

December 24, 2013

Bridget Psarianos  
Planning and Environmental Specialist  
BLM - Alaska State Office  
bpsarianos@blm.gov  
(907) 271-4208

**Subject: Revisions to the Air Quality Impact Analysis for Greater Mooses Tooth 1  
Alternative D**

Dear Bridget:

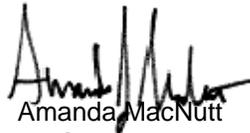
AECOM has revised the ambient air quality impact tables previously submitted for the Greater Mooses Tooth 1 (GMT1) Alternative D transmitted by email on November 27, 2013<sup>1</sup>. The revised impact tables have been included with this letter as Attachment A. The Alternative D analysis has been revised to account for more air traffic at GMT1 than was assumed in the previous analysis. There were no other revisions. Aircraft emissions associated with Alternative A were also revisited, but those changes did not impact the Alternative A dispersion modeling since it did not include aircraft emissions.

Since the model predicted impacts from the aircraft emissions are small relative to other Alternative D sources, the results and conclusions have changed very little. The revised model-predicted impacts are shown in the tables included in Attachment A. As a result of the changes, the near-field modeling digital archive will be transmitted again.

Sincerely,



Thomas Damiana  
Air Quality Engineer/Meteorologist  
Tel. (970) 530-3465  
[thomas.damiana@aecom.com](mailto:thomas.damiana@aecom.com)



Amanda MacNutt  
Air Quality Meteorologist  
Tel. (978) 905-2297  
[Amanda.Macnutt@aecom.com](mailto:Amanda.Macnutt@aecom.com)

cc: Lynn DeGeorge (ConocoPhillips Alaska, Inc.)  
Brad Thomas (ConocoPhillips Alaska, Inc.)  
Alan Peck (BLM Alaska)  
Jessica Stark (SLR International)

Attachment: Revised Air Quality Impact Analysis Summary for ConocoPhillips Alaska, Inc. Greater Mooses Tooth – Alternative D

---

<sup>1</sup> Email from Thomas Damiana (AECOM) to Bridgett Psarianos (BLM) RE GMT1 Alt D Far-Field Final Impact Tables and GMT1 Alt D Final Near-Field Impact Tables. Sent on Wed 11/27/2013 2:20 PM (MT). Attachments included:

- GMT1 Ambient Impacts Summary Tables\_ROADLESS\_15-NOV-2013 for Submittal.xlsx
- GMT1 Ambient Impacts Summary Tables\_ROADLESS\_15-NOV-2013\_NUIQSUT\_RECEPTOR for Submittal.xlsx
- CALPUFF Farfield Results - Alternative D updated with RFD.doc

**Attachment A  
Revised Air Quality Impact  
Analysis Summary for GMT1  
Alternative D**

# Revised Air Quality Impact Analysis Summary for ConocoPhillips Alaska, Inc. Greater Mooses Tooth – Alternative D

## Summary Air Quality Impacts

Summaries of near-field, far-field ambient air quality impacts predicted for the Greater Mooses Tooth 1 (GMT1) Project Alternative D (Roadless Alternative) are presented in the tables below. These include an analysis of impacts compared to the National and Alaska Ambient Air Quality Standards (NAAQS/AAAQS), Prevention of Significant Deterioration (PSD) Class II Increments and applicable thresholds for evaluating impacts from air toxics.

**Table A-1 GMT1 Project Cumulative Impacts Compared to Established Ambient Criteria for Infill Drilling – Alternative D**

Pollutant	Averaging Period	Rank <sup>1</sup>	Maximum Model Predicted Concentration (µg/m <sup>3</sup> )	Ambient Background (µg/m <sup>3</sup> )	Total (µg/m <sup>3</sup> )	NAAQS/AAAQS (µg/m <sup>3</sup> )	% of NAAQS/AAAQS
CO	1-hour	H2H	861	1,488	2,349	40,000	6%
	8-hour	H2H	420	1,259	1,680	10,000	17%
SO <sub>2</sub>	1-hour	99th	3.87	7.7	12	196	6%
	3-hour	H2H	3.84	18	21	1,300	2%
	24-hour	H2H	3.23	6.8	10	365	3%
	Annual	MAX	0.469	0.34	0.81	80	1%
NO <sub>2</sub>	1-hour	98th	118	38	155	188	83%
	Annual	MAX	39.6	2.9	42	100	42%
PM <sub>10</sub>	24-hour	H6H	104	48	152	150	<b>102%</b>
PM <sub>2.5</sub>	24-hour	98th	27.5	7.1	35	35	99%
	Annual	MAX	10.9	2.2	13	12	<b>109%</b>

<sup>1</sup> H2H: Highest Second Highest value across all five modeled years.  
 H6H: Highest Sixth Highest value across five continuous modeled years.  
 98th: Average across all five modeled years of the 98<sup>th</sup> percentile of 1-hour daily maximum predicted concentrations (1-hour NO<sub>2</sub>) or of 24-hour concentrations (24-hour PM<sub>2.5</sub>).  
 99th: Average across all five modeled years of the 99<sup>th</sup> percentile of 1-hour daily maximum predicted concentrations.  
 MAX: Maximum period impact from among all individual modeled years.

**Table A-2 GMT1 Project Cumulative Impacts Compared to Established Ambient Criteria for Well Intervention – Alternative D**

Pollutant	Averaging Period	Rank <sup>1</sup>	Maximum Model Predicted Concentration (µg/m <sup>3</sup> )	Ambient Background (µg/m <sup>3</sup> )	Total (µg/m <sup>3</sup> )	NAAQS/AAAQS (µg/m <sup>3</sup> )	% of NAAQS/AAAQS
CO	1-hour	H2H	495	1,488	1,983	40,000	5%
	8-hour	H2H	328	1,259	1,587	10,000	16%
SO <sub>2</sub>	1-hour	99th	3.87	7.7	12	196	6%
	3-hour	H2H	3.84	18	21	1,300	2%
	24-hour	H2H	3.23	6.8	10	365	3%
	Annual	MAX	0.421	0.3	0.76	80	1%
NO <sub>2</sub>	1-hour	98th	128	38	165	188	88%
	Annual	MAX	9.88	2.9	13	100	13%
PM <sub>10</sub>	24-hour	H6H	104	48	152	150	<b>102%</b>
PM <sub>2.5</sub>	24-hour	98th	27.4	7.1	35	35	99%
	Annual	MAX	4.83	2.2	7.0	12	59%

<sup>1</sup> H2H: Highest Second Highest value across all five modeled years.  
 H6H: Highest Sixth Highest value across five continuous modeled years.  
 98th: Average across all five modeled years of the 98<sup>th</sup> percentile of 1-hour daily maximum predicted concentrations (1-hour NO<sub>2</sub>) or of 24-hour concentrations (24-hour PM<sub>2.5</sub>).  
 99th: Average across all five modeled years of the 99<sup>th</sup> percentile of 1-hour daily maximum predicted concentrations.  
 MAX: Maximum period impact from among all individual modeled years.

**Table A-3 GMT1 Cumulative Impacts Compared to Established Ambient Criteria for Pad and Access Road Construction – Alternative D**

Pollutant	Averaging Period	Rank <sup>1</sup>	Maximum Model Predicted Concentration (µg/m <sup>3</sup> )	Ambient Background (µg/m <sup>3</sup> )	Total (µg/m <sup>3</sup> )	NAAQS/AAAQS (µg/m <sup>3</sup> )	% of NAAQS/AAAQS
CO	1-hour	H2H	1,820	1,488	3,308	40,000	8%
	8-hour	H2H	1,206	1,259	2,465	10,000	25%
SO <sub>2</sub>	1-hour	99th	3.99	7.7	12	196	6%
	3-hour	H2H	4.10	18	22	1,300	2%
	24-hour	H2H	2.13	6.8	8.9	365	2%
	Annual	MAX	0.113	0.3	0.45	80	1%
NO <sub>2</sub>	1-hour	98th	166	AERMOD <sup>2</sup>	166	188	88%
	Annual	MAX	28.5	2.9	31	100	31%
PM <sub>10</sub>	24-hour	H6H	104	48	152	150	<b>102%</b>
PM <sub>2.5</sub>	24-hour	98th	36.8	7.1	44	35	<b>125%</b>
	Annual	MAX	6.09	2.2	8.3	12	69%

<sup>1</sup> H2H: Highest Second Highest value across all five modeled years.

H6H: Highest Sixth Highest value across five continuous modeled years.

98th: Average across all five modeled years of the 98<sup>th</sup> percentile of 1-hour daily maximum predicted concentrations (1-hour NO<sub>2</sub>) or of 24-hour concentrations (24-hour PM<sub>2.5</sub>).

99th: Average across all five modeled years of the 99<sup>th</sup> percentile of 1-hour daily maximum predicted concentrations.

MAX: Maximum period impact from among all individual modeled years.

<sup>2</sup> Seasonally varying background was included as an input to the model run; therefore, a single ambient background concentration was not added in order to determine the cumulative impact.

**Table A-4 GMT1 Project Cumulative Impacts Compared to Established Ambient Criteria for Activities within the Clover Material Source – Alternative D**

Pollutant	Averaging Period	Rank <sup>1</sup>	Maximum AERMOD Predicted Concentration (µg/m <sup>3</sup> )	Ambient Background (µg/m <sup>3</sup> )	Total (µg/m <sup>3</sup> )	NAAQS/AAQS (µg/m <sup>3</sup> )	% of NAAQS/AAQS
CO	1-hour	H2H	1,884	1,488	3,373	40,000	8%
	8-hour	H2H	1,227	1,259	2,487	10,000	25%
SO <sub>2</sub>	1-hour	99th	16.0	7.7	24	196	12%
	3-hour	H2H	28.3	18	46	1,300	4%
	24-hour	H2H	6.57	6.8	13	365	4%
	Annual	MAX	0.116	0.3	0.46	80	1%
NO <sub>2</sub>	1-hour	98th	145	38	183	188	97%
	Annual	MAX	38.4	2.9	41	100	41%
PM <sub>10</sub>	24-hour	H6H	52.4	48	101	150	67%
PM <sub>2.5</sub>	24-hour	98th	28.3	7.1	35	35	<b>101%</b>
	Annual	MAX	3.97	2.2	6.2	12	51%

<sup>1</sup> H2H: Highest Second Highest value across all five modeled years.  
 H6H: Highest Sixth Highest value across five continuous modeled years.  
 98th: Average across all five modeled years of the 98<sup>th</sup> percentile of 1-hour daily maximum predicted concentrations (1-hour NO<sub>2</sub>) or of 24-hour concentrations (24-hour PM<sub>2.5</sub>).  
 99th: Average across all five modeled years of the 99<sup>th</sup> percentile of 1-hour daily maximum predicted concentrations.  
 MAX: Maximum period impact from among all individual modeled years.

**Table A-5 GMT1 Project Impacts Compared to the Class II PSD Increments for Infill Drilling –Alternative D**

Pollutant	Averaging Period	Rank <sup>1</sup>	Maximum Model Predicted Concentration (µg/m <sup>3</sup> )	Class II PSD Increments
SO <sub>2</sub>	3-hour	H2H	3.8	512
	24-hour	H2H	3.2	91
	Annual	MAX	0.47	20
NO <sub>2</sub>	Annual	MAX	40	25
PM <sub>10</sub>	24-hour	H2H	112	30
	Annual	MAX	101	17
PM <sub>2.5</sub>	24-hour	H2H	73	9
	Annual	MAX	11	4

<sup>1</sup> H2H: Highest Second Highest value across all five modeled years.  
 MAX: Maximum period impact from among all individual modeled years.

**Table A-6 GMT1 Project Cumulative Impacts Compared to Established Ambient Criteria at the Community of Nuiqsut – Alternative D**

Pollutant	Averaging Period	Rank	Maximum AERMOD Predicted Concentrations (µg/m <sup>3</sup> )					Ambient Background (µg/m <sup>3</sup> )	Total (µg/m <sup>3</sup> )	NAAQS/AAAQS (µg/m <sup>3</sup> )	% of NAAQS/AAAQS
			Infill Drilling	Well Interv.	Pad & Access Road Constr.	Clover Material Source	Max				
CO	1-hour	H2H	81.5	176	26.7	24.0	176	1,488	1,664	40,000	4%
	8-hour	H2H	10.4	26.2	4.34	3.54	26.2	1,259	1,286	10,000	13%
SO <sub>2</sub>	1-hour	99th	0.0562	1.40	0.0678	0.0535	1.40	7.7	9.1	196	5%
	3-hour	H2H	0.0752	1.08	0.0429	0.0367	1.08	18	19	1,300	1%
	24-hour	H2H	0.0119	0.194	0.008	0.0069	0.194	6.8	7.0	365	2%
	Annual	MAX	0.00009	0.00110	0.00038	0.0002	0.0011	0.3	0.34	80	0%
NO <sub>2</sub>	1-hour	98th	86.6	103	46.4	50.6	103	38	141	188	75%
	Annual	MAX	0.0256	0.113	0.056	0.014	0.113	2.9	3.0	100	3%
PM <sub>10</sub>	24-hour	H6H	0.644	1.12	0.565	0.533	1.12	48	49	150	33%
PM <sub>2.5</sub>	24-hour	98th	0.529	0.744	0.228	0.205	0.744	7.1	7.8	35	22%
	Annual	MAX	0.0084	0.0062	0.0134	0.0075	0.0134	2.2	2.2	12	19%

<sup>1</sup> H2H: Highest Second Highest value across all five modeled years.  
H6H: Highest Sixth Highest value across five continuous modeled years.  
98th: Average across all five modeled years of the 98<sup>th</sup> percentile of 1-hour daily maximum predicted concentrations (1-hour NO<sub>2</sub>) or of 24-hour concentrations (24-hour PM<sub>2.5</sub>).  
99th: Average across all five modeled years of the 99<sup>th</sup> percentile of 1-hour daily maximum predicted concentrations.  
MAX: Maximum period impact from among all individual modeled years.

**Table A-7 Air Toxics Acute Exposure Assessment and Long-term Non-carcinogenic Exposure Assessment Predicted at the GMT1 Pad Edge – Alternative D**

Pollutant	REL (1-hour) (µg/m <sup>3</sup> )	Maximum Modeled 1-hour Concentration (µg/m <sup>3</sup> )	Non-carcinogenic RfC <sup>3</sup> (Annual) (µg/m <sup>3</sup> )	Maximum Modeled Annual Concentration (µg/m <sup>3</sup> )
Benzene	1,300 <sup>1</sup>	3.3	30	0.10
Ethyl benzene	350,000 <sup>2</sup>	0.52	1,000	0.013
Formaldehyde	55 <sup>1</sup>	8.1	9.8	0.43
n-Hexane	390,000 <sup>2</sup>	69	700	0.49
Toluene	37,000 <sup>1</sup>	2.6	5,000	0.040
Xylene	22,000 <sup>1</sup>	1.1	100	0.034

<sup>1</sup> USEPA Air Toxics Database, Table 2 (USEPA 2011).

<sup>2</sup> No REL available for these air toxics. Values shown are from (IDLH/10), USEPA Air Toxics Database, Table 2 (USEPA 2011).

<sup>3</sup> USEPA Air Toxics Database, Table 1 (USEPA 2012b).

**Table A-8 Air Toxics Long-Term Cancer Risk Analysis for Nuiqsut Community Receptor – Alternative D**

Exposure Scenario <sup>1</sup>	Pollutant	Maximum Modeled Annual Concentration (µg/m <sup>3</sup> )	Carcinogenic Unit Risk Factor <sup>2</sup> (1/µg/m <sup>3</sup> )	Exposure Adjustment Factor	Cancer Risk
MLE	Benzene	1.1E-04	7.8E-06	0.43	3.7E-10
MLE	Ethyl benzene	1.0E-05	2.5E-06	0.43	1.1E-11
MLE	Formaldehyde	3.2E-04	1.3E-05	0.43	1.8E-09
<b>Total Inhalation Cancer Risk</b>					<b>2.2E-09</b>
MEI	Benzene	1.1E-04	7.8E-06	0.43	3.7E-10
MEI	Ethyl benzene	1.0E-05	2.5E-06	0.43	1.1E-11
MEI	Formaldehyde	3.2E-04	1.3E-05	0.43	1.8E-09
<b>Total Inhalation Cancer Risk</b>					<b>2.2E-09</b>

<sup>1</sup> MLE = most likely exposure; MEI = maximally exposed individual.

<sup>2</sup> USEPA Air Toxics Database, Table 1 (USEPA 2012b).

**Table A-9 GMT1 Air Quality Impacts at Alaska National Wildlife Refuge – Project Only – Alternative D**

Pollutant	Averaging Period	Maximum Predicted Impact (µg/m <sup>3</sup> )	Ambient Background (µg/m <sup>3</sup> )	Total Impact (µg/m <sup>3</sup> )	NAAQS/AAAQS (µg/m <sup>3</sup> )	% of NAAQS/AAAQS
NO <sub>2</sub>	1-hour <sup>1</sup>	5.6E-02	38	38.1	188	20%
	Period <sup>1,2</sup>	5.9E-04	2.9	2.90	100	3%
SO <sub>2</sub>	1-hour <sup>1</sup>	4.5E-04	7.7	7.70	196	4%
	3-hour <sup>1</sup>	3.2E-04	18	18.0	1,300	1%
	24-hour <sup>1</sup>	1.4E-04	6.8	6.80	365	2%
	Period <sup>1,2</sup>	5.6E-06	0.3	0.30	80	0%
PM <sub>10</sub>	24-hour <sup>1</sup>	5.2E-02	48	48.1	150	32%
PM <sub>2.5</sub>	24-hour <sup>1</sup>	5.2E-02	7.1	7.15	35	20%
	Period <sup>1,2</sup>	2.6E-03	2.2	2.20	12	18%

<sup>1</sup> The maximum impacts are reported for all averaging periods.

<sup>2</sup> Due to the two erroneous WRF files, both 2007 and 2009 had to be run in separate periods in CALPUFF. Therefore, the reported values may represent an annual average for only 2008, while 2007 and 2009 have periods much less than 8,760 hours and conservatively represent an annual average.

**Table A-10 GMT1 Air Quality Impacts at Gates of the Arctic – Project Only – Alternative D**

Pollutant	Averaging Period	Maximum Predicted Impact (µg/m <sup>3</sup> )	Ambient Background (µg/m <sup>3</sup> )	Total Impact (µg/m <sup>3</sup> )	NAAQS/AAAQS (µg/m <sup>3</sup> )	% of NAAQS/AAAQS
NO <sub>2</sub>	1-hour <sup>1</sup>	2.7E-02	38	38.0	188	20%
	Period <sup>1,2</sup>	7.8E-05	2.9	2.90	100	3%
SO <sub>2</sub>	1-hour <sup>1</sup>	3.3E-04	7.7	7.70	196	4%
	3-hour <sup>1</sup>	3.0E-04	18	18.0	1,300	1%
	24-hour <sup>1</sup>	1.2E-04	6.8	6.80	365	2%
	Period <sup>1,2</sup>	2.1E-06	0.3	0.30	80	0%
PM <sub>10</sub>	24-hour <sup>1</sup>	7.0E-02	48	48.1	150	32%
PM <sub>2.5</sub>	24-hour <sup>1</sup>	7.0E-02	7.1	7.17	35	20%
	Period <sup>1,2</sup>	1.3E-03	2.2	2.20	12	18%

<sup>1</sup> The maximum impacts are reported for all averaging periods.

<sup>2</sup> Due to the two erroneous WRF files, both 2007 and 2009 had to be run in separate periods in CALPUFF. Therefore, the reported values may represent an annual average for only 2008, while 2007 and 2009 have periods much less than 8760 hours and conservatively represent an annual average.

**Table A-11 GMT1 Number of Days Greater Than 0.5 ddv – Project Only – Alternative D**

Area	Number of Days Greater Than 0.5 ddv		
	2007	2008	2009
Alaska National Wildlife Refuge	0	0	0
Gates of the Arctic	0	0	0

**Table A-12 GMT1 Number of Days Greater Than 1.0 ddv – Project Only – Alternative D**

Area	Number of Days Greater Than 1 ddv		
	2007	2008	2009
Alaska National Wildlife Refuge	0	0	0
Gates of the Arctic	0	0	0

**Table A-13 GMT1 Project Maximum ddv Impact – Project Only – Alternative D**

Area	Maximum ddv		
	2007	2008	2009
Alaska National Wildlife Refuge	0.238	0.288	0.315
Gates of the Arctic	0.154	0.220	0.431

**Table A-14 GMT1 Project 98th Percentile ddv Impact – Project Only – Alternative D**

Area	98 <sup>th</sup> Percentile ddv		
	2007	2008	2009
Alaska National Wildlife Refuge	0.127	0.114	0.170
Gates of the Arctic	0.079	0.085	0.087

**Table A-15 GMT1 Project Deposition Impacts – Project Only – Alternative D**

Area	Pollutant	Averaging Period	Maximum Impact (kg/ha/yr)	DAT (kg/ha/yr)	% of DAT (%)
Alaska National Wildlife Refuge	Nitrogen	Annual <sup>1</sup>	1.92E-04	0.005	7
Gates of the Arctic	Nitrogen	Annual <sup>1</sup>	1.03E-04	0.005	2
Alaska National Wildlife Refuge	Sulfur	Annual <sup>1</sup>	2.79E-06	0.005	0.1
Gates of the Arctic	Sulfur	Annual <sup>1</sup>	1.72E-06	0.005	0.03

<sup>1</sup> All maximum GMT deposition impacts occur in year 2008, thus represent a true annual impact.

**Table A-16 Cumulative Air Quality Impacts at Alaska National Wildlife Refuge – Alternative D**

Pollutant	Averaging Period	Maximum Predicted Impact (µg/m <sup>3</sup> )	Ambient Background (µg/m <sup>3</sup> )	Total Impact (µg/m <sup>3</sup> )	NAAQS/AAAQS (µg/m <sup>3</sup> )	% of NAAQS/AAAQS
NO <sub>2</sub>	1-hour <sup>1</sup>	41	38	78.8	188	42%
	Period <sup>1,2</sup>	0.14	2.9	3.04	100	3%
SO <sub>2</sub>	1-hour <sup>1</sup>	0.76	7.7	8.46	196	4%
	3-hour <sup>1</sup>	0.54	18	18.5	1,300	1%
	24-hour <sup>1</sup>	0.17	6.8	6.97	365	2%
	Period <sup>1,2</sup>	0.013	0.3	0.31	80	0%
PM <sub>10</sub>	24-hour <sup>1</sup>	2.7	48	50.7	150	34%
PM <sub>2.5</sub>	24-hour <sup>1</sup>	0.45	7.1	7.55	35	22%
	Period <sup>1,2</sup>	0.023	2.2	2.22	12	19%

<sup>1</sup> The maximum impacts are reported for all averaging periods.

<sup>2</sup> Due to the two erroneous WRF files, both 2007 and 2009 had to be run in separate periods in CALPUFF. Therefore the reported values may represent an annual average for only 2008, while 2007 and 2009 have periods much less than 8760 hours and conservatively represent an annual average.

**Table A-17 Cumulative Air Quality Impacts at Gates of the Arctic – Alternative D**

Pollutant	Averaging Period	Maximum Predicted Impact (µg/m <sup>3</sup> )	Ambient Background (µg/m <sup>3</sup> )	Total Impact (µg/m <sup>3</sup> )	NAAQS/AAAQS (µg/m <sup>3</sup> )	% of NAAQS/AAAQS
NO <sub>2</sub>	1-hour <sup>1</sup>	0.44	38	38.4	188	20%
	Period <sup>1,2</sup>	0.0024	2.9	2.90	100	3%
SO <sub>2</sub>	1-hour <sup>1</sup>	0.046	7.7	7.75	196	4%
	3-hour <sup>1</sup>	0.038	18	18.0	1,300	1%
	24-hour <sup>1</sup>	0.017	6.8	6.82	365	2%
	Period <sup>1,2</sup>	0.0010	0.3	0.30	80	0%
PM <sub>10</sub>	24-hour <sup>1</sup>	0.33	48	48.3	150	32%
PM <sub>2.5</sub>	24-hour <sup>1</sup>	0.037	7.1	7.14	35	20%
	Period <sup>1,2</sup>	0.0032	2.2	2.20	12	18%

<sup>1</sup> The maximum impacts are reported for all averaging periods.

<sup>2</sup> Due to the two erroneous WRF files, both 2007 and 2009 had to be run in separate periods in CALPUFF. Therefore the reported values may represent an annual average for only 2008, while 2007 and 2009 have periods much less than 8,760 hours and conservatively represent an annual average.

**Table A-18 Cumulative Air Quality Impacts at the Community of Nuiqsut – Alternative D**

Pollutant	Averaging Period	Maximum Predicted Impact (µg/m <sup>3</sup> )	Ambient Background (µg/m <sup>3</sup> )	Total Impact (µg/m <sup>3</sup> )	NAAQS/AAAQS (µg/m <sup>3</sup> )	% of NAAQS/AAAQS
NO <sub>2</sub>	1-hour <sup>1</sup>	2.7	38	40.7	188	22%
	Period <sup>1,2</sup>	0.17	2.9	3.07	100	3%
SO <sub>2</sub>	1-hour <sup>1</sup>	0.71	7.7	8.41	196	4%
	3-hour <sup>1</sup>	0.60	18	18.6	1,300	1%
	24-hour <sup>1</sup>	0.31	6.8	7.11	365	2%
	Period <sup>1,2</sup>	0.025	0.3	0.33	80	0%
PM <sub>10</sub>	24-hour <sup>1</sup>	4.8	48	52.8	150	35%
PM <sub>2.5</sub>	24-hour <sup>1</sup>	0.15	7.1	7.25	35	21%
	Period <sup>1,2</sup>	0.029	2.2	2.23	12	19%

<sup>1</sup> The maximum impacts are reported for all averaging periods.

<sup>2</sup> Due to the two erroneous WRF files, both 2007 and 2009 had to be run in separate periods in CALPUFF. Therefore, the reported values may represent an annual average for only 2008, while 2007 and 2009 have periods much less than 8,760 hours and conservatively represent an annual average.

**Table A-19 Cumulative Number of Days Greater Than 0.5 ddv – Alternative D**

Area	Number of Days Greater Than 0.5 ddv		
	2007	2008	2009
Alaska National Wildlife Refuge	86	108	96
Gates of the Arctic	11	12	19

**Table A-20 Cumulative Number of Days Greater Than 1.0 ddv – Alternative D**

Area	Number of Days Greater Than 1 ddv		
	2007	2008	2009
Alaska National Wildlife Refuge	50	59	48
Gates of the Arctic	1	1	2

**Table A-21 Cumulative Maximum ddv Impact – Alternative D**

Area	Max ddv		
	2007	2008	2009
Alaska National Wildlife Refuge	9.016	8.628	7.791
Gates of the Arctic	1.243	1.039	1.182

**Table A-22 Cumulative 98th Percentile ddv Impact – Alternative D**

Area	98th percentile ddv		
	2007	2008	2009
Alaska National Wildlife Refuge	3.623	4.267	4.504
Gates of the Arctic	0.566	0.586	0.784

**Table A-23 Cumulative Deposition Impacts – Alternative D**

Area	Pollutant	Averaging Period	Maximum Impact (kg/ha/yr)	DAT (kg/ha/yr)	% of DAT (%)
Alaska National Wildlife Refuge	Nitrogen	Annual <sup>1</sup>	2.37E-02	0.005	474
Gates of the Arctic	Nitrogen	Period <sup>2</sup>	4.68E-03	0.005	94
Alaska National Wildlife Refuge	Sulfur	Annual <sup>1</sup>	3.91E-03	0.005	78
Gates of the Arctic	Sulfur	Period <sup>2</sup>	7.93E-04	0.005	16

<sup>1</sup> Maximum cumulative impacts occur in year 2008, thus represent a true annual impact.

<sup>2</sup> Maximum cumulative impacts occur in the second portion of year 2009 (7,230 hours), thus do not represent a true annual impact. The conversion from g/m<sup>2</sup>/s to kg/ha/yr assumes 8,784 hours, thus reported impacts are conservative.