


APPENDIX B

PROJECT EMISSION CALCULATIONS

**Appendix B
 ConocoPhillips - Los Angeles Refinery
 PM10 and NOx Reduction Projects
 Construction Schedule**

Location/Project	Month/Year	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08
Wilmington Plant																				
Wet Gas Scrubber																				
Boiler 7																				
Carson Plant																				
Boiler 11																				



Demolition = 
 Construction = 

Appendix B ConocoPhillips - Los Angeles Refinery PM10 and NOx Reduction Projects Construction Emission Summary

Emissions from Equipment	Wilmington				Carson		Project Totals - Construction		
	Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11	Carson	Construction Scenario 1 ⁽¹⁾	Construction Scenario 2 ⁽²⁾	Construction Scenario 3 ⁽¹⁾
CO (lb/day)	7.53	12.61	10.84	41.71	3.08	Carson	57.40	10.84	52.32
NOx (lb/day)	15.17	20.51	19.63	74.82	9.07	Boiler 11	104.40	19.03	99.07
VOC (lb/day)	2.89	5.12	3.53	13.92	1.04	Boiler 11	20.08	3.53	17.85
SOx (lb/day)	0.01	0.02	0.02	0.07	0.01	Boiler 11	0.10	0.02	0.09
PM10 (lb/day)	1.05	1.42	1.46	5.21	0.42	Boiler 11	7.06	1.46	6.68

Emission from Trips	Wilmington				Carson		Project Totals - Construction		
	Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11	Carson	Construction Scenario 1 ⁽¹⁾	Construction Scenario 2 ⁽²⁾	Construction Scenario 3 ⁽¹⁾
CO (lb/day)	7.95	23.91	25.31	25.48	15.08	Carson	64.47	25.31	48.51
NOx (lb/day)	4.78	6.70	8.70	8.95	5.07	Boiler 11	20.72	8.70	18.79
VOC (lb/day)	0.98	2.71	2.92	2.94	1.74	Boiler 11	7.39	2.92	5.66
SOx (lb/day)	0.01	0.02	0.02	0.02	0.01	Boiler 11	0.06	0.02	0.05
PM10 (lb/day)	0.61	1.21	1.42	1.44	0.83	Boiler 11	3.49	1.42	2.89
Exhaust PM10 (lb/day)	0.11	0.21	0.24	0.25	0.14	Boiler 11	0.60	0.24	0.50
Fugitive PM10 (lb/day)	0.51	1.00	1.17	1.19	0.69	Boiler 11	2.89	1.17	2.39

Fugitive PM	Wilmington				Carson		Project Totals - Construction		
	Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11	Carson	Construction Scenario 1 ⁽¹⁾	Construction Scenario 2 ⁽²⁾	Construction Scenario 3 ⁽¹⁾
PM10 (lb/day)	0.00	26.81	0.00	32.20	23.52	Carson	82.54	0.00	55.72

Total Emissions	Thresholds	Wilmington				Carson		Project Totals - Construction		
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11	Carson	Construction Scenario 1 ⁽¹⁾	Construction Scenario 2 ⁽²⁾	Construction Scenario 3 ⁽¹⁾
CO (lb/day)	550	15.48	36.52	36.15	67.19	18.16	121.87	36.15	100.83	
NOx (lb/day)	100	19.95	27.21	28.33	83.77	14.14	125.12	28.33	117.86	
VOC (lb/day)	75	3.87	7.83	6.45	16.86	2.78	27.47	6.45	23.51	
SOx (lb/day)	150	0.02	0.04	0.04	0.09	0.02	0.16	0.04	0.14	
PM10 (lb/day)	150	1.67	29.45	2.87	38.85	24.78	93.08	2.87	65.30	
PM2.5 (lb/day) ⁽⁴⁾	55	0.97	17.08	1.67	22.53	14.37	53.99	1.67	37.87	

(1) Construction overlap of Boiler 7 SCR, Wet Gas Scrubber, and Boiler 11 SCR.

(2) Wet Gas Scrubber Demolition Only

(3) Overlap of Wet Gas Scrubber construction, Boiler 7 demolition, and Boiler 11 construction.

(4) https://www.aqmd.gov/ceqa/handbook/PM2_5/pm2_5ratio.xls : Profile ID #391.

Appendix B
ConocoPhillips - Los Angeles Refinery
PM10 and NOx Reduction Projects
Peak Daily Construction Equipment Emission Rates

Equipment Type	Fuel	Hp	2007 Emission Factors lb/hr ⁽¹⁾				
			CO	NOx	PM10	SOx	VOC
Air Compressor	Diesel	50	0.2933	0.2468	0.0290	0.0003	0.1306
Air Compressor	Diesel	50	0.2933	0.2468	0.0290	0.0003	0.1306
Backhoe	Diesel	75	0.3748	0.6979	0.0635	0.0006	0.1179
Backhoe	Diesel	120	0.5030	1.0427	0.0868	0.0008	0.1767
Backhoe	Diesel	200	0.4716	1.9310	0.0643	0.0019	0.1714
Crane	Diesel	150	0.4975	1.1009	0.0615	0.0009	0.1417
Crane	Diesel	165	0.4975	1.1009	0.0615	0.0009	0.1417
Crane	Diesel	250	0.4119	1.4665	0.0571	0.0013	0.1478
Crane	Diesel	250	0.4119	1.4665	0.0571	0.0013	0.1478
Crane	Diesel	400	0.8483	2.1049	0.0819	0.0018	0.2121
Front End Loader	Diesel	100	0.3748	0.6979	0.0635	0.0006	0.1179
Man Lift	Diesel	25	0.0678	0.1103	0.0083	0.0001	0.0268
Man Lift	Diesel	25	0.0678	0.1103	0.0083	0.0001	0.0268
Man Lift	Diesel	50	0.2042	0.2062	0.0210	0.0003	0.0867
Man Lift	Diesel	100	0.2563	0.5110	0.0398	0.0004	0.0819
Forklift	Diesel	45	0.2119	0.1643	0.0206	0.0002	0.0932
Forklift	Diesel	120	0.2337	0.4359	0.0428	0.0004	0.0786
Fork Lift	Diesel	Composite	0.2495	0.6430	0.0346	0.0006	0.0861
Generator	Diesel	50	0.3076	0.3197	0.0318	0.0004	0.1294
Generator	Diesel	85	0.5185	1.0338	0.0791	0.0009	0.1638
Demolition Hammer	Pneumatic	0	0.0000	0.0000	0.0000	0.0000	0.0000
Welder	Electric	40	0.0000	0.0000	0.0000	0.0000	0.0000
Welder	Diesel	40	0.3169	0.2825	0.0317	0.0003	0.1392

(1) SCAQMD, 2006 : http://www.aqmd.gov/ceqa/handbook/offroad/offroadEF_0620.xls

Appendix B
ConocoPhillips - Los Angeles Refinery
PM10 and NOx Reduction Projects
Peak Daily Construction Equipment Emissions

Equipment	Hours (hr/day)	Wilmington				Carson
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11
Air Compressor	7	1				
Air Compressor	4		1			
Backhoe	10					1
Backhoe	6	1				
Backhoe	3					1
Crane	2					1
Crane	10			1	1	
Crane	4	1				
Crane	6		1			
Crane	10				1	
Front End Loader	10			1		
Man Lift	6	2				
Man Lift	8		2			
Man Lift	1					1
Man Lift	10					3
Forklift	10			1	1	
Forklift	2					1
Forklift	2		1			
Generator	8		3			
Generator	10				1	
Demolition Hammer	10			1		
Welder	8	2	8			4
Welder	10				3	

CO	Emission Rate (lb/hr)	Wilmington				Carson
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11
Air Compressor	0.293	2.05	0.00	0.00	0.00	0.00
Air Compressor	0.293	0.00	1.17	0.00	0.00	0.00
Backhoe	0.375	0.00	0.00	0.00	3.75	0.00
Backhoe	0.503	3.02	0.00	0.00	0.00	0.00
Backhoe	0.472	0.00	0.00	0.00	0.00	1.41
Crane	0.497	0.00	0.00	0.00	0.00	0.99
Crane	0.497	0.00	0.00	4.97	4.97	0.00
Crane	0.412	1.65	0.00	0.00	0.00	0.00
Crane	0.412	0.00	2.47	0.00	0.00	0.00
Crane	0.848	0.00	0.00	0.00	8.48	0.00
Front End Loader	0.375	0.00	0.00	3.75	0.00	0.00
Man Lift	0.068	0.81	0.00	0.00	0.00	0.00
Man Lift	0.068	0.00	1.09	0.00	0.00	0.00
Man Lift	0.204	0.00	0.00	0.00	0.00	0.20
Man Lift	0.256	0.00	0.00	0.00	7.69	0.00
Forklift	0.212	0.00	0.00	2.12	2.12	0.00
Forklift	0.234	0.00	0.00	0.00	0.00	0.47
Forklift	0.250	0.00	0.50	0.00	0.00	0.00
Generator	0.308	0.00	7.38	0.00	0.00	0.00
Generator	0.519	0.00	0.00	0.00	5.19	0.00
Demolition Hammer	0.000	0.00	0.00	0.00	0.00	0.00
Welder (electric)	0.000	0.00	0.00	0.00	0.00	0.00
Welder (diesel)	0.317	0.00	0.00	0.00	9.51	0.00
Total		7.53	12.61	10.84	41.71	3.08

NOX	Emission Rate (lb/hr)	Wilmington				Carson
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11
Air Compressor	0.247	1.73	0.00	0.00	0.00	0.00
Air Compressor	0.247	0.00	0.99	0.00	0.00	0.00
Backhoe	0.698	0.00	0.00	0.00	6.98	0.00
Backhoe	1.043	6.26	0.00	0.00	0.00	0.00
Backhoe	1.931	0.00	0.00	0.00	0.00	5.79
Crane	1.101	0.00	0.00	0.00	0.00	2.20
Crane	1.101	0.00	0.00	11.01	11.01	0.00
Crane	1.466	5.87	0.00	0.00	0.00	0.00
Crane	1.466	0.00	8.80	0.00	0.00	0.00
Crane	2.105	0.00	0.00	0.00	21.05	0.00
Front End Loader	0.698	0.00	0.00	6.98	0.00	0.00
Man Lift	0.110	1.32	0.00	0.00	0.00	0.00
Man Lift	0.110	0.00	1.77	0.00	0.00	0.00
Man Lift	0.206	0.00	0.00	0.00	0.00	0.21
Man Lift	0.511	0.00	0.00	0.00	15.33	0.00
Forklift	0.164	0.00	0.00	1.64	1.64	0.00
Forklift	0.436	0.00	0.00	0.00	0.00	0.87
Forklift	0.643	0.00	1.29	0.00	0.00	0.00
Generator	0.320	0.00	7.67	0.00	0.00	0.00
Generator	1.034	0.00	0.00	0.00	10.34	0.00
Demolition Hammer	0.000	0.00	0.00	0.00	0.00	0.00
Welder (electric)	0.000	0.00	0.00	0.00	0.00	0.00
Welder (diesel)	0.282	0.00	0.00	0.00	8.47	0.00
Total		15.17	20.51	19.63	74.82	9.07

Appendix B
ConocoPhillips
PM10 and NOx Reduction Projects
Peak Daily Construction Equipment Emissions (Cont.)

	Emission Rate (lb/hr)	Wilmington				Carson
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11
VOC	2007					
Air Compressor	0.131	0.91	0.00	0.00	0.00	0.00
Air Compressor	0.131	0.00	0.52	0.00	0.00	0.00
Backhoe	0.118	0.00	0.00	0.00	1.18	0.00
Backhoe	0.177	1.06	0.00	0.00	0.00	0.00
Backhoe	0.171	0.00	0.00	0.00	0.00	0.51
Crane	0.142	0.00	0.00	0.00	0.00	0.28
Crane	0.142	0.00	0.00	1.42	1.42	0.00
Crane	0.148	0.59	0.00	0.00	0.00	0.00
Crane	0.148	0.00	0.89	0.00	0.00	0.00
Crane	0.212	0.00	0.00	0.00	2.12	0.00
Front End Loader	0.118	0.00	0.00	1.18	0.00	0.00
Man Lift	0.027	0.32	0.00	0.00	0.00	0.00
Man Lift	0.027	0.00	0.43	0.00	0.00	0.00
Man Lift	0.087	0.00	0.00	0.00	0.00	0.09
Man Lift	0.082	0.00	0.00	0.00	2.46	0.00
Forklift	0.093	0.00	0.00	0.93	0.93	0.00
Forklift	0.079	0.00	0.00	0.00	0.00	0.16
Forklift	0.086	0.00	0.17	0.00	0.00	0.00
Generator	0.129	0.00	3.10	0.00	0.00	0.00
Generator	0.164	0.00	0.00	0.00	1.64	0.00
Demolition Hammer	0.000	0.00	0.00	0.00	0.00	0.00
Welder (electric)	0.000	0.00	0.00	0.00	0.00	0.00
Welder (diesel)	0.139	0.00	0.00	0.00	4.18	0.00
Total		2.89	5.12	3.53	13.92	1.04

	Emission Rate (lb/hr)	Wilmington				Carson
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11
SOx	2007					
Air Compressor	0.000	0.00	0.00	0.00	0.00	0.00
Air Compressor	0.000	0.00	0.00	0.00	0.00	0.00
Backhoe	0.001	0.00	0.00	0.00	0.01	0.00
Backhoe	0.001	0.00	0.00	0.00	0.00	0.00
Backhoe	0.002	0.00	0.00	0.00	0.00	0.01
Crane	0.001	0.00	0.00	0.00	0.00	0.00
Crane	0.001	0.00	0.00	0.01	0.01	0.00
Crane	0.001	0.01	0.00	0.00	0.00	0.00
Crane	0.001	0.00	0.01	0.00	0.00	0.00
Crane	0.002	0.00	0.00	0.00	0.02	0.00
Front End Loader	0.001	0.00	0.00	0.01	0.00	0.00
Man Lift	0.000	0.00	0.00	0.00	0.00	0.00
Man Lift	0.000	0.00	0.00	0.00	0.00	0.00
Man Lift	0.000	0.00	0.00	0.00	0.00	0.00
Man Lift	0.000	0.00	0.00	0.00	0.01	0.00
Forklift	0.000	0.00	0.00	0.00	0.00	0.00
Forklift	0.000	0.00	0.00	0.00	0.00	0.00
Forklift	0.001	0.00	0.00	0.00	0.00	0.00
Generator	0.000	0.00	0.01	0.00	0.00	0.00
Generator	0.001	0.00	0.00	0.00	0.01	0.00
Demolition Hammer	0.000	0.00	0.00	0.00	0.00	0.00
Welder (electric)	0.000	0.00	0.00	0.00	0.00	0.00
Welder (diesel)	0.000	0.00	0.00	0.00	0.01	0.00
Total		0.01	0.02	0.02	0.07	0.01

	Emission Rate (lb/hr)	Wilmington				Carson
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11
PM10	2007					
Air Compressor	0.029	0.20	0.00	0.00	0.00	0.00
Air Compressor	0.029	0.00	0.12	0.00	0.00	0.00
Backhoe	0.063	0.00	0.00	0.00	0.63	0.00
Backhoe	0.087	0.52	0.00	0.00	0.00	0.00
Backhoe	0.064	0.00	0.00	0.00	0.00	0.19
Crane	0.061	0.00	0.00	0.00	0.00	0.12
Crane	0.061	0.00	0.00	0.61	0.61	0.00
Crane	0.057	0.23	0.00	0.00	0.00	0.00
Crane	0.057	0.00	0.34	0.00	0.00	0.00
Crane	0.082	0.00	0.00	0.00	0.82	0.00
Front End Loader	0.063	0.00	0.00	0.63	0.00	0.00
Man Lift	0.008	0.10	0.00	0.00	0.00	0.00
Man Lift	0.008	0.00	0.13	0.00	0.00	0.00
Man Lift	0.021	0.00	0.00	0.00	0.00	0.02
Man Lift	0.040	0.00	0.00	0.00	1.19	0.00
Forklift	0.021	0.00	0.00	0.21	0.21	0.00
Forklift	0.043	0.00	0.00	0.00	0.00	0.09
Forklift	0.035	0.00	0.07	0.00	0.00	0.00
Generator	0.032	0.00	0.76	0.00	0.00	0.00
Generator	0.079	0.00	0.00	0.00	0.79	0.00
Demolition Hammer	0.000	0.00	0.00	0.00	0.00	0.00
Welder (electric)	0.000	0.00	0.00	0.00	0.00	0.00
Welder (diesel)	0.032	0.00	0.00	0.00	0.95	0.00
Total		1.05	1.42	1.46	5.21	0.42

Appendix B
ConocoPhillips - Los Angeles Refinery
PM10 and NOx Reduction Projects
On-site Construction Vehicle Trip Emissions

Vehicle	Miles per Day	Wilmington				Carson
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11
Pickup Trucks	0	0	0	0	0	0
12 Passenger Van	0	0	0	0	0	0
Total Light Vehicle Miles		0	0	0	0	0
Flatbed Truck	10	0	2	1	1	0
Refueling Truck	10	1	1	0	0	0
Dump Truck	10	1	0	0	1	0
Water Truck	0	0	0	0	0	0
Total Medium Truck Miles		20	30	10	20	0
Bus	0	0	0	0	0	0
Semi Tractor	0	0	0	0	0	0
Bulk Delivery Truck	0	0	0	0	0	0
Transport Truck	0	0	0	0	0	0
Total Heavy Truck Miles		0	0	0	0	0

CO	Emission Rate (lb/mi) ⁽¹⁾	Wilmington				Carson
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11
Light Duty	0.01282000	0.00	0.00	0.00	0.00	0.00
Medium Duty	0.01745500	0.35	0.52	0.17	0.35	0.00
Heavy Duty	0.00552033	0.00	0.00	0.00	0.00	0.00
Total		0.35	0.52	0.17	0.35	0.00

NOx	Emission Rate (lb/mi) ⁽¹⁾	Wilmington				Carson
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11
Light Duty	0.00136100	0.00	0.00	0.00	0.00	0.00
Medium Duty	0.02497800	0.50	0.75	0.25	0.50	0.00
Heavy Duty	0.03563463	0.00	0.00	0.00	0.00	0.00
Total		0.50	0.75	0.25	0.50	0.00

VOC	Emission Rate (lb/mi) ⁽¹⁾	Wilmington				Carson
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11
Light Duty	0.00138300	0.00	0.00	0.00	0.00	0.00
Medium Duty	0.00260800	0.05	0.08	0.03	0.05	0.00
Heavy Duty	0.00122652	0.00	0.00	0.00	0.00	0.00
Total		0.05	0.08	0.03	0.05	0.00

SOx	Emission Rate (lb/mi) ⁽¹⁾	Wilmington				Carson
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11
Light Duty	0.00000900	0.00	0.00	0.00	0.00	0.00
Medium Duty	0.00003300	0.00	0.00	0.00	0.00	0.00
Heavy Duty	0.00004572	0.00	0.00	0.00	0.00	0.00
Total		0.00	0.00	0.00	0.00	0.00

PM10	Emission Rate (lb/mi) ⁽¹⁾	Wilmington				Carson
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11
Light Duty Exhaust	0.00007995	0.00	0.00	0.00	0.00	0.00
Medium Duty Exhaust	0.00043966	0.01	0.01	0.00	0.01	0.00
Heavy Duty Exhaust	0.00064407	0.00	0.00	0.00	0.00	0.00
Exhaust Sub-total		0.01	0.01	0.00	0.01	0.00
Light Duty Fugitive ⁽²⁾	0.00038589	0.00	0.00	0.00	0.00	0.00
Medium Duty Fugitive ⁽²⁾	0.00210368	0.04	0.06	0.02	0.04	0.00
Heavy Duty Fugitive ⁽²⁾	0.02011945	0.00	0.00	0.00	0.00	0.00
Fugitive Sub-total		0.04	0.06	0.02	0.04	0.00
Total		0.05	0.08	0.03	0.05	0.00

(1) Based on 2007 SCAQMD on-road emission rates. (<http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>)

(2) Emission Calculations for travel on paved roads from EPA AP-42 Section 13.2.1, December 2003

$$E = k(sL/2)^{0.65} \times (W/3)^{1.5} \times C$$

Where: k = 0.016 lb/VMT for PM10, sL = road silt loading (gms/m2) from CARB Methodology 7.9 for paved roads (0.240 for local roads and 0.037 for major/collector roads), W = weight of vehicles (2.4 tons for cars; 5 for pickup trucks, and 20 for heavy trucks), and C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear (0.00047 lbs/VMT).

Appendix B
ConocoPhillips - Los Angeles Refinery
PM10 and NOx Reduction Projects
Off-site Construction Vehicle Trip Emissions

Vehicle	Miles per Day	Wilmington				Carson
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11
Commuters	32.4	12	50	50	50	30
Pickup Trucks	0	0	0	0	0	0
12 Passenger Van	0	0	0	0	0	0
Total Light Vehicle Miles		388.8	1620	1620	1620	972
Delivery Truck	50	3	3	5	5	3
Flatbed Truck	0	0	0	0	0	0
Refueling Truck	0	0	0	0	0	0
Dump Truck	0	0	0	0	0	0
Water Truck	0	0	0	0	0	0
Total Medium Truck Miles		150	150	250	250	150
Bus	0	0	0	0	0	0
Semi Tractor	0	0	0	0	0	0
Bulk Delivery Truck	0	0	0	0	0	0
Transport Truck	0	0	0	0	0	0
Total Heavy Truck Miles		0	0	0	0	0

CO	Emission Rate (lb/mi) ⁽¹⁾	Wilmington				Carson
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11
Light Duty	0.01282000	4.98	20.77	20.77	20.77	12.46
Medium Duty	0.01745500	2.62	2.62	4.36	4.36	2.62
Heavy Duty	0.00552033	0.00	0.00	0.00	0.00	0.00
Total		7.60	23.39	25.13	25.13	15.08

NOx	Emission Rate (lb/mi) ⁽¹⁾	Wilmington				Carson
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11
Light Duty	0.00136100	0.53	2.20	2.20	2.20	1.32
Medium Duty	0.02497800	3.75	3.75	6.24	6.24	3.75
Heavy Duty	0.03563463	0.00	0.00	0.00	0.00	0.00
Total		4.28	5.95	8.45	8.45	5.07

VOC	Emission Rate (lb/mi) ⁽¹⁾	Wilmington				Carson
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11
Light Duty	0.00138300	0.54	2.24	2.24	2.24	1.34
Medium Duty	0.00260800	0.39	0.39	0.65	0.65	0.39
Heavy Duty	0.00122652	0.00	0.00	0.00	0.00	0.00
Total		0.93	2.63	2.89	2.89	1.74

SOx	Emission Rate (lb/mi) ⁽¹⁾	Wilmington				Carson
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11
Light Duty	0.0000900	0.00	0.01	0.01	0.01	0.01
Medium Duty	0.00003300	0.00	0.00	0.01	0.01	0.00
Heavy Duty	0.00004572	0.00	0.00	0.00	0.00	0.00
Total		0.01	0.02	0.02	0.02	0.01

PM10	Emission Rate (lb/mi) ⁽¹⁾	Wilmington				Carson
		Boiler 7 - Demolition	Boiler 7 - Construction	WGS - Demolition	WGS - Construction	Boiler 11
Light Duty Exhaust	0.00007995	0.03	0.13	0.13	0.13	0.08
Medium Duty Exhaust	0.00043966	0.07	0.07	0.11	0.11	0.07
Heavy Duty Exhaust	0.00064407	0.00	0.00	0.00	0.00	0.00
Exhaust Sub-total		0.10	0.20	0.24	0.24	0.14
Light Duty Fugitive ⁽²⁾	0.00038589	0.15	0.63	0.63	0.63	0.38
Medium Duty Fugitive ⁽²⁾	0.00210368	0.32	0.32	0.53	0.53	0.32
Heavy Duty Fugitive ⁽²⁾	0.02011945	0.00	0.00	0.00	0.00	0.00
Fugitive Sub-total		0.47	0.94	1.15	1.15	0.69
Total		0.56	1.14	1.39	1.39	0.83

(1) Based on 2007 SCAQMD on-road emission rates. (<http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>)

(2) Emission Calculations for travel on paved roads from EPA AP-42 Section 13.2.1, December 2003

$$E = k(sL/2)^{0.65} \times (W/3)^{1.5} \times C$$

Where: k = 0.016 lb/VMT for PM10, sL = road silt loading (gms/m2) from CARB Methodology 7.9 for paved roads

(0.240 for local roads and 0.037 for major/collector roads), W = weight of vehicles (2.4 tons for cars; 5 for pickup trucks,

and 20 for heavy trucks), and C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear (0.00047 lbs/VMT).

Appendix B
ConocoPhillips - Los Angeles Refinery
PM10 and NOx Reduction Projects
Fugitive PM Construction Emissions for Boiler 7 Demolition

Grading Operations Construction Activities ⁽¹⁾	Average Pieces of Equipment Operating	Peak Pieces of Equipment Operating	Hours of Operation	PM10 Emission Factor (lb/hour)	Water Control Factor	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source Table A9-9-F
						Average PM10 Emissions (lbs/day)	Peak PM10 Emissions (lbs/day)	Average PM10 Emissions (lbs/day)	Peak PM10 Emissions (lbs/day)	
	0	0	8	5.837	0.5	0.00	0.00	0.00	0.00	
TRENCHING OPERATIONS (Backhoe)										
	Average Tons of Materials Handled Per Day	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source	
	0	0	0.0035	0.5	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	0	Table A9-9-G
TEMPORARY STOCKPILES										
	Days of Construction	Average Acreage Disturbed Per Day	Peak Acreage Disturbed Per Day	PM10 Emission Factor (lb/day/acre)	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source	
	0	0	0	0.200	Average PM10 Emissions Tons/Year	Peak PM10 Emissions Tons/Year	Average PM10 Emissions Tons/Year	Peak PM10 Emissions Tons/Year	0.000	Table A9-9-E
WIND EROSION DISTURBED AREA AND TEMPORARY STOCKPILES										
	Estimated Materials Handled Per Day (tons)	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source	
	0	0	0.02205	0.5	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	0	Table A9-9
	0	0	0.009075	0.5	0	0	0	0	0	Table A9-9
TRUCK FILLING/DUMPING										
	Estimated Materials Handled Per Day (tons)	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source	
	0	0	0.02205	0.5	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	0	Table A9-9
	0	0	0.009075	0.5	0	0	0	0	0	Table A9-9

Assumptions: 1 cubic yard trench spoils = 1 ton

TOTAL PM10 Pounds/day	Average	Peak
(Controlled Emissions)	0.0000	0.00000
(Uncontrolled Emissions)	0.000	0.000

- (1) Emissions (lbs/hr) = $[0.75 \times (G^{1.5}) / (H^{1.4})] \times J$
 where G = silt content (7.5%), H = moisture content (2.0%), and J = hrs of operation (EPA AP-42 Table 11.9-1 for bulldozing overburden).
- (2) Emissions (lbs/ton) = $0.00112 \times [(G/5)^3 / (H/2)^{1.4}] \times J$
 where G=mean wind speed (12 mph), H=moisture content of surface material (2%); I=lbs of dirt handled per day (100,000 lbs); and J=2,000 lbs/ton
- (3) Emissions (lbs/day/acre) = $1.7 \times [(G/1.5)^3 / (365-H)/235] \times I/15 \times J$
 where G = silt content (7.5%); H = days with >0.01 inch of rain (34); I = percentage of time wind speed exceeds 12 mph (50%) and J= fraction of TSP (0.5)
- (4) Used SCAQMD Table 9-9 Default emission factors.

**Appendix B
ConocoPhillips - Los Angeles Refinery
PM10 and NOx Reduction Projects
Fugitive PM Construction Emissions for Boiler 7 SCR Construction**

Grading Operations Construction Activities ⁽¹⁾	Average Pieces of Equipment Operating	Peak Pieces of Equipment Operating	Hours of Operation	PM10 Emission Factor (lb/hour)	Water Control Factor	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source Table A9-9-F
						Average PM10 Emissions (lbs/day)	Peak PM10 Emissions (lbs/day)	Average PM10 Emissions (lbs/day)	Peak PM10 Emissions (lbs/day)	
1	1	1	8	5.837	0.5	23.35	23.35	46.69830868	46.69830868	Table A9-9-F

TRENCHING OPERATIONS (Backhoe)	Average Tons of Materials Handled Per Day	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source Table A9-9-G
					Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	
TEMPORARY STOCKPILES	200	200	0.0035	0.5	0.35	0.35	0.7	0.7	Table A9-9-G

Assumptions: 1cubic yard trench spoils = 1 ton

WIND EROSION Disturbed Area and Temporary Stockpiles Construction Activities ⁽²⁾	Days of Construction	Average Acreage Disturbed Per Day	Peak Acreage Disturbed Per Day	PM10 Emission Factor (lb/day/acre)	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source Table A9-9-E
					Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	
5	5	0.011	0.011	0.200	0.002	0.002	0.000	0.000	Table A9-9-E

TRUCK FILLING/DUMPING	Estimated Materials Handled Per Day (tons)	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source Table A9-9
					Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	
Truck Filling ⁽⁴⁾	200	200	0.02205	0.5	2.205	2.205	4.41	4.41	Table A9-9
Truck Dumping	200	200	0.009075	0.5	0.9075	0.9075	1.815	1.815	Table A9-9

TOTAL PM10 Pounds/day (Controlled Emissions)	Average	Peak
	26.8138	26.81385
(Uncontrolled Emissions)	53.626	53.626

- (1) Emissions (lbs/hr) = $[0.75 \times (G^{1.5}) / (H^{1.4})] \times J$
where G = silt content (7.5%), H = moisture content (2.0%) and J = hrs of operation (EPA AP-42 Table 11.9-1 for bulldozing overburden).
- (2) Emissions (lbs/ton) = $0.00112 \times [(G/5)^3 / (H/2)^{1.4}] \times I / J$
where G=mean wind speed (12 mph), H=moisture content of surface material (2%), I=lbs of dirt handled per day (100,000 lbs); and J=2,000 lbs/ton
- (3) Emissions (lbs/day/acre) = $1.7 \times [(G/1.5)^3 \times (365-H) / 235] \times I / 15 \times J$
where G = silt content (7.5%); H = days with >0.01 inch of rain (34); I = percentage of time wind speed exceeds 12 mph (50%) and J= fraction of TSP (0.5)
- (4) Used SCAQMD Table 9-9 Default emission factors.

**Appendix B
ConocoPhillips - Los Angeles Refinery
PM10 and NOx Reduction Projects
Fugitive PM Construction Emissions for WGS Demolition**

Grading Operations Construction Activities ⁽¹⁾	Average Pieces of Equipment Operating	Peak Pieces of Equipment Operating	Hours of Operation	PM10 Emission Factor (lb/hour)	Water Control Factor	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source Table A9-9-F
						Average PM10 Emissions (lbs/day)	Peak PM10 Emissions (lbs/day)	Average PM10 Emissions (lbs/day)	Peak PM10 Emissions (lbs/day)	
0	0	0	0	5.837	0.5	0.00	0.00	0	0	0

TRENCHING OPERATIONS (Backhoe)										
TEMPORARY STOCKPILES Construction Activities ⁽²⁾	Average Tons of Materials Handled Per Day	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source Table A9-9-G	
					Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day		
0	0	0	0.0035	0.5	0	0	0	0	0	0

Assumptions: 1cubic yard trench spoils = 1 ton

WIND EROSION Disturbed Area and Temporary Stockpiles Construction Activities										
WIND EROSION Disturbed Area and Temporary Stockpiles Construction Activities	Days of Construction	Average Acreage Disturbed Per Day	Peak Acreage Disturbed Per Day	PM10 Emission Factor (lb/day/acre)	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source Table A9-9-E	
					Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Tons/Year	Peak PM10 Emissions Tons/Year		
0	0	0	0	0.200	0.000	0.000	0.000	0.000	0.000	0.000

TRUCK FILLING/DUMPING										
Truck Filling ⁽⁴⁾ Truck Dumping	Estimated Materials Handled Per Day (tons)	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source Table A9-9	
					Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day	Average PM10 Emissions Pounds/day	Peak PM10 Emissions Pounds/day		
0	0	0	0.02205	0.5	0	0	0	0	0	0
0	0	0	0.009075	0.5	0	0	0	0	0	0

TOTAL PM10 Pounds/day (Controlled Emissions)	Average	Peak
	0.0000	0.0000
	0.000	0.000

(1) Emissions (lbs/hr) = $[0.75 \times (G^{1.5}) / (H^{1.4})] \times J$
 where G = silt content (7.5%), H = moisture content (2.0%) and J = hrs of operation (EPA AP-42 Table 11.9-1 for bulldozing overburden).

(2) Emissions (lbs/ton) = $0.00112 \times [(G/5)^{-3} / (H/2)^{-1}] \times I/J$
 where G=mean wind speed (12 mph), H=moisture content of surface material (2%), I=lbs of dirt handled per day (100,000 lbs); and J=2,000 lbs/ton

(3) Emissions (lbs/day/acre) = $1.7 \times [(G/1.5)^{-3} / (365-H)/235] \times I/15 \times J$
 where G = silt content (7.5%); H = days with >0.01 inch of rain (34); I = percentage of time wind speed exceeds 12 mph (50%) and J= fraction of TSP (0.5)

(4) Used SCAQMD Table 9-9 Default emission factors.

Appendix B
ConocoPhillips - Los Angeles Refinery
PM10 and NOx Reduction Projects
Fugitive PM Construction Emissions for WGS Construction

Activity	Average Pieces of Equipment Operating	Peak Pieces of Equipment Operating	Hours of Operation	PM10 Emission Factor (lb/hour)	Water Control Factor	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source
						Average PM10 Emissions (lbs/day)	Peak PM10 Emissions (lbs/day)	Average PM10 Emissions (lbs/day)	Peak PM10 Emissions (lbs/day)	
Grading Operations	1	1	8	5.837	0.5	23.35	23.35	46.69830868	46.69830868	Table A9-9-F
Construction Activities ⁽¹⁾										
TRENCHING OPERATIONS (Backhoe)										
	Average Tons of Materials Handled Per Day	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor						
TEMPORARY STOCKPILES	500	600	0.0035	0.5		0.875	1.05	1.75	2.1	Table A9-9-G
Construction Activities ⁽²⁾										
Assumptions: 1cubic yard trench spoils = 1 ton										
	Days of Construction	Average Acreage Disturbed Per Day	Peak Acreage Disturbed Per Day	PM10 Emission Factor (lb/day/acre)	Water Control Factor					
WIND EROSION Disturbed Area and Temporary Stockpiles	20	0.1	0.1	0.200	0.5	0.020	0.020	0.000	0.000	Table A9-9-E
Construction Activities										
TRUCK FILLING/DUMPING										
	Estimated Materials Handled Per Day (tons)	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor						
Truck Filling ⁽⁴⁾	500	600	0.02205	0.5		5.5125	6.615	11.025	13.23	Table A9-9
Truck Dumping	500	500	0.009075	0.5		2.26875	2.26875	4.5375	4.5375	Table A9-9

TOTAL PM10 Pounds/day (Controlled Emissions)	Average	Peak
	32.0254	32.20036
(Uncontrolled Emissions)	64.031	66.586

(1) Emissions (lbs/hr) = $[0.75 \times (G^{1.5}) / (H^{1.4})] \times J$
 where G = silt content (7.5%), H = moisture content (2.0%) and J = hrs of operation (EPA AP-42 Table 11.9-1 for bulldozing overburden).

(2) Emissions (lbs/ton) = $0.00112 \times [(G/5)^{-3} / (H/2)^{-1}] \times I / J$
 where G=mean wind speed (12 mph), H=moisture content of surface material (2%), I=lbs of dirt handled per day (100,000 lbs); and J=2,000 lbs/ton

(3) Emissions (lbs/day/acre) = $1.7 \times [(G/1.5)^{-3} / (365-H)/235] \times I / 15 \times J$
 where G = silt content (7.5%); H = days with >0.01 inch of rain (34); I = percentage of time wind speed exceeds 12 mph (50%) and J= fraction of TSP (0.5)

(4) Used SCAQMD Table 9-9 Default emission factors.

**Appendix B
ConocoPhillips - Los Angeles Refinery
PM10 and NOx Reduction Projects
Fugitive PM Construction Emissions for Boiler 11 SCR**

Activity	Average Pieces of Equipment Operating	Peak Pieces of Equipment Operating	Hours of Operation	PM10 Emission Factor (lb/hour)	Water Control Factor	Controlled Emissions		Uncontrolled Emissions		SCAQMD Emission Factor Source
						Average PM10 Emissions (lbs/day)	Peak PM10 Emissions (lbs/day)	Average PM10 Emissions (lbs/day)	Peak PM10 Emissions (lbs/day)	
Grading Operations	1	1	8	5.837	0.5	23.35	23.35	46.69830868	46.69830868	Table A9-9-F
Construction Activities ⁽¹⁾										
TRENCHING OPERATIONS (Backhoe)										
	Average Tons of Materials Handled Per Day	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor						
TEMPORARY STOCKPILES	10	10	0.0035	0.5						
Construction Activities ⁽²⁾										
Assumptions: 1cubic yard trench spoils = 1 ton										
WIND EROSION Disturbed Area and Temporary Stockpiles										
	Days of Construction	Average Acreage Disturbed Per Day	Peak Acreage Disturbed Per Day	PM10 Emission Factor (lb/day/acre)	Water Control Factor					
Construction Activities	5	0.0004	0.0004	0.200	0.5					
Assumptions: 1cubic yard trench spoils = 1 ton										
TRUCK FILLING/DUMPING										
	Estimated Materials Handled Per Day (tons)	Peak Tons of Materials Handled Per Day	PM10 Emission Factor (lb/ton)	Water Control Factor						
Truck Filling ⁽⁴⁾	10	10	0.02205	0.5						
Truck Dumping	10	10	0.009075	0.5						
Assumptions: 1cubic yard trench spoils = 1 ton										

TOTAL PM10 Pounds/day (Controlled Emissions)	Average	Peak
	23.5224	23.52236
(Uncontrolled Emissions)	47.045	47.045

(1) Emissions (lbs/hr) = $[0.75 \times (G^{1.5}) / (H^{1.4})] \times J$
 where G = silt content (7.5%), H = moisture content (2.0%) and J = hrs of operation (EPA AP-42 Table 11.9-1 for bulldozing overburden).

(2) Emissions (lbs/ton) = $0.00112 \times [(G/5)^{-3} / (H/2)^{-1}] \times I / J$
 where G=mean wind speed (12 mph), H=moisture content of surface material (2%), I=lbs of dirt handled per day (100,000 lbs); and J=2,000 lbs/ton

(3) Emissions (lbs/day/acre) = $1.7 \times [(G/1.5)^{-3} / (365-H)/235] \times I / 15 \times J$
 where G = silt content (7.5%); H = days with >0.01 inch of rain (34); I = percentage of time wind speed exceeds 12 mph (50%) and J= fraction of TSP (0.5)

(4) Used SCAQMD Table 9-9 Default emission factors.

Appendix B
ConocoPhillips - Los Angeles Refinery
PM10 and NOx Reduction Projects
Localized Significance Threshold Evaluation

On-site Source Emissions (lbs/day)

	CO	VOC	NOx	SOx	PM10
Wilmington Plant					
Construction Equipment	24.82	9.1	42.34	0.04	3.15
Vehicle Emissions and Road Dust	48.52	5.52	14.4	0.04	2.53
Total On-site Emissions	73.34	14.62	56.74	0.08	5.68
Screening Value ⁽¹⁾	6547	NA	311	NA	242
Above Value?	NO	-	NO	-	NO
Carson Plant					
Construction Equipment	3.44	1.14	10.98	0.01	0.45
Vehicle Emissions and Road Dust	0	0	0	0	0
Total On-site Emissions	3.44	1.14	10.98	0.01	0.45
Screening Value ⁽²⁾	1013	NA	150	NA	89
Above Value?	NO	-	NO	-	NO

Plant	Distance to Fenceline		Size of Construction Area	
	(ft)	(m)	(ft ²)	(acres)
Wilmington	1450	442	40000	0.92
Carson	350	107	7500	0.17

(1) Screening values for LST analysis from SCAQMD Final Localized Significance Threshold Methodology, Appendix C, Tables C-1, C-2, and C-4 for SRA No. 4 for 1-acre sites at 500 meters (June 2003).

(2) Screening values for LST analysis from SCAQMD Final Localized Significance Threshold Methodology, Appendix C, Tables C-1, C-2, and C-4 for SRA No. 4 for 1-acre sites at 100 meters (June 2003).

**Appendix B
ConocoPhillips - Los Angeles Refinery
Operational Emissions
Vehicle Trip Emissions**

Vehicle	Miles per Day	Round Trips per Day
Ammonia Delivery Truck	50	2
Total Heavy Truck Miles		100

	Emission Rate (lb/mi) ⁽¹⁾	Emissions (lb/day)
CO	0.00552033	0.55
NOx	0.03563463	3.56
VOC	0.00122652	0.12
SOx	0.00004572	0.00
Total PM10		2.08
Exhaust PM10	0.00064407	0.06
Fugitive PM10 ⁽²⁾	0.02011945	2.01

(1) Based on 2007 SCAQMD on-road emission rates. (<http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html>)

(2) Emission Calculations for travel on paved roads from EPA AP-42 Section 13.2.1, December 2003

$$E = k(sL/2)^{0.65} \times (W/3)^{1.5} - C$$

Where: k = 0.016 lb/VMT for PM10, sL = road silt loading (gms/m²) from CARB Methodology 7.9 for paved roads (0.240 for local roads and 0.037 for major/collector roads), W = weight of vehicles (2.4 tons for cars; 5 for pickup trucks, and 20 for heavy trucks), and C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear (0.00047 lbs/VMT).

Appendix B
ConocoPhillips - Los Angeles Refinery
Operational Emissions
SCR Ammonia Slip Emissions

Wilmington Plant - Boiler 7

Excess O2 = 3 %
 Firing Rate= 304 mmBtu/hr
 Ammonia Slip = 5 ppmv
 Fd = 0.00871 scf/Btu
 Ammonia Molecular Weight = 17 lb/lbmole
 scf/mole Conversion Factor = 379.43 scf/mole

Dry flue gas rate = Firing Rate *1000*Fd*(20.9/(20.9-Excess O2))
 Dry flue gas rate = 304*1000*0.00871*(20.9/(20.9-3))
 Dry flue gas rate = 3091.612 mscf/hr

Ammonia Slip Emissions = dry flue gas rate*1000*ammonia slip*molecular weight of ammonia/scf/mole conversion factor
 Ammonia Slip Emissions = 3091.6*1000*5/1000000*17/379.43 lb/hr
 Ammonia Slip Emissions = 0.693 lb/hr * 24 hrs/day = **16.62 lbs/day** = 17 lbs/day rounded

Carson Plant - Boiler 11

Excess O2 = 3 %
 Firing Rate= 352 mmBtu/hr
 Ammonia Slip = 5 ppmv
 Fd = 0.00871 scf/Btu
 Ammonia Molecular Weight = 17 lb/lbmole
 scf/mole Conversion factor = 379.43 scf/mole

Dry flue gas rate = Firing Rate *1000*Fd*(20.9/(20.9-Excess O2))
 Dry flue gas rate = 352*1000*0.00871*(20.9/(20.9-3))
 Dry flue gas rate = 3579.761 mscf/hr

Ammonia Slip Emissions = dry flue gas rate*1000*ammonia slip*molecular weight of ammonia/scf/mole conversion factor
 Ammonia Slip Emissions = 3579.8*1000*5/1000000*17/379.43 lb/hr
 Ammonia Slip Emissions = 0.802 lb/hr * 24 hrs/day = **19.26 lbs/day**