Table 1. Project Emissions Increase Summary - Phase 1

Source	Total PM	Total PM_{10}	Total $PM_{2.5}$	CO	VOC	SO_2	NO_X	Lead	CO_2e
Potential Emissions from New Units									
Banbury Mixer #10	0.34	0.34	0.34	--	93.66	--	--	4.17E-04	--
RTO-1	0.48	0.48	0.48	5.34	0.35	0.04	6.36	3.18E-05	7,674
Total	*0.83*	*0.83*	*0.83*	*5.34*	*94.00*	*0.04*	*6.36*	*4.49E-04*	*7,674*
	lb/hr =	**0.19**							
Potential Associated Emissions Increases									
Carbon Black Towers[a]	1.93	1.93	1.93	--	--	--	--	--	--
Surge Bins[a]	1.93	1.93	1.93	--	--	--	--	--	--
Calenders/Extruders[b]	5.52E-04	5.52E-04	5.52E-04	--	6.96	--	--	--	--
Solvent Use[b]	--	--	--	--	26.09	--	--	--	--
Curing[b]	--	--	--	--	1130.76	--	--	--	--
Boilers[b]	0.55	0.54	0.53	5.55	0.36	0.63	18.26	0.00	8028.06
Total	4.40	4.39	4.38	5.55	1164.18	0.63	18.26	0.00	8028.06
Contemporaneous Increases and Decreases									
Baseline Emissions from Decommissioned Units									
Banbury Mixer #3	2.10	2.10	2.10	--	2.67	--	--	2.09E-04	--
BB#3 Pelletizer	26.05	14.36	7.66	--	--	--	--	--	--
Potential Emissions from Contemporaneous Projects									
Slurry Mixer	2.04E-02	9.64E-03	1.46E-03	--	--	--	--	--	--
Extruder	1.61E-04	1.61E-04	1.61E-04	--	0.07	--	--	--	--
Green Tire Spray	--	--	--	--	1.03	--	--	--	--
Aero Curing Presses	--	--	--	--	15.15	--	--	--	--
Total Phase 1	5.2	5.2	5.2	10.9	1,258.2	0.7	24.6	4.9E-04	15,702
Contemporaneous Emission Changes	-28.1	-16.5	-9.8	0.0	13.6	0.0	0.0	0.0	0.0
Net Emission Increase	-22.9	-11.2	-4.6	10.9	1,271.8	0.7	24.6	2.8E-04	15,702
SER	25	15	10	100	40	40	40	0.6	75,000
Exceeds	No	No	No	No	**YES**	No	No	No	No

[a] Potential emissions increases from associated units includes increases associated with Banbury Mixer #10.

[b] Potential emissions increases from calenders/extruders, curing, solvent use, and boilers assumed to be associated with implementation of Phase 1.

Table 2. Project Emissions Increase Summary - Phase 2

Source	Total PM	Total PM_{10}	Total $PM_{2.5}$	CO	VOC	SO_2	NO_X	Lead	CO_2e
Potential Emissions from New Units									
Banbury Mixer #11	0.34	0.34	0.34	--	93.66	--	--	4.17E-04	--
Banbury Mixer #12	0.34	0.34	0.34	--	93.66	--	--	4.17E-04	--
Total	*0.69*	*0.69*	*0.69*	*0.00*	*187.31*	*0.00*	*0.00*	*8.35E-04*	*0.00*
Potential Associated Emissions Increases									
Carbon Black Towers[a]	3.85	3.85	3.85	--	--	--	--	--	--
Surge Bins[a]	3.85	3.85	3.85	--	--	--	--	--	--
Total	7.70	7.70	7.70	0.00	0.00	0.00	0.00	0.00	0.00
Contemporaneous Increases and Decreases									
Baseline Emissions from Decommissioned Units									
Banbury Mixer #2	2.04	2.04	2.04	--	2.59	--	--	2.03E-04	--
BB#2 Pelletizer	24.81	13.68	7.30	--	--	--	--	--	--
Potential Emissions from Contemporaneous Projects[b]									
Slurry Mixer	--	--	--	--	--	--	--	--	--
Extruder	--	--	--	--	--	--	--	--	--
Green Tire Spray	--	--	--	--	--	--	--	--	--
Aero Curing Presses	--	--	--	--	--	--	--	--	--
Total Phase 2	8.4	8.4	8.4	0.0	187.3	0.00	0.0	8.3E-04	0
Contemporaneous Emission Changes	-26.8	-15.7	-9.3	0.0	-2.6	0.0	0.0	-2.03E-04	0.0
Net Emission Increase	-18.5	-7.3	-0.9	0.0	184.7	0.0	0.0	6.3E-04	0
SER	25	15	10	100	40	40	40	0.6	75,000
Exceeds	No	No	No	No	**YES**	No	No	No	No

[a] Potential emissions increases from associated units includes increases associated with Banbury Mixers #11 and #12.

[b] Potential Emissions from Contemporaneous Projects is included in Phase 1

Table 3. Project Emissions Increase Summary - Project Total

Source	Total PM	Total PM_{10}	Total $PM_{2.5}$	CO	VOC	SO_2	NO_X	Lead	CO_2e
Potential Emissions from New Units									
Banbury Mixer #10	0.34	0.34	0.34	--	93.66	--	--	4.17E-04	--
Banbury Mixer #11	0.34	0.34	0.34	--	93.66	--	--	4.17E-04	--
Banbury Mixer #12	0.34	0.34	0.34	--	93.66	--	--	4.17E-04	--
RTO-1	0.48	0.48	0.48	5.34	0.35	0.04	6.36	3.18E-05	7,674
Total	*1.51*	*1.51*	*1.51*	*5.34*	*281.32*	*0.04*	*6.36*	*1.28E-03*	*7,674*
Potential Associated Emissions Increases									
Carbon Black Towers[a]	5.78	5.78	5.78	--	--	--	--	--	--
Surge Bins[a]	5.78	5.78	5.78	--	--	--	--	--	--
Calenders/Extruders	5.52E-04	5.52E-04	5.52E-04	--	6.96	--	--	--	--
Solvent Use	--	--	--	--	26.09	--	--	--	--
Curing	--	--	--	--	1130.76	--	--	--	--
Boilers	0.55	0.54	0.53	5.55	0.36	0.63	18.26	0.00	8028.06
Total	12.11	12.09	12.08	5.55	1164.18	0.63	18.26	0.00	8028.06
Contemporaneous Increases and Decreases									
Baseline Emissions from Decommissioned Units									
Banbury Mixer #2	2.04	2.04	2.04	--	2.59	--	--	2.03E-04	--
Banbury Mixer #3	2.10	2.10	2.10	--	2.67	--	--	2.09E-04	--
BB#2 Pelletizer	24.81	13.68	7.30	--	--	--	--	--	--
BB#3 Pelletizer	26.05	14.36	7.66	--	--	--	--	--	--
Potential Emissions from Contemporaneous Projects									
Slurry Mixer	2.04E-02	9.64E-03	1.46E-03	--	--	--	--	--	--
Extruder	1.61E-04	1.61E-04	1.61E-04	--	7.45E-02	--	--	--	--
Green Tire Spray	--	--	--	--	1.03	--	--	--	--
Aero Curing Presses	--	--	--	--	15.15	--	--	--	--
Total Project	13.6	13.6	13.6	10.9	1,445.5	0.7	24.6	1.3E-03	15,702
Contemporaneous Emission Changes	-55.0	-32.2	-19.1	0.0	11.0	0.0	0.0	-4.12E-04	0.0
Net Emission Increase	-41.4	-18.6	-5.5	10.9	1,456.5	0.7	24.6	9.1E-04	15,702
SER	25	15	10	100	40	40	40	0.6	75,000
Exceeds	No	No	No	No	**YES**	No	No	No	No

[a] Potential emissions increases from associated units includes increases associated with Banbury Mixers #10, #11, and #12.

Table 4. Banbury Mixer #2 (New Banbury Mixer #11) and Raw Material Parameters[a]

Non-Productive Mixing - % of total emitted		90 %
Banbury Dust Collector Efficiency		99 %
Assoc. Equipment Dust Collector Efficiency		98 %
Fly Loss for Associated Equipment		1 %
Throughput Compound Makeup		
Inner Liner	(RMA #1)	9 %
Plybelt	(RMA #2)	5 %
Belt Coat	(RMA #3)	13 %
Sidewall	(RMA #4)	12 %
Apex & Bead	(RMA #5)	14.5 %
Tread	(RMA #6)	46.5 %

Table 5. Past Actual Throughput for Banbury Mixer #2 and Associated Equipment[b]

Year	Total Mixer Rubber Throughput (lb/yr)	Banbury Mixer #2 Rubber Throughput (lb/yr)	Carbon Black Towers (tons/yr)	Carbon Black Towers associated with Banbury Mixer #2 (tons/yr)	Pounds of Pellets Transferred from Banbury Mixer #2 (lb/yr)	Total Surge Bins (tons/yr)	Surge Bins associated with Banbury Mixer #2 (tons/yr)
2006	839,483,328	67,460,348	33,745	2,712	67,460,348	33,745	2,712
2007	1,022,904,037	82,824,804	42,775	3,463	82,824,804	42,775	3,463
2008	944,692,017	83,683,042	37,392	3,312	83,683,042	37,392	3,312
2009	514,244,831	9,061,119	22,515	397	9,061,119	22,515	397
2010	821,199,374	62,717,396	36,098	2,757	62,717,396	36,098	2,757
2011	1,014,224,554	79,429,620	63,826	4,999	76,429,620	63,826	4,999
2012	888,896,944	66,424,216	58,248	4,353	66,424,216	58,248	4,353

Table 6. Potential Throughput for Associated Equipment[d]

	Banbury #11[c] (lb/yr)	Carbon Black Towers (ton/yr)	Surge Bins (ton/yr)
Potential Throughput	150,000,000	9,617	9,617

[a] Assumptions for parameters and compound makeup taken from facility-provided plant wide actual emission spreadsheets.
[b] Throughput data taken from plant wide actual emission spreadsheets from 2006 - 2012.
[c] Proposed Banbury #2 replacement (to be renamed Banbury #11) will increase the potential throughput to 150,000,000 lb/yr.
[d] Potential throughput for associated emissions is based on maximum average 24-month rolling throughput (2011-2012) and scaled with the Banbury Mixer #2 increase over past actual. The throughput shown represents only the throughput associated with Banbury Mixer #2 determined by Banbury Mixer #2 (lb/yr) divided by Total Throughput (lb/yr).

Sample Calculations

Potential Throughput for Carbon Black Towers
= Banbury Mixer #11 potential throughput (lb/yr) x Average throughput from 2011-2012 Carbon Black Throughput (tpy) ÷ Average Banbury Mixer#2 throughput from 2011-2012 (lb/yr)
=150,000,000 lb/yr x [(4,999+4,353)/2] tpy ÷ [(79,429,620+66,424,216)/2] lb/yr
=9,617

Table 7. Banbury Mixer #3 (new Banbury #12) and Raw Material Parameters [a]

Non-Productive Mixing - % of total emitted		90	%
Banbury Dust Collector Efficiency		99	%
Assoc. Equipment Dust Collector Efficiency		98	%
Fly Loss for Associated Equipment		1	%
Throughput Compound Makeup			
Inner Liner	(RMA #1)	9	%
Plybelt	(RMA #2)	5	%
Belt Coat	(RMA #3)	13	%
Sidewall	(RMA #4)	12	%
Apex & Bead	(RMA #5)	14.5	%
Tread	(RMA #6)	46.5	%

Table 8. Past Actual Throughput for Banbury Mixer #3 and Associated Equipment [b]

Year	Total Mixer Rubber Throughput (lb/yr)	Banbury Mixer #3 Rubber Throughput (lb/yr)	Carbon Black Towers (tons/yr)	Carbon Black Towers associated with Banbury Mixer #3 (tons/yr)	Pounds of Pellets Transferred from Banbury Mixer #3 (lb/yr)	Total Surge Bins (tons/yr)	Surge Bins associated with Banbury Mixer #3 (tons/yr)
2006	839,483,328	65,305,249	33,745	2,625	65,305,249	33,745	2,625
2007	1,022,904,037	82,325,573	42,775	3,443	82,325,573	42,775	3,443
2008	944,692,017	74,792,581	37,392	2,960	74,792,581	37,392	2,960
2009	514,244,831	47,548,694	22,515	2,082	47,548,694	22,515	2,082
2010	821,199,374	65,337,661	36,098	2,872	65,337,661	36,098	2,872
2011	1,014,224,554	74,851,797	63,826	4,710	74,851,797	63,826	4,710
2012	888,896,944	75,213,967	58,248	4,929	75,134,967	58,248	4,929

Table 9. Potential Throughputs for Associated Equipment [d]

	Banbury #12 [c] (lb/yr)	Carbon Black Towers (ton/yr)	Surge Bins (ton/yr)
Potential Throughput	150,000,000	9,635	9,635

[a] Assumptions for parameters and compound makeup taken from facility-provided plant wide actual emission spreadsheets.
[b] Throughput data taken from plant wide actual emission spreadsheets from 2006 - 2012.
[c] Proposed Banbury #3 replacement (to be renamed Banbury #12) will increase the potential throughput to 150,000,000 lb/yr.
[d] Potential throughput for associated emissions is based on maximum average 24-month rolling throughput (2007-2008) and scaled with the Banbury Mixer #3 increase over past actual. The throughput shown represents only the throughput associated with Banbury Mixer #3 determined by Banbury Mixer #3 (lb/yr) divided by Total Throughput (lb/yr).

<u>Sample Calculations</u>
Potential Throughput for Carbon Black Towers

= Banbury Mixer #12 potential throughput (lb/yr) x Average throughput from 2011-2012 Carbon Black Throughput (tpy) ÷ Average Banbury Mixer#3 throughput from 2011-2012 (lb/yr)

=150,000,000 lb/yr x [(4,710+4,929)/2] tpy ÷ [(74,851,797+75,213,967)/2] lb/yr

=9,635

Table 10. Banbury Mixer #10 and Raw Material Parameters [a]

Non-Productive Mixing - % of total emitted		90 %
Banbury Dust Collector Efficiency		99 %
Assoc. Equipment Dust Collector Efficiency		98 %
Fly Loss for Associated Equipment		1 %
Throughput Compound Makeup		
Inner Liner	(RMA #1)	9 %
Plybelt	(RMA #2)	5 %
Belt Coat	(RMA #3)	13 %
Sidewall	(RMA #4)	12 %
Apex & Bead	(RMA #5)	14.5 %
Tread	(RMA #6)	46.5 %

Table 11. Potential Throughputs for Associated Equipment [d]

	Banbury #10 [c] (lb/yr)	Carbon Black Towers (ton/yr)	Surge Bins (ton/yr)
Potential Throughput	150,000,000	9,635	9,635

[a] Assumptions for parameters and compound makeup taken from facility-provided plant wide actual emission spreadsheets.

[b] Throughput data taken from plant wide actual emission spreadsheets from 2006 - 2012.

[c] Proposed Banbury #10 has a potential throughput to 150,000,000 lb/yr.

[d] Potential throughput for units associated with Banbury #10 are calculated based on historical throughput for Banbury #3, a similarly sized mixer. The potential throughput for associated emissions is based on maximum average 24-month rolling throughput (2007-2008) and scaled with the Banbury Mixer #10 increase over past actual Banbury #3 throughput. The throughput shown represents only the throughput associated with Banbury Mixer #10.

Sample Calculations

Potential Throughput for Carbon Black Towers

= Banbury Mixer #10 potential throughput (lb/yr) x Average throughput from 2011-2012 Carbon Black Throughput (tpy) ÷ Average Banbury Mixer#3 throughput from 2011-2012 (lb/yr)

=150,000,000 lb/yr x [(4,710+4,929)/2] tpy ÷ [(74,851,797+75,213,967)/2] lb/yr

=9,635

Table 12. Banbury Emission Factors[a]

Pollutant	Emission Factor Cmpd #1 (Inner Liner) lb/lb rubber	Emission Factor Cmpd #2 (Ply Coat) lb/lb rubber	Emission Factor Cmpd #3 (Belt Coat) lb/lb rubber	Emission Factor Cmpd #4 (Sidewall) lb/lb rubber	Emission Factor Cmpd #5 (Apex) lb/lb rubber	Emission Factor Cmpd #6 (Tread) lb/lb rubber	Emission Factor X (9% Cmpd #1) lb/lb rubber	Emission Factor X (5% Cmpd #2) lb/lb rubber	Emission Factor X (13% Cmpd #3) lb/lb rubber	Emission Factor X (12% Sidewall Cmpd #4) lb/lb rubber	Emission Factor X (14.5% Cmpd #5) lb/lb rubber	Emission Factor X (46.5% Tread Cmpd #6) lb/lb rubber	Weighted Total Emission Factor lb/lb rubber
PM	1.75E-04	4.02E-04	9.00E-04	3.00E-04	9.25E-04	4.00E-04	1.58E-05	2.01E-05	1.17E-04	3.60E-05	1.34E-04	1.86E-04	5.09E-04
VOC	6.17E-05	3.91E-05	1.36E-04	3.88E-05	2.15E-04	3.86E-05	5.55E-06	1.96E-06	1.77E-05	4.66E-06	3.12E-05	1.80E-05	7.90E-05
HAP/TAP Pollutants													
Acetaldehyde	6.95E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.26E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.26E-08
Acetophenone	2.32E-06	2.13E-08	5.14E-08	3.75E-09	1.85E-08	7.67E-08	2.09E-07	1.07E-09	6.68E-09	4.50E-10	2.68E-09	3.56E-08	2.55E-07
Aniline	0.00E+00	4.80E-07	0.00E+00	4.30E-07	0.00E+00	9.97E-08	0.00E+00	2.40E-08	0.00E+00	5.16E-08	0.00E+00	4.64E-08	1.22E-07
Benzene	5.46E-08	4.62E-08	1.13E-07	1.14E-07	2.98E-07	0.00E+00	4.91E-09	2.31E-09	1.47E-08	1.37E-08	4.32E-08	0.00E+00	7.88E-08
Biphenyl	0.00E+00	0.00E+00	5.63E-08	5.42E-09	0.00E+00	1.17E-08	0.00E+00	0.00E+00	7.32E-09	6.50E-10	0.00E+00	5.46E-09	1.34E-08
Bromoform	2.78E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-08
Butadiene 1,3-	9.78E-08	0.00E+00	0.00E+00	2.17E-07	0.00E+00	0.00E+00	8.80E-09	0.00E+00	0.00E+00	2.60E-08	0.00E+00	0.00E+00	3.48E-08
Cadmium (Cd) Compounds	9.35E-09	2.40E-09	7.01E-09	2.55E-09	5.05E-09	2.18E-09	8.42E-10	1.20E-10	9.11E-10	3.06E-10	7.32E-10	1.01E-09	3.92E-09
Carbon Disulfide	0.00E+00	0.00E+00	0.00E+00	1.99E-07	1.84E-07	3.83E-06	0.00E+00	0.00E+00	0.00E+00	2.39E-08	2.67E-08	1.78E-06	1.83E-06
Carbon Tetrachloride	0.00E+00	0.00E+00	1.19E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.55E-08	0.00E+00	0.00E+00	0.00E+00	1.55E-08
Carbonyl Sulfide	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.34E-07	1.59E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.74E-08	7.41E-07	8.18E-07
Chromium (Cr) Compounds	3.18E-08	6.99E-09	5.91E-08	2.38E-08	2.72E-08	4.26E-09	2.86E-09	3.50E-10	7.68E-09	2.86E-09	3.94E-09	1.98E-09	1.97E-08
Cresol, o-	0.00E+00	0.00E+00	8.64E-08	8.34E-10	1.30E-08	6.00E-09	0.00E+00	0.00E+00	1.12E-08	1.00E-10	1.89E-09	2.79E-09	1.60E-08
Cumene	2.92E-09	0.00E+00	4.00E-09	1.67E-09	1.41E-09	1.21E-08	2.63E-10	0.00E+00	5.20E-10	2.00E-10	2.04E-10	5.62E-09	6.81E-09
Di(2-ethylhexyl)phthalate (DEHP)	3.91E-08	3.01E-08	1.19E-07	0.00E+00	2.29E-08	1.79E-07	3.52E-09	1.51E-09	1.55E-08	0.00E+00	3.32E-09	8.31E-08	1.07E-07
Dibutylphthalate	8.00E-08	1.61E-08	5.49E-08	0.00E+00	0.00E+00	1.50E-08	7.20E-09	8.05E-10	7.14E-09	0.00E+00	0.00E+00	6.96E-09	2.21E-08
Dichlorobenzene 1,4-	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dimethylphthalate	7.16E-09	1.05E-08	1.57E-08	1.56E-09	0.00E+00	0.00E+00	6.44E-10	5.25E-10	2.04E-09	1.87E-10	0.00E+00	0.00E+00	3.40E-09
Ethylbenzene	0.00E+00	1.45E-07	2.13E-07	1.17E-07	1.18E-07	2.43E-07	0.00E+00	7.25E-09	2.77E-08	1.40E-08	1.71E-08	1.13E-07	1.79E-07
Furans - Dibenzofurans	0.00E+00	2.11E-09	3.42E-08	1.41E-09	0.00E+00	3.31E-09	0.00E+00	1.06E-10	4.45E-09	1.69E-10	0.00E+00	1.54E-09	6.26E-09
Hexachlorobenzene	0.00E+00	0.00E+00	9.29E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-09	0.00E+00	0.00E+00	0.00E+00	1.21E-09
Hexane	8.24E-06	1.08E-06	1.58E-06	1.56E-06	5.91E-06	1.49E-06	7.42E-07	5.40E-08	2.05E-07	1.87E-07	8.57E-07	6.91E-07	2.74E-06
Hydroquinone	0.00E+00	0.00E+00	0.00E+00	8.10E-07	2.62E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.72E-08	3.80E-06	0.00E+00	3.90E-06
Isophorone	0.00E+00	6.63E-07	0.00E+00	5.93E-08	0.00E+00	0.00E+00	0.00E+00	3.32E-08	0.00E+00	7.12E-09	0.00E+00	0.00E+00	4.03E-08
Lead (Pb) Compounds	6.35E-09	3.24E-10	1.25E-08	3.42E-09	2.03E-08	0.00E+00	5.72E-10	1.62E-11	1.63E-09	4.10E-10	2.94E-09	0.00E+00	5.57E-09
Methyl chloride	0.00E+00	3.12E-08	0.00E+00	2.98E-08	0.00E+00	3.25E-07	0.00E+00	1.56E-09	0.00E+00	3.58E-09	0.00E+00	1.51E-07	1.56E-07
Methyl chloroform	0.00E+00	8.03E-08	3.19E-07	4.23E-08	1.84E-07	0.00E+00	0.00E+00	4.02E-09	4.15E-08	5.08E-09	2.67E-08	0.00E+00	7.72E-08
Methyl ethyl ketone	5.91E-06	1.59E-06	9.01E-07	2.74E-06	1.53E-06	4.40E-07	5.32E-07	7.95E-08	1.17E-07	3.29E-07	2.22E-07	2.05E-07	1.48E-06
Methyl isobutyl ketone	0.00E+00	1.97E-07	1.26E-05	1.49E-05	0.00E+00	3.06E-05	0.00E+00	9.85E-09	1.64E-06	1.79E-06	0.00E+00	1.42E-05	1.77E-05
Methylene Chloride	1.10E-06	9.51E-07	3.86E-05	1.86E-06	4.18E-07	2.49E-06	9.90E-08	4.76E-08	5.02E-06	2.23E-07	6.06E-08	1.16E-06	6.61E-06
Naphthalene	2.50E-08	3.33E-08	3.08E-07	1.73E-08	2.52E-07	5.11E-08	2.25E-09	1.67E-09	4.00E-08	2.08E-09	3.65E-08	2.37E-08	1.06E-07
Nickel (Ni) Compounds	4.92E-08	0.00E+00	9.53E-08	4.09E-08	2.47E-08	0.00E+00	4.43E-09	0.00E+00	1.24E-08	4.91E-09	3.58E-09	0.00E+00	2.53E-08
Phenol	7.21E-08	4.90E-08	2.77E-07	1.47E-08	7.61E-07	4.43E-08	6.49E-09	2.45E-09	3.60E-08	1.76E-09	1.10E-07	2.06E-08	1.78E-07
Styrene	0.00E+00	0.00E+00	0.00E+00	4.44E-08	0.00E+00	4.25E-06	0.00E+00	0.00E+00	0.00E+00	5.33E-09	0.00E+00	1.98E-06	1.98E-06
t-Butyl Methyl Ether	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethene	0.00E+00	4.10E-06	9.65E-08	6.59E-08	0.00E+00	1.01E-07	0.00E+00	2.05E-07	1.25E-08	7.91E-09	0.00E+00	4.72E-08	2.73E-07
Trimethylpentane 2,2,4-	8.95E-08	7.69E-07	2.87E-07	9.60E-08	1.03E-07	1.59E-07	8.06E-09	3.85E-08	3.73E-08	1.15E-08	1.49E-08	7.40E-08	1.84E-07
Toluene	1.65E-06	2.06E-06	2.11E-06	5.99E-07	1.73E-06	5.45E-07	1.49E-07	1.03E-07	2.74E-07	7.19E-08	2.51E-07	2.53E-07	1.10E-06
Toluidine, o-	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.23E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-07	1.04E-07
Vinyl Acetate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.35E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.41E-07	0.00E+00	3.41E-07
Vinylidene chloride	0.00E+00	0.00E+00	0.00E+00	5.47E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E-08	0.00E+00	0.00E+00	6.56E-08
Xylene, o-	9.60E-08	3.89E-07	3.20E-07	3.77E-07	1.52E-07	9.51E-07	8.64E-09	1.95E-08	4.16E-08	4.52E-08	2.20E-08	4.42E-07	5.79E-07
Xylene, p-	2.62E-07	5.79E-07	7.11E-07	5.15E-07	4.11E-07	0.00E+00	2.36E-08	2.90E-08	9.24E-08	6.18E-08	5.96E-08	0.00E+00	2.66E-07

[a] Emission factors taken from RMA emission factors.

Sample Calculations

Compound PM Emission Factor (lb/lb rubber) = PM Emission Factor for Compound #1 (lb/rubber) x % Compound Makeup
= 0.000175 x 8.8%
= 0.0000154

Total Emission Factor for PM (lb/lb rubber) = Compound #1 factor x % Compound #1 + Compound #2 factor x % Compound #2 + Compound #3 factor x % Compound #3 + Compound #4 factor x % Compound #4 + Compound #5 factor x % Compound #5
= 1.54E-05 + 5.15E-05 + 9.36E-05 + 4.59E-05 + 1.39E-04 + 6.01E-05 +4.05E-04
= 0.000405

Table 13. Baseline Actual $PM/PM_{10}/PM_{2.5}$ Emissions for Banbury Mixer #2 and Associated Equipment
January 2006 - December 2012

Year	Banbury Mixer #2 Emissions[a] (ton/yr)	Carbon Black Tower Emissions assoc. with Banbury Mixer #2 (ton/yr)[b]	Surge Bins Emissions assoc. with Banbury Mixer #2 (ton/yr)[b]	Total Associated Unit Emissions (ton/yr)	Total Baseline $PM/PM_{10}/PM_{2.5}$ Emissions[c] (ton/yr)
2006	0.15	0.54	0.54	1.08	1.24
2007	0.19	0.69	0.69	1.39	1.58
2008	0.19	0.66	0.66	1.32	1.52
2009	0.02	0.08	0.08	0.16	0.18
2010	0.14	0.55	0.55	1.10	1.25
2011	0.18	1.00	1.00	2.00	2.18
2012	0.15	0.87	0.87	1.74	1.89
				24-Month Total 2011 - 2012 (tons/yr)	**4.07**
				Total PM Baseline Emissions (ton/yr)	**2.04**

[a] Non-Productive Banbury PM Emissions = throughput (lb)x weighted RMA Factor (lb PM/lb rubber) x Non-Productive Ratio (90%) x (1- dust collector efficiency(%))

[b] Associated equipment PM Emissions = associated equipment throughput (tpy) x (1-Control Device efficiency(%)) x Flyloss (1%)

[c] PM_{10} and $PM_{2.5}$ emissions are equal to PM emissions.

Table 14. Baseline Actual VOC Emissions for Banbury Mixer #2
January 2006 - December 2012

Year	Banbury #2 Mixer Emissions[d,e] Total (lbs/yr)	Total (tons/yr)
2006	4,795.47	2.40
2007	5,887.67	2.94
2008	5,948.68	2.97
2009	644.12	0.32
2010	4,458.32	2.23
2011	5,646.32	2.82
2012	4,721.82	2.36
24-Month Total 2011 - 2012 (tons/yr)		5.18
Baseline Emissions (ton/yr)[f]		2.59

[d] The Banbury Mixer is the only source of VOC emissions, no associated equipment emits VOC.

[e] Non-Productive Banbury VOC Emissions = (throughput (lb) x weighted average RMA Factor(lb/lb rubber) x Non-Productive Ratio (90%)

[f] Assumes Banbury Mixer No. 2 did not previously process coupling agent (i.e., there are no past actual VOC emissions from the coupling agent use).

Table 15. Pelletizer Emission Factors

Pollutant	Emission Factors		
	Shaker Cooler (lb/lb)	Dump Sink (lb/lb)	Airveyor (lb/lb)
PM [g]	6.85E-04	9.35E-06	4.13E-07
PM_{10} [g]	3.77E-04	5.80E-06	2.15E-07
$PM_{2.5}$ [h]	2.01E-04	3.10E-06	1.15E-07

[g] Emission factors for pelletizers from stack testing conducted in April 2000 for PM and PM_{10}.

[h] $PM_{2.5}$ emissions are conservatively estimated based on the ratio of $PM_{2.5}$ to PM_{10} emissions for talc mills, as provided in AP-42, Appendix B-1.

Table 16. Baseline Actual PM/PM_{10}/$PM_{2.5}$ Emissions for Banbury Mixer #2 Pelletizer
January 2006 - December 2012

Year	Pounds of Pellets Transferred from Banbury Mixer #2 (lb/yr)	Shaker Cooler Emissions			Dump Sink Emissions			Airveyor Emissions		
		PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
2006	67,460,348	23.11	12.72	6.79	0.32	0.20	0.10	0.01	0.01	0.00
2007	82,824,804	28.37	15.61	8.33	0.39	0.24	0.13	0.02	0.01	0.00
2008	83,683,042	28.66	15.77	8.42	0.39	0.24	0.13	0.02	0.01	0.00
2009	9,061,119	3.10	1.71	0.91	0.04	0.03	0.01	0.00	0.00	0.00
2010	62,717,396	21.48	11.82	6.31	0.29	0.18	0.10	0.01	0.01	0.00
2011	76,429,620	26.18	14.41	7.69	0.36	0.22	0.12	0.02	0.01	0.00
2012	66,424,216	22.75	12.52	6.68	0.31	0.19	0.10	0.01	0.01	0.00
24-Month Total 2011 - 2012 (tons/yr)		**48.93**	**26.93**	**14.37**	**0.67**	**0.41**	**0.22**	**0.03**	**0.02**	**0.01**
Total Baseline Emissions (ton/yr)		**24.46**	**13.46**	**7.19**	**0.33**	**0.21**	**0.11**	**0.01**	**0.01**	**0.00**

Table 17. Past Actual $PM/PM_{10}/PM_{2.5}$ Emissions for Banbury Mixer #3 and Associated Equipment
January 2006 - December 2012

Year	Banbury Mixer #3 Emissions[a] (ton/yr)	Carbon Black Tower Emissions assoc. with Banbury Mixer #3 (ton/yr)[b]	Surge Bins Emissions assoc. with Banbury Mixer #3 (ton/yr)[b]	Total Associated Unit Emissions (ton/yr)	Total Baseline $PM/PM_{10}/PM_{2.5}$ Emissions[c] (ton/yr)
2006	0.15	0.53	0.53	1.05	1.20
2007	0.19	0.69	0.69	1.38	1.57
2008	0.17	0.59	0.59	1.18	1.36
2009	0.11	0.42	0.42	0.83	0.94
2010	0.15	0.57	0.57	1.15	1.30
2011	0.17	0.94	0.94	1.88	2.06
2012	0.17	0.99	0.99	1.97	2.14
				24-Month Total 2011 - 2012 (tons/yr)	**4.20**
				Total PM Baseline Emissions (ton/yr)	**2.10**

[a] Non-Productive Banbury PM Emissions = throughput (lb)x weighted RMA Factor (lb PM/lb rubber) x Non-Productive Ratio (90%) x (1- dust collector efficiency(%))

[b] Associated equipment PM Emissions = associated equipment throughput (tpy) x (1-Control Device efficiency(%)) x Flyloss (1%)

[c] PM_{10} and $PM_{2.5}$ emissions are equal to PM emissions.

Table 18. Baseline Actual VOC Emissions for Banbury Mixer #3
January 2006 - December 2012

	Banbury #3 Mixer Emissions [d,e]	
Year	Total (lbs/yr)	Total (tons/yr)
2006	4,642.28	2.32
2007	5,852.18	2.93
2008	5,316.69	2.66
2009	3,380.04	1.69
2010	4,644.58	2.32
2011	5,320.90	2.66
2012	5,346.65	2.67
24-Month Total 2011 - 2012 (tons/yr)		5.33
Baseline Emissions (ton/yr) [f]		2.67

[d] The Banbury Mixer is the only source of VOC emissions, no associated equipment emits VOC.

[e] Non-Productive Banbury VOC Emissions = (throughput (lb) x weighted average RMA Factor(lb/lb rubber) x Non-Productive Ratio (90%)

[f] Assumes Banbury mixer did not previously process the coupling agent (i.e., there are no past actual VOC emissions from the coupling agent use).

Table 19. Pelletizer Emission Factors

Pollutant	Emission Factors: Shaker Cooler (lb/lb)	Dump Sink (lb/lb)	Airveyor (lb/lb)
PM [g]	6.85E-04	9.35E-06	4.13E-07
PM_{10} [g]	3.77E-04	5.80E-06	2.15E-07
$PM_{2.5}$ [f]	2.01E-04	3.10E-06	1.15E-07

[g] Emission factors for pelletizers from stack testing conducted in April 2000 for PM and PM_{10}.

[h] $PM_{2.5}$ emissions are conservatively estimated based on the ratio of $PM_{2.5}$ to PM_{10} emissions for talc mills, as provided in AP-42, Appendix B-1.

Table 20. Baseline Actual PM/PM_{10}/$PM_{2.5}$ Emissions for Banbury Mixer #3 Pelletizer
January 2006 - December 2012

Year	Pounds of Pellets Transferred from Banbury Mixer #3 (lb/yr)	Shaker Cooler Emissions PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Dump Sink Emissions PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	Airveyor Emissions PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
2006	65,305,249	22.37	12.31	6.57	0.31	0.19	0.10	0.01	0.01	0.00
2007	82,325,573	28.20	15.52	8.28	0.38	0.24	0.13	0.02	0.01	0.00
2008	74,792,581	25.62	14.10	7.52	0.35	0.22	0.12	0.02	0.01	0.00
2009	47,548,694	16.29	8.96	4.78	0.22	0.14	0.07	0.01	0.01	0.00
2010	65,337,661	22.38	12.32	6.57	0.31	0.19	0.10	0.01	0.01	0.00
2011	74,851,797	25.64	14.11	7.53	0.35	0.22	0.12	0.02	0.01	0.00
2012	75,134,967	25.73	14.16	7.56	0.35	0.22	0.12	0.02	0.01	0.00
24-Month Total 2011 - 2012 (tons/yr)		**51.37**	**28.27**	**15.09**	**0.70**	**0.43**	**0.23**	**0.03**	**0.02**	**0.01**
Total Baseline Emissions (ton/yr)		**25.69**	**14.14**	**7.54**	**0.35**	**0.22**	**0.12**	**0.02**	**0.01**	**0.00**

Table 27. Banbury #10 Coupling Agent Parameters

			Notes:
Potential Banbury #10 Rubber Throughput	150,000,000	lb/yr	
High Temperature Coupling Agent Emissions			Drop Temps greater than 300 F
Liquid Coupling Agent			
Maximum Usage Rate	0.024	lb coupling agent/lb rubber	Based on proposed rubber batches
Maximum Usage	3,600,000	lb coupling agent/yr	
VOC Content	0.388	lb VOC/lb coupling agent	
Potential Uncontrolled VOC Emissions	698.40	tpy	
Solid Coupling Agent			
Maximum Usage Rate	0.048	lb coupling agent/lb rubber	Solid agent is 50% strength, but 2X dosing
Maximum Usage	7,200,000	lb coupling agent/yr	
VOC Content	0.194	lb VOC/lb coupling agent	
Potential Uncontrolled VOC Emissions	698.40	tpy	
Rubber Mixing VOC Emissions			
RMA VOC Emission Factor	7.90E-05	lb/lb	Accounts for VOCs in productive & non-productive rubl
Potential Uncontrolled VOC Emissions	5.92	tpy	
Combined Potential Uncontrolled VOC Emissions	704.32	tpy	
Low Temperature Coupling Agent Emissions			Drop Temps between 250 and 300 F
Liquid Coupling Agent			
Maximum Usage Rate	0.0195	lb coupling agent/lb rubber	Based on current rubber batches
Maximum Usage	2,925,000	lb coupling agent/yr	
VOC Content	0.342	lb VOC/lb coupling agent	
Potential Uncontrolled VOC Emissions	500.18	tpy	
Solid Coupling Agent			
Maximum Usage Rate	0.039	lb coupling agent/lb rubber	Solid agent is 50% strength, but 2X dosing
Maximum Usage	5,850,000	lb coupling agent/yr	
VOC Content	0.171	lb VOC/lb coupling agent	
Potential Uncontrolled VOC Emissions	500.18	tpy	
Rubber Mixing VOC Emissions			
RMA VOC Emission Factor	7.90E-05	lb/lb	Accounts for VOCs in productive & non-productive rubl
Potential Uncontrolled VOC Emissions	5.92	tpy	
Combined Potential Uncontrolled VOC Emissions	506.10	tpy	
Low Temperature Coupling Agent Emissions Profile			
Percent VOC Emission Released in Mixing	25	%	
Percent VOC Emission Released in Curing	75	%	
High Temperature Coupling Agent Emissions Profile			
Percent VOC Emission from Mixing	75	%	
Percent VOC Emission from Curing	25	%	
Mixing Capture Efficiency	84	%	
RTO Control Efficiency	98	%	
Hours of Operation	8,760	hr/yr	

Table 28. VOC Emissions from Banbury Mixer #10 Coupling Agent Usage

		Low Temperature Coupling Agent				High Temperature Coupling Agent			
		Uncontrolled Emissions		Controlled Emissions		Uncontrolled Emissions		Controlled Emissions	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Mixing	Ethanol[a]	28.55	125.04	5.05	22.11	119.59	523.80	21.14	92.61
	Mixing VOC[b]	1.35	5.92	0.24	1.05	1.35	5.92	0.24	1.05
	MIXING TOTAL	***29.90***	***130.97***	***5.29***	***23.16***	***120.94***	***529.72***	***21.38***	***93.66***
Curing	Ethanol[a]	85.65	375.13	85.65	375.13	39.86	174.60	39.86	174.60
Total	**Total VOC**	**115.55**	**506.10**	**90.93**	**398.29**	**160.80**	**704.32**	**61.25**	**268.26**

[a] Ethanol emissions resulting from coupling agent ethanol content
[b] VOC emissions based on RMA VOC emission factors

Sample Calculations

Uncontrolled Coupling Agent VOC Emissions (tpy) = Potential Rubber Throughput (lb/yr) x Coupling Agent Usage Rate (lb coupling agent/lb rubber) x VOC Content (lb VOC/lb coupling agent) x 1/2,000 (lb/ton)

Uncontrolled Mixing VOC Emissions (tpy) = Potential Rubber Throughput (lb/yr) x RMA VOC Emission Factor (lb VOC/lb rubber) x 1/2,000 (lb/ton)

Combined Potential Uncontrolled VOC Emissions (tpy) = Uncontrolled Coupling Agent Emissions (tpy) + Uncontrolled Mixing Emissions (tpy)

Uncontrolled Mixing Emissions (tpy) = Combined Potential Uncontrolled VOC Emissions (tpy) x Percent VOC Emissions from Mixing (%) x RTO Mixing Capture Efficiency (%) x [1 - RTO Control Efficiency (%)]

Controlled Mixing Emissions (tpy) = Uncontrolled Mixing Emissions (tpy) x {[1 - Mixing Capture Efficiency (%)] + Mixing Capture Efficiency (%) x [1 - RTO Control Efficiency (%)]}

Table 29. Potential Emissions for Banbury Mixer #10 and Associated Equipment

Pollutant	Banbury Mixer #10 (ton/yr)	Carbon Black Towers (ton/yr)	Surge Bins (ton/yr)
$PM/PM_{10}/PM_{2.5}$[a,b,c]	0.34	1.93	1.93
VOC[d]	93.66	--	--

Table 29A

Phase 1	Phase 2	Project
NUE [e, f] Banbury Mixer #6A (ton/yr)	**(ton/yr)**	**(ton/yr)**
34.4	**68.7**	**103.1**

[a] Non-Productive Banbury PM Emissions = Potential Throughput (lb) x Weighted RMA Factor(lb/lb rubber) x Non-Productive Ratio (90%) x (1 - dust collector efficiency(%))
[b] Potential PM Actuals for Associated Equipment = associated equipment throughput (tpy) x (1-Control Device efficiency(%)) x Flyloss (1%)
[c] PM_{10} and $PM_{2.5}$ emissions are equal to PM emissions.
[d] Non-Productive Banbury VOC Emissions = Potential Throughput (lb) x Weighted RMA Factor(lb/lb rubber) x Non-Productive Ratio (90%)
[e] **Non-Productive Banbury PM Emissions = Potential Throughput (lb) x Weighted RMA Factor(lb/lb rubber)**

Table 21. Banbury #11 Coupling Agent Parameters

			Notes:
Potential Banbury #11 Rubber Throughput	150,000,000	lb/yr	
High Temperature Coupling Agent Emissions			Drop Temps greater than 300 F
Liquid Coupling Agent			
Maximum Usage Rate	0.024	lb coupling agent/lb rubber	Based on proposed rubber batches
Maximum Usage	3,600,000	lb coupling agent/yr	
VOC Content	0.388	lb VOC/lb coupling agent	
Potential Uncontrolled VOC Emissions	698.40	tpy	
Solid Coupling Agent			
Maximum Usage Rate	0.048	lb coupling agent/lb rubber	Solid agent is 50% strength, but 2X dosing
Maximum Usage	7,200,000	lb coupling agent/yr	
VOC Content	0.194	lb VOC/lb coupling agent	
Potential Uncontrolled VOC Emissions	698.40	tpy	
Rubber Mixing VOC Emissions			
RMA VOC Emission Factor	7.90E-05	lb/lb	Accounts for VOCs in productive & non-productive ru
Potential Uncontrolled VOC Emissions	5.92	tpy	
Combined Potential Uncontrolled VOC Emissions	704.32	tpy	
Low Temperature Coupling Agent Emissions			Drop Temps between 250 and 300 F
Liquid Coupling Agent			
Maximum Usage Rate	0.0195	lb coupling agent/lb rubber	Based on current rubber batches
Maximum Usage	2,925,000	lb coupling agent/yr	
VOC Content	0.342	lb VOC/lb coupling agent	
Potential Uncontrolled VOC Emissions	500.18	tpy	
Solid Coupling Agent			
Maximum Usage Rate	0.039	lb coupling agent/lb rubber	Solid agent is 50% strength, but 2X dosing
Maximum Usage	5,850,000	lb coupling agent/yr	
VOC Content	0.171	lb VOC/lb coupling agent	
Potential Uncontrolled VOC Emissions	500.18	tpy	
Rubber Mixing VOC Emissions			
RMA VOC Emission Factor	7.90E-05	lb/lb	Accounts for VOCs in productive & non-productive ru
Potential Uncontrolled VOC Emissions	5.92	tpy	
Combined Potential Uncontrolled VOC Emissions	506.10	tpy	
Low Temperature Coupling Agent Emissions Profile			
Percent VOC Emission Released in Mixing	25	%	
Percent VOC Emission Released in Curing	75	%	
High Temperature Coupling Agent Emissions Profile			
Percent VOC Emission from Mixing	75	%	
Percent VOC Emission from Curing	25	%	
Mixing Capture Efficiency	84	%	
RTO Control Efficiency (High Temp Coupling Agent)	98	%	
Hours of Operation	8,760	hr/yr	

Table 22. VOC Emissions from Banbury Mixer #11 Coupling Agent Usage

		Low Temperature Coupling Agent				High Temperature Coupling Agent			
		Uncontrolled Emissions		Controlled Emissions		Uncontrolled Emissions		Controlled Emissions	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Mixing	Ethanol[a]	28.55	125.04	5.05	22.11	119.59	523.80	21.14	92.61
	Mixing VOC[b]	1.35	5.92	0.24	1.05	1.35	5.92	0.24	1.05
	MIXING TOTAL	***29.90***	***130.97***	5.29	***23.16***	***120.94***	***529.72***	***21.38***	***93.66***
Curing	Ethanol[a]	85.65	375.13	85.65	375.13	39.86	174.60	39.86	174.60
Total	**Total VOC**	**115.55**	**506.10**	90.93	**398.29**	**160.80**	**704.32**	**61.25**	**268.26**

[a] Ethanol emissions resulting from coupling agent ethanol content
[b] VOC emissions based on RMA VOC emission factors

<u>Sample Calculations</u>

Uncontrolled Coupling Agent VOC Emissions (tpy) = Potential Rubber Throughput (lb/yr) x Coupling Agent Usage Rate (lb coupling agent/lb rubber) x VOC Content (lb VOC/lb coupling agent) x 1/2,000 (lb/ton)

Uncontrolled Mixing VOC Emissions (tpy) = Potential Rubber Throughput (lb/yr) x RMA VOC Emission Factor (lb VOC/lb rubber) x 1/2,000 (lb/ton)

Combined Potential Uncontrolled VOC Emissions (tpy) = Uncontrolled Coupling Agent Emissions (tpy) + Uncontrolled Mixing Emissions (tpy)

Uncontrolled Mixing Emissions (tpy) = Combined Potential Uncontrolled VOC Emissions (tpy) x Percent VOC Emissions from Mixing (%) x RTO Mixing Capture Efficiency (%) x [1 - RTO Control Efficiency (%)]

Controlled Mixing Emissions (tpy) = Uncontrolled Mixing Emissions (tpy) x {[1 - Mixing Capture Efficiency (%)] + Mixing Capture Efficiency (%) x [1 - RTO Control Efficiency (%)]}

Table 23. Potential Emissions for Banbury Mixer #11 and Associated Equipment

Pollutant	Banbury Mixer #11 (ton/yr)	Carbon Black Towers (ton/yr)	Surge Bins (ton/yr)
$PM/PM_{10}/PM_{2.5}$[a,b,c]	0.34	1.92	1.92
VOC[d]	93.66	--	--

[a] Non-Productive Banbury PM Emissions = Potential Throughput (lb) x Weighted RMA Factor(lb/lb rubber) x Non-Productive Ratio (90%) x (1 - dust collector efficiency(%))
[b] Potential PM Actuals for Associated Equipment = associated equipment throughput (tpy) x (1-Control Device efficiency(%)) x Flyloss (1%)
[c] PM_{10} and $PM_{2.5}$ emissions are equal to PM emissions.
[d] Non-Productive Banbury VOC Emissions = Potential Throughput (lb) x Weighted RMA Factor(lb/lb rubber) x Non-Productive Ratio (90%)

Table 24. Banbury #12 Coupling Agent Parameters

Parameter	Value	Units	Notes
Potential Banbury #12 Rubber Throughput	150,000,000	lb/yr	Notes:
High Temperature Coupling Agent Emissions			Drop Temps greater than 300 F
Liquid Coupling Agent			
Maximum Usage Rate	0.024	lb coupling agent/lb rubber	Based on proposed rubber batches
Maximum Usage	3,600,000	lb coupling agent/yr	
VOC Content	0.388	lb VOC/lb coupling agent	
Potential Uncontrolled VOC Emissions	698.40	tpy	
Solid Coupling Agent			
Maximum Usage Rate	0.048	lb coupling agent/lb rubber	Solid agent is 50% strength, but 2X dosing
Maximum Usage	7,200,000	lb coupling agent/yr	
VOC Content	0.194	lb VOC/lb coupling agent	
Potential Uncontrolled VOC Emissions	698.40	tpy	
Rubber Mixing VOC Emissions			
RMA VOC Emission Factor	7.90E-05	lb/lb	Accounts for VOCs in productive & non-productive rubl
Potential Uncontrolled VOC Emissions	5.92	tpy	
Combined Potential Uncontrolled VOC Emissions	704.32	tpy	
Low Temperature Coupling Agent Emissions			Drop Temps between 250 and 300 F
Liquid Coupling Agent			
Maximum Usage Rate	0.0195	lb coupling agent/lb rubber	Based on current rubber batches
Maximum Usage	2,925,000	lb coupling agent/yr	
VOC Content	0.342	lb VOC/lb coupling agent	
Potential Uncontrolled VOC Emissions	500.18	tpy	
Solid Coupling Agent			
Maximum Usage Rate	0.039	lb coupling agent/lb rubber	Solid agent is 50% strength, but 2X dosing
Maximum Usage	5,850,000	lb coupling agent/yr	
VOC Content	0.171	lb VOC/lb coupling agent	
Potential Uncontrolled VOC Emissions	500.18	tpy	
Rubber Mixing VOC Emissions			
RMA VOC Emission Factor	7.90E-05	lb/lb	Accounts for VOCs in productive & non-productive rubl
Potential Uncontrolled VOC Emissions	5.92	tpy	
Combined Potential Uncontrolled VOC Emissions	506.10	tpy	
Low Temperature Coupling Agent Emissions Profile			
Percent VOC Emission Released in Mixing	25	%	
Percent VOC Emission Released in Curing	75	%	
High Temperature Coupling Agent Emissions Profile			
Percent VOC Emission from Mixing	75	%	
Percent VOC Emission from Curing	25	%	
Mixing Capture Efficiency	84	%	
RTO Control Efficiency	98	%	
Hours of Operation	8,760	hr/yr	

Table 25. VOC Emissions from Banbury Mixer #12 Coupling Agent Usage

		Low Temperature Coupling Agent				**High Temperature Coupling Agent**			
		Uncontrolled Emissions		**Controlled Emissions**		**Uncontrolled Emissions**		**Controlled Emissions**	
		lb/hr	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**
Mixing	Ethanol[a]	28.55	125.04	5.05	22.11	119.59	523.80	21.14	92.61
	Mixing VOC[b]	1.35	5.92	0.24	1.05	1.35	5.92	0.24	1.05
	MIXING TOTAL	***29.90***	***130.97***	***5.29***	***23.16***	***120.94***	***529.72***	***21.38***	***93.66***
Curing	Ethanol[a]	85.65	375.13	85.65	375.13	39.86	174.60	39.86	174.60
Total	**Total VOC**	**115.55**	**506.10**	**90.93**	**398.29**	**160.80**	**704.32**	**61.25**	**268.26**

[a] Ethanol emissions resulting from coupling agent ethanol content
[b] VOC emissions based on RMA VOC emission factors

Sample Calculations

Uncontrolled Coupling Agent VOC Emissions (tpy) = Potential Rubber Throughput (lb/yr) x Coupling Agent Usage Rate (lb coupling agent/lb rubber) x VOC Content (lb VOC/lb coupling agent) x 1/2,000 (lb/ton)

Uncontrolled Mixing VOC Emissions (tpy) = Potential Rubber Throughput (lb/yr) x RMA VOC Emission Factor (lb VOC/lb rubber) x 1/2,000 (lb/ton)

Combined Potential Uncontrolled VOC Emissions (tpy) = Uncontrolled Coupling Agent Emissions (tpy) + Uncontrolled Mixing Emissions (tpy)

Uncontrolled Mixing Emissions (tpy) = Combined Potential Uncontrolled VOC Emissions (tpy) x Percent VOC Emissions from Mixing (%) x RTO Mixing Capture Efficiency (%) x [1 - RTO Control Efficiency (%)]

Controlled Mixing Emissions (tpy) = Uncontrolled Mixing Emissions (tpy) x {[1 - Mixing Capture Efficiency (%)] + Mixing Capture Efficiency (%) x [1 - RTO Control Efficiency (%)]}

Table 26. Potential Emissions for Banbury Mixer #12 and Associated Equipment

Pollutant	**Banbury Mixer #12 (ton/yr)**	**Carbon Black Towers (ton/yr)**	**Surge Bins (ton/yr)**
$PM/PM_{10}/PM_{2.5}$[a,b,c]	0.34	1.93	1.93
VOC[d]	93.66	--	--

[a] Non-Productive Banbury PM Emissions = Potential Throughput (lb) x Weighted RMA Factor(lb/lb rubber) x Non-Productive Ratio (90%) x (1 - dust collector efficiency(%))
[b] Potential PM Actuals for Associated Equipment = associated equipment throughput (tpy) x (1-Control Device efficiency(%)) x Flyloss (1%)
[c] PM_{10} and $PM_{2.5}$ emissions are equal to PM emissions.
[d] Non-Productive Banbury VOC Emissions = Potential Throughput (lb) x Weighted RMA Factor(lb/lb rubber) x Non-Productive Ratio (90%)

Table 30. RTO-1 Parameters

Maximum Heat Input	15	MMBtu/hr
Hours of Operation	8,760	hours
Heating Value of Natural Gas	1,034	Btu/CF
Projected Actual Natural Gas Usage	127,141	MCF/yr
PM Control Efficiency	0.00	%

Table 31. RTO-1 Criteria Pollutant Summary

Pollutant	Emission Factor [a] (lb/MMCF)	Projected Actual Emissions (lb/hr)	(tpy)
PM [b]	7.6	0.110	0.48
PM_{10} [b]	7.6	0.110	0.48
$PM_{2.5}$ [b]	7.6	0.110	0.48
SO_2	0.6	0.009	0.04
NOx	100	1.451	6.36
VOC	5.5	0.080	0.35
CO	84	1.219	5.34
CO_2e [c]	--	1,752.04	7,674

Table 32. RTO-1 Toxic/Hazardous Air Pollutant Summary

Pollutant	Emission Factor [a] (lb/MMCF)	Projected Actual Emissions (lb/yr)	(tpy)
2-Methylnapthalene*	2.40E-05	3.48E-07	1.53E-06
3-Methylchloranthrene*	1.80E-06	2.61E-08	1.14E-07
7,12-Dimethylben(a)anthrancene*	1.60E-05	2.32E-07	1.02E-06
Acenaphthene*	1.80E-06	2.61E-08	1.14E-07
Acenphthylene*	1.80E-06	2.61E-08	1.14E-07
Anthracene*	2.40E-06	3.48E-08	1.53E-07
Arsenic	2.00E-04	2.90E-06	1.27E-05
Benz(a)anthracene*	1.80E-06	2.61E-08	1.14E-07
Benzene	2.10E-03	3.05E-05	1.33E-04
Benzo(a)pyrene*	1.20E-06	1.74E-08	7.63E-08
Benzo(b)fluoranthene*	1.80E-06	2.61E-08	1.14E-07
Benzo(g,h,i)perylene*	1.20E-06	1.74E-08	7.63E-08
Benzo(k)fluoranthene*	1.80E-06	2.61E-08	1.14E-07
Beryllium	1.20E-05	1.74E-07	7.63E-07
Cadmium	1.10E-03	1.60E-05	6.99E-05
Chromium	1.40E-03	2.03E-05	8.90E-05
Chrysene*	1.80E-06	2.61E-08	1.14E-07
Cobalt	8.40E-05	1.22E-06	5.34E-06
Dibenzo(a,h)anthracene*	1.20E-06	1.74E-08	7.63E-08
Dichlorobenzene	1.20E-03	1.74E-05	7.63E-05
Fluoranthene*	3.00E-06	4.35E-08	1.91E-07
Fluorene*	2.80E-06	4.06E-08	1.78E-07
Formaldehyde	7.50E-02	1.09E-03	4.77E-03
n-Hexane	1.80E+00	2.61E-02	1.14E-01
Indeno(1,2,3-cd)pyrene*	1.80E-06	2.61E-08	1.14E-07
Lead	5.00E-04	7.26E-06	3.18E-05
Manganese	3.80E-04	5.52E-06	2.42E-05
Mercury	2.60E-04	3.77E-06	1.65E-05
Naphthalene	6.10E-04	8.85E-06	3.88E-05
Nickel	2.10E-03	3.05E-05	1.33E-04
Phenanathrene*	1.70E-05	2.47E-07	1.08E-06
Pyrene*	5.00E-06	7.26E-08	3.18E-07
Selenium	2.40E-05	3.48E-07	1.53E-06
Toluene	3.40E-03	4.93E-05	2.16E-04
Polycyclic Organic Matter (POM) [d]	--	4.19E-05	1.83E-04
Greenhouse Gas Pollutants			
CO_2	120,000	1.74E+03	7.63E+03
CH_4	2.3	3.42E-02	1.50E-01
N_2O	2.2	3.20E-02	1.40E-01

[a] Emission factors are from AP-42, 5th Edition, Section 1.4, 7/98.
[b] Particulate matter from natural gas combustion has been estimated to be less than one micrometer in size.
[c] CO_2e calculations based on global warming potential of 1 for CO_2, 25 for CH_4, and 298 for N_2O, from 40 CFR Subpart 98, Table A-1 (Nov 29
[d] POM emissions are comprised of multiple pollutant emissions (denoted with astrisk); therefore, no single emission factor is included for POM.

Table 33. Banbury Mixers #2, #3, and #10 HAP/TAP Emissions Summary

Pollutant	Weighted Total Emission Factor lb/lb rubber	Potential Emissions lb/hr	tpy
Acetaldehyde	6.26E-08	3.21E-03	1.41E-02
Acetophenone	2.55E-07	1.31E-02	5.74E-02
Aniline	1.22E-07	6.27E-03	2.74E-02
Benzene	7.88E-08	4.05E-03	1.77E-02
Biphenyl	1.34E-08	6.90E-04	3.02E-03
Bromoform	2.50E-08	1.29E-03	5.63E-03
Butadiene 1,3-	3.48E-08	1.79E-03	7.84E-03
Cadmium (Cd) Compounds	3.92E-09	2.02E-04	8.83E-04
Carbon Disulfide	1.83E-06	9.41E-02	4.12E-01
Carbon Tetrachloride	1.55E-08	7.95E-04	3.48E-03
Carbonyl Sulfide	8.18E-07	4.20E-02	1.84E-01
Chromium (Cr) Compounds	1.97E-08	1.01E-03	4.43E-03
Cresol, o-	1.60E-08	8.22E-04	3.60E-03
Cumene	6.81E-09	3.50E-04	1.53E-03
Di(2-ethylhexyl)phthalate (DEHP)	1.07E-07	5.49E-03	2.41E-02
Dibutylphthalate	2.21E-08	1.14E-03	4.97E-03
Dichlorobenzene 1,4-	0.00E+00	0.00E+00	0.00E+00
Dimethylphthalate	3.40E-09	1.75E-04	7.64E-04
Ethylbenzene	1.79E-07	9.20E-03	4.03E-02
Furans - Dibenzofurans	6.26E-09	3.21E-04	1.41E-03
Hexachlorobenzene	1.21E-09	6.20E-05	2.72E-04
Hexane	2.74E-06	1.41E-01	6.16E-01
Hydroquinone	3.90E-06	2.00E-01	8.77E-01
Isophorone	4.03E-08	2.07E-03	9.06E-03
Lead (Pb) Compounds	5.57E-09	2.86E-04	1.25E-03
Methyl chloride	1.56E-07	8.04E-03	3.52E-02
Methyl chloroform	7.72E-08	3.97E-03	1.74E-02
Methyl ethyl ketone	1.48E-06	7.62E-02	3.34E-01
Methyl isobutyl ketone	1.77E-05	9.08E-01	3.98E+00
Methylene Chloride	6.61E-06	3.39E-01	1.49E+00
Naphthalene	1.06E-07	5.46E-03	2.39E-02
Nickel (Ni) Compounds	2.53E-08	1.30E-03	5.69E-03
Phenol	1.78E-07	9.13E-03	4.00E-02
Styrene	1.98E-06	1.02E-01	4.46E-01
t-Butyl Methyl Ether	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethene	2.73E-07	1.40E-02	6.13E-02
Trimethylpentane 2,2,4-	1.84E-07	9.47E-03	4.15E-02
Toluene	1.10E-06	5.66E-02	2.48E-01
Toluidine, o-	1.04E-07	5.33E-03	2.33E-02
Vinyl Acetate	3.41E-07	1.75E-02	7.67E-02
Vinylidene chloride	6.56E-08	3.37E-03	1.48E-02
Xylene, o-	5.79E-07	2.98E-02	1.30E-01
Xylene, p-	2.66E-07	1.37E-02	5.99E-02

Non-Productive Banbury HAP/TAP Emissions = Projected Throughput (lb) x Weighted RMA Factor(lb/lb rubber) x Non-Productive Ratio (90%)

Calendering and Extruding

Increase in productive rubber	39,511,280	lb/yr
BB non-prod./prod. mix ratio[a]	1.74	

Color Code
- Extruded stock
- Calendered stock

Mill Emission Estimates:		
HFE		
# HFE Barrels with Mills	7	
Total # HFE Mills	22	
Avg # mill passes/HFE	3.14	
Total Extruder Productive lbs	28,843,234	lb/yr
e.g., Duplex HFE 2 barrels		
Calenders:		
# Calenders with Mills	1	
# Mills/Calender	2	
Avg # mill passes/Cal	2	
Total Calender Productive lbs	10,668,046	lb/yr

[a] Non-productive/Productive mix ratio based on 2010 actual production ratio

Compound	Rubber Compound Split			Mills	Extruder Mill	Calender Mill	Calender		Extruder				Cushion Mill	
				RMA Factors	Emissions[c]	Emissions[c]	RMA Factors	Emissions[c]	RMA Factors		Emissions[c]		RMA Factors	Emissions[c]
	% Total Weight	Productive[a] lb/yr	Non-Prod[b] lb/yr	VOC lb/prod. lbs	VOC tpy	VOC tpy	VOC lb/prod. lbs	VOC tpy	VOC lb/prod. lbs	PM lb/prod. lbs	VOC tpy	PM tpy	VOC lb/prod. lbs	VOC tpy
Innerliner - #1 (Calender or DDM)	9	3,556,015	6,201,237	8.99E-05		3.20E-01	5.33E-05	9.48E-02	1.48E-05	2.12E-08	2.63E-02	3.77E-05		
Ply Coat - #2 (Fabric Calender)	5	1,975,564	3,445,132	1.10E-04		2.17E-01	5.59E-05	5.52E-02	9.37E-06	4.85E-08	9.26E-03	4.79E-05		
Belt Coat - #3 (WFC)	10	3,951,128	6,890,264	1.13E-04		4.46E-01	1.17E-04	2.31E-01						
Base/Sidewall - #4 (EXT or DDM)	11.5	4,543,797	7,923,803	8.37E-05	5.98E-01				5.67E-06	3.11E-08	1.29E-02	7.07E-05		
Apex - #5 (EXT or DDM)	14	5,531,579	9,646,369	3.14E-04	2.73E+00				5.15E-05	1.12E-07	1.42E-01	3.10E-04		
Tread - #6 (EXT)	44.5	17,582,520	30,661,674	5.64E-05	1.56E+00				1.23E-05	7.77E-09	1.08E-01	6.83E-05		
Chaffer - #6 (EXT or DDM)	2	790,226	1,378,053	5.64E-05	7.00E-02				1.23E-05	7.77E-09	4.86E-03	3.07E-06		
Bead - #5 (EXT)	0.5	197,556	344,513	3.14E-04	9.75E-02				5.15E-05	1.12E-07	5.09E-03	1.11E-05		
Toeguard - #6 (EXT)	0	0	0	5.64E-05	0.00E+00				1.23E-05	7.77E-09	0.00E+00	0.00E+00		
Gum Strip - #3 (Cal or DDM)	3	1,185,338	2,067,079	1.13E-04		1.34E-01	1.17E-04	6.93E-02						
Coverstrip - #4 (Ext)	0.5	197,556	344,513	8.37E-05	2.60E-02				5.67E-06	3.11E-08	5.60E-04	3.07E-06	8.37E-05	8.27E-03
Total	**100**	**39,511,280**	**68,902,639**		**5.08E+00**	**1.12E+00**		**4.50E-01**			**3.10E-01**	**5.52E-04**		**8.27E-03**

[a] Productive rubber (lb/yr) = % total weight x increase in productive rubber (lb/yr)

[b] Non-Productive Rubber (lb/yr) = productive rubber (lb/yr) x BB non-prod./prod. Mix ratio (%)

[c] Emissions (tpy) = RMA Factor (lb/productive lbs) x productive rubbber (lb/yr) / 2000 (lb/ton)

Extruder VOC Emissions (tpy)	5.40E+00
Extruder PM Emissions (tpy)	5.52E-04
Calender VOC Emissions (tpy)	1.57E+00

Tire Building (Solvent Use)

Increase in productive rubber[a]	**31,813,913**	lbs/yr

Solvent Use Emissions Increase

Material	Solvent Use Factor[b] lb solvent/lb rubber	VOC tpy
Tire Building		
Total Inks/Marking Cements	3.68E-05	0.59
Rubber Cement (M9315)	0.00E+00	0.00
Rubber Cement (M9779)	1.83E-05	0.29
Inner Cement (M9903)	4.30E-07	0.01
Extruder Head Lube	2.13E-06	0.03
Splice Cement (M9480)	1.56E-04	2.48
Core Cement (M0365)	2.24E-06	0.04
Kerosene	6.12E-06	0.10
Kanjine (bulk)	9.25E-04	14.72
Isol	3.83E-04	6.09
Repair/Patch/Curing		
Kanjine (Drums) - Spot-au-Matics	2.52E-04	4.01
Bladder and Tire Spray	1.99E-06	0.03
	Total Solvent Use Emissions Increase[e]	**26.09**

Tire Building (Solvent Use)
Baseline Solvent Use

Baseline Curing Area Throughput[c] 240,979,811 lbs

Material	Baseline Amount Used[c] lbs	Solvent Use Factor lb solvent/lb rubber
Tire Building		
Total Inks/Marking Cements	8,877	3.68E-05
Rubber Cement (M9315)	0	0.00E+00
Rubber Cement (M9779)	4,420	1.83E-05
Inner Cement (M9903)	104	4.30E-07
Extruder Head Lube	513	2.13E-06
Splice Cement (M9480)	37,500	1.56E-04
Core Cement (M0365)	540	2.24E-06
Kerosene	1,474	6.12E-06
Kanjine (bulk)	222,986	9.25E-04
Isol	92,290	3.83E-04
Repair/Patch/Curing		
Kanjine (Drums) - Spot-au-Matics	60,802	2.52E-04
Bladder and Tire Spray	480	1.99E-06

Baseline Hazardous Waste Shipped[c]	34,808	lbs
Hazardous Waste Factor[d]	1.44E-04	lbs VOC/lbs rubber

[a] Solvent use increase based on projected increase in productive cured rubber.

[b] Solvent Use Factor = Amount of material used in baseline year (lbs)/Curing throughput in baseline year (lbs)

[c] Baseline values calculated using actual tire building material usage, hazardous waste shipments, and curing area throughput from calendar year 2010

[d] Hazardous Waste Factor = VOC in Hazardous Waste Shipped in baseline year (lbs) / Curing throughput in baseline year (lbs)

[e] Emissions Increase [tpy] = (Sum of Solvent Use Factors [lbs/ lb cured] - Hazardous Waste Factor [lbs/lb cured]) X Productive Rubber Throughput Increase [lb/yr] / 2000 [lb/ton]

Curing

Increase in Productive Rubber Cured[a]	**31,813,913**	lbs/yr
RMA Emission Factor	3.37E-04	lb/lb rubber

	VOC Emissions Increase (lb/yr)	VOC Emissions Increase (tpy)
Curing Emissions Increase[b]	10,735	5.37
Coupling Agent Usage Emissions (BM2, BM3, BM10)[c]	2,250,788	1125.39
Total Curing Emissions Increase	**2,261,523**	**1,130.76**

[a] Calculated using ratio of actual Calendaring/Extruding throughput to Curing throughput for baseline calendar year 2010

[b] Curing Emissions Increase = RMA Emission Factor (lb/lb cured) x Increase in Productive Rubber (lbs/yr)

[c] Worst-case VOC emissions from coupling agent usage. See "Potentials-BM2", "Potentials-BM3", "Potentials-BM10" tabs for calculations.

Boiler Emissions

Productive Rubber Increase (Calendaring/Extruding):	39,511,280	lbs/yr
Heating value of natural gas:	1,034	BTU/scf
Heating value of #6 fuel oil:	156,435	BTU/gallon
Fuel oil sulfur percent by weight:	1.17	
Ash Content Waste Oil:	0	

Projected Fuel Usage Rates

	Oil Fuel Usage[a] (gallons/lb produced)	Natural Gas Fuel Usage[a] (MMscf/lb produced)
Boiler 1 (EU035)	5.46E-05	1.08E-06
Boiler 2 (EU036)	5.46E-05	1.08E-06
Boiler 3 (EU037)	5.46E-05	1.08E-06
Total	**1.64E-04**	**3.24E-06**

Projected Fuel Usage Rates

	Oil Fuel Usage[a] (gallons/lb produced)	Natural Gas Fuel Usage[a] (MMscf/lb produced)
Boiler 4 (EU038)	0	9.02E-08
Total	**0**	**9.02E-08**

[a] Rate based on Calendar Year 2010 actual fuel usage and productive rubber throughputs

Projected Fuel Usage Increase

	Oil Actual Fuel Usage (gallons)	Natural Gas Actual Fuel Usage (MMscf)
Boiler 1 (EU035)	2,156.30	42.70
Boiler 2 (EU036)	2,156.30	42.70
Boiler 3 (EU037)	2,156.30	42.70
Total	**6,468.89**	**128.10**

Projected Fuel Usage Increase

	Oil Actual Fuel Usage (gallons)	Natural Gas Actual Fuel Usage (MMscf)
Boiler 4 (EU038)	0	3.56
Total	**0**	**3.56**

Emission Factors For Boiler 1, Boiler 2, Boiler 3)

Pollutant	#6 Fuel Oil - Industrial (lb/gal)[a]	Natural Gas - >100 MMBTU/hr (lb/MMCu. Ft.)[b]
SO_2	1.84E-01	6.00E-01
NOx	4.70E-02	2.80E+02
CO	5.00E-03	8.40E+01
PM-Total[c]	1.55E-02	7.60E+00
PM10	1.20E-02	7.60E+00
VOC-Total	2.80E-04	5.50E+00
NH_3[d]	8.00E-04	3.20E+00
Pb	1.51E-06	5.00E-04
PM2.5	7.85E-03	7.60E+00
Greenhouse Gas Pollutants		
CO2	2.50E+01	120000
CH4	1.00E-03	2.3
N2O	5.30E-04	2.2

Emission Factors For Boiler 4

Pollutant	#6 Fuel Oil - Industrial (lb/gal)[a]	Natural Gas - 10 to 100 MMBTU/hr (lb/MMCu. Ft.)[b]
SO_2	1.84E-01	6.00E-01
NOx	4.70E-02	1.00E+02
CO	5.00E-03	8.40E+01
PM-Total[c]	1.55E-02	7.60E+00
PM10	1.20E-02	7.60E+00
VOC-Total	2.80E-04	5.50E+00
NH_3[d]	8.00E-04	3.20E+00
Pb	1.51E-06	5.00E-04
PM2.5	7.85E-03	7.60E+00
Greenhouse Gas Pollutants		
CO2	2.50E+01	120000
CH4	1.00E-03	2.3
N2O	5.30E-04	2.2

[a] Emission factors from AP-42 1.3 Fuel Oil Combustion (September 1998): CO, NOx, SO_2, filterable PM (Table1.3-1); condensable PM (Table 1.3-2); VOC, CH_4 (Table 1.3-3); PM10 and PM2.5 (Table 1.3-5), N2O (Table 1.3-8), Pb (T
CO_2 (Table 1.3-12) except as noted.

[b] Emission factors from AP-42 1.4 Natural Gas Combustion (July 1998): CO and NO_x (Table 1.4-1); SO_2, VOC, PM, Pb, CO_2, CH_4, N_20 (Table 1.4-2).

[c] PM Emission factors include filterable and condensable PM.

[d] Emission factor from FIRE database (version 6.23)

Boiler Emissions Increase

Boiler Emissions Increase Pollutant	**Boilers 1, 2, 3 Emissions (tpy)**	**Boiler 4 Emissions (tpy)**	**Total Boiler Emissions (tpy)**
SO_2	6.33E-01	1.07E-03	6.34E-01
NOx	1.81E+01	1.78E-01	1.83E+01
CO	5.40E+00	1.50E-01	5.55E+00
PM-Total	5.37E-01	1.35E-02	5.50E-01
PM10	5.26E-01	1.35E-02	5.39E-01
VOC-Total	3.53E-01	9.80E-03	3.63E-01
NH_3	2.08E-01	5.70E-03	2.13E-01
Pb	3.69E-05	8.91E-07	3.78E-05
PM2.5	5.12E-01	1.35E-02	5.26E-01
Greenhouse Gas Pollutants			
CO2	7.77E+03	2.14E+02	7.98E+03
CH4	1.51E-01	4.10E-03	1.55E-01
N2O	1.43E-01	3.92E-03	1.47E-01
CO2e[a]	**7.81E+03**	**2.15E+02**	**8.03E+03**

[a] CO_2e calculations based on global warming potential of 1 for CO_2, 25 for CH_4, and 298 for N_2O, from 40 CFR Subpart 98, Table A-1 (Nov 29, 2013).

Contemporaneous Projects - Slurry Mixer Installation (Feb. 2013)
PM Emissions from Dry Solids Material Handling

Annual Process Throughput:	10,792,000	lbs
	5,396	tons

Equation 1

$$E\ (\text{lb/ton}) = k\ (0.0032)\frac{(U/5)^{1.3}}{(M/2)^{1.4}}$$

k (PM) [a]	0.74	PM particle size multiplier
k (PM_{10}) [a]	0.35	PM_{10} particle size multiplier
k ($PM_{2.5}$) [a]	0.053	$PM_{2.5}$ particle size multiplier
U [b]	1.3	Wind speed (mph)
M [c]	0.25	Material moisture content (%)

Pollutant	Emission Factor [a] (lb/ton)	Potential Uncontrolled Emissions[b,c,d] (lb/yr)	(tpy)
PM	7.55E-03	40.76	2.04E-02
PM_{10}	3.57E-03	19.28	9.64E-03
$PM_{2.5}$	5.41E-04	2.92	1.46E-03

[a] The emission factor is calculated using Equation 1 from Section 13.2.4, "Aggregate Handling and Storage Piles," AP-42 (Nov. 2006). Aerodynamic particle size multipliers for Equation 1 are also from AP-42 Section 13.2.4.

[b] The slurry mixer will be located indoors, therefore the average wind speed is set to the minimum within the bounds of Equation 1. Note that no building control efficiency is applied for potential emission calculations.

[c] Since the moisture content is unknown, it was conservatively set to the minimum value within the bounds of Equation 1.

[d] The slurry mixer will be equipped with a dust filter, however, the unit is exempt and no control credit is taken in this emissions calculation for netting pu

Contemporaneous Projects - Extruder Installation (Feb. 2013)

Potential Extruder Throughput	330	lb/hr
	7,920	lb/day
	2,890,800	lb/year

Pollutant Name	CAS #	RMA Extruding Emission Factors [a] Interpolated Cmpd #1 lb/lb rubber	Interpolated Cmpd #2 lb/lb rubber	Interpolated Cmpd #3 lb/lb rubber	Cmpd #4 lb/lb rubber	Interpolated Cmpd #5 lb/lb rubber	Cmpd #6 lb/lb rubber	Worst-Case Emission Factor lb/lb rubber	Potential Emissions (lb/hr)	(lb/day)	(tpy)
Total VOC		1.48E-05	9.37E-06	3.25E-05	5.67E-06	5.15E-05	1.23E-05	5.15E-05	0.02	0.41	0.07
Total Particulate Matter		2.12E-08	4.85E-08	1.08E-07	3.11E-08	1.12E-07	7.77E-09	1.12E-07	3.68E-05	8.84E-04	1.61E-04
Total HAPs		1.13E-05	7.14E-06	3.16E-05	1.03E-05	2.24E-05	3.52E-05	3.52E-05	0.01	0.28	0.05
1,1,1-Trichloroethane	71-55-6	--	4.31E-08	1.71E-07	8.47E-08	9.84E-08	9.37E-08	1.71E-07	5.63E-05	1.35E-03	2.47E-04
1,3-Butadiene	106-99-0	5.24E-08	--	--	8.92E-08	--	5.06E-07	5.06E-07	1.67E-04	4.01E-03	7.31E-04
1,4-Dichlorobenzene	106-46-7	--	--	--	8.36E-09	--	--	8.36E-09	2.76E-06	6.62E-05	1.21E-05
2-Butanone	78-93-3	3.17E-06	8.52E-07	4.83E-07	1.34E-07	8.20E-07	1.17E-07	3.17E-06	1.05E-03	2.51E-02	4.58E-03
2-Chloroacetophenone	532-27-4	--	--	--	6.48E-09	--	1.68E-09	6.48E-09	2.14E-06	5.13E-05	9.36E-06
2-Methylphenol	95-48-7	--	--	4.63E-08	--	6.94E-09	--	4.63E-08	1.53E-05	3.67E-04	6.69E-05
4-Methyl-2-Pentanone	108-10-1	--	1.05E-07	6.73E-06	5.54E-06	--	2.66E-06	6.73E-06	2.22E-03	5.33E-02	9.72E-03
Acetaldehyde	75-07-0	3.73E-07	--	--	--	--	--	3.73E-07	1.23E-04	2.95E-03	5.39E-04
Acetaldehyde + Isobutane		--	--	--	--	3.28E-07	--	3.28E-07	1.08E-04	2.60E-03	4.74E-04
Acetonitrile	75-05-8	--	--	--	1.09E-07	--	2.19E-07	2.19E-07	7.23E-05	1.74E-03	3.17E-04
Acetophenone	98-86-2	1.24E-06	1.14E-08	2.75E-08	3.65E-08	9.92E-09	3.32E-06	3.32E-06	1.10E-03	2.63E-02	4.80E-03
Acrolein	107-02-8	--	--	--	2.03E-07	--	3.10E-07	3.10E-07	1.02E-04	2.46E-03	4.48E-04
Aniline	62-53-3	--	2.57E-07	--	5.08E-07	--	2.19E-07	5.08E-07	1.68E-04	4.03E-03	7.35E-04
Benzene	71-43-2	2.93E-08	2.47E-08	6.07E-08	4.46E-08	1.60E-07	2.69E-07	2.69E-07	8.87E-05	2.13E-03	3.89E-04
Biphenyl	92-52-4	--	--	3.02E-08	4.65E-09	--	1.68E-08	3.02E-08	9.96E-06	2.39E-04	4.36E-05
bis(2-Ethylhexyl)phthalate	117-81-7	2.09E-08	1.61E-08	6.37E-08	1.94E-07	1.22E-08	1.13E-07	1.94E-07	6.41E-05	1.54E-03	2.81E-04
Bromoform	75-25-2	1.49E-07	--	--	--	--	--	1.49E-07	4.92E-05	1.18E-03	2.15E-04
Carbon Disulfide	75-15-0	--	--	--	1.09E-07	9.84E-08	2.66E-07	2.66E-07	8.77E-05	2.10E-03	3.84E-04
Carbon Tetrachloride	56-23-5	--	--	6.38E-08	--	--	--	6.38E-08	2.11E-05	5.05E-04	9.22E-05
Carbonyl Sulfide	463-58-1	--	--	--	--	2.86E-07	--	2.86E-07	9.45E-05	2.27E-03	4.14E-04
Chloromethane	74-87-3	--	1.67E-08	--	7.06E-08	--	6.64E-08	7.06E-08	2.33E-05	5.59E-04	1.02E-04
Chromium (Cr) Compounds		1.96E-09	4.31E-10	3.65E-09	2.45E-07	1.68E-09	2.25E-08	2.45E-07	8.09E-05	1.94E-03	3.55E-04
Cobalt (Co) Compounds		--	--	--	1.90E-08	--	9.92E-09	1.90E-08	6.27E-06	1.50E-04	2.75E-05
Cumene	98-82-8	1.56E-09	--	2.15E-09	3.66E-08	7.54E-10	1.36E-07	1.36E-07	4.48E-05	1.08E-03	1.96E-04
Di-n-butylphthalate	84-74-2	4.29E-08	8.64E-09	2.94E-08	1.87E-07	--	1.98E-07	1.98E-07	6.53E-05	1.57E-03	2.86E-04
Dibenzofuran	132-64-9	--	1.13E-09	1.83E-08	3.52E-09	--	3.24E-09	1.83E-08	6.04E-06	1.45E-04	2.65E-05
Dimethylphthalate	131-11-3	--	--	8.43E-09	--	--	4.27E-09	8.43E-09	2.78E-06	6.67E-05	1.22E-05
Ethylbenzene	100-41-4	--	7.76E-08	1.14E-07	3.30E-08	6.34E-08	8.10E-08	1.14E-07	3.77E-05	9.05E-04	1.65E-04
Hexachlorobenzene	118-74-1	--	--	4.98E-09	--	--	--	4.98E-09	1.64E-06	3.94E-05	7.20E-06
Hexane	110-54-3	4.42E-06	5.77E-07	8.49E-07	1.02E-07	3.17E-06	3.94E-07	4.42E-06	1.46E-03	3.50E-02	6.38E-03
Hydroquinone	123-31-9	--	--	--	--	1.41E-05	--	1.41E-05	4.64E-03	1.11E-01	2.03E-02
Isooctane	540-84-1	4.80E-08	4.12E-07	1.54E-07	3.81E-08	5.52E-08	4.51E-08	4.12E-07	1.36E-04	3.27E-03	5.96E-04
Isophorone	78-59-1	--	3.55E-07	--	3.50E-08	--	--	3.55E-07	1.17E-04	2.81E-03	5.14E-04
m-Xylene + p-Xylene		1.41E-07	3.10E-07	3.81E-07	7.01E-08	2.20E-07	3.32E-07	3.81E-07	1.26E-04	3.02E-03	5.50E-04
Methylene Chloride	75-09-2	5.90E-07	5.10E-07	2.07E-05	1.60E-06	2.24E-07	1.32E-05	2.07E-05	6.83E-03	1.64E-01	2.99E-02
N,N-Dimethylaniline	121-69-7	--	--	--	5.45E-09	--	--	5.45E-09	1.80E-06	4.31E-05	7.87E-06
Naphthalene	91-20-3	1.34E-08	1.78E-08	1.65E-07	1.08E-07	1.35E-07	1.98E-07	1.98E-07	6.53E-05	1.57E-03	2.86E-04
Nickel (Ni) Compounds		3.03E-09	--	5.88E-09	1.99E-07	1.53E-09	7.24E-08	1.99E-07	6.56E-05	1.58E-03	2.88E-04
o-Toluidine	95-53-4	--	--	--	--	--	1.50E-07	1.50E-07	4.94E-05	1.18E-03	2.16E-04
o-Xylene	95-47-6	5.14E-08	2.09E-07	1.71E-07	3.49E-08	8.15E-08	2.58E-07	2.58E-07	8.51E-05	2.04E-03	3.73E-04
Phenol	108-95-2	3.86E-08	2.62E-08	1.48E-07	3.11E-07	4.08E-07	1.84E-07	4.08E-07	1.34E-04	3.23E-03	5.89E-04
Propylene Oxide	75-56-9	--	--	--	--	--	1.75E-06	1.75E-06	5.78E-04	1.39E-02	2.53E-03
Styrene	100-42-5	--	--	--	9.61E-09	--	7.25E-07	7.25E-07	2.39E-04	5.74E-03	1.05E-03
Tetrachloroethene	127-18-4	--	2.20E-06	5.17E-08	5.32E-08	--	4.44E-08	2.20E-06	7.25E-04	1.74E-02	3.17E-03
Toluene	108-88-3	8.84E-07	1.11E-06	1.13E-06	1.07E-07	9.28E-07	9.26E-06	9.26E-06	3.05E-03	7.33E-02	1.34E-02
Vinyl Acetate	108-05-4	--	--	--	--	1.26E-06	--	1.26E-06	4.15E-04	9.96E-03	1.82E-03

[a] Emission factors provided by the Rubber Manufacturer's Association.

Contemporaneous Projects - Green Tire Spray Installation (Expected September 2014)

Potential Green Tire Spray Throughput	51.51	tons/year
	103,020	lb/year
Annual hours of operation	8,760	hours/year

Pollutant	VOC Content of Green Tire Spray [a] (lb/lb)	Potential Emissions (lb/hr)	(tpy)
VOC	0.02	0.24	1.03

[a] VOC content of green tire spray and potential throughput provided by Carlton Williams (Goodyear) to Trinity on August 23, 2013

Contemporaneous Project - 3 New Aerospace Curing Presses (Expected 2015)

Expected Throughput After Project[a]	412,920,000	lb/yr
Baseline Throughput[b]	323,140,582	lb/yr
RMA Emission Factor	3.37E-04	lb/lb rubber

	VOC Emissions Increase (lb/yr)	VOC Emissions Increase (tpy)
Projected Actual Emissions[c]	139,336	69.67
Baseline Emissions	109,041	54.52
Project Emissions Increase[c]	**30,295**	**15.15**

a Based on a projected actual tire production of 4,500,000 tires/year, 114.7 lbs/tire, with a rubber composition of 80% per tire.

b Average annual throughput based on the actual curing throughput for project baseline period of January 2012 through December 2013.

c For this application, Projected Actual Emissions for are conservatively calculated without excluding the emissions increases allowed in subparagrph c of the *projected actual emissions* definition in 9 VAC 5-80-1615.

RTO-1 BACT Conversion Calculation

Mixer Throughput	75,000	tpy/mixer
Potential Mixer Uncontrolled Emission Rate	529.72	tpy
Capture Efficiency	84	%
RTO Control Efficiency	98	%
Controlled Emission Rate	93.66	tpy/mixer
Controlled Emission Rate (3 Mixers)	280.97	tpy
Controlled Emission Rate (3 Mixers)	561,931.03	lb/yr
VOC Emission Rate	2.497	lb/ton