ENVIRON

VISIBILITY MODELING FOR CENTRALIA POWER PLANT

COMPARISON OF FLEX FUEL AND FLEX FUEL WITH SNCR

March 2010

TABLE 1

BASELINE (2003-2005) 24-HOUR MAXIMUM EMISSION RATES

Year	NOx (lb/hr)		SO_2 (lb/hr)		PM_{10} (lb/hr)	
	Unit 1	Unit 2	Unit 1	Unit 2	Unit 1	Unit 2
2003	2,474	2,293	1,898	1,783	91	57
2004	2,440	2,510	2,062	2,460	91	90
2005	2,415	2,496	740	1,135	98	144
Max Rate Used	2,474	2,510	2,062	2,460	98	144
Date of Max	02/28/03	06/17/04	10/13/04	10/13/04	12/16/05	7/12/05
MMBtu/hr on Max day	8,201	8,198	7,516	7,295	8,175	8,461
lb/MMBtu on Max Day	0.302	0.306	0.274	0.337	0.012	0.017

TABLE 2

BART NOX EMISSION RATES

Case	Emission Factor (lb/MMBtu)	Heat Demand (MMBtu/hr)	Unit 1 NOx (lb/hr)	Unit 2 NOx (lb/hr)
Flex Fuels	0.240	8,200	1,968	1,968
Flex Fuels w SNCR [1]	0.180	8,200	1,476	1,476

1. NOx emission rate for "Flex Fuels w SNCR" case is based on 75% of Flex Fuels case.

TABLE 3

BART EMISSION RATES BY CASE, TOTAL FOR BOTH UNITS

Case	NOx (lb/hr)	SO_2 (lb/hr)	PM_{10} (lb/hr)
Baseline [1]	4,984	4,522	242
Flex Fuels [2]	3,936	1,854	242
Flex Fuels w SNCR [2]	2,952	1,854	242

1. Maximum actual 24-hour emissions during 2003-2005.
2. Flex Fuel SO_2 emissions based on the ratio of sulfur in Jacobs Ranch coal to Centralia Mine coal (41%) times the 2003-2005 maximum 24-hour rate of 4,522 lb/hr. NOx emissions reduced by 25% for SNCR.

TABLE 4
STACK PARAMETERS

Case	Stack Location xlcc (km) [1]	Stack Location ylcc (km) [1]	Base Elevation (m) [2]	Stack Height (m)	Diameter (m)	Velocity (m/s)	Temperature (K)
All	-136.702	-239.551	108.6	143.3	12.82 [3]	15.0 [4]	332.3 [4]

1 Lambert Conic Conformal (LCC) coordinates with reference Latitude 49 North and reference Longitude 121 West.

2 Source elevation based on bilinear interpolation of the 4-km mesh size terrain used by CALMET

3 The units were simulated as a release from a single stack. The two stacks are next to one another and the flows were combined using an equivalent diameter calculated from the combined area of the two stacks

4 Velocity and temperature are based on the average measured data from 2003-2005

TABLE 5
PM10 SPECIATION

Case	$(NH_4)_2SO_4$	NH_4NO_3	OC	PMC	PMF	EC
Baseline [1]	22.68%	0.00%	5.67%	39.81%	30.67%	1.18%
Flex Fuels [1]	22.68%	0.00%	5.67%	39.81%	30.67%	1.18%
Flex Fuels w SNCR [1]	22.68%	0.00%	5.67%	39.81%	30.67%	1.18%

1. NPS PM_{10} profile for Dry Bottom Boiler burning pulverized coal with FGD and ESP assuming a sulfur content of 0.92%, an ash content of 14.9%, and a heat content of 7,961 Btu/lb

TABLE 6

CALPUFF EMISSION RATES, TOTAL FOR BOTH UNITS

	Maximum 24-hour Emission Rates (lb/hr)								
Case	**SO_2**	**SO_4**	**NOx**	**HNO_3**	**NO_3**	**OC [1]**	**PMC**	**PMF**	**EC**
Baseline	4,522.0	40.0	4,984.0	0.0	0.0	13.7	96.4	74.3	2.9
Flex Fuels	1,854.0	40.0	3,936.0	0.0	0.0	13.7	96.4	74.3	2.9
Flex Fuels w SNCR	1,854.0	40.0	2,952.0	0.0	0.0	13.7	96.4	74.3	2.9

1. OC emissions were actually labeled secondary organic aerosols (SOA) in the CALPUFF input files to facilitate post-processing with CALPOST. This assumes all OC emitted forms SOA with the same molecular weight.

TABLE 7

NUMBER OF DAYS WITH PREDICTED CHANGE TO THE HAZE INDEX GREATER THAN 0.5 DECIVIEWS

		Number of Days in 2003-2005 with Delta HI > 0.5 dv		
Area of Interest	**Period**	**Baseline**	**Flex Fuels**	**Flex Fuels w SNCR**
Alpine Lakes Wilderness	2003-2005	432	361	323
Glacier Peak Wilderness	2003-2005	275	202	168
Goat Rocks Wilderness	2003-2005	414	354	318
Mt. Adams Wilderness	2003-2005	329	271	241
Mt. Hood Wilderness	2003-2005	224	176	147
Mt. Jefferson Wilderness	2003-2005	130	89	77
Mt. Rainier National Park	2003-2005	505	462	428
Mt. Washington Wilderness	2003-2005	101	63	45
N. Cascades National Park	2003-2005	206	137	103
Olympic National Park	2003-2005	254	216	199
Pasayten Wilderness	2003-2005	141	82	55
Three Sisters Wilderness	2003-2005	105	68	51
CRGNSA	2003-2005	245	173	140
Overall	Min	101	63	45
	Mean	259	204	177
	Max	505	462	428

TABLE 8

PREDICTED CHANGE TO THE 98TH PERCENTILE DAILY HAZE INDEX FOR 2003-2005

		98th Percentile Daily Delta HI (dv) [1]		
Area of Interest	**Period**	**Baseline**	**Flex Fuels**	**Flex Fuels w SNCR**
Alpine Lakes Wilderness	2003-2005	4.346	2.994	2.598
Glacier Peak Wilderness	2003-2005	2.622	1.905	1.532
Goat Rocks Wilderness	2003-2005	4.286	3.180	2.637
Mt. Adams Wilderness	2003-2005	3.628	2.591	2.147
Mt. Hood Wilderness	2003-2005	2.830	1.997	1.665
Mt. Jefferson Wilderness	2003-2005	1.888	1.267	1.053
Mt. Rainier National Park	2003-2005	5.489	4.225	3.501
Mt. Washington Wilderness	2003-2005	1.414	0.872	0.737
N. Cascades National Park	2003-2005	2.212	1.486	1.228
Olympic National Park	2003-2005	4.024	2.991	2.486
Pasayten Wilderness	2003-2005	1.482	0.999	0.822
Three Sisters Wilderness	2003-2005	1.538	0.993	0.819
CRGNSA	2003-2005	2.353	1.657	1.378
Overall	Min	1.414	0.872	0.737
	Mean	2.932	2.089	1.739
	Max	5.489	4.225	3.501

1. Based on the 22nd highest on a Class I area basis

TABLE 9
YEARLY PREDICTED CHANGE TO THE 98TH PERCENTILE DAILY HAZE INDEX

		98th Percentile Delta HI (dv) [1]		
Area of Interest	**Year**	**Baseline**	**Flex Fuels**	**Flex Fuels w SNCR**
Alpine Lakes Wilderness	2003	3.599	2.490	2.092
	2004	4.871	3.564	2.949
	2005	3.856	2.841	2.306
Glacier Peak Wilderness	2003	2.070	1.399	1.153
	2004	3.615	2.403	2.049
	2005	2.554	1.857	1.525
Goat Rocks Wilderness	2003	4.207	3.002	2.440
	2004	4.993	3.676	3.069
	2005	3.826	2.815	2.308
Mt. Adams Wilderness	2003	3.667	2.646	2.194
	2004	3.628	2.591	2.128
	2005	3.379	2.543	2.096
Mt. Hood Wilderness	2003	2.773	1.939	1.586
	2004	3.471	2.346	1.978
	2005	2.159	1.470	1.225
Mt. Jefferson Wilderness	2003	1.570	1.059	0.867
	2004	2.079	1.399	1.150
	2005	1.182	0.813	0.656
Mt. Rainier National Park	2003	5.552	4.318	3.606
	2004	5.447	4.252	3.573
	2005	5.373	4.092	3.401

1. Based on the 8th highest on a Class I area basis

TABLE 9 (Continued)

YEARLY PREDICTED CHANGE TO THE 98TH PERCENTILE DAILY HAZE INDEX

		98th Percentile Delta HI (dv) [1]		
Area of Interest	**Year**	**Baseline**	**Flex Fuels**	**Flex Fuels w SNCR**
Mt. Washington Wilderness	2003	1.374	0.925	0.755
	2004	2.027	1.323	1.106
	2005	0.945	0.594	0.485
N. Cascades National Park	2003	1.557	1.172	0.935
	2004	2.821	1.852	1.570
	2005	1.811	1.373	1.084
Olympic National Park	2003	3.848	2.824	2.432
	2004	4.645	3.192	2.695
	2005	3.629	2.734	2.214
Pasayten Wilderness	2003	1.131	0.767	0.618
	2004	1.954	1.287	1.075
	2005	1.172	0.771	0.622
Three Sisters Wilderness	2003	1.538	0.993	0.807
	2004	2.172	1.333	1.139
	2005	1.071	0.651	0.553
CRGNSA	2003	2.431	1.699	1.411
	2004	2.545	1.748	1.446
	2005	1.714	1.259	1.013
Overall	Min	0.945	0.594	0.485
	Mean	2.878	2.052	1.700
	Max	5.552	4.318	3.606

1. Based on the 8th highest on a Class I area basis