

APPENDIX D1:
ATLANTIC RIM NEAR-FIELD MODELING,
SOURCE EMISSIONS AND MODELING PARAMETERS

Appendix D1 – Atlantic Rim Near-Field Modeling - Source Emissions and Modeling Parameters

The following is a list of the tables included within this appendix.

- D1.1 PM₁₀ Source Emissions and Modeling Parameters
- D1.2 PM_{2.5} Source Emissions and Modeling Parameters
- D1.3 SO₂ Source Emissions and Modeling Parameters
- D1.4 NO_x Source Emissions and Modeling Parameters
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- D1.6 Compression Modeling Summary
- D1.7 HAPs Source Emissions and Modeling Parameters

Table D1.1
Atlantic Rim Near-Field Modeling
PM₁₀ Source Emissions and Modeling Parameters

PM ₁₀ Sources	Modeled Emission Rate (lb/hr)	Modeled Area Source (m ²)	Modeled Emission Rate (g/s/m ²)	Modeled Emission Rate (g/s)	Source Type	Source Exit Characteristics and Layout	Area Source	Area	Area	Volume	Volume	Volume
							Release Height (m)	Source X _{init} (m)	Source Y _{init} (m)	Source Release Height (m)	Source Y _{init} (m)	Source σ z _{init} (m)
Well Pad Construction	5.82	--	--	0.733	Volume	Volume source centered around well pad.				2.29	20.92	2.13
Road Construction	0.25	--	--	0.0403	Volume	23 volume sources over the length of newly constructed road (0.25 miles). Information listed for one volume source. Emissions include road construction, heavy equipment tailpipe, and traffic.	--	--	--	2.29	8.51	2.13
Construction Traffic	0.08	--	--	0.0104	Volume	176 volume sources over a representative length of road (2 miles). Emissions include traffic.	--	--	--	2.29	8.51	2.13
Well Pad Wind Erosion	28.60	8,094.00	4.45E-04	--	Area	Area source centered around the well pad.	0.00	89.97	89.97	--	--	--
Access Road Wind Erosion	26.00	3,680.84	8.90E-04	--	Area	Divided into 5 equal area sources over length of newly constructed road. Information listed is total emissions for all 5 sources.	0.00	80.47	9.15	--	--	--

Table D1.2
Atlantic Rim Near-Field Modeling
PM_{2.5} Source Emissions and Modeling Parameters

PM _{2.5} Sources	Modeled	Modeled Area	Modeled	Source	Source Exit Characteristics and Layout	Area Source	Area	Area	Volume	Volume	Volume
	Emission Rate	Source	Emission Rate	Type		Release	SourceX _i	Source Y _{init}	Source Release	Source	Source
	(lb/hr)	(m ²)	(g/s)			Height	nit	(m)	Height	σ _y _{init}	σ _z _{init}
						(m)	(m)	(m)	(m)		
Well Pad Construction	1.58	--	0.199	Volume	Volume source centered around well pad.				2.29	20.92	2.13
Road Construction	0.081	--	1.02E-02	Volume	23 volume sources over the length of newly constructed road (0.25 miles). Information listed for one volume source. Emissions include road construction, heavy equipment tailpipe, and traffic.	--	--	--	2.29	8.51	2.13
Construction Traffic	0.012	--	1.56E-03	Volume	176 volume sources over a representative length of road (2 miles). Emissions include traffic.	--	--	--	2.29	8.51	2.13
Well Pad Wind Erosion	11.44	8,094.00	1.78E-04	Area	Area source centered around the well pad.	0.00	89.97	89.97	--	--	--
Access Road Wind Erosion	10.46	3,680.84	3.58E-04	Area	Divided into 5 equal area sources over length of newly constructed road. Information listed is total emissions for all 5 sources.	0.00	80.468	9.15	--	--	--

Table D1.3
 Atlantic Rim Near-Field Modeling
 SO₂ Source Emissions and Modeling Parameters

SO₂ Source	Modeled Emission Rate (lb/hr)	Modeled Emission Rate (g/s)	Source Type	Source Exit Characteristics and Layout	Stack Height (m)	Stack Temperature (K)	Stack Velocity (g/s)	Stack Diameter (m)
Drilling Rigs	2.21	0.278	Point	Located in the Center of the Well Pad.	5.00	675.00	30.00	0.20

Table D1.4
Atlantic Rim Near-Field Modeling
NO_x Source Emissions and Modeling Parameters

NO _x Sources	Modeled Emission Rate (lb/hr)	Modeled Area Source (m ²)	Modeled Emission Rate (g/s/m ²)	Source Type	Source Exit Characteristics and Layout	Release Height (m)	X _{init} (m)	Y _{init} (m)	Angle	σ _{z,init} (m)
Brown Cow Area Source	0.85	5,760,000	1.85E-08	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Blue Sky Area Source	0.85	5,760,000	1.85E-08	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Cow Creek Area Source	0.85	7,043,130	1.51E-08	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.502 km by 2.815 km.	5.00	1,000.00	1,000.00	0.00	4.65
Doty Mountain Area Source	0.85	5,760,000	1.85E-08	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Jolly Rogers Area Source	0.85	5,760,000	1.85E-08	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Muddy Mountain Area Source	0.85	5,760,000	1.85E-08	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Red Rim Area Source	0.85	5,760,000	1.85E-08	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Sun Dog Area Source	0.85	5,760,000	1.85E-08	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Unpermitted C.S. #1 Area Source	0.85	5,760,000	1.85E-08	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Unpermitted C.S. #2 Area Source	0.85	5,760,000	1.85E-08	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Unpermitted C.S. #3 Area Source	0.85	5,760,000	1.85E-08	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Unpermitted C.S. #4 Area Source	0.85	5,760,000	1.85E-08	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65

Compression - please see Table D1.6 Atlantic Rim Compression Modeling Summary.

Table D1.5
Atlantic Rim Near-Field Modeling
CO Source Emissions and Modeling Parameters

CO Sources	Modeled Emission Rate (lb/hr)	Modeled Area Source (m ²)	Modeled Emission Rate (g/s/m ²)	Source Type	Source Exit Characteristics and Layout	Release Height (m)	X _{init} (m)	Y _{init} (m)	Angle	σ Z _{init} (m)
Brown Cow Area Source	0.19	5,760,000	4.17E-09	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Blue Sky Area Source	0.19	5,760,000	4.17E-09	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Cow Creek Area Source	0.19	7,043,130	3.41E-09	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2502 m by 2815 m.	5.00	1,000.00	1,000.00	0.00	4.65
Doty Mountain Area Source	0.19	5,760,000	4.17E-09	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Jolly Rogers Area Source	0.19	5,760,000	4.17E-09	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Muddy Mountain Area Source	0.19	5,760,000	4.17E-09	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Red Rim Area Source	0.19	5,760,000	4.17E-09	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Sun Dog Area Source	0.19	5,760,000	4.17E-09	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Unpermitted C.S. #1 Area Source	0.19	5,760,000	4.17E-09	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Unpermitted C.S. #2 Area Source	0.19	5,760,000	4.17E-09	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Unpermitted C.S. #3 Area Source	0.19	5,760,000	4.17E-09	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65
Unpermitted C.S. #4 Area Source	1.90E-01	5,760,000	4.17E-09	Area	Includes heavy equipment tailpipe and separator emissions. Centered around compressor station, 2.4 km square.	5.00	1,000.00	1,000.00	0.00	4.65

Compression - please see Table D1.6 Atlantic Rim Compression Modeling Summary.

Table D1.6
Atlantic Rim Near-Field Modeling
Compression Modeling Summary

Facility	Unit Description	Horsepower	Stack ID	Source Type	Source Location		Stack Parameters				Stack Parameter Source	Permitted Emissions			Emissions Source	Modeled Emissions		
					UTM Zone 13		Height (m)	Temperature (K)	Velocity (m/s)	Diameter (m)		NO _x (tpy)	CO (tpy)	Formaldehyde (tpy)		NO _x (g/s)	CO (g/s)	Formaldehyde (g/s)
					Easting	Northing												
Blue Sky C.S.	compressor engine	1,206	BluSkyC1	point	277287.5	4574028.3	11.00	730.40	71.60	0.254	Blue Sky Permit Application	17.50	5.80	0.82	Blue Sky Permit	0.503	0.167	0.024
	compressor engine	1,206	BluSkyC2	point	277279.2	4574035.6	11.00	730.40	71.60	0.254		17.50	5.80	0.82		0.503	0.167	0.024
	generator engine	1,206	BluSkyG1	point	277287.9	4574097.4	11.00	762.00	38.60	0.254		11.10	16.70	0.78		0.320	0.480	0.022
	generator engine	1,206	BluSkyG2	point	277291.8	4574070.4	11.00	762.00	38.60	0.254		11.10	16.70	0.78		0.320	0.480	0.022
	dehydrator			BluSkyDH	volume	277303.9	4574065.6	Please see footnote number 1.				0.10	0.10	--		2.88E-03	2.88E-03	--
Brown Cow C.S.	compressor engine	1,206	BrnCOWC1	point	283311.4	4563568.2	11.00	730.40	71.60	0.254	Assumed to be identical most common compressor station configuration.	17.50	5.80	0.82	Assumed to be identical as the most commonly permitted compressor station emissions.	0.503	0.167	0.024
	compressor engine	1,206	BrnCOWC2	point	283317.1	4563556.7	11.00	730.40	71.60	0.254		17.50	5.80	0.82		0.503	0.167	0.024
	generator engine	1,206	BrnCOWG1	point	283306.8	4563577.0	11.00	762.00	38.60	0.254		11.60	17.50	0.70		0.335	0.503	0.020
	generator engine	1,206	BrnCOWG2	point	283322.8	4563545.2	11.00	762.00	38.60	0.254		11.60	17.50	0.70		0.335	0.503	0.020
	dehydrator			BrnCOWDH	volume	283310.7	4563550.0	Please see footnote number 1.				0.10	0.10	--		2.88E-03	2.88E-03	--
Cow Creek C.S.	compressor engine	1,089	CowCrkC1	point	274714.0	4583443.0	7.62	749.00	71.60	0.3048	Cow Creek Permit Application	15.80	5.30	0.74	Cow Creek Permit MD-951	0.4545	0.1525	0.0212
	compressor engine	394	CowCrkC2	point	274714.0	4583415.0	7.62	749.00	71.60	0.3048		3.80	3.80	0.23		0.1093	0.1093	0.0066
	compressor engine	607	CowCrkC3	point	274714.0	4583435.0	7.62	749.00	71.60	0.3048		5.90	5.90	0.35		0.1697	0.1697	0.0101
	dehydrator			CowCrkDH	volume	274692.0	4583410.0	Please see footnote number 1.				0.10	0.10	--		0.00288	0.00288	--
Doty Mountain C.S.	compressor engine	1,206	DtyMtnC1	point	281342.9	4590669.0	11.00	730.40	71.60	0.254	Doty Mountain Permit Application	17.50	5.80	0.82	Doty Mountain Permit CT-3349	0.503	0.167	0.024
	compressor engine	1,206	DtyMtnC2	point	281340.4	4590658.0	11.00	730.40	71.60	0.254		17.50	5.80	0.82		0.503	0.167	0.024
	generator engine	1,206	DtyMtnG1	point	281345.2	4590679.4	11.00	762.00	38.60	0.254		11.70	17.50	0.70		0.335	0.503	0.020
	generator engine	1,206	DtyMtnG2	point	281334.0	4590651.3	11.00	762.00	38.60	0.254		11.70	17.50	0.70		0.335	0.503	0.020
	dehydrator			DtyMtnDH	volume	281346.1	4590646.5	Please see footnote number 1.				0.10	0.10	--		2.88E-03	2.88E-03	--
Jolly Rogers C.S.	compressor engine	1,206	JlyRgsC1	point	287289.6	4603589.5	11.00	730.40	71.60	0.254	Jolly Rogers Permit Application	17.50	5.80	0.8	Jolly Rogers Permit Application	0.503	0.167	0.023
	compressor engine	1,206	JlyRgsC2	point	287292.6	4603578.6	11.00	730.40	71.60	0.254		17.50	5.80	0.8		0.503	0.167	0.023
	generator engine	1,206	JlyRgsG1	point	287286.8	4603599.8	11.00	762.00	38.60	0.254		11.60	17.50	0.6		0.335	0.670	0.017
	generator engine	1,206	JlyRgsG2	point	287284.3	4603609.5	11.00	762.00	38.60	0.254		11.60	17.50	0.6		0.335	0.670	0.017
	dehydrator			JlyRgsDH	volume	287286.2	4603571.9	Please see footnote number 1.				0.10	0.10	--		2.88E-03	2.88E-03	--
Muddy Mountain C.S.	compressor engine	1,206	MdyMtnC1	point	283559.5	4553604.3	11.00	730.40	71.60	0.254	Muddy Mountain Permit Application	17.50	5.80	0.81	Muddy Mountain Permit CT-3352	0.503	0.167	0.023
	compressor engine	1,206	MdyMtnC2	point	283565.2	4553592.8	11.00	730.40	71.60	0.254		17.50	5.80	0.81		0.503	0.167	0.023
	generator engine	1,206	MdyMtnG1	point	283554.9	4553613.1	11.00	762.00	38.60	0.254		11.60	17.50	0.7		0.335	0.503	0.020
	generator engine	1,206	MdyMtnG2	point	283570.9	4553581.3	11.00	762.00	38.60	0.254		11.60	17.50	0.7		0.335	0.503	0.020
	dehydrator			MdyMtnDH	volume	283558.8	4553586.1	Please see footnote number 1.				0.10	0.10	--		2.88E-03	2.88E-03	--
Red Rim C.S.	compressor engine	1,206	RedRimC1	point	298540.2	4617889.4	11.00	730.40	71.60	0.254	Red Rim Permit Application	17.50	5.80	0.82	Red Rim Permit CT-3393	0.503	0.167	0.024
	compressor engine	1,206	RedRimC2	point	298535.0	4617899.5	11.00	730.40	71.60	0.254		17.50	5.80	0.82		0.503	0.167	0.024
	generator engine	637	RedRimG1	point	298610.8	4617919.0	11.00	762.00	38.60	0.254		6.20	3.10	0.43		0.178	0.089	0.012
	generator engine	1,206	RedRimG2	point	298615.3	4617910.5	11.00	762.00	38.60	0.254		11.70	17.50	0.7		0.337	0.503	0.020
	dehydrator			RedRimDH	volume	298614.7	4617892.0	Please see footnote number 1.				0.10	0.10	--		2.88E-03	2.88E-03	--
Sun Dog C.S.	compressor engine	1,206	SunDogC1	point	277230.7	4580968.6	11.00	730.40	71.60	0.254	Assumed to be identical most common compressor station configuration.	17.50	5.80	0.82	Assumed to be identical as the most commonly permitted compressor station emissions.	0.503	0.167	0.024
	compressor engine	1,206	SunDogC2	point	277228.2	4580957.6	11.00	730.40	71.60	0.254		17.50	5.80	0.82		0.503	0.167	0.024
	generator engine	1,206	SunDogG1	point	277233.0	4580979.0	11.00	762.00	38.60	0.254		11.60	17.50	0.70		0.335	0.503	0.020
	generator engine	1,206	SunDogG2	point	277233.9	4580946.1	11.00	762.00	38.60	0.254		11.60	17.50	0.70		0.355	0.503	0.020
	dehydrator			SunDogDH	volume	277221.8	4580950.9	Please see footnote number 1.				0.10	0.10	--		2.88E-03	2.88E-03	--
Unpermitted C.S. #1	compressor engine	1,206	upcs1C1	point	302737.6	4620846.5	11.00	730.40	71.60	0.254	Assumed to be identical most common compressor station configuration.	17.50	5.80	0.82	Assumed to be identical as the most commonly permitted compressor station emissions.	0.503	0.167	0.024
	compressor engine	1,206	upcs1C2	point	302743.3	4620835.0	11.00	730.40	71.60	0.254		17.50	5.80	0.82		0.503	0.167	0.024
	generator engine	1,206	upcs1G1	point	302733.0	4620853.3	11.00	762.00	38.60	0.254		11.60	17.50	0.70		0.335	0.503	0.020
	generator engine	1,206	upcs1G2	point	302749.0	4620823.5	11.00	762.00	38.60	0.254		11.60	17.50	0.70		0.355	0.503	0.020
	dehydrator			upcs1DH	volume	302736.9	4620828.3	Please see footnote number 1.				0.10	0.10	--		2.88E-03	2.88E-03	--
Unpermitted C.S. #2	compressor engine	1,206	upcs2C1	point	291870.1	4609063.2	11.00	730.40	71.60	0.254	Assumed to be identical most common compressor station configuration.	17.50	5.80	0.82	Assumed to be identical as the most commonly permitted compressor station emissions.	0.503	0.167	0.024
	compressor engine	1,206	upcs2C2	point	291875.8	4609051.7	11.00	730.40	71.60	0.254		17.50	5.80	0.82		0.503	0.167	0.024
	generator engine	1,206	upcs2G1	point	291865.5	4609072.0	11.00	762.00	38.60	0.254		11.60	17.50	0.70		0.335	0.503	0.020
	generator engine	1,206	upcs2G2	point	291881.5	4609040.2	11.00	762.00	38.60	0.254		11.60	17.50	0.70		0.355	0.503	0.020

Table D1.6
Atlantic Rim Near-Field Modeling
Compression Modeling Summary

Facility	Unit Description	Horsepower	Stack ID	Source Type	Source Location		Stack Parameters				Stack Parameter Source	Permitted Emissions			Emissions Source	Modeled Emissions		
					UTM Zone 13		Height (m)	Temperature (K)	Velocity (m/s)	Diameter (m)		NO _x (tpy)	CO (tpy)	Formaldehyde (tpy)		NO _x (g/s)	CO (g/s)	Formaldehyde (g/s)
					Eastings	Northing												
	dehydrator		upcs2DH	volume	291869.4	4609045.0	Please see footnote number 1.				station configuration.	0.10	0.10	--	emissions.	2.88E-03	2.88E-03	--
Unpermitted C.S. #3	compressor engine	1,206	upcs3C1	point	284449.4	4596750.4	11.00	730.40	71.60	0.254	Assumed to be identical most common compressor station configuration.	17.50	5.80	0.82	Assumed to be	0.503	0.167	0.024
	compressor engine	1,206	upcs3C2	point	284449.4	4596750.4	11.00	730.40	71.60	0.254		17.50	5.80	0.82	identical as the most	0.503	0.167	0.024
	generator engine	1,206	upcs3G1	point	284451.7	4596760.8	11.00	762.00	38.60	0.254		11.60	17.50	0.70	commonly permitted	0.335	0.503	0.020
	generator engine	1,206	upcs3G2	point	284440.5	4596732.7	11.00	762.00	38.60	0.254		11.60	17.50	0.70	compressor station	0.355	0.503	0.020
	dehydrator		upcs3DH	volume	284452.6	4596727.9	Please see footnote number 1.				station configuration.	0.10	0.10	--	emissions.	2.88E-03	2.88E-03	--
Unpermitted C.S. #4	compressor engine	1,206	upcs4C1	point	280970.3	4568733.5	11.00	730.40	71.60	0.254	Assumed to be identical most common compressor station configuration.	17.50	5.80	0.82	Assumed to be	0.503	0.167	0.024
	compressor engine	1,206	upcs4C2	point	280976.0	4568722.0	11.00	730.40	71.60	0.254		17.50	5.80	0.82	identical as the most	0.503	0.167	0.024
	generator engine	1,206	upcs4G1	point	280965.7	4568742.3	11.00	762.00	38.60	0.254		11.60	17.50	0.70	commonly permitted	0.335	0.503	0.020
	generator engine	1,206	upcs4G2	point	280981.7	4568710.5	11.00	762.00	38.60	0.254		11.60	17.50	0.70	compressor station	0.355	0.503	0.020
	dehydrator		upcs4DH	volume	280969.6	4568715.3	Please see footnote number 1.				station configuration.	0.10	0.10	--	emissions.	2.88E-03	2.88E-03	--

¹ Dehydrators modeled as a volume source, 5m x 5m x 5m.

Emission rate (g/s)	Release Height	$\sigma_{y_{init}}$	$\sigma_{z_{init}}$
2.88E-03	2.50	1.16	2.33

Table D1.7
Atlantic Rim Near-Field Modeling
HAPs Source Emissions and Modeling Parameters

HAP Sources	Modeled Emission Rate (lb/hr)	Modeled Emission Rate (g/s)	Source Type	Source Exit Characteristics and Layout	Release Height (m)	$\sigma_{y_{init}}$	$\sigma_{z_{init}}$
Benzene	2.89	0.36	Volume	Includes gas dehydration emissions and condensate storage tank emissions.	2.50	1.16	2.33
Toluene	4.36	0.55	Volume	Includes gas dehydration emissions and condensate storage tank emissions.	2.50	1.16	2.33
Ethylbenzene	0.47	0.06	Volume	Includes gas dehydration emissions and condensate storage tank emissions.	2.50	--	2.33
Xylenes	2.54	0.32	Volume	Includes gas dehydration emissions and condensate storage tank emissions.	2.50	1.16	2.33
n-Hexane	11.83	1.49	Volume	Includes gas dehydration emissions and condensate storage tank emissions.	2.50	1.16	2.33
Formaldehyde	No sources in addition to compression. Please see Table D1.6 Atlantic Rim Compression Modeling Summary						