Released from Flue Gas Conditioning)

$ER_{Total} = ER_{Comb} + ER_{FGC}$ Total sulfuric acid released from combustion and from flue gas conditioning

ER_{Total} = (501 + 0) lbs/year

ER_{Total} =	501 lbs/year

Total Past Actual Sulfuric Acid Emission Rate =	501 lbs/year 0.3 tons/year

Table WYO - 12

Wyodak Future Potential Sulfuric Acid Emission Evaluation

Sulfuric Acid Mist Manufactured from Combustion (EPRI LARK-TRIPP method used to calculate sulfuric acid emission rate)

$EM_{Comb} = K*F1*E2$

Where:

EM_{Comb} = total H_2SO_4 manufactured from combustion, lbs/year

K = molecular weight and units conversion constant = (98.07)/(64.04) * 2000

98.07 = Molecular weight of H_2SO_4

64.04 = Molecular weight of SO_2

K = 3,063

F1 = Fuel Impact Factor

F1 = 0.0018 (Subbituminous/PRB coal)

E2 = SO_2 mass rate, tons/year

$E2 = K1 * K2 * C1 * S1$

Where:

K1 = molecular weight and units conversion constant = (64.04)/(100*32.06)

64.04 = Molecular weight of SO_2

32.06 = Molecular weight of S

100 = conversion of % S to fraction

K1 = 0.02

K2 = Sulfur conversion to SO_2; implicit from EPA AP-42

K2 = 0.875 (Subbituminous coal)

C1 = Coal burn, tons/year

C1 = 2,563,892 tons/year (future potential maximum from WYO-10)

S1 = Coal sulfur weighted, %

Table WYO - 12 (continued)

Wyodak Future Potential Sulfuric Acid Emission Evaluation

	Annual Average Coal Sulfur Concentration (percent)					Average Coal Sulfur Concentration (percent)
	2002	2003	2004	2005	2006	
Wyodak	0.61	0.58	0.64	0.63	0.65	0.62

S1 = 0.62

E2 = K1 * K2 * C1 * S1

E2 = (0.02) x (0.875) x (2,563,892) x (0.62) SO_2 emissions tons/year

E2 = 27,908 tons/year

EM_{Comb} = K*F1*E2

EM_{Comb} = (3,063) x (0.0018) x (29,908) lbs/year

EM_{Comb} = 153,868 lbs/year

Table WYO - 12 (continued)

Wyodak Future Potential Sulfuric Acid Emission Evaluation

$EM_{FGC} = K_e * B * f_e * I_s$ Total H_2SO_4 manufactured from flue gas conditioning system, lbs/year

Where:

EM_{FGC} = Total H_2SO_4 manufactured from flue gas conditioning system, lbs/year

K_e = 3,799 conversion factor

B = Coal burn in TBtu/year

B = 41.2 TBtu/year (From WYO-10)

f_e = Operating factor of flue gas conditioning system (generally = 0.8)

f_e = 0 (Wyodak does not use flue gas conditioning)

I_s = SO_3 injection rate in ppmv at 6% O_2, wet;

I_s = 0 ppmv (flue gas conditioning is not used at Wyodak)

EM_{FGC} = (3,799) x (41.2) x (0.8) x (0) lbs/year

EM_{FGC} = 0 lbs/year (Sulfuric Acid Manufactured from Flue Gas Conditioning)

$ER_{Comb} = EM_{Comb} * F2$ (all that apply)

ER_{Comb} = Sulfuric acid released from combustion

F2 = Technology Impact Factors

F2 = 0.56 (Air Heater Removal of Sulfuric Acid - PRB Coal; Applicable to Wyodak Boiler)

F2 = 0.10 (Baghouse - Subbituminous Coal; Applicable to Wyodak Boiler following Baghouse Installation)

F2 = 0.01 (Dry FGD - PRB Coal; Applicable to Wyodak)

ER_{Comb} = (153,868) x (0.56) x (0.10) x (0.01) lbs/year

Table WYO - 12 (continued)

Wyodak Future Potential Sulfuric Acid Emission Evaluation

ER_{Comb} =	86	lbs/year (Sulfuric Acid Released from Combustion)

$ER_{FGC} = [EM_{FGC} - (K_e * B * f_e * I_{NH3})] * F3_{FGC} * F2$ Total H_2SO_4 released from flue gas conditioning

Where:

ER_{FGC} = Sulfuric Acid Released from Flue Gas Conditioning

EM_{FGC} = Sulfuric acid manufactured from flue gas conditioning

EM_{FGC} = 0 lbs/year

K_e = 3,799 conversion factor

B = Coal burn in TBtu/year

B = 41.2 TBtu/year (From WYO-10)

f_e = 0 (Wyodak does not use flue gas conditioning)

I_{NH3} = NH_3 injection for dual flue gas conditioning, ppmv at 6% O_2, wet;

I_{NH3} = 0 ppmv Wyodak

$F3_{FGC}$ = Technology Impact Factors for FGC

$F3_{FGC}$ = 0.02 (Subbituminous coal with FGC injection downstream of APH)

Table WYO - 12 (continued)

Wyodak Future Potential Sulfuric Acid Emission Evaluation

F2 = Technology Impact Factors

F2 = 0.56 (Air Heater Removal of Sulfuric Acid - PRB Coal; Applicable to Wyodak)

F2 = 0.10 (Baghouse - Subbituminous Coal; Applicable to Wyodak following Baghouse Installation)

F2 = 0.01 (Dry FGD - PRB Coal; Applicable to Wyodak)

ER_{FGC} = [0 - (3,799 x 41.2 x 0.8 x 0)] x 0.02 x 0.01 (Use F2 factor for equipment after the baghouse)

ER_{FGC} =	0 lbs/year (Wyodak Sulfuric Acid Released from Flue Gas Conditioning)

$ER_{Total} = ER_{Comb} + ER_{FGC}$ Total sulfuric acid released from combustion and from flue gas conditioning

ER_{Total} = (86 + 0) lbs/year

ER_{Total} =	86 lbs/year

Total Future Potential Sulfuric Acid Emission Rate =	86 lbs/year 0.0 tons/year

Table WYO - 13

Wyodak Past Actual Lead Emission Evaluation

Lead emissions calculated using AP-42 Table 1.1-16 9/98

Lead emissions ($lb/10^{12}$ Btu) = $3.4 * (C/A * PM)^{0.80}$

C = milligrams/kilogram (lead cncentration in coal)

A= percent ash in coal

PM = average particulate matter emission rate lb/MMBtu

	Annual Average Coal Lead Concentration (C) (ppm)					Average Coal Lead Concentration (C) (ppm)
	2002	2003	2004	2005	2006	
Wyodak	5.25	3.00	3.67	3.00	3.09	3.60

	Annual Average Coal Ash Concentration (A) (percent)					Average Coal Ash Concentration (A) (percent)
	2002	2003	2004	2005	2006	
Wyodak	6.70%	6.73%	7.20%	7.14%	7.27%	7.01%

Table WYO - 13 (continued)

Wyodak Past Actual Lead Emission Evaluation

	Annual Average Particulate Matter Emission Rate (PM) (lb/MMBtu)					Average PM Emission Rate (PM) (lb/MMBtu)
	2003	2004	2005	2006	2007	
Wyodak	0.017	0.013	0.012	0.024	0.016	0.016

	Maximum Past Annual Heat Input (MMBtu/year)	Reference
Wyodak	33,919,881	WYO-5; December 2004

	Average Lead Concentration (C) (ppm)	Average Coal Ash Concentration (A) (weight fraction)	Average Particulate Matter Emission Rate (PM) (lb/MMBtu)	Annual Lead Emission Rate ($lb/10^{12}$Btu)
Wyodak	3.60	0.0701	0.016	2.96

	Annual Lead Emission Rate ($lb/10^{12}$ Btu)	Annual Heat Input (10^{12} Btu/year)	Annual Lead Emission Rate (lb/year)	Annual Lead Emission Rate (tons/year)
Wyodak	2.96	33.9	100.6	0.05

Maximum Past Actual Lead Emission Rate:	0.05 tons/year

Table WYO - 14

Wyodak Future Potential Lead Emission Evaluation

Lead emissions calculated using AP-42 Table 1.1-16 9/98

Lead emissions ($lb/10^{12}$ Btu) = $3.4 * (C/A * PM)^{0.80}$

C = milligrams/kilogram (lead cncentration in coal)

A= percent ash in coal

PM = average particulate matter emission rate lb/MMBtu

	Annual Average Coal Lead Concentration (C) (ppm)					Average Coal Lead Concentration (C) (ppm)
	2002	2003	2004	2005	2006	
Wyodak	5.25	3.00	3.67	3.00	3.09	3.60

	Annual Average Coal Ash Concentration (A) (percent)					Average Coal Ash Concentration (A) (percent)
	2002	2003	2004	2005	2006	
Wyodak	6.70%	6.73%	7.20%	7.14%	7.27%	7.01%

Table WYO - 14 (continued)

Wyodak Future Potential Lead Emission Evaluation

	Future Post-Project Particulate Matter Emission Rate (PM) (lb/MMBtu)
Wyodak	0.015

	Maximum Future Potential Annual Heat Input (MMBtu/year)	Reference
Wyodak	41,172,000	Table WYO-10

	Average Lead Concentration (C) (ppm)	Average Coal Ash Concentration (A) (weight fraction)	Post-Project Particulate Matter Emission Rate (PM) (lb/MMBtu)	Annual Lead Emission Rate ($lb/10^{12}$Btu)
Wyodak	3.60	0.0701	0.015	2.76

	Annual Lead Emission Rate ($lb/10^{12}$ Btu)	Annual Heat Input (10^{12} Btu/year)	Annual Lead Emission Rate (lb/year)	Annual Lead Emission Rate (tons/year)
Wyodak	2.76	41.2	113.7	0.06

Maximum Future Potential Lead Emission Rate:	0.06 tons/year

Table WYO - 15

Wyodak Past Actual Carbon Monoxide Emission Evaluation

Carbon monoxide emissions calculated using AP-42 Table 1.1-3 9/98

Carbon monoxide AP-42 emission factor = 0.5 lb/ton (0.5 lb of CO emitted per ton of coal burned)

	Maximum Past Actual Annual Coal Burn Rate (tons/year)	Reference	Carbon Monoxide Emission Factor lb/ton	Annual CO Emission Rate lb/year	Annual CO Emission Rate tons/year
Wyodak	2,040,782	WYO-6; December 2004	0.5	1,020,391	510.2

Maximum Past Actual Stack Carbon Monoxide Emission Rate:	510.2 tons/year

Maximum Past Actual Non-Stack CO Emissions

Emissions Source	Maximum Past Actual Non-Stack CO Emission Rate (tons/year)
Emergency Diesel Generator Engine	0.1
Emergency Diesel Fire Pump Engine	0.0
Standby Diesel Fire Pump Engine	0.0
Propane-Fired Space Heater (coal handling)	0.0
Propane-Fired Space Heater (main coal silo)	0.0
Propane-Fired Space Heater (main coal silo)	0.0
Propane-Fired Space Heater (boiler building)	0.0
Propane-Fired Space Heater (boiler building)	0.0
Propane-Fired Space Heater (turbine building)	0.0
Propane-Fired Space Heater (water treatment building)	0.0
Propane-Fired Space Heater (new maintenance shop)	0.0
Propane-Fired Space Heater (old maintenance shop)	NA
Total Maximum Non-Stack CO Emission Rate (tons/year)	0.1

Total Maximum Past Actual CO Emission Rate Stack and Non-Stack Emissions (tons/year)	510.3

Table WYO - 16

Wyodak Future Potential Carbon Monoxide Emission Evaluation

Step 1: Calculate future potential emissions based on post-low-NO_X project emission limits

	Maximum Boiler Heat Input Rate (MMBtu/hour)	Post-Project Carbon Monoxide Emission Limit (lb/MMBtu)	Maximum Annual Boiler Operational Time (hours/year)	Post-Project Annual Carbon Monoxide Stack Emission Rate (tons/year)
Wyodak	4,700	0.25	8,760	5,146.5

Future Potential Non-Stack Annual CO Emission Ra	0.1	tons/year

Total Future Potential Annual Carbon Monoxide Emission Rate:	5,146.6	tons/year

Table WYO - 17

Wyodak Past Actual VOC Emission Evaluation

Volatile Organic Compound emissions calculated using AP-42 Table 1.1-19 9/98

VOC AP-42 emission factor = 0.06 lb/ton (0.06 lb of VOC emitted per ton of coal burned)

	Maximum Past Actual Annual Coal Burn Rate (tons/year)	Reference	VOC Emission Factor lb/ton	Annual VOC Emission Rate lb/year	Annual VOC Emission Rate tons/year
Wyodak	2,040,782	WYO-6; December 2004	0.06	122,447	61.2

Maximum Past Actual Stack VOC Emission Rate:	61.2 tons/year

Maximum Past Actual Non-Stack VOC Emissions

Emissions Source	Maximum Past Actual Non-Stack VOC Emission Rate (tons/year)
Emergency Diesel Generator Engine	0.0
Emergency Diesel Fire Pump Engine	0.0
Standby Diesel Fire Pump Engine	0.0
Propane-Fired Space Heater (coal handling)	0.0
Propane-Fired Space Heater (main coal silo)	0.0
Propane-Fired Space Heater (main coal silo)	0.0
Propane-Fired Space Heater (boiler building)	0.0
Propane-Fired Space Heater (boiler building)	0.0
Propane-Fired Space Heater (turbine building)	0.0
Propane-Fired Space Heater (water treatment building)	0.0
Propane-Fired Space Heater (new maintenance shop)	0.0
Propane-Fired Space Heater (old maintenance shop)	NA
Total Maximum Non-Stack VOC Emission Rate (tons/year)	0.0

Total Maximum Past Actual VOC Emission Rate Stack and Non-Stack Emissions (tons/year)	61.2

Table WYO - 18

Wyodak Future Potential VOC Emission Evaluation

Volatile Organic Compound emissions calculated using AP-42 Table 1.1-19 9/98

VOC AP-42 emission factor = 0.06 lb/ton (0.06 lb of VOC emitted per ton of coal burned)

	Maximum Future Potential Annual Coal Burn Rate (tons/year)	Reference	VOC Emission Factor lb/ton	Annual VOC Emission Rate lb/year	Annual VOC Stack Emission Rate tons/year
Wyodak	2,563,892	Table WYO-10	0.06	153,834	76.9

Future Potential Non-Stack Annual VOC Emission Rat	0.0	tons/year

Total Future Potential VOC Emission Rate:	76.9	tons/year

Appendix C: Permit Application Form

This appendix includes a completed Wyoming Department of Environmental Quality Air Quality Division permit application form.

DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

PERMIT APPLICATION FORM

Date of Application: March 11, 2008

1. Name of Firm or Institution: PacifiCorp Energy - Wyodak Power Plant

2. Mailing Address

48 Wyodak Road - Garner Lake Route		Gillette	Wyoming
Number	Street	City	State
Campbell	82716	(307) 687-4230	
County	Zip	Telephone	

3. Plant Location

5 Miles East of Gillette		Gillette	Wyoming
Number	Street	City	State
Campbell	82718	(307) 687-4230	
County	Zip	Telephone	

4. Name of owner or company official to contact regarding air pollution matters

Bill Lawson	Director- Engineering and Environmental	(801) 220-4581
Name	Title	Telephone

1407 West North Temple	Salt Lake City	Utah	84116
Number Street	City	State	Zip

5. General nature of business

The Wyodak facility is a coal-fired plant used to generate electricity

6. Permit application is made for: ___ New Construction _X_ Modification
___ Relocation ___ Operation

7. Type of equipment to be constructed, modified, or relocated. (List each major piece of equipment separately.)

PacifiCorp plans to replace the existing Wyodak electrostatic precipitator with a fabric filter baghouse, install a new-generation low-NO_X control system and rebuild the facility's steam turbine.

The replacement of the electrostatic precipitator with a fabric filter baghouse will significantly reduce the particulate matter emission rate from the boiler and allow increased sulfur dioxide removal rates from the flue gas desulfurization system. The low-NO_X burner project will result in lower NO_X emission rates from the Wyodak boiler.

8. If application is being made for operation of an existing source in a new location, list previous location and new location:

Previous Location: Not Applicable

New Location:

9. If application is being made for a crushing unit, is there: (mark all appropriate boxes)

Not applicable. Identified projects are being constructed to:

- Reduce the boiler particulate matter emission rate
  (Replace the existing electrostatic precipitator with a fabric filter baghouse)
- Rebuild the Wyodak steam turbine
- Reduce the boiler SO_2 emission rate with increased scrubber removal efficiencies resulting from the fabric filter baghouse project (approach temperature benefits)
- Reduce boiler NO_X emission rate

No material crushing equipment is associated with the listed projects.

10. Materials used in unit or process (include solid fuels): Not applicable. The listed projects are being installed to reduce the particulate matter emission rate from the Wyodak boiler; to increase the FGD system SO_2 removal efficiency; and to reduce the boiler NO_X emission rate. The listed projects will not alter the coal throughput or heat input capacities of the Wyodak boiler.

Type of Material	Process Weight Average (lb/hr)	Process Weight Maximum (lb/hr)	Quantity/Year
Coal			2,563,892 tons (maximum)

11. Air contaminants emitted:

The replacement of the Wyodak ESP with a fabric filter baghouse will not change the characteristics of the pollutants being discharged from the stack; however, the project will result in a reduction of the particulate matter emission rate from the source. The baghouse installation will also allow a lower flue gas approach temperature from the FGD scrubber to the baghouse as compared to the allowable approach temperature from the FGD scrubber to the existing electrostatic precipitator. The capability of a reduced baghouse approach temperature allows an increased SO_2 removal rate from the existing flue gas desulfurization system. The steam turbine overhaul will have no effect on the characteristics of the pollutants being discharged from the Wyodak exhaust stack. The low-NO_X burner project will reduce NO_X pollutants being emitted from the exhaust stack and may result in an increase in CO emissions.

The Wyodak Plant currently has a particulate matter emission limit of 0.10 lb/MMBtu heat input. Following the installation of the fabric filter baghouse the emission rate from the boiler will be equivalent to an annual limit of 0.015 lb/MMBtu (71 lb/hour).

PacifiCorp requests that a plantwide applicability limitation (PAL) for NO_X equivalent to 5,078.0 tons/year be established on a 12-month rolling average basis at issuance of the requested construction permit. Following completion of the low-NO_X burner project, PacifiCorp requests that a 12-month rolling average NO_X emission limitation of 0.23 lb/MMBtu be applied to the Wyodak boiler. Furthermore, PacifiCorp requests that a 12-month rolling average NO_X PAL equivalent to 4,775.5 tons/year be established at Wyodak following completion of the low-NO_X control project.

Because the installation of the low-NO_X control project may increase emissions of carbon monoxide, a 30-day rolling average CO limit of 0.25 lb/MMBtu (1,175 lb/hour) is requested for the Wyodak facility following completion of the boiler low-NO_X project.

PacifiCorp requests that a plantwide applicability limitation (PAL) for SO_2 equivalent to 7,893.5 tons/year be established on a 12-month rolling average basis at issuance of the requested construction permit. Following completion of the fabric filter baghouse project, PacifiCorp requests that a 12-month rolling average SO_2 emission limitation of 0.16 lb/MMBtu be applied to the Wyodak boiler as well as a fixed block 3-hour average SO_2 limit of 2,115 lb/hour. Furthermore, PacifiCorp requests that a 12-month rolling average SO_2 PAL equivalent to 3,333.8 tons/year be established at Wyodak following completion of the fabric filter baghouse project.

Calculations of the Emission Estimates

Summary of Past Actual Annual Emissions

Wyodak	SO_2 tons/yr	NO_X tons/yr	PM_{10} tons/yr	VOC tons/yr	CO tons/yr	H_2SO_4 tons/yr	Lead tons/yr	Fluorides tons/yr
Stack Emissions	7,853.5	5,038.0	374.0	61.2	510.3	0.3	0.05	13.0

Summary of Projected Annual Emissions

Wyodak	SO_2 tons/yr	NO_X tons/yr	PM_{10} tons/yr	VOC tons/yr	CO tons/yr	H_2SO_4 tons/yr	Lead tons/yr	Fluorides tons/yr
Stack Emissions	3,293.8	4,735.5	355.3	76.9	5,146.6	0.0	0.06	10.7

Evaluation of significance levels by pollutant

To determine if a Prevention of Significant Deterioration significance level has been reached the past actual annual emissions are subtracted from the Projected Annual Emissions

Wyodak Permitted Projects: • **Fabric filter baghouse** • **Boiler low-NO_X burners** • **Steam turbine overhaul** • **Other plant projects**	**Past Actual tons/year**	**Future Potential tons/year**	**Future Potential minus Past Actual tons/year**	**PSD Review Significance Level tons/year**	**Is Emission Increase greater than Significance Level**
SO_2	7,853.5	3,293.8	-4,559.7	40	No
NO_X	5,038.0	4,735.5	-302.4	40	No
PM_{10}	374.0	355.3	-18.8	25	No
CO	510.3	5,146.6	4,636.3	100	Yes
Ozone (as VOC)	61.2	76.9	15.7	40	No
Fluoride (as HF)	13.0	10.7	-2.3	3	No
Lead	0.05	0.06	0.01	0.6	No
H_2SO_4	0.3	0.0	-0.2	7	No

12. Air contaminant control equipment:

Emission Point	Type	Pollutant Removed	Efficiency
Boiler Stack	• Fabric Filter Baghouse • Low-NO_X Burners • FGD System	PM_{10} NO_X SO_2	This equipment is expected to reduce particulate matter emissions from 0.10 lb/MMBtu heat input (pre-project emission rate) to 0.015 lb/MMBtu heat input on an annual average basis; and reduce NO_X emissions to 0.23 lb/MMBtu and reduce SO_2 emissions to 0.16 lb/MMBtu on a 12-month rolling average basis

13. Type of combustion unit: (check if applicable):

A. Coal

1. *Pulverized* _X_:
General ___; Dry Bottom X; Wet Bottom _; With Flyash Reinjection __;
Without Flyash Reinjection ___; Other _Wall-Fired
2. *Spreader Stoker* ___:
With Flyash Reinjection ___; Without Flyash Reinjection ___; Cyclone ___;
Hand-Fired ___; Other

B. Fuel Oil
Horizontally Fired ___ Tangentially Fired

Type of combustion unit:(check if applicable):

C. Natural Gas

D. If other, please specify

Hourly fuel consumption (estimate for new equipment) Not Applicable

Size of combustion unit 4,700 MMBtu/hour (Wyodak boiler)

14. Operating Schedule: ___24__ hours/day; ___7___ days/week; __52___ weeks/year.

Peak production season (if any):

15. Fuel analysis: Not applicable. The planned projects include the installation of pollution control equipment including low-NO_X burners to reduce NO_X emissions and a fabric filter baghouse to control particulate matter emissions and allow increased SO_2 removal in the flue gas desulfurization system. The requested projects will not change the amount of fuel burned or the capacity of the generating unit.

	COAL	FUEL OIL	NATURAL GAS
% Sulfur			
% Ash			
BTU Value			

16. Not applicable. Not applicable. The planned projects include the installation of pollution control equipment including low-NO_X burners to reduce NO_X emissions and a fabric filter baghouse to control particulate matter emissions and allow increased SO_2 removal in the flue gas desulfurization system. The requested projects will not change the amount of fuel burned or the capacity of the generating unit..

Products	Quantity/Year

17. Emissions to the atmosphere (each point of emission should be listed separately and numbered so that it can be located on the flow sheet):

Emission Point	Stack Height (ft)	Stack Diameter (ft)	Gas Discharge SCFM	Exit Temp (^OF)	Gas Velocity (ft/s)
Wyodak Stack	400	20 (exit I.D.)	1,900,000	190	100

18. Does the input material or product from this process or unit contain finely divided materials which could become airborne?

X Yes ___ No

Is this material stored in piles or in some other way as to make possible the creation of dust problems?

X Yes ___ No

Not applicable. The planned projects include the installation of pollution control equipment including low-NO_X burners to reduce NO_X emissions and a fabric filter baghouse to control particulate matter emissions and allow increased SO_2 removal in the flue gas desulfurization system. The requested projects will not change the amount of fuel burned or the capacity of the generating unit.

18. Continued:
List storage pile (if any):

Type of Material	Particle Size (Diameter or Screen Size)	Pile Size (Average Tons on Pile)	Pile Wetted (Yes or No)	Pile Covered (Yes or No)

19. Using a flow diagram:

(1) Illustrate input of raw materials.

(2) Label production processes, process fuel combustion, process equipment, and air pollution control equipment.

(3) Illustrate locations of air contaminant release so that emission points under items 11, 12 and 17 can be identified. For refineries show normal pressure relief and venting systems. Attach extra pages as needed.

20. A site map should be included indicating the layout of facility at the site. All buildings, pieces of equipment, roads, pits, rivers and other such items should be shown on the layout.

21. A location drawing should be included indicating location of the facility with respect to prominent highways, cities, towns, or other facilities (include UTM coordinates).

"I certify to the accuracy of the plans, specifications, and supplementary data submitted with this application. It is my Opinion that any new equipment installed in accordance with these submitted plans and operated in accordance with the manufacturer's recommendations will meet emission limitations specified in the Wyoming Air Quality Standards and Regulations."

Signature	Gary L. Harris	Typed Name	Gary L. Harris
Title	Plant Managing Director	Company	PacifiCorp Energy
Mailing Address	48 Wyodak Road – Garner Lake Route	Telephone No.	(307) 687-4230
City	Gillette	State	Wyoming
Zip	82716		

P.E. Registration (if applicable)

State where registered