SUPPLEMENTAL CALPUFF MODELING RESULTS FOR THE

RAY D. NIXON POWER PLANT'S SUBJECT-TO-BART DETERMINATION

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Colorado Springs Utilities

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Introduction

This report is the third document submitted to the Colorado Department of Health and Environment's (CDPHE) Air Pollution Control Division (APCD). This document presents CALPUFF model results using updated emission rates based on discussion with APCD staff and with a different set of MM5 data for the year 2002 (per APCD recommendation).

As with previous submittals, this work focuses on the four Class I Areas that had the highest visibility impacts in the APCD modeling work; namely, the Rocky Mountain National Park, Great Sand Dunes National Park, Eagles Nest Wilderness Area, and the Rawah Wilderness Area.

Colorado Springs Utilities (Utilities) set up and ran the CALPUFF model to obtain the visibility impact results at the four Class I Areas mentioned above. The APCD had reviewed the CALPUFF model settings used in the previous submittals and gave conditional approval for their use if the WRAP's 12 kilometer MM5 data set was used instead of VISTAS' 36 kilometer MM5 data set for the model year 2002. The 12 km MM5 data set for 2002 has been used here with the same model settings as was used in previous submittals.

The APCD reviewed the emission rates used for the Nixon modeling and made some recommendations. Through discussion with APCD staff, a set of appropriately conservative emission rates was agreed upon. That set of emission rates has been used in this updated modeling.

This report provides a brief description of the modeling domain, the emissions rates entered into the model, and then mainly focuses on the results obtained from the model runs. The model results indicate that even with the updated emission rates and different MM5 data being used for 2002, visibility impacts at the four Class I Areas studied are below the 0.500 deciview threshold at the 98th percentile. Therefore, the Ray D. Nixon Power Plant should not be "subject-to-BART".

Background

Colorado Springs Utilities submitted a report entitled, *CALPUFF Model Results for the Ray D. Nixon's "Subject to BART" Determination,* to the Colorado Department of Health and Environment (CDPHE) on May 8, 2006. The report detailed CALPUFF model inputs, emission rates and visibility results indicating that the Ray D. Nixon Power Plant (Nixon Power Plant) should not be "subject to BART". A one kilometer grid size was used in the modeling for this previously submitted report. After review by the APCD, the APCD requested that different values be used for particulate matter speciation.

A second submittal, entitled *CALUFF Model Results for the Ray D. Nixon's SO_2 and NO_x Limits,* addressed enforceable limits for the Nixon Power Plant. This report summarized work showing that Nixon's current limits for SO_2 and NO_x were protective of visibility and therefore new limits should not be required. However, the APCD is requiring a new SO_2 limit derived from the historical emission rates used in the "Subject-to-BART" determination and new modeling results rather than on existing limits.

After thorough review of the emissions rates, stack test documentation and speciation of particulate matter, the Utilities and APCD staff came to agreement on a set of conservative emission rates to use in the CALPUFF model.

Modeling Domain

A fine grid domain was set up with a 50 kilometer buffer around these four Class I Areas previously identified and the Nixon Power Plant consistent with the *IWAQM – Phase 2 Summary Report*[1]. The grid size was set to a half kilometer. The number of half kilometer cells in the *x* direction was 540 and in the *y* direction it was 900. The modeling domain is shown in Figure 2-1 in Appendix A.

Emission Rates

In previous submittals, emissions from 2003, 2004 and 2005 were analyzed to determine the peak 24-hour average maximums for SO_2 and NO_x. These emissions are expected to adequately represent future operations at Nixon Power Plant, because this time period includes operations with the types of coal expected to be utilized in the future at the plant. In the analysis of the data from 2003, 2004, and 2005, hours of operation at less than full load were eliminated and then the resulting daily averages were computed only with hours of operation at full load. The peak values obtained from this analysis are presented in Table 1. Graphs showing actual 24 hour averages of emissions of SO_2 and NO_x have been included in Appendix B.

Table 1 – Maximum 24 Hour Average Emission Rates at Peak Utilization

Pollutant	24-Hour Max (lbs/hr)	24 Hour Max (g/s)	Year of Occurrence
SO_2	1,889	238.0	2004
NO_x	1,199	151.1	2004

Particulate emissions (PM) need to be speciated for input to the model. A stack test was conducted for the Nixon Power Plant on March 23, 2006. The final report was obtained on May 8, 2006 from the testing company. The stack test report was submitted to the APCD for their review. The relevant pages detailing stack test results have been included in Appendix C.

As part of the stack test, filterable PM was analyzed for particle size distribution. The results indicate that all filterable PM from Nixon's emissions should be characterized as Fine Particulate Matter (PMF) in CALPUFF. In addition, to account for variation in baghouse performance, the filterable PM rate from the highest result of three runs (36.5 lbs/hr) was doubled to ensure that maximum 24 hour-average conditions were being modeled. This gives a PMF rate of 74 lbs/hr for use in CALUFF. All filterable PM has been assigned to PMF, and therefore the emission rate for coarse particulate matter (PMC) is zero.

[1] Environmental Protection Agency, *Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts*, EPA-454-98-019, December 1998, p. 10.

Elemental carbon (EC) was analyzed using scanning electron microscopy (SEM) to examine filters containing PM. The results for EC were non-detect at the 1% detection limit. Again to ensure that maximum 24-hour average emissions are being modeled, elemental carbon was modeled at a rate of 3% of typical filterable PM emissions. "Typical filterable PM emissions" are represented by the March, 2003 Title V permit compliance stack test. The average of three runs was 24.61 lbs/hr. Three percent of 24.61 is 0.74 pounds/hour as shown in Table 2. The reason the March, 2003 test is considered to be "typical" is that it represents the midrange value of filterable PM from three stack tests (18.9 lb/hr – June, 2005, 24.61 lb/hr – March, 2003, 33.5 lb/hr – March, 2006 – stack test results are included in Appendix C).

The term "SO4" in Table 2 contains the sum of emissions of acid gases (H_2SO_4, HF and HCl) that were measured in stack tests on June 29, 2005 and March 23, 2006.[2] The APCD staff recommended this approach of including HF and HCl emissions in the SO4 species in CALPUFF to account for potential visibility impairment from emissions of HF and HCl. The stack test results are included in Appendix C. The highest average value of three runs from the stack tests was selected for rounding up and then for use in CALPUFF. The highest average of three runs for H_2SO_4 was 0.685 lbs/hr in the March, 2006 stack test; for HF it was 5.51 lbs/hr in the March, 2006 stack test, and for HCl it was 2.10 lbs/hr in the June 29, 2005 stack test. These average values were rounded up to the following: H_2SO_4 = 1.0 lbs/hr; HF = 6.0 lbs/hr; HCl = 2.1 lbs/hr. This comes to a total of 9.1 lbs/hr of SO4 that was modeled.

Secondary Organic Aerosol (SOA) emissions were measured only in the March, 2006 stack test. The average of three runs was 0.067 lbs/hr (see Condensable Organic Particulate result in Appendix C). A very conservative value of 1.0 lbs/hr was used in the modeling and is shown in Table 2.

Table 2 – Speciated PM Emissions Used in the CALPUFF Model

Pollutant	g/s	lb/hr
PMF	9.324	74.0
PMC	Included in PMF	Included in PMF
EC	0.093	0.74
SOA	0.126	1.0
SO4	1.147	9.1
TOTAL	10.690	84.84

The emission rates discussed in this section were reviewed by the APCD and approved in a letter dated July 20, 2006. The letter is included in Appendix D.

[2] In a conversation with Chuck Machovec, it was concluded that molecular weight conversions were not necessary for inclusion of HF and HCl in the species SO_4 for use in the CALPUFF model.

Changes to CALMET Parameter Settings

Changes to CALMET settings from what the APCD used in their initial "subject-to-BART" modeling have been documented by the Utilities in previous submittals to the APCD. These changes were reviewed and conditionally approved for use in Colorado Springs Utilities' modeling (see letter from APCD dated June 21, 2006 in Appendix D). The conditional approval was based on the APCD recommendation that the WRAP's 12 km MM5 data set be used to initialize CALMET for the calendar year 2002 instead of the VISTA's 36 km MM5. The WRAP's 12 km MM5 was used in the model runs for this submittal.

CALPUFF, POSTUTIL, and CALPOST

The APCD provided CALPUFF, POSTUTIL and CALPOST input files to each facility that requested them. The expectation of the APCD is that few changes would be made to these portions of the model. Colorado Springs Utilities did not make any changes to the parameter settings in any of these three portions of the model. In addition, all model versions used were the ones specified by the APCD in their modeling protocol.

Results from Nixon's Maximum Historical 24-Hour Average Emissions

Nixon's impacts from maximum historical 24-hour average emissions (using approved emission rates) at the four Class I Areas are shown in Figure 1. All of the impacts at the 98th percentile are below the 0.500 deciview threshold.

Figure 1 - CALPUFF 98th Percentile Delta-Deciview Values

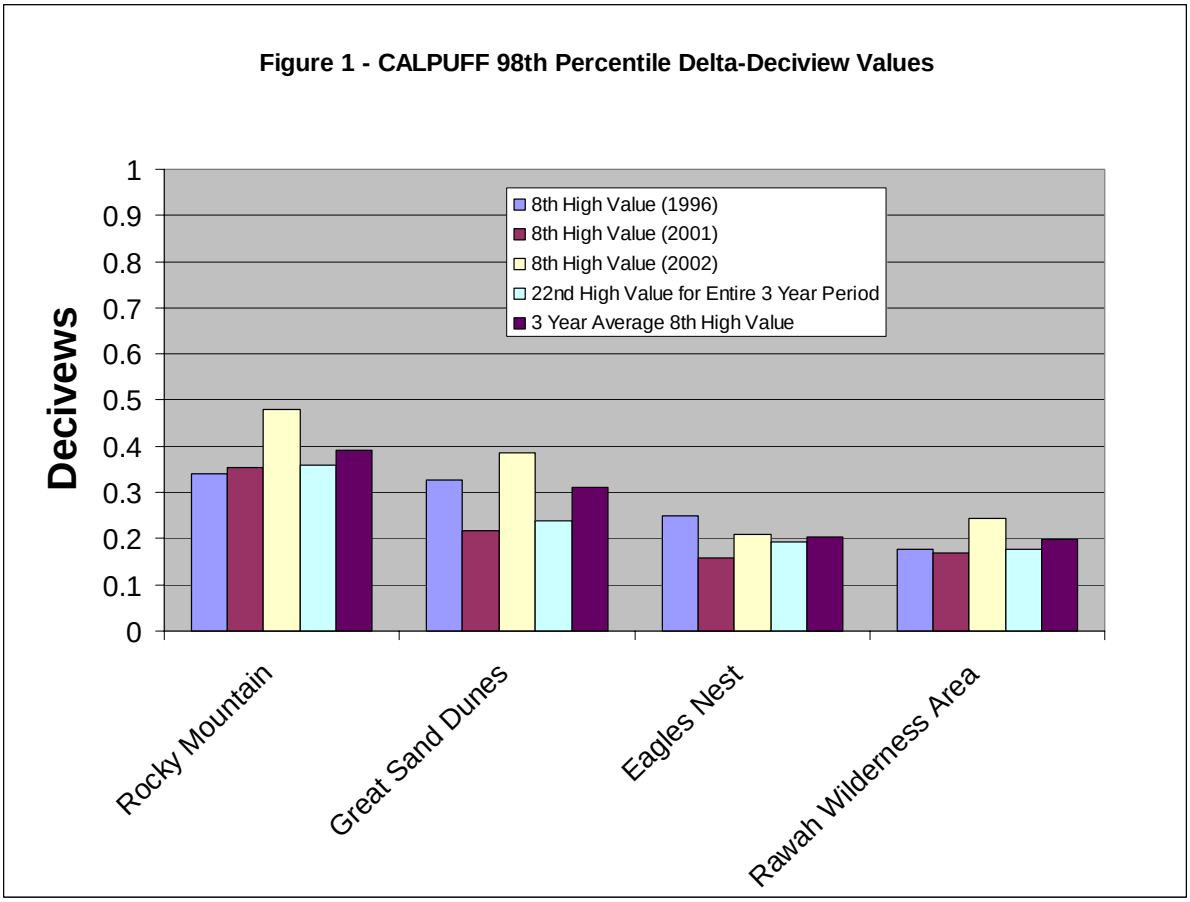


Table 3 contains the top eight deciview impacts at each of the parks for the three years that were modeled with the revised emission rates. Again, all of the impacts at the 98th percentile are below the 0.500 deciview threshold.

Table 3 -Nixon - Results for Four Park Areas for 1996, 2001, and 2002

1996

Rocky Mtn. Nat. Park			Great Sand Dunes			Eagle's Nest			Rawah Wilderness Area		
Day	dV	Rank	Day	dV	Rank	Day	dV	Rank	Day	dV	Rank
306	1.161	1	332	0.676	1	34	0.858	1	306	0.739	1
34	0.849	2	239	0.624	2	33	0.738	2	322	0.678	2
145	0.79	3	67	0.581	3	96	0.322	3	34	0.493	3
60	0.516	4	296	0.511	4	60	0.297	4	145	0.363	4
322	0.497	5	271	0.404	5	97	0.295	5	60	0.25	5
96	0.389	6	335	0.385	6	255	0.293	6	146	0.22	6
33	0.358	7	33	0.334	7	237	0.259	7	238	0.182	7
105	0.341	8	226	0.327	8	167	0.248	8	33	0.178	8
4 Days > 0.5 dV			4 Days > 0.5 dV			2 Days > 0.5 dV			2 Days > 0.5 dV		

2001

Rocky Mtn. Nat. Park			Great Sand Dunes			Eagle's Nest			Rawah Wilderness Area		
Day	dV	Rank	Day	dV	Rank	Day	dV	Rank	Day	dV	Rank
171	0.607	1	125	0.897	1	40	0.397	1	191	0.328	1
60	0.585	2	243	0.423	2	77	0.314	2	171	0.299	2
108	0.485	3	332	0.412	3	24	0.301	3	60	0.291	3
86	0.475	4	222	0.315	4	173	0.278	4	67	0.28	4
59	0.437	5	275	0.297	5	16	0.259	5	59	0.236	5
40	0.377	6	274	0.239	6	123	0.192	6	173	0.193	6
173	0.368	7	41	0.227	7	191	0.189	7	86	0.17	7
67	0.354	8	359	0.216	8	60	0.157	8	172	0.17	8
2 Days > 0.5 dV			1 Days > 0.5 dV			0 Days > 0.5 dV			0 Days > 0.5 dV		

2002

Rocky Mtn. Nat. Park			Great Sand Dunes			Eagle's Nest			Rawah Wilderness Area		
Day	dV	Rank	Day	dV	Rank	Day	dV	Rank	Day	dV	Rank
304	1.56	1	60	0.564	1	304	0.711	1	305	1.02	1
305	1.439	2	338	0.544	2	305	0.591	2	30	0.829	2
93	1.079	3	61	0.495	3	197	0.371	3	304	0.619	3
84	0.962	4	303	0.468	4	200	0.286	4	93	0.429	4
297	0.733	5	302	0.439	5	357	0.27	5	84	0.289	5
30	0.68	6	188	0.399	6	74	0.267	6	75	0.275	6
129	0.524	7	4	0.393	7	198	0.218	7	200	0.267	7
74	0.481	8	193	0.387	8	199	0.208	8	297	0.245	8
7 Days > 0.5 dV			2 Days > 0.5 dV			2 Days > 0.5 dV			3 Days > 0.5 dV		

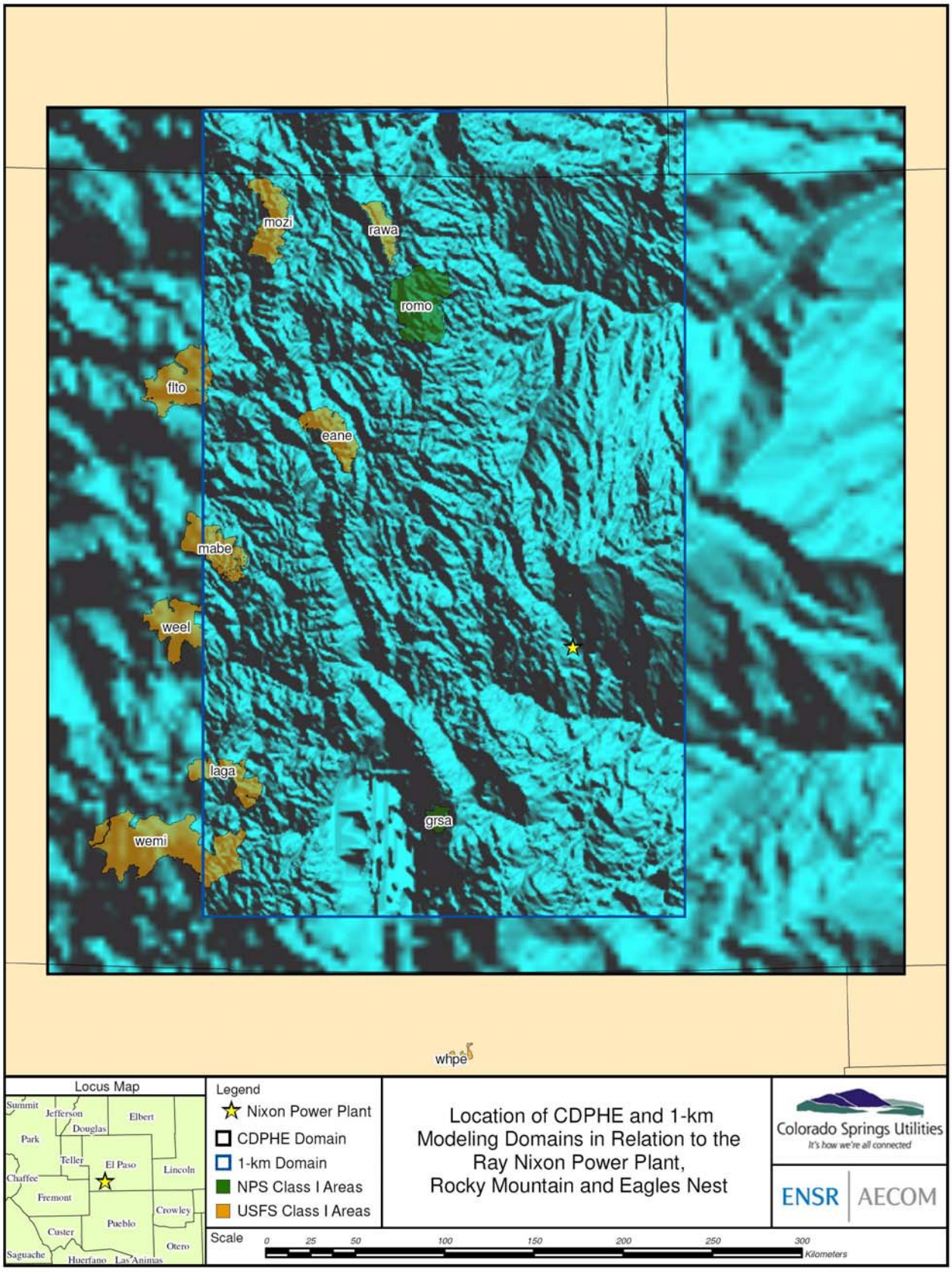
Conclusion

Refined modeling was carried out by Colorado Springs Utilities using APCD approved emission rates and the APCD recommended 2002 12 km MM5 data as well as the previously used 1996 and 2001 MM5 data. The results indicate that Nixon's revised emission rates still do not cause or contribute to visibility impairment at the four closest Class 1 areas above the "subject-to-BART" threshold of 0.500 deciviews at the 98th percentile.

We respectfully request the Division to review the modeling files and results and agree that the Nixon Plant is not "subject-to-BART". We will be ready to provide any further clarifications that may be needed.

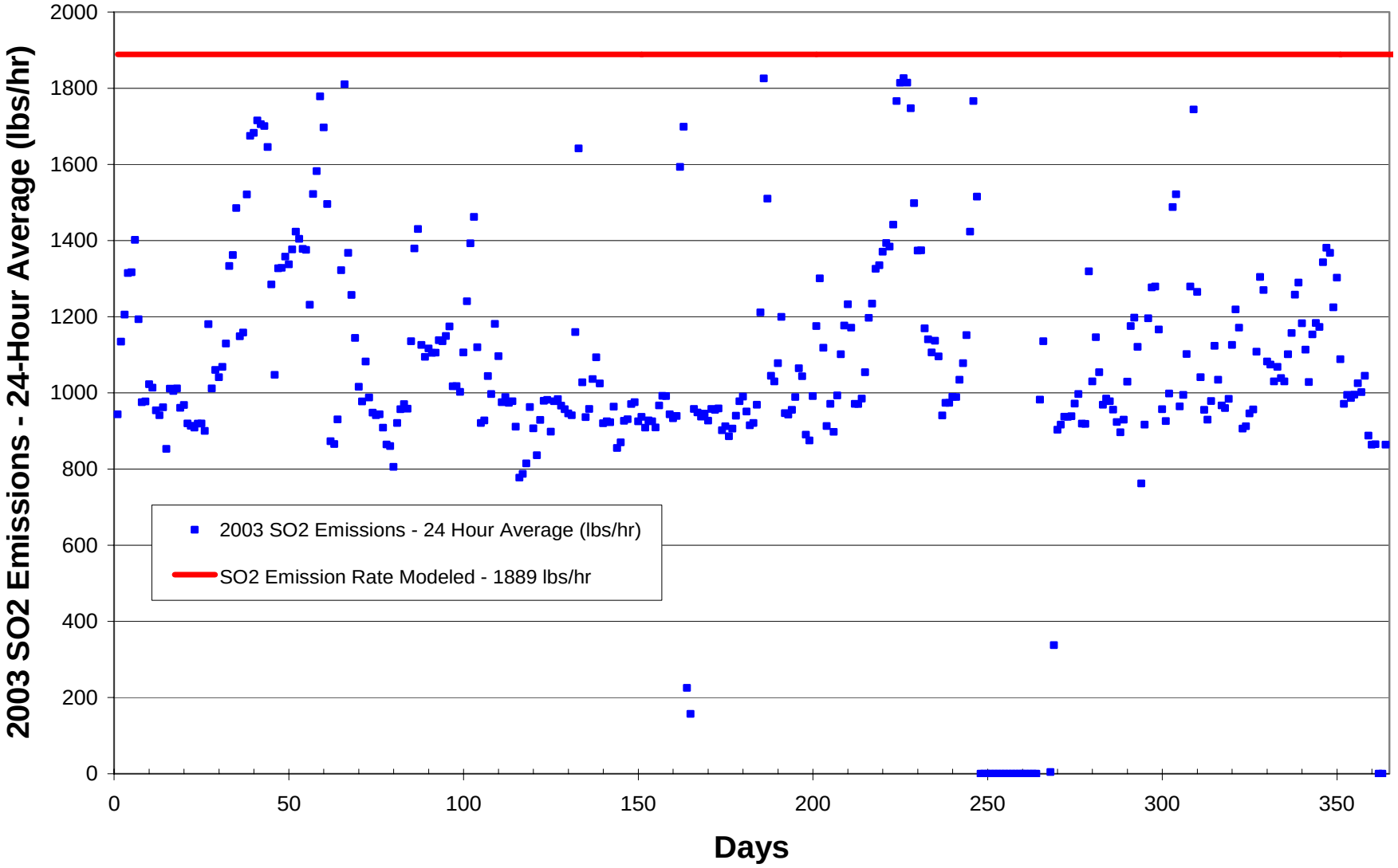
APPENDIX A

Figure 2 - Comparison of the Modeling Domain used in the APCD BART Analysis and in the Nixon Refined Analysis

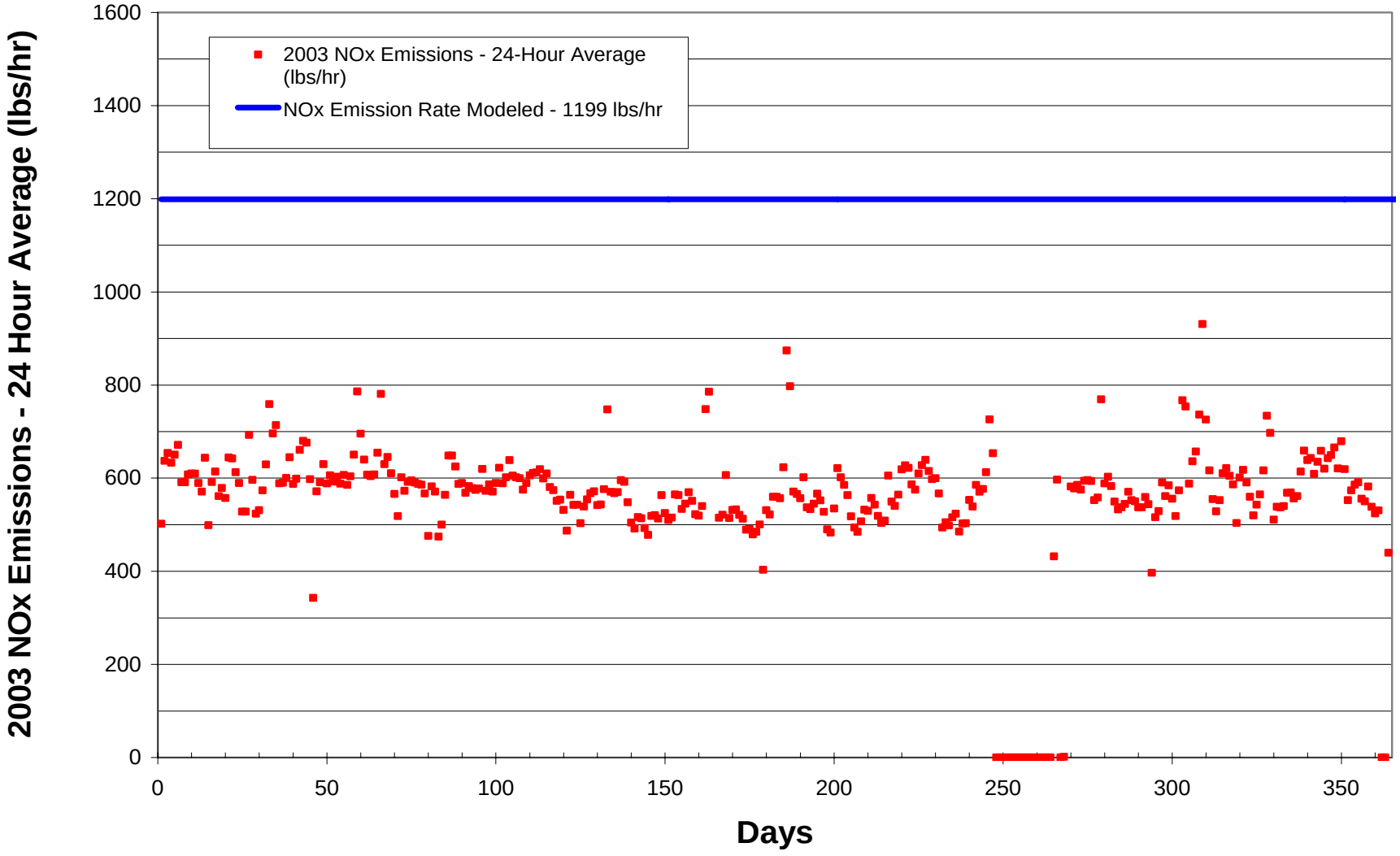


APPENDIX B: 24 HOUR AVERAGE EMISSIONS FOR SO_2 AND NO_X FOR 2003, 2004 AND 2005

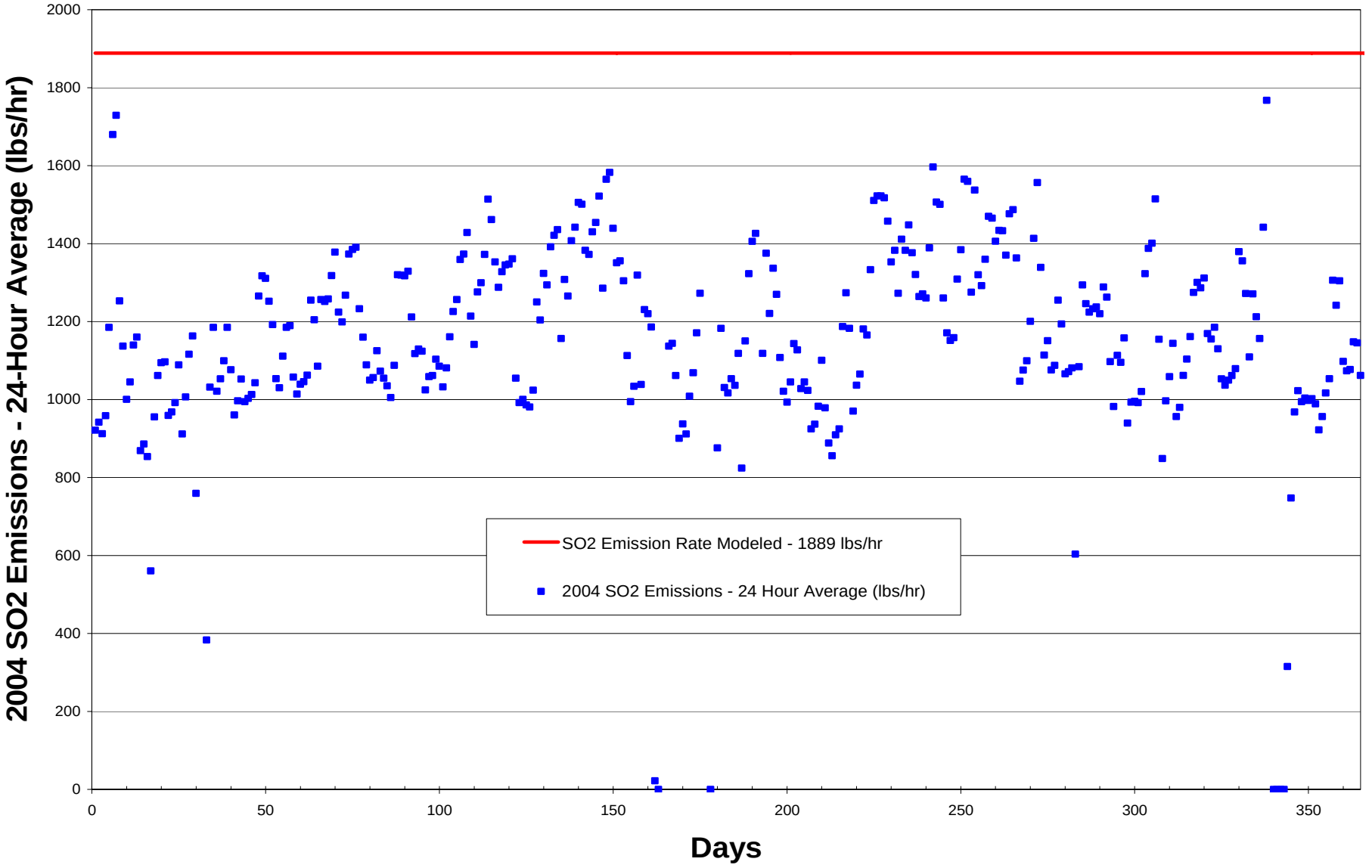
Nixon Power Plant - 24-Hour Average SO2 Emissions for 2003



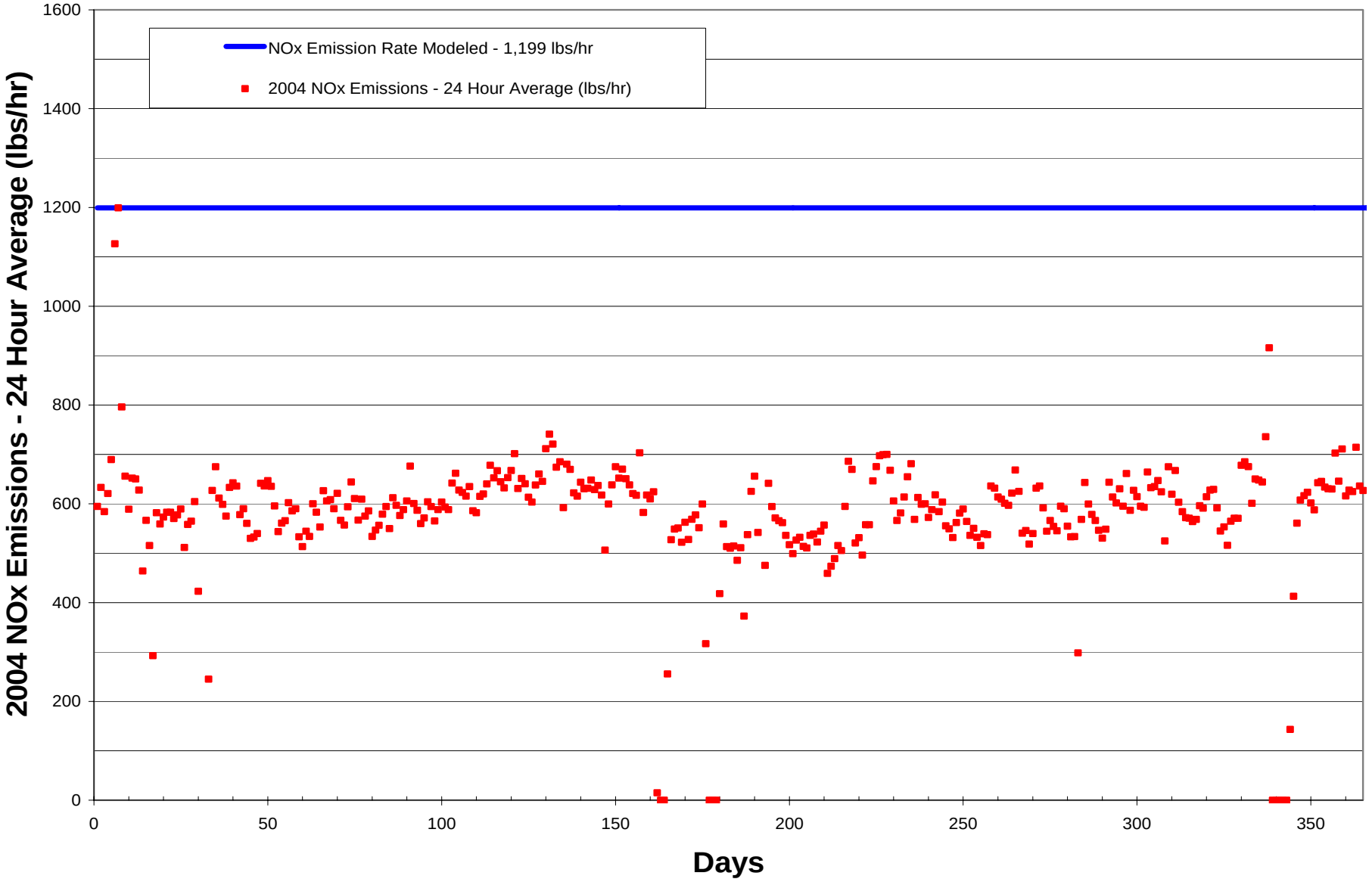
Nixon Power Plant - 24-Hour Average NOx Emissions for 2003



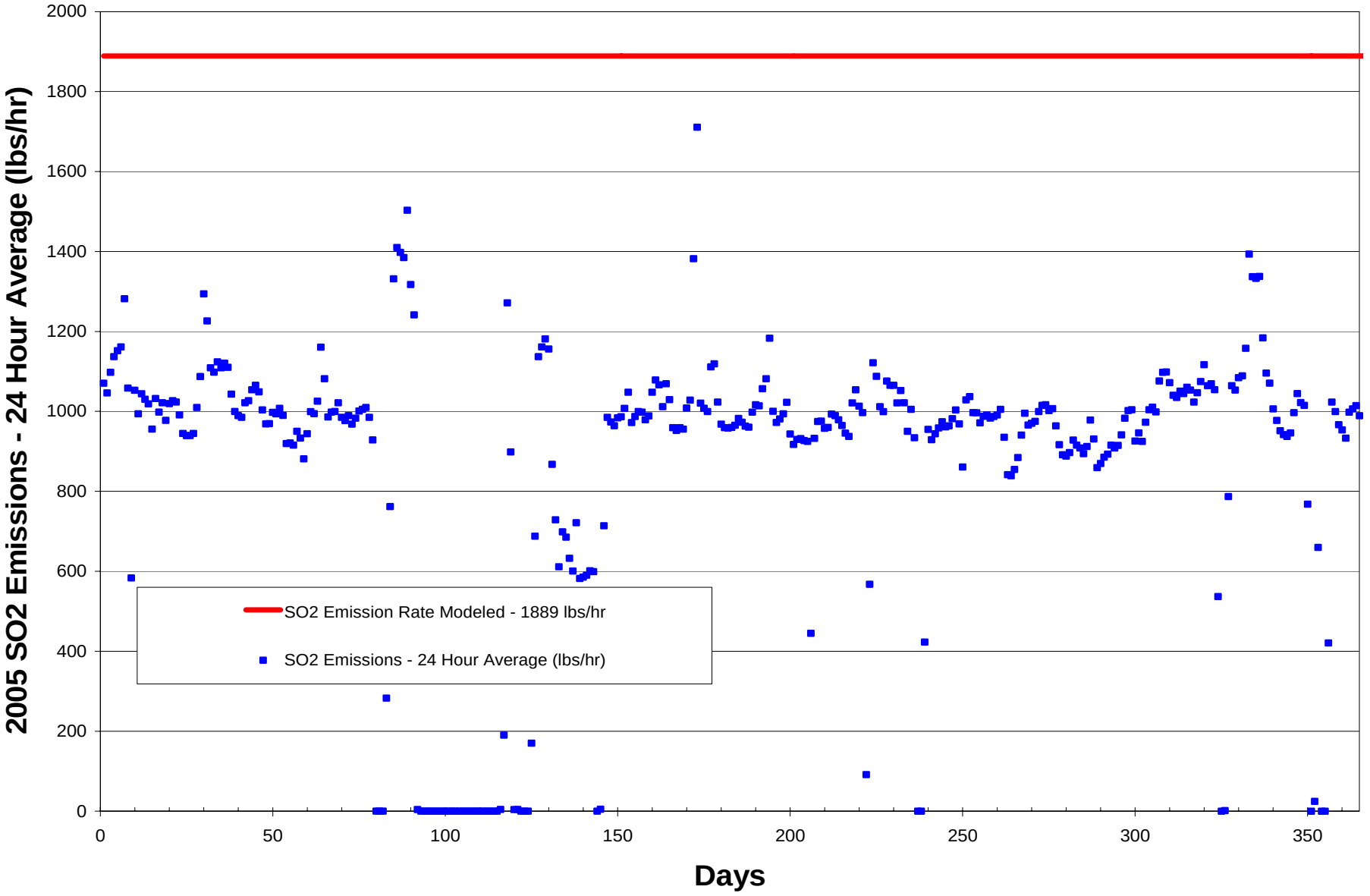
Nixon Power Plant - 24-Hour Average SO2 Emissions for 2004



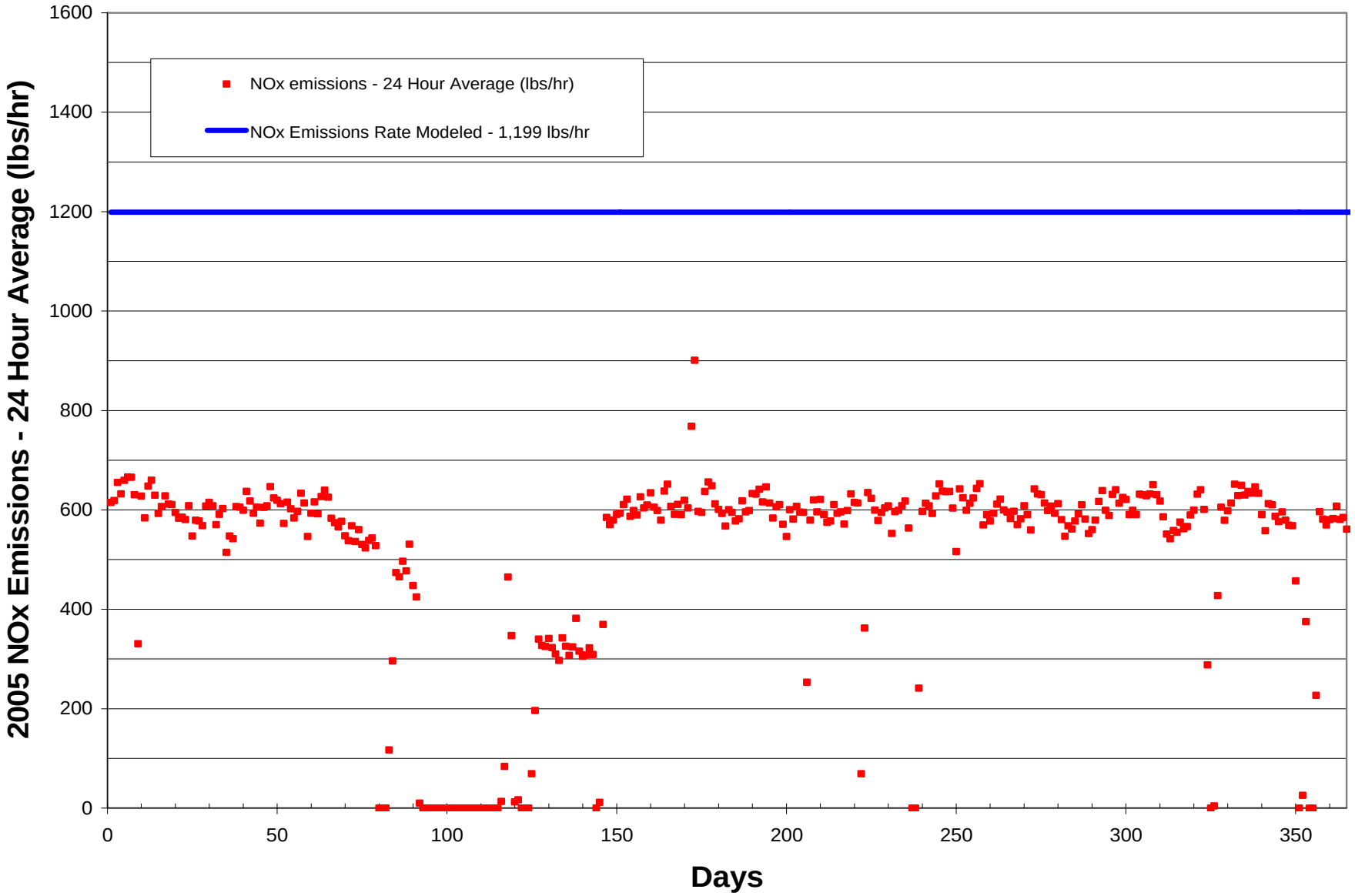
Nixon Power Plant - 24-Hour Average NOx Emissions for 2004



Nixon Power Plant - 24-Hour Average SO2 Emissions for 2005



Nixon Power Plant - 24-Hour Average NOx Emissions for 2005



APPENDIX C: STACK TEST RESULTS FOR THE RAY D. NIXON POWER PLANT ON MARCH 23, 2006 AND JUNE 29, 2005

Summary of Results

Table 1 – Filterable and Condensible Particulate Results

Test Parameters	**Run 1**	**Run 2**	**Run 3**	**Average**
Date	3/23/2006	3/23/2006	3/23/2006	
Start Time	7:34	11:50	15:25	
Stop Time	10:35	14:05	17:45	
Gas Conditions				
Temperature (°F)	297	293	298	**296**
Volumetric Flow Rate (acfm)	1,060,000	1,010,000	1,070,000	**1,050,000**
Volumetric Flow Rate (scfm)	603,000	578,000	611,000	**597,000**
Volumetric Flow Rate (dscfm)	546,000	530,000	551,000	**542,000**
Carbon Dioxide (% dry)	13.6	13.8	13.4	**13.6**
Oxygen (% dry)	5.73	5.73	6.20	**5.89**
Moisture (%)	9.49	8.43	9.91	**9.27**
Filterable Particulate Results				
Concentration (grains/dscf)	0.00701	0.00687	0.00772	**0.00720**
Concentration (mg/kg)	12.0	11.8	13.1	**12.3**
Emission Rate (lb/hr)	32.8	31.2	36.5	**33.5**
Emission Rate (lb/mmBtu)	0.0135	0.0132	0.0153	**0.0140**
Condensible Organic Particulate Results				
Concentration (grains/dscf)	0.0000431	0.00	0.00	**0.0000144**
Concentration (mg/kg)	0.074	0.00	0.00	**0.0245**
Emission Rate (lb/hr)	0.202	0.00	0.00	**0.0673**
Emission Rate (lb/mmBtu)	0.000083	0.00	0.00	**0.0000277**
Condensible Inorganic Particulate Results				
Concentration (grains/dscf)	0.00224	0.00098	0.00147	**0.00156**
Concentration (mg/kg)	3.82	1.68	2.50	**2.67**
Emission Rate (lb/hr)	10.5	4.44	6.93	**7.29**
Emission Rate (lb/mmBtu)	0.00432	0.00188	0.00292	**0.00304**
Total Condensible Particulate Results				
Concentration (grains/dscf)	0.00228	0.00098	0.00147	**0.00158**
Concentration (mg/kg)	3.90	1.68	2.50	**2.69**
Emission Rate (lb/hr)	10.70	4.44	6.93	**7.36**
Emission Rate (lb/mmBtu)	0.00440	0.00188	0.00292	**0.00307**
Total Particulate Results				
Concentration (grains/dscf)	0.00930	0.00784	0.00919	**0.00878**
Concentration (mg/kg)	15.9	13.5	15.6	**15.0**
Emission Rate (lb/hr)	43.5	35.6	43.4	**40.9**
Emission Rate (lb/mmBtu)	0.0179	0.0151	0.0183	**0.0171**

Table 2 – Sulfur Trioxide and Sulfur Dioxide Results

Test Parameters	**Run 1**	**Run 2**	**Run 3**	**Average**
Date	3/23/2006	3/23/2006	3/23/2006	
Start Time	8:37	11:50	15:34	
Stop Time	10:37	13:50	17:34	
Gas Conditions				
Temperature (°F)	297	293	298	**296**
Volumetric Flow Rate (acfm)	1,060,000	1,010,000	1,070,000	**1,050,000**
Volumetric Flow Rate (scfm)	603,000	578,000	611,000	**597,000**
Volumetric Flow Rate (dscfm)	546,000	530,000	551,000	**542,000**
Carbon Dioxide (% dry)	13.6	13.8	13.4	**13.6**
Oxygen (% dry)	5.73	5.73	6.20	**5.89**
Moisture (%)	9.49	8.43	9.91	**9.27**
Sulfuric Acid Mist/Suflur Trioxide Results				
Concentration (ppm)	0.0930	0.0936	0.117	**0.101**
Emission Rate (lb/hr)	0.633	0.618	0.804	**0.685**
Concentration (mg/kg)	0.231	0.234	0.290	**0.251**
Emission Rate (lb/mmBtu)	2.60E-04	2.62E-04	3.39E-04	**2.87E-04**
Sulfur Dioxide Results				
Concentration (ppm)	170	176	171	**173**
Emission Rate (lb/hr)	928	931	940	**933**
Concentration (mg/kg)	338	352	339	**343**
Emission Rate (lb/mmBtu)	0.382	0.395	0.395	**0.391**

Table 3 – Particle Size Distribution and Elemental Carbon Results

Test Parameters	**Run 1**	**Run 2**	**Run 4**	**Average**
Date	3/23/2006	3/23/2006	3/23/2006	
Start Time	11:09	14:48	18:00	
Stop Time	11:24	15:02	18:05	
Particle Size Distribution Results				
Less Than 0.5 micron (%)	71.5	63.6	66.6	**67.2**
0.5 micron < Particle Diameter < 1 micron (%)	19.5	22.6	22.7	**21.6**
1 micron < Particle Diameter < 1.5 micron (%)	6.63	7.11	6.50	**6.75**
1.5 micron < Particle Diamete r< 2 micron (%)	1.47	2.24	2.09	**1.93**
2 micron < Particle Diameter < 2.5 micron (%)	0.368	1.63	1.16	**1.05**
Greater Than 2.5 Micron (%)	0.552	2.85	0.928	**1.44**
Elemental Carbon Results (SEM)				
Concentration (%)	<1.00	<1.00	<1.00	**<1.00**

Table 4 – Hydrogen Fluoride and Hydrogen Chloride Results

Test Parameters	**Run 1**	**Run 2**	**Run 3**	**Average**
Date	3/23/2006	3/23/2006	3/23/2006	
Start Time	7:34	11:50	15:25	
Stop Time	10:35	14:05	17:45	
Gas Conditions				
Temperature (°F)	297	293	298	**296**
Volumetric Flow Rate (acfm)	1,060,000	1,010,000	1,070,000	**1,050,000**
Volumetric Flow Rate (scfm)	603,000	578,000	611,000	**597,000**
Volumetric Flow Rate (dscfm)	546,000	530,000	551,000	**542,000**
Carbon Dioxide (% dry)	13.6	13.8	13.4	**13.6**
Oxygen (% dry)	5.73	5.73	6.20	**5.89**
Moisture (%)	9.49	8.43	9.91	**9.27**
Hydrogen Fluoride Results				
Concentration (lb/dscf)	1.38E-07	1.58E-07	1.51E-07	**1.49E-07**
Concentration (ppm)	2.65	3.05	2.91	**2.87**
Concentration (mg/kg)	1.64	1.90	1.80	**1.78**
Emission Rate (lb/hr)	4.51	5.04	4.99	**4.84**
Emission Rate (lb/mmBtu)	0.00186	0.00214	0.00210	**0.00203**
Hydrogen Chloride Results				
Concentration (lb/dscf)	3.96E-08	3.72E-08	4.31E-08	**4.00E-08**
Concentration (ppm)	0.419	0.393	0.455	**0.423**
Concentration (mg/kg)	0.473	0.447	0.513	**0.478**
Emission Rate (lb/hr)	1.30	1.18	1.42	**1.30**
Emission Rate (lb/mmBtu)	5.34E-04	5.02E-04	5.99E-04	**5.45E-04**

Table 7 – Hydrogen Chloride & Hydrogen Fluoride Test Results (12 Hour test)

Test Parameters	**12 Hour**
Date	3/23/2006
Start Time	6:47
Stop Time	18:47
Gas Conditions	
Temperature (°F)	296
Volumetric Flow Rate (acfm)	1,060,000
Volumetric Flow Rate (scfm)	603,000
Volumetric Flow Rate (dscfm)	545,000
Carbon Dioxide (% dry)	13.6
Oxygen (% dry)	5.89
Moisture (%)	9.70
Hydrogen Fluoride Results	
Concentration (lb/dscf)	1.69E-07
Concentration (ppm)	3.25
Concentration (mg/kg)	2.01
Emission Rate (lb/hr)	5.51
Emission Rate (lb/mmBtu)	0.00229
Hydrogen Chloride Results	
Concentration (lb/dscf)	5.16E-08
Concentration (ppm)	0.545
Concentration (mg/kg)	0.615
Emission Rate (lb/hr)	1.69
Emission Rate (lb/mmBtu)	0.000703

Colorado Springs Utilities – Ray D. Nixon Power Plant, Unit 1 HCL/HF – June 29th 2005				
Run	**1**	**2**	**3**	
Field Data				
Start	9:40	12:32	15:24	
Stop	11:40	14:32	17:24	**Average**
Stack Temp (˚F)	313	318	317	316
O_2 (%vd)	6.5	6.5	6.5	6.5
CO_2 (%vd - CEMS)	12.6	12.8	12.6	12.7
Calculations				
Moisture (%vw)	11.2	11.4	11.2	11.3
Flow (dscfm)	533,375	512,992	506,277	517,548
% Isokinetic	102.5	103.5	101.2	102.4
PM Emssions				
PM (gr/dscf)	6.3E-03	3.6E-03	2.7E-03	4.2E-03
PM (mg/dscm)	14.4	8.3	6.2	9.7
PM (lb/hr)	28.8	16.0	11.9	18.9
PM (lb/MMBtu)	0.0128	0.0074	0.0056	0.0086
Hydogen Halide Emissions				
HCl (ppmvd)	0.7	0.7	0.7	0.7
HCl (mg/dscm)	1.1	1.1	1.1	1.1
HCl (lb/hr)	2.1	2.1	2.1	2.1
HCl (lb/MMBtu)	9.6E-04	9.8E-04	9.7E-04	9.7E-04
HF (ppmvd)	0.5	0.4	0.4	0.4
HF (mg/dscm)	0.4	0.4	0.3	0.4
HF (lb/hr)	0.8	0.7	0.6	0.7
HF (lb/MMBtu)	3.6E-04	3.3E-04	2.9E-04	3.3E-04
Cl_2 (ppmvd)	0.2	0.2	0.2	0.2
Cl_2 (mg/dscm)	0.5	0.4	0.4	0.5
Cl_2 (lb/hr)	0.9	0.9	0.9	0.9
Cl_2 (lb/MMBtu)	4.1E-04	3.9E-04	4.0E-04	4.0E-04

Table 5.2 Method 26A HCL/HF Results Summary

2.0 SUMMARY OF RESULTS

Three test-runs each were performed on Unit Nos.1 stack on March 20, 2003. The following were measured:

March 21, 2003

Unit 1

TEST NO.	1	2	3	Ave.
ACFM	985761	1025976	1018550	1010096
DSCFH	29948139	31127728	30791531	30622466
EMISSIONS				
Grains/DSCF	0.0060	0.0058	0.0051	0.0056
lbs / hour	25.74	25.59	22.49	24.61
lbs/10^6 BTU (Fc)	0.0112	0.0108	0.0096	0.0105

Complete test results summaries are tabulated and can be found on pages 5

3.0 DISCUSSION OF RESULTS

Three particulate test runs were performed on Unit Number 1 Stack. No problems were encountered with the test equipment during testing. Plant operations appeared normal during the testing. Testing was not be completed on the original test day due to inclement weather. Operational and opacity data was recorded and summarized by Colorado Springs Utilities personnel. Summaries of that data can be found appended.

4.0 PLANT AND SOURCE DESCRIPTION

The Ray D. Nixon Plant is owned by the City of Colorado Springs and operated by the City of Colorado Springs Utilities - Electric Department. The facility is located at Exit 125 off of I-25, in Fountain, Colorado. The elevation of the facility is approximately 5,500 feet above sea level. Normal barometric pressure runs about 24 - 25 in-Hga.

This plant consists of one (1) coal-fired utility steam-electric generating unit and it is a Phase 2 affected unit under the CAAA Title IV regulations and two (2) General Electric natural gas combustion turbines.

APPENDIX D: CORRESPONDENCE FROM THE COLORADO DEPT. OF HEALTH & ENVIRONMENT'S AIR POLLUTION CONTROL DIVISION

Nixon BART Project File

STATE OF COLORADO

Bill Owens, Governor
Dennis E. Ellis, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

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Colorado Department
of Public Health
and Environment

June 21 2006

Mr. Michael Brady
Technical Services Supervisor
Environmental Services Department
Colorado Springs Utilities
P.O. Box 1103, Mail Code 0940
Colorado Springs, CO 80947-0940

RE: BART CALPUFF Modeling Review

Dear Mr. Brady:

The Colorado Air Pollution Control Division (Division) has reviewed the CALPUFF modeling submitted by Colorado Springs Utilities (CSU) in May 2006 for both the Martin Drake Power Plant and the Ray D. Nixon Power Plant to support subject-to-BART and, potentially, BART degree of improvement modeling. This letter addresses meteorological and dispersion modeling issues. Comments related to emission rates and the synthetic minor permit applications will be addressed in separate communications.

The meteorological and modeling analysis methods in the May 2006 reports are satisfactory, except as addressed in this letter.

The decisions in this letter are based on the Division's review of the modeling and on meteorological performance evaluation products we reviewed and discussed during a meeting on June 15, 2006.

The Division's only modeling and meteorology comments regard the CALMET analysis.

The proposed CALMET revisions are conditionally accepted for purposes of subject-to-BART modeling and for BART degree of improvement modeling. In general, the Division's analysis suggests that both the Division's and CSU's CALMET fields are reasonable for regulatory decision-making. However, from a theoretical standpoint, the use of finer resolution grid cells should improve treatment of terrain-induced flows as compared to the Division's grid resolution. Based on a comparison of modeled wind vectors with observations during the types of regimes that lead to visibility impairment, CSU's refined CALMET fields tend to perform better than the Division's fields in this case. Thus, they may be used instead of the Division's CALMET fields.

The CALMET fields are only approved conditionally because there are periods where the CALMET fields perform poorly when compared to observations. Consequently, to better understand the

performance issues, both the Division and CSU performed exploratory modeling and conducted a limited evaluation using the 12km WRAP MM5 data for 2002. The Division's subject-to-BART protocol also suggested that the WRAP MM5 should be considered. It states:

> *While the VISTAS data was considered to be acceptable for the PSCo Comanche PSD permit and for this analysis based on data availability issues, the Western Regional Air Partnership (WRAP) 36km and 12 km 2002 data should be considered as a replacement for the 2002 VISTAS data if additional CALPUFF modeling is performed beyond this initial effort.*

The meteorological performance evaluation suggests that, on average, CALMET fields initialized with the WRAP 12km data perform as well or better than fields initialized with the 36 km MM5 VISTAS data. This conclusion is consistent with the fact that, theoretically, the finer resolution 12km WRAP MM5 data should perform better in Colorado, meteorologically, than the VISTAS 36km data.

Regarding refinements to R1, R2, RMAX1, and RMAX2, the Division's review suggests that different sets of R-values tend to perform better on different hours at different geographic locations. Without a much more extensive performance evaluation process, it is difficult to determine a set of best performing values for all hours when visibility impairment is possible. On some of the worst visibility days, the flow fields are relatively uniform and not sensitive to changes in R-values. On other days, the CALMET fields are very sensitive to R-value selection. Nevertheless, the Division finds that the proposed R-values are reasonable and acceptable for purposes of BART modeling.

In this case, "conditional approval" means that the Division will accept the CALMET fields unless the Division determines that the use of 2002 12km WRAP MM5 in CALMET instead of 36km MM5 data might change the outcome of the BART exemption decision or significantly affect the BART control scenario determination. For the BART exemption modeling, the Division may revisit the CALMET analysis if modeled visibility impacts are greater than 0.35 deciviews but less than 0.5 deciviews. Consequently, since the modeled impacts in the May 2006 modeling are in the range of 0.35 to 0.5 deciviews, the Division strongly recommends revising the 2002 CALMET fields using the 12km WRAP MM5 data for 2002. If the modeling for 2002 is not revised by CSU using the 12km WRAP 2002 data, the Division may revise the modeling later in the review process and use the revised modeling results in the final BART decision process.

If you have any questions on modeling, please feel free to contact me at (303) 692-3249 or by email (chuck.machovec@state.co.us).

Sincerely,

Chuck Machovec
Meteorology, Modeling, and Emission Inventory Unit
Technical Services Program
Air Pollution Control Division

cc: Kirsten King, APCD
Doris Jung, APCD
Matt Burgett, APCD
Barbara Macrae, APCD
Roland Hea, APCD

STATE OF COLORADO

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Colorado Department
of Public Health
and Environment

July 20, 2006

Mr. Michael Brady
Colorado Springs Utilities
P.O. Box 1103, Mail Code 940
Colorado Springs, CO 80947-0940

RE: Revised BART Emission Rate Review

Dear Mr. Brady:

The Colorado Air Pollution Control Division (the Division) has reviewed the revised emission rates submitted by Colorado Springs Utilities in the June 30, 2006 table titled "Emission Rates to Model for Ray D. Nixon Subject to BART Determination". The emission rates are from the one BART-eligible boiler (Unit S001). Emission rates of SO_2 and NO_x were determined based on historic data from the Continuous Emission Monitor System (CEMS). Emission rates of particulate matter are mostly based on the results of stack testing. This letter includes a summary of the Division's review and comments regarding the emission rates contained in the analysis, and will revise the emission rates previously approved in the June 26, 2006 letter sent by the Division.

As stated in our previous letter, the Division finds that the daily SO_2 and NO_x emission rates as submitted in the analysis are acceptable for the subject-to-BART modeling. However, since the coal sulfur content can vary and influence the SO_2 emissions, the Division would require that Colorado Springs Utilities obtain an appropriate permit limit to give the Division reasonable assurance that the SO_2 emission rate is a good indicator of anticipated future peak emissions allowed under the permit. The Division requests that Colorado Springs Utilities obtain a 30-day rolling SO_2 limit of 1571.9 lb/hr. This limit was developed based on the maximum 30-day rolling SO_2 emissions (lb/hr) from the three years that were analyzed to determine the peak 24-hr emission rate (2003 – 2005). The Division did increase the actual maximum 30-day rolling SO_2 amount (1429 lb/hr) by 10% to allow for some flexibility while still providing reasonable assurance that the rate is a good indicator of anticipated future peak daily emissions allowed under the permit.

PM_{10} filterable emissions were estimated based on a stack test conducted on March 21, 2003. An additional stack test was conducted on June 29, 2005 and exhibited emissions of PM_{10} filterable below the modeled emission rate. Both of these stack tests were reviewed and approved by the Division's Field Services Unit. Colorado Springs Utilities has agreed to model an emission rate that is double the highest single run from the stack test. Typically the Division would not necessarily consider a stack test to represent peak 24-hour emissions. However, since Colorado Springs Utilities is willing to double the measured emission rate, and taking into consideration that two stack tests showed compliance with the

requested emission rate, the Division will allow use of the submitted emission rate for PM_{10} filterable emissions.

The resulting PM_{10} filterable emissions are further subdivided into fine PM (PMF), coarse PM (PMC), and elemental carbon (EC). Colorado Springs Utilities assumed 3% of typical PM is EC. The Division will accept this since it is more conservative than the latest National Park Service (NPS) recommended speciation. Colorado Springs Utilities assumed 100% of the remaining emissions were PMF and 0% were PMC. The Division will accept these rates since they are more conservative than the rates recommended by the NPS.

Colorado Springs Utilities determined the condensable portion of the PM emissions based off of stack testing results (performed March 23, 2006). The stack test was reviewed and approved by the Division. Secondary Organic Aerosols (SOA) emissions were also determined based off the results of this stack test. Colorado Springs Utilities actually recommended a rate more conservative than the rate suggested by the stack test. The Division will accept this emission rate since it is more conservative than the rate recommended by the NPS and AP-42.

Sulfuric acid gas, HCl and HF emissions were also determined based on the stack test conducted on March 23, 2006. Proposed rates are based on the highest average test result, and rounded up in the case of HF and sulfuric acid. The Division will accept these emission rates since they are adequately conservative.

In summary, the Division approves the use of the following emission rates for the subject-to-BART modeling:

Pollutant	Unit S001 (lb/hr)	Additional Permit Requirements
SO_2	1889	30-day rolling limit of 1571.9 lb/hr
NO_x	1199	-
PM_{10} filterable	74.74	-
EC	0.74	-
PMF	74.0	-
PMC	0	-
PM_{10} condensable	N/A	-
SOA	1.0	-
H_2SO_4	1.0	-
HF	6.0	-
HCl	2.1	-

The Division believes these emission rates represent "high capacity utilization" during normal operating conditions and should be a good indicator of anticipated future peak emissions allowed under the current permit (with the additional permit requirement listed above). It should be noted that Colorado Springs Utilities has not yet submitted information to the Division that proves the Nixon Power Plant does not cause visibility impacts at any of the Class I areas above the 0.500 deciview threshold at the 98^{th} percentile, while using the emission rates listed above.

Thank you for working closely with the Division to conduct this review. Your patience and help were appreciated during this process. Please do not hesitate to contact me should you have any questions or comments at (303) 692-3183.

Sincerely,

Matthew S. Burgett, P.E.
Operating Permit Unit
Stationary Sources Program
Air Pollution Control Division

cc: Kirsten King, APCD (electronic copy)
Doris Jung, APCD (electronic copy)
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Roland Hea, APCD (electronic copy)
Mike Silverstein (electronic copy)