BEFORE THE ENVIRONMENTAL QUALITY COUNCIL
STATE OF WYOMING

In the Matter of:	)	
Basin Electric Power Cooperative	)	Docket No. 10-2802
Air Quality Permit No. MD-6047	)	
BART Permit: Laramie River Station	)	

RESPONSE TO BASIN ELECTRIC'S MOTION FOR SUMMARY JUDGMENT

DEQ/AQD's "Subject to BART Letter" with enc.

EXHIBIT 1

Department of Environmental Quality

To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.

Dave Freudenthal, Governor

John Corra, Director

June 14, 2006

Dallas Wade, Plant Manager
Basin Electric Power Cooperative
P.O. Box 1346
Wheatland, Wyoming 82201

Re: Laramie River Station

Dear Mr. Wade:

This letter is being directed to you because your facility has been determined to be "Subject to BART (Best Available Retrofit Technology)" per the U.S. Environmental Protection Agency regulations contained in 40 CFR Part 51, Appendix Y: Guidelines for BART Determinations under the Regional Haze Rule. The specific documents containing the complete text of the regulations are found in 40 CFR Part 51, Appendix Y, as published on July 6, 2005 in the Federal Register beginning on Page 39104, not including later amendments (copy included).

The Regional Haze Rule requires states to submit State Implementation Plans (SIP's) to address visibility impairment in 156 Federally-protected parks and wilderness areas (Class I Areas). While the Regional Haze Rule directs states to examine visibility impairment resulting from a variety of emission sources, the rule specifically requires states to look at the contribution from BART sources. Between now and December 2007, the Air Quality Division will be preparing a Regional Haze SIP which will include, among other things, a section identifying BART Eligible sources, a determination as to whether such sources cause or contribute to visibility impairment in a Class I area, and for those sources that are "Subject to BART", identification of the appropriate type and level of BART control. The general process of applying Appendix Y is described below.

Section II of Appendix Y (Page 39158) provides guidelines for identifying BART Eligible Sources using a three step procedure. Facilities that are BART Eligible are those: (Step 1) belonging to one of the 26 listed categories, (Step 2) "in existence" on August 7, 1977, but not "in operation" before August 7, 1962 and (Step 3) with the potential to emit greater than 250 tons per year of any single visibility impairing pollutant.

Once a source is determined to be "BART Eligible", Section III of Appendix Y (Page 39161) provides guidelines for determining whether that source is "Subject to BART". The Air Quality Division has established a threshold of 0.5 deciviews for determining that sources "contribute" to visibility impairment in any Class I area according to Section III A.1 of the July 6th BART

Guidelines. We then looked at SO_2, NO_X, and direct particulate matter (PM) emissions in making this determination according to Section III A.2. of the Guidelines; and followed Option 1 using the CALPUFF model according to Section III A.3. in analyzing the impact of BART Eligible sources contributing to visibility impairment.

This screening procedure shows that your facility has been determined to be "Subject to BART" (report attached). Therefore under §35-11-110 of the Wyoming Environmental Quality Act, I am requesting that your organization now conduct an analysis of BART options according to the guidelines in Section IV of Appendix Y (Page 39163), and report back the "best" alternative (Section IV E.) to the Air Quality Division by October 15, 2006.

Upon receipt, the Air Quality Division will review your analysis for all three pollutants, SO_2, NO_X, and Particulate Matter. We will base our control requirements on the final BART analyses for NO_X and PM. For SO_2 we will either use the BART analysis to show that an alternative Trading Program shows "Greater Reasonable Progress than BART" if the trading program survives, or to institute SO_2 BART controls if the program fails. For BART implementation, we will accept or amend your proposed emission controls, and set enforceable emission limits for your facility according to Section V of Appendix Y.

Also you should know that the Air Quality Division is concurrently developing Mercury control requirements, and as the control strategies for the visibility impairing pollutants may overlap with Hg, you may wish to consider this fact in developing your BART control strategies.

The Division recognizes that applying these federal guidelines will be challenging. In order to assist facility owners and establish a level playing field for all affected sources, the Division is proposing to establish a state BART rule which will define how the BART process will be applied in Wyoming. This proposal will be considered by the Air Quality Advisory Board on July 10 and 11, 2006 in Gillette, Wyoming. Owners and operators of sources subject to BART are encouraged to attend. Additional information on this meeting, including a draft BART rule will be available on the Air Quality Website http://deq.state.wy.us/aqd/index.asp?pageid=8 after June 14, 2006.

If you have any additional questions regarding this requirement, please feel free to call me at 307-777-7391 or contact Lee Gribovicz at 307-777-6993 for further assistance.

Sincerely,

D Finley

Dave Finley, Administrator
Air Quality Division

cc:	District Engineers	Lee Gribovicz	Bernie Dailey
	Robert Gill	Tina Anderson	Mike Stoll

Enclosure #1: July 6, 2005 Federal Register Regional Haze BART Guidelines
Enclosure #2: June 9, 2006 Don Watzel Memo – "BART Screening Analysis"
Enclosure #3: April, 2006 McVehil-Monnet Draft Final Report – "BART Air Modeling; Individual Source Visibility Impairment Analysis"

Memorandum

From: Don Watzel DW

To: Dave Finley, Bernie Dailey, Chad Schlichtemeier, Ken Rairigh KR

Date: June 9, 2006

Re: BART Screening Analysis

The Division has completed the BART screening analysis for fourteen (14) facilities in Wyoming with BART eligible emission units to determine which facilities produced a significant impact on visibility on Class I areas in Wyoming, Colorado, and South Dakota. The list of BART-eligible sources and emissions inventory was compiled from the District Engineers. Altogether, there were fourteen (14) facilities identified.

The U.S. EPA regulations for best available retrofit technology (BART) are contained in 40 CFR Part 51, Appendix Y, published July 6, 2005 in the Federal Register, and provide the guidelines for BART determinations. Section II of Appendix Y discusses a three-step procedure for identifying BART eligible sources. A source is BART eligible if it 1.) belongs to one of the 26 listed categories, 2.) was "in existence" on August 7, 1977, but not "in operation" before August 7, 1962, and 3.) has the potential to emit greater than 250 tons per year of any single visibility impairing pollutant. If a facility meets all three criteria mentioned, then a screening analysis will determine if it will be "subject to BART", per Section III of Appendix Y.

As specified in the Division's BART modeling protocol dated April, 2006 (attached), a source will have been deemed to produce a significant impact to visibility on a Class I area if the source has a modeled impact to visibility value greater than 0.5 deciview (dv) to determine a daily maximum change in visibility (Δdv) value for each Class I area and year of meteorological data. The visibility impact threshold to determine BART sources is a 98th percentile change in visibility (Δdv) of 0.5 dv above background conditions. Therefore, if the 8th highest Δdv value is equal to or greater than 0.5 dv, the source will be considered to cause or contribute to visibility impairment in the subject Class I area, and therefore is "subject to BART". However, if the 8th highest value for all three years at each Class I area in a given domain is less than 0.5 dv, the source will not be subject to BART. Using these criteria, the fourteen (14) facilities were screened for BART subjectivity. Table 1 details the emission units at the BART eligible sources. The facilities subject to BART and not subject to BART are denoted below. Screening results, which provide the maximum change in visibility, number of days > 0.5 dv, and 8th high values, are summarized in the attached spreadsheet(s):

Subject to BART (src>0.5 dv)
Pacificorp – Bridger
Pacificorp – Naughton
FMC – Granger
FMC – Green River
Basin Electric – LRS
Pacificorp – Wyodak
Pacificorp – Dave Johnson
General Chemical

Not Subject to BART (src<0.5dv)
P4 Production
OCI Wyoming
Dyno Nobel
Sinclair – Casper Refinery
Black Hills – Neil Simpson 1
Sinclair – Sinclair Refinery

Table 1
Summary of Stack Parameters and Emission Rates for Sources Modeled in BART Screening Analysis

Company	Facility	Emission Unit	Description	NO_x lb/hr	SO_2 lb/hr	PM_{10} lb/hr	UTM Coordinates Zone	Easting (m)	Northing (m)	Elev (m)	Stack Height (m)	Stack Temperature (K)	Stack Velocity (m/s)	Stack Diameter (m)	Federal Class I Area(s)	Meteorological Data
Basin Electric	Laramie River Power Plant	Boiler	PC - Babcock & Wilcox Boiler #1	2619.4	1264.0	546.0	13	509887	4681575	1348	182.9	332.2	15.2	8.54	Wind Cave NP, Badlands NP	2001, 2002, 2003
Basin Electric	Laramie River Power Plant	Boiler	PC - Babcock & Wilcox Boiler #2	1502.3	1264.0	546.0	13	509887	4681662	1348	182.9	332.2	15.2	8.54		
Basin Electric	Laramie River Power Plant	Boiler	PC - Babcock & Wilcox Boiler #3	2719.2	1320.0	548.0	13	509887	4681749	1348	182.9	358.2	22.9	8.66		
				6840.8	3868.0	1640.0										
Black Hills	Neil Simpson #1	Boiler	PC Boiler - Foster Wheeler	112.8	351.8	86.7	13	469090.1	4903545.4	1402	76.2	442.4	21.9	1.63	Wind Cave NP, Badlands NP	2001, 2002, 2003
				112.8	351.8	86.7										
Dyno Nobel North America	Cheyenne Plant	IC Engine	South Cooper Bessemer Engine	170.6	–	–	13	507555	4549175	1925	13.41	485.9	16.78	1.68	Mt Zirkel NP, Rawah WA, Rocky Mtn NP	1996, 2001, 2002
Dyno Nobel North America	Cheyenne Plant	IC Engine	North Cooper Bessemer Engine	170.6	–	–										
Dyno Nobel North America	Cheyenne Plant	Nitric Acid Plant	#1 Nitric Acid Plant (125 TPD)	6.0	–	–	13	507637	4549219	1924	21.34	438.7	11.86	0.61		
Dyno Nobel North America	Cheyenne Plant	Nitric Acid Plant	#2 Nitric Acid Plant (125 TPD)	6.0	–	–	13	507637	4549217	1924	21.34	438.7	11.88	0.61		
Dyno Nobel North America	Cheyenne Plant	Prill Tower	HIDAN Prill Tower	–	–	54.0	13	507683	4549219	1923	39.83	310.4	24.23	1.52		
Dyno Nobel North America	Cheyenne Plant	Wet Scrubber	HIDAN Cooling Drum	–	–	19.7	13	507707	4549213	1923	23.82	294.3	51.51	0.46		
Dyno Nobel North America	Cheyenne Plant	Wet Scrubber	Urea Evaporator	–	–	15.6	13	507740	4549088	1923	51.21	368.3	6.89	0.46		
Dyno Nobel North America	Cheyenne Plant	Prill Tower	Urea Prill Tower	–	–	43.1	13	507732	4549087	1923	41.76	357.6	2.72	3.35		
Dyno Nobel North America	Cheyenne Plant	Boiler	Urea Auxiliary Boiler	6.1	–	–	13	507715	4549075	1923	21.34	505.4	5.15	0.33		
				369.3	0.0	132.8										
FMC Corporation	Granger Soda Ash Plant	Boiler	PC Boiler #1	251.0	71.7	35.8	12	591757	4613883	1932	45.72	333.2	21.29	1.98	Bridger WA, Fitzpatrick WA	1995, 1996, 2001
FMC Corporation	Granger Soda Ash Plant	Boiler	PC Boiler #2	251.0	71.7	35.8	12	591770	4614077	1929	45.72	333.2	21.2	1.98		
				501.9	143.4	71.7										
FMC Corporation	Sodium Products	Boiler	NS-1A Mono Coal/Gas Boiler	523.3	1064.4	45.0	12	598376	4607862	1924	91.44	414.8	54.49	1.83	Bridger WA, Fitzpatrick WA	1995, 1996, 2001
FMC Corporation	Sodium Products	Boiler	NS-1B Mono Coal/Gas Boiler	374.3	1064.4	45.0	12	598380	4607962	1925	91.44	410.9	54.96	1.83		
FMC Corporation	Sodium Products	Boiler	PH-3 Sesqui Gas Fired Boiler	43.4	–	8.4	12	598300	4608338	1917	21.34	394.3	8.34	2.29		
				941.0	2128.8	98.4										
General Chemical	Green River Soda Ash	Boiler	Boiler C	245.6	640.8	50.0	12	603815	4605128	1920	47.55	452.6	15.98	3.05	Bridger WA, Fitzpatrick WA	1995, 1996, 2001
General Chemical	Green River Soda Ash	Boiler	Boiler D	501.6	1056.0	80.0	12	603681	4605144	1920	47.55	460.9	25.12	3.05		
				747.2	1696.8	130.0										
OCI	Big Island	Boiler	Combustion Engineering Boiler #4	13.3	–	7.5	12	608793	4618978.7	1893	18.76	434.1	18.39	1.98	Bridger WA, Fitzpatrick WA	1995, 1996, 2001
OCI	Big Island	Boiler	Combustion Engineering Boiler #5	13.3	–	8.6	12	608787.9	4618950.6	1893	24.38	440.1	21.53	1.03		
OCI	Big Island	Boiler	Combustion Engineering Boiler #6	13.3	–	–	12	608780.2	4618962	1893	24.38	434.1	21.63	1.83		
				40.0	0.0	16.1										
P4 Production	Rock Springs Coking Plant	Coker	Salem Coker (Calciner)	72.9	218.0	22.0	12	648355	4599787	1951	39.62	1255.4	12.24	4.75	Bridger WA, Fitzpatrick WA	1996, 1998, 2001
				72.9	218.0	22.0										
Pacificorp	Dave Johnston	Boiler	Boiler 3	1194.2	2671.0	513.9	13	435537.4	4742908.9	1519	152.4	444.82	33.22	4.97	Wind Cave NP, Badlands NP	2001, 2002, 2003
Pacificorp	Dave Johnston	Boiler	Boiler 4	1447.3	1737.0	730.4	13	436492.1	4742959.3	1519	76.2	325.9	8.53	7.01		
				2641.5	4408.0	1244.3										
Pacificorp	Jim Bridger	Boiler	Tangential Coal Boiler #1	2008.4	1583.0	561.0	12	684262	4622809	2042	152.4	333.2	22.3	7.32	Bridger WA, Fitzpatrick WA	1995, 1996, 2001
Pacificorp	Jim Bridger	Boiler	Tangential Coal Boiler #2	1716.7	1683.0	561.0	12	684209	4622873	2042	152.4	333.2	22.3	7.32		
Pacificorp	Jim Bridger	Boiler	Tangential Coal Boiler #3	1841.1	1683.0	561.0	12	684158	4622936	2042	152.4	333.2	25.2	7.32		
Pacificorp	Jim Bridger	Boiler	Tangential Coal Boiler #4	2030.8	1004.0	502.0	12	684102	4623004	2042	152.4	333.2	13	9.45		
				7596.9	5953.0	2185.0										
Pacificorp	Naughton Plant	Boiler	CE Coal Boiler #1	1079.8	2218.6	446.6	12	533470	4622710	2114	60.96	410.8	25.52	4.27	Bridger WA, Fitzpatrick WA	1995, 1996, 2001
Pacificorp	Naughton Plant	Boiler	CE Coal Boiler #2	1322.5	2844.0	548.3	12	533520	4622740	2114	68.58	410.8	21.34	4.88		
Pacificorp	Naughton Plant	Boiler	CE Coal Boiler #3	2052.0	1839.5	788.3	12	533610	4622850	2114	137.16	323	19.81	8.08		
				4456.2	6902.3	1783.2										
Pacificorp	Wyodak	Boiler	PC Boiler	1189.0	2050.0	410.0	13	469389.2	4903887.3	1402	121.9	346.9	22.6	6.1	Wind Cave NP, Badlands NP	2001, 2002, 2003
				1189.0	2050.0	410.0										
Sinclair	Casper Refinery	Boiler	#7 Boiler	26.7	98.2	15.6	13	398495	4745568	1567	41.39	549.8	12.9	1.37	Wind Cave NP, Badlands NP	2001, 2002, 2003
				26.7	98.2	15.6										
Sinclair	Sinclair Refinery	Heater	780 FCC Heater H2	15.8	–	–	13	324973.8	4627288.6	2011	33.53	872	10.3	0.76	Wind Cave NP, Badlands NP	2001, 2002, 2003
Sinclair	Sinclair Refinery	Heater	781 Naphtha Splitter Heater	7.9	–	–	13	324877.2	4627317.7	2011	36.6	477.6	4.39	1.22		
Sinclair	Sinclair Refinery	Heater	781 #1 HDS Heater	5.5	–	–	13	324815.9	4627300.2	2011	27.43	1018.5	9.33	1.22		
Sinclair	Sinclair Refinery	Heater	781 LEF Heater	5.5	–	–	13	324959.7	4627290.1	2011	33.53	630.4	8.09	0.91		
Sinclair	Sinclair Refinery	Heater	781 #1 Reformer Heater	9.6	1.0	–	13	324822.7	4627300.1	2011	45.72	727.6	5.88	1.52		
Sinclair	Sinclair Refinery	Heater	781 #3 Reformer Heater	2.1	0.5	–	13	324811.8	4627300.4	2011	19.2	855.4	2.06	1.22		
Sinclair	Sinclair Refinery	Heater	781 Stabilizer Heater	2.6	0.3	–	13	324834.3	4627290.8	2011	41.15	635.9	2.24	1.22		
Sinclair	Sinclair Refinery	Heater	582 PFlash Htr. F101	3.2	–	–	13	324830.7	4627316.2	2011	36.6	838.7	8.49	1.22		
Sinclair	Sinclair Refinery	Heater	582 PFlash Htr. F103	3.8	–	–	13	324826.4	4627314.5	2011	38.6	866.5	3.4	1.52		
Sinclair	Sinclair Refinery	Heater	582 Crude Htr. F102A	6.5	–	–	13	324833.1	4627315.4	2011	36.6	866.5	6.96	1.52		
Sinclair	Sinclair Refinery	Heater	582 Crude Htr. F102B	3.4	–	–	13	324859.6	4627314.8	2011	36.6	833.2	5.15	1.52		
Sinclair	Sinclair Refinery	Heater	582 Vac. Htr. F104	9.0	–	–	13	324849	4627322.8	2011	36.6	883.2	13.47	0.91		
Sinclair	Sinclair Refinery	Heater	Asphalt Heater #2	1.6	–	–	13	325029	4627237	2011	12.8	810.9	8.35	0.91		
Sinclair	Sinclair Refinery	Heater	Alky Heater H1	4.3	–	–	13	325121.9	4627530.5	2011	27.4	715.5	5.03	1.22		
Sinclair	Sinclair Refinery	Boiler	#10 High Press. Boiler	23.8	2.3	–	13	324811.7	4627192.6	2011	15.24	449.82	9.08	1.52		
Sinclair	Sinclair Refinery	Sulfur Recovery Unit	SRU #1	5.1	340.0	–	13	324972.9	4627218.7	2011	49.1	810.93	1.4	1.52		
				111.1	344.0	0.0										

BART Screening Analysis Results

SW Domain	1995 (Num Values >.5 DV)	1996 (Num Values >.5 DV)	2001 (Num Values >.5 DV)	1995 Max DV Change	1996 Max DV Change	2001 Max DV Change
P4 Production						
Bridger Wilderness	0	0	0	0.143	0.381	0.388
Fitzpatrick Wilderness	0	0	0	0.081	0.129	0.094
Pacificorp - Bridger						
Bridger Wilderness	55	21	42	9.717	8.666	4.617
Fitzpatrick Wilderness	25	15	23	3.337	3.754	4.327
Pacificorp - Naughton						
Bridger Wilderness	105	109	128	5.984	6.185	7.331
Fitzpatrick Wilderness	48	43	81	3.305	5.253	4.789
FMC - Granger						
Bridger Wilderness	3	13	7	0.862	1.719	1.090
Fitzpatrick Wilderness	0	2	0	0.260	1.140	0.272
FMC - Green River						
Bridger Wilderness	20	24	38	2.063	2.788	2.214
Fitzpatrick Wilderness	5	8	11	1.003	1.811	1.236
General Chemical						
Bridger Wilderness	11	18	27	1.471	2.369	1.757
Fitzpatrick Wilderness	4	5	6	0.702	1.658	1.077
OCI - Wyoming						
Bridger Wilderness	0	0	0	0.097	0.149	0.127
Fitzpatrick Wilderness	0	0	0	0.019	0.056	0.028

NE Domain	2001 (Num Values >.5 DV)	2002 (Num Values >.5 DV)	2003 (Num Values >.5 DV)	2001 Max DV Change	2002 Max DV Change	2003 Max DV Change
Basin Electric - LRS						
Bad Lands	81	57	62	5.503	5.879	5.441
Wind Cave	73	58	36	6.273	7.709	8.518
Black Hills - Neil Simpson 1						
Bad Lands	0	0	0	0.207	0.346	0.374
Wind Cave	0	0	1	0.234	0.425	0.700
Pacificorp - Dave Johnston						
Bad Lands	88	65	79	4.299	4.051	3.482
Wind Cave	91	69	77	4.46	4.678	4.326
Pacificorp - Wyodak						
Bad Lands	20	23	29	1.155	2.16	2.484
Wind Cave	30	28	37	1.671	2.49	3.685
Sinclair - Casper Refinery						
Bad Lands	0	0	0	0.075	0.089	0.091
Wind Cave	0	0	0	0.112	0.119	0.106
Sinclair - Sinclair Refinery						
Bad Lands	0	0	0	0.196	0.166	0.132
Wind Cave	0	0	0	0.303	0.189	0.247

SE Domain	2001 (Num Values >.5 DV)	2002 (Num Values >.5 DV)	2003 (Num Values >.5 DV)	2001 Max DV Change	2002 Max DV Change	2003 Max DV Change
Sinclair - Sinclair Refinery						
Rocky Mountain NP	0	0	0	0.242	0.282	0.144
Rawah Wilderness	0	0	0	0.267	0.32	0.151
Mt. Zirkel Wilderness	0	0	0	0.425	0.213	0.177
Dyno-Nobel						
Rocky Mountain NP	1	3	1	0.819	0.883	0.671
Rawah Wilderness	1	1	0	0.696	0.552	0.134
Mt. Zirkel Wilderness	0	0	0	0.261	0.282	0.271

BART Screening Analysis Results

SW Domain	1995	1996	2001
	H8H DV Change	H8H DV Change	H8H DV Change
P4 Production			
Bridger Wilderness	0.068	0.051	0.109
Fitzpatrick Wilderness	0.034	0.022	0.050
Pacificorp - Bridger			
Bridger Wilderness	3.107	2.046	2.802
Fitzpatrick Wilderness	1.469	1.066	1.486
Pacificorp - Naughton			
Bridger Wilderness	3.119	4.364	4.277
Fitzpatrick Wilderness	1.632	2.378	2.428
FMC - Granger			
Bridger Wilderness	0.266	0.704	0.495
Fitzpatrick Wilderness	0.120	0.225	0.183
FMC - Green River			
Bridger Wilderness	0.752	1.298	1.430
Fitzpatrick Wilderness	0.364	0.541	0.627
General Chemical			
Bridger Wilderness	0.746	0.977	1.356
Fitzpatrick Wilderness	0.295	0.372	0.493
OCI - Wyoming			
Bridger Wilderness	0.042	0.067	0.068
Fitzpatrick Wilderness	0.009	0.016	0.017

NE Domain	2001	2002	2003
	H8H DV Change	H8H DV Change	H8H DV Change
Basin Electric - LRS			
Bad Lands	3.663	2.777	2.671
Wind Cave	3.295	3.142	3.207
Black Hills - Neil Simpson 1			
Bad Lands	0.125	0.176	0.147
Wind Cave	0.163	0.136	0.268
Pacificorp - Dave Johnston			
Bad Lands	2.596	2.008	2.361
Wind Cave	2.498	2.246	3.293
Pacificorp - Wyodak			
Bad Lands	0.842	1.246	1.097
Wind Cave	1.007	1.213	1.657
Sinclair - Casper Refinery			
Bad Lands	0.051	0.047	0.045
Wind Cave	0.045	0.045	0.062
Sinclair - Sinclair Refinery			
Bad Lands	0.096	0.072	0.075
Wind Cave	0.081	0.089	0.117

SE Domain	2001	2002	2003
	H8H DV Change	H8H DV Change	H8H DV Change
Sinclair - Sinclair Refinery			
Rocky Mountain NP	0.049	0.088	0.085
Rawah Wilderness	0.062	0.11	0.077
Mt. Zirkel Wilderness	0.08	0.098	0.074
Dyno-Nobel			
Rocky Mountain NP	0.118	0.219	0.218
Rawah Wilderness	0.117	0.169	0.082
Mt. Zirkel Wilderness	0.068	0.046	0.023

DRAFT
FINAL REPORT

BART AIR MODELING

INDIVIDUAL SOURCE VISIBILITY IMPAIRMENT ANALYSIS

April, 2006

Prepared For:

State of Wyoming
Department of Environmental Quality
Air Quality Division
Cheyenne, WY 82002

Prepared By:

McVehil-Monnett Associates, Inc.
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Englewood, CO 80112

MMA Project Number 1938-05-3

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Tables

1.0 INTRODUCTION

The U.S. EPA has issued final amendments to the Regional Haze Regulations, along with Guidelines for Best Available Retrofit Technology (BART) Determinations.[1] The Guidelines address methodology for determining which facilities must apply BART (sources subject to BART) and the evaluation of control options.

The State of Wyoming has utilized air quality modeling, using the CALPUFF modeling system, in accordance with the EPA Guidelines to determine the Wyoming sources which are subject to BART. This report describes the specific methodology applied in the air quality modeling analysis, and presents analysis results defining those Wyoming sources that have been determined to be subject to BART.

[1] 40 CFR Part 51: Regional Haze Regulations and Guidelines for Best Available Retrofit Technology (BART) Determinations; Final Rule. 70 Federal Register, 39103-39172, July 6, 2005.

2.0 OVERVIEW

The Wyoming Air Quality Division determined that there are fourteen "BART-Eligible" sources in the State. The sources are listed in Table 1. Modeling and analyses described in this report were used to determine, for each of these sources, whether they are "subject to BART".[2] A source is subject to BART if air quality modeling indicates that the source causes or contributes to visibility impairment in any Class I area, within or outside of Wyoming.

Class I areas that could potentially experience visibility impairment due to emissions from Wyoming sources were initially defined as all of those within 300 km of any BART-eligible source.

In Wyoming:	N. Absaroka WA Washakie WA Yellowstone NP Teton WA Fitzpatrick WA Bridger WA Grand Teton NP
In Colorado:	Rawah WA Rocky Mountain NP Mt. Zirkel WA Flat Tops WA Eagles Nest WA Maroon Bells – Snowmass WA West Elk WA
In Utah:	Arches NP
In South Dakota:	Badlands NP Wind Cave NP
In Idaho:	Craters of the Moon NM

Not all of these Class I areas were included in modeling analyses. For each BART-eligible source, those Class I areas deemed most likely to experience visibility impacts on the basis of distance, meteorology, and terrain were assessed in the analysis. Modeling domains, sources, and the Class I areas addressed for each source are described in subsequent parts of the report.

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[2] All sources except Dyno Nobel N.A. and OCI Wyoming are addressed in this report. Those two sources were analyzed in separate but identical analyses.

Wyoming has followed the BART guideline for evaluation of all BART-eligible sources. The threshold for classification of a source as subject to BART is a visibility impact exceeding 0.5 deciview (dv) compared to the 20% best days natural background, based on the 98^{th} percentile of modeled 24-hour delta – deciview values.

Table 1. Wyoming BART – Eligible Sources

Basin Electric	Laramie River Power Plant	Boilers # 1, 2, 3
Black Hills P & L	Neil Simpson # 1 Power Plant	Boiler
Dyno Noble N.A.	Cheyenne Plant	Misc. Sources
FMC Corporation	Granger Soda Ash Plant	Boilers # 1, 2
FMC Corporation	Green River Sodium Plant	Three boilers
General Chemical Co.	Green River Soda Ash	Two boilers
OCI Wyoming	Big Island Soda Ash Plant	Boilers # 4, 5, 6
P4 Production	Rock Springs Coking Plant	Calciner
PacifiCorp	Dave Johnson Power Plant	Boilers # 3, 4
PacifiCorp	Jim Bridger Power Plant	Boilers # 1 – 4
PacifiCorp	Naughton Power Plant	Boilers # 1, 2, 3
PacifiCorp	Wyodak Power Plant	Boiler
Sinclair Oil Co.	Casper Refinery	Boiler # 7
Sinclair Oil Co.	Sinclair Refinery	Misc. Sources

3.0 POLLUTANTS AND EMISSIONS

The pollutants included in the CALPUFF modeling analyses were sulfur dioxide (SO_2), nitrogen oxides (NO_x), and particulate matter. Where data were available, particulate matter emissions were quantified separately as fine particles (PM2.5) and coarse particles (PM10). If no particle size information was available, all particles were assumed to be PM2.5. Emissions of ammonia (NH_3) and volatile organic compounds (VOC) were not considered. It is believed that emissions of these pollutants have negligible impact on regional haze in Wyoming.

Table 2 presents a listing of emission rates modeled for all BART-eligible sources. The emission rates were determined by the Division based upon existing permits, allowable rates, and emissions reporting data. They represent the best available estimates of maximum 24-hour average emissions for each source and pollutant. Table 3 lists stack parameters for each source. The data in Tables 2 and 3 were used for all BART modeling to define the individual source's impact on visibility.

Table 2. Maximum 24-hr Emission Rates for BART Source Attribution Modeling

Source	Emission Unit	NO_x		SO_2		PM2.5		PM10	
		lb/hr	g/s	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s
Basin Electric Laramie River	Boiler # 1	2619.4	330.04	1284.0	161.78	158.3	19.95	387.7	48.85
	Boiler # 2	1502.3	189.29	1284.0	161.78	158.3	19.95	387.7	48.85
	Boiler # 3	2719.2	342.61	1320.0	166.32	158.9	20.02	389.1	49.03
Black Hills Neil Simpson # 1	Boiler	112.8	14.21	351.6	44.30	28.0	3.53	68.7	8.66
Dyno Nobel	IC Engine	170.6	21.50						
	IC Engine	170.6	21.50						
	Nitric Acid Plant	6.0	0.76						
	Nitric Acid Plant	6.0	0.76						
	Prill Tower					54.0	6.80		
	Wet Scrubber					19.7	2.48		
	Wet Scrubber					15.8	1.99		
	Prill Tower					43.1	5.43		
	Boiler	6.1	0.77						
FMC Corporation Granger Soda Ash	Boiler # 1	251.0	31.63	71.7	9.03	35.8	4.51		
	Boiler # 2	251.0	31.63	71.7	9.03	35.8	4.51		
FMC Corporation Sodium Products	NS-1A Boiler	523.3	65.93	1064.4	134.1	45.0	5.67		
	NS-1B Boiler	374.3	47.16	1064.4	134.1	45.0	5.67		
	PH-3 Boiler	43.4	5.47			8.4	1.06		
General Chemical Green River Soda Ash	Boiler C	245.6	30.95	640.8	80.74	50.0	6.30		
	Boiler D	501.6	63.20	1056.0	133.05	80.0	10.08		

Table 2. Maximum 24-hr Emission Rates for BART Source Attribution Modeling (Continued)

Source	Emission Unit	NO_x		SO_2		PM2.5		PM10	
		lb/hr	g/s	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s
OCI Big Island	Boiler # 4	13.3	1.68			7.5	0.95		
	Boiler # 5	13.3	1.68			8.6	1.08		
	Boiler # 6	13.3	1.68						
P4 Production	Calciner	72.9	9.19	218.0	27.47	22.0	2.77		
Pacificorp Dave Johnston	Boiler # 3	1194.2	150.47	2671.0	336.54	149.0	18.77	364.9	45.98
	Boiler # 4	1447.3	182.36	1737.0	218.86	372.5	46.93	357.9	45.09
Pacificorp Jim Bridger	Boiler # 1	2008.4	253.05	1683.0	212.05	162.7	20.50	398.3	50.19
	Boiler # 2	1716.7	216.30	1683.0	212.05	162.7	20.50	398.3	50.19
	Boiler # 3	1941.1	244.57	1683.0	212.05	162.7	20.50	398.3	50.19
	Boiler # 4	2030.8	255.88	1004.0	126.50	145.6	18.35	356.4	44.91
Pacificorp Naughton Plant	Boiler # 1	1079.8	136.05	2218.8	279.56	129.5	16.32	317.1	39.95
	Boiler # 2	1322.5	166.63	2844.0	358.34	159.0	20.03	389.3	49.05
	Boiler # 3	2052.9	258.66	1839.5	231.77	228.6	28.80	559.7	70.52
Pacificorp Wyodak	Boiler	1189.0	149.81	2050.0	258.30	118.9	14.98	291.1	36.68
Sinclair Casper Refinery	Boiler	26.7	3.36	98.2	12.37	15.6	1.97		

Table 2. Maximum 24-hr Emission Rates for BART Source Attribution Modeling (Continued)

Source	Emission Unit	NO_x		SO_2		PM2.5		PM10	
		lb/hr	g/s	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s
Sinclair Refinery	Heater	15.6	1.97						
	Heater	7.9	1.00						
	Heater	5.5	0.69						
	Heater	5.5	0.69						
	Heater	9.6	1.21	1.0	0.13				
	Heater	2.1	0.26	0.5	0.06				
	Heater	2.6	0.33	0.3	0.04				
	Heater	3.2	0.40						
	Heater	3.8	0.48						
	Heater	8.6	1.08						
	Heater	3.4	0.43						
	Heater	9.0	1.13						
	Heater	1.8	0.23						
	Heater	4.3	0.54						
	Boiler # 10	23.0	2.90	2.3	0.29				
	SRU # 1	5.1	0.64	340.0	42.84				

Table 3. Stack Parameters for BART Source Attribution Modeling

Source	Emission Unit	Height (m)	Temp (K)	Vel (m/s)	Dia (m)
Basin Electric Laramie River	Boiler # 1	182.9	332.2	15.2	9.54
	Boiler # 2	182.9	332.2	15.2	9.54
	Boiler # 3	182.9	358.2	22.9	8.66
Black Hills Neil Simpson # 1	Boiler	76.2	442.4	21.9	1.83
Dyno Nobel	IC Engine	13.41	485.9	16.78	1.68
	IC Engine	13.41	485.9	16.78	1.68
	Nitric Acid Plant	21.34	438.7	11.88	0.61
	Nitric Acid Plant	21.34	438.7	11.88	0.61
	Prill Tower	39.93	310.4	24.23	1.52
	Wet Scrubber	23.62	294.3	51.51	0.46
	Wet Scrubber	51.21	369.3	6.89	0.46
	Prill Tower	41.76	357.6	2.72	3.55
	Boiler	21.34	505.4	5.15	0.33
FMC Corporation Granger Soda Ash	Boiler # 1	45.72	333.2	21.29	1.98
	Boiler # 2	45.72	333.2	21.2	1.98
FMC Corporation Sodium Products	NS-1A Boiler	91.44	414.8	54.49	1.83
	NS-1B Boiler	91.44	410.9	54.96	1.83
	PH-3 Boiler	21.34	394.3	8.34	2.29
General Chemical Green River Soda Ash	Boiler C	47.55	452.6	15.98	3.05
	Boiler D	47.55	460.9	25.12	3.05
OCI Big Island	Boiler # 4	16.76	434.1	18.39	1.98
	Boiler # 5	24.38	440.1	21.53	1.83
	Boiler # 6	24.38	434.1	21.53	1.83
P4 Production	Calciner	39.62	1255.4	12.24	4.75
Pacificorp Dave Johnston	Boiler # 2	152.4	444.8	33.22	4.57
	Boiler # 3	76.2	325.9	8.53	7.01

Table 3. Stack Parameters for BART Source Attribution Modeling (Continued)

Source	Emission Unit	Height (m)	Temp (K)	Vel (m/s)	Dia (m)
Pacificorp Jim Bridger	Boiler # 1	152.4	333.2	22.3	7.32
	Boiler # 2	152.4	333.2	22.3	7.32
	Boiler # 3	152.4	333.2	25.2	7.32
	Boiler # 4	152.4	333.2	13	9.45
Pacificorp Naughton Plant	Boiler # 1	60.96	410.8	26.52	4.27
	Boiler # 2	68.58	410.8	21.34	4.88
	Boiler # 3	137.16	323	19.81	8.08
Pacificorp Wyodak	Boiler	121.9	346.9	22.6	6.1
Sinclair Casper Refinery	Boiler	41.39	549.8	12.9	1.37
Sinclair Refinery	Heater	33.53	672	10.3	0.76
	Heater	36.6	477.6	4.39	1.22
	Heater	27.43	1016.5	9.33	1.22
	Heater	33.53	630.4	8.09	0.91
	Heater	45.72	727.6	5.88	1.52
	Heater	19.2	855.4	2.08	1.22
	Heater	41.15	635.9	2.24	1.22
	Heater	36.6	838.7	6.49	1.22
	Heater	36.6	866.5	3.4	1.52
	Heater	36.6	866.5	6.96	1.52
	Heater	36.6	833.2	5.15	1.52
	Heater	36.6	683.2	13.47	0.91
	Heater	12.8	810.9	8.35	0.91
	Heater	27.4	716.5	5.03	1.22
	Boiler # 10	15.24	449.8	9.08	1.52
	SRU # 1	49.1	810.9	1.4	1.52

4.0 MODELING DOMAIN AND METEOROLOGICAL DATA

The determination of those sources subject to BART was carried out through application of the CALPUFF modeling system. Wind and meteorological fields for CALPUFF were developed using the CALMET meteorological processor; input data consisted of MM5 prognostic model fields, augmented with surface and upper air data from observing stations within the model domain.

The Class I areas potentially affected by Wyoming sources are located over a large area within and surrounding the state. Wyoming BART – eligible sources are widely distributed within the state. Therefore, a very large modeling domain would be required to address all sources and Class I areas. It was also desired to utilize to the extent possible meteorological data fields previously used for long-range transport modeling that have been checked and quality assured. For these reasons, BART modeling utilized three separate modeling domains and two meteorological data sets.

The model domains included a Southwest Wyoming domain, utilizing meteorological data for 1995, 1996, and 2001, and Northeast and Southeast Wyoming domains with 2001, 2002, and 2003 meteorological data. The southwest and northeast data sets were developed for prior Wyoming analyses and were readily adapted for BART modeling. The southeast domain meteorological fields were developed specifically for the BART analyses. MM5 model output for the southeast domain were acquired by the Division, and used in CALMET (with additional surface and upper air data) to generate required input meteorological fields for CALPUFF. The three modeling domains, along with the locations of Class I areas and BART – eligible sources, are shown in Figure 1.

Model domains and Class I areas used for each source's BART evaluation are shown in Table 4. The assignments in Table 4 were developed on the basis of source/Class I area locations, distances to each Class I area, and professional judgment considering meteorological and terrain factors. All source-Class I area distances exceed 50 km, and are less than 300 km, thus falling within the range of recommended CALPUFF application.

Only those Class I areas most likely to be impacted by each source were modeled. Areas greater than 300 km from a source have been excluded. Also, when several Class I areas are located in the same direction from a source, only the closest Class I areas were evaluated. If impacts are less than the BART threshold for the Class I areas modeled, it can be reasonably assumed that areas at a greater distance and in directions of less frequent plume transport will not experience significant impacts.

Table 4. Source-Specific Model Domains and Meteorological Data Years

Source	Modeling Domain	Meteorological Data Years	Class I Areas to be Evaluated
1. Basin Electric Laramie River	Northeast WY	2001, 2002, 2003	Wind Cave, Badlands
2. Black Hills Neil Simpson # 1	Northeast WY	2001, 2002, 2003	Wind Cave, Badlands
3. Dyno Nobel Cheyenne Plant	Southeast WY	2001, 2002, 2003	Rocky Mountain NP, Rawah, Mt. Zirkel
4. FMC Corporation Granger Soda Ash	Southwest WY	1995, 1996, 2001	Bridger, Fitzpatrick
5. FMC Corporation Sodium Products	Southwest WY	1995, 1996, 2001	Bridger, Fitzpatrick
6. General Chemical Green River Soda Ash	Southwest WY	1995, 1996, 2001	Bridger, Fitzpatrick
7. OCI Big Island Plant	Southwest WY	1995, 1996, 2001	Bridger, Fitzpatrick
8. P4 Production Rock Springs Coking	Southwest WY	1995, 1996, 2001	Bridger, Fitzpatrick
9. Pacificorp Dave Johnston	Northeast WY	2001, 2002, 2003	Wind Cave, Badlands

Table 4. Source-Specific Model Domains and Meteorological Data Years (Continued)

Source	Modeling Domain	Meteorological Data Years	Class I Areas to be Evaluated
10. Pacificorp Jim Bridger	Southwest WY	1995, 1996, 2001	Bridger, Fitzpatrick
11. Pacificorp Naughton Plant	Southwest WY	1995, 1996, 2001	Bridger, Fitzpatrick
12. Pacificorp Wyodak	Northeast WY	2001, 2002, 2003	Wind Cave, Badlands
13. Sinclair Casper Refinery	Northeast WY	2001, 2002, 2003	Wind Cave, Badlands
14. Sinclair Sinclair Refinery	Southeast WY	2001, 2002, 2003	Rocky Mountain NP, Rawah, Mt. Zirkel

5.0 CALMET INPUT

Input options for CALMET generally applied default values except where application-specific choices are required. Table 5 summarizes the CALMET inputs.

All MM5 prognostic data had 36 km resolution, except for the 1995 (southwest Wyoming) data set, which has 20 km resolution. The MM5 data were used in CALMET, along with data from surface, upper air, and precipitation observations, to generate the final meteorological files required as input to CALPUFF. Appendix A lists the surface and upper air stations from which data were used for each domain and meteorological year. The number of upper air stations used as input to the CALMET processing varied from none (1996 only) to three, depending upon the availability of data from representative stations. For 1996, the MM5 data fields were used alone to define upper air conditions.

Table 5. CALMET Input Parameters that are Application-Specific or Differ from Default Values

CALMET Input Parameter	Value(s)
Input Group 2	
Map projection (PMAP)	Lambert Conformal
Grid spacing (DGRIDKM)	4
Number vertical layers (NZ)	10
Top of lowest layer (m)	20
Top of highest layer (m)	3500
Input Group 4	
Observation mode (NOOBS)	0 1 (for 1996 only)
Input Group 5	
Prog. Wind data (IPROG)	14
(RMAX1)	30
(RMAX2)	50
(RMAX3)	N/A
Terrain influence (TERRAD)	15
(R1)	5
(R2)	25
Input Group 6	
Max mixing ht (ZIMAX)	3500

CALMET Model Version 5.53A, Level 040716

6.0 CALPUFF MODELING

CALPUFF modeling was conducted for each BART-eligible source to calculate concentrations of each visibility-impairing pollutant in each Class I area. Source emissions, meteorological data, and model domains were as prescribed in Sections 3.0 and 4.0. Each source was modeled separately for each of three years of meteorological data, utilizing the CALMET meteorological fields generated for the applicable years/model domains.

Concentration calculations were made for all receptors within the designated Class I areas. Receptors were defined for each area by the standard receptor points developed by the Federal Land Managers (FLMs) and available from the National Park Service web site database.

CALPUFF model options conformed with standard default values with limited exceptions. Table 6 lists non-default and application-specific parameters that were used in CALPUFF. Chemical transformation calculations used MESOPUFF II equations, and dispersion coefficients were PG coefficients (MDISP=3).

Since most of the sources have relatively tall stacks, and only impacts at distances greater than 50 km are of interest, building wake effects were not considered for any sources. Puff splitting were not used for CALPUFF modeling, in order to limit computation time to reasonable levels.

Background ozone concentrations were considered in the model by use of hourly ozone files from representative monitoring sites in each model domain.[(3)] A default ozone concentration (for missing data hours) was specified as 44 ppb, based on average data from northeast Wyoming. The background ammonia concentration was specified as 2.0 ppb for all model domains. The value of 2.0 is based on monitoring data from nearby states and IWAQM guidance. North Dakota has specified a background ammonia concentration of 2.0 ppb for the western part of the state, as indicated by 2000-2001 monitoring data from Beulah. Colorado found background ammonia concentrations of 0.5 to 1.6 ppb for the Mt. Zirkel area. The IWAQM Phase II report suggests values of 0.5 ppb for forested areas, 1.0 ppb for arid lands, and 10.0 ppb for agricultural lands (within a factor of two). Since a single background ammonia value must be specified within a model domain, a value of 2.0 ppb was selected as reasonable given the available data. Experience has suggested that this value is conservative in that it is unlikely to significantly limit nitrate formation in the model.

Default particle size data were used for all modeled particles except PM10. Since PM10 represents coarse particles with diameters between 2.5 and 10.0 μm, the mass-mean PM10 diameter was estimated as 7.0 μm.

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[3] See Appendix A for list of ozone stations.

Table 6. CALPUFF Input Parameters that are Application-Specific or Differ From Default Values

CALPUFF Input Parameter	Value(s)
Input Group 1	
Number of species modeled (NSPEC)	7
Number of species emitted (NSE)	4
Input Group 2	
Dispersion coefficients (MDISP)	3
Input Group 3	
Species Modeled	SO_2, SO_4, NO_x, HNO_3, NO_3, PM10, PM25
Species emitted	SO_2, NO_x, PM10, PM25
Input Group 4	
Map projection (PMAP)	Lambert Conformal
Grid spacing (DGRIDKM)	4
Cell face heights (ZFACE)	same as used for applicable CALMET
Sampling grid	F
Input Group 8	
Particle size parameters	mean 0.48, st. dev. 2.0 except 7.0, 2.0 for PM10
Input Group 11	
Ozone input option (MOZ)	1 (hourly ozone files)
Monthly ozone (BCKO3)	44 ppb
Monthly ammonia (BCKNH3)	2.0 ppb
Input Group 12	
Max mixing height (XMAXZ1)	same as applicable CALMET

CALPUFF Model Version 5.711A, Level 040716

7.0 POSTPROCESSING

The CALPOST processor is used in the final processing step to calculate 24-hour average visibility results. Output was specified in deciview (dv) units. The output consists of the highest deciview impact on each day from all receptors within each Class I area.

Calculations of light extinction were made for each pollutant modeled (sulfate, nitrate, coarse particles, and fine particles). The sum of all extinction values is then used to calculate the delta-dv change relative to natural background. Default extinction coefficients for each species, as given below, were used.

Ammonium sulfate	3.0
Ammonium nitrate	3.0
PM Coarse (PM10)	0.6
PM Fine (PM25)	1.0

Monthly average relative humidity factors F(RH) were used in the light extinction calculations to account for the hygroscopic characteristic of sulfate and nitrate particles. Monthly f(RH) values, from the EPA Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule, are shown in Table 7 for each set of Class I areas. Values shown in Table 7 represent the average f(RH) for the Class I areas listed. In many cases the tabulated f(RH) values for a given month are the same for each Class I area within a group. Where differences occur, they are no greater than 0.3 units; the average values are within 0.1 to 0.2 units of the Guideline values for any individual area.

CALPOST visibility Method 6 (MVISBK=6) was used for determination of background visibility. It should be noted that when Method 6 is used, the CALPOST calculation of f(RH) and the CALPOST designation of maximum relative humidity (RHMAX) are irrelevant and not used for calculations.

The natural background conditions as a reference for determination of the delta-dv change due to a source should be representative of the 20% best natural visibility days. EPA BART guidance provides the 20% best days deciview values for each Class I area on an annual basis, but does not provide species concentration data for the 20% best background conditions. These concentrations were needed for input to CALPOST.

Annual species concentrations corresponding to the 20% best days were calculated for each Class I area to be addressed, by scaling back the annual average concentrations given in Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule (Table 2-1). A separate scaling factor was derived for each Class I area such that, when multiplied by the Guidance table annual concentrations, the 20% best days deciview value for that area would be calculated. The scaled aerosol concentrations were then averaged over the Class I areas to be addressed in each model domain to provide data (to be used for each month) for CALPOST input. The 20% best days aerosol concentrations used for Wyoming BART evaluations are listed in Table 8.

Concentrations were generally very similar at all of the Class I areas in a given model domain. Comparison of predicted deciview values for individual Class I areas (using annual average f(RH) and concentrations from Table 8) to the Guidance 20% best deciview tabulations show agreement within one percent for all Class I areas.

Table 7. Monthly f(RH) Factors for Class I Areas

Month	Wind Cave NP Badlands NP	Bridger WA Fitzpatrick WA	Rocky Mt. NP Rawah WA Mt. Zirkel WA
Jan	2.65	2.50	2.10
Feb	2.65	2.30	2.13
Mar	2.65	2.27	2.00
Apr	2.55	2.10	2.10
May	2.70	2.10	2.23
Jun	2.60	1.83	1.87
Jul	2.30	1.57	1.77
Aug	2.30	1.53	1.83
Sep	2.20	1.80	2.00
Oct	2.25	2.03	1.87
Nov	2.75	2.47	2.07
Dec	2.65	2.43	2.03

Table 8. Natural Background Concentrations of Aerosol Components for 20% Best Days for BART Analyses (μg/m³).

Aerosol Component	Wind Cave NP Badlands NP	Fitzpatrick WA Bridger WA	Rawah WA Rocky Mountain NP Mt. Zirkel WA
Ammonium Sulfate	.047	.045	.045
Ammonium Nitrate	.040	.038	.037
Organic Carbon	.186	.178	.178
Elemental Carbon	.008	.008	.007
Soil	.198	.189	.189
Coarse Mass	1.191	1.136	1.135

8.0 DETERMINATION OF SOURCES SUBJECT TO BART

Results of the CALPOST visibility processing for each BART-eligible source consisted of a listing of daily maximum Δdv values for each Class I area and year of meteorological data. The visibility impact threshold to identify those sources subject to BART is a 98th percentile change in visibility (Δdv) of 0.5 dv. Therefore, if the 8th highest Δdv value for any year is equal to or greater than 0.5 dv, the source is considered to cause or contribute to visibility impairment in the subject Class I area.

Table 9 presents the model results for each source, year, and Class I area. The table lists, in each case, the number of days on which the calculated Δdv value at any receptor exceeded 0.5, and the largest Δdv value calculated for any day and receptor. Based on the Table 9 results, the following Wyoming sources have been determined to be subject to BART.

- Pacificorp Bridger Power Plant
- Pacificorp Naughton Power Plant
- FMC Granger Soda Ash Plant
- FMC Green River Sodium Plant
- General Chemical Green River Soda Ash Plant
- Basin Electric Laramie River Power Plant
- Pacificorp Dave Johnson Power Plant
- Pacificorp Wyodak Power Plant

Four sources that were screened did not have results indicating a significant visibility impact in the Class I areas modeled. The P4 Production Rock Springs Coking Plant had no impacts exceeding 0.4 dv at the Bridger or Fitzpatrick WAs. The source is more than 200 km from any other Class I area (compared to 115 km from Bridger WA). Therefore it is concluded that P4 Production is not subject to BART.

Similarly, Black Hills Neil Simpson # 1 Power Plant produced only one day out of three years with an impact exceeding 0.5 dv at Wind Cave and Badlands NPs. The plant is 165 km from Wind Cave (generally upwind) and 300 km or more from all Class I areas in other directions. It is concluded that Neil Simpson # 1 has no significant Class I area visibility impacts and is not subject to BART.

Results are slightly less clear in the cases of the Sinclair Refinery and Sinclair Casper Refinery. Screening of these sources (for the Southeast and Northeast domains, respectively) indicate no impacts exceeding 0.5 dv. However, these sources are approximately equidistant from Class I areas in other domains, with a possibility of plume transport in those directions. Thus, an additional CALPUFF model run was executed for Sinclair; it was modeled in the Northeast domain to evaluate impacts at Wind Cave and Badlands NPs. The results of that analysis (included in Table 9) also show no impact exceeding 0.5 dv. Since total emissions from the Sinclair Casper Refinery are substantially less than from the Sinclair Refinery, and the latter is shown to have insignificant impacts in both the northeast and southeast domains, it is concluded that neither Sinclair source is subject to BART.

Table 9. Results of CALPUFF Visibility Modeling for BART-Eligible Sources

SW Domain	1995 (Num Values >.5 DV)	1996 (Num Values >.5 DV)	2001 (Num Values >.5 DV)	1995 Largest DV Change	1996 Largest DV Change	2001 Largest DV Change
P4 Production						
Bridger Wilderness	0	0	0	0.143	0.381	0.388
Fitzpatrick Wilderness	0	0	0	0.081	0.129	0.094
Pacificorp Bridger						
Bridger Wilderness	55	21	42	9.717	8.666	4.617
Fitzpatrick Wilderness	25	15	23	3.337	3.764	4.327
Pacificorp Naughton						
Bridger Wilderness	105	109	128	5.984	6.185	7.331
Fitzpatrick Wilderness	48	43	81	3.305	5.253	4.789
FMC - Granger						
Bridger Wilderness	3	13	7	0.862	1.719	1.090
Fitzpatrick Wilderness	0	2	0	0.260	1.140	0.272
FMC - Green River						
Bridger Wilderness	20	24	38	2.063	2.788	2.214
Fitzpatrick Wilderness	5	8	11	1.003	1.811	1.235
General Chemical						
Bridger Wilderness	11	18	27	1.471	2.369	1.757
Fitzpatrick Wilderness	4	5	6	0.702	1.658	1.077

NE Domain	2001 (Num Values >.5 DV)	2002 (Num Values >.5 DV)	2003 (Num Values >.5 DV)	2001 Largest DV Change	2002 Largest DV Change	2003 Largest DV Change
Basin Electric						
Bad Lands	81	57	62	5.503	5.879	5.441
Wind Cave	73	58	62	6.273	7.709	8.518
Black Hills						
Bad Lands	0	0	0	0.207	0.346	0.374
Wind Cave	0	0	1	0.234	0.425	0.700
Pacificorp Dave Johnston						
Bad Lands	88	65	79	4.299	4.051	3.482
Wind Cave	91	69	77	4.460	4.678	4.326
Pacificorp Wyodak						
Bad Lands	20	23	29	1.155	2.160	2.484
Wind Cave	30	28	37	1.671	2.490	3.685
Sinclair Casper						
Bad Lands	0	0	0	0.075	0.089	0.091
Wind Cave	0	0	0	0.112	0.119	0.106
Sinclair Refinery						
Bad Lands	0	0	0	0.196	0.166	0.132
Wind Cave	0	0	0	0.303	0.189	0.247

SE Domain	2001 (Num Values >.5 DV)	2002 (Num Values >.5 DV)	2003 (Num Values >.5 DV)	2001 Largest DV Change	2002 Largest DV Change	2003 Largest DV Change
Sinclair Refinery						
Rocky Mountain NP	0	0	0	0.242	0.282	0.144
Rawah Wilderness	0	0	0	0.267	0.320	0.151
Mt. Zirkel Wilderness	0	0	0	0.425	0.213	0.177

APPENDIX A

SOURCES OF METEOROLOGICAL AND
OZONE MONITORING DATA

SOUTHWEST DOMAIN

Meteorological Data:

1995		1996		2001	
Surface	Upper Air	Surface*	Upper Air	Surface	Upper Air
Baggs, WY	Denver, CO	Rock Springs, WY	None	Rawlins, WY	Riverton, WY
Craig, CO	Grand Junction, CO	Riverton, WY	(Vertical profiles	Riverton, WY	Salt Lake City, UT
Tg Soda Ash	Lander, WY	Lander, WY	Based on data	Salt Lake City, UT	Grand Junction, CO
OCIW	Salt Lake City, UT	Big Piney, WY	Generated at each	Rock Springs, WY	
Naughton Power Plt		Evanston, WY	36 km. spaced	Big Piney, WY	
General Chemical		Jackson Hole, WY	grid cell by MM5)	Casper, WY	
Whitney Canyon		Worland, WY		Evanston, WY	
Shute Creek Gas Pl		Rawlins, WY		Jackson Hole, WY	
Pinedale, WY		Ogden, UT		Pocatello, ID	
Centennial, WY		Salt Lake City, UT		Ogden, UT	
Yellowstone NP		Pocatello, ID			
Craters of the Moon		Idaho Falls, ID			
Denver, CO		Soda Springs, ID			
Grand Junction, CO		Malad City, ID			
Cheyenne, WY		Casper, WY			
Lander, WY					
Rock Springs, WY					
Casper, WY					
Salt Lake City, UT					
Pocatello, ID					
Rawlins, WY					
Riverton, WY					

* - 63 National Weather Service stations were input because the original modeling domain developed with the 1996 data set is substantially larger than the SWWYTAF domain, extending into a large part of Montana, the entire state of Wyoming and the western Dakotas; only those stations located within the SWWYTAF domain are listed

Precipitation Stations: total of 249 stations in original modeling domain

Ozone Monitoring Stations:

Pinedale, WY
Centennial, WY
Yellowstone NP, WY
Craters of the Moon NM, ID
Highland, UT
Hayden, CO

NORTHEAST DOMAIN

Meteorological Data: all years except where noted

Surface	Upper Air
Ellsworth AFB, SD	Rapid City, SD
Chadron, NE	
Lander, WY	
Scottsbluff, NE	
Sheridan, WY	
Billings, MT	
Cody, WY	
Rawlins, WY	
Riverton, WY	
Worland, WY	
Casper, WY	
Rapid City, SD	
Gillette, WY	
Buffalo, WY – 2003 only	

Precipitation Stations: total of 62 stations (63 for 2003)

Ozone Monitoring Stations:

Thunder Basin, WY
Robbinsdale, SD (except 2001)

SOUTHEAST DOMAIN

Meteorological Data: all years

Surface	Upper Air
Lamar Municipal Airport, CO	Denver, CO
Pueblo Memorial Airport, CO	Grand Junction, CO
Goodland, CO	Rapid City, SD
Colorado Springs Municipal Airport, CO	Riverton, WY
Limon, CO	
Leadville Lake County Airport, CO	
Meeker Airport, CO	
Eagle County Airport, CO	
Aspen Pitkin County Airport, CO	
Gunnison County Airport, CO	
Burlington Carson Airport, CO	
Akron Washington Co Airport, CO	
Grand Junction Walker Field, CO	
Montrose Regional Airport, CO	
Greeley - Weld County Airport, CO	
Loveland Ft Collins – Loveland, CO	
Cheyenne, WY	
Laramie Regional Airport, WY	
Denver International Airport, CO	
Douglas Converse County Airport, WY	
Casper Natrona Co International Airport, WY	
Craig Craig - Moffat Cnty Airport, CO	
Hayden Yampa Valley Airport, CO	
Rifle Garfield County Airport, CO	
Rock Springs Sweetwater Co Airport, WY	
Rawlins Municipal Airport, WY	
Lander Hunt Field, WY	
Torrington Municipal Airport, WY	
Riverton, WY	
Big Piney Marbleton Airport, WY	

Precipitation Stations: total of 108 stations

Ozone Monitoring Stations:

Centennial, WY
Rocky Mountain NP, CO