Appendix L

Cumulative Analysis for Air Quality

Report

Cumulative Analysis for Air Quality

Prepared for

U.S. Bureau of Land Management

Ely Field Office, Nevada

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1.0 Cumulative Air Quality Analysis

This report describes the NEPA cumulative air impacts predicted for the area of the Proposed Action. NEPA cumulative air impacts differ slightly from PSD cumulative air impacts in that they are evaluated as those resulting from existing facilities, the Proposed Action, and reasonably expected future actions. PSD cumulative air impacts result only from the existing facilities and the Proposed Action (impacts from reasonably expected future actions are not evaluated in a PSD cumulative analysis).

In order to prevent confusion, "PSD" was included as appropriate in the use of these terms in order to discriminate between the two rules (for example, PSD cumulative). If the term is not preceded by PSD than it is to be assumed to be used in the context of NEPA.

Consistent with EPA's position on cumulative PSD modeling (see 72 FR 31390, June 6, 2007), all NEPA cumulative modeling analyses presented below are based on the maximum emission rates for each source during normal operation (for example, 100 percent load operation for power plants) to produce a representative picture of the degree of change in short-term pollution concentrations over time. Emissions associated with infrequent, episodic events such as startups or shutdowns were not evaluated in the cumulative analyses since modeling such events would not be expected to produce results representative of the concentrations that would occur at any given location over time.

2.0 Existing Air Quality

2.1 Introduction

The available air quality data at the proposed White Pine Energy Station (WPES) site are provided to establish the background levels against which changes in air quality are evaluated. During the air quality permitting process, the Nevada Division of Environmental Protection—Bureau of Air Pollution Control (NDEP-BAPC) required White Pine Energy Associates (WPEA) to monitor the ambient air at the proposed site location for 1 full year for air pollutants including nitrogen dioxide (NO_2), particulate matter (PM_{10}), and sulfur dioxide (SO_2). Table 1 shows the existing background air pollution levels measured onsite, along with the latest available air quality monitoring information for the vicinity of the proposed site for lead, and ozone (O_3).

TABLE 1
Summary of Measured Ambient Background Concentrations

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)
NO_2	Annual	1.9
O_3	8-hour [a]	145
Lead	Quarterly [b]	0.07
SO_2	Annual	2.7
	24-hour	8.0
	3-hour	42.6
PM_{10}	Annual	10
	24-hour	30

Notes:
[a] Based on most recent 3 years of monitoring at Great Basin National Park.
[b] Based on monitoring at Lehman Cave at Great Basin National Park.

2.2 Air Quality Metrics

The cumulative analysis includes evaluations of the predicted air quality impacts with respect to the metrics described in the following text.

2.2.1 NAAQS

The National Ambient Air Quality Standards (NAAQS) are ambient air quality standards established to protect public health and the environment. Additionally, Nevada Ambient Air Quality Standards in NAC 445B.22097(1), which are equivalent to the National Ambient Air Quality Standards, are applicable. For simplicity, both the Nevada and the National

Ambient Air Quality Standards are referred to as the "NAAQS." The Clean Air Act established the following two types of NAAQS:

- Primary standards that set limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly
- Secondary standards that set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

The NAAQS are the maximum allowable concentrations of "criteria pollutants" in the ambient air (areas external to buildings and accessible to the general public). The criteria pollutants include carbon monoxide (CO), lead, NO_2, PM_{10}, $PM_{2.5}$, O_3, and SO_2. Air quality modeling analyses for demonstrating compliance with the NAAQS take into account the air emissions sources in the area and the background concentration levels existing in the area. In this way, a NAAQS demonstration evaluates pollutant concentrations caused by both existing facilities and planned future facilities in the area. Table 2 lists the NAAQS for each pollutant.

TABLE 2
Listing of the NAAQS

Pollutant	Averaging Period	Primary NAAQS ($\mu g/m^3$)	Secondary NAAQS ($\mu g/m^3$)
CO	8-hour [a]	10,000	—
	1-hour [a]	40,000	—
NO_2	Annual (Arithmetic Mean)	100	same as primary
O_3	8-hour [e]	160	same as primary
Lead	Quarterly Average	1.5	same as primary
PM_{10}	Annual [b]	50	—
	24-hour [a]	150	—
$PM_{2.5}$	Annual [c]	15.0	same as primary
	24-hour [d]	35	—
SO_2	Annual	80	—
	24-hour [a]	365	—
	3-hour [a]	—	1,300

[a] Not to be exceeded more than once per year.
[b] Revoked by EPA in 2006.
[c] Based on 3-year average of weighted annual mean concentrations.
[d] Based on 3-year average of the 98th percentile of 24-hour concentrations.
[e] Based on 3-year average of the 4th-highest daily maximum 8-hour average.

It should be noted that the NAAQS analysis summarized in the April 2007 DEIS is consistent with the EPA's procedures for demonstrating that a source will not cause or contribute to a violation of the NAAQS. By evaluating reasonably anticipated future projects that submitted air permit applications after the date of the air permit application for the WPES, this cumulative impact analysis goes beyond the requirements for demonstrating compliance with the NAAQS. Because additional emissions are evaluated beyond those required for a NAAQS demonstration, the concentrations presented in this cumulative analysis should be considered conservatively high.

2.2.2 PSD Increment Consumption

The primary purpose of EPA's Prevention of Significant Deterioration (PSD) program is to ensure that significant deterioration of air quality does not occur. The air quality standards set forth by the PSD program are known as the PSD increments. A PSD increment is the maximum allowed increase in pollutant concentration above a baseline concentration in a given area. This prevents a source from consuming available air quality right up to the NAAQS. The PSD increments and the NAAQS work together to ensure that air quality is protected in all areas. The changes in pollutant concentration allowed by the PSD increments are much smaller than the NAAQS; therefore, in areas where existing air quality is good, the PSD increments ensure that air pollution levels never approach the NAAQS, which represent the maximum acceptable pollution levels. PSD increments have been established for NO_2, PM_{10}, and SO_2. Applicants applying for a PSD air permit, such as the WPES, are required to demonstrate that their proposed emissions will not cause or contribute to a violation of the PSD increments.

The PSD air permitting program establishes two separate sets of PSD Increments. Class I increments apply to certain areas designated as Class I areas. Class II increments apply elsewhere. A Class III area designation also exists, but no such area has been designated. The Class I areas within 300 kilometers (km) of the Proposed Action are Zion National Park in Southwest Utah and Jarbidge Wilderness Area in Northern Nevada. All other areas are designated as Class II areas. The Class I and Class II PSD increments are listed in Table 3.

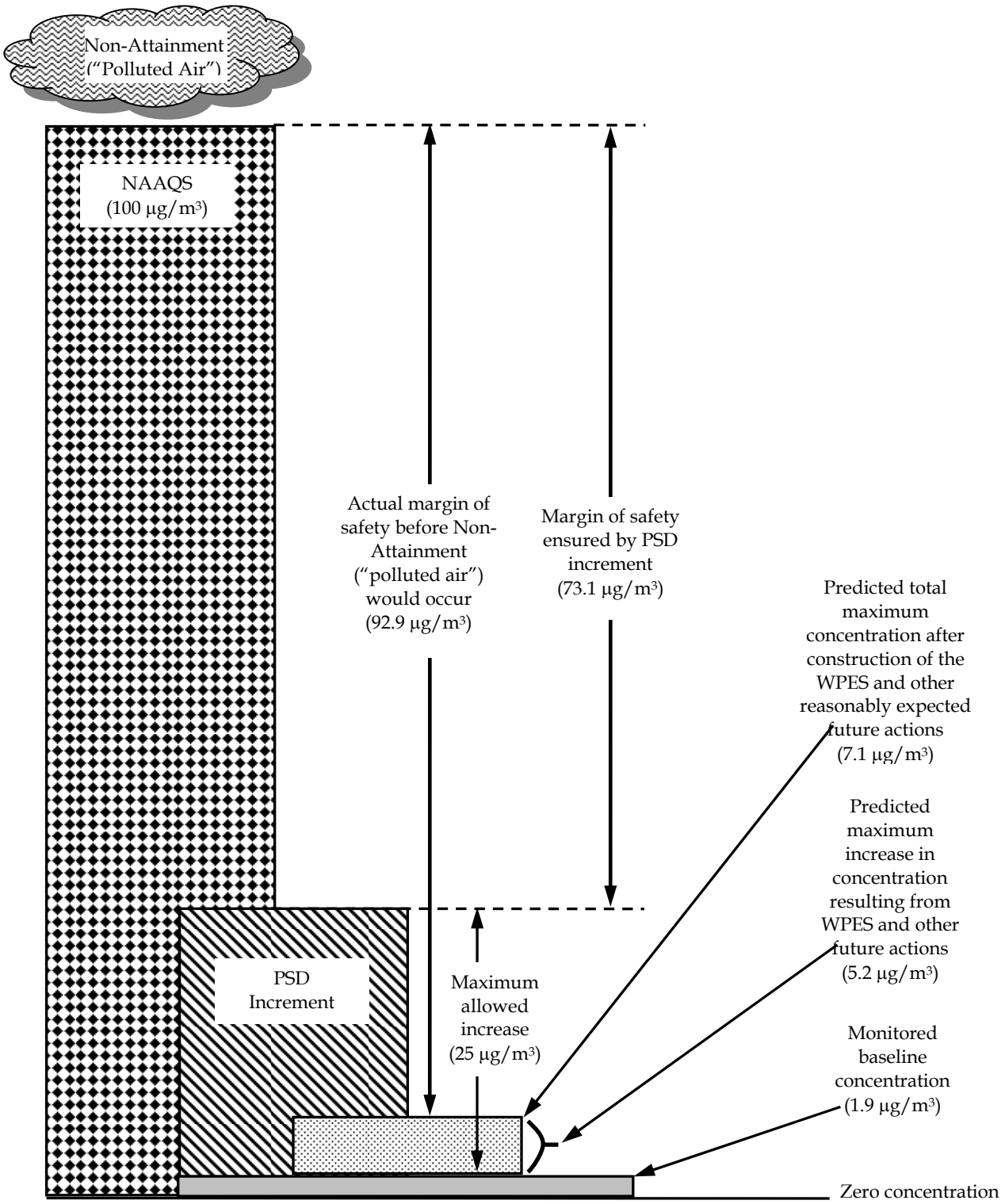
TABLE 3
Listing of PSD Increments

Pollutant	Averaging Period	Class I PSD Increment ($\mu g/m^3$)	Class II PSD Increment ($\mu g/m^3$)
NO_2	Annual	2.5	25
PM_{10}	Annual	4	17
	24-hour*	8	30
SO_2	Annual	2	20
	24-hour*	5	91
	3-hour*	25	512

* Not to be exceeded more than once per year.

The high level of air quality protection offered by the PSD increments can be illustrated by the case of the air quality analysis for NO_2 (see Section 3.0 for additional details). The PSD air permit application for the WPES set the minor source baseline date for NO_2 in the area of the WPES. Therefore, the existing NO_2 concentration at the time WPEA submitted its application is considered the baseline concentration. The NO_2 impacts predicted in the cumulative increment analysis were well below the PSD increment, which is far less than the NAAQS. Thus, total predicted NO_2 concentrations after construction of the WPES are below the maximum allowable concentrations with a wide margin of safety. This is illustrated in Figure 1.

Figure 1 – Cumulative Air Quality Impacts for NO_2



Finally, it should be noted that the PSD Increment analysis summarized in the April 2007 DEIS is consistent with EPA's procedures for demonstrating that a source will not cause or contribute to a violation of a PSD increment. By evaluating reasonably anticipated future projects that submitted air permit applications after the date of the air permit application for the WPES, this cumulative impact analysis goes beyond the requirements for demonstrating compliance with the PSD increments. Because additional emissions are evaluated beyond those required for a PSD increment demonstration, the concentrations presented in this cumulative analysis should be considered conservatively high.

2.2.3 Visibility

Visibility in an area can be affected by natural or human-caused emissions. The major natural contributor is relative humidity or precipitation (rain or show). Air emissions from power plants and other industry, including sulfur oxides, nitrogen compounds, and particulates, have the potential to create visibility obscuration.

While there are no quantitative limits on visibility obscuration, visibility in Class I areas is protected by the PSD air permitting program, in which the Federal Land Managers, in consultation with the permitting agency, determine whether a new source would have an adverse impact on visibility. Guidance on evaluating visibility impacts in Class I areas was developed by the Federal Land Managers' Air Quality Related Values Workgroup (FLAG) and is called the FLAG Phase I report (December 2000). Visibility is also protected in Class II areas (the remaining areas in the region not designated as Class I) by the secondary NAAQS.

2.2.4 Sulfur and Nitrogen Deposition

Sulfur and nitrogen compounds present in the atmosphere can be deposited on the surface during periods of precipitation (wet deposition) or during periods when no precipitation is present (dry deposition). Depending on the rates of deposition and the sensitivity of a given ecosystem, deposition may have no impact, or deposition may have negative environmental impacts. Sulfur and nitrogen deposited in aquatic ecosystems (such as lakes) have the potential to cause acidification in bodies of water that are not sufficiently buffered. Also in aquatic ecosystems, excess nitrogen may cause changes in algal species composition and abundance, resulting in changes to food web dynamics. Nitrogen may cause eutrophication, with loss of water clarity and potential loss of dissolved oxygen. In terrestrial ecosystems, excess nitrogen may affect soil nutrient cycling and plant community structure and function. For example, nitrogen may favor invasive plant species over native plants.

While there are no quantitative limits on sulfur and nitrogen deposition, air quality related values (AQRVs) in Class I areas (including sulfur and nitrogen deposition) are regulated under the PSD air permitting program, in which the Federal Land Managers, in consultation with the permitting agency, determine whether a new source would have an adverse impact on AQRVs.

Finally, EPA's nationwide Acid Rain Program has reduced SO_2 emissions and subsequent sulfur deposition significantly in recent years. The program requires reductions in annual SO_2 emissions by 10 million tons below 1980 levels by establishing a permanent cap on the total amount of SO_2 that may be emitted by electric generating units in the contiguous

United States. As of 1995, SO_2 emissions had been reduced by almost 40 percent below their required level at the affected units nationwide. EPA reports that Acid Rain Program sources have reduced annual SO_2 emissions by 41 percent compared to 1980 levels and 35 percent compared to 1990 levels. Because of the SO_2 emissions cap under the Acid Rain Program, the total allowable SO_2 emissions on a nationwide basis will not increase, even as new sources such as the WPES are constructed.

The following text presents the results of the cumulative air quality analysis. For each type of analysis, a discussion of the analysis methodology is included, along with a discussion of the results.

3.0 Cumulative NAAQS Analysis

The following subsections present an analysis of the air emissions from the Proposed Action, existing sources, and reasonably expected future actions with respect to the NAAQS. It should be noted that there is a difference between the cumulative analysis that was included in the PSD Air Application and the cumulative analysis presented in this report.

A PSD cumulative analysis includes the proposed action and other existing sources, whereas NEPA requires the cumulative impact analysis to include both direct and indirect effects of the Proposed Action. These effects can occur at the same time and place or at later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR 1508.8). In order to comply with the intent of NEPA, it was assumed that the indirect effects would include emissions from sources that submitted air permit applications after submittal of the WPES application. Therefore, the results of the cumulative analysis and the comparison to the NAAQS should be considered conservative.

3.1 Methodology

The available data for the cumulative NAAQS analysis are taken from the PSD air permit application submitted to NDEP-BAPC by the Nevada Power Company for the Ely Energy Center (EEC) in October 2007, along with the air permit application for the WPES. The EEC is a 1,500-megawatt (MW) pulverized coal-fired power plant proposed for construction by Sierra Pacific Resources and the Nevada Power Company. The EEC is proposed to be constructed approximately 30 km south of the WPES. The NAAQS analysis for the EEC presents the worst-case predicted ambient concentrations resulting from modeling with a full year of on-site meteorological data. The cumulative NAAQS analysis presented here uses the monitored background concentration data from the WPES site (see Table 1), which is expected to be representative of existing conditions in the area where impacts due to the WPES would be highest. For CO, O_3, and lead, EPA policy did not require the EEC to conduct a cumulative analysis to demonstrate compliance with the NAAQS. A cumulative analysis was not required because the results of the "facility-only" preliminary modeling were below the PSD significance levels, values below which EPA policy concludes that the source would not be expected to cause or contribute to any violation of the NAAQS or PSD increments. Therefore, for CO and lead, this cumulative analysis sums the worst-case "facility-only" impacts from the WPES and the EEC to obtain an estimate of the total ambient impacts in the area. For O_3, the EEC has been added to the O_3 screening analysis for the WPES to obtain an estimate of the total ambient impacts in the area. Detailed information showing the calculation of each cumulative NAAQS impact is provided in Attachment 1. The O_3 analysis is provided in Attachment 2.

3.1.1 Sources Included in Evaluation

The sources considered in the cumulative NAAQS analysis include the WPES, the EEC, and the other existing emission sources within 150 km of the WPES. One additional source at a distance of 155 kilometers was included to ensure that predicted concentrations were conservatively high. Emission rates for the other existing emission sources were provided by NDEP-BAPC in support of the modeling analysis. A complete list of the emission sources considered in the cumulative NAAQS analysis is included in Attachment 3 of this report.

3.1.2 Analysis Area

The analysis area (the area where the air dispersion model calculated ground-level concentrations at discrete "receptors") was a 50-km by 50-km area encompassing the WPES, the EEC, and the surrounding topography. Additionally, 30 receptors were modeled on surrounding mountain peaks to ensure maximum impacts were identified at these elevated locations.

3.2 Results

The results of the cumulative NAAQS analysis are provided in Table 4. Detailed information showing the calculation of each cumulative NAAQS impact is provided in Attachment 1. The values shown in Table 4 take into account the background concentrations measured at the WPES site over a full year in accordance with EPA guidance.

As shown in Table 4, the WPES and the other cumulative emission sources are not expected to cause or contribute to any violation of the NAAQS. Additionally, it is noted that the maximum cumulative impacts listed above are not representative of the entire analysis area. Rather, these impacts represent the maximum concentration occurring at one receptor over the specified averaging period. Average impacts over the entire analysis area would be lower.

TABLE 4
Comparison of Cumulative Impacts to the NAAQS

Pollutant	Averaging Period	Maximum Impact from WPES ($\mu g/m^3$)[a]	Cumulative Maximum Impact Including Background ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
CO	8-hour	88.8	250 [b]	10,000
	1-hour	433	1,081 [b]	40,000
NO_2	Annual	1.4	7.1	100
O_3	8-hour	--[c]	145	160
Lead	Quarterly	0.0009	0.071 [d]	1.5
PM_{10}	Annual	7.4	19.4 [e]	50 [e]
	24-hour	24.8	61.9 [e]	150
SO_2	Annual	2.0	9.6	80
	24-hour	17.4	42.0	365
	3-hour	88.7	219	1,300

[a] Maximum impacts from the "facility-only" significance modeling analysis for the WPES.

[b] Represents maximum CO concentration from WPES plus maximum CO concentration from EEC. Results are considered conservatively high because maximum WPES and EEC impacts are not paired in time and space. No background concentration data is available. The Nevada Ambient Air Quality Standards also include a 8-hour average CO threshold of 7,000 μg/m3 for sites located at elevations greater than 5,000 feet above mean sea level.

[c] As demonstrated in Attachment 2, the O_3 concentration increases resulting from the WPES and the EEC is expected to be negligible. Therefore, the O_3 concentration is not expected to rise above existing background levels.

[d] Represents maximum lead concentration from the WPES plus maximum lead concentration from the EEC. Also includes maximum measured background concentration. Results reflect a monthly averaging period, which is more conservative than the required quarterly average. Additionally, results are considered conservatively high because maximum WPES and EEC impacts are not paired in time and space.

[e] Although the annual PM_{10} standard was revoked in 2006, the annual results are presented for informational purposes. EPA policy dictates that PM_{10} be evaluated as a surrogate for $PM_{2.5}$ until such time as final new source review rules for $PM_{2.5}$ are promulgated.

4.0 PSD Increment Consumption

The following subsections present an analysis of the air emissions from the Proposed Action and reasonably expected future actions with respect to the PSD increments. It should be noted that the PSD Increment analysis submitted with the PSD air permit application for the WPES and summarized in the April 2007 DEIS was conducted in accordance with EPA guidance and demonstrated that the WPES would not cause or contribute to any violation of a PSD increment. The cumulative increment analysis presented below goes beyond the requirements for a PSD increment analysis by evaluating emissions from sources that submitted air permit applications after submittal of the WPES application. Therefore, the results of the cumulative analysis and the comparison to the PSD increments should be considered conservative.

4.1 Methodology

4.1.1 Class I Areas

In the air quality analysis prepared by WPEA in support of its PSD air permit application, impacts from the WPES triggered the need for a cumulative analysis for SO_2 only; thus, consistent with EPA guidance, a cumulative Class I analysis was required for SO_2 only. However, to ensure that the impacts from existing facilities, the Proposed Action, and reasonably expected future actions are evaluated in this cumulative analysis, the maximum hypothetical worst-case increment consumption is calculated as the sum of the individual increment consumption values reported for NO_x, PM_{10}, and SO_2 for each source included in the evaluation. This methodology is highly conservative because it assumes that all the reported increment consumption for the various facilities occurs at the same location at the same time (whereas increment consumption actually occurs as separate in space and time). Detailed information showing the calculation of each cumulative PSD increment impact is provided in Attachment 1.

4.1.2 Class II Areas

The available data for the cumulative PSD increment analysis is taken from the PSD air permit application submitted to NDEP-BAPC by the Nevada Power Company for the EEC in October 2007. The PSD Increment analysis for the EEC presents the worst-case predicted ambient concentrations of NO_x, PM_{10}, and SO_2 resulting from modeling with a full year of on-site meteorological data.

4.1.3 Sources Included in Evaluation

When modeling to demonstrate compliance with the (PSD) increments, all increment consuming sources in addition to the proposed source must be included in the inventory. All post-baseline sources emitting SO_2, NO_2, or PM-10 are considered to consume increment. To determine whether or not an existing source consumes increment it is necessary to know the applicable baseline dates. There are two types of baseline dates:

1) Major Source Baseline Dates
2) Minor Source Baseline Dates

The Major Source Baseline Dates are fixed dates identified in the 1977 Clean Air Act for each of the three pollutants. These are:

SO_2 and PM_{10}—January 6, 1975

NO_2—February 8, 1988

Emissions associated with a modification at a major stationary source consume increment after this date.

The Minor Source Baseline Date is set by the first completed PSD application received by the Air Quality Division for a particular air control region (for example, Nevada planning areas/Hydrographic Areas).

4.1.3.1 Class I Areas

The sources considered in the cumulative increment analysis include the WPES, the EEC, Toquop, Newmont, IPP3, and Nevco-Sevier. Toquop is the 750-MW coal-fired power plant proposed for construction in Lincoln County, Nevada, by Toquop Energy, LLC, an affiliate of Sithe Global Power, LLC. Newmont is the 200-MW coal-fired power plant being constructed in Eureka County, Nevada, by Newmont Nevada Energy Investment, LLC. IPP3 is the 950-MW (gross) coal-fired unit proposed at the Intermountain Power Project (IPP) site near Delta, Utah. Nevco-Sevier refers to the 270-MW coal-fired unit proposed in Sevier County, Utah, by Sevier Power Company. Further, an inventory of more than 40 existing SO_2 emission sources was developed during the preparation of the PSD air permit application for the WPES. Impacts from these existing sources were included in the cumulative Class I increment analysis to ensure the best available data was used. This inventory of existing sources is included in Attachment 3. Pursuant to the Class I modeling protocol agreed upon by the National Park Service and USDA Forest Service in August 2006, this inventory of existing sources includes all PSD major sources inside the WPES Class I modeling domain and all PSD minor sources inside the WPES Class I modeling domain within 50 km of a Class I receptor. Due to commencing operation prior to the January 6, 1975, major source date, Reid Gardner Units #1 and #2 were excluded. Refer to Attachment 3 of this report for additional information.

4.1.3.2 Class II Areas

The emission sources considered in the cumulative PSD increment analysis include the WPES, the EEC, and other existing emission sources provided by NDEP and the Utah Division of Air Quality (UDAQ) within 150 km of the WPES (including one additional

Nevada source at a distance of 155 km). Modeling the surrounding sources out to 150 km is considered conservative since, pursuant to the Class II modeling protocol approved by NDEP-BAPC during preparation of the PSD application for the WPES, only those sources within 50 km of the radius of impact (i.e., sources within 117 km of the WPES) were required to be included in the analysis. All emissions were assumed to be increment-consuming, that is, none of the sources provided by the agencies were screened out of the modeling inventory due to the baseline dates. A complete list of the cumulative Class II emission inventory sources is included in Attachment 3 of this report.

4.1.4 Analysis Area

4.1.4.1 Class I Areas

Consistent with EPA guidelines and the modeling protocol agreed upon by WPEA, National Park Service, and USDA Forest Service, the analysis area includes all Class I receptors at Zion National Park and Jarbidge Wilderness Area within 300 km of the WPES.

4.1.4.2 Class II Areas

The analysis area (the area where the air dispersion model calculated ground-level concentrations at discrete "receptors") was a 50-km by 50-km area encompassing the WPES, the EEC, and the surrounding topography. Additionally, 30 receptors were modeled on surrounding mountain peaks to ensure maximum impacts were identified at these elevated locations.

4.2 Results

The results of the cumulative PSD increment analysis for the Class I and Class II areas described above are provided in Tables 5 and 6.

As shown in Tables 5 and 6, the WPES and the other cumulative emission sources are not expected to cause or contribute to any violation of the PSD increments. Thus, the area is not expected to experience significant deterioration in air quality, and construction of the WPES, along with construction of the other proposed sources in the region, would allow for future growth in the area. It should also be noted that increment consumption is both spatial and temporal. Each impact listed above is a maximum occurring at one particular place during one particular time; therefore, maximum impacts are not representative of the average air quality over the analysis area. For example, the maximum WPES-only and cumulative PM_{10} impacts occur at the fence lines of the WPES and the EEC, respectively, and these maximums do not overlap (they do not occur at the same place or during the same time period). Other industry locating in the area in the future would not likely be located at the fence lines of the WPES and EEC where concentrations from the new industry would be more likely to overlap with high predicted concentrations from the WPES and the EEC.

TABLE 5
Comparison of Cumulative Impacts to the Class I PSD Increments

Class I Area	Pollutant	Averaging Period	Predicted Impact from WPES ($\mu g/m^3$) [a]	Cumulative Maximum Impact ($\mu g/m^3$) [b]	PSD Increment ($\mu g/m^3$)
Zion	NO_2	Annual	0.002	0.02	2.5
	PM_{10}	Annual	0.0005	0.02	4
		24-hour	0.02	0.31	8
	SO_2	Annual	0.007	0.04	2
		24-hour	0.18	1.34	5
		3-hour	1.11	7.61	25
Jarbidge	NO_2	Annual	0.004	0.01	2.5
	PM_{10}	Annual	0.001	0.02	4
		24-hour	0.04	0.36	8
	SO_2	Annual	0.02	0.03	2
		24-hour	0.44	1.54	5
		3-hour	1.70	4.90	25

[a] Maximum impacts from the "facility-only" modeling analysis for the WPES.

[b] Represents the sum of the individual increment consumption for the sources included in the analysis (see Section 3.1.1 above for a list of these sources).

TABLE 6
Comparison of Cumulative Impacts to the Class II PSD Increments

Pollutant	Averaging Period	Predicted Impact from WPES ($\mu g/m^3$) [a]	Cumulative Maximum Impact ($\mu g/m^3$) [b]	PSD Increment ($\mu g/m^3$)
NO_2	Annual	1.4	5.2	25
PM_{10}	Annual	7.4	9.4	17
	24-hour	24.8	25.8	30
SO_2	Annual	2.0	6.9	20
	24-hour	17.4	27.4	91
	3-hour	88.7	94.4	512

[a] Maximum impacts from the "facility-only" modeling analysis for the WPES.

[b] Represents the sum of the individual increment consumption for the sources included in the analysis (see Section 3.1.1 above for a list of these sources).

5.0 Visibility

The following subsections present an analysis of the predicted visibility obscuration resulting from the Proposed Action and the reasonably expected future actions. A study that was performed by the National Park Service as part of a response to the Ely Energy Center (EEC) Air Quality Permit has also been included below (Section 5.3).

5.1 Methodology

The individual visibility analyses that were conducted for the Proposed Action and the reasonably expected future actions pursuant to their respective PSD permitting processes represent the best available data for assessing cumulative visibility impacts in the area. The predicted visibility impacts for the various sources are summarized in Section 5.2. Considered collectively, these impacts provide an indication of the visibility impacts that would be expected in the region after construction of the Proposed Action and the reasonably expected future actions.

5.1.1 Sources Included in Evaluation

The sources considered in the evaluation are the WPES, the EEC, Toquop, Newmont, IPP3, and Nevco-Sevier.

5.1.2 Analysis Area

The visibility analysis for the WPES included all Class I receptors at Zion and Jarbidge within 300 km of the WPES. The visibility results listed for the other reasonably expected future actions may apply to additional receptors at Zion greater than 300 km away from the WPES. Additionally, the best available data is provided for Ruby Lake National Wildlife Refuge (Ruby Lake) and Great Basin National Park (Great Basin), which were identified as areas of interest by National Park Service during preparation of the PSD air permit application for the WPES.

5.2 Results

Tables 7, 8, 9, and 10 show the visibility impacts predicted for the Proposed Action and each of the reasonably expected future actions. The predicted visibility impacts are compared against the thresholds of 5 percent (a “just noticeable” change in most landscapes) and 10 percent (a “small but perceptible” change under many conditions). It should be noted that the changes in visibility are calculated relative to estimated natural background conditions. Changes in visibility relative to current levels would actually be lower than presented in the tables because these areas currently experience levels of human-caused visibility impairment on certain days and because the natural background conditions do not include the visibility impacts of wildfire.

TABLE 7

Predicted Visibility Impacts at Jarbidge Wilderness Area

Area	Reasonably Expected Future Actions	Number of Days >5%	Number of Days >10%	Notes
Jarbidge	WPES	15	8	Worst-case year: 2001
	EEC	16	7	Worst-case year: 2004
	Toquop	--	--	N/A: >300 km away
	Newmont	0	0	Worst-case year: 1990
	IPP3	--	--	N/A: >300 km away
	Nevco-Sevier	--	--	N/A: >300 km away

TABLE 8

Predicted Visibility Impacts at Zion National Park

Area	Reasonably Expected Future Actions	Number of Days >5%	Number of Days >10%	Notes
Zion	WPES	2	1	Worst-case year: 1996
	EEC	7	3	Worst-case year: 2004
	Toquop	0	0	Worst-case year: 2003
	Newmont	--	--	N/A: >300 km away
	IPP3	0	0	Modeled year: 1996 (only year modeled)
	Nevco-Sevier	0	0	Modeled year: 1999 (only year modeled)

TABLE 9

Predicted Visibility Impacts at Great Basin National Park

Area	Reasonably Expected Future Actions	Number of Days >5%	Number of Days >10%	Notes
Great Basin	WPES	52	22	Worst-case year: 2002
	EEC	82	45	Worst-case year: 2002
	Toquop	--	--	N/A: not included in Toquop PSD app
	Newmont	--	--	N/A: not included in Newmont PSD app
	IPP3	1	0	Modeled year: 1996 (only year modeled)
	Nevco-Sevier	--	--	N/A: not included in N-S PSD app

TABLE 10
Predicted Visibility Impacts at Ruby Lake National Wildlife Refuge

Area	Reasonably Expected Future Actions	Number of Days >5%	Number of Days >10%	Notes
Ruby Lake	WPES	11	4	Worst-case year: 2001
	EEC	22	16	Worst-case year: 2004
	Toquop	--	--	N/A: not included in Toquop PSD app
	Newmont	--	--	N/A: not included in Newmont PSD app
	IPP3	--	--	N/A: not included in IPP3 PSD app
	Nevco-Sevier	--	--	N/A: >300 km away

The tables above provide an indication of the visibility impacts that are predicted for each area associated with each emissions source. The visibility impacts listed above reflect the "worst-case year" among the available years of modeling results for each facility, where the worst-case year is considered to be the year with the highest number of predicted days with impacts above 10 percent. The predicted visibility impacts on the various areas are not necessarily additive because the values shown are worst-case values (which occur at different locations and during different days). However, some plume overlap and resulting visibility impacts could possibly occur, depending on the meteorology in the region for a given day or series of days.

The visibility impacts presented above should be considered as conservative estimates because of the presence of natural visibility obscuration overlapping with the modeled visibility impacts on certain days. Natural visibility obscuration is associated with periods of rainfall and snow. During such periods, the model may predict visibility impairment from the modeled human sources that would not actually be observable at the modeled location because of the natural impairment resulting from the precipitation.

For each analysis area, if it is assumed that the days of predicted perceptible visibility changes associated with each source did not overlap (that is, each day with a perceptible visibility change modeled for any source contributes one day with a perceptible visibility change to the cumulative evaluation), which is an extremely conservative assumption (because the weather conditions that would maximize visibility impacts from some sources would cause impacts from other sources to be nonexistent, and because the "worst case year" for the various sources would likely be different years), and assuming it would not be raining or snowing on any of the days of predicted visibility impacts (also very conservative), there could be "just noticeable" or perceptible cumulative visibility impacts on the various receptors as follows: Jarbidge Wilderness Area—31 out of 365 days; Zion National Park—9 out of 365 days; Great Basin National Park—135 out of 365 days; Ruby Lake National Wildlife Refuge—33 out of 365 days. Due to the highly conservative nature of the assumptions used for this assessment, the actual number of days when perceptible cumulative visibility impacts would occur would be considerably lower than these figures.

Because there are no quantitative limits on visibility impacts, no regulatory thresholds are available for direct comparison with the predicted visibility impacts; however, the secondary NAAQS are set to protect against decreased visibility. As discussed in Section 3.2, the cumulative impacts are not expected to cause or contribute to any exceedance of the NAAQS; therefore, impacts from the cumulative emission sources are less than the applicable quantitative limits established to protect against decreased visibility.

5.3 National Park Service Study

During the recent PSD air permit public comment period for the EEC (another proposed PC-fired power generation facility in White Pine County), the National Park Service, as part of their comments, conducted a visibility analysis estimating the combined visibility impacts that would result from the WPES and the EEC when considered together. The National Park Service submitted the results of this analysis to NDEP-BAPC (January 9, 2008) and made the results available to the public at http://www.nps.gov/grba/parknews (under *Ely Energy Center Comment Letter & Impact Technical Report* and *Ely Energy Center haze impacts black background)*. Although the National Park Service combined (WPES + EEC) visibility analysis utilized an emissions speciation different from the one agreed upon by the Park Service and WPEA during the air permitting process for the WPES, the results of the National Park Service analysis are comparable to the cumulative visibility results presented in the previous text and are summarized in Table 11 below.

TABLE 11
National Park Service Predicted Visibility Impacts Due to the EEC and WPES Combined

National Park:	**Great Basin**		**Zion**	
Year Modeled:	**2002**	**2004**	**2002**	**2004**
Number of Days >5%	133	105	17	12
Number of Days >10%	85	64	5	8
Maximum % Change	103%	197%	48%	28%

Other tables of data and analyses included in the National Park Service comments on the draft air permit for the EEC[1] are applicable to the EEC alone (that is, the Park Service did not analyze the WPES except in the combined visibility section of the EEC comment letter).

Although the National Park Service states in their comment that *"The predicted impacts on visibility at Great Basin again fall well beyond the range of previous adverse impact determinations made by the FLM, and are within the range of impacts at Zion NP that has previously been considered adverse when attributed to a single source."*, the FLAG guidance is for a Class I areas. Since Great Basin Nation Park is not a Class I area this standard is not applicable.

[1] For example, a photo analysis demonstrating maximum visibility impacts for the EEC, see http://www.nps.gov/grba/parknews/upload/Ely%20Energy%20Center%20haze%20impacts%20black%20background.pdf

6.0 Sulfur and Nitrogen Deposition

The following subsections present an analysis of the predicted sulfur and nitrogen deposition resulting from the Proposed Action and the reasonably expected future actions.

6.1 Methodology

The cumulative deposition analysis considers the monitored levels of deposition that have been measured resulting from existing sources, along with the deposition increase that would be predicted because of the Proposed Action and reasonably expected future actions. The existing monitored levels are shown in Table 12.

TABLE 12
Existing Measured Deposition Levels

Area	Monitored Sulfur Deposition (kg/ha/yr)	Monitored Nitrogen Deposition (kg/ha/yr)	Year Corresponding to Maximum
Jarbidge [a]	0.91	2.0	1993
Zion [b]	2.4	4.7	2001
Great Basin [c]	0.71	2.2	2002
Ruby Lake [d]	0.71	2.2	2002

[a] Per the USDA Forest Service, EPA's CASTNET deposition data from Saval Ranch is representative of Jarbidge. Wet and dry deposition data are available from this site for the years 1990 through 1993.

[b] Per the National Park Service, wet deposition at Bryce Canyon is representative of Zion; dry deposition at Canyonlands National Park is representative of Zion. EPA's CASTNET deposition data is available for these two sites for the years 1996 and 2001 through 2004.

[c] Deposition from EPA's CASTNET deposition monitoring site at Great Basin. Wet and dry deposition is available for the years 1996 through 1998, 2001, 2002, and 2004.

[d] Deposition levels at Great Basin are assumed representative of Ruby Lake.

In the deposition analysis conducted as part of the PSD air permit application for the WPES, only the WPES was required to be included. No single modeling assessment has been conducted that would predict the combined deposition impacts of the Proposed Action and the reasonably expected future actions. However, because of the annual averaging period, the individual predicted deposition levels for the Proposed Action and the reasonably expected future actions can be added together to obtain a reasonable estimate of the deposition increase above current levels that would result from construction of the Proposed Action and the reasonably expected future actions. Calculations of the predicted increases in deposition because of the Proposed Action and reasonably expected future actions are shown in Attachment 1 of this report.

Once the current and future deposition levels are determined, the deposition analysis can proceed based on the site-specific information available for each area. The deposition

analyses rely on published information as available (for Zion) and a conservative, empirically-based screening method (for Jarbidge, Great Basin, and Ruby Lake).

A report by the National Park Service provides information about the sensitivity of Zion to air pollution and acid deposition (Binkley et al., 1997). According to the National Park Service, no signs of air pollution injury have been reported for vegetation in or near Zion. Additionally, the National Park Service states the following with regard to acid deposition at Zion:

> The major water resource in Zion National Park is the Virgin River, cutting through the Zion Narrows. The Virgin River has substantial acid buffering capacity and is unlikely to be affected by acid deposition. The Park also has important freshwater habitats including springs, seeps, creeks and ponds that are relatively undisturbed, and which provide habitat islands for aquatic insects. The southeast side of the Park contains exposed bedrock, with rain-filled depressions called waterpockets, potholes or tinajas. These small water bodies vary in depth from several centimeters to 5 meters, and are usually ephemeral. Gladney et al. (1993) measured [acid neutralization capacities] ANCs as low as 220 μeq/l in potholes in Utah, indicating a moderately high buffering capacity of some of these water bodies. However, this lower bound of ANC is still not at the concern level for effects of acid deposition; water quality monitoring would be needed to determine the seasonal fluctuations in pothole chemistry. Given the similarity of geology between Zion and Capitol Reef National Park (Chapter 8), we expect that the aquatic systems are similarly well-buffered with respect to acid deposition (Binkley et al. 1997).

Based on the information from National Park Service in the previous text, waters at Zion are well-buffered and are not expected to be affected by acid deposition. Therefore, cumulative acid deposition is not expected to be a concern at Zion.

For the areas where site-specific agency analysis was not available (Jarbidge, Great Basin, and Ruby Lake), a conservative screening procedure was used to evaluate the potential for adverse environmental impacts because of acid deposition. The U.S. Forest Service research paper, "Estimating Lake Susceptibility to Acidification Due to Acid Deposition" (Nichols, 1990) (the Paper), provides a procedure for predicting acid deposition effects on aquatic ecosystems. To utilize this procedure, the sensitive aquatic ecosystems must be identified, and the ANC for each sensitive aquatic ecosystem is quantified. The ANC data, along with the total deposition for the area, is used to determine whether the deposition levels in question would be safe for the area (safe levels are considered those that would not lower the ANC below 25 microequivalents per liter, μeq/L, creating the potential for acidification concerns). The Paper uses empirical data for high-elevation western lakes to construct "safe lines" on a plot of deposition vs. ion concentration. Per the Paper, site-specific deposition/ANC data points that fall on the right side of the "safe lines" are not expected to be adversely affected by the corresponding deposition levels.

Aquatic ecosystems with an ANC of 50 μeq/L or less are those generally considered potentially sensitive to the effects of acid deposition. Table 13 shows the baseline measured ANC values for aquatic ecosystems analyzed at Jarbidge, Great Basin, and Ruby Lake.

TABLE 13
Area-Specific Aquatic Ecosystems Analyzed

Area	Aquatic Ecosystem Analyzed	Baseline Acid Neutralization Capacity (μeq/L)
Jarbidge	Emerald Lake [a]	342
Great Basin	Baker Lake [b]	73
Ruby Lake	South Marsh [c]	6,594

[a] High-elevation lake at Jarbidge with documented trout population. Acid neutralization capacity value based on alkalinity measured by the Nevada Division of Wildlife.

[b] Aquatic ecosystem of concern noted by National Park Service. Acid neutralization capacity provided by National Park Service.

[c] Aquatic ecosystem of concern noted by USDA Forest Service. Acid neutralization capacity determined by recent sampling.

As shown in Table 12, none of the aquatic ecosystems being analyzed had a baseline ANC in the range that would be considered potentially sensitive to acid deposition effects (ANC less than or equal to 50 μeq/L); thus, a more detailed acid deposition analysis would not typically be required in order to demonstrate that the predicted impacts would not be harmful. However, to ensure a thorough and conservative evaluation of the potential impacts the screening procedure outlined in the Paper was used to evaluate each ecosystem listed in Table 13. Detailed information showing the screening procedure for each ecosystem is provided in Attachment 4.

6.1.1 Sources Included in Evaluation

The sources considered in the cumulative deposition analysis include all existing sources (through the monitored background levels), along with the sources expected to increase deposition in the region, including the WPES, the EEC, Toquop, Newmont, IPP3, and Nevco-Sevier.

6.1.2 Analysis Area

The deposition analysis for the WPES included all Class I receptors at Zion and Jarbidge within 300 km of the WPES. The deposition increases associated with the other reasonably expected future actions may apply to additional receptors at Zion greater than 300 km away from the WPES. Additionally, the deposition analysis also includes Ruby Lake and Great Basin, which were identified as areas of interest by National Park Service during preparation of WPEA's PSD air permit application.

6.2 Results

The results of the cumulative sulfur deposition analysis are provided in Table 14. Aquatic ecosystems at Zion were determined not to be sensitive to the effects of acid deposition based on information published by the National Park Service (see Section 6.1). For aquatic ecosystems at Jarbidge, Great Basin, and Ruby Lake, the deposition analysis was conducted

in accordance with the USDA Forest Service screening procedure discussed in Section 6.1. The details of the screening analyses are presented in Attachment 4 of this report.

TABLE 14
Summary of Cumulative Sulfur Deposition Analysis

Area	Maximum Monitored Deposition (kg/ha/yr)	Modeled Deposition Increase (kg/ha/yr)	Total Predicted Deposition (kg/ha/yr)	Is Deposition Expected to Cause Adverse Impact? *
Jarbidge	0.91	0.03	0.94	No
Zion	2.72	0.02	2.74	No
Great Basin	0.77	0.14	0.91	No
Ruby Lake	0.71	0.03	0.74	No

* Based on available data and screening analyses. See Section 6.1 and Attachment 4.

As shown in Table 14, the predicted increases in sulfur deposition are considered safe, that is, the predicted deposition levels are not expected to have any adverse effects on aquatic ecosystems at any of the areas. The results of the cumulative nitrogen deposition analysis are provided in Table 15.

TABLE 15
Summary of Cumulative Nitrogen Deposition Analysis

Area	Maximum Monitored Deposition (kg/ha/yr)	Modeled Deposition Increase (kg/ha/yr)	Total Predicted Deposition (kg/ha/yr)	Percent Increase Over Existing	Is Deposition Expected to Cause Adverse Impact? *
Jarbidge	2.0	0.008	2.01	0.45	No
Zion	5.8	0.008	5.81	0.14	No
Great Basin	2.1	0.06	2.16	3.33	No
Ruby Lake	2.2	0.01	2.21	0.45	No

* Based on available data and screening analyses. See Section 6.1 and Attachment 4.

As shown in Table 15, the predicted increases in nitrogen deposition are small percentages of the monitored background levels. Predicted increases in cumulative nitrogen deposition are as follows compared to the monitored background levels: Jarbidge Wilderness Area, 0.45 percent; Zion National Park, 0.14 percent; Great Basin National Park, 3.33 percent; and Ruby Lake National Wildlife Refuge, 2.21 percent. No existing adverse effects associated with nitrogen deposition have been noted at any of the areas analyzed.

Adverse environmental conditions can result when terrestrial nitrogen levels become saturated and nitrogen runoff to surface waters occurs. As discussed in Section 2.2.4 above, conditions associated with excess nitrogen in aquatic ecosystems include changes in algal species composition and abundance and resulting in changes to food web dynamics.

Eutrophication, with loss of water clarity and potential loss of dissolved oxygen, is also associated with excess nitrogen in aquatic ecosystems. However, based on the available information (Fenn et al., 1998; Fenn et al., 2003), none of the potentially-sensitive areas studied are nitrogen-saturated, and the small incremental predicted increases in deposition would not be expected to create saturation conditions since the predicted deposition increases are within the year-to-year variability in the monitored deposition data. Thus, the adverse effects to aquatic ecosystems discussed in the previous text would not be expected to result.

As discussed in Section 2.2.4 above, in terrestrial ecosystems, excess nitrogen may affect soil nutrient cycling and plant community structure and function. For example, nitrogen may favor invasive plant species over native plants. However, based on the available information (Fenn et al., 1998; Fenn et al., 2003), none of the potentially-sensitive areas studied are nitrogen-saturated, and the small incremental predicted increases in deposition would not be expected to create saturation conditions since the predicted deposition increases are within the year-to-year variability in the monitored deposition data. Thus, excess nitrogen levels in terrestrial ecosystems with the associated adverse effects to aquatic ecosystems discussed in the previous text would not be expected to result.

Based on the above information, the predicted cumulative increases in nitrogen deposition are not expected to have any adverse effects on aquatic or terrestrial ecosystems.

7.0 Mercury

7.1 Background

As a naturally occurring element, mercury is found in the earth's crust. Mercury can be released to the environment through any mechanism that exposes crustal material to the surface or through geothermal activities such as volcanoes and hot springs. Such mechanisms are both natural and anthropogenic (human-caused) in origin and may include mercury mining and processing (primary mercury production), mining of other metals where mercury is produced as a byproduct (secondary mercury production), coal combustion, forest fires, soil or rock weathering, soil/air interface, and ocean/air interface. Additionally, mercury may be released to the environment through spills of mercury-containing chemicals or through improper disposal of mercury-containing equipment such as thermometers or mercury switches.

Mercury emissions and subsequent deposition rates are a global issue. Approximately one-third of global mercury emissions are natural in origin (for example, from oceans or volcanoes) and are not caused by human activities. EPA estimates that about one-third of U.S. emissions are deposited within the contiguous U.S., and the remainder enters the global cycle (EPA, 2007a). Therefore, mercury deposited in a given area may originate from natural sources, local anthropogenic sources, or other anthropogenic sources comprising the global mercury emissions pool.

Mercury concentrations in the ambient air are very low and are not considered a direct concern (EPA, 2000). The primary concern with mercury is that mercury deposited in water bodies can be converted to a toxic form called methylmercury, which can bioaccumulate in the food chain (particularly in predator fish) and create health concerns for humans and animals. Bioaccumulation of methylmercury in the food chain depends on a myriad of factors, including the amount of mercury deposited from the atmosphere, local non-air releases of mercury, naturally occurring mercury in soils, the physical, biological, and chemical properties of different waterbodies, and the age, size and types of food the predator species consume (EPA, 2007b). Because of the ecosystem-specific nature of mercury fate and transport and the large margins of error inherent in predicting the relevant parameters, it is not possible to accurately quantify the increase in methylmercury bioaccumulation that would result from increased mercury emissions from a given new source or a group of new sources.

According to EPA, methylmercury presents health concerns for fetuses, infants, and children. The primary health effect of methylmercury is impaired neurological development. Methylmercury exposure in the womb, which can result from a mother's consumption of fish or shellfish that contain methylmercury, can adversely affect a baby's growing brain and nervous system. Impacts on cognitive thinking, memory, attention, language, and fine-motor and visual spatial skills have been seen in children exposed to methylmercury in the womb. Recent human biological monitoring by the Centers for Disease Control and Prevention in 1999 and 2000 shows that most people have blood

mercury levels below a level associated with possible health effects. More recent data from the CDC support this general finding (EPA, 2007c).

7.2 Mercury Emissions Trends in Nevada

Mercury is geologically concentrated in regions associated with volcanic activity, high heat flow, and plate tectonic boundaries, and is commonly found associated with gold deposits (Jones and Miller, 2005). All of these conditions exist in Nevada.

Nevada is home to a broad "mercury belt" that consists of numerous mercury deposits scattered throughout several tens of thousands of square kilometers, primarily in western and central Nevada (Gray et al., 1999). Because of the presence of this mercury belt, mercury mining in Nevada has historically been an important industry in the state. The last primary mercury mine (mine where mercury is produced as the primary product) in the U.S. was the McDermitt mine in Northern Nevada, which shut down in 1990 after providing 448 metric tons of mercury in that year (Jones and Miller, 2005). The dominant environmental concern associated with these mercury mines is inorganic mercury in cinnabar ore and elemental mercury remaining at the mine sites that may potentially erode into streams and rivers (Gray et al., 1999).

Additionally, mercury has long been associated with gold mining, and in 2003, more than 80 percent of gold production in the U.S. came from Nevada mines. Historically, mercury was used to extract gold from ore. Currently, mercury is a byproduct of gold production and is sold to companies who may further purify the mercury for sale to customers. Mercury may be released to the environment from several points in the gold production process, such as mining, roasting, activated carbon regeneration, retorting, waste rock dumps, and tailings facilities (Jones and Miller, 2005).

Mining companies in Nevada were first required to report mercury emissions to EPA in 1999. Motivated by the high reported emission rates, EPA Region 9, NDEP, and Nevada mining companies worked together to implement a Voluntary Mercury Reduction Program (VMRP), which ultimately reduced mercury emissions from the mines from a baseline of over 21,000 pounds per year in 2001 to less than 3,800 pounds per year in 2004 (NDEP, 2005). Further statewide mercury emissions reductions are expected in the future due to multiple new regulations in effect, including Nevada's Mercury Rule (CAMR) program, the federal CAMR program (mercury emissions standards under 40 CFR Part 60, Subpart Da), and the Nevada Mercury Air Emissions Control Program (NMCP) for the mining industry. The NMCP will require additional controls and reporting for Nevada's mining industry.

7.3 Existing Mercury Levels in Nevada

No ambient air monitoring for mercury has been conducted at the proposed WPES project site or in White Pine County. Mercury concentrations and dry deposition rates at Gibbs Ranch (approximately 215 kilometers north of the proposed WPES site) were measured in a recent study and are summarized in Table 16.

TABLE 16

Mercury Concentrations and Dry Deposition Rates at Gibbs Ranch (24-Hour Averaging Period) [a]

Month	Elemental Hg (µg/m3)	Oxidized Hg (µg/m3)	Particulate Hg (µg/m3)	Total Hg (µg/m3)	Dry Hg Deposition on Soil (kg/ha/yr)
March 05	0.0022	0.002	0.027	0.031	0.000002
July 05	0.0035	0.012	0.012	0.028	Not measured
August 05	0.0024	0.009	0.012	0.023	-0.000041[b]
October 05	0.0020	0.004	0.003	0.009	0.000019
Maximum:	0.0035	0.012	0.027	0.031	0.000019

[a] Lyman et al., 2007

[b] For August 2005, the measured direction of mercury flux was from the soil to the air.

The Nevada Division of Wildlife (NDOW) monitors for mercury in fish tissue around the state. The most recent available NDOW fish tissue monitoring results for water bodies in White Pine County are provided in Table 17. NDOW's monthly fish consumption limits based on methylmercury content are provided in Table 18.

TABLE 17

Mercury Fish Tissue Test Results from NDOW for 2006*

Water Body	Fish Species	Methylmercury Content (ppm wet)
Bassett Lake	Northern Pike	0.03
	Largemouth Bass	0.02
	Carp	0.03
Comins Lake	Northern Pike	1.20
	Largemouth Bass	1.25
	Rainbow Trout	0.85
Snake Creek	Brown Trout	0.08

Source: NDOW, 2007b

TABLE 18
NDOW Suggested Monthly Fish Consumption Limits*

Methylmercury in Fish Tissue (ppm wet)	Fish Consumption Limit (meals per month)
0 - 0.029	Unrestricted (>16)
>0.029 - 0.059	16
>0.059 - 0.078	12
>0.078 - 0.12	8
>0.12 - 0.23	4
>0.23 - 0.31	3
>0.31 - 0.47	2
>0.47 - 0.94	1
>0.94 - 1.9	0.5
>1.9	None (<0.5)

* Source: NDOW, 2007a

As shown in the tables above, methylmercury levels in fish tissue in White Pine County range from low concentrations corresponding to a suggested consumption limit of 16 or more meals per month for Bassett Lake to comparatively high concentrations corresponding to a suggested consumption limit of 0.5 meal per month for Comins Lake. The relatively high methylmercury levels in fish at Comins Lake have been preliminarily determined by NDOW, EPA, and the Nevada Division of Environmental Protection (NDEP) to be the result of mercury contamination from two abandoned mining sites in the lake's drainage area. An EPA report on this issue is expected to be published in the near future.

7.4 Increases in Mercury Levels due to the WPES

Operation of the WPES is expected to increase the amount of mercury present in the air and water globally by a small, incremental amount.

7.4.1 Ambient Mercury

Assuming that the ambient mercury concentrations measured at Gibbs Ranch (see Table 16) are generally representative of background mercury concentrations in the region, Table 19 below shows the maximum predicted mercury concentration that would result from operation of the WPES.

TABLE 19
Predicted Increase in Ambient Mercury Concentration due to the WPES (Annual Averaging Period)

Existing Total Hg Concentration (µg/m3)[a]	Maximum Hg Increase Due to the WPES (µg/m3)[b]	% Increase Predicted Due to the WPES	Predicted Total Hg Concentration (µg/m3)	EPA Prioritized Chronic Dose-Response Level (µg/m3)[b]
0.031	0.000152	0.5%	0.0312	0.3

[a] Maximum total mercury measured at Gibbs Ranch. See Table 15.
[b] Refer to Table 4.6-8 of the FEIS.

As shown in Table 19, the WPES is predicted to increase the mercury concentration in the ambient air by a maximum of 0.5 percent. The predicted total mercury concentration is still well below EPA's chronic exposure threshold. Additionally, the maximum mercury concentration increase due to the WPES would occur approximately 1 kilometer from the WPES fenceline, to the north of the facility, based on the annual averaging period modeling results from the WPES PSD air permit application.

These results can be extrapolated to provide a conservative estimate of cumulative ambient mercury impacts. Although the other proposed power plants in the region (the EEC, Toquop, Newmont, IPP3, and Nevco-Sevier) did not publish mercury modeling results for the vicinity of the WPES, a conservative estimate of the maximum cumulative increase in mercury concentrations could be derived by assuming that each of the cumulative facilities would increase mercury concentrations by the same amount as the WPES and that the maximum mercury concentrations from all the facilities would coincide at the point of maximum concentration for the WPES. The maximum total concentration would be calculated as follows:

$$\begin{aligned}\text{Cumulative Hg} &= \text{Existing Hg} + \text{WPES Hg} + \text{Cumulative Hg}\\ &= \text{Existing Hg} + \text{WPES Hg} + (5\ \text{Other Facilities}) \times (\text{WPES Hg})\\ &= 0.031\ \mu g/m^3 + 0.000152\ \mu g/m^3 + (5) \times (0.000152\ \mu g/m^3)\\ &= 0.0319\ \mu g/m^3\end{aligned}$$

Therefore, the maximum cumulative concentration (0.0319 $\mu g/m^3$) would be well below EPA's chronic exposure threshold (0.30 $\mu g/m^3$). Additionally, the maximum cumulative mercury impact (0.0319 $\mu g/m^3$) would be only 3% higher than the existing ambient background mercury concentration (0.0319 $\mu g/m^3$). As noted above, this assumes the ambient mercury concentrations measured at Gibbs Ranch (see Table 15) are representative of average background concentrations in the region.

7.4.2 Mercury Deposition and Bioaccumulation

Based on the currently available methods, increases in mercury deposition and methylmercury bioaccumulation resulting from a single source or a group of individual sources cannot be predicted accurately. For example, mercury deposition rates depend on several factors, including, but not limited to, the speciation of mercury in the atmosphere (the relative proportions of the elemental, oxidized, or particulate forms), the land cover type (for example, water, soil, or vegetation type), terrain, and meteorology (for example, global/regional wind patterns, temperatures, and precipitation). In a recent study of eight mercury models, wet and dry deposition rates were shown to diverge from the actual measured values by +/- 45 percent and +/- 50 percent, respectively (Ryaboshapko et al., 2007). Therefore, current models would not be expected to reliably quantify the increase in deposition rates that would occur because of the small incremental increases in mercury concentration resulting from operation of the WPES or the other cumulative sources.

Even if it were possible to accurately predict the incremental increases in mercury deposition rates, the complex and ecosystem-specific nature of methylmercury formation and bioaccumulation would not allow accurate quantification of the corresponding incremental increases in methylmercury bioaccumulation. As discussed above, bioaccumulation of methylmercury in the food chain depends on a myriad of factors,

including the amount of mercury deposited from the atmosphere, local non-air releases of mercury, naturally occurring mercury in soils, the physical, biological, and chemical properties of different waterbodies, and the age, size and types of food the predator species consume. The margin of uncertainty in predicted bioaccumulation rates that would result from attempting to estimate these various ecosystem-specific parameters would be expected to preclude sufficient resolution to differentiate the effects of small incremental increases in ambient mercury concentration (EPA, 2001). Thus, current models and available methods would not be expected to reliably quantify the increase in methylmercury bioaccumulation that would occur because of the small incremental increases in mercury concentration resulting from operation of the WPES or the other cumulative sources.

Notwithstanding the difficulties noted above in predicting mercury deposition and bioaccumulation rates, it could conservatively be assumed that these parameters would increase proportionally with increases in mercury concentration in the ambient air. That is, for the location of hypothetical peak-case ambient mercury concentration discussed above (the location just to the north of the WPES fenceline where ambient mercury concentrations from the WPES and all the other cumulative sources are assumed to overlap), mercury deposition and bioaccumulation rates could increase by up to 3 percent above the existing values. Note that this estimate is highly conservative, considering the speciation of the mercury emitted from the WPES, the depositional mechanisms for the emitted mercury, and the chemical and biological transformations required for the methylation of mercury in the environment. The actual increases in deposition and subsequent bioaccumulation would be expected to be significantly less than 3 percent even if ambient mercury concentrations were to increase by 3 percent (which is considered a hypothetical peak-case assumption). Because a 3 percent increase in ambient mercury concentrations is a highly conservative estimate (mercury concentrations due to the various facilities would not actually overlap at the locations of maximum concentration), actual increases in deposition and bioaccumulation would be expected to be much less than 3 percent.

8.0 Works Cited

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Attachment 1

Calculation of Cumulative Impacts

Analysis: NAAQS
Pollutant: CO

Averaging Period	Measured Background ($\mu g/m^3$)	Facilities Modeled	Modeled Impact ($\mu g/m^3$)	Source of Modeled Impact Information	Total Impact ($\mu g/m^3$)	Regulatory Limit ($\mu g/m^3$)	Notes
1-hour	Not measured	WPES	433	WPEA PSD significance modeling report	1,081	40,000	Total impact includes WPEA and EEC only (no other information available). Results are conservative since impacts are not paired in time or space.
		Ely Energy Center	648	EEC PSD significance modeling report			
8-hour	Not measured	WPES	88.8	WPEA PSD significance modeling report	250	10,000	Total impact includes WPEA and EEC only. Results are conservative since impacts are not paired in time or space.
		Ely Energy Center	161	EEC PSD significance modeling report			

Analysis: NAAQS
Pollutant: Pb

Averaging Period	Measured Background ($\mu g/m^3$)	Facilities Modeled	Modeled Impact ($\mu g/m^3$)	Source of Modeled Impact Information	Total Impact ($\mu g/m^3$)	Regulatory Limit ($\mu g/m^3$)	Notes
Quarterly	0.07	WPES	0.0009	WPEA PSD significance modeling report	0.071	1.5	Total impact includes WPEA, EEC, and background. Background value is maximum measured at Lehman Cave from 1977 to 1987. Results are conservative since impacts are not paired in time or space.
		Ely Energy Center	0.00059	EEC PSD significance modeling report			

Analysis: **NAAQS**
Pollutant: **NO2**

Averaging Period	Measured Background ($\mu g/m^3$)	Facilities Modeled	Modeled Impact ($\mu g/m^3$)	Source of Modeled Impact Information	Total Impact ($\mu g/m^3$)	Regulatory Limit ($\mu g/m^3$)	Notes
Annual	1.9	WPES, EEC, and other surrounding sources	5.2	EEC PSD full impacts modeling report	7.1	100	Background from on-site monitoring at the WPES site.

Analysis: NAAQS
Pollutant: PM10

Averaging Period	Measured Background ($\mu g/m^3$)	Facilities Modeled	Modeled Impact ($\mu g/m^3$)	Source of Modeled Impact Information	Total Impact ($\mu g/m^3$)	Regulatory Limit ($\mu g/m^3$)	Notes
24-hour	30	WPES, EEC, and other surrounding sources	31.9	EEC PSD full impacts modeling report	61.9	150	Background from on-site monitoring at the WPES site.
Annual	10	WPES, EEC, and other surrounding sources	9.4	EEC PSD full impacts modeling report	19.4	50	Background from on-site monitoring at the WPES site.

Analysis: **NAAQS**
Pollutant: **SO2**

Averaging Period	Measured Background ($\mu g/m^3$)	Facilities Modeled	Modeled Impact ($\mu g/m^3$)	Source of Modeled Impact Information	Total Impact ($\mu g/m^3$)	Regulatory Limit ($\mu g/m^3$)	Notes
3-hour	42.6	WPES, EEC, and other surrounding sources	176	EEC PSD full impacts modeling report	218.6	1,300	Background from on-site monitoring at the WPES site.
24-hour	8	WPES, EEC, and other surrounding sources	34.0	EEC PSD full impacts modeling report	42	365	Background from on-site monitoring at the WPES site.
Annual	2.7	WPES, EEC, and other surrounding sources	6.9	EEC PSD full impacts modeling report	9.6	80	Background from on-site monitoring at the WPES site.

Analysis: **Increment**
Pollutant: **NO2**
Area(s): **Class II**

Averaging Period	Facilities Modeled	Source of Modeled Impact Information	Modeled Impact ($\mu g/m^3$)	Regulatory Limit ($\mu g/m^3$)	Notes
Annual	WPES, EEC, and other surrounding sources	EEC PSD full impacts modeling report	5.2	25	--

Analysis: **Increment**
Pollutant: **PM10**
Area(s): **Class II**

Averaging Period	Facilities Modeled	Source of Modeled Impact Information	Modeled Impact ($\mu g/m^3$)	Regulatory Limit ($\mu g/m^3$)	Notes
24-hour	WPES, EEC, and other surrounding sources	EEC PSD full impacts modeling report	25.8	30	Value reported is highest 2nd-high for comparison to the standard.
Annual	WPES, EEC, and other surrounding sources	EEC PSD full impacts modeling report	9.4	17	--

Analysis: **Increment**
Pollutant: **SO2**
Area(s): **Class II**

Averaging Period	Facilities Modeled	Source of Modeled Impact Information	Modeled Impact ($\mu g/m^3$)	Regulatory Limit ($\mu g/m^3$)	Notes
3-hour	WPES, EEC, and other surrounding sources	EEC PSD full impacts modeling report	94.4	512	Value reported is highest 2nd-high for comparison to the standard.
24-hour	WPES, EEC, and other surrounding sources	EEC PSD full impacts modeling report	27.4	91	Value reported is highest 2nd-high for comparison to the standard.
Annual	WPES, EEC, and other surrounding sources	EEC PSD full impacts modeling report	6.9	20	--

Analysis: **Increment**
Pollutant: **NO2**
Area(s): **Class I**

Class I Area	Averaging Period	Regulatory Limit ($\mu g/m^3$)	Facilities Modeled	Modeled Impact ($\mu g/m^3$)	Source of Modeled Impact Information	Notes
Jarbidge	Annual	2.5	WPES	0.004	WPES PSD app	--
			EEC	0.002	EEC PSD app	--
			Toquop	--	--	N/A: Toquop >300 km away
			Newmont	0.004	Newmont PSD app	--
			IPP3	--	--	N/A: IPP3 >300 km away
			Nevco-Sevier	--	--	N/A: N-S >300 km away
			Total Modeled Impact:	**0.010**		
Zion	Annual	2.5	WPES	0.002	WPES PSD app	--
			EEC	0.001	EEC PSD app	--
			Toquop	0.002	Toquop PSD app	--
			Newmont	--	--	N/A: Newmont >300 km away
			IPP3	0.002	IPP3 PSD app	--
			Nevco-Sevier	0.012	UDAQ eng. review	Worst-case: not specific to Zion
			Total Modeled Impact:	**0.019**		

Analysis: Increment
Pollutant: PM10
Area(s): Class I

Class I Area	Averaging Period	Regulatory Limit ($\mu g/m^3$)	Facilities Modeled	Modeled Impact ($\mu g/m^3$)	Source of Modeled Impact Information	Notes
Jarbidge	24-hour	4	WPES	0.04	WPES PSD app	--
			EEC	0.18	EEC PSD app	--
			Toquop	--	--	N/A: Toquop >300 km away
			Newmont	0.14	Newmont PSD app	--
			IPP3	--	--	N/A: IPP3 >300 km away
			Nevco-Sevier	--	--	N/A: N-S >300 km away
			Total Modeled Impact:	**0.36**		
	Annual	8	WPES	0.001	WPES PSD app	--
			EEC	0.006	EEC PSD app	--
			Toquop	--	--	N/A: Toquop >300 km away
			Newmont	0.010	Newmont PSD app	--
			IPP3	--	--	N/A: IPP3 >300 km away
			Nevco-Sevier	--	--	N/A: N-S >300 km away
			Total Modeled Impact:	**0.017**		
Zion	24-hour	4	WPES	0.02	WPES PSD app	--
			EEC	0.12	EEC PSD app	--
			Toquop	0.09	Toquop PSD app	--
			Newmont	--	--	N/A: Newmont >300 km away
			IPP3	0.04	IPP3 PSD app	--
			Nevco-Sevier	0.05	UDAQ eng. review	Worst-case: not specific to Zion
			Total Modeled Impact:	**0.31**		
	Annual	8	WPES	0.001	WPES PSD app	--
			EEC	0.004	EEC PSD app	--
			Toquop	0.004	Toquop PSD app	--
			Newmont	--	--	N/A: Newmont >300 km away
			IPP3	0.002	IPP3 PSD app	--
			Nevco-Sevier	0.004	UDAQ eng. review	Worst-case: not specific to Zion
			Total Modeled Impact:	**0.015**		

Analysis: **Increment**
Pollutant: **SO2**
Area(s): **Class I**

Class I Area	Averaging Period	Regulatory Limit ($\mu g/m^3$)	Facilities Modeled	Modeled Impact ($\mu g/m^3$)	Source of Modeled Impact Information	Notes
Jarbidge	3-hour	25	WPES	2.02	WPES PSD app	Includes Class I SO2 increment modeling inventory sources - See Attachment 3
			EEC	2.02	EEC PSD app	--
			Toquop	--	--	N/A: Toquop >300 km away
			Newmont	0.86	Newmont PSD app	--
			IPP3	--	--	N/A: IPP3 >300 km away
			Nevco-Sevier	--	--	N/A: N-S >300 km away
			Total Modeled Impact:	**4.90**		
	24-hour	5	WPES	0.95	WPES PSD app	Includes Class I SO2 increment modeling inventory sources - See Attachment 3
			EEC	0.41	EEC PSD app	--
			Toquop	--	--	N/A: Toquop >300 km away
			Newmont	0.18	Newmont PSD app	--
			IPP3	--	--	N/A: IPP3 >300 km away
			Nevco-Sevier	--	--	N/A: N-S >300 km away
			Total Modeled Impact:	**1.54**		
	Annual	2	WPES	0.01	WPES PSD app	--
			EEC	0.01	EEC PSD app	--
			Toquop	--	--	N/A: Toquop >300 km away
			Newmont	0.01	Newmont PSD app	--
			IPP3	--	--	N/A: IPP3 >300 km away
			Nevco-Sevier	--	--	N/A: N-S >300 km away
			Total Modeled Impact:	**0.03**		

Analysis: **Increment**
Pollutant: **SO2**
Area(s): **Class I**

Class I Area	Averaging Period	Regulatory Limit ($\mu g/m^3$)	Facilities Modeled	Modeled Impact ($\mu g/m^3$)	Source of Modeled Impact Information	Notes
Zion	3-hour	25	WPES	3.98	WPES PSD app	Includes Class I SO2 increment modeling inventory sources - See Attachment 3
			EEC	1.04	EEC PSD app	--
			Toquop	0.57	Toquop PSD app	--
			Newmont	--	--	N/A: Newmont >300 km away
			IPP3	1.23	IPP3 PSD app	--
			Nevco-Sevier	0.78	UDAQ eng. review	Worst-case: not specific to Zion
			Total Modeled Impact:	**7.61**		
	24-hour	5	WPES	0.66	WPES PSD app	Includes Class I SO2 increment modeling inventory sources - See Attachment 3
			EEC	0.23	EEC PSD app	--
			Toquop	0.12	Toquop PSD app	--
			Newmont	--	--	N/A: Newmont >300 km away
			IPP3	0.18	IPP3 PSD app	--
			Nevco-Sevier	0.14	UDAQ eng. review	Worst-case: not specific to Zion
			Total Modeled Impact:	**1.34**		
	Annual	2	WPES	0.01	WPES PSD app	--
			EEC	0.01	EEC PSD app	--
			Toquop	0.01	Toquop PSD app	--
			Newmont	--	--	N/A: Newmont >300 km away
			IPP3	0.01	IPP3 PSD app	--
			Nevco-Sevier	0.01	UDAQ eng. review	Worst-case: not specific to Zion
			Total Modeled Impact:	**0.04**		

Analysis: Visibility

24-Hour Averaging Period

Area	Reasonably Expected Future Actions	Number of Days >5%	Number of Days >10%	Notes *
Jarbidge	WPES	15	8	Worst-case year: 2001
	EEC	13	8	Worst-case year: 2004
	Toquop	--	--	N/A: >300 km away
	Newmont	0	0	Worst-case year: 1990
	IPP3	--	--	N/A: >300 km away
	Nevco-Sevier	--	--	N/A: >300 km away
Zion	WPES	2	1	Worst-case year: 1996
	EEC	6	3	Worst-case year: 2004
	Toquop	0	0	Worst-case year: 2003
	Newmont	--	--	N/A: >300 km away
	IPP3	0	0	Modeled year: 1996 (only year modeled)
	Nevco-Sevier	0	0	Modeled year: 1999 (only year modeled)
Great Basin	WPES	52	22	Worst-case year: 2002
	EEC	74	38	Worst-case year: 2002
	Toquop	--	--	N/A: not included in Toquop PSD app
	Newmont	--	--	N/A: not included in Newmont PSD app
	IPP3	1	0	Modeled year: 1996 (only year modeled)
	Nevco-Sevier	--	--	N/A: not included in N-S PSD app
Ruby Lake	WPES	11	4	Worst-case year: 2001
	EEC	22	13	Worst-case year: 2004
	Toquop	--	--	N/A: not included in Toquop PSD app
	Newmont	--	--	N/A: not included in Newmont PSD app
	IPP3	--	--	N/A: not included in IPP3 PSD app
	Nevco-Sevier	--	--	N/A: >300 km away

* Worst-case year is the year with the highest number of days above 10% for the area.

Analysis: Sulfur Deposition

Annual Averaging Period

Area	Reasonably Expected Future Actions	Modeled Deposition (kg/ha/yr)	Source of Information for Modeled Increase	Notes
Jarbidge	WPES	0.018	WPES PSD app	Includes both wet and dry deposition.
	EEC	0.006	EEC PSD app	
	Toquop	--	N/A: >300 km away	
	Newmont	0.005	Newmont PSD app	
	IPP3	--	N/A: >300 km away	
	Nevco-Sevier	--	N/A: >300 km away	
	Total Increase:	**0.028**		
Zion	WPES	0.009	WPES PSD app	Includes both wet and dry deposition.
	EEC	0.003	EEC PSD app	
	Toquop	0.005	Toquop PSD app	
	Newmont	--	N/A: >300 km away	
	IPP3	0.004	IPP3 PSD app	
	Nevco-Sevier	0.001	UDAQ eng. review	
	Total Increase:	**0.021**		
Great Basin	WPES	0.054	WPES PSD app	Includes both wet and dry deposition.
	EEC	0.085	EEC PSD app	
	Toquop	--	N/A: not included in Toquop PSD app	
	Newmont	--	N/A: not included in Newmont PSD app	
	IPP3	0.005	IPP3 PSD app	
	Nevco-Sevier	--	N/A: not included in N-S PSD app	
	Total Increase:	**0.144**		
Ruby Lake	WPES	0.014	WPES PSD app	Includes both wet and dry deposition.
	EEC	0.014	EEC PSD app	
	Toquop	--	N/A: not included in Toquop PSD app	
	Newmont	--	N/A: not included in Newmont PSD app	
	IPP3	--	N/A: not included in IPP3 PSD app	
	Nevco-Sevier	--	N/A: >300 km away	
	Total Increase:	**0.028**		

Analysis: Nitrogen Deposition

Annual Averaging Period

Area	Reasonably Expected Future Actions	Modeled Deposition (kg/ha/yr)	Source of Information for Modeled Increase	Notes
Jarbidge	WPES	0.003	WPES PSD app	Includes both wet and dry deposition.
	EEC	0.003	EEC PSD app	
	Toquop	--	N/A: >300 km away	
	Newmont	0.002	Newmont PSD app	
	IPP3	--	N/A: >300 km away	
	Nevco-Sevier	--	N/A: >300 km away	
	Total Increase:	**0.008**		
Zion	WPES	0.002	WPES PSD app	Includes both wet and dry deposition.
	EEC	0.002	EEC PSD app	
	Toquop	0.003	Toquop PSD app	
	Newmont	--	N/A: >300 km away	
	IPP3	0.001	IPP3 PSD app	
	Nevco-Sevier	0.001	UDAQ eng. review	
	Total Increase:	**0.008**		
Great Basin	WPES	0.016	WPES PSD app	Includes both wet and dry deposition.
	EEC	0.042	EEC PSD app	
	Toquop	--	N/A: not included in Toquop PSD app	
	Newmont	--	N/A: not included in Newmont PSD app	
	IPP3	0.002	IPP3 PSD app	
	Nevco-Sevier	--	N/A: not included in N-S PSD app	
	Total Increase:	**0.060**		
Ruby Lake	WPES	0.003	WPES PSD app	Includes both wet and dry deposition.
	EEC	0.006	EEC PSD app	
	Toquop	--	N/A: not included in Toquop PSD app	
	Newmont	--	N/A: not included in Newmont PSD app	
	IPP3	--	N/A: not included in IPP3 PSD app	
	Nevco-Sevier	--	N/A: >300 km away	
	Total Increase:	**0.009**		

Attachment 2

Ozone Analysis

White Pine Energy Station

Cumulative Ozone Analysis

Rigorous analysis of ozone impacts is not possible without access to regional grid modeling, which has not been previously prepared by the agencies for this region. Therefore, a screening assessment method must be used. One common screening method, the Scheffe method, is not applicable because this method is applicable to VOC-dominated point sources only (Scheffe, 09/1998), and the sources in the area (i.e., the WPES and the EEC) are NOX-dominated sources. Since the WPES and EEC are NOX-dominated sources, typical empirical kinetic modeling approach (EKMA) isopleths are used to estimate the cumulative ozone impacts in the area of the WPES and the EEC. The following inputs are needed to estimate impacts using EKMA isopleths:

VOC and NOX Concentrations

The VOC and NOX concentrations of the combined exhaust are calculated from the emission rates and volumetric flows shown in the air permit applications for the WPES and the EEC.

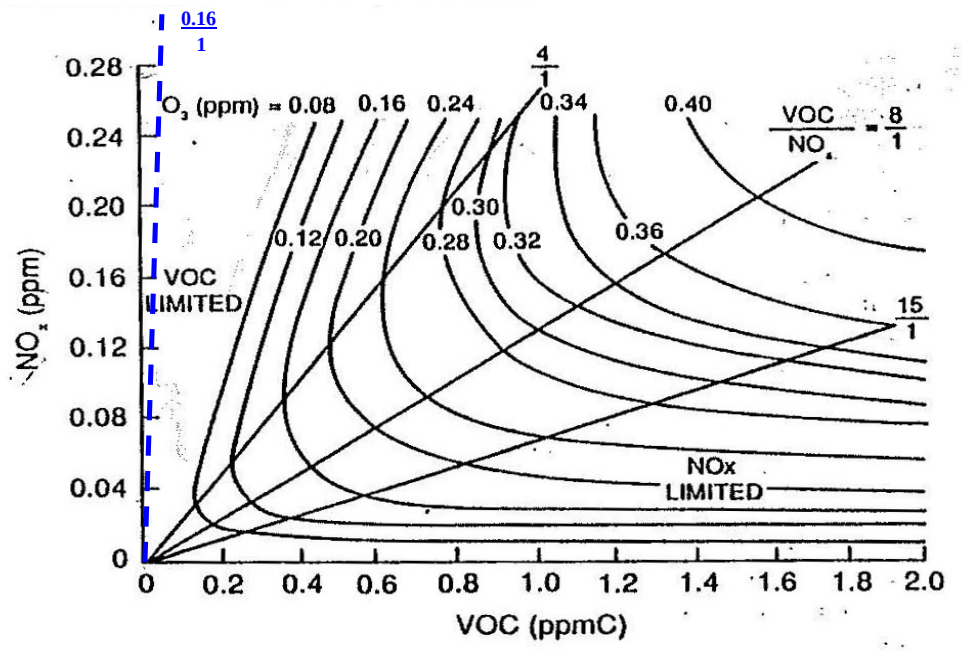
Concentration	
VOC (ppm)	**NOX (ppm)**
6.00	38.1

VOC-to-NOX Ratio

The VOC-to-NOX ratio is calculated as the ratio of VOC concentration to NOX concentration in the gas. This ratio is used to define a line that would intersect a maximum ozone isopleth on the EKMA chart. The EKMA chart is shown below, with the WPEA VOC-to-NOX ratio indicated by a dashed line.

VOC-to-NOX Ratio: 0.16

Typical EKMA curve. Adapted from Dodge, 1977.



As shown in the chart above, the VOC-to-NOX line for the combined exhaust falls well below the lowest ozone isopleth. Thus, it is concluded that the facilities would have a negligible effect on ambient ozone levels.

White Pine Energy Station

Reference Information for Cumulative Ozone Analysis

The following background information is used in the ozone analysis.

WPES Flow and Emissions Data at 100% Load:

VOC Emission Rate:	18.8	lb/hr per PC-fired boiler
	532	moles/hr as methane
	15,137	liters/hour at 165 degrees F and 0.788 atm
NOX Emission Rate:	365.2	lb/hr per PC-fired boiler
	3,601	moles/hr as NO2
	102,540	liters/hour at 165 degrees F and 0.788 atm
Stack Temperature:	165	degrees F (at 100% load)
	347	K
Stack Flow:	1,509,649	acfm per PC-fired boiler at 165 degrees F and 0.788 atm
	42,748,731	liters/minute
	2.6E+09	liters/hour

EEC Flow and Emissions Data at 100% Load:

VOC Emission Rate:	30.5	lb/hr per PC-fired boiler
	862	moles/hr as methane
	22,935	liters/hour at 124 degrees F and 0.788 atm
NOX Emission Rate:	522.6	lb/hr per PC-fired boiler
	5,153	moles/hr as NO2
	137,104	liters/hour at 124 degrees F and 0.788 atm
Stack Temperature:	124	degrees F (at 100% load)
	324	K
Stack Flow:	3,382,914	acfm per PC-fired boiler at 124 degrees F and 0.788 atm
	95,793,976	liters/minute
	5.7E+09	liters/hour

Properties of the Combined WPES/EEC Exhaust

Total Moles of VOC:	3.3E+03	moles/hr	ppm VOC:	6.0
Total Moles of NOX:	2.1E+04	moles/hr	ppm NOX:	38.1
Total Moles of Exhaust:	5.5E+08	moles/hr		

White Pine Energy Station

Reference Information for Cumulative Ozone Analysis

Additional Reference Data:

Molecular Weights for Compounds of Interest

Compound	Molecular Weight (g/mole)	Notes
VOC	12.0 16.0	As carbon As methane
NOX	46.0	As NO2

R (ideal gas constant): 0.082057 (L*atm) / (mol*K)

Attachment 3

Modeling Inventory Data

MODELED POINT SOURCE EMISSIONRATES AND STACK PARAMETERS

POINT SOURCES															
Source Name	Source Description	NAD 83 UTM Location (mE)	NAD 83 UTM Location (mN)	Elevation (m)	Stack Height (meters)	Stack Temperature (K)	Exit Velocity (m/s)	Stack Diameter (meters)	Modeled Emission Rates (g/s)[1]						
									CO	NO_X	Pb	PM_{10}	SO_2		VOC
MSTK1	Unit #1 Boiler	690102	4374813	1889	221.6	324.3	16.80	11.00	109.75	65.85	2.8E-02	21.95	3-hr 24 -hr	87.80 65.85	3.84
MSTK2	Unit #2 Boiler	690114	4374813	1889	221.6	324.3	16.80	11.00	109.75	65.85	2.8E-02	21.95	3-hr 24 -hr	87.80 65.85	3.84
AUXBLR	Auxiliary Boiler	690010	4374629	1888	91.4	449.8	18.00	1.52	9.98E-01	2.77E+00	N/A	5.54E-01	1.39E+00		4.99E-02
DIESGEN	3 MW Diesel Generator	690390	4373576	1895	6.09	710.9	22.01	0.69	2.92E+00	1.33E-01	N/A	1.67E-01	2.39E-03		6.67E-01
RAILF	Locomotive Idle - Front	689137	4375594	1875	6.09	700.0	25.30	0.46	7.33E-01	2.47E+00	N/A	1.50E-01	2.84E-02		1.83E-01
RAILB	Locomotive Idle - Back	688987	4373543	1883	6.09	700.0	25.30	0.46	7.33E-01	2.47E+00	N/A	1.50E-01	2.84E-02		1.83E-01
FRPMP	Fire Pump	689284	4374181	1883	3.05	836.5	26.59	0.30	5.69E-01	2.62E-02	N/A	3.28E-02	4.04E-04		1.31E-01
FRPMP2	90 hp Diesel Fire Water Booster Pump	690010	4374597	1889	3.05	308.2	5.27	0.20	9.25E-02	2.23E-03	N/A	7.50E-03	4.62E-05		1.09E-02
DIESGEN500	750 kW Diesel Generator	690006	4374628	1889	6.09	805.4	22.74	0.36	7.29E-01	3.33E-02	N/A	4.17E-02	5.20E-04		1.67E-01
DIESPMP	Emergency Quench Water System Diesel Pump	689284	4374168	1883	3.05	810.9	20.05	0.30	4.93E-01	1.42E-02	N/A	2.84E-02	3.50E-04		7.11E-02
SPKGEN	Propane Spark Ignited Communication Auxiliary Generator	690373	4373576	1895	1.36	901.2	29.71	0.10	4.03E-03	1.09E-02	N/A	7.56E-04	1.89E-03		6.30E-04
MDC-1	Car Dumper Dust Collector	689455	4375621	1880	1.83	Ambient	18.39	2.29	N/A	N/A	N/A	8.64E-01	N/A		N/A
MDC-2	Transfer Tower #1 Dust Collector	689549	4375331	1883	61.00	Ambient	15.75	0.87	N/A	N/A	N/A	1.13E-01	N/A		N/A
MDC-3	Transfer Tower #2 Dust Collector	689759	4375242	1885	61.00	Ambient	15.75	0.87	N/A	N/A	N/A	1.13E-01	N/A		N/A
MDC-4	Crusher Building Dust Collector	690018	4375264	1887	36.58	Ambient	17.24	0.91	N/A	N/A	N/A	1.24E-01	N/A		N/A
MDC-5	Transfer Tower #3 Dust Collector	690020	4374602	1889	61.00	Ambient	15.75	0.87	N/A	N/A	N/A	1.13E-01	N/A		N/A
CDC-1	Coal Storage Dome #1 Dust Collector (live storage)	689443	4375371	1883	1.83	Ambient	18.46	2.21	N/A	N/A	N/A	8.10E-01	N/A		N/A
CDC-2	Coal Storage Dome #2 Dust Collector (live storage)	689666	4375314	1883	1.83	Ambient	18.46	2.21	N/A	N/A	N/A	8.10E-01	N/A		N/A
CDC-3	Coal Reclaim Conveyor and Tunnel #1 Dust Collector	689533	4375340	1883	1.83	Ambient	18.96	0.63	N/A	N/A	N/A	5.94E-02	N/A		N/A
CDC-4	Coal Reclaim Conveyor and Tunnel #2 Dust Collector	689570	4375339	1883	1.83	Ambient	18.96	0.63	N/A	N/A	N/A	5.94E-02	N/A		N/A
CDC-5	Coal Tripper Floor Unit #1 Dust Collector A	690018	4375264	1887	36.58	Ambient	17.24	0.91	N/A	N/A	N/A	1.24E-01	N/A		N/A
CDC-6	Coal Tripper Floor Unit #1 Dust Collector B	690018	4375264	1887	36.58	Ambient	17.24	0.91	N/A	N/A	N/A	1.24E-01	N/A		N/A
CDC-7	Coal Tripper Floor Unit #2 Dust Collector A	690018	4375264	1887	36.58	Ambient	17.24	0.91	N/A	N/A	N/A	1.24E-01	N/A		N/A
CDC-8	Coal Tripper Floor Unit #2 Dust Collector B	690018	4375264	1887	36.58	Ambient	17.24	0.91	N/A	N/A	N/A	1.24E-01	N/A		N/A
LDC-1	Limestone Preparation Building Dust Collector	690108	4374864	1890	24.38	Ambient	16.56	0.38	N/A	N/A	N/A	2.16E-02	N/A		N/A

MODELED POINT SOURCE EMISSIONRATES AND STACK PARAMETERS (CONTINUED)

POINT SOURCES														
Source Name	Source Description	NAD 83 UTM Location (mE)	NAD 83 UTM Location (mN)	Elevation (m)	Stack Height (meters)	Stack Temperature (K)	Exit Velocity (m/s)	Stack Diameter (meters)	Modeled Emission Rates (g/s)[1]					
									CO	NO_X	Pb	PM_{10}	SO_2	VOC
LDC-2	Limestone Silo A Dust Collector	690108	4374864	1890	24.38	Ambient	17.73	0.16	N/A	N/A	N/A	7.56E-03	N/A	N/A
LDC-3	Limestone Silo B Dust Collector	690108	4374864	1890	24.38	Ambient	17.73	0.16	N/A	N/A	N/A	7.56E-03	N/A	N/A
LDC-4	Limestone Reclaim Tunnel Dust Collector	690108	4374890	1890	1.83	Ambient	21.89	0.38	N/A	N/A	N/A	2.23E-02	N/A	N/A
LDC-5	Limestone Unloading Building dust collector	690143	4375027	1890	1.83	Ambient	19.40	1.52	N/A	N/A	N/A	4.05E-01	N/A	N/A
ACD-1	Fly Ash Silo 1 Dust	690177	4374998	1890	30.48	324.8	14.63	0.19	N/A	N/A	N/A	1.08E-02	N/A	N/A
ACD-2	Fly Ash Silo 2 Dust	690201	4374998	1890	30.48	324.8	14.63	0.19	N/A	N/A	N/A	1.08E-02	N/A	N/A
ACD-3	Bottom Ash Silo 1 Dust Collector	690026	4374693	1890	30.48	324.8	14.63	0.19	N/A	N/A	N/A	1.08E-02	N/A	N/A
ACD-4	Bottom Ash Silo 2 Dust Collector	690118	4374693	1890	30.48	324.8	14.63	0.19	N/A	N/A	N/A	1.08E-02	N/A	N/A
IDC-1	DSI Storage Silo Unit 1 Dust Collector	690023	4374729	1890	22.80	Ambient	15.20	0.15	N/A	N/A	N/A	6.48E-03	N/A	N/A
IDC-2	PAC Storage Silo Unit 1 Dust Collector	690023	4374718	1890	21.30	Ambient	15.20	0.15	N/A	N/A	N/A	6.48E-03	N/A	N/A
IDC-3	DSI Storage Silo Unit 2 Dust Collector	690194	4374729	1890	22.80	Ambient	15.20	0.15	N/A	N/A	N/A	6.48E-03	N/A	N/A
IDC-4	PAC Storage Silo Unit 2 Dust Collector	690194	4374718	1890	21.30	Ambient	15.20	0.15	N/A	N/A	N/A	6.48E-03	N/A	N/A
WDC-1	Soda Ash Storage Silo Dust Collector	689892	4374733	1888	15.20	Ambient	15.20	0.15	N/A	N/A	N/A	6.48E-03	N/A	N/A
WDC-2	Lime Storage Silo Dust Collector	689907	4374733	1888	52.00	Ambient	15.20	0.15	N/A	N/A	N/A	6.48E-03	N/A	N/A
WDC-3	Magnesium Hydroxide (MgOH) Dust Collector	689922	4374733	1888	52.00	Ambient	15.20	0.15	N/A	N/A	N/A	6.48E-03	N/A	N/A
FE-1	Secondary fuel/startup and emergency power - 2,000,000 gallon diesel tank	689995	4375099	1888	9.75	Ambient	0.08	0.16	N/A	N/A	N/A	N/A	N/A	3.33E-03
FE-2	Rail Power Refueling - 1,000,000 gallon diesel tank	689030	4373602	1883	9.75	Ambient	0.08	0.16	N/A	N/A	N/A	N/A	N/A	2.01E-03
FE-3	Burner Supply - 60,000 gallon diesel tank	690192	4374645	1890	18.29	Ambient	0.08	0.16	N/A	N/A	N/A	N/A	N/A	5.01E-04
FE-4	Burner Supply - 60,000 gallon diesel tank	690192	4374618	1890	18.29	Ambient	0.08	0.16	N/A	N/A	N/A	N/A	N/A	5.01E-04
FE-5	Auxiliary Boiler/Emergency Generator - 15,000 gallon diesel tank	689980	4374648	1890	3.66	Ambient	0.08	0.16	N/A	N/A	N/A	N/A	N/A	2.28E-04
FE-6	Main Fire Water Pump - 700 gallon diesel tank	689268	4374182	1883	2.13	Ambient	0.08	0.06	N/A	N/A	N/A	N/A	N/A	1.73E-06
FE-7	Booster Fire Water Pump - 200 gallon diesel tank	689980	4374616	1890	1.83	Ambient	0.08	0.06	N/A	N/A	N/A	N/A	N/A	1.15E-06

MODELED POINT SOURCE EMISSIONRATES AND STACK PARAMETERS (CONTINUED)

POINT SOURCES														
Source Name	Source Description	NAD 83 UTM Location (mE)	NAD 83 UTM Location (mN)	Elevation (m)	Stack Height (meters)	Stack Temperature (K)	Exit Velocity (m/s)	Stack Diameter (meters)	Modeled Emission Rates (g/s)[1]					
									CO	NO_X	Pb	PM_{10}	SO_2	VOC
FE-8	Emergency Quench Water Pump - 700 gallon diesel tank	689268	4374168	1883	2.13	Ambient	0.08	0.06	N/A	N/A	N/A	N/A	N/A	1.73E-06
FE-9	Switchyard Backup Power Supply - 700 gallon diesel tank	690386	4373625	1895	2.13	Ambient	0.08	0.06	N/A	N/A	N/A	N/A	N/A	1.73E-06
FE-10	Coal Yard Equipment Fueling - 25,000 gallon	689304	4375498	1880	3.35	Ambient	0.08	0.16	N/A	N/A	N/A	N/A	N/A	1.95E-04
FE-11	Ash Haul Truck/Light Vehicle Fueling - 15,000 gallon diesel tank	690202	4375158	1890	3.35	Ambient	0.08	0.16	N/A	N/A	N/A	N/A	N/A	2.75E-05
FE-12	Ash Haul Truck/Light Vehicle Refueling - 15,000 gallon gasoline tank	690212	4375158	1890	3.66	Ambient	0.08	0.13	N/A	N/A	N/A	N/A	N/A	5.27E-02
TC1-1	Tower1Cell01	689742	4374247	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-2	Tower1Cell02	689742	4374259	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-3	Tower1Cell03	689742	4374272	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-4	Tower1Cell04	689742	4374284	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-5	Tower1Cell05	689742	4374296	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-6	Tower1Cell06	689742	4374308	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-7	Tower1Cell07	689742	4374320	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-8	Tower1Cell08	689742	4374332	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-9	Tower1Cell09	689742	4374344	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-10	Tower1Cell10	689742	4374357	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-11	Tower1Cell11	689742	4374369	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-12	Tower1Cell12	689742	4374381	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-13	Tower1Cell13	689742	4374393	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-14	Tower1Cell14	689742	4374405	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-15	Tower1Cell15	689742	4374417	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-16	Tower1Cell16	689742	4374430	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-17	Tower1Cell17	689742	4374442	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-18	Tower1Cell18	689742	4374454	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-19	Tower1Cell19	689742	4374466	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-20	Tower1Cell20	689742	4374478	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-21	Tower1Cell21	689742	4374490	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-22	Tower1Cell22	689742	4374503	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-23	Tower1Cell23	689742	4374515	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC1-24	Tower1Cell24	689742	4374527	1887	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-1	Tower2Cell01	690383	4374244	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-2	Tower2Cell02	690383	4374256	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-3	Tower2Cell03	690383	4374268	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-4	Tower2Cell04	690383	4374280	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-5	Tower2Cell05	690383	4374292	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-6	Tower2Cell06	690383	4374304	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-7	Tower2Cell07	690383	4374317	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-8	Tower2Cell08	690383	4374329	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A

MODELED POINT SOURCE EMISSIONRATES AND STACK PARAMETERS (CONTINUED)

POINT SOURCES														
Source Name	Source Description	NAD 83 UTM Location (mE)	NAD 83 UTM Location (mN)	Elevation (m)	Stack Height (meters)	Stack Temperature (K)	Exit Velocity (m/s)	Stack Diameter (meters)	Modeled Emission Rates (g/s)[1]					
									CO	NO_X	Pb	PM_{10}	SO_2	VOC
TC2-9	Tower2Cell09	690383	4374341	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-10	Tower2Cell10	690383	4374353	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-11	Tower2Cell11	690383	4374365	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-12	Tower2Cell12	690383	4374377	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-13	Tower2Cell13	690383	4374390	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-14	Tower2Cell14	690383	4374402	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-15	Tower2Cell15	690383	4374414	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-16	Tower2Cell16	690383	4374426	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-17	Tower2Cell17	690383	4374438	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-18	Tower2Cell18	690383	4374450	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-19	Tower2Cell19	690383	4374463	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-20	Tower2Cell20	690383	4374475	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-21	Tower2Cell21	690383	4374487	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-22	Tower2Cell22	690383	4374499	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-23	Tower2Cell23	690383	4374511	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A
TC2-24	Tower2Cell24	690383	4374523	1895	14.33	284.6	7.15	10.00	N/A	N/A	N/A	3.28E-02	N/A	N/A

MODELED VOLUME SOURCE EMISSIONRATES AND RELEASE PARAMETERS

VOLUME SOURCES													
Source Name	Source Description	NAD 83 UTM Location (mE)	NAD 83 UTM Location (mN)	Elevation (m)	Release Height (meters)	Sigma-Y	Sigma-Z	Modeled Emission Rates (g/s)[1]					
								CO	NOX	Pb	PM_{10}	SO2	VOC
CH-1	Coal Unloading Belt Feeder Transfer Point	689463	4375553	1880	9.14	3.5	4.3	N/A	N/A	N/A	0.00E+00	N/A	N/A
CH-2	Coal Stockout Conveyor	689887	4375285	1885	9.14	3.5	4.3	N/A	N/A	N/A	8.85E-03	N/A	N/A
CH-3	Active Coal Pile Wind Erosion and Maintenance	689523	4375168	1883	9.14	26.3	4.3	N/A	N/A	N/A	2.45E-01	N/A	N/A
CH-4	Inactive Portion of Coal Pile Wind Erosion - Phase I	689500	4375058	1883	9.14	100.2	4.3	N/A	N/A	N/A	3.27E-03	N/A	N/A
LH-1	Limestone Unloading Conveyor Transfer Point	690136	4375075	1889	21.34	3.5	9.9	N/A	N/A	N/A	1.54E-02	N/A	N/A
LH-2	Limestone Silo A Loading Conveyor Transfer Point	690108	4374864	1890	21.34	3.5	9.9	N/A	N/A	N/A	4.87E-03	N/A	N/A
LH-3	Limestone Silo B Loading Conveyor Transfer Point	690108	4374864	1890	21.34	3.5	9.9	N/A	N/A	N/A	4.87E-03	N/A	N/A
LH-4	Limestone Pile Wind Erosion and Maintenance	690120	4375135	1889	21.34	12.8	9.9	N/A	N/A	N/A	1.75E-01	N/A	N/A
GH-1	Gypsum Stockout Conveyor	690066	4374942	1890	7.62	3.5	3.5	N/A	N/A	N/A	1.42E-02	N/A	N/A
GH-2	Gypsum Pile Wind Erosion and Maintenance	690044	4374963	1890	7.62	11.6	3.5	N/A	N/A	N/A	2.61E-02	N/A	N/A
LF-1	Landfill Inactive Pile Wind Erosion - area 1	690889	4376051	1890	24.38	325.6	11.3	N/A	N/A	N/A	0.00E+00	N/A	N/A
LF-2	Landfill Inactive Pile Wind Erosion - area 2	689505	4376127	1880	24.38	318.6	11.3	N/A	N/A	N/A	0.00E+00	N/A	N/A
LF-3	Landfill Inactive Pile Wind Erosion - 5 yr cell	689153	4376496	1870	24.38	160.5	11.3	N/A	N/A	N/A	0.00E+00	N/A	N/A
LF-4	Landfill Stockout	689153	4376496	1870	24.38	3.5	11.3	N/A	N/A	N/A	4.34E-04	N/A	N/A
LF-5	Landfill Active Pile Wind Erosion and Maintenance	689153	4376496	1870	24.38	46.5	11.3	N/A	N/A	N/A	3.07E-01	N/A	N/A
Limestone Supply	Total route emissions, see map for routes[2]				see A6-54	see A6-54	see A6-54	N/A	N/A	N/A	2.83E-02	N/A	N/A
Lime Supply	Total route emissions, see map for routes[2]				see A6-54	see A6-54	see A6-54	N/A	N/A	N/A	5.49E-03	N/A	N/A
Sorbent Supply	Total route emissions, see map for routes[2]				see A6-54	see A6-54	see A6-54	N/A	N/A	N/A	1.65E-02	N/A	N/A

MODELED VOLUME SOURCE EMISSIONRATES AND RELEASE PARAMETERS (CONTINUED)

VOLUME SOURCES													
Source Name	Source Description	NAD 83 UTM Location (mE)	NAD 83 UTM Location (mN)	Elevation (m)	Release Height (meters)	Sigma-Y	Sigma-Z	Modeled Emission Rates (g/s)[1]					
								CO	NOX	Pb	PM_{10}	SO2	VOC
Soda Ash Supply	Total route emissions, see map for routes[2]				see A6-54	see A6-54	see A6-54	N/A	N/A	N/A	1.69E-02	N/A	N/A
Magnesium Hydroxide Supply	Total route emissions, see map for routes[2]				see A6-54	see A6-54	see A6-54	N/A	N/A	N/A	4.39E-03	N/A	N/A
Scrubber Sludge trucked to Landfill	Total route emissions, see map for routes[2]				see A6-54	see A6-54	see A6-54	N/A	N/A	N/A	8.13E-02	N/A	N/A
Fly Ash trucked to Landfill	Total route emissions, see map for routes[2]				see A6-54	see A6-54	see A6-54	N/A	N/A	N/A	1.60E-01	N/A	N/A
Bottom Ash trucked to Landfill	Total route emissions, see map for routes[2]				see A6-54	see A6-54	see A6-54	N/A	N/A	N/A	4.55E-02	N/A	N/A

NEARBY POINT SOURCE (WHITE PINE ENERGY) EMISSION RATES AND STACK PARAMETERS

Source Name	NAD 83 UTM Location (mE)	NAD 83 UTM Location (mN)	Stack Height (meters)	Stack Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)	Modeled Emission Rate (g/s)			
							CO	NO_x	PM_{10}	SO_2
S01 S02	691242.7	4399588	182.88	347	19.81	9.57	197.2	92.0	49.95	116.4
S03	691362	4399588	182.88	347	19.81	6.77	98.6	46.0	24.97	58.2
S05	691238.4	4399461	68.58	627.6	18.11	2.21	1.85	0.264	2.31	0.072
S06	690904	4399120	1.52	293.2	0.01	1	NA	NA	0.065	NA
S08	690706.9	4399432	1.52	293.2	21.47	0.3	NA	NA	0.0359	NA
S10	690671	4399359	28.04	293.2	0.01	1	NA	NA	0.1196	NA
S13	690571.8	4399377	1.52	293.2	19.09	0.46	NA	NA	0.0717	NA
S15	690958.6	4399363	42.67	293.2	19.09	0.46	NA	NA	0.0717	NA
S17	691309.6	4399423	86.87	293.2	23.86	0.91	NA	NA	0.3586	NA
S20	691319.4	4399445	1.52	293.2	0.01	1	NA	NA	5.39E-04	NA
S22	691319.3	4399463	1.52	293.2	0.01	1	NA	NA	5.39E-04	NA
S23	691319.3	4399469	1.52	293.2	0.01	1	NA	NA	2.02E-03	NA
S25	692104.1	4401105	1.52	293.2	0.01	1	NA	NA	2.02E-03	NA
S26	691263.6	4399642	22.86	293.2	20.04	0.46	NA	NA	0.1506	NA
S27	691221	4399637	10.67	293.2	19.09	0.46	NA	NA	0.0717	NA
S28	691212.9	4399641	1.52	293.2	0.01	1	NA	NA	2.18E-03	NA
S30	692046.6	4401047	1.52	293.2	0.01	1	NA	NA	2.18E-03	NA
S33	691140	4399425	10.67	293.2	22.55	0.3	NA	NA	0.0753	NA
S35	690926.3	4399465	10.67	293.2	17.06	1.22	NA	NA	0.4558	NA
S37	691136.8	4399449	18.29	293.2	20.04	0.46	NA	NA	0.1506	NA
S44	691238.6	4399439	7.62	699.8	45.72	0.37	0.332	0.1798	0.0293	3.05E-03
S45	691091.6	4399539	10.67	699.8	45.72	0.18	0.3243	0.0167	0.0499	6.20E-04

NEARBY AREA AND VOLUME SOURCE (WHITE PINE ENERGY) EMISSION RATES AND STACK PARAMETERS

Source Name	Source Type	NAD 83 UTM Location (mE)	NAD 83 UTM Location (mN)	Release Height (meters)	areacirc = radius areapoly = number of vertices volume = sigma y	Sigma Zinit	Modeled Emission Rate (g/s)
							PM_{10}
S07	AREACIRC	690671.1	4399436	9.91	26.36	4.61	4.28E-05
S11	AREACIRC	690718.2	4399359	14.02	37.18	6.52	4.30E-05
S12	AREACIRC	690623.8	4399359	14.02	37.18	6.52	4.30E-05
S18	AREAPOLY	690807.2	4399300	9.14	4	4.25	7.29E-07
S32 S38	AREAPOLY	690050.9	4401032	0	4	0	8.76E-08
S39.1 – S39.56[a]	VOLUME	691421.2	4398741	3.05	17.01	1.42	2.84E-04

NEARBY SOURCE EMISSION RATES AND STACK PARAMETERS

Facility Name	Source ID	Pollutant	Emission Rate (g/s)	UTM Location (mE)	UTM Location (mN)	Stack Height (meters)	Stack Temperature (K)	Exit Velocity (m/s)	Stack Diameter (meters)
H E Hunewill Construction Co., Inc.	0171am	PM_{10}	10.67	740760	4321140	10.00	295.37	0.00001	1.01
	0171am	SO_2	4.02	740760	4321140	10.00	295.37	0.00001	1.01
	0171048a	PM_{10}	0.37	740760	4321140	12.65	422.04	5.346	1.01
	0171048a	SO_2	2.12	740760	4321140	12.65	422.04	5.346	1.01
	0171048b	PM_{10}	0.37	740760	4321140	12.65	422.04	5.346	1.01
	0171048b	SO_2	2.12	740760	4321140	12.65	422.04	5.346	1.01
	171049	PM_{10}	2.14	740760	4321140	12.65	422.04	32.667	1.01
	171049	SO_2	2.65	740760	4321140	12.65	422.04	32.667	1.01
Robinson Nevada Mining Company	0373am	PM_{10}	12.12	671580	4347540	10.00	295.37	0.00001	1.01
	0373am	SO_2	0.51	671580	4347540	10.00	295.37	0.00001	1.01
	0373am	NO_x	0.736	671580	4347540	10.00	295.37	0.00001	1.01
	373008	PM_{10}	0.02	671580	4347540	9.14	295.37	0.00001	0.67
	373002	PM_{10}	0.33	671580	4347540	8.99	292.98	10.109	0.91
	373005	PM_{10}	0.33	671580	4347540	10.00	296.09	10.110	0.91
	373006	PM_{10}	0.07	671580	4347540	15.00	292.98	9.676	0.43
	373009	PM_{10}	0.10	671580	4347540	6.00	324.98	4.450	0.76
	373010	PM_{10}	0.13	671580	4347540	6.00	324.98	5.795	0.76
	373011	PM_{10}	0.003	671580	4347540	6.00	354.98	9.675	0.70
	373017	PM_{10}	0.05	671580	4347540	2.99	874.82	14.513	0.58
	373017	SO_2	0.18	671580	4347540	2.99	874.82	14.513	0.58
	373017	NO_x	0.078	671580	4347540	2.99	874.82	14.513	0.58
Newmont Gold Company	0405am	PM_{10}	1.00	583930	4495990	10.00	295.37	0.00001	1.01
J & M Trucking, Inc.	543001	PM_{10}	0.04	684020	4346150	10.00	342.76	2.052	1.52
	0543am	PM_{10}	0.07	684020	4346150	10.00	295.37	0.00001	1.01

NEARBY SOURCE EMISSION RATES AND STACK PARAMETERS (CONTINUED)

Facility Name	Source ID	Pollutant	Emission Rate (g/s)	UTM Location (mE)	UTM Location (mN)	Stack Height (meters)	Stack Temperature (K)	Exit Velocity (m/s)	Stack Diameter (meters)
Homestake Mining Company	713019	PM_{10}	0.002	589940	4376280	21.42	333.15	10.097	0.10
Reck Brothers	0835am	PM_{10}	0.45	689110	4348990	10.00	295.37	0.00001	1.01
	0835am	PM_{10}	0.12	689110	4348990	10.00	295.37	0.00001	1.01
	0835am	NO_x	0.296	689110	4348990	10.00	295.37	0.00001	1.01
Nevada Slag, Inc.	1065am	PM_{10}	0.87	691300	4364600	10.00	295.37	0.00001	1.01
	1065am	PM_{10}	0.93	691300	4364600	10.00	295.37	0.00001	1.01
	1065am	NO_x	0.308	691300	4364600	10.00	295.37	0.00001	1.01
Reed Distributing, Inc.	1124001	PM_{10}	0.0003	682780	4348580	6.10	505.37	0.809	0.61
	1124001	PM_{10}	0.0003	682780	4348580	6.10	505.37	0.809	0.61
J & M Trucking, Inc.	1177am	PM_{10}	0.07	589410	4373560	10.00	295.37	0.00001	1.01
Bald Mountain Mine Properties	1336am	PM_{10}	0.03	630900	4420250	10.00	295.37	0.00001	1.01
Bald Mountain Mine Properties	1362001a	PM_{10}	0.03	617000	4423100	10.67	322.04	0.356	0.30
	1362001b	PM_{10}	0.002	617000	4423100	10.67	588.71	2.329	0.30
	1362001b	PM_{10}	0.002	617000	4423100	10.67	588.71	2.329	0.30
	1362002	PM_{10}	0.0001	617000	4423100	10.67	588.71	2.329	0.30
	1362002	PM_{10}	0.0001	617000	4423100	10.67	588.71	2.329	0.30
	1362003a	PM_{10}	0.01	617000	4423100	10.67	310.93	4.858	0.91
	1362003b	PM_{10}	0.0001	617000	4423100	10.67	310.93	4.858	0.91
	1362003b	PM_{10}	0.000	617000	4423100	10.67	310.93	4.858	0.91
	1362001	NO_x	0.056	617000	4423100	10.67	747.04	10.083	0.13
	1362002	NO_x	0.001	617000	4423100	10.67	588.71	2.329	0.30
	1362003	NO_x	0.016	617000	4423100	10.67	310.93	4.858	0.91
Cooper & Sons, Inc.	1377am	PM_{10}	0.74	688350	4356200	10.00	295.37	0.00001	1.01
	1377am	PM_{10}	0.62	688350	4356200	10.00	295.37	0.00001	1.01
	1377am	NO_x	0.406	688350	4356200	10.00	295.37	0.00001	1.01
Country Construction	1417001	PM_{10}	0.42	685820	4353520	10.00	295.37	0.00001	1.01
White Pine County School District	1466001	PM_{10}	0.26	684170	4346840	12.19	449.82	0.00003	0.46

NEARBY SOURCE EMISSION RATES AND STACK PARAMETERS (CONTINUED)

Facility Name	Source ID	Pollutant	Emission Rate (g/s)	UTM Location (mE)	UTM Location (mN)	Stack Height (meters)	Stack Temperature (K)	Exit Velocity (m/s)	Stack Diameter (meters)
	1466001	SO_2	0.01	684170	4346840	12.19	449.82	0.00003	0.46
	1466001	NO_x	0.041	684170	4346840	12.19	449.82	0.00003	0.46
Chevron Environmental Management Company	1594001	NO_x	0.053	683560	4347130	10.00	295.37	0.00001	1.01
U.S. Army - Dugway Proving Ground - Utah	10706	SO_2	0.66	820553	4448686	10.00	422.00	9.14	0.30

Attachment 3B

Modeling Inventory Developed for
Class I SO2 PSD Increment Analysis

(Used for Class I SO2 Increment Analysis)

White Pine Energy Station
Modeling Source Inventory - Cumulative Sources of SO_2

State	County	Company Name	Facility Name	Emission Point Description	UTM Zone 11 East (m)	UTM Zone 11 North (m)	Emission Rate (lb/hr)
NV	Elko	QUEENSTAKE RESOURCES USA, INC.	CLASS 1A -SSX PROJECT / INDEPENDENCE	SYSTEM 27 - HEAT CIRCUIT	591,760	4,584,600	0.032
NV	Elko	QUEENSTAKE RESOURCES USA, INC.	CLASS 1A -SSX PROJECT / INDEPENDENCE	SYSTEM 40 - WEST ROASTER PROCESS	591,760	4,584,600	2.91
NV	Elko	QUEENSTAKE RESOURCES USA, INC.	CLASS 1A -SSX PROJECT / INDEPENDENCE	SYSTEM 42 - EAST ROASTER PROCESS	591,760	4,584,600	2.91
NV	Elko	QUEENSTAKE RESOURCES USA, INC.	CLASS 1A -SSX PROJECT / INDEPENDENCE	SYSTEM 35 - DRY MILL CIRCUIT - ORE DRYING PROCESS	591,760	4,584,600	14.5
NV	Elko	HECLA VENTURES CORPORATION	CLASS 1 -HOLLISTER BLOCK DEVELOPMENT PROJECT	BACK-UP POWER GENERATION	536,800	4,550,500	1.52
NV	Elko	HECLA VENTURES CORPORATION	CLASS 1 -HOLLISTER BLOCK DEVELOPMENT PROJECT	POWER GENERATION	536,800	4,550,500	6.08
NV	Elko	CITY OF ELKO	CLASS 1 -ELKO SANITARY LANDFILL	SYSTEM 2 - GRINDING OPERATION - TREE & WOOD WASTES	607,600	4,521,200	0.45
NV	Elko	CITY OF ELKO	CLASS 1 -ELKO SANITARY LANDFILL	SYSTEM 2 ALT. OP. SCENARIO - GRINDING OPS. - ASPHALT MAT.	607,600	4,521,200	0.45
NV	Elko	GRAYMONT WESTERN US, INC	CLASS 1 - PILOT PEAK TITLE V	SYSTEM 12 - KILN 1 CIRCUIT (D-85)	734,420	4,522,850	14.0
NV	Elko	GRAYMONT WESTERN US, INC	CLASS 1 - PILOT PEAK TITLE V	SYSTEM 16 - KILN 2 CIRCUIT (D-285)	734,420	4,522,850	21.0
NV	Elko	GRAYMONT WESTERN US, INC	CLASS 1 - PILOT PEAK TITLE V	SYSTEM 21 - KILN 3 CIRCUIT (D-385)	734,420	4,522,850	33.6
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 84 - OXYGEN PLANT REGENERATIVE HEATER	568,120	4,512,620	0.005
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 60 - LIQUID SULFUR/ACID TANK HEATERS	568,120	4,512,620	0.04
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 68 - CARBON STRIPPING BOILER #3	568,120	4,512,620	0.05
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 69 - CARBON STRIPPING BOILER #4	568,120	4,512,620	0.05
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 70 - CARBON STRIPPING BOILER #5	568,120	4,512,620	0.05
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 71 - CARBON STRIPPING BOILER #6	568,120	4,512,620	0.05
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 74 - PROPANE VAPORIZER	568,120	4,512,620	0.07
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 75 - PROPANE VAPORIZER	568,120	4,512,620	0.07
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 76 - PROPANE VAPORIZER	568,120	4,512,620	0.07

White Pine Energy Station
Modeling Source Inventory - Cumulative Sources of SO_2

State	County	Company Name	Facility Name	Emission Point Description	UTM Zone 11 East (m)	UTM Zone 11 North (m)	Emission Rate (lb/hr)
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 58 - CFB NORTH ROASTER OXYGEN PREHEATER	568,120	4,512,620	0.07
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 59 - CFB SOUTH ROASTER OXYGEN PREHEATER	568,120	4,512,620	0.07
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 67 - CARBON STRIPPING BOILER #2	568,120	4,512,620	0.07
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 66 - CARBON STRIPPING BOILER #1	568,120	4,512,620	0.09
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 45 - ACID PLANT STARTUP HEATER	568,120	4,512,620	0.16
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 72 - CARBON REGENERATION KILN #1	568,120	4,512,620	0.17
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 73 - CARBON REGENERATION KILN #2	568,120	4,512,620	0.17
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 43 - NORTH CFB PREHEATER & SOUTH CFB PREHEATER	568,120	4,512,620	12.9
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 42 - MILL 6 STATIC SEPARATOR	568,120	4,512,620	27.4
NV	Eureka	NEWMONT MINING CORPORATION	CLASS 1B -GOLD QUARRY	SYSTEM 44 - N. CFB ROASTER, S. CFB ROASTER & RTO	568,120	4,512,620	39.5
NV	Eureka	BARRICK GOLDSTRIKE MINES, INC	CLASS 1B - GOLDSTRIKE MINE	ANCILLARY EQUIPMENT- PROPANE VAPORIZERS	554,700	4,536,310	0.004
NV	Eureka	BARRICK GOLDSTRIKE MINES, INC	CLASS 1B - GOLDSTRIKE MINE	PROPANE VAPORIZERS #1-#3	554,700	4,536,310	0.004
NV	Eureka	BARRICK GOLDSTRIKE MINES, INC	CLASS 1B - GOLDSTRIKE MINE	AUTOCLAVE CIRCUIT BOILER #1 (S2.021)	554,700	4,536,310	0.01
NV	Eureka	BARRICK GOLDSTRIKE MINES, INC	CLASS 1B - GOLDSTRIKE MINE	OXYGEN PLANT LIQUID OXYGEN VAPORIZER	554,700	4,536,310	0.02
NV	Eureka	BARRICK GOLDSTRIKE MINES, INC	CLASS 1B - GOLDSTRIKE MINE	AUTOCLAVE CIRCUIT BOILER #2&3 (S2.022 - 2.023)	554,700	4,536,310	0.03
NV	Eureka	BARRICK GOLDSTRIKE MINES, INC	CLASS 1B - GOLDSTRIKE MINE	RODEO MINE AIR HEATERS	554,700	4,536,310	0.05
NV	Eureka	BARRICK GOLDSTRIKE MINES, INC	CLASS 1B - GOLDSTRIKE MINE	AUTOCLAVE CIRCUIT BOILER #4 (S2.024)	554,700	4,536,310	0.05
NV	Eureka	BARRICK GOLDSTRIKE MINES, INC	CLASS 1B - GOLDSTRIKE MINE	MEIKLE MINE- MEIKLE AIR HEATERS	554,700	4,536,310	0.05
NV	Eureka	BARRICK GOLDSTRIKE MINES, INC	CLASS 1B - GOLDSTRIKE MINE	AUTOCLAVES #1 -#6	554,700	4,536,310	0.29
NV	Eureka	BARRICK GOLDSTRIKE MINES, INC	CLASS 1B - GOLDSTRIKE MINE	CARBON REACTIVATION KILN 2	554,700	4,536,310	0.30
NV	Eureka	BARRICK GOLDSTRIKE MINES, INC	CLASS 1B - GOLDSTRIKE MINE	AUTOCLAVES #1 -#6	554,700	4,536,310	0.45
NV	Eureka	BARRICK GOLDSTRIKE MINES, INC	CLASS 1B - GOLDSTRIKE MINE	AUTOCLAVES #1 -#6	554,700	4,536,310	0.90
NV	Eureka	BARRICK GOLDSTRIKE MINES, INC	CLASS 1B - GOLDSTRIKE MINE	AUTOCLAVES #1 -#6	554,700	4,536,310	0.90
NV	Eureka	BARRICK GOLDSTRIKE MINES, INC	CLASS 1B - GOLDSTRIKE MINE	MILL #1 DRY GRINDING PROCESS	554,700	4,536,310	4.28

White Pine Energy Station
Modeling Source Inventory - Cumulative Sources of SO_2

State	County	Company Name	Facility Name	Emission Point Description	UTM Zone 11 East (m)	UTM Zone 11 North (m)	Emission Rate (lb/hr)
NV	Eureka	BARRICK GOLDSTRIKE MINES, INC	CLASS 1B - GOLDSTRIKE MINE	MILL #2 DRY GRINDING PROCESS	554,700	4,536,310	4.28
NV	Eureka	BARRICK GOLDSTRIKE MINES, INC	CLASS 1B - GOLDSTRIKE MINE	SHOTCRETE PLANT W/AGG DRYER	554,700	4,536,310	10.6
NV	Eureka	BARRICK GOLDSTRIKE MINES, INC	CLASS 1B - GOLDSTRIKE MINE	S2.209 ORE ROASTING PROCESS	554,700	4,536,310	44.9
NV	Eureka	AIR LIQUIDE LARGE INDUSTRIES U.S. L.P.	CLASS 1A -BARRICK GOLDSTRIKE OXYGEN PLANT	COMBINED REACTIVATION GAS HEATER & GAS VAPORIZER	554,600	4,536,000	0.01
NV	Eureka	AIR LIQUIDE LARGE INDUSTRIES U.S. L.P.	CLASS 1A -BARRICK GOLDSTRIKE OXYGEN PLANT	COMBINED REACTIVATION GAS HEATER & GAS VAPORIZER	554,600	4,536,000	0.02
NV	Eureka	NEWMONT NEVADA ENERGY INVESTMENT, LLC	CLASS 1 PSD OPTC -BOULDER VALLEY POWER PROJ.	DIESEL FIREWATER PUMP	539,690	4,510,070	0.07
NV	Eureka	NEWMONT NEVADA ENERGY INVESTMENT, LLC	CLASS 1 PSD OPTC -BOULDER VALLEY POWER PROJ.	BACK-UP COMBUSTION TURBINES, #2 FUEL OIL FIRED	539,690	4,510,070	19.1
NV	Eureka	NEWMONT NEVADA ENERGY INVESTMENT, LLC	CLASS 1 PSD OPTC -BOULDER VALLEY POWER PROJ.	BACK-UP COMBUSTION TURBINES, #2 FUEL OIL FIRED	539,690	4,510,070	19.1
NV	Eureka	NEWMONT NEVADA ENERGY INVESTMENT, LLC	CLASS 1 PSD OPTC -BOULDER VALLEY POWER PROJ.	BACK-UP COMBUSTION TURBINES, #2 FUEL OIL FIRED	539,690	4,510,070	19.1
NV	Eureka	NEWMONT NEVADA ENERGY INVESTMENT, LLC	CLASS 1 PSD OPTC -BOULDER VALLEY POWER PROJ.	BACK-UP COMBUSTION TURBINES, #2 FUEL OIL FIRED	539,690	4,510,070	19.1
NV	Eureka	NEWMONT NEVADA ENERGY INVESTMENT, LLC	CLASS 1 PSD OPTC -BOULDER VALLEY POWER PROJ.	SUB-CRITICAL STEAM BOILER	539,690	4,510,070	193
NV	Humboldt	NEWMONT MINING CORPORATION	CLASS 1B -TWIN CREEKS MINE	SYSTEM 12 - PINON MILL CARBON REGENERATION KILN	485,840	4,567,620	0.004
NV	Humboldt	NEWMONT MINING CORPORATION	CLASS 1B -TWIN CREEKS MINE	SYSTEM 9 - JUNIPER MILL PACKAGE BOILERS - FIRETUBE	485,840	4,567,620	0.005
NV	Humboldt	NEWMONT MINING CORPORATION	CLASS 1B -TWIN CREEKS MINE	SYSTEM 4 - JUNIPER MILL CARBIN KILNS	485,840	4,567,620	0.006
NV	Humboldt	NEWMONT MINING CORPORATION	CLASS 1B -TWIN CREEKS MINE	SYSTEM 20 - OXYGEN PLANT VAPORIZER	485,840	4,567,620	0.01
NV	Humboldt	NEWMONT MINING CORPORATION	CLASS 1B -TWIN CREEKS MINE	SYSTEM 21 - OXYGEN PLANT VAPORIZER	485,840	4,567,620	0.01
NV	Humboldt	NEWMONT MINING CORPORATION	CLASS 1B -TWIN CREEKS MINE	SYSTEM 15 - SAGE MILL STEAM GENERATORS	485,840	4,567,620	0.10
NV	Humboldt	NEWMONT MINING CORPORATION	CLASS 1B -TWIN CREEKS MINE	SYSTEM 14 - SAGE MILL AUTOCLAVES: PRIM. & ALT. OP. SCENARIO	485,840	4,567,620	33.3
NV	Clark	NEVADA POWER COMPANY	PSD - REID-GARDNER GENERATING STATION	SYSTEMS 03A & 03B: STEAM BOILER #3 (B-03)	711,620	4,059,440	680
NV	Clark	NEVADA POWER COMPANY	PSD - REID-GARDNER GENERATING STATION	SYSTEMS 04A & 04B: STEAM BOILER #4 (B-04)	711,620	4,059,440	857

White Pine Energy Station
Modeling Source Inventory - Cumulative Sources of SO_2

State	County	Company Name	Facility Name	Emission Point Description	UTM Zone 11 East (m)	UTM Zone 11 North (m)	Emission Rate (lb/hr)
NV	Clark	Chemical Lime - Apex	Chemical Lime - Apex	Portable Screening Plant Generator	687,325	4,025,734	0.04
NV	Clark	Lasco Bathware	Lasco Bathware	Air Heater - Line 1	712,587	4,062,663	0.01
NV	Clark	Lasco Bathware	Lasco Bathware	Air Heater - Line 1	712,588	4,062,625	0.01
NV	Clark	Lasco Bathware	Lasco Bathware	Air Heater - Line 2	712,634	4,062,663	0.01
NV	Clark	Lasco Bathware	Lasco Bathware	Air Heater - Line 2	712,634	4,062,625	0.01
NV	Clark	Lasco Bathware	Lasco Bathware	Airex RTO	712,581	4,062,663	0.01
NV	Clark	Simplot Silica Products	Simplot Silica Products	Coal fired sand dryer	730,457	4,044,128	7.34
NV	Clark	Simplot Silica Products	Simplot Silica Products	Pit Area	726,784	4,039,557	10.8
NV	Clark	Simplot Silica Products	Simplot Silica Products	Dry Area	730,300	4,044,007	0.96
NV	Clark	Simplot Silica Products	Simplot Silica Products	Portable Dryer	730,484	4,044,118	0.06
NV	Clark	Royal Cement Company	Royal Cement Company	Rotary Kiln	723,301	4,058,917	16.6
NV	Clark	NPC Harry Allen Station	NPC Harry Allen Station	GE Turbine	688,237	4,033,301	45.3
NV	Clark	NPC Harry Allen Station	NPC Harry Allen Station	Cummins Generator	688,184	4,033,358	0.27
NV	Clark	NPC Harry Allen Station	NPC Harry Allen Station	Turbine/HRSG	688,169	4,033,533	1.00
NV	Clark	NPC Harry Allen Station	NPC Harry Allen Station	Turbine/HRSG	688,129	4,033,588	1.00
NV	Clark	NPC Harry Allen Station	NPC Harry Allen Station	Katolight Generator	688,199	4,033,479	0.80
NV	Clark	NPC Harry Allen Station	NPC Harry Allen Station	Caterpillar Generator	688,268	4,033,393	1.60
NV	Clark	NPC Harry Allen Station	NPC Harry Allen Station	GE PG 7 EA Turbine	688,202	4,033,324	0.64
NV	Clark	NPC Harry Allen Station	NPC Harry Allen Station	Clarke Fire Pump	688,150	4,033,424	0.31
NV	Clark	Mirant LLC	Mirant LLC	CTGHRSG1	682,932	4,031,880	1.00
NV	Clark	Mirant LLC	Mirant LLC	CTGHRSG2	682,925	4,031,844	1.00
NV	Clark	Mirant LLC	Mirant LLC	Gasheater - part	682,776	4,031,688	0.005
NV	Clark	Mirant LLC	Mirant LLC	Gasheater - part	682,776	4,031,686	0.005
NV	Clark	Mirant LLC	Mirant LLC	Generator	683,032	4,031,790	2.40
NV	Clark	Mirant LLC	Mirant LLC	Fire Pump	682,863	4,031,820	0.60
NV	Clark	NPC SilverHawk Power Plant	NPC SilverHawk Power Plant	Westinghouse turbine/HRSG	682,958	4,031,122	1.50
NV	Clark	NPC SilverHawk Power Plant	NPC SilverHawk Power Plant	Westinghouse turbine/HRSG	682,997	4,031,147	1.50
NV	Clark	NPC SilverHawk Power Plant	NPC SilverHawk Power Plant	Fire Pump	683,050	4,031,234	0.50
NV	Clark	NPC SilverHawk Power Plant	NPC SilverHawk Power Plant	Generator	682,948	4,031,274	0.01
NV	Clark	Ashgrove Cement (ATC appln)	Ashgrove Cement (ATC appln)	Kiln	699,293	4,044,523	84.0
ID	MINIDOKA	TASCO, Paul	TASCO, Paul	TASCO, Paul	765,970	4,722,588	72.8
ID	MINIDOKA	TASCO, Paul	TASCO, Paul	TASCO, Paul	765,970	4,722,588	0.02
ID	MINIDOKA	TASCO, Paul	TASCO, Paul	TASCO, Paul	765,960	4,722,588	58.6
ID	MINIDOKA	TASCO, Paul	TASCO, Paul	TASCO, Paul	765,888	4,722,771	16.5
ID	MINIDOKA	TASCO, Paul	TASCO, Paul	TASCO, Paul	765,898	4,722,771	20.1
ID	MINIDOKA	TASCO, Paul	TASCO, Paul	TASCO, Paul	765,961	4,722,702	0.78
ID	MINIDOKA	TASCO, Paul	TASCO, Paul	TASCO, Paul	765,955	4,722,711	0.02

White Pine Energy Station
Modeling Source Inventory - Cumulative Sources of SO_2

State	County	Company Name	Facility Name	Emission Point Description	UTM Zone 11 East (m)	UTM Zone 11 North (m)	Emission Rate (lb/hr)
ID	MINIDOKA	TASCO, Paul	TASCO, Paul	TASCO, Paul	765,972	4,722,614	4.37
ID	TWIN FALLS	TASCO, Twin Falls	TASCO, Twin Falls	TASCO, Twin Falls	711,018	4,711,770	186
ID	TWIN FALLS	TASCO, Twin Falls	TASCO, Twin Falls	TASCO, Twin Falls	711,070	4,711,655	225
ID	TWIN FALLS	TASCO, Twin Falls	TASCO, Twin Falls	TASCO, Twin Falls	710,912	4,711,910	13.3
ID	TWIN FALLS	TASCO, Twin Falls	TASCO, Twin Falls	TASCO, Twin Falls	710,972	4,711,898	0.95
ID	TWIN FALLS	TASCO, Twin Falls	TASCO, Twin Falls	TASCO, Twin Falls	710,972	4,711,898	0.48
ID	TWIN FALLS	TASCO, Twin Falls	TASCO, Twin Falls	TASCO, Twin Falls	710,964	4,711,912	1.25
UT	Sevier	Nevco Power Pant	Nevco Power Pant	270 MW Coal-Fired Boiler	935,678	4,311,470	125
UT	Millard	Intermountain Power Plant	Intermountain Power Plant	Unit 1	880,096	4,382,612	455
UT	Millard	Intermountain Power Plant	Intermountain Power Plant	Unit 2	880,096	4,382,612	424
UT	Millard	Intermountain Power Plant	Intermountain Power Plant	Unit 3	879,936	4,382,602	905
UT	Millard	Graymont Western Lime	Graymont Western Lime	Kiln 1	862,670	4,318,192	109
UT	Millard	Graymont Western Lime	Graymont Western Lime	Kiln 2	862,649	4,318,184	25.9
UT	Millard	Graymont Western Lime	Graymont Western Lime	Kiln 3	862,627	4,318,132	29.4
UT	Millard	Graymont Western Lime	Graymont Western Lime	Kiln 4	862,665	4,318,001	38.4
UT	Iron	Genpak Corporation	Polystyrene Foam Production Facility	Natural Gas Heater / Thermal Oxidizer	843,891	4,177,663	0.003
UT	Washington	Kern River Gas Transmission Company	Veyo Compressor Station	SoLoNOx Turbine	793,729	4,138,458	0.22
UT	Washington	Kern River Gas Transmission Company	Veyo Compressor Station	SoLoNOx Turbine	793,729	4,138,458	0.72
UT	Washington	Kern River Gas Transmission Company	Veyo Compressor Station	SoLoNOx Turbine	793,729	4,138,458	0.36
UT	Washington	Kern River Gas Transmission Company	Veyo Compressor Station	Backup Generator	793,729	4,138,458	0.004
UT	Washington	Kern River Gas Transmission Company	Veyo Compressor Station	Boiler	793,729	4,138,458	0.002
UT	Washington	St. George City Power	Red Rock Power Generation Station	Diesel Engine Generator	804,994	4,111,226	0.21
UT	Washington	St. George City Power	Red Rock Power Generation Station	Dual Fuel Engine	804,994	4,111,226	0.14

White Pine Energy Station
Modeling Source Inventory - Cumulative Sources of SO_2

State	County	Company Name	Facility Name	Emission Point Description	UTM Zone 11 East (m)	UTM Zone 11 North (m)	Emission Rate (lb/hr)
UT	Washington	Southern Utah Asphalt	Asphalt Plant in Ft. Pierce Industrial park	Asphalt Plant in Ft. Pierce Industrial park	801,321	4,106,683	0.74
UT	Washington	Progressive Contracting Incorporated	Aggregate Mining	Aggregate Mining	802,645	4,106,366	2.71
UT	Washington	Western Rock Products Corporation	Sorenson Pit	Sorenson Pit	803,107	4,113,312	1.14
UT	Washington	Washington Cty Solid Waste Spcl Svc Dist	Washington County Sanitary Landfill	Washington County Sanitary Landfill	804,105	4,139,027	4.99
UT	Washington	Intermountain Health Care	Dixie Regional Hospital (New)	Dixie Regional Hospital (New)	806,087	4,111,239	6.07
UT	Washington	Sunroc Corporation	Concrete Block Facility	Concrete Block Facility	806,515	4,105,408	0.60
UT	Washington	Sunroc Corporation	Ft. Pearce Concrete Batch & Aggregate Plants	Ft. Pearce Concrete Batch & Aggregate Plants	807,286	4,104,935	2.94
UT	Washington	Western Rock Products Corporation	Fort Pierce Pit	Fort Pierce Pit	808,156	4,104,810	6.85
UT	Washington	Quality Excavation Inc.	Aggregate Plant - Fort Pierce Industrial Park	Aggregate Plant - Fort Pierce Industrial Park	808,823	4,106,957	2.75
UT	Washington	Gilbert Development Corporation	Aggregate Crushing - SR 9 Pit	Aggregate Crushing - SR 9 Pit	816,958	4,119,403	2.08
UT	Washington	Interstate Rock Products	Hurricane Pit	Hurricane Pit	822,923	4,120,121	0.75
UT	Iron	Western Rock Products Corporation	Cedar City Yard & Ready Mix Plant	Cedar City Yard & Ready Mix Plant	845,457	4,180,613	7.50
UT	Iron	Mel Clark Construction	Cedar City Aggregate Processing Plant	Cedar City Aggregate Processing Plant	845,674	4,180,205	0.09
UT	Iron	Ashdown Brothers Construction	Asphalt Plant/Crusher/Concrete Plant	Asphalt Plant/Crusher/ Concrete Plant	845,957	4,179,852	8.03
UT	Iron	Southern Utah University	Cedar City Campus	Cedar City Campus	846,597	4,176,967	17.0
UT	Iron	Sunroc Corporation	Cedar City Concrete Batching Plant	Cedar City Concrete Batching Plant	847,417	4,179,615	2.01
UT	Iron	Mel Clark Construction	Clark Pit: Aggregate Processing Facility	Clark Pit: Aggregate Processing Facility	848,059	4,194,603	0.09
UT	Washington	Twin City Power	Hildale City Cogeneration Facility	Hildale City Cogeneration Facility	855,757	4,102,512	1.67

White Pine Energy Station
Modeling Source Inventory - Cumulative Sources of SO_2

Per the cumulative SO2 PSD increment modeling protocol agreed upon by WPEA and the National Park Service, the modeling source inventory includes SO2 emissions from all increment-consuming PSD major sources inside the Calpuff modeling domain and all increment-consuming PSD minor sources within 50 km of a Class I receptor. Note that only potentially increment-consuming emissions are included in the modeling inventory. Increment expansion was not included, although increment expansion may have actually occurred due to emissions reductions at some sources in the analysis.

The Calpuff modeling domain includes areas in Nevada, Oregon, Idaho, Utah, and Arizona. Specific details of the modeling source inventory for each state are provided below:

State-Specific Modeling Inventory Details

Jurisdiction	Agency Contact Supplying Inventory Data	Notes
Nevada	Greg Remer, NDEP (phone: 775-687-9359)	Emission rates from the NDEP database are on a potential to emit basis. Since the NDEP database does not flag PSD major sources, al Class 1 facilities (i.e., >100 tpy potential emissions for any criteria pollutant) located within the Calpuff domain were conservatively assumed to be PSD major and were included in the modeling inventory. No Class 2 facilities (i.e., <100 tpy potential for all criteria pollutants) were located within 50 km of a Class I receptor. Since the Reid Gardner Units #1 and #2 were operating prior to the January 6, 1975, baseline date (per email from Greg Remer, NDEP, to David Wilson, LS Power, 09/14/2006) emissions from these units are part of the PSD increment baseline. Therefore, Reid-Gardner Units #1 and #2 are not included in the modeling inventory. Since Reid-Gardner installed SO2 scrubbers after the baseline date, increment expansion by these units could have been documented and modeled.
Nevada (Clark County)	Vasant Rajagopalan, Clark County Department of Air Quality Management (phone: 702-455-5942)	Emission rates for Clark County are on a potential to emit basis. The modeling inventory includes all Clark County PSD major sources within the Calpuff modeling domain. Since Clark County is not within 50 km of a Class I receptor, no Clark County minor sources are included in in the modeling inventory.
Oregon	Mark Bailey, Oregon DEQ (phone: 541-388-6146, ext. 322)	No PSD major sources exist within the Calpuff modeling domain (per email from Mark Bailey, Oregon DEQ, to David Wilson, LS Power, 09/08/2006). Since the Oregon area of the Calpuff modeling domain is not within 50 km of a Class I receptor, no Oregon mino sources are included in the modeling inventory.
Idaho	Gary Reinbold, Idaho DEQ (phone: 208-373-0253)	Emission rates from the Idaho DEQ are actuals. The modeling inventory includes all Idaho PSD major sources within the Calpuff modeling domain. No Idaho PSD minor sources are located within 50 km of a Class I receptor (per email from Gary Reinbold, Idaho DEQ, to David Wilson, LS Power, 09/14/2006).
Utah	Tom Orth, Utah DEQ (phone: 801-536-4005)	Emissions from the Utah DEQ are actuals. The modeling inventory includes all Utah PSD major sources within the Calpuff modeling domain. Potential emissions are modeled for new proposed power plants that have not established actual emissions levels. Several PSD minor sources in Iron and Washington counties are included in the modeling inventory since they are located within 50 km of Class I receptors at Zion.
Arizona	Latha Toopal, ADEQ (phone: 602-771-2273)	The Calpuff modeling domain includes portions of Mohave and Coconino Counties; however, based on source locations provided by ADEQ, there are no PSD major or minor sources located within the modeling domain. Thus, no Arizona sources are included in the modeling inventory.

Attachment 4

Analysis of Sulfur and Nitrogen Deposition

Attachment 4A

Deposition Analysis for Jarbidge Wilderness Area

Sulfur and Nitrogen Deposition

Cumulative Deposition Assessment - Jarbidge Wilderness Area

The total deposition increases due to the WPES, the EEC, Toquop, Newmont, IPP3, and Nevco-Sevier, are evaluated in conjunction with EPA's Clean Air Status and Trends (CASTNET) monitored deposition values to demonstrate that aquatic ecosystems in the area would be safe from acidification effects after construction of the proposed action and the reasonably expected future actions. Predicted total deposition increases are presented below, along with actual monitored values applicable to Jarbidge from the CASTNET monitoring network.

Table 1. Sulfur Deposition at Jarbidge

Total S Deposition Increase (kg/ha/yr) (1)	CASTNET Monitored Existing S Deposition (kg/ha/yr) (2)	Total Predicted S Deposition (kg/ha/yr)
0.03	0.91	0.94

Notes:

(1) Total predicted sulfur deposition due to the WPES, EEC, Toquop, Newmont, IPP3, and Nevco-Sevier calculated in Attachment 1.

(2) Per USDA Forest Service, Saval Ranch CASTNET deposition data is representative of Jarbidge. For the Saval Ranch site, wet and dry deposition values are available for the date range 1990 through 1993. The worst-case deposition occurred in 1993 and is represented in the table. Site-specific deposition charts are included at the end of this analysis.

Table 2. Nitrogen Deposition at Jarbidge

Total N Deposition Increase (kg/ha/yr) (1)	CASTNET Monitored Existing N Deposition (kg/ha/yr) (2)	Total Predicted N Deposition (kg/ha/yr)
0.008	2.0	2.01

Notes:

(1) Total predicted nitrogen deposition due to the WPES, EEC, Toquop, Newmont, IPP3, and Nevco-Sevier calculated in Attachment 1.

(2) Per USDA Forest Service, Saval Ranch CASTNET deposition data is representative of Jarbidge. For the Saval Ranch site, wet and dry deposition values are available for the date range 1990 through 1993. The worst-case deposition occurred in 1993 and is represented in the table. Site-specific deposition charts are included at the end of this analysis.

The USDA Forest Service research paper *Estimating Lake Susceptibility to Acidification Due to Acid Deposition* (the Paper) provides a procedure for predicting acid deposition effects on aquatic ecosystems. Figure 3 of the paper represents "safe lines" on a plot of deposition vs. base cation concentration. Lakes that fall on the right side of the "safe lines" are not expected to be adversely affected by the corresponding deposition levels. The Figure 3 "lookup" values corresponding to Jarbidge are discussed below.

Sulfur and Nitrogen Deposition

Cumulative Deposition Assessment - Jarbidge Wilderness Area

In high elevation Western lakes, both sulfur and nitrogen deposition can contribute to aquatic acidity. For such lakes, the Paper indicates that the total deposition used as a "lookup" value in Figure 3 should include all sulfur deposition, plus 25% of the nitrogen deposition to account for the acidification potential of inorganic nitrogen.

Emerald Lake is a high-elevation lake identified at Jarbidge with a population of brook trout documented by the Nevada Division of Wildlife (NDOW). The alkalinity of Emerald Lake is reported by NDOW as 342 μeq/L. Alkalinity serves as a worst-case indicator for acid neutralization capacity (ANC). Assuming a worst-case 1:1 relationship between ANC and base cation concentration (per Figure 1 of the paper), the worst-case base cation concentration would be 342 μeq/L. The "lookup" values for Figure 3 of the Paper are provided in Table 3 below.

Table 3. Lookup Values for Figure 3 of the Paper

Lookup Values	
Total Deposition (kg/ha/yr) (1)	**Worst-Case Base Cation Concentration (μeq/L) (2)**
1.4	342

Notes:
(1) Total deposition is calculated as sulfur deposition plus 25% of nitrogen deposition. Individual sulfur and nitrogen deposition values in the calculation are taken from Tables 1 and 2 of this analysis.
(2) Worst-case base cation concentration corresponding to alkalinity of Emerald Lake analyzed by NDOW.

Figure 3 from the Paper is provided below, with points plotted for the Jarbidge lookup values and superimposed in blue. Since the point corresponding to Jarbidge falls to the right of all the safe lines in Figure 3, the predicted deposition levels for Jarbidge are not expected to have any adverse effects on plant or animal life in the aquatic ecosystems.

Sulfur and Nitrogen Deposition

Cumulative Deposition Assessment - Jarbidge Wilderness Area

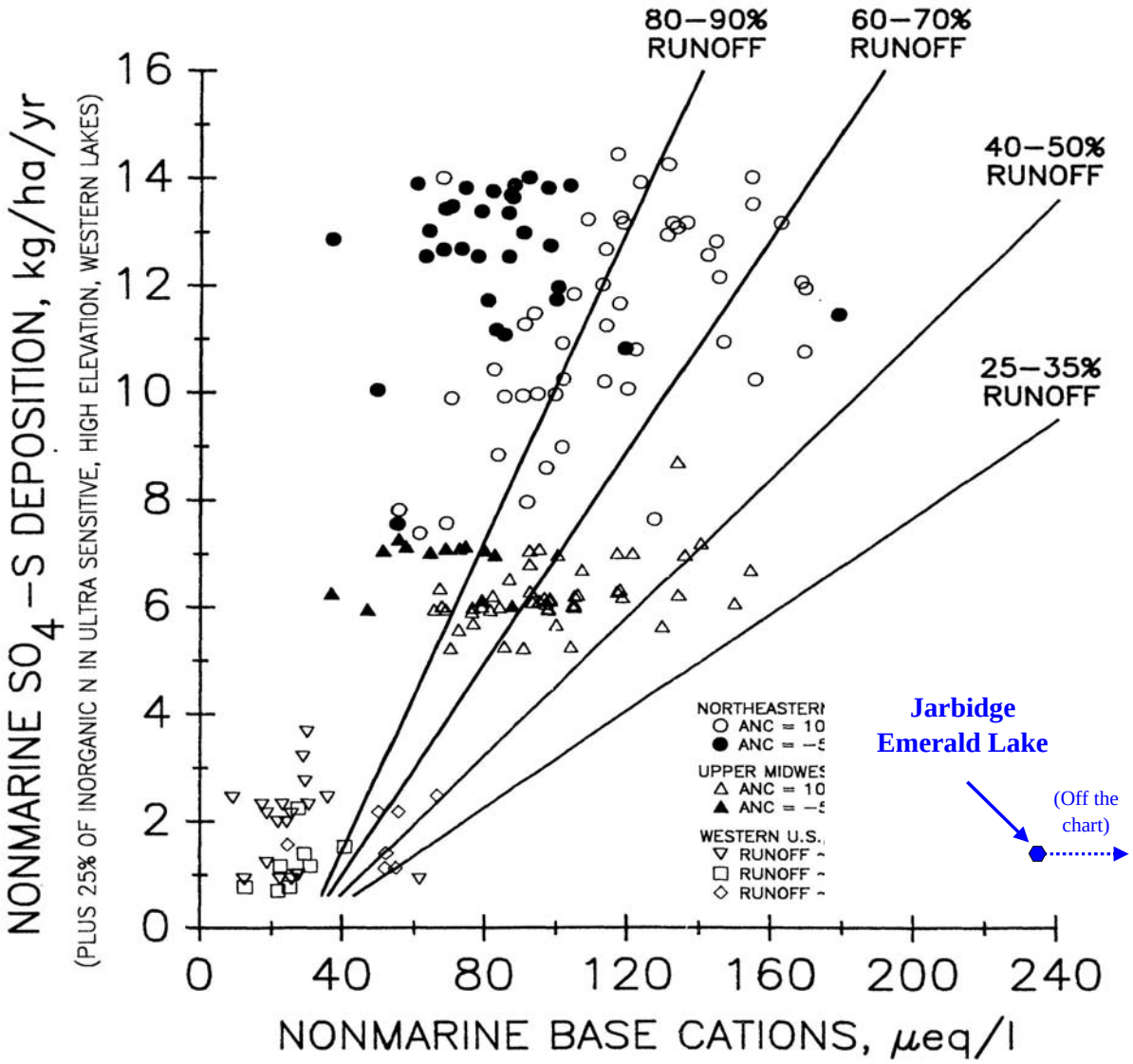


Figure 3.—*Base cations vs. deposition, "safe" lines. Lakes to the right of the appropriate runoff line are unlikely to be acidic. (Lake chemistry data from Kanciruk* et al. *1986 and Eilers* et al. *1987.)*

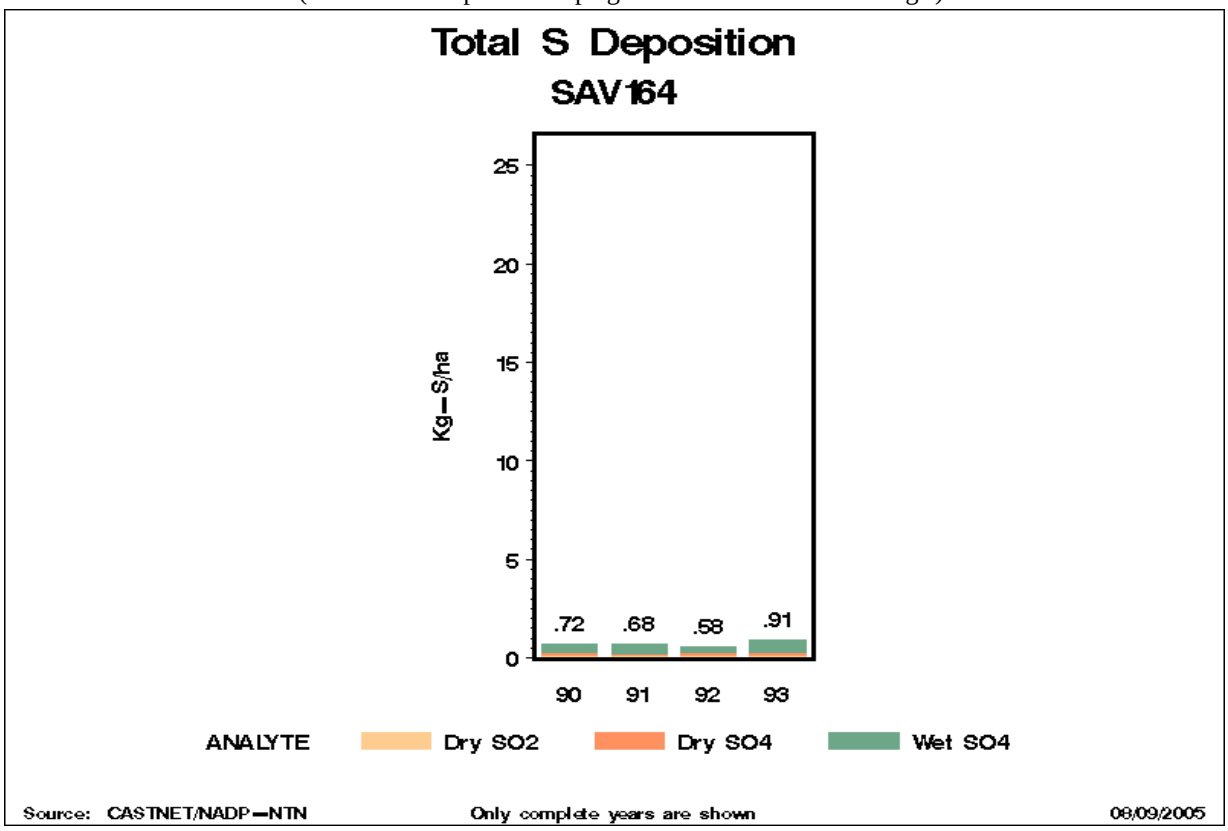
(Figure 3 from Nichols, Dale S., *Estimating Lake Susceptibility to Acidification Due to Acid Deposition*, United States Department of Agriculture Forest Service, Research Paper No. NC-289, February 1990.)

Sulfur and Nitrogen Deposition

Cumulative Deposition Assessment - Jarbidge Wilderness Area

CASTNET Monitored Sulfur Deposition at Saval Ranch

(available at http://www.epa.gov/castnet/charts/sav164ts.gif)

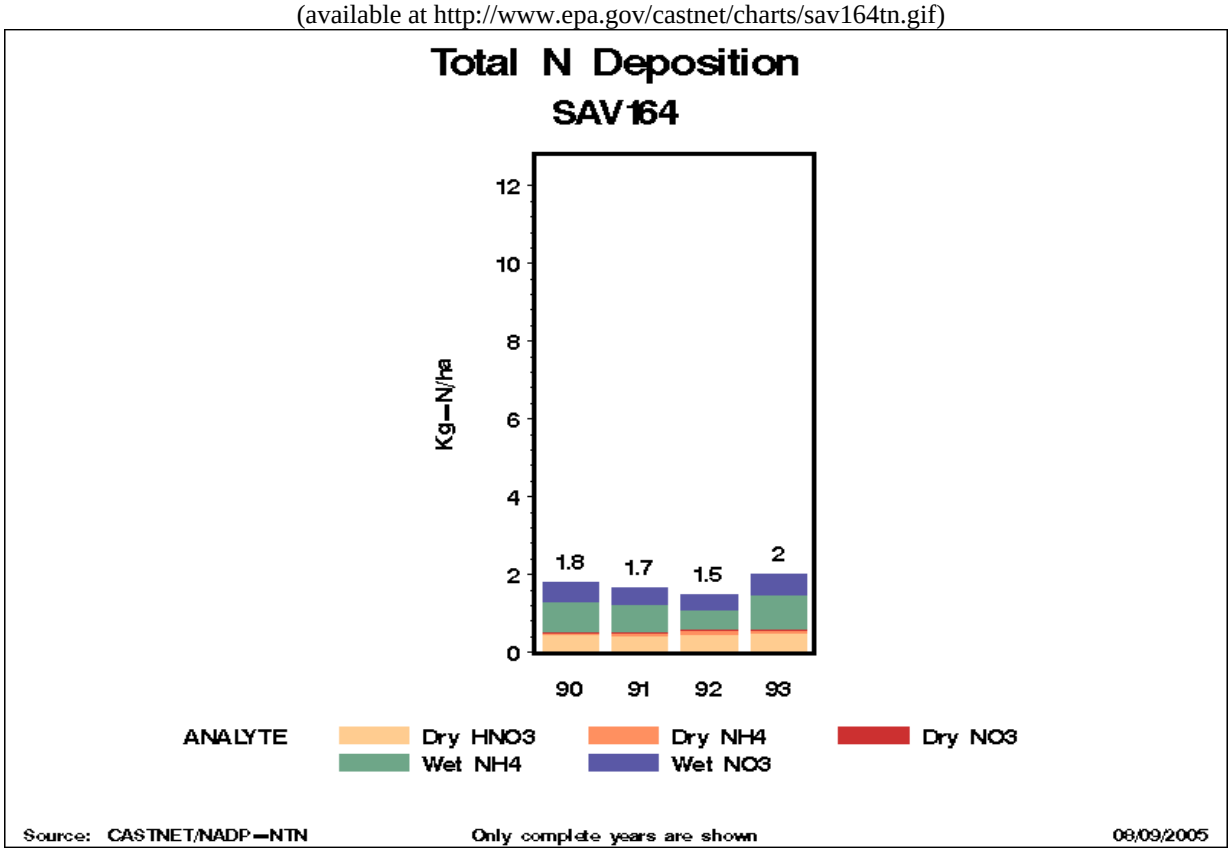


Sulfur and Nitrogen Deposition

Cumulative Deposition Assessment - Jarbidge Wilderness Area

CASTNET Monitored Nitrogen Deposition at Saval Ranch

(available at http://www.epa.gov/castnet/charts/sav164tn.gif)



Attachment 4B

Deposition Analysis for
Great Basin National Park

Sulfur and Nitrogen Deposition

Cumulative Deposition Assessment - Great Basin National Park

The total deposition increases due to the WPES, the EEC, Toquop, Newmont, IPP3, and Nevco-Sevier, are evaluated in conjunction with EPA's Clean Air Status and Trends (CASTNET) monitored deposition values to demonstrate that aquatic ecosystems in the area would be safe from acidification effects after construction of the proposed action and the reasonably expected future actions. Predicted total deposition increases are presented below, along with actual monitored values applicable to Great Basin from the CASTNET monitoring network.

Table 1. Sulfur Deposition in the Great Basin Class II Area

Total S Deposition Increase (kg/ha/yr) (1)	CASTNET Monitored Existing S Deposition (kg/ha/yr) (2)	Total Predicted S Deposition (kg/ha/yr)
0.14	0.77	0.91

Notes:
(1) Total predicted sulfur deposition due to the WPES, EEC, Toquop, Newmont, IPP3, and Nevco-Sevier calculated in Attachment 1. Maximum deposition due to the WPES occurred during 1996; thus, background deposition values for 1996 were used.

(2) Site-specific deposition charts are included on the following pages.

Table 2. Nitrogen Deposition in the Great Basin Class II Area

Total N Deposition Increase (kg/ha/yr) (1)	CASTNET Monitored Existing N Deposition (kg/ha/yr) (2)	Total Predicted N Deposition (kg/ha/yr)
0.06	2.1	2.16

Notes:
(1) Total predicted nitrogen deposition due to the WPES, EEC, Toquop, Newmont, IPP3, and Nevco-Sevier calculated in Attachment 1. Maximum sulfur deposition due to the WPES occurred during 1996; thus, background deposition values for 1996 were used.

(2) Site-specific deposition charts are included on the following pages.

The USDA Forest Service research paper *Estimating Lake Susceptibility to Acidification Due to Acid Deposition* (the Paper) provides a procedure for predicting acid deposition effects on aquatic ecosystems. Figure 3 of the paper represents "safe lines" on a plot of deposition vs. base cation concentration. Lakes that fall on the right side of the "safe lines" are not expected to be adversely affected by the corresponding deposition levels. The Figure 3 "lookup" values corresponding to Great Basin are discussed below.

Sulfur and Nitrogen Deposition

Cumulative Deposition Assessment - Great Basin National Park

In high elevation Western lakes, both sulfur and nitrogen deposition can contribute to aquatic acidity. For such lakes, the Paper indicates that the total deposition used as a "lookup" value in Figure 3 should include all sulfur deposition, plus 25% of the nitrogen deposition to account for the acidification potential of inorganic nitrogen.

The National Park Service (NPS) notes that Baker Lake is the most sensitive lake at Great Basin, with an acid neutralization capacity (ANC) of 73 μeq/L. Assuming a worst-case 1:1 relationship between ANC and base cation concentration (per Figure 1 of the paper), the worst-case base cation concentration would be 73 μeq/L. The "lookup" values for Figure 3 of the Paper are provided in Table 3 below.

Table 3. Lookup Values for Figure 3 of the Paper

Lookup Values	
Total Deposition (kg/ha/yr) (1)	**Worst-Case Base Cation Concentration (μeq/L) (2)**
1.5	73

Notes:

(1) Total deposition is calculated as sulfur deposition plus 25% of nitrogen deposition. Individual sulfur and nitrogen deposition values in the calculation are taken from Tables 1 and 2 of this analysis.

(2) Worst-case base cation concentration corresponding to acid neutralization capacity of Baker Lake provided by NPS.

Figure 3 from the Paper is provided below, with points plotted for the Great Basin lookup values and superimposed in blue. Since the point corresponding to Great Basin falls to the right of all the safe lines in Figure 3, the predicted deposition levels for Great Basin are not expected to have any adverse effects on plant or animal life in the aquatic ecosystems.

Sulfur and Nitrogen Deposition

Cumulative Deposition Assessment - Great Basin National Park

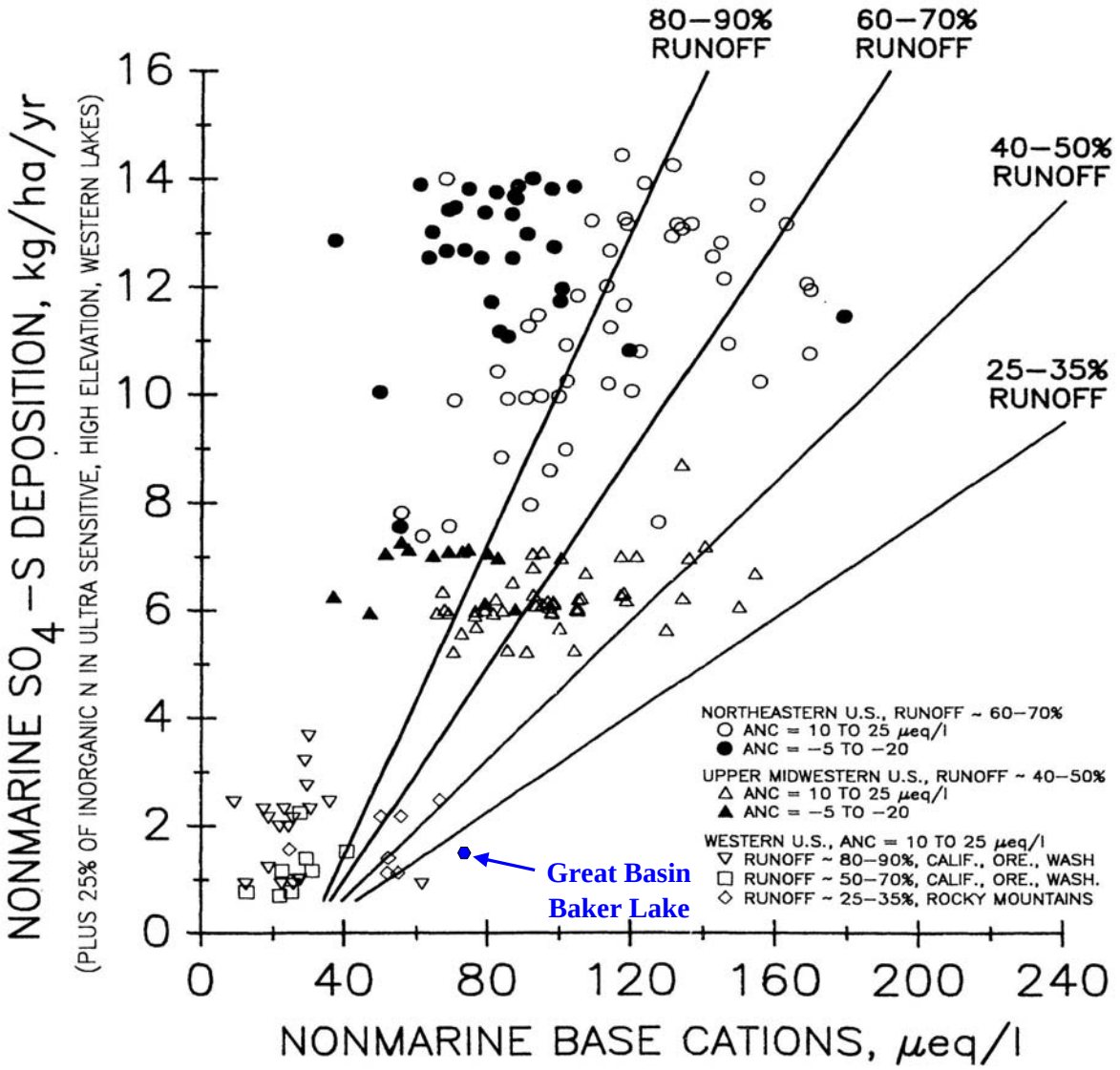


Figure 3.—*Base cations vs. deposition, "safe" lines. Lakes to the right of the appropriate runoff line are unlikely to be acidic. (Lake chemistry data from Kanciruk* et al. *1986 and Eilers* et al. *1987.)*

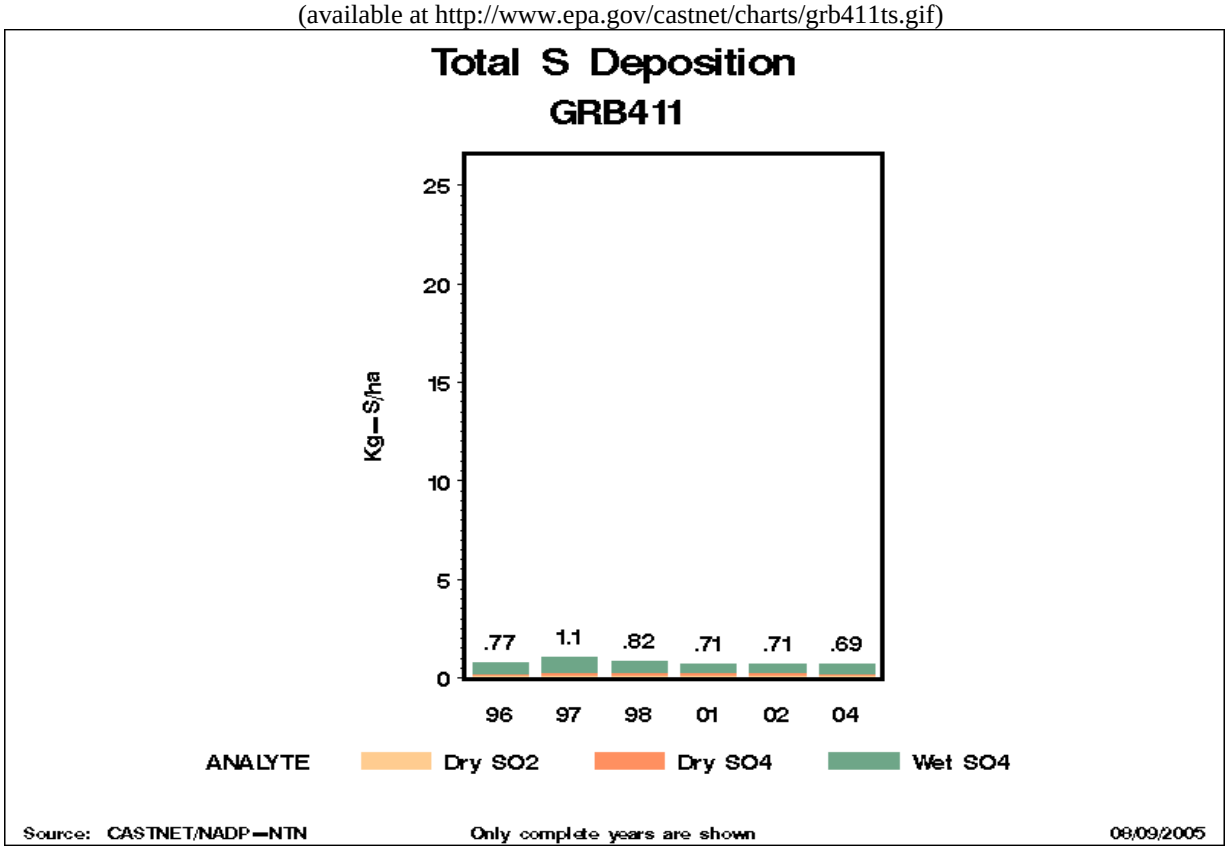
(Figure 3 from Nichols, Dale S., *Estimating Lake Susceptibility to Acidification Due to Acid Deposition*, United States Department of Agriculture Forest Service, Research Paper No. NC-289, February 1990.)

Sulfur and Nitrogen Deposition

Cumulative Deposition Assessment - Great Basin National Park

CASTNET Monitored Sulfur Deposition at Great Basin

(available at http://www.epa.gov/castnet/charts/grb411ts.gif)

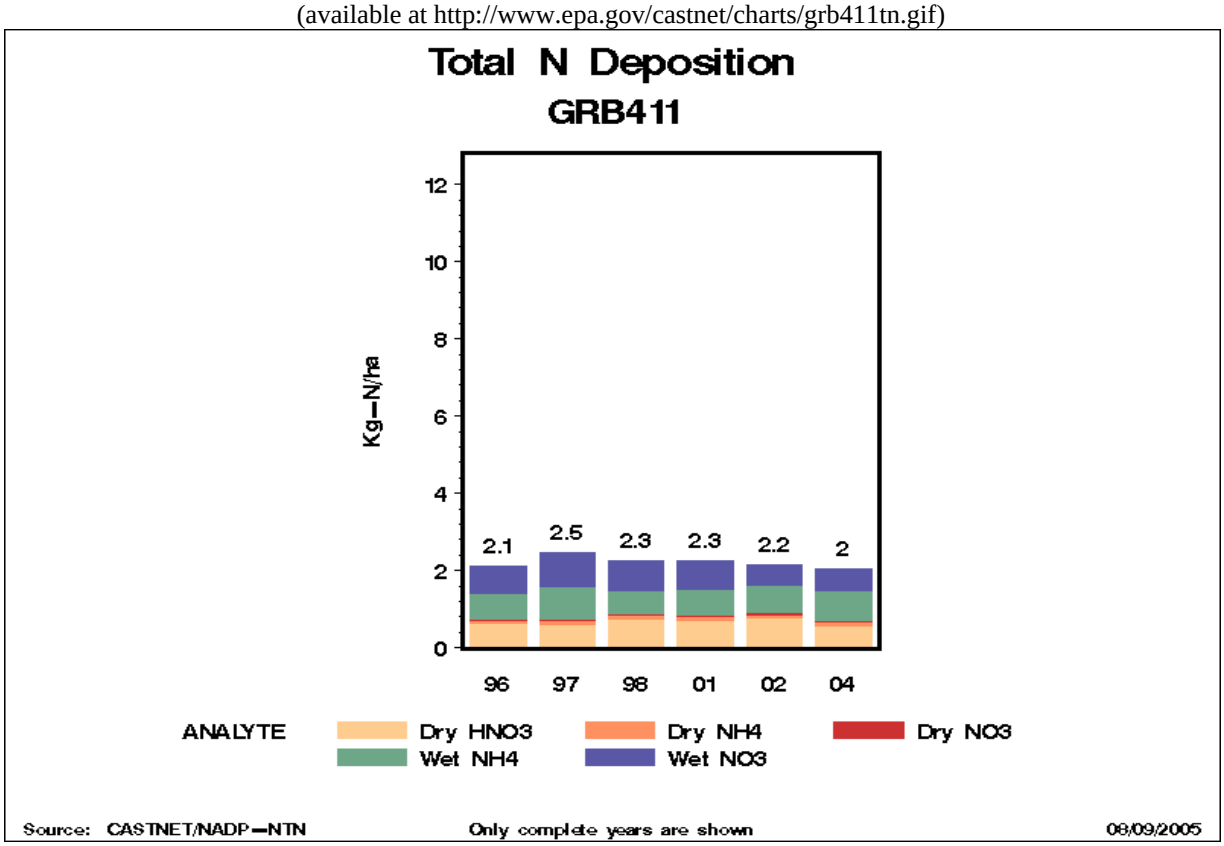


Sulfur and Nitrogen Deposition

Cumulative Deposition Assessment - Great Basin National Park

CASTNET Monitored Nitrogen Deposition at Great Basin

(available at http://www.epa.gov/castnet/charts/grb411tn.gif)



Attachment 4C

Deposition Analysis for
Ruby Lake National Wilderness Area

Sulfur and Nitrogen Deposition

Cumulative Deposition Assessment - Ruby Lake National Wildlife Refuge

The total deposition increases due to the WPES, the EEC, Toquop, Newmont, IPP3, and Nevco-Sevier, are evaluated in conjunction with EPA's Clean Air Status and Trends (CASTNET) monitored deposition values to demonstrate that aquatic ecosystems in the area would be safe from acidification effects after construction of the proposed action and the reasonably expected future actions. Predicted total deposition increases are presented below, along with representative existing deposition values applicable to Ruby Lake from the CASTNET monitoring network.

Table 1. Sulfur Deposition in the Ruby Lake Class II Area

Total S Deposition Increase (kg/ha/yr) (1)	CASTNET Monitored Existing S Deposition (kg/ha/yr) (2)	Total Predicted S Deposition (kg/ha/yr)
0.03	0.71	0.74

Notes:
(1) Total predicted sulfur deposition due to the WPES, EEC, Toquop, Newmont, IPP3, and Nevco-Sevier calculated in Attachment 1. Maximum deposition due to the WPES occurred during 2001; thus, background deposition values for 2001 were used.

(2) Deposition measured at Great Basin National Park is considered representative of Ruby Lake due to the relative proximity of these two sites. Deposition charts for Great Basin are included in Attachment 3B of this white paper.

Table 2. Nitrogen Deposition in the Ruby Lake Class II Area

Total N Deposition Increase (kg/ha/yr) (1)	CASTNET Monitored Existing N Deposition (kg/ha/yr) (2)	Total Predicted N Deposition (kg/ha/yr)
0.01	2.2	2.21

Notes:
(1) Total predicted nitrogen deposition due to the WPES, EEC, Toquop, Newmont, IPP3, and Nevco-Sevier calculated in Attachment 1. Maximum sulfur deposition due to the WPES occurred during 2001; thus, background deposition values for 2001 were used.
(2) Deposition measured at Great Basin National Park is considered representative of Ruby Lake due to the relative proximity of these two sites. Deposition charts for Great Basin are included in Attachment 3B of this white paper.

The USDA Forest Service research paper *Estimating Lake Susceptibility to Acidification Due to Acid Deposition* (the Paper) provides a procedure for predicting acid deposition effects on aquatic ecosystems. Figure 3 of the paper represents "safe lines" on a plot of deposition vs. base cation concentration. Lakes that fall on the right side of the "safe lines" are not expected to be adversely affected by the corresponding deposition levels. The Figure 3 "lookup" values corresponding to Ruby Lake are discussed below.

Sulfur and Nitrogen Deposition

Cumulative Deposition Assessment - Ruby Lake National Wildlife Refuge

In high elevation Western lakes, both sulfur and nitrogen deposition can contribute to aquatic acidity. For such lakes, the Paper indicates that the total deposition used as a "lookup" value in Figure 3 should include all sulfur deposition, plus 25% of the nitrogen deposition to account for the acidification potential of inorganic nitrogen. (Although the elevation of Ruby Lake, approximately 6,000 feet, may be lower than other western lakes considered "high-elevation," the high-elevation lake evaluation methods are used to ensure a conservative analysis.)

The US Fish & Wildlife Service identified the Ruby Lake South Marsh as a potentially sensitive area with respect to acid deposition. Recent sampling at the South Marsh indicates the base cations concentration at the South Marsh is 7,511 μeq/L. The "lookup" values for Figure 3 of the Paper are provided in Table 3 below.

Table 3. Lookup Values for Figure 3 of the Paper

Lookup Values	
Total Deposition (kg/ha/yr) (1)	**Base Cation Concentration (μeq/L) (2)**
1.3	7,511

Notes:
(1) Total deposition is calculated as sulfur deposition plus 25% of nitrogen deposition. Individual sulfur and nitrogen deposition values in the calculation are taken from Tables 1 and 2 of this analysis.
(2) Base cation concentration at the South Marsh determined by recent testing.

Figure 3 from the Paper is provided below, with points plotted for the Ruby Lake lookup values and superimposed in blue. Since the point corresponding to Ruby Lake falls to the right of all the safe lines in Figure 3, the predicted deposition levels for Ruby Lake are not expected to have any adverse effects on plant or animal life in the aquatic ecosystems.

Sulfur and Nitrogen Deposition

Cumulative Deposition Assessment - Ruby Lake National Wildlife Refuge

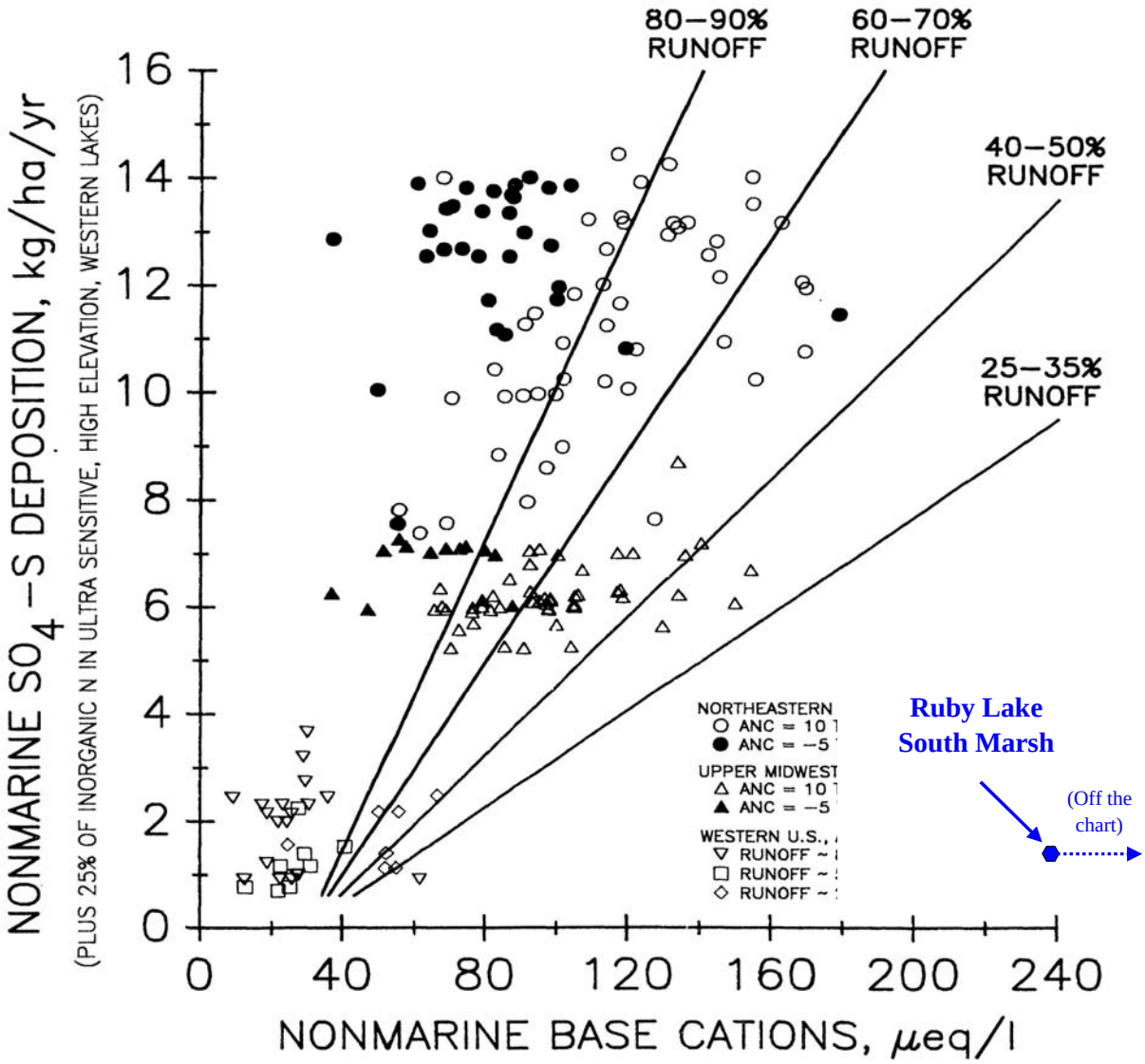


Figure 3.—*Base cations vs. deposition, "safe" lines. Lakes to the right of the appropriate runoff line are unlikely to be acidic. (Lake chemistry data from Kanciruk* et al. *1986 and Eilers* et al. *1987.)*

(Figure 3 from Nichols, Dale S., *Estimating Lake Susceptibility to Acidification Due to Acid Deposition*, United States Department of Agriculture Forest Service, Research Paper No. NC-289, February 1990.)