Rosemont Copper Company

Executive Summary
Air Quality Information
Rosemont Copper Project
Southeastern Arizona

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July 28, 2010

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1. INTRODUCTION

The planned Rosemont Copper Project (RCP) is an open-pit copper mining, milling, leaching, and solvent extraction/electrowinning facility located approximately 30 miles southeast of Tucson, west of State Highway 83, within Pima County in southeastern Arizona. The facility is anticipated to have a project operating life of over 20 years with peak mining rates of up to 376,000 tons per day (tpd) of total material (ore and waste). Projected annual copper production is expected to be approximately 221 million pounds of copper, with by-products of 4.7 million pounds of molybdenum, 2.4 million ounces of silver and smaller quantities of gold.

An application for the issuance of a Class II Air Quality Permit (*Rosemont Copper Company, Application for a Class II Permit, Rosemont Copper Project, Southeastern Arizona,* July 28, 2010) is being submitted to the Pima County Department of Environmental Quality (PCDEQ). The application includes all information required for issuance of the air quality permit including site plans, process flow diagrams, equipment descriptions, pollution controls, maximum process rates, maximum emissions of regulated pollutants, and applicable air quality requirements. Detailed information regarding each of these items is presented in the application and will not be repeated in this document.

The Rosemont Copper Project is also subject to the National Environmental Policy Act (NEPA) that requires an Environmental Impact Statement (EIS). Information necessary to address air quality aspects of an EIS includes additional information that is not required for Class II air quality permits. Such information includes inclusion of sources in the emission inventories that are not subject to regulation by the PCDEQ and performance of air impact analyses demonstrating that emissions from all sources, regulated and not regulated by the PCDEQ, will not cause exceedances of applicable National Ambient Air Quality Standards (NAAQS), or have significant effects on other air quality related values.

The EIS is being prepared by SWCA Environmental Consultants (SWCA). Information requested by SWCA for preparation of the EIS is presented in Appendix A of this document, and includes the following:

- Voluntary Measures – Innovative or non-standard actions that would reduce emissions;
- Emission Inventory – Emission estimates (including greenhouse gases) on a five year cycle throughout the life of the mine;
- Weather and Ambient Pollution Data Summary – Wind roses, rainfall, other meteorology records, monthly PM_{10} summaries, and the PM_{10} annual arithmetic mean; and
- Air Modeling – Modeling protocol, assumptions, settings, and results.

A summary of each of the above category is presented below. Detailed information regarding each category is presented in separate reports as referenced below.

2. VOLUNTARY MEASURES

The RCP will employ modern practices for minimizing emissions to the extent practical. This includes utilization of control devices where feasible and fugitive control measures where control devices are not feasible. Fugitive emissions from unpaved roads will be reduced 90% by the application of water and/or dust palliatives.

Pollution control equipment that will be utilized by the RCP includes six wet scrubbers, one cyclone scrubber, four baghouse, and an electrostatic precipitator. These control devices will control all process equipment that will have a significant potential to emit of air pollutants. Additionally, processes with a low potential to emit (such as conveyor-to-conveyor transfer points where a control device such as a scrubber or baghouse is not practical) will be controlled by water sprays and/or enclosed transfer points.

Nine of the pollution control devices control emissions from metallic mineral processing equipment subject to 40 CFR 60 Subpart LL, New Source Performance Standards (NSPS) for metallic mineral processing facilities. These pollution control devices are subject to an outlet grain loading limit of 0.022 grains/dscf for particulate matter (40 CFR 60.382(a)(1)). In order to minimize emissions from these control devices, the RCP has accepted in its application for an air quality permit federally enforceable emission limits expressed in either pounds/hour or in grains/dscf that is stricter than the federally mandated emission limit. A listing of these control devices, the applicable regulatory limit, the voluntarily accepted emission limit, and the resulting reduction of emissions due to the stricter limit is presented in Table 2.1.

Additionally, three pollution control devices (Crushing Area Scrubber (PC-CAS), Stockpile Area Scrubber (PC-SAS), and Reclaim Tunnel Scrubber (PC-RTS) are subject to the Pima County Code (P.C.C.) Section 17.16.360, which includes a 20% opacity limit but no stack outlet PM_{10} emission limit. Consequently, these control devices can emit at any PM_{10} emission rate that will not result in an opacity value above 20%. The voluntarily accepted limits in pounds per hour for these pollution control devices are also included in Table 2.1. These emission limits are based upon an outlet grain loading rate of 0.010 grains/dscf which is also much lower than the above referenced emission limit for facilities subject to 40 CFR 60 Subpart LL.

Gaseous emissions from the RCP will result from fuel combustion sources, with the majority due to tailpipe emissions from mobile sources such as haul trucks, dozers, loaders, and the general vehicle fleet used to operate the facility. Mobile sources are typically subject to the non-road engine requirements of 40 CFR 89 rather than local or state requirements. Emission standards for such equipment is dictated by the year of manufacture with stricter limits for newer equipment. For example, the NOx emission limit for a Tier 1 compression ignition non-road diesel engine built in 2000 and used by haul trucks is 9.2 g/kW-hr, whereas the same engine built in 2006 and being a Tier 2 engine has a combined non-methane hydrocarbon (NMHC) – NOx limit of 6.4 g/kW-hr. The RCP will utilize the newer Tier 2 engine, thereby emitting at the lower emission rates.

Table 2.1 Pollution Control Devices With Voluntarily Accepted Emission Limits

Pollution Control Device	Exhaust Flow Rate		Regulatory Emission Limit		Voluntarily Accept Emission Limit		Reduction in Emissions Due to Voluntarily Accepted Emission Limit
	acfm	dscfm	PM_{10} Emission Standard	PM_{10} Emissions [a,b]	PM_{10} Limit	PM_{10} Emissions [a,b]	
Crushing Area Scrubber (PC-CAS)	18,000	14,920	--	--	1.28 lb/hour	5.61 tpy	--
Stockpile Area Scrubber (PC-SAS)	36,500	30,254	--	--	2.59 lb/hour	11.34 tpy	--
Reclaim Tunnel Scrubber (PC-RTS)	15,000	12,433	--	--	1.07 lb/hour	4.69 tpy	--
Pebble Crusher Area Scrubber (PC-PCAS)	22,000	18,235	0.022 gr/dscf	14.96 tpy	1.56 lb/hour	6.83 tpy	8.13 tpy
Copper Concentrate Scrubber 1 (PC-CCS1)	50,000	41,444	0.022 gr/dscf	34.00 tpy	3.55 lb/hour	15.55 tpy	18.45 tpy
Copper Concentrate Scrubber 2 (PC-CCS2)	50,000	41,444	0.022 gr/dscf	34.00 tpy	3.55 lb/hour	15.55 tpy	18.45 tpy
Molybdenum Scrubber (PC-MS) and Electrostatic Precipitator (PC-EP) in series	500	225	0.022 gr/dscf	0.18 tpy	0.02 lb/hour	0.09 tpy	0.10 tpy
Molybdenum Dust Collector (PC-MDC)	1,500	1,244	0.022 gr/dscf	1.02 tpy	0.010 gr/dscf	0.47 tpy	0.55 tpy
Laboratory Dust Collector 1 (PC-L1)	10,000	8,290	0.022 gr/dscf	4.53 tpy	0.005 gr/dscf	1.04 tpy	3.50 tpy
Laboratory Dust Collector 2 (PC-L2)	10,000	8,290	0.022 gr/dscf	4.53 tpy	0.005 gr/dscf	1.04 tpy	3.50 tpy
Laboratory Dust Collector 3 (PC-L3)	10,000	8,290	0.022 gr/dscf	4.53 tpy	0.005 gr/dscf	1.04 tpy	3.50 tpy
Total Reduction in Emissions:							**56.16 tpy**

[a] tpy = tons/year

3. EMISSION INVENTORY

The air pollutants emissions due to the RCP operations will included particulate matter (PM), particulate matter less than 10 microns in aerodynamic diameter (PM_{10}), particulate matter less than 2.5 microns in aerodynamic diameter ($PM_{2.5}$), carbon monoxide (CO), nitrous oxides (NO_x), sulfur dioxide (SO_2), volatile organic compounds (VOCs), sulfuric acid mist (H_2SO_4), hazardous air pollutants (HAPs), and carbon dioxide (CO_2). Emission factors for other greenhouse gases (methane, nitrous oxides, and fluorinated gases) are generally not available for the RCP operations and are not included in the inventories. Such emissions are anticipated to be much smaller than any of the above-mentioned pollutants.

The emission inventories include emissions from all mining and ore and waste rock processing activities within the RCP property boundaries. Unlike the emission inventories presented in the Class II Air Quality Permit Application that are limited to emission sources regulated by the PCDEQ, the emission inventories for the EIS includes all emission sources. This includes tailpipe emissions from all mobile equipment, non-road engines and fugitive emissions from vehicles not associated with mining activities (i.e. shipment, delivery, and commuter vehicles) traveling on unpaved roads at the mine.

The methodology used to prepare the emission inventories is presented in the report *Emission Inventory Information, Years 1, 5, 10, 15, and 20, Rosemont Copper Project, Southeastern Arizona*, July 28, 2010. Emissions were calculated based on the maximum anticipated process rates, voluntarily accepted emission limits as discussed in Section 2 above, regulatory limits, emission factors in EPA's *AP-42, Fifth Editions, Compilation of Air Pollutant Emission Factors*, EPA's Mobile6 Vehicle Emission Modeling Program, and other factors as described in this report. Technical specifications of the equipment at the RCP, including fuel type and other factors related to the calculation of emissions are also included in this report.

A summary of maximum hourly, daily, and annual emissions for all emission sources for Years 1, 5, 10, 15, and 20, representing the anticipated life of the mine are presented in Table 3.1. Hourly, daily, and annual emissions for individual sources are presented in the emission tables that follow the Emission Inventory Methodology described above. The annual emissions are the total emissions that are expected to occur during the year being evaluated. Daily emissions represent maximum anticipated daily emissions and, except for Year 1, are based upon a 20% capacity factor over average daily process rates. Hourly emission rates are based upon all operations (sulfide ore haul, oxide ore haul, waste rock haul, blasting, dozer operations, etc.) being at maximum capacity at the same time. This cannot occur and would not be economical, as it would require redundant equipment, vehicle fleets, and personnel. Except for blasting emissions, hourly emissions for demonstrating protection of short term NAAQS (24-hour or less) were thus determined by dividing the daily emission rates by 24 hours. Annual emissions were used to demonstrate compliance with annual NAAQS.

Emissions due to the off-site generation of the electricity necessary to operate the RCP equipment is considered an out of scope task to the air quality analysis, as such emissions are not under the control of RCP. Such emissions will have either minimal (if located within the Tucson area) or no effect (if located at a distant generating station) to air quality impacts caused by emissions at the RCP facility. Emissions due to off-site generation of electricity are not included in this document.

Table 3.1 Summary of Maximum Hourly, Daily and Annual Emissions from Sources Operating at the Rosemont Copper Company.

Pollutant	Period	Year 1	Year 5	Year 10	Year 15	Year 20
PM	lb/hr	1,274.71	1,543.76	1,375.46	1,360.72	1,014.21
	tpd	9.63	12.89	10.87	10.69	6.53
	tpy	2,910.05	3,367.53	2,856.30	2,784.93	1,674.17
PM_{10}	lb/hr	451.98	521.28	478.01	472.67	380.87
	tpd	2.93	3.77	3.25	3.18	2.08
	tpy	878.96	991.76	860.23	831.88	529.24
$PM_{2.5}$	lb/hr	60.87	67.94	63.62	62.78	52.41
	tpd	0.52	0.61	0.56	0.55	0.42
	tpy	161.72	172.96	159.84	155.97	121.10
CO	lb/hr	3,705.91	3,706.19	3,706.23	3,705.77	3,699.66
	tpd	6.14	6.14	6.15	6.14	6.07
	tpy	1,419.86	1,388.01	1,384.70	1,218.97	930.50
NO_x	lb/hr	1,266.43	1,267.20	1,267.24	1,266.56	1,256.74
	tpd	5.45	5.46	5.46	5.45	5.34
	tpy	1,515.64	1,505.75	1,505.07	1,460.53	1,353.06
SO_2	lb/hr	105.08	105.03	105.03	105.03	105.03
	tpd	0.11	0.11	0.11	0.11	0.11
	tpy	20.55	19.66	19.56	14.67	6.82
VOCs	lb/hr	28.93	28.97	28.98	28.93	28.26
	tpd	0.35	0.35	0.35	0.35	0.34
	tpy	105.05	104.88	104.89	104.68	101.89
H_2SO_4	lb/hr	0.004	0.004	0.004	0.004	0.004
	tpd	0.00005	0.00005	0.00005	0.00005	0.00005
	tpy	0.02	0.02	0.02	0.02	0.02
CO_2	lb/hr	82,347.13	82,377.79	82,386.37	82,256.84	80,829.53
	tpd	654.16	654.86	654.96	653.41	636.28
	tpy	195,494.99	194,843.23	194,852.52	192,955.43	184,826.35
HAPs	lb/hr	0.84	0.84	0.84	0.84	0.84
	tpd	0.01	0.01	0.01	0.01	0.01
	tpy	3.37	3.37	3.37	3.37	3.37

4. WEATHER AND AMBIENT POLLUTION DATA SUMMARY

Ambient monitoring at the RCP site commenced on April 1, 2006 for meteorological parameters and on June 16, 2006 for PM_{10}. The monitoring was conducted in accordance to the *Monitoring Protocol and Quality Assurance Project Plan for Conducting Ambient MP_{10} and Meteorological Monitoring for the Proposed Rosemont Copper Mine, Pima County, Arizona,* July 1, 2006 that was provided to the PCDEQ. Monitoring for PM_{10} continued through June 30, 2009 resulting in three years of data. Monitoring for meteorological parameters is continuing. Both monitoring programs complied with the Prevention of Significant Deterioration (PSD) guidelines established by EPA.

Hourly averages of meteorological parameters collected for the 3-year period, April 1, 2006 – March 31, 2009 are included in the report *Summary of Ambient Air Quality and Meteorological Data Collected From Startup Through the First Quarter 2009, Rosemont Copper Mine Monitoring Site, Pima County, Arizona*, April 8, 2009. Annual wind roses for the first three years of monitoring are presented in Figures 4.1, 4.2, and 4.3. As indicated by these figures, the Rosemont site is subject to persistent wind flow from the West with approximately 50% coming from the directions of West-Southwest (WSW) to the Northwest (NW).

The ambient PM_{10} monitoring program from June 16, 2006 through June 30, 2009 is summarized in the reports titled *Summary of Ambient Air Quality and Meteorological Data Collected From Startup Through the First Quarter 2009, Rosemont Copper Mine Monitoring Site, Pima County, Arizona*, April 8, 2009, and *Summary of Ambient Air Quality and Meteorological Data Collected During the Second Quarter 2009, Rosemont Copper Mine Monitoring Site, Pima County, Arizona,* July 7, 2009. These documents provide descriptions of the monitoring sites and samplers, and include all measurements, instrument calibrations, and audits. A quarter-by-quarter summary of the highest and average PM_{10} concentrations is presented in Table 4.1 with a year-by-year summary presented in Table 4.2. A chronological presentation of measured concentrations is presented in Figure 4.4. This chronological presentation exhibits a strong seasonal dependence with highest concentrations during the late Spring and Summer with very low concentrations during the Fall and Winter. Figure 4.4 indicates that the concentration of 71.3 may be an outlier not representative of the sample distribution. A statistical analysis of all measurements, indicates that it has a 5.87×10^{-11} probability of recurring, and consequently was not included in the analysis.

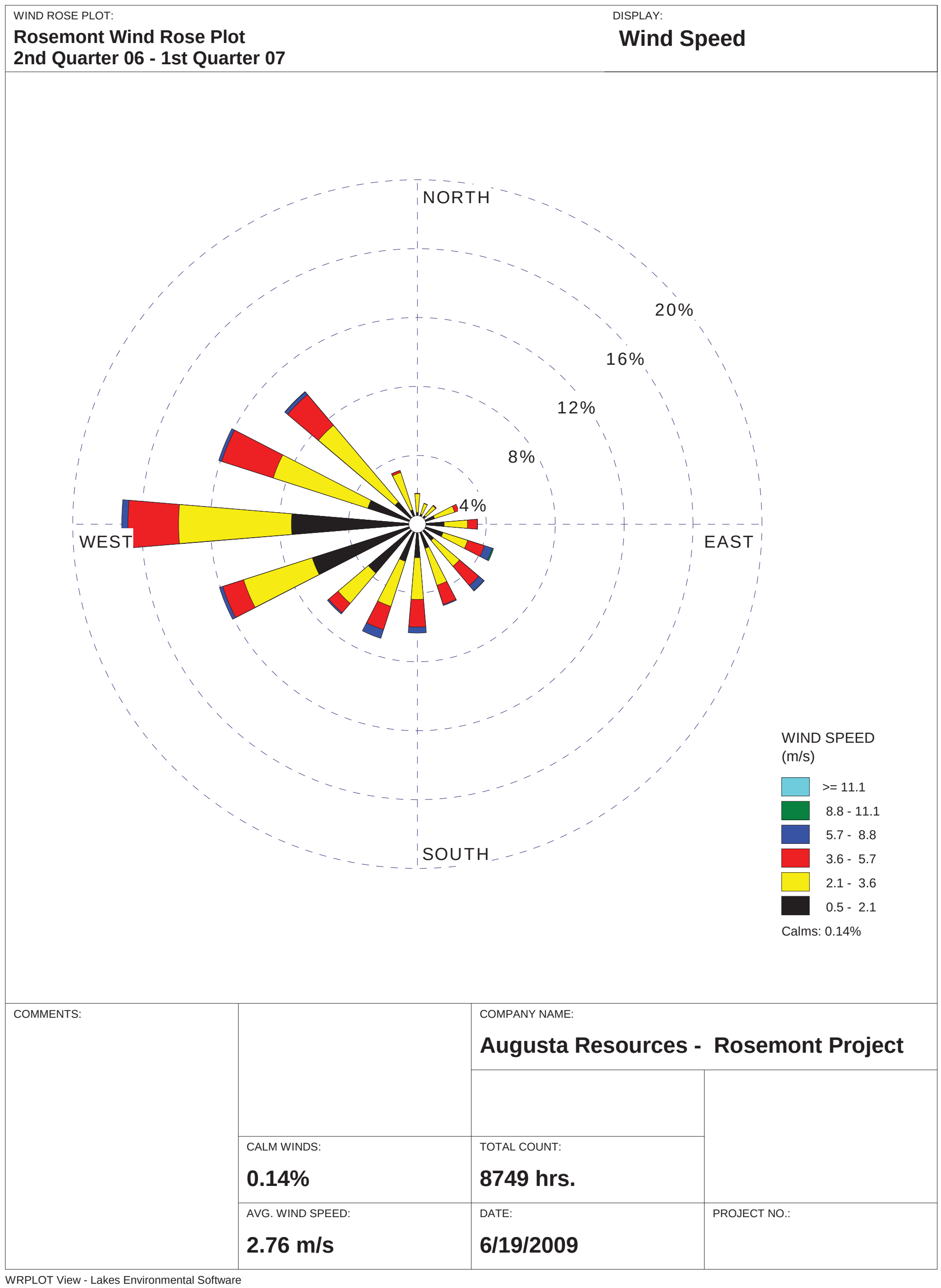


Figure 4.1 **Wind rose for the Rosemont meteorological station for the time period April 1, 2006 - March 31, 2007.**

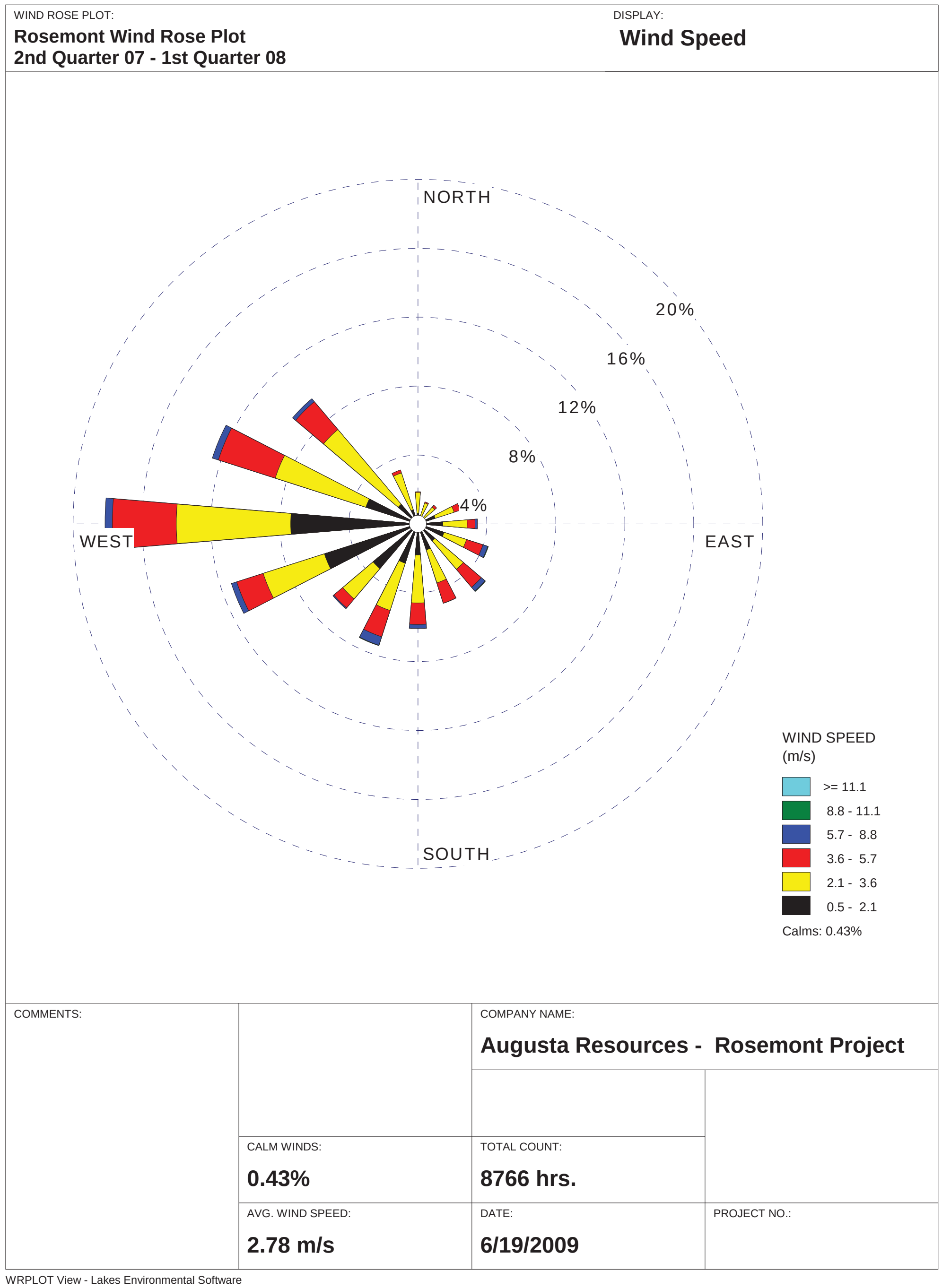


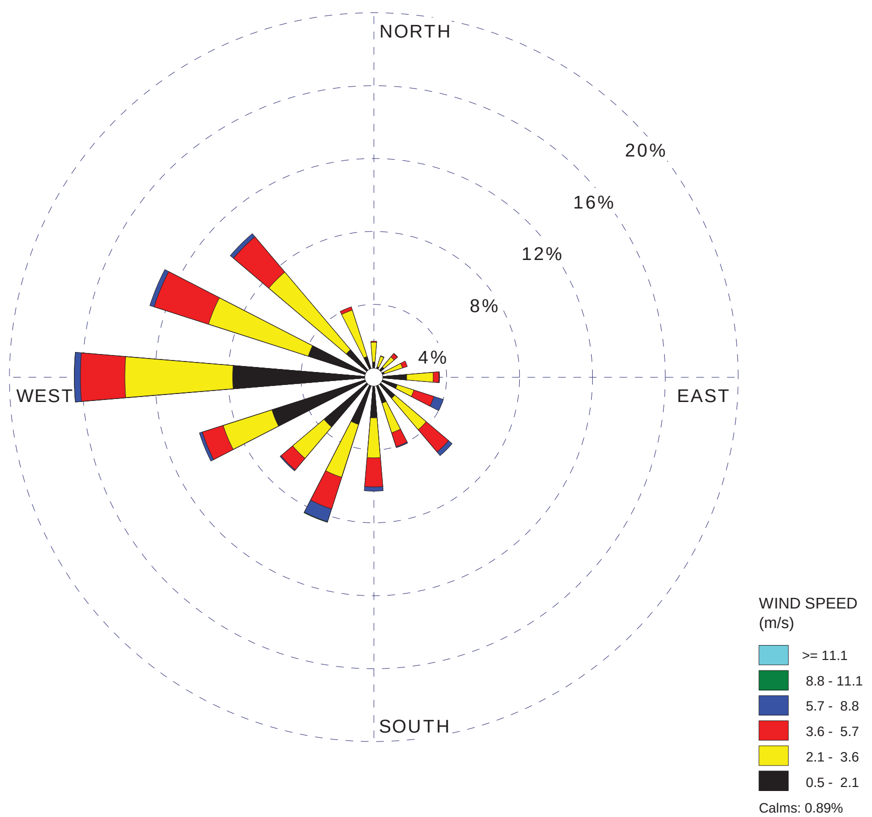
Figure 4.2 Wind rose for the Rosemont meteorological station for the time period April 1, 2007 - March 31, 2008.

WIND ROSE PLOT:

Rosemont Wind Rose Plot
2nd Quarter 08 - 1st Quarter 09

DISPLAY:

Wind Speed



COMMENTS:

COMPANY NAME:

Augusta Resources - Rosemont Project

CALM WINDS:

0.89%

TOTAL COUNT:

8753 hrs.

AVG. WIND SPEED:

2.71 m/s

DATE:

6/19/2009

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Figure 4.3 Wind rose for the Rosemont meteorological station for the time period April 1, 2008 - March 31, 2009.

Table 4.1 Summary of 24-Hour PM_{10} Concentrations (µg/m^3), July 2006 – June 2009

Time Period	Valid Samples	Arithmetic Mean	Highest	2nd Highest	3rd Highest
Summary of 24-Hour PM_{10} Concentrations (µg/m^3): July 2006 - June 2007					
3rd Quarter 06	13	24.6	71.3	27.0	26.8
4th Quarter 06	14	8.3	18.7	17.7	10.6
1st Quarter 07	15	2.3	7.0	5.5	4.6
2nd Quarter 07	15	17.6	28.7	27.0	25.6
Average	14.25	13.2	N/A	N/A	N/A
Highest Overall	N/A	N/A	71.3	27.0	26.8
Summary of 24-Hour PM_{10} Concentrations (µg/m^3): July 2007 - June 2008					
3rd Quarter 07	13	19.2	40.3	21.7	20.8
4th Quarter 07	15	5.3	11.9	11.9	8.0
1st Quarter 08	16	4.1	13.5	9.6	7.7
2nd Quarter 08	15	19.5	32.6	28.2	25.2
Average	14.75	12.02	N/A	N/A	N/A
Highest Overall	N/A	N/A	40.3	28.2	25.2
Summary of 24-Hour PM_{10} Concentrations (µg/m^3): July 2008 - June 2009					
3rd Quarter 08	14	15.3	24.5	21.2	20.0
4th Quarter 08	15	8.5	31.6	15.1	12.7
1st Quarter 09	15	8.0	17.9	17.8	17.6
2nd Quarter 09	16	10.0	15.4	12.9	12.9
Average	15	10.45	N/A	N/A	N/A
Highest Overall	N/A	N/A	31.6	21.2	20.0

Time Period	Valid Samples/ Quarter	Arithmetic Mean	Highest	2nd Highest	3rd Highest
July 2006 - June 2007	14.25	13.2	71.3	27.0	26.8
July 2007 - June 2008	14.8	12.0	40.3	28.2	25.2
July 2008 - June 2009	15	10.45	31.6	21.2	20.0
Average	14.7	11.9	N/A	N/A	N/A
Highest Overall	N/A	N/A	71.3	28.2	26.8

Table 4.2 Summary of Annual PM_{10} Concentrations ($\mu g/m^3$)

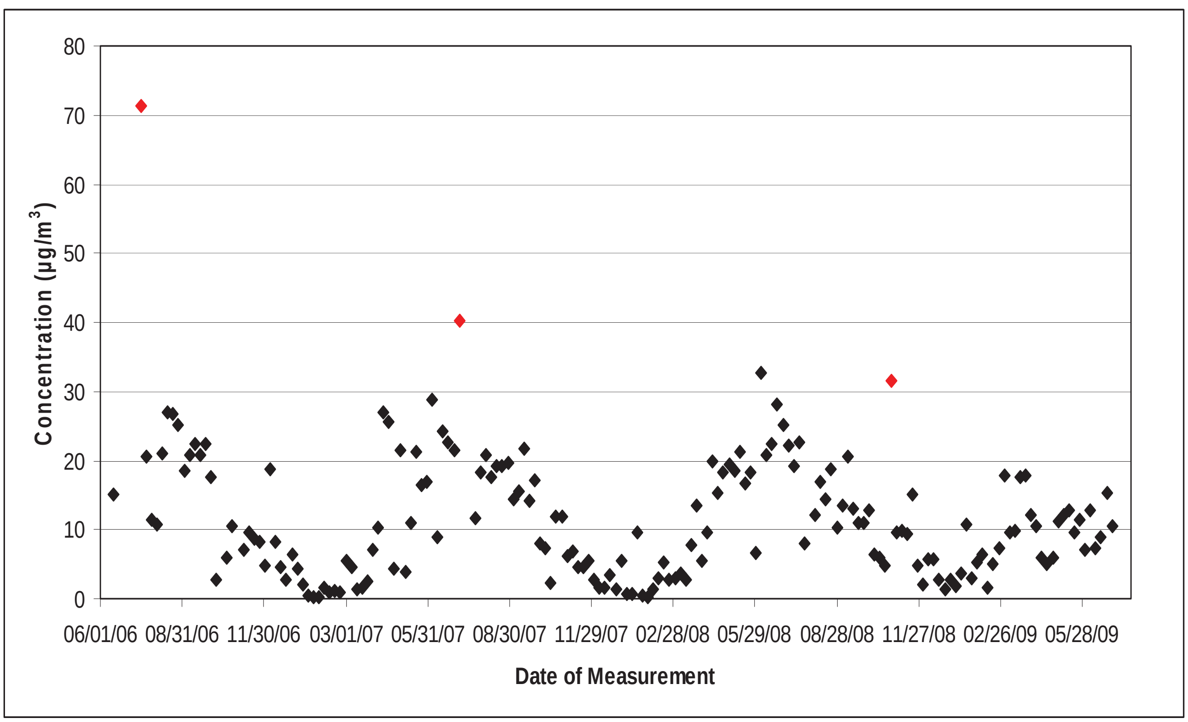


Figure 4.4 Chronological Presentation of Measured PM_{10} Concentrations.

5. AIR IMAPACT ANALYSIS

Evaluation of potential ambient air quality impacts due to emissions from the RCP was conducted using EPA's AERMOD and CALPUFF Models. The analyses were conducted in accordance to the methodologies presented in two previously provided protocols *Modeling Protocol to Assess Ambient Air Quality Impacts from the Rosemont Copper Project*, October 30, 2009, and *CALPUFF Modeling Protocol for Rosemont Copper Project to Assess Impacts in Class I Areas*, October 30, 2009. Potential impacts were evaluated for projected emissions during both Year 1 and Year 5. Modeling for Year 5 was selected because it is projected to have the maximum haul truck travel, and consequently, the maximum emissions. Modeling for Year 1 was selected because it was projected to have the maximum out-of-pit haul truck travel and consequently, maximum out-of-pit emissions. Out-of-pit emissions are anticipated to potentially have different ambient impacts on a pound-per-pound basis than emissions that occur within the pit.

The air impact analysis for Year 1 and Year 5 based on EPA's AERMOD model is presented in the report *Modeling Report to Assess Ambient Air Quality Impacts from the Rosemont Copper Project,* July 28, 2010. A summary of predicted impacts, estimated and/or measured background concentrations, and the maximum resulting concentrations demonstrating protection of the NAAQS is presented in Table 5.1 for Year 1 and Table 5.2 for Year 5.

The CALPUFF Model was selected to evaluate potential air quality and visual impacts in Class I Areas located within 100 km of the RCP. These include the Saguaro National Monument West, Saguaro National Monument East, and the Galliuro Wilderness Area. The CALPUFF Model utilizes hourly wind and temperature fields on a three-dimensional gridded modeling domain to predict potential impacts. The modeling data incorporates meteorological data from multiple surface stations including data from the Nogales Airport, Douglas Bisbee Airport, Tucson Airport, and Davis Montham Air Force Base. The meteorological data years used by the CALPUFF Model correspond to years 2001, 2002, and 2003. The air impact analysis for Year 1 and Year 5 based on the CALPUFF Model is presented in the report *CALPUFF Modeling Report to Assess Ambient Air Quality and Visual Impacts in Class I Areas,* July 28, 2010.

The CALPUFF Model provides maximum impacts on a year-by-year basis. Predicted impacts for the Class I Areas identified above for years 2001, 2002, and 2003 based upon the daily emission rates for emission inventory Year 1 and Year 5 are presented in Appendix B. This Appendix provides the maximum pollutant concentrations for PM_{10}, $PM_{2.5}$, SO_2, and NOx, and potential visual impacts on days when visibility conditions correspond to the annual average and to the Best 20% Days. The 3-hour and 24-hour concentrations presented in these tables are the highest 2^{nd} high values of all receptors; the annual values are the highest among all receptors. Of the three Class I geographic areas, predicted pollutant concentrations are greatest at the Saguaro National Monument East with the highest 2^{nd} highest 24-hour predicted concentration during any of the three years being 5.2 $\mu g/m^3$ for PM_{10}. All other predicted impacts, whether they be short term or annual, are less than 1 $\mu g/m^3$. Predicted impacts at the Saguaro National Monument West and Galliuro Wilderness Area are much less than those predicted for the Saguaro National Monument East.

As indicated in Appendix B, the CALPUFF Model also predicts the highest visual impacts on any receptor among the three Class I Areas. These are expected to occur in the Saguaro National Monument East. The predicted impacts in Appendix B are based upon the hourly emission rates that are used to demonstrate protection of the NAAQS. Use of the annual emission rates would give reduced impacts.

The significance of visual impacts are determined by the Federal Land Manager. With regards to evaluating the significance of these impacts, it should be noted that the Tucson urban area is located at a closer proximity to the Class I Area and will have much greater emissions. An inventory of emissions from the Tucson urban area is not available. EPA's National Emissions Inventory, however, maintains a data base of emissions for criteria pollutants on a national, state, and county basis. Table 5.3 provides annual Pima County emissions for these pollutants for Calendar Year 2005 and the corresponding annual emissions predicted for Rosemont for Year 5. Based upon this comparison the effect of Rosemont emissions will be very small relative to urban impacts on the Class I Area.

Table 5.1 Maximum Ambient Concentrations Due to Emissions for Year 1

Emission Specie	Averaging Period	Modeled Conc. ($\mu g/m^3$)	UTM Easting (m)	UTM Northing (m)	Background Conc. ($\mu g/m^3$) [c]	Maximum Ambient Conc. ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
CO	1-HR	8180.1*	522000.0	3523200.0	582.0	8762.1	40,000
	8-HR	1312.0 *	522100.0	3523200.0	582.0	1894.0	10,000
NO_x	ANNUAL	77.2	525951.0	3520673.0	4.0	81.2	100
PM_{10}	24-HR	104.9**	526181.8	3520922.0	33.0	137.9	150
	ANNUAL	26.1	525934.5	3520655.0	11.9	38.0	50
$PM_{2.5}$	24-HR	12.4***	526016.9	3520744.3	10.8	23.2	35
	ANNUAL	3.6	526285.6	3521250.0	3.7	7.3	15
SO_2	3-HR	85.8 *	521300.0	3522200.0	43.0	128.8	1,300
	24-HR	12.5*	524456.1	3524099.0	17.0	29.5	365
	ANNUAL	0.26	522100.0	3523200.0	3.0	3.26	80

* Represents the high 2nd high concentration.

** Represents the 4th highest concentration over a 3 year period.

***Represents the 8th highest concentration over a 3 year period.

Table 5.2 Maximum Ambient Concentrations Due to Emissions for Year 5

Emission Specie	Averaging Period	Modeled Conc. ($\mu g/m^3$)	UTM Easting (m)	UTM Northing (m)	Background Conc. ($\mu g/m^3$) [c]	Maximum Ambient Conc. ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
CO	1-HR	7597.7*	521900.0	3523500.0	582.0	8179.7	40,000
	8-HR	1173.4 *	521700.0	3523900.0	582.0	1755.4	10,000
NO_x	ANNUAL	56.3	525934.5	3520655.0	4.0	60.3	100
PM_{10}	24-HR	99.5 **	525848.0	3520268.0	33.0	132.5	150
	ANNUAL	24.3	525935.5	3520655.0	11.9	36.2	50
$PM_{2.5}$	24-HR	11.1***	526278.2	3521203.3	10.8	21.9	35
	ANNUAL	3.2	526289.0	3521273.3	3.7	6.9	15
SO_2	3-HR	70.6 *	521700.0	3523900.0	43.0	113.6	1,300
	24-HR	10.5*	521700.0	3523900.0	17.0	27.5	365
	ANNUAL	0.2	526261.5	3521087.0	3.0	3.2	80

* Represents the high 2nd high concentration.

** Represents the 4th highest concentration over a 3 year period.

***Represents the 8th highest concentration over a 3 year period.

Table 5.3 Comparison of Pima County Emissions Data (tons/year) per EPA's National Emissions Inventory (Calendar year 2005) and Rosemont Emissions.

Emissions Source Type	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$	VOC	CO_2[a]
On-Road Vehicles	17,338	128,269	370	467	311	15,128	-
Non-Road Equipment	5,864	59,104	596	527	497	4,962	-
Industrial Processes	3,321	4,814	75	2,155	1,081	166	-
Electricity Generation	2,247	152	3,714	127	110	25	-
Fossil Fuel Combustion	1,515	726	1,359	463	112	52	-
Fires	60	2,093	26	240	204	502	-
Residential Wood Combustion	51	3,986	8	556	556	855	-
Waste Disposal	12	35	8	11	8	200	-
Miscellaneous	1	54	-	10,528	1,107	3,315	-
Road Dust	-	-	-	9,589	832	-	-
Solvent Use	-	-	-	-	-	5,939	-
TOTAL	**30,409**	**199,233**	**6,156**	**24,663**	**4,818**	**31,144**	**17,426,666**
Rosemont (Year 5)	1,506	1,388	20	992	173	105	194,843
Percent Additional (%)	4.95%	0.70%	0.32%	4.02%	3.59%	0.34%	1.12%

[a] EPA's National Emissions Inventory does not include CO_2 emissions. Data is from *Regional Greenhouse Gas Inventory,* Pima Association of Governments, November 2008, encompassing the Eastern Pima County Area comprised of a rectangular area with the northern line stopping at the Pima County Line; the southern line stopping at the southern edge of Sahuarita; the eastern line stopping at Vail; and the western line stopping at Three Points.

APPENDIX A

MEMORANDUM FROM DAVE MORROW, SWCA

SWCA
ENVIRONMENTAL CONSULTANTS

Memorandum

To: Louis Thanukos AEC via fax 480/829.8985

CC: Tom Ferguson SWCA, Bob Lefevre USFS via email

From: Dave Morrow SWCA

Date: April 15, 2009

Re: Rosemont Mine Air Quality Information

Hi Louis,

To prepare the EIS for this project we will need information from you at an adequate level of detail to allow understanding and replication of calculations. Please document all references and information sources for your reports to allow independent corroboration.

Voluntary Measures
If your analysis incorporates innovative or non-standard actions that would reduce emissions please describe them. If possible, provide a quantitative estimate of tons of emissions avoided on an annual basis. Where appropriate, these voluntary measures should be reflected in the inventory and modeling efforts outlined below.

Emission Inventory
The emissions inventory should reflect current best available information about the project over its entire life. NEPA requires the Forest Service to look at the whole of the action, so we will need to look beyond what is normally considered for an air permit.

- List mining equipment that has potential to emit by category, magnitude of emissions, and temporal extent.
- Provide technical specifications of equipment, fuel and other factors related to emissions.
- Estimate emissions on a five-year cycle starting with the mine initiation and running through mine closure.
- Estimate of emissions from purchased electricity on a five-year cycle. Arizona is transitioning toward sustainable energy production so this may lessen pollutants per MW in future years.
- Calculate emissions from all on-road motor vehicles associated with the project, including commuters and service trucks. I recommend obtaining the most recent Mobile6 run from the state to help in this effort.
- Provide estimates of greenhouse gases (GHG) as listed by the US EPA. This GHG emission inventory should be co-incident with the same five year cycle as that for mine operation. Please try to account for all direct and indirect GHG emissions (e.g., electricity generation as above). Again, documenting assumptions, calculations, and authorities will be useful for independent verification.

Weather and Ambient Pollution Data Summary
I understand that AEC has been operating several weather stations and PM10 monitors on the Rosemont property. Please provide wind roses, rainfall and other available meteorology records as well. Provide monthly PM10 summaries and the PM10 annual arithmetic mean for the data of record.

Air Modeling
Please provide a brief technical report describing modeling protocol, assumptions, settings, and results. I recommend that you consult with the federal land manager's air quality working group (FLAG) for guidance, and that you follow the FLAG protocol for assessing impacts to Class 1 areas. The National Park Service submitted specific comments during the scoping period that you should review before beginning modeling efforts. At the conclusion of the air modeling the Forest Service may ask me or another qualified party to review the model runs and attempt to replicate your results. Consequently it is very important to save all files related to the modeling for future use by an outside auditor.

Please feel free to call me at anytime for clarification or assistance with the NEPA air quality data needs. My direct line is 805/543.7095 x 106

APPENDIX B

MODELED IMPACTS IN CLASS I AREAS

Table B.1 Modeled Impacts due to Year 1 Hourly Emissions

Pollutant	Averaging	Modeled Impact ($\mu g/m^3$)	UTM Northing (KM)	UTM Easting (KM)	Class I Area Impacted
		2001 Impacts			
PM_{10}	24-hr	1.61*	531.032	3560.155	Saguaro NP East
	Annual	0.17	531.82	3559.233	Saguaro NP East
$PM_{2.5}$	24-hr	0.37*	531.82	3559.233	Saguaro NP East
	Annual	0.05	531.82	3559.233	Saguaro NP East
SO_2	3-hr	0.14*	535.755	3557.399	Saguaro NP East
	24-hr	0.04*	541.279	3551.878	Saguaro NP East
	Annual	0.003	542.065	3551.881	Saguaro NP East
NO_X	Annual	0.26	531.82	3559.233	Saguaro NP East
		2002 Impacts			
PM_{10}	24-hr	2.79*	531.82	3559.233	Saguaro NP East
	Annual	0.18	531.82	3559.233	Saguaro NP East
$PM_{2.5}$	24-hr	0.50*	531.82	3559.233	Saguaro NP East
	Annual	0.05	531.82	3559.233	Saguaro NP East
SO_2	3-hr	0.15*	535.745	3560.17	Saguaro NP East
	24-hr	0.02*	531.82	3559.233	Saguaro NP East
	Annual	0.003	542.065	3551.881	Saguaro NP East
NO_X	Annual	0.27	531.82	3559.233	Saguaro NP East
		2003 Impacts			
PM_{10}	24-hr	2.00*	534.165	3562.936	Saguaro NP East
	Annual	0.15	531.032	3560.155	Saguaro NP East
$PM_{2.5}$	24-hr	0.45*	534.165	3562.936	Saguaro NP East
	Annual	0.04	531.032	3560.155	Saguaro NP East
SO_2	3-hr	0.12*	541.279	3551.878	Saguaro NP East
	24-hr	0.03*	541.279	3551.878	Saguaro NP East
	Annual	0.003	542.065	3551.881	Saguaro NP East
NO_X	Annual	0.21	531.032	3560.155	Saguaro NP East

*Represents the high 2nd high concentration

Table B.2 Modeled Impacts due to Year 5 Hourly Emissions

Pollutant	Averaging	Modeled Impact ($\mu g/m^3$)	UTM Northing (KM)	UTM Easting (KM)	Class I Area Impacted
2001 Impacts					
PM_{10}	24-hr	2.69*	536.518	3563.868	Saguaro NP East
	Annual	0.24	531.82	3559.233	Saguaro NP East
$PM_{2.5}$	24-hr	0.46*	536.518	3563.868	Saguaro NP East
	Annual	0.05	531.82	3559.233	Saguaro NP East
SO_2	3-hr	0.14*	535.755	3557.399	Saguaro NP East
	24-hr	0.03*	541.279	3551.878	Saguaro NP East
	Annual	0.003	542.065	3551.881	Saguaro NP East
NO_X	Annual	0.29	531.82	3559.233	Saguaro NP East
2002 Impacts					
PM_{10}	24-hr	5.21*	531.82	3559.233	Saguaro NP East
	Annual	0.27	531.82	3559.233	Saguaro NP East
$PM_{2.5}$	24-hr	0.80*	531.82	3559.233	Saguaro NP East
	Annual	0.05	531.82	3559.233	Saguaro NP East
SO_2	3-hr	0.15*	535.745	3560.17	Saguaro NP East
	24-hr	0.02*	531.82	3559.233	Saguaro NP East
	Annual	0.003	542.065	3551.881	Saguaro NP East
NO_X	Annual	0.32	531.82	3559.233	Saguaro NP East
2003 Impacts					
PM_{10}	24-hr	3.63*	534.165	3562.936	Saguaro NP East
	Annual	0.22	531.032	3560.155	Saguaro NP East
$PM_{2.5}$	24-hr	0.62*	534.165	3562.936	Saguaro NP East
	Annual	0.04	531.032	3560.155	Saguaro NP East
SO_2	3-hr	0.11*	533.392	3559.239	Saguaro NP East
	24-hr	0.03*	541.279	3551.878	Saguaro NP East
	Annual	0.002	542.065	3551.881	Saguaro NP East
NO_X	Annual	0.24	531.032	3560.155	Saguaro NP East

*Represents the high 2nd high concentration

Table B.3 Visibility Impacts for Year 1 Hourly Emissions

2001				
Natural Conditions	Annual Average		Best 20%	
Class I Area	Saguaro	Galiuro	Saguaro	Galiuro
Number of days with Delta Deciview => 0.5	50	1	71	3
Number of days with Delta Deciview => 1	18	1	27	1
Largest Delta Deciview =	2.357	1.386	2.823	1.739
Number of days with Extinction Change => 5%	51	2	73	4
Number of days with Extinction Change => 10%	20	1	30	1
Largest Extinction Change =	26.58%	14.87%	32.32%	19.00%
2002				
Natural Conditions	Annual Average		Best 20%	
Class I Area	Saguaro	Galiuro	Saguaro	Galiuro
Number of days with Delta Deciview => 0.5	46	2	67	2
Number of days with Delta Deciview => 1	15	0	19	0
Largest Delta Deciview =	4.345	0.684	5.127	0.866
Number of days with Extinction Change => 5%	47	2	69	2
Number of days with Extinction Change => 10%	16	0	22	0
Largest Extinction Change =	54.42%	7.08%	66.98%	9.05%
2003				
Natural Conditions	Annual Average		Best 20%	
Class I Area	Saguaro	Galiuro	Saguaro	Galiuro
Number of days with Delta Deciview => 0.5	60	4	72	5
Number of days with Delta Deciview => 1	15	2	21	3
Largest Delta Deciview =	2.644	1.196	3.157	1.5
Number of days with Extinction Change => 5%	61	5	76	5
Number of days with Extinction Change => 10%	18	2	24	3
Largest Extinction Change =	30.27%	12.70%	37.13%	16.19%

Table B.4 Visibility Impacts for Year 5 Hourly Emissions

2001				
Natural Conditions	Annual Average		Best 20%	
Class I Area	Saguaro	Galiuro	Saguaro	Galiuro
Number of days with Delta Deciview => 0.5	67	3	85	6
Number of days with Delta Deciview => 1	25	1	34	1
Largest Delta Deciview =	2.963	1.97	3.529	2.456
Number of days with Extinction Change => 5%	69	3	88	6
Number of days with Extinction Change => 10%	29	1	36	2
Largest Extinction Change =	34.49%	21.78%	42.32%	27.83%
2002				
Natural Conditions	Annual Average		Best 20%	
Class I Area	Saguaro	Galiuro	Saguaro	Galiuro
Number of days with Delta Deciview => 0.5	70	2	91	2
Number of days with Delta Deciview => 1	21	1	27	2
Largest Delta Deciview =	6.274	1.24	7.296	1.558
Number of days with Extinction Change => 5%	77	2	94	2
Number of days with Extinction Change => 10%	23	1	30	2
Largest Extinction Change =	87.27%	13.20%	107.43%	16.86%
2003				
Natural Conditions	Annual Average		Best 20%	
Class I Area	Saguaro	Galiuro	Saguaro	Galiuro
Number of days with Delta Deciview => 0.5	76	6	90	6
Number of days with Delta Deciview => 1	24	3	32	4
Largest Delta Deciview =	4.216	1.789	4.971	2.21
Number of days with Extinction Change => 5%	77	6	93	6
Number of days with Extinction Change => 10%	26	4	35	4
Largest Extinction Change =	52.44%	19.60%	64.39%	24.73%