RESULTS

Table 2-1:
EP 5 Calciner Stack - Carbon Monoxide, Ethane, Methane, Total Hydrocarbons

Run No.		1	2	3[1]	4[1]	Average
Date (1995)		January 11	January 11	January 11	January 11	
Start Time (approx.)		10:46	12:51	14:26	15:52	
Stop Time (approx.)		11:45	13:50	15:25	16:51	
Operating Data						
	Trona processing rate (tons/hr)	162	162	162	162	**162**
Gas Conditions						
T_s	Temperature (°F)	345	349	344	346	**346**
Volumetric Flow Rate						
Q_a	Volumetric flow rate, actual (acfm)	150,300	142,700	143,700	153,500	**147,550**
Q_{std}	Volumetric flow rate, standard (dscfm)	49,440	47,240	48,050	50,990	**48,930**
Carbon Monoxide						
C	Concentration (ppmdv)	2,563	2,644	1	1	**2,600**
E	Emission rate (lb/hr)	552.7	544.7	1	1	**549**
E	Emission rate (lb/tons of trona)	3.41	3.36	1	1	**3.39**
Ethane						
C	Concentration (ppmdv)	BDL	BDL	1	1	**BDL**
Methane						
C	Concentration (ppmdv)	493.0	498.0	1	1	**496**
E	Emission rate (lb/hr)	60.88	58.76	1	1	**59.8**
E	Emission rate (lb/tons of trona)	0.376	0.363	1	1	**0.369**
Total Hydrocarbons						
C	Concentration (ppmdv)	413.3	465.4	454.1	400.0	**433**
E	Emission rate (lb/hr)	140.3	151.0	149.8	140.0	**145**
E	Emission rate (lb/tons of trona)	0.866	0.932	0.925	0.864	**0.897**
Non-methane, non-ethane hydrocarbons [2]						
E	Emission rate (lb/hr)	79.42	92.20	90.00	80.23	**85.5**
E	Emission rate (lb/tons of trona)	0.490	0.569	0.556	0.495	**0.528**

[1] Analytical results indicate that the Tedlar sample bags leaked. These runs are not included in the averages.
[2] The average methane result was used to calculate the non-methane, non-ethane hydrocarbons for Runs 3 and 4.
BDL: Indicates that the value was below the detection limit.

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RESULTS

Table 2-2:
EP 5 Calciner Stack - Volatile Organic Compounds by M18

Run No.		1	2	3	4	Average
Date (1995)		January 11	January 11	January 11	January 11	
Start Time (approx.)		10:55	12:52	14:30	15:56	
Stop Time (approx.)		11:55	13:52	15:30	16:56	
Operating Data						
	Trona processing rate (tons/hr)	162	162	162	162	**162**
Gas Conditions						
T_s	Temperature (°F)	345	349	344	346	**346**
Volumetric Flow Rate						
Q_a	Volumetric flow rate, actual (acfm)	150,300	142,700	143,700	153,500	**147,550**
Q_{std}	Volumetric flow rate, standard (dscfm)	49,440	47,240	48,050	50,990	**48,930**
1, 3 Butadiene [1]						
C	Concentration (mg/dscm)	12.02	BDL	BDL	BDL	**3.00**
C	Concentration (ppmdv)	5.346	BDL	BDL	BDL	**1.34**
E	Emission rate (lb/hr)	2.226	BDL	BDL	BDL	**0.557**
E	Emission rate (lb/tons of trona)	0.0137	BDL	BDL	BDL	**0.00344**
1-1-1 Trichloroethane						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
Acrylonitrile						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
Benzene						
C	Concentration (mg/dscm)	19.51	18.46	23.87	6.926	**17.2**
C	Concentration (ppmdv)	6.007	5.684	7.351	2.133	**5.29**
E	Emission rate (lb/hr)	3.613	3.266	4.297	1.323	**3.12**
E	Emission rate (lb/tons of trona)	0.0223	0.0202	0.0265	0.00817	**0.0193**
Ethylbenzene						
C	Concentration (mg/dscm)	BDL	1.738	1.916	1.005	**1.16**
C	Concentration (ppmdv)	BDL	0.3939	0.4341	0.2277	**0.264**
E	Emission rate (lb/hr)	BDL	0.3076	0.3449	0.1919	**0.211**
E	Emission rate (lb/tons of trona)	BDL	0.00190	0.00213	0.00118	**0.00130**
Hexane						
C	Concentration (mg/dscm)	2.138	2.421	2.609	BDL	**1.79**
C	Concentration (ppmdv)	0.5969	0.6758	0.7283	BDL	**0.500**
E	Emission rate (lb/hr)	0.3960	0.4285	0.4696	BDL	**0.324**
E	Emission rate (lb/tons of trona)	0.00244	0.00264	0.00290	BDL	**0.00266**
Methylene Chloride						
C	Concentration (mg/dscm)	BDL	2.752	1.908	1.558	**1.55**
C	Concentration (ppmdv)	BDL	0.7795	0.5403	0.4414	**0.440**
E	Emission rate (lb/hr)	BDL	0.4870	0.3434	0.2977	**0.282**
E	Emission rate (lb/tons of trona)	BDL	0.00301	0.00212	0.00184	**0.00232**
Styrene						
C	Concentration (mg/dscm)	BDL	1.621	2.087	0.6679	**1.09**
C	Concentration (ppmdv)	BDL	0.4591	0.5912	0.1892	**0.310**
E	Emission rate (lb/hr)	BDL	0.2869	0.3757	0.1276	**0.198**
E	Emission rate (lb/tons of trona)	BDL	0.00177	0.00232	0.000788	**0.00163**
Toluene						
C	Concentration (mg/dscm)	4.076	4.366	5.862	2.515	**4.20**
C	Concentration (ppmdv)	1.064	1.140	1.530	0.657	**1.10**
E	Emission rate (lb/hr)	0.7549	0.7727	1.055	0.480	**0.766**
E	Emission rate (lb/tons of trona)	0.00466	0.00477	0.00651	0.00297	**0.00473**
Xylene						
C	Concentration (mg/dscm)	2.470	4.780	6.319	2.738	**4.08**
C	Concentration (ppmdv)	0.5598	1.083	1.432	0.6204	**0.924**
E	Emission rate (lb/hr)	0.4575	0.8459	1.137	0.5230	**0.741**
E	Emission rate (lb/tons of trona)	0.00282	0.00522	0.00702	0.00323	**0.00457**

[1] See comments on 1, 3 Butadiene results by Method 18 in the Project Overview.
BDL: Indicates that the value was below the detection limit.

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RESULTS

Table 2-3:
EP 5 Calciner Stack - Volatile Organic Compounds by M0030

Run No.		1	2	3	4	Average
Date (1995)		January 11	January 11	January 11	January 11	
Start Time (approx.)		10:55	12:52	14:30	15:56	
Stop Time (approx.)		11:15	13:12	14:50	16:16	
Operating Data						
	Trona processing rate (tons/hr)	162	162	162	162	**162**
Volumetric Flow Rate						
Q_a	Actual conditions (acfm)	150,300	142,700	143,700	153,500	**147,600**
Q_{std}	Standard conditions (dscfm)	49,440	47,240	48,050	50,990	**48,930**
Acrylonitrile						
C	Concentration (mg/dscm)	0.9320	0.7796	0.3281	0.1874	**0.557**
C	Concentration (ppm)	0.4226	0.3535	0.1487	0.08497	**0.252**
E	Emission rate (lb/hr)	0.1726	0.1380	0.05905	0.03580	**0.101**
E	Emission rate (lb/tons of trona)	0.00107	0.000852	0.000365	0.000221	**0.000626**
Allyl chloride						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
Benzene						
C	Concentration (mg/dscm)	6.585	6.946	6.019	3.844	**5.85**
C	Concentration (ppm)	2.028	2.139	1.854	1.184	**1.80**
E	Emission rate (lb/hr)	1.220	1.229	1.084	0.7343	**1.07**
E	Emission rate (lb/tons of trona)	0.00753	0.00759	0.00669	0.00453	**0.00658**
Bromoform						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
1,3-Butadiene						
C	Concentration (mg/dscm)	9.330	25.45	21.26	6.463	**15.6**
C	Concentration (ppm)	4.150	11.32	9.453	2.874	**6.95**
E	Emission rate (lb/hr)	1.728	4.504	3.826	1.235	**2.82**
E	Emission rate (lb/tons of trona)	0.0107	0.0278	0.0236	0.00762	**0.0174**
Carbon disulfide						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
Carbon tetrachloride						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
Chlorobenzene						
C	Concentration (mg/dscm)	0.0112	BDL	BDL	BDL	**0.00281**
C	Concentration (ppm)	0.0024	BDL	BDL	BDL	**0.000601**
E	Emission rate (lb/hr)	0.0021	BDL	BDL	BDL	**0.000521**
E	Emission rate (lb/tons of trona)	1.29E-05	BDL	BDL	BDL	**3.21E-06**
Chloroform						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
Cumene (isopropylbenzene)						
C	Concentration (mg/dscm)	0.01499	0.01760	0.01144	0.006247	**0.0126**
C	Concentration (ppm)	0.003001	0.003524	0.002291	0.001250	**0.00252**
E	Emission rate (lb/hr)	0.002777	0.003115	0.002060	0.001193	**0.00229**
E	Emisison rate (lb/tons of trona)	1.71E-05	1.92E-05	1.27E-05	7.37E-06	**1.41E-05**
cis-1,3-Dichloropropene						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**

BDL: Indicates the value was below detection limits.

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RESULTS

Table 2-3:
EP 5 Calciner Stack - Volatile Organic Compounds by M0030 (Continued)

Run No.		1	2	3	4	Average
Date (1995)		January 11	January 11	January 11	January 11	
Start Time (approx.)		10:55	12:52	14:30	15:56	
Stop Time (approx.)		11:15	13:12	14:50	16:16	
Operating Data						
	Trona processing rate (tons/hr)	162	162	162	162	**162**
Volumetric Flow Rate						
Q_a	Actual conditions (acfm)	150,300	142,700	143,700	153,500	**147,600**
Q_{std}	Standard conditions (dscfm)	49,440	47,240	48,050	50,990	**48,930**
trans-1,3-Dichloropropene						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
Ethyl acrylate						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
Ethylbenzene						
C	Concentration (mg/dscm)	0.5422	1.107	0.5875	0.2536	**0.622**
C	Concentration (ppm)	0.1229	0.2508	0.1331	0.05747	**0.141**
E	Emission rate (lb/hr)	0.1004	0.1958	0.1057	0.04845	**0.113**
E	Emisison rate (lb/tons of trona)	0.000620	0.00121	0.000653	0.000299	**0.000695**
1,2-Epoxybutane						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
Dibromomethane						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
1,2-Dichlrorethane						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
1,1-Dichloroehtane						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
n-Hexane						
C	Concentration (mg/dscm)	0.8570	1.117	0.6625	0.2799	**0.729**
C	Concentration (ppm)	0.2393	0.3117	0.1849	0.07813	**0.204**
E	Emission rate (lb/hr)	0.1587	0.1976	0.1192	0.05346	**0.132**
E	Emisison rate (lb/tons of trona)	0.0010	0.0012	0.0007	0.0003	**0.001**
Bromomethane						
C	Concentration (mg/dscm)	BDL	0.01383	0.01017	0.008746	**0.00819**
C	Concentration (ppm)	BDL	0.003505	0.002577	0.002216	**0.00207**
E	Emission rate (lb/hr)	BDL	0.002448	0.001831	0.001671	**0.00149**
E	Emission rate (lb/tons of trona)	BDL	1.51E-05	1.13E-05	1.03E-05	**9.18E-06**
Chloromethane						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
1,1,1-Trichloroethane						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**

BDL: Indicates the value was below detection limits.

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RESULTS

Table 2-3:
EP 5 Calciner Stack - Volatile Organic Compounds by M0030 (Continued)

Run No.		1	2	3	4	Average
Date (1995)		January 11	January 11	January 11	January 11	
Start Time (approx.)		10:55	12:52	14:30	15:56	
Stop Time (approx.)		11:15	13:12	14:50	16:16	
Operating Data						
	Trona processing rate (tons/hr)	162	162	162	162	**162**
Volumetric Flow Rate						
Q_a	Actual conditions (acfm)	150,300	142,700	143,700	153,500	**147,600**
Q_{std}	Standard conditions (dscfm)	49,440	47,240	48,050	50,990	**48,930**
2-Butanone						
C	Concentration (mg/dscm)	0.3623	0.7583	0.1628	0.1337	**0.354**
C	Concentration (ppm)	0.1209	0.2530	0.05430	0.04460	**0.118**
E	Emission rate (lb/hr)	0.06710	0.1342	0.02930	0.02554	**0.0640**
E	Emission rate (lb/tons of trona)	0.000414	0.000828	0.000181	0.000158	**0.000395**
Idomethane						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
4-Methyl-2-pentanone						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
Tert-butyl methyl ether						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
Methylene chloride						
C	Concentration (mg/dscm)	BDL	BDL	1.076	0.03373	**0.277**
C	Concentration (ppm)	BDL	BDL	0.3047	0.009554	**0.0786**
E	Emission rate (lb/hr)	BDL	BDL	0.1936	0.006444	**0.0500**
E	Emission rate (lb/tons of trona)	BDL	BDL	0.00120	3.98E-05	**0.000309**
Methyl methacrylate						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
1,2-Dichloropropane						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	BDL
Styrene						
C	Concentration (mg/dscm)	0.8533	1.854	1.019	0.4660	**1.05**
C	Concentration (ppm)	0.1971	0.4282	0.2353	0.1077	**0.242**
E	Emission rate (lb/hr)	0.1580	0.3280	0.1833	0.08902	**0.190**
E	Emission rate (lb/tons of trona)	0.000976	0.00202	0.00113	0.000549	**0.00117**
1,1,2,2-Tetrachloroethane						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
Tetrachloroethene						
C	Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**

BDL: Indicates the value was below detection limits.

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RESULTS

Table 2-3:
EP 5 Calciner Stack - Volatile Organic Compounds by M0030 (Continued)

Run No.	1	2	3	4	Average
Date (1995)	January 11	January 11	January 11	January 11	
Start Time (approx.)	10:55	12:52	14:30	15:56	
Stop Time (approx.)	11:15	13:12	14:50	16:16	
Operating Data					
Trona processing rate (tons/hr)	162	162	162	162	**162**
Volumetric Flow Rate					
Q_a Actual conditions (acfm)	150,300	142,700	143,700	153,500	**147,600**
Q_{stc} Standard conditions (dscfm)	49,440	47,240	48,050	50,990	**48,930**
Toluene					
C Concentration (mg/dscm)	2.650	6.880	5.742	2.194	**4.37**
C Concentration (ppm)	0.6919	1.796	1.499	0.5729	**1.14**
E Emission rate (lb/hr)	0.4908	1.217	1.034	0.4191	**0.790**
E Emission rate (lb/tons of trona)	0.00303	0.00752	0.00638	0.00259	**0.00488**
1,1,2-Trichloroethane					
C Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
Trichloroethene					
C Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
Isocatane					
C Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
Vinyl acetate					
C Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
Vinyl bromide					
C Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
Vinyl chloride					
C Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
1,1-Dichloroethene					
C Concentration (mg/dscm)	BDL	BDL	BDL	BDL	**BDL**
o-Xylene					
C Concentration (mg/dscm)	0.2424	0.4804	0.2556	0.1162	**0.274**
C Concentration (ppm)	0.05492	0.1089	0.05792	0.02633	**0.0620**
E Emission rate (lb/hr)	0.04489	0.08501	0.04601	0.02219	**0.0495**
E Emission rate (lb/tons of trona)	0.000277	0.000525	0.000284	0.000137	**0.000306**
m-/p-Xylene					
C Concentration (mg/dscm)	1.851	4.417	2.083	0.918	**2.32**
C Concentration (ppm)	0.4196	1.001	0.4720	0.2081	**0.525**
E Emission rate (lb/hr)	0.3429	0.7818	0.3749	0.1754	**0.419**
E Emission rate (lb/hr)	0.00212	0.00483	0.00231	0.00108	**0.00258**

BDL: Indicates the value was below detection limits.

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RESULTS

Table 2-4:
EP 5 Calciner Stack - Carbon Monoxide, Ethane, Methane, Total Hydrocarbons

Run No.		5[1]	6[1]	7	Average
Date (1995)		January 12	January 12	January 12	
Start Time (approx.)		09:16	10:47	12:10	
Stop Time (approx.)		10:15	11:46	13:09	
Operating Data					
	Trona processing rate (tons/hr)	147	147	147	**147**
Gas Conditions					
T_s	Temperature (°F)	337	331	316	**328**
Volumetric Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	135,300	134,200	135,700	**135,067**
Q_{std}	Volumetric flow rate, standard (dscfm)	45,640	45,510	47,280	**46,143**
Carbon Monoxide					
C	Concentration (ppmdv)	1	1	3,255	**3,260**
E	Emission rate (lb/hr)	1	1	671.3	**671**
E	Emission rate (lb/tons of trona)	1	1	4.57	**4.57**
Ethane					
C	Concentration (ppmdv)	1	1	BDL	**BDL**
Methane					
C	Concentration (ppmdv)	1	1	532.0	**532**
E	Emission rate (lb/hr)	1	1	62.83	**62.8**
E	Emission rate (lb/tons of trona)	1	1	0.427	**0.427**
Total Hydrocarbons					
C	Concentration (ppmdv)	415.0	402.3	442.1	**420**
E	Emission rate (lb/hr)	130.0	125.7	143.5	**133**
E	Emission rate (lb/tons of trona)	0.885	0.855	0.976	**0.905**
Non-methane, non-ethane hydrocarbons [2]					
E	Emission rate (lb/hr)	67.22	62.90	80.70	**70.3**
E	Emission rate (lb/tons of trona)	0.457	0.428	0.549	**0.478**

[1] Analytical results indicate that the Tedlar sample bags leaked. These runs are not included in averages.
[2] The average methane result was used to calculate non-methane, non-ethane hydrocarbons for Runs 5 and 6.
BDL: Indicates that value was below detection limits.

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RESULTS

Table 2-5:
EP 5 Calciner Stack - Volatile Organic Compounds by M18

Run No.		5	6	7	Average
Date (1995)		January 12	January 12	January 12	
Start Time (approx.)		09:22	10:50	12:10	
Stop Time (approx.)		10:22	11:50	13:10	
Operating Data					
	Trona processing rate (tons/hr)	147	147	147	**147**
Gas Conditions					
T_s	Temperature (°F)	337	331	316	**328**
Volumetric Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	135,300	134,200	135,700	**135,067**
Q_{std}	Volumetric flow rate, standard (dscfm)	45,640	45,510	47,280	**46,143**
1, 3 Butadiene [1]					
C	Concentration (mg/dscm)	21.23	23.31	36.21	**26.9**
C	Concentration (ppmdv)	9.441	10.37	16.10	**12.0**
E	Emission rate (lb/hr)	3.629	3.974	6.413	**4.67**
E	Emission rate (lb/tons of trona)	0.0247	0.0270	0.0436	**0.0318**
1-1-1 Trichloroethane					
C	Concentration (mg/dscm)	BDL	BDL	BDL	**BDL**
Acrylonitrile					
C	Concentration (mg/dscm)	BDL	BDL	BDL	**BDL**
Benzene					
C	Concentration (mg/dscm)	18.57	15.38	23.73	**19.2**
C	Concentration (ppmdv)	5.719	4.738	7.306	**5.92**
E	Emission rate (lb/hr)	3.175	2.623	4.202	**3.33**
E	Emission rate (lb/tons of trona)	0.0216	0.0178	0.0286	**0.0227**
Ethylbenzene					
C	Concentration (mg/dscm)	1.486	1.894	2.976	**2.12**
C	Concentration (ppmdv)	0.3366	0.4291	0.6743	**0.480**
E	Emission rate (lb/hr)	0.2540	0.3229	0.5271	**0.368**
E	Emission rate (lb/tons of trona)	0.00173	0.00220	0.00359	**0.00250**
Hexane					
C	Concentration (mg/dscm)	1.878	1.755	2.709	**2.11**
C	Concentration (ppmdv)	0.5243	0.4899	0.7563	**0.590**
E	Emission rate (lb/hr)	0.3211	0.2992	0.4799	**0.367**
E	Emission rate (lb/tons of trona)	0.00218	0.00204	0.00326	**0.00249**
Methylene Chloride					
C	Concentration (mg/dscm)	5.340	3.605	6.544	**5.16**
C	Concentration (ppmdv)	1.512	1.021	1.853	**1.46**
E	Emission rate (lb/hr)	0.9130	0.6146	1.159	**0.896**
E	Emission rate (lb/tons of trona)	0.00621	0.00418	0.00788	**0.00609**
Styrene					
C	Concentration (mg/dscm)	1.275	1.448	2.530	**1.75**
C	Concentration (ppmdv)	0.3613	0.4101	0.7166	**0.496**
E	Emission rate (lb/hr)	0.2181	0.2468	0.4481	**0.304**
E	Emission rate (lb/tons of trona)	0.00148	0.00168	0.00305	**0.00207**
Toluene					
C	Concentration (mg/dscm)	7.281	5.623	10.25	**7.72**
C	Concentration (ppmdv)	1.901	1.468	2.676	**2.02**
E	Emission rate (lb/hr)	1.245	0.9587	1.816	**1.34**
E	Emission rate (lb/tons of trona)	0.00847	0.00652	0.0124	**0.00911**
Xylene					
C	Concentration (mg/dscm)	4.156	4.614	7.190	**5.32**
C	Concentration (ppmdv)	0.9417	1.046	1.629	**1.21**
E	Emission rate (lb/hr)	0.7105	0.7866	1.273	**0.924**
E	Emission rate (lb/tons of trona)	0.00483	0.00535	0.00866	**0.00628**

[1] See comments on 1, 3 Butadiene results by Method 18 in Project Overview.
BDL: Indicates that value was below detection limits.

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RESULTS

Table 2-3:
EP-5-Total Hydrocarbons, Runs 1-3

Run No.	1	2	3	Average
Date (1995)	April 27	April 27	April 27	
Start Time (approx.)	13:06	14:34	16:25	
Stop Time (approx.)	14:06	15:34	17:25	
Process Conditions				
Feed rate (ton of trona/hr)	157	157	157	**157**
Gas Conditions[1]				
T_s Stack temperature (°F)	288	291	289	**289**
B_{wo} Moisture in sample (% by volume)	36.36	36.21	36.12	**36.23**
O_2 Oxygen (dry volume %)	8.4	8.4	8.4	**8.4**
CO_2 Carbon dioxide (dry volume%)	14.4	14.4	14.4	**14.4**
Flow Conditions				
Q_a Volumetric flow rate, actual (acfm)	117,500	132,200	130,900	**126,867**
Q_{std} Volumetric flow rate, standard (dscfm)	41,750	46,880	46,640	**45,090**
Continuous Emissions Monitoring				
Carbon Monoxide				
C Concentration (ppmdv)	533	390	351	**425**
E Emission rate (lb/hr)	97.0	79.8	71.4	**82.7**
E Emission rate (lb/ton of trona)	0.618	0.508	0.455	**5.27E-01**
Total Hydrocarbons(as propane)				
C Concentration (ppmdv)	316	229	191	**245**
E Emission rate (lb/hr)	90.6	73.7	63.4	**76**
E Emission rate (lb/ton of trona)	0.577	0.469	0.404	**0.483**
Methane				
C Concentration (ppmdv)	197	185	180	**187**
E Emission rate (lb/hr)	20.5	21.7	21.0	**21.1**
Total Non-Methane Hydrocarbons(as propane)				
E Emission rate (lb/hr)	70.1	52.0	42.4	**54.8**
E Emission rate (lb/ton of trona)	0.446	0.331	0.270	**0.349**

[1] Gas conditions are taken from simultaneous velocity-moisture test.

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RESULTS

Table 2-4:
EP 5 VOCs , Runs 1-3

Run No.		1	2	3	Average
Date (1995)		April 27	April 27	April 27	
Start Time (approx.)		13:07	14:35	16:26	
Stop Time (approx.)		14:13	15:41	17:33	
Process Conditions					
	Feed rate(ton of trona/hr)	157	157	157	157
Gas Conditions[1]					
B_{wo}	Moisture (% by volume)	36.36	36.21	36.12	**36.23**
Q_{std}	Volumetric flow rate, standard (dscfm)	41,750	46,880	46,640	**45,090**
2-Butanone					
C	Concentration (ppmdv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate(lb/ton of trona)	BDL	BDL	BDL	**BDL**
Benzene					
C	Concentration (ppmdv)	5.06	3.56	1.66	**3.43**
E	Emission rate (lb/hr)	2.57	2.03	0.94	**1.85**
E	Emission rate(lb/ton of trona)	1.64E-02	1.29E-02	6.00E-03	**1.18E-02**
1,3 Butadiene					
C	Concentration (ppmdv)	INT	INT	9.52	**9.52**
E	Emission rate (lb/hr)	INT	INT	3.74	**3.74**
E	Emission rate(lb/ton of trona)	INT	INT	2.38E-02	**2.38E-02**
Ethyl Benzene					
C	Concentration (ppmdv)	1.08	0.53	BDL	**0.54**
E	Emission rate (lb/hr)	0.75	0.41	BDL	**0.39**
E	Emission rate(lb/ton of trona)	4.77E-03	2.63E-03	BDL	**2.47E-03**
Hexane					
C	Concentration (ppmdv)	3.52	2.27	1.00	**2.26**
E	Emission rate (lb/hr)	1.97	1.43	0.63	**1.34**
E	Emission rate(lb/ton of trona)	1.26E-02	9.11E-03	3.99E-03	**8.55E-03**
Methylene Chloride					
C	Concentration (ppmdv)	3.27	2.76	1.94	**2.66**
E	Emission rate (lb/hr)	1.80	1.71	1.20	**1.57**
E	Emission rate(lb/ton of trona)	1.15E-02	1.09E-02	7.63E-03	**1.00E-02**
Styrene					
C	Concentration (ppmdv)	1.34	0.83	0.44	**0.87**
E	Emission rate (lb/hr)	0.90	0.63	0.33	**0.62**
E	Emission rate(lb/ton of trona)	5.76E-03	4.02E-03	2.11E-03	**3.96E-03**
Toluene					
C	Concentration (ppmdv)	8.92	7.24	3.46	**6.54**
E	Emission rate (lb/hr)	5.35	4.87	2.32	**4.18**
E	Emission rate(lb/ton of trona)	3.41E-02	3.10E-02	1.47E-02	**2.66E-02**
1,1,1 - Trichloroethane					
C	Concentration (ppmdv)	7.42	3.62	2.14	**4.39**
E	Emission rate (lb/hr)	6.43	3.53	2.08	**4.01**
E	Emission rate(lb/ton of trona)	4.10E-02	2.25E-02	1.32E-02	**2.56E-02**
Xylene					
C	Concentration (ppmdv)	8.96	6.68	3.90	**6.51**
E	Emission rate (lb/hr)	6.18	5.18	3.01	**4.79**
E	Emission rate(lb/ton of trona)	3.94E-02	3.30E-02	1.91E-02	**3.05E-02**

BDL indicates the value was below the detection limit. A value of zero was used for BDL in the average calculation.
INT-indicates quantitation not possible due to an analytical interferent.
[1] Gas conditions are taken from simultaneous velocity-moisture test.

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RESULTS

Table 2-2:
EP-5 Calciner Stack - Nitrogen Oxides, Carbon Monoxide, Methane and Total Hydrocarbons

Run No.	1 (Short Flame)	2 (Med. Flame)	3 (Long Flame)	Average
Date (1995)	April 28	April 28	April 28	
Start Time (approx.)	13:11	15:30	16:59	
Stop Time (approx.)	13:56	16:15	17:44	
Gas Conditions[1]				
T_s Stack temperature (°F)	301	306	299	**302**
B_{wo} Moisture in sample (% by volume)	36.92	38.22	36.00	**37.05**
O_2 Oxygen (dry volume %)	10.4	11.7	10.9	**11.0**
CO_2 Carbon dioxide (dry volume%)	12.6	11.2	12.1	**12.0**
Process Conditions[2]				
Feed rate (ton of trona /hr)	166	166	166	**166**
Flow Conditions				
Q_a Volumetric flow rate, actual (acfm)	144,400	148,800	144,500	**145,900**
Q_{std} Volumetric flow rate, standard (dscfm)	49,910	50,020	50,820	**50,250**
Continuous Emissions Monitoring				
Nitrogen Oxides				
C Concentration (ppmdv)	44.1	42.7	37.7	**41.5**
E Emission rate (lb/hr)	15.8	15.3	13.7	**14.9**
E Emission rate (lb/ton of trona)	0.0950	0.0922	0.0827	**0.0900**
Carbon Monoxide				
C Concentration (ppmdv)	617.2	1499.8	497.0	**871.3**
E Emission rate (lb/hr)	134.4	327.2	110.2	**190.6**
E Emission rate (lb/ton of trona)	0.809	1.971	0.664	**1.15**
Total Hydrocarbons (as propane)				
C Concentration (ppmdv)	320.5	262.0	204.9	**262.4**
E Emission rate (lb/hr)	109.8	90.0	71.5	**90.4**
E Emission rate (lb/ton of trona)	0.662	0.542	0.431	**0.545**
Methane				
C Concentration (ppmdv)	203	249	168	**207**
E Emission rate (lb/hr)	25.3	31.1	21.3	**25.9**
E Emission rate (lb/ton of trona)	0.152	0.187	0.128	**0.156**
Total Non-Methane Hydrocarbons (as propane)				
E Emission rate (lb/hr)	84.5	58.9	50.2	**64.5**

[1] Gas conditions are taken from simultaneous velocity-moisture testing.
[2] Process conditions provided by Solvay Minerals, Inc.

RESULTS

Table 2-3:
EP-5 Calciner - Stack Volatile Organic Compounds

Run No.		1 (Short Flame)	2 (Med. Flame)	3 (Long Flame)	Average
Date (1995)		April 28	April 28	April 28	
Start Time (approx.)		13:12	15:32	16:58	
Stop Time (approx.)		13:56	16:15	17:42	
Process Conditions[1]					
	Feed rate(ton of trona/hr)	166	166	166	**166**
Gas Conditions[2]					
B_{wo}	Moisture (% by volume)	36.92	38.22	36.00	**37.05**
Q_{std}	Volumetric flow rate, standard (dscfm)	49,910	50,020	50,820	**50,250**
1,1,1-Trichloroethane					
C	Concentration (ppmdv)	3.11	1.39	3.42	**2.64**
E	Emission rate (lb/hr)	3.22	1.45	3.61	**2.76**
E	Emission rate(lb/ton of trona)	1.94E-02	8.72E-03	2.18E-02	**1.66E-02**
1,3 Butadiene					
C	Concentration (ppmdv)	16.12	5.71	11.41	**11.08**
E	Emission rate (lb/hr)	6.78	2.41	4.88	**4.69**
E	Emission rate(lb/ton of trona)	4.08E-02	1.45E-02	2.94E-02	**2.82E-02**
2-Butanone					
C	Concentration (ppmdv)	0.71	BDL	0.97	**0.56**
E	Emission rate (lb/hr)	0.40	BDL	0.55	**0.32**
E	Emission rate(lb/ton of trona)	2.41E-03	BDL	3.33E-03	**1.91E-03**
Benzene					
C	Concentration (ppmdv)	3.46	1.65	2.81	**2.64**
E	Emission rate (lb/hr)	2.10	1.00	1.74	**1.61**
E	Emission rate(lb/ton of trona)	1.26E-02	6.05E-03	1.05E-02	**9.72E-03**
Ethyl Benzene					
C	Concentration (ppmdv)	0.40	BDL	5.87	**2.09**
E	Emission rate (lb/hr)	0.33	BDL	4.94	**1.75**
E	Emission rate(lb/ton of trona)	1.97E-03	BDL	2.97E-02	**1.06E-02**
Hexane					
C	Concentration (ppmdv)	1.95	0.84	1.42	**1.40**
E	Emission rate (lb/hr)	1.31	0.56	0.97	**0.95**
E	Emission rate(lb/ton of trona)	7.87E-03	3.40E-03	5.84E-03	**5.70E-03**
Methylene Chloride					
C	Concentration (ppmdv)	2.35	1.75	3.41	**2.50**
E	Emission rate (lb/hr)	1.55	1.16	2.29	**1.67**
E	Emission rate(lb/ton of trona)	9.33E-03	6.97E-03	1.38E-02	**1.00E-02**
Styrene					
C	Concentration (ppmdv)	0.49	0.31	0.48	**0.43**
E	Emission rate (lb/hr)	0.40	0.25	0.40	**0.35**
E	Emission rate(lb/ton of trona)	2.40E-03	1.50E-03	2.40E-03	**2.10E-03**
Toluene					
C	Concentration (ppmdv)	4.22	2.35	4.14	**3.57**
E	Emission rate (lb/hr)	3.02	1.68	3.02	**2.57**
E	Emission rate(lb/ton of trona)	1.82E-02	1.01E-02	1.82E-02	**1.55E-02**
Xylene					
C	Concentration (ppmdv)	4.01	1.67	3.17	**2.95**
E	Emission rate (lb/hr)	3.31	1.38	2.66	**2.45**
E	Emission rate(lb/ton of trona)	1.99E-02	8.31E-03	1.61E-02	**1.48E-02**

BDL indicates value was below the detection limit. A value of zero was used for BDL in the average calculation.
[1] Process conditions provided by Solvay Minerals, Inc.
[2] Gas conditions are taken from simultaneous velocity-moisture test.

RESULTS

Table 2-1:
EP-5 Calciner - Total Non-Methane Hydrocarbons

Run No.		1	2	3	Average
Date (1995)		October 29	October 29	October 29	
Start Time (approx.)		09:19	10:48	12:14	
Stop Time (approx.)		10:19	11:48	13:14	
Process Conditions[1]					
Feed rate (tons/hr of trona)		140	140	140	**140**
Gas Conditions[2]					
T_s	Temperature (°F)	311	315	315	**314**
O_2	Oxygen (dry volume %)	9.0	9.0	9.0	**9.0**
CO_2	Carbon dioxide (dry volume %)	13.7	13.8	13.8	**13.8**
B_{wo}	Moisture (volume %)	35.37	36.77	37.21	**36.45**
Q_{std}	Standard conditions (dscfm)	57,670	57,280	56,730	**57,227**
Total Hydrocarbons (as propane)					
C	Concentration (ppmdv)	159.5	161.2	193.1	**171.3**
E	Emission rate (lb/hr)	63.2	63.4	75.2	**67.3**
E	Emission rate (lb/ton of trona)	0.451	0.453	0.537	**0.480**
Methane					
C	Concentration (ppmdv)	128.4	148.2	168.5	**148.4**
E	Emission rate (lb/hr)	18.5	21.2	23.9	**21.2**
E	Emission rate (lb/ton of trona)	0.132	0.151	0.171	**0.151**
Total Non-Methane Hydrocarbons (as propane)					
E	Emission rate (lb/hr)	44.7	42.2	51.3	**46.1**
E	Emission rate (lb/ton of trona)	0.319	0.301	0.367	**0.329**

[1] Feed rate provided by Solvay Minerals, Inc.

[2] Gas conditions taken from simultaneous velocity-moisture testing.

RESULTS

Table 2-2:
EP-5 Calciner - Volatile Organic Compounds

Run No.		1	2	3	Average
Date (1995)		October 29	October 29	October 29	
Start Time (approx.)		09:18	10:51	12:13	
Stop Time (approx.)		10:18	11:51	13:12	
Process Conditions[1]					
	Feed rate(ton of trona/hr)	140	140	140	**140**
Gas Conditions[2]					
B_{wo}	Moisture (% by volume)	35.37	36.77	37.21	**36.45**
Q_{stc}	Volumetric flow rate, standard (dscfm)	57,670	57,280	56,730	**57,227**
1,1,1-Trichloroethane					
C	Concentration (ppmdv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**
1,3 Butadiene					
C	Concentration (ppmdv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**
Acrylonitrile					
C	Concentration (ppmdv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**
Benzene					
C	Concentration (ppmdv)	2.65	2.86	3.69	**3.07**
E	Emission rate (lb/hr)	1.86	1.99	2.55	**2.13**
E	Emission rate (lb/ton of trona)	0.013	0.014	0.018	**0.015**
Ethyl Benzene					
C	Concentration (ppmdv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**
Hexane					
C	Concentration (ppmdv)	1.83	1.80	2.39	**2.01**
E	Emission rate (lb/hr)	1.41	1.39	1.82	**1.54**
E	Emission rate (lb/ton of trona)	0.010	0.010	0.013	**0.011**
Methylene Chloride					
C	Concentration (ppmdv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**
Styrene					
C	Concentration (ppmdv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**
Toluene					
C	Concentration (ppmdv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**
Trichloroethene					
C	Concentration (ppmdv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**
Xylene					
C	Concentration (ppmdv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**

BDL indicates value was below the detection limit.
[1] Process conditions provided by Solvay Minerals, Inc.
[2] Gas conditions are taken from simultaneous velocity-moisture testing.

RESULTS

Table 2-1:
EP 1&2 Calciner Stack - Particulate (287 tons/hr Feed Rate)

Run No.		1	2	3	Average
Date (1995)		December 12	December 12	December 12	
Start Time (approx.)		09:35	11:40	13:35	
Stop Time (approx.)		10:56	13:02	14:52	
Process Conditions					
	Feed Rate (tons/hr)' Fields A, B and C off	291	283	288	**287**
Gas Conditions					
T_s	Temperature (°F)	374	373	373	**374**
B_{wo}	Moisture (volume %)	24.48	25.02	24.75	**24.75**
O_2	Oxygen (dry volume %)	14.0	13.8	13.9	**13.9**
CO_2	Carbon dioxide (dry volume %)	7.8	7.8	8.0	**7.9**
Volumetric Flow Rate					
Q_a	Actual conditions (acfm)	433,700	433,500	439,500	**435,600**
Q_{std}	Standard conditions (dscfm)	163,900	162,800	165,800	**164,200**
Front Half Particulate					
C	Concentration (gr/dscf)	0.0140	0.0198	0.0135	**0.0158**
E	Emission rate (lb/hr)	19.7	27.6	19.1	**22.2**
E	Emission rate (lb/ton of trona)	0.068	0.098	0.066	**0.077**
Back Half Organic Particulate					
C	Concentration (gr/dscf)	0.0269	0.0145	0.0132	**0.0182**
E	Emission rate (lb/hr)	37.8	20.3	18.8	**25.6**
E	Emission rate (lb/ton of trona)	0.130	0.072	0.065	**0.089**
Back Half Inorganic Particulate					
C	Concentration (gr/dscf)	0.0165	0.0037	0.0056	**0.0086**
E	Emission rate (lb/hr)	23.2	5.12	7.90	**12.1**
E	Emission rate (lb/ton of trona)	0.080	0.018	0.027	**0.042**
Back Half Total Particulate					
C	Concentration (gr/dscf)	0.0434	0.0182	0.0188	**0.0268**
E	Emission rate (lb/hr)	61.0	25.4	26.7	**37.7**
E	Emission rate (lb/ton of trona)	0.210	0.090	0.093	**0.131**
Front and Back Half Inorganic Particulate					
C	Concentration (gr/dscf)	0.0305	0.0235	0.0190	**0.0243**
E	Emission rate (lb/hr)	42.9	32.8	27.0	**34.2**
E	Emission rate (lb/ton of trona)	0.147	0.116	0.094	**0.119**

' Process feed rate provided by Solvay Minerals, Inc. For additional process operating data see Appendix H.

RESULTS

Table 2-2:
EP-5 Calciner Stack - Particulate (145 tons/hr Feed Rate)

Run No.		1	2	3	Average
Date (1995)		December 13	December 13	December 13	
Start Time (approx.)		09:08	11:00	12:47	
Stop Time (approx.)		10:27	12:20	14:05	
Process Conditions					
	Feed Rate (tons/hr)[1] Fields 1, 2 and 3 off	145	145	145	**145**
Gas Conditions					
T_s	Temperature (°F)	334	332	335	**334**
B_{wo}	Moisture (volume %)	32.15	32.18	31.35	**31.89**
O_2	Oxygen (dry volume %)	10.8	10.8	10.8	**10.8**
CO_2	Carbon dioxide (dry volume %)	11.8	11.7	11.8	**11.8**
Volumetric Flow Rate					
Q_a	Actual conditions (acfm)	184,300	172,300	170,700	**175,800**
Q_{std}	Standard conditions (dscfm)	65,870	61,740	61,700	**63,100**
Front Half Particulate					
C	Concentration (gr/dscf)	0.0016	0.0005	0.0024	**0.0015**
E	Emission rate (lb/hr)	0.9	0.3	1.2	**0.8**
E	Emission rate (lb/ton of trona)	0.006	0.002	0.009	**0.006**
Back Half Organic Particulate					
C	Concentration (gr/dscf)	0.0218	0.0207	0.0177	**0.0201**
E	Emission rate (lb/hr)	12.3	10.9	9.4	**10.9**
E	Emission rate (lb/ton of trona)	0.085	0.075	0.065	**0.075**
Back Half Inorganic Particulate					
C	Concentration (gr/dscf)	0.0058	0.0060	0.0043	**0.0054**
E	Emission rate (lb/hr)	3.3	3.2	2.3	**2.9**
E	Emission rate (lb/ton of trona)	0.023	0.022	0.016	**0.020**
Back Half Total Particulate					
C	Concentration (gr/dscf)	0.0276	0.0267	0.0220	**0.0254**
E	Emission rate (lb/hr)	15.6	14.1	11.6	**13.8**
E	Emission rate (lb/ton of trona)	0.107	0.097	0.080	**0.095**
Front and Back Half Inorganic Particulate					
C	Concentration (gr/dscf)	0.0074	0.0066	0.0066	**0.0069**
E	Emission rate (lb/hr)	4.2	3.5	3.5	**3.7**
E	Emission rate (lb/ton of trona)	0.029	0.024	0.024	**0.026**

[1] Process feed rate provided by Solvay Minerals, Inc. For additional process operating data see Appendix H.

RESULTS

Table 2-4:
EP-5 Calciner Stack - Total Non-Methane Hydrocarbons

Run No.		1	2	3	Average
Date (1995)		December 15	December 15	December 15	
Start Time (approx.)		08:37	11:00	13:05	
Stop Time (approx.)		09:37	12:00	14:05	
Process Conditions[1]					
	Feed rate (tons/hr of trona)	145	145	145	**145**
Gas Conditions[2]					
O_2	Oxygen (dry volume %)	8.4	9.0	8.8	**8.7**
CO_2	Carbon dioxide (dry volume %)	14.6	14.2	14.2	**14.3**
B_{wo}	Moisture (volume %)	35.58	35.98	35.86	**35.81**
Q_{std}	Standard conditions (dscfm)	50,830	50,130	51,170	**50,710**
Total Hydrocarbons (as propane)					
C	Concentration (ppmdv)	334.1	316.4	244.6	**298.4**
E	Emission rate (lb/hr)	116.6	108.9	86.0	**103.8**
E	Emission rate (lb/ton of trona)	0.804	0.751	0.593	**0.716**
Methane					
C	Concentration (ppmdv)	236.8	236.2	199.8	**224.2**
E	Emission rate (lb/hr)	30.1	29.6	25.5	**28.4**
E	Emission rate (lb/ton of trona)	0.207	0.204	0.176	**0.196**
Total Non-Methane Hydrocarbons (as propane)					
E	Emission rate (lb/hr)	86.6	79.3	60.4	**75.4**
E	Emission rate (lb/ton of trona)	0.597	0.547	0.417	**0.520**

[1] Feed rate provided by Solvay Minerals. inc.
[2] Gas conditions are taken from near simultaneous BIF 0011 formaldehyde test.

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Table 2-5:
EP-5 Calciner Stack - Volatile Organic Compounds

Run No.		1	2	3	Average
Date (1995)		December 15	December 15	December 15	
Start Time (approx.)		08:28	10:49	13:00	
Stop Time (approx.)		09:46	12:07	13:22	
Process Conditions[1]					
	Feed rate(ton of trona/hr)	145	145	145	**145**
Gas Conditions[2]					
B_{wo}	Moisture (% by volume)	35.58	35.98	35.86	**35.81**
Q_{stc}	Volumetric flow rate, standard (dscfm)	50,830	50,130	51,170	**50,710**
1,1,1-Trichloroethane					
C	Concentration (ppmdv)	1.71	2.59	2.15	**2.15**
E	Emission rate (lb/hr)	1.80	2.70	2.29	**2.26**
E	Emission rate (lb/ton of trona)	0.0124	0.0186	0.0158	**0.0156**
1,3 Butadiene					
C	Concentration (ppmdv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**
2-Butanone					
C	Concentration (ppmdv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**
Acrylonitrile					
C	Concentration (ppmdv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**
Benzene					
C	Concentration (ppmdv)	8.82	8.34	6.47	**7.88**
E	Emission rate (lb/hr)	5.45	5.09	4.03	**4.85**
E	Emission rate (lb/ton of trona)	0.0376	0.0351	0.0278	**0.0335**
Ethyl Benzene					
C	Concentration (ppmdv)	0.22	0.17	0.12	**0.17**
E	Emission rate (lb/hr)	0.18	0.14	0.11	**0.14**
E	Emission rate (lb/ton of trona)	0.0013	0.0010	0.0007	**0.0010**
Hexane					
C	Concentration (ppmdv)	3.52	3.42	2.62	**3.19**
E	Emission rate (lb/hr)	2.40	2.30	1.80	**2.17**
E	Emission rate (lb/ton of trona)	0.0166	0.0159	0.0124	**0.0150**
Methylene Chloride					
C	Concentration (ppmdv)	1.83	0.48	BDL	**0.77**
E	Emission rate (lb/hr)	1.23	0.32	BDL	**0.52**
E	Emission rate (lb/ton of trona)	0.0085	0.0022	BDL	**0.0036**
Styrene					
C	Concentration (ppmdv)	2.03	2.37	1.76	**2.06**
E	Emission rate (lb/hr)	1.68	1.93	1.46	**1.69**
E	Emission rate (lb/ton of trona)	0.0116	0.0133	0.0101	**0.0117**
Toluene					
C	Concentration (ppmdv)	2.87	2.97	2.18	**2.67**
E	Emission rate (lb/hr)	2.09	2.13	1.60	**1.94**
E	Emission rate (lb/ton of trona)	0.0144	0.0147	0.0111	**0.0134**
Trichloroethene					
C	Concentration (ppmdv)	0.53	0.47	0.16	**0.38**
E	Emission rate (lb/hr)	0.55	0.48	0.16	**0.40**
E	Emission rate (lb/ton of trona)	0.0038	0.0033	0.0011	**0.0027**
Xylene					
C	Concentration (ppmdv)	1.96	1.20	0.81	**1.32**
E	Emission rate (lb/hr)	1.64	1.00	0.69	**1.11**
E	Emission rate (lb/ton of trona)	0.0113	0.0069	0.0047	**0.0076**

BDL indicates value was below the detection limit. A value of zero was used for BDL in the average calculation.
[1] Process conditions provided by Solvay Minerals, Inc.
[2] Gas conditions are taken from near simultaneous BIF 0011 formaldehyde test.

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RESULTS

Table 2-6:
EP-5 Calciner Stack - Aldehydes and Ketones

Run No.		1	2	3	Average
Date (1995)		December 15	December 15	December 15	
Start Time (approx.)		08:26	10:47	12:57	
Stop Time (approx.)		10:11	12:30	14:40	
Process Conditions					
	Feed Rate (tons/hr)[1]	145	145	145	**145**
Gas Conditions					
T_s	Temperature (°F)	315	315	317	**315**
B_{wo}	Moisture (volume %)	35.58	35.98	35.86	**35.81**
O_2	Oxygen (dry volume %)	8.4	9.0	8.8	**8.7**
CO_2	Carbon dioxide (dry volume %)	14.6	14.2	14.2	**14.3**
Volumetric Flow Rate					
Q_a	Actual conditions (acfm)	144,500	143,400	146,400	**144,767**
Q_{std}	Standard conditions (dscfm)	50,830	50,130	51,170	**50,710**
Formaldehyde					
C	Concentration (lb/dscf)	3.99E-09	5.59E-09	2.97E-09	**4.19E-09**
C	Concentration (µg/dscm)	6.39E+01	8.96E+01	4.76E+01	**6.70E+01**
C	Concentration (ppmdv)	0.05	0.07	0.04	**0.05**
E	Emission rate (lb/hr)	0.01	0.02	0.01	**0.01**
E	Emission rate (lb/ton of trona)	0.0001	0.0001	0.0001	**0.0001**
Acetaldehyde					
C	Concentration (lb/dscf)	BDL	4.09E-09	5.85E-08	**2.08E-08**
C	Concentration (µg/dscm)	BDL	6.55E+01	9.36E+02	**3.34E+02**
C	Concentration (ppmdv)	BDL	0.04	0.51	**0.18**
E	Emission rate (lb/hr)	BDL	0.01	0.18	**0.06**
E	Emission rate (lb/ton of trona)	BDL	0.0001	0.0012	**0.0004**
Propionaldehyde					
C	Concentration (lb/dscf)	BDL	3.78E-09	1.75E-08	**7.09E-09**
C	Concentration (µg/dscm)	BDL	6.05E-01	2.80E+02	**1.14E+02**
C	Concentration (ppmdv)	BDL	0.03	0.12	**0.05**
E	Emission rate (lb/hr)	BDL	0.01	0.05	**0.02**
E	Emission rate (lb/ton of trona)	BDL	0.0001	0.0004	**0.0001**
Acrolein					
C	Concentration (lb/dscf)	2.01E-08	7.18E-08	9.02E-08	**6.07E-08**
C	Concentration (µg/dscm)	3.22E+02	1.15E+03	1.44E-03	**9.72E+02**
C	Concentration (ppmdv)	0.138	0.49	0.62	**0.42**
E	Emission rate (lb/hr)	0.061	0.22	0.28	**0.19**
E	Emission rate (lb/ton of trona)	0.0004	0.0015	0.0019	**0.0013**
Acetone					
C	Concentration (lb/dscf)	BDL	BDL	BDL	**BDL**
C	Concentration (µg/dscm)	BDL	BDL	BDL	**BDL**
C	Concentration (ppmdv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**
2-Butanone					
C	Concentration (lb/dscf)	BDL	BDL	BDL	**BDL**
C	Concentration (µg/dscm)	BDL	BDL	BDL	**BDL**
C	Concentration (ppmdv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**

BDL indicates value was below the detection limit. A value of zero was used for BDL in the average calculation.

[1] Process conditions proviced by Solvay Minerals, Inc.

RESULTS

Table 2-1: CA-3 Calciner Stack - Aldehydes and Ketones

Run No.		1	2	3	Average
Date (1996)		July 24	July 24	July 24	
Start Time (approx.)		12:38	15:10	17:38	
Stop Time (approx.)		14:45	17:17	19:46	
Process Conditions[1]					
	Feed Rate (tons/hr)	120	120	120	**120**
Gas Conditions					
T_s	Temperature (°F)	306	309	307	**308**
B_{wo}	Moisture (volume %)	28.56	28.82	29.05	**28.81**
O_2	Oxygen (dry volume %)	12.3	12.3	13.0	**12.5**
CO_2	Carbon dioxide (dry volume %)	9.3	9.7	9.3	**9.4**
Volumetric Flow Rate					
Q_a	Actual conditions (acfm)	177,500	168,800	165,400	**170,567**
Q_{std}	Standard conditions (dscfm)	70,120	66,190	64,810	**67,040**
Formaldehyde					
C	Concentration (lb/dscf)	1.14E-08	7.78E-09	6.63E-09	**8.61E-09**
C	Concentration (µg/dscm)	1.83E+02	1.25E+02	1.06E+02	**1.38E+02**
C	Concentration (ppmdv)	0.147	0.100	0.085	**0.110**
E	Emission rate (lb/hr)	0.048	0.031	0.026	**0.035**
E	Emission rate (lb/ton of trona)	0.0004	0.0003	0.0002	**0.0003**
Acetaldehyde					
C	Concentration (lb/dscf)	8.48E-09	2.89E-08	2.50E-08	**2.08E-08**
C	Concentration (µg/dscm)	1.36E+02	4.62E+02	4.00E+02	**3.33E+02**
C	Concentration (ppmdv)	0.074	0.252	0.218	**0.182**
E	Emission rate (lb/hr)	0.036	0.115	0.097	**0.082**
E	Emission rate (lb/ton of trona)	0.0003	0.0010	0.0008	**0.0007**
Propionaldehyde					
C	Concentration (lb/dscf)	3.07E-09	8.43E-09	6.95E-09	**6.15E-09**
C	Concentration (µg/dscm)	4.91E+01	1.35E+02	1.11E+02	**9.85E+01**
C	Concentration (ppmdv)	0.020	0.056	0.046	**0.041**
E	Emission rate (lb/hr)	0.013	0.033	0.027	**0.025**
E	Emission rate (lb/ton of trona)	0.0001	0.0003	0.0002	**0.0002**
Acrolein[2]					
C	Concentration (lb/dscf)	2.04E-08	5.47E-08	4.69E-08	**4.07E-08**
C	Concentration (µg/dscm)	3.27E+02	8.75E+02	7.52E+02	**6.51E+02**
C	Concentration (ppmdv)	0.140	0.376	0.323	**0.280**
E	Emission rate (lb/hr)	0.086	0.217	0.183	**0.162**
E	Emission rate (lb/ton of trona)	0.0007	0.0018	0.0015	**0.0014**
Acetone[2]					
C	Concentration (lb/dscf)	9.27E-09	2.54E-08	2.16E-08	**1.88E-08**
C	Concentration (µg/dscm)	1.48E+02	4.07E+02	3.46E+02	**3.01E+02**
C	Concentration (ppmdv)	0.061	0.169	0.143	**0.124**
E	Emission rate (lb/hr)	0.039	0.101	0.084	**0.075**
E	Emission rate (lb/ton of trona)	0.0003	0.0008	0.0007	**0.0006**
2-Butanone					
C	Concentration (lb/dscf)	4.57E-09	1.04E-08	8.21E-09	**7.72E-09**
C	Concentration (µg/dscm)	7.32E+01	1.66E+02	1.32E+02	**1.24E+02**
C	Concentration (ppmdv)	0.024	0.055	0.044	**0.041**
E	Emission rate (lb/hr)	0.019	0.041	0.032	**0.031**
E	Emission rate (lb/ton of trona)	0.0002	0.0003	0.0003	**0.0003**

[1] Process conditions provided by Solvay Minerals, Inc.
[2] Acetone and acrolein peaks unresolved. See comments in project overview.

RESULTS

Table 2-1:
CA-3 Calciner Stack - Total Non-Methane/Ethane Hydrocarbons

Run No.		1	2	3	Average
Date (1996)		July 25	July 25	July 25	
Start Time (approx.)		12:06	13:37	14:54	
Stop Time (approx.)		13:06	14:37	15:54	
Process Conditions[1]					
	Feed rate (ton of trona/hr)	155.1	155.1	155.1	**155.1**
Gas Conditions[2]					
T_s	Temperature (°F)	351	348	349	**349**
O_2	Oxygen (dry volume %)	13.0	12.3	12.1	**12.5**
CO_2	Carbon Dioxide (dry volume %)	9.0	9.7	9.9	**9.5**
B_{wo}	Moisture (volume %)	29.70	29.13	30.10	**29.64**
Q_{std}	Standard conditions (dscfm)	77,440	75,650	70,690	**74,593**
Total Hydrocarbons (as propane)					
C	Concentration (ppmdv)	625.2	706.3	988.3	**773.3**
E	Emission rate (lb/hr)	332.5	366.9	479.7	**393.0**
E	Emission rate (lb/ton of trona)	2.144	2.366	3.093	**2.534**
Methane					
C	Concentration (ppmdv)	354.0	400.3	431.0	**395.1**
E	Emission rate (lb/hr)	68.5	75.6	76.1	**73.4**
E	Emission rate (lb/ton of trona)	0.441	0.488	0.491	**0.473**
Ethane					
C	Concentration (ppmdv)	45.7	53.1	62.6	**53.8**
E	Emission rate (lb/hr)	16.6	18.8	20.7	**18.7**
E	Emission rate (lb/ton of trona)	0.107	0.121	0.134	**0.121**
Total Non-Methane/Ethane Hydrocarbons (as propane)					
E	Emission rate (lb/hr)	247.4	272.5	382.9	**300.9**
E	Emission rate (lb/ton of trona)	1.595	1.757	2.469	**1.940**

[1] Feed rate provided by Solvay Minerals, Inc.
[2] Gas conditions taken from near simultaneous velocity and moisture testing.

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RESULTS

Table 2-2:
CA-3 Calciner Stack - Volatile Organic Compounds

Run No.		1	2	3	Average
Date (1995)		July 25	July 25	July 25	
Start Time (approx.)		11:58	13:39	14:56	
Stop Time (approx.)		13:13	14:30	16:12	
Process Conditions[1]					
	Feed rate (ton of trona/hr)	155.1	155.1	155.1	**155.1**
Gas Conditions[2]					
B_{wo}	Moisture (% by volume)	29.70	29.13	30.10	**29.64**
Q_{std}	Volumetric flow rate, standard (dscfm)	77,440	75,650	70,690	**74,593**
1,1,1-Trichloroethane					
C	Concentration (ppmdv)	BDL	3.78	BDL	**1.26**
E	Emission rate (lb/hr)	BDL	5.94	BDL	**1.98**
E	Emission rate (lb/ton of trona)	BDL	0.0383	BDL	**0.0128**
1,3 Butadiene					
C	Concentration (ppmdv)	7.48	11.49	38.20	**19.06**
E	Emission rate (lb/hr)	4.88	7.32	22.74	**11.65**
E	Emission rate (lb/ton of trona)	0.0315	0.0472	0.1466	**0.0751**
2-Butanone					
C	Concentration (ppmdv)	0.88	0.87	1.40	**1.05**
E	Emission rate (lb/hr)	0.77	0.74	1.11	**0.87**
E	Emission rate (lb/ton of trona)	0.0049	0.0048	0.0072	**0.0056**
Acrylonitrile					
C	Concentration (ppmdv)	BDL	BDL	2.33	**0.78**
E	Emission rate (lb/hr)	BDL	BDL	1.36	**0.45**
E	Emission rate (lb/ton of trona)	BDL	BDL	0.0088	**0.0029**
Benzene					
C	Concentration (ppmdv)	4.42	4.88	11.43	**6.91**
E	Emission rate (lb/hr)	4.17	4.49	9.83	**6.16**
E	Emission rate (lb/ton of trona)	0.0269	0.0290	0.0634	**0.0397**
Ethyl Benzene					
C	Concentration (ppmdv)	BDL	BDL	0.54	**0.18**
E	Emission rate (lb/hr)	BDL	BDL	0.64	**0.21**
E	Emission rate (lb/ton of trona)	BDL	BDL	0.0041	**0.0014**
Hexane					
C	Concentration (ppmdv)	0.97	1.34	4.69	**2.33**
E	Emission rate (lb/hr)	1.01	1.36	4.45	**2.27**
E	Emission rate (lb/ton of trona)	0.0065	0.0088	0.0287	**0.0147**
Methylene Chloride					
C	Concentration (ppmdv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**
Styrene					
C	Concentration (ppmdv)	BDL	0.17	0.94	**0.37**
E	Emission rate (lb/hr)	BDL	0.21	1.08	**0.43**
E	Emission rate (lb/ton of trona)	BDL	0.0013	0.0070	**0.0028**
Toluene					
C	Concentration (ppmdv)	0.85	1.02	2.78	**1.55**
E	Emission rate (lb/hr)	0.95	1.10	2.82	**1.62**
E	Emission rate (lb/ton of trona)	0.0061	0.0071	0.0182	**0.0105**
Trichloroethene					
C	Concentration (ppmdv)	0.23	0.71	1.87	**0.94**
E	Emission rate (lb/hr)	0.36	1.09	2.71	**1.39**
E	Emission rate (lb/ton of trona)	0.0023	0.0070	0.0175	**0.0089**
Xylene					
C	Concentration (ppmdv)	1.45	1.78	3.42	**2.22**
E	Emission rate (lb/hr)	1.86	2.22	4.00	**2.69**
E	Emission rate (lb/ton of trona)	0.0120	0.0143	0.0258	**0.0174**

BDL indicates value was below the detection limit. A value of zero was used for BDL in the average calculation.
[1] Process conditions provided by Solvay Minerals, Inc.
[2] Gas conditions are taken from near simultaneous velocity and moisture testing.

RESULTS

Table 2-1:
CA-3 Calciner Stack - Nitrogen Oxides

Run No.		1	2	3	Average
Date (1996)		July 25	July 25	July 25	
Start Time (approx.)		12:06	13:37	14:54	
Stop Time (approx.)		13:06	14:37	15:54	
Process Conditions[1]					
	Trona feed rate (tons/hr)	155.1	155.1	155.1	**155.1**
Gas Conditions[2]					
T_s	Temperature (°F)	351	348	349	**349**
O_2	Oxygen (dry volume %)	13.0	12.3	12.1	**12.47**
CO_2	Carbon Dioxide (dry volume %)	9.0	9.7	9.9	**9.53**
B_{wo}	Moisture (volume %)	29.70	29.13	30.10	**29.64**
Q_{std}	Standard conditions (dscfm)	77,440	75,650	70,690	**74,593**
Nitrogen Oxides					
C	Concentration (ppmdv)	14.8	15.0	13.4	**14.4**
E	Emission rate (lb/hr)	8.24	8.11	6.81	**7.72**
E	Emission rate (lb/ton of trona)	0.053	0.052	0.044	**0.050**

[1] Feed rate data provided by Solvay Minerals, Inc.
[2] Gas conditions were taken from simultaneous velocity and moisture testing.

RESULTS

Table 2-1:
CA-3 Calciner Stack - Total Hydrocarbons

Run No.		1	2	3	Average
Date (1996)		November 12	November 12	November 12	
Start Time (approx.)		10:17	12:13	13:57	
Stop Time (approx.)		12:00	13:44	15:40	
Process Conditions[1]					
Feed rate (ton/hr)		160	160	160	**160**
Gas Conditions[2]					
T_s	Temperature (°F)	307	312	312	**310**
O_2	Oxygen (dry volume %)	14.2	13.4	12.8	**13.5**
CO_2	Carbon Dioxide (dry volume %)	7.4	8.3	8.8	**8.2**
B_{wo}	Moisture (volume %)	23.65	26.22	24.55	**24.81**
Q_{std}	Standard conditions (dscfm)	68,170	73,260	76,540	**72,657**
Total Hydrocarbons (as propane)					
C	Concentration (ppmdv)	756.3	838.1	767.7	**787.4**
E	Emission rate (lb/hr)	354.0	421.6	403.5	**393.1**
E	Emission rate (lb/ton of trona)	2.2127	2.6351	2.5219	**2.4566**

1 Process conditions obtained from Solvay Minerals, Inc.
2 Gas conditions obtained from concurrent Method 1-4 testing.

RESULTS

Table 2-2:
CA-3 Calciner Stack - GCMS HAPs

Run No.		1	2	3	Average
Date (1996)		November 12	November 12	November 12	
Start Time (approx.)		10:17	12:13	13:57	
Stop Time (approx.)		12:00	13:44	15:40	
Process Conditions[1]					
Feed rate (ton of trona/hr)		160	160	160	**160**
Volumetric Flow Rate[2]					
Q_a	Actual conditions (acfm)	163,300	182,900	186,600	**177,600**
Q_{std}	Standard conditions (dscfm)	68,170	73,260	76,540	**72,660**
Benzene					
C	Concentration (ppm)	4.12	5.44	4.78	**4.78**
E	Emission rate (lb/hr)	3.42	4.85	4.45	**4.24**
E	Emission rate (lb/ton of trona)	0.0214	0.0303	0.0278	**0.0265**
1,3 Butadiene					
C	Concentration (ppm)	0.22	0.25	0.15	**0.21**
E	Emission rate (lb/hr)	0.13	0.15	0.10	**0.13**
E	Emission rate (lb/ton of trona)	0.0008	0.0010	0.0006	**0.0008**
Ethylbenzene					
C	Concentration (ppm)	0.56	0.65	0.69	**0.63**
E	Emission rate (lb/hr)	0.63	0.79	0.87	**0.76**
E	Emission rate (lb/ton of trona)	0.0039	0.0049	0.0055	**0.0048**
2-Butanone					
C	Concentration (ppm)	0.92	1.17	1.16	**1.08**
E	Emission rate (lb/hr)	0.70	0.96	1.00	**0.89**
E	Emission rate (lb/ton of trona)	0.0044	0.0060	0.0062	**0.0055**
Hexane					
C	Concentration (ppm)	0.08	0.08	0.22	**0.13**
E	Emission rate (lb/hr)	0.07	0.08	0.23	**0.13**
E	Emission rate (lb/ton of trona)	0.0005	0.0005	0.0014	**0.0008**
Styrene					
C	Concentration (ppm)	0.38	0.53	0.47	**0.46**
E	Emission rate (lb/hr)	0.42	0.63	0.58	**0.54**
E	Emission rate (lb/ton of trona)	0.0026	0.0039	0.0036	**0.0034**
Toluene					
C	Concentration (ppm)	1.67	2.22	2.08	**1.99**
E	Emission rate (lb/hr)	1.63	2.33	2.28	**2.08**
E	Emission rate (lb/ton of trona)	0.0102	0.0146	0.0143	**0.0130**
Xylene					
C	Concentration (ppm)	2.51	3.22	3.30	**3.01**
E	Emission rate (lb/hr)	2.83	3.90	4.18	**3.63**
E	Emission rate (lb/ton of trona)	0.0177	0.0244	0.0261	**0.0227**
Total HAPs					
E	Emission rate (lb/hr)	9.83	13.69	13.69	**12.40**
E	Emission rate (lb/ton of trona)	0.0615	0.0856	0.0855	**0.0775**

[1] Process conditions provided by Solvay Minerals, Inc.
[2] Flow conditions obtained from concurrent Method 1-4 testing.

RESULTS

Table 2-2:
CA-3 Calciner Stack - GCMS HAPs

Run No.		1	2	3	Average
Date (1996)		November 12	November 12	November 12	
Start Time (approx.)		10:17	12:13	13:57	
Stop Time (approx.)		12:00	13:44	15:40	
Process Conditions[1]					
Feed rate (ton of trona/hr)		160	160	160	**160**
Volumetric Flow Rate[2]					
Q_a	Actual conditions (acfm)	163,300	182,900	186,600	**177,600**
Q_{std}	Standard conditions (dscfm)	68,170	73,260	76,540	**72,660**
Benzene					
C	Concentration (ppm)	4.12	5.44	4.78	**4.78**
E	Emission rate (lb/hr)	3.42	4.85	4.45	**4.24**
E	Emission rate (lb/ton of trona)	0.0214	0.0303	0.0278	**0.0265**
1,3 Butadiene					
C	Concentration (ppm)	0.22	0.25	0.15	**0.21**
E	Emission rate (lb/hr)	0.13	0.15	0.10	**0.13**
E	Emission rate (lb/ton of trona)	0.0008	0.0010	0.0006	**0.0008**
Ethylbenzene					
C	Concentration (ppm)	0.56	0.65	0.69	**0.63**
E	Emission rate (lb/hr)	0.63	0.79	0.87	**0.76**
E	Emission rate (lb/ton of trona)	0.0039	0.0049	0.0055	**0.0048**
2-Butanone					
C	Concentration (ppm)	0.92	1.17	1.16	**1.08**
E	Emission rate (lb/hr)	0.70	0.96	1.00	**0.89**
E	Emission rate (lb/ton of trona)	0.0044	0.0060	0.0062	**0.0055**
Hexane					
C	Concentration (ppm)	0.08	0.08	0.22	**0.13**
E	Emission rate (lb/hr)	0.07	0.08	0.23	**0.13**
E	Emission rate (lb/ton of trona)	0.0005	0.0005	0.0014	**0.0008**
Styrene					
C	Concentration (ppm)	0.38	0.53	0.47	**0.46**
E	Emission rate (lb/hr)	0.42	0.63	0.58	**0.54**
E	Emission rate (lb/ton of trona)	0.0026	0.0039	0.0036	**0.0034**
Toluene					
C	Concentration (ppm)	1.67	2.22	2.08	**1.99**
E	Emission rate (lb/hr)	1.63	2.33	2.28	**2.08**
E	Emission rate (lb/ton of trona)	0.0102	0.0146	0.0143	**0.0130**
Xylene					
C	Concentration (ppm)	2.51	3.22	3.30	**3.01**
E	Emission rate (lb/hr)	2.83	3.90	4.18	**3.63**
E	Emission rate (lb/ton of trona)	0.0177	0.0244	0.0261	**0.0227**
Total HAPs					
E	Emission rate (lb/hr)	9.83	13.69	13.69	**12.40**
E	Emission rate (lb/ton of trona)	0.0615	0.0856	0.0855	**0.0775**

[1] Process conditions provided by Solvay Minerals, Inc.
[2] Flow conditions obtained from concurrent Method 1-4 testing.

PROJECT OVERVIEW

During the course of the test program the 100g external calibration was discovered to be drifting. After discussing the problem with OHAUS it was found that the balance had a high range internal calibration mode that was not being performed. The high range internal calibration was then performed and the actual value of the 100g calibration weight was established.

At this point a correction factor was applied to all tare and gross weights over 1.0g. The correction factor was derived by taking the known calibration weight value and dividing it by the calibration value of each day. All subsequent tare and gross weights were multiplied by the correction factor of each day. All original and corrected weights can be found in Appendix F, Laboratory Data.

Coordinating the field testing were:

D. Potter - Solvay Minerals, Inc.
M. Pierce - Clean Air Engineering

Table 1-2:
Summary of Test Results

Source	Constituent	Sampling Method	Average Concentration
CA-3 Inlet	Total Inorganic Particulate (gr/dscf)	EPA M17	80.3491
CA-3 Stack	Total Inorganic Particulate (gr/dscf)	EPAM5/202	0.0093
	Removal Efficiency (%)[1]		99.988

[1] Removal Efficiency based on total inorganic particulate (gr/dscf).

RESULTS

Table 2-1:
CA-3 Calciner Stack - Particulate, Condition 1

Run No.[1]		1	3	4	Average
Date (1997)		May 22	May 22	May 22	
Start Time (approx.)		12:00	15:40	17:30	
Stop Time (approx.)		13:06	16:48	18:35	
Process Conditions[2]					
	Feed Rate (tons/hr)	198	198	198	**198**
Gas Conditions					
T_s	Temperature (°F)	306	307	308	**307**
B_{wo}	Moisture (volume %)	34.24	33.46	33.16	**33.62**
O_2	Oxygen (dry volume %)	9.6	9.7	9.6	**9.6**
CO_2	Carbon dioxide (dry volume %)	12.6	12.8	13.0	**12.8**
Volumetric Flow Rate					
Q_a	Actual conditions (acfm)	196,400	191,000	190,800	**192,700**
Q_{std}	Standard conditions (dscfm)	70,370	69,150	69,320	**69,610**
Front Half Total Particulate					
C	Concentration (gr/dscf)	0.0007	0.0012	0.0009	**0.0009**
E	Emission rate (lb/hr)	0.42	0.70	0.55	**0.56**
E	Emission rate (lb/ton of trona)	0.002	0.004	0.003	**0.003**
Back Half Organic Particulate					
C	Concentration (gr/dscf)	0.0178	0.0223	0.0236	**0.0212**
E	Emission rate (lb/hr)	10.7	13.2	14.0	**12.6**
E	Emission rate (lb/ton of trona)	0.054	0.067	0.071	**0.064**
Back Half Inorganic Particulate					
C	Concentration (gr/dscf)	0.0050	0.0036	0.0048	**0.0044**
E	Emission rate (lb/hr)	3.00	2.14	2.82	**2.66**
E	Emission rate (lb/ton of trona)	0.015	0.011	0.014	**0.013**
Back Half Total Particulate					
C	Concentration (gr/dscf)	0.0228	0.0259	0.0283	**0.0257**
E	Emission rate (lb/hr)	13.7	15.3	16.8	**15.3**
E	Emission rate (lb/ton of trona)	0.069	0.077	0.085	**0.077**
Front and Back Half Inorganic Particulate					
C	Concentration (gr/dscf)	0.0057	0.0048	0.0057	**0.0054**
E	Emission rate (lb/hr)	3.42	2.84	3.37	**3.21**
E	Emission rate (lb/ton of trona)	0.017	0.014	0.017	**0.016**

[1] Run 2 was aborted because high winds knocked over the sampling train.
[2] Process conditions provided by Solvay Minerals, Inc.

RESULTS

Table 2-2:
CA-3 Calciner Stack - Particulate, Condition 2

Run No.		5	6	7	Average
Date (1997)		May 28	May 28	May 28	
Start Time (approx.)		08:30	10:23	12:15	
Stop Time (approx.)		09:37	11:29	13:21	
Process Conditions					
	Feed Rate (tons/hr)	181	181	181	**181**
Gas Conditions					
T_s	Temperature (°F)	294	293	294	**294**
B_{wo}	Moisture (volume %)	32.20	32.14	31.56	**31.97**
O_2	Oxygen (dry volume %)	10.3	10.3	10.3	**10.3**
CO_2	Carbon dioxide (dry volume %)	12.5	12.6	12.5	**12.5**
Volumetric Flow Rate					
Q_a	Actual conditions (acfm)	177,700	173,200	184,100	**178,300**
Q_{std}	Standard conditions (dscfm)	67,760	66,220	70,910	**68,300**
Front Half Total Particulate					
C	Concentration (gr/dscf)	0.0042	0.0016	0.0020	**0.0026**
E	Emission rate (lb/hr)	2.46	0.92	1.23	**1.54**
E	Emission rate (lb/ton of trona)	0.014	0.005	0.007	**0.008**
Back Half Organic Particulate					
C	Concentration (gr/dscf)	0.0235	0.0167	0.0231	**0.0211**
E	Emission rate (lb/hr)	13.6	9.49	14.0	**12.4**
E	Emission rate (lb/ton of trona)	0.075	0.052	0.078	**0.068**
Back Half Inorganic Particulate					
C	Concentration (gr/dscf)	0.0064	0.0063	0.0081	**0.0070**
E	Emission rate (lb/hr)	3.72	3.60	4.92	**4.08**
E	Emission rate (lb/ton of trona)	0.021	0.020	0.027	**0.023**
Back Half Total Particulate					
C	Concentration (gr/dscf)	0.0299	0.0231	0.0312	**0.0280**
E	Emission rate (lb/hr)	17.4	13.1	19.0	**16.5**
E	Emission rate (lb/ton of trona)	0.096	0.072	0.105	**0.091**
Front and Back Half Inorganic Particulate					
C	Concentration (gr/dscf)	0.0106	0.0080	0.0101	**0.0096**
E	Emission rate (lb/hr)	6.18	4.53	6.15	**5.62**
E	Emission rate (lb/ton of trona)	0.034	0.025	0.034	**0.031**

RESULTS

Table 2-3:
CA-3 Calciner Stack - Particulate, Condition 3

Run No.		**8**
Date (1997)		May 30
Start Time (approx.)		08:17
Stop Time (approx.)		09:20
Process Conditions		
	Feed Rate (tons/hr)	216
Gas Conditions		
T_s	Temperature (°F)	314
B_{wo}	Moisture (volume %)	33.48
O_2	Oxygen (dry volume %)	9.7
CO_2	Carbon dioxide (dry volume %)	12.9
Volumetric Flow Rate		
Q_a	Actual conditions (acfm)	207,400
Q_{std}	Standard conditions (dscfm)	75,910
Front Half Total Particulate		
C	Concentration (gr/dscf)	0.0020
E	Emission rate (lb/hr)	1.28
E	Emission rate (lb/ton of trona)	0.006
Back Half Organic Particulate		
C	Concentration (gr/dscf)	0.0135
E	Emission rate (lb/hr)	8.78
E	Emission rate (lb/ton of trona)	0.041
Back Half Inorganic Particulate		
C	Concentration (gr/dscf)	0.0048
E	Emission rate (lb/hr)	3.14
E	Emission rate (lb/ton of trona)	0.015
Back Half Total Particulate		
C	Concentration (gr/dscf)	0.0183
E	Emission rate (lb/hr)	11.9
E	Emission rate (lb/ton of trona)	0.055
Front and Back Half Inorganic Particulate		
C	Concentration (gr/dscf)	0.0068
E	Emission rate (lb/hr)	4.42
E	Emission rate (lb/ton of trona)	0.020

RESULTS

Table 2-4:
CA-3 Calciner Stack - NOx, CO and Total Non-Methane/Ethane Hydrocarbons, Condition 1

Run No.[1]		1	3	4	Average
Date (1997)		May 22	May 22	May 22	
Start Time (approx.)		12:00	15:40	17:30	
Stop Time (approx.)		13:06	16:48	18:35	
Process Conditions[2]					
	Feed Rate (ton of trona/hr)	198	198	198	
Gas Conditions[3]					
T_s	Temperature (°F)	306	307	308	**307**
B_{wc}	Moisture (volume %)	34.2	33.5	33.2	**33.6**
Q_{std}	Standard conditions (dscfm)	70,370	69,150	69,320	**69,613**
Oxygen					
C	Concentration (%)	9.5	9.4	9.2	**9.4**
Carbon Dioxide					
C	Concentration (%)	13.8	13.0	13.1	**13.3**
Nitrogen Oxides					
C	Concentration (ppmdv)	28.3	30.6	34.5	**31.1**
E	Emission rate (lb/hr)	14.2	15.2	17.1	**15.5**
E	Emission rate (lb/ton trona)	0.0719	0.0766	0.0864	**0.0783**
Carbon Monoxide					
C	Concentration (ppmdv)	1,869	1,815	1,833	**1,839**
E	Emission rate (lb/hr)	574	547	554	**558**
E	Emission rate (lb/ton trona)	2.90	2.76	2.80	**2.82**
Total Hydrocarbons (As Propane)					
C	Concentration (ppmdv)	287	212	214	**238**
E	Emission rate (lb/hr)	139	101	102	**114**
E	Emission rate (lb/ton trona)	0.701	0.509	0.514	**0.574**
Methane					
C	Concentration (ppmdv)	380	221	199	**266**
E	Emission rate (lb/hr)	66.8	38.1	34.4	**46.4**
E	Emission rate (lb/ton trona)	0.337	0.193	0.174	**0.234**
Ethane					
C	Concentration (ppmdv)	16.6	10.3	0.00	**9.0**
E	Emission rate (lb/hr)	5.46	3.33	0.00	**2.93**
E	Emission rate (lb/ton trona)	0.0276	0.0168	0.00	**0.0148**
Total Non-methane/Ethane Hydrocarbons (as propane)					
E	Emission rate (lb/hr)	66.6	59.3	67.3	**64.4**
E	Emission rate (lb/ton trona)	0.336	0.299	0.340	**0.325**

[1] Run 2 was void due to high winds knocking over the sampling train.
[2] Feed rate provided by Solvay Minerals, Inc.
[3] Gas conditions obtained from concurrent Method 5/202 testing.

RESULTS

Table 2-5:
CA-3 Calciner Stack - NOx, CO and Total Non-Methane/Ethane Hydrocarbons, Condition 2

Run No.		5	6	7	Average
Date (1997)		May 28	May 28	May 28	
Start Time (approx.)		08:30	10:23	12:15	
Stop Time (approx.)		09:37	11:29	13:21	
Process Conditions[1]					
	Feed Rate (ton of trona/hr)	181	181	181	
Gas Conditions[2]					
T_s	Temperature (°F)	306	307	308	**307**
B_{wc}	Moisture (volume %)	32.20	32.14	31.56	**31.97**
Q_{stc}	Standard conditions (dscfm)	67,760	66,220	70,910	**68,297**
Oxygen					
C	Concentration (%)	10.3	10.3	10.2	**10.2**
Carbon Dioxide					
C	Concentration (%)	12.5	12.6	12.6	**12.6**
Nitrogen Oxides					
C	Concentration (ppmdv)	26.9	27.6	30.0	**28.1**
E	Emission rate (lb/hr)	13.0	13.1	15.2	**13.8**
E	Emission rate (lb/ton trona)	0.0721	0.0724	0.0841	**0.0762**
Carbon Monoxide					
C	Concentration (ppmdv)	2,054	1,881	2,152	**2,029**
E	Emission rate (lb/hr)	607	543	666	**605**
E	Emission rate (lb/ton trona)	3.36	3.00	3.68	**3.35**
Total Hydrocarbons					
C	Concentration (ppmdv)	407	325	428	**387**
E	Emission rate (lb/hr)	189	148	208	**182**
E	Emission rate (lb/ton trona)	1.05	0.817	1.15	**1.01**
Methane					
C	Concentration (ppmdv)	451	398	411	**420**
E	Emission rate (lb/hr)	76.4	65.8	72.9	**71.7**
E	Emission rate (lb/ton trona)	0.422	0.364	0.403	**0.396**
Ethane					
C	Concentration (ppmdv)	26.9	24.7	25.2	**25.6**
E	Emission rate (lb/hr)	8.55	7.67	8.38	**8.20**
E	Emission rate (lb/ton trona)	0.0472	0.0424	0.0463	**0.0453**
Total Non-methane/Ethane Hydrocarbons (as propane)					
E	Emission rate (lb/hr)	105	74.4	127	**102**
E	Emission rate (lb/ton trona)	0.578	0.411	0.702	**0.564**

[1] Feed rate provided by Solvay Minerals, Inc.
[2] Gas conditions obtained from concurrent Method 5/202 testing.

RESULTS

Table 2-6:
CA-3 Calciner Stack - NOx, CO and Total Non-Methane/Ethane Hydrocarbons, Condition 3

Run No.		**8**
Date (1997)		May 30
Start Time (approx.)		08:17
Stop Time (approx.)		09:20
Process Conditions[1]		
	Feed Rate (ton of trona/hr)	216
Gas Conditions[2]		
T_s	Temperature (°F)	314
B_{wo}	Moisture (volume %)	33.48
Q_{std}	Standard conditions (dscfm)	75,910
Oxygen		
C	Concentration (%)	9.7
Carbon Dioxide		
C	Concentration (%)	12.9
Nitrogen Oxides		
C	Concentration (ppmdv)	31.2
E	Emission rate (lb/hr)	17.0
E	Emission rate (lb/ton trona)	0.079
Carbon Monoxide		
C	Concentration (ppmdv)	1,467
E	Emission rate (lb/hr)	486
E	Emission rate (lb/ton trona)	2.25
Total Hydrocarbons		
C	Concentration (ppmdv)	338
E	Emission rate (lb/hr)	176
E	Emission rate (lb/ton trona)	0.818
Methane		
C	Concentration (ppmdv)	522
E	Emission rate (lb/hr)	99.0
E	Emission rate (lb/ton trona)	0.459
Ethane		
C	Concentration (ppmdv)	26.5
E	Emission rate (lb/hr)	9.41
E	Emission rate (lb/ton trona)	0.0437
Total Non-methane/Ethane Hydrocarbons (as propane)		
E	Emission rate (lb/hr)	67.9
E	Emission rate (lb/ton trona)	0.315

[1] Feed rate provided by Solvay Minerals, Inc.
[2] Gas conditions obtained from concurrent Method 5/202 testing.

RESULTS

Table 2-7:
CA-3 Calciner Stack - Volatile Organic Compounds, Condition 1

Run No.[1]		1	3	4	Average
Date (1997)		May 22	May 22	May 22	
Start Time (approx.)		12:00	15:40	17:30	
Stop Time (approx.)		13:06	16:48	18:35	
Process Conditions[2]					
	Feed rate (ton of trona/hr)	198	198	198	**198**
Gas Conditions[3]					
B_{wo}	Moisture (% by volume)	34.24	33.46	33.16	**33.62**
Q_{sd}	Volumetric flow rate, standard (dscfm)	70,370	69,150	69,320	**69,610**
1,1,1-Trichloroethane					
C	Concentration (ppmdv)	BDL	BDL	0.172	**0.172**
E	Emission rate (lb/hr)	BDL	BDL	0.100	**0.100**
E	Emission rate (lb/ton of trona)	BDL	BDL	0.0005	**0.0005**
1,3 Butadiene					
C	Concentration (ppmdv)	10.1	7.55	8.8	**8.9**
E	Emission rate (lb/hr)	6.01	4.57	5.16	**5.25**
E	Emission rate (lb/ton of trona)	0.0304	0.0231	0.0261	**0.0265**
2-Butanone					
C	Concentration (ppmdv)	0.957	0.481	1.49	**0.975**
E	Emission rate (lb/hr)	0.756	0.373	1.16	**0.762**
E	Emission rate (lb/ton of trona)	0.0038	0.0019	0.0058	**0.0038**
Acrylonitrile					
C	Concentration (ppmdv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**
Benzene					
C	Concentration (ppmdv)	3.30	2.93	2.82	**3.02**
E	Emission rate (lb/hr)	2.82	2.46	2.36	**2.55**
E	Emission rate (lb/ton of trona)	0.0143	0.0124	0.0120	**0.0129**
Ethyl Benzene					
C	Concentration (ppmdv)	0.887	0.920	0.183	**0.663**
E	Emission rate (lb/hr)	1.03	1.05	0.209	**0.764**
E	Emission rate (lb/ton of trona)	0.0052	0.0053	0.0011	**0.0039**
Hexane					
C	Concentration (ppmdv)	1.06	0.730	0.935	**0.908**
E	Emission rate (lb/hr)	1.00	0.678	0.870	**0.850**
E	Emission rate (lb/ton of trona)	0.0051	0.0034	0.0044	**0.0043**
Methylene Chloride					
C	Concentration (ppmdv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**
Styrene					
C	Concentration (ppmdv)	0.595	0.807	1.57	**0.923**
E	Emission rate (lb/hr)	0.679	0.681	1.76	**1.04**
E	Emission rate (lb/ton of trona)	0.0034	0.0034	0.0089	**0.0053**
Toluene					
C	Concentration (ppmdv)	2.04	1.82	1.27	**1.71**
E	Emission rate (lb/hr)	2.06	1.81	1.27	**1.71**
E	Emission rate (lb/ton of trona)	0.0104	0.0091	0.0064	**0.0086**
Trichloroethene					
C	Concentration (ppmdv)	0.450	0.299	0.238	**0.329**
E	Emission rate (lb/hr)	0.648	0.423	0.337	**0.470**
E	Emission rate (lb/ton of trona)	0.0033	0.0021	0.0017	**0.0024**
Xylene					
C	Concentration (ppmdv)	1.95	1.33	2.11	**1.79**
E	Emission rate (lb/hr)	2.26	1.52	2.41	**2.06**
E	Emission rate (lb/ton of trona)	0.0114	0.0077	0.0122	**0.0104**

BDL indicates value was below the detection limit. A value of zero was used for BDL in the average calculation.
[1] Run 2 was aborted because high winds knocked over the sampling train.
[2] Process conditions provided by Solvay Minerals, Inc.
[3] Gas conditions are taken from near simultaneous velocity and moisture testing.

RESULTS

Table 2-8:
CA-3 Calciner Stack - Volatile Organic Compounds, Condition 2

Run No.		5	6	7	Average
Date (1997)		May 28	May 28	May 28	
Start Time (approx.)		08:30	10:23	12:15	
Stop Time (approx.)		09:37	11:29	13:21	
Process Conditions[1]					
	Feed rate (ton of trona/hr)	181	181	181	**181**
Gas Conditions[2]					
B_{wc}	Moisture (% by volume)	32.20	32.14	31.56	**31.97**
Q_{std}	Volumetric flow rate, standard (dscfm)	67,760	66,220	70,910	**68,297**
1,1,1-Trichloroethane					
C	Concentration (ppmcv)	6.83	BDL	BDL	**2.28**
E	Emission rate (lb/hr)	9.62	BDL	BDL	**3.21**
E	Emission rate (lb/ton of trona)	0.0531	BDL	BDL	**0.0177**
1,3 Butadiene					
C	Concentration (ppmcv)	15.4	12.2	17.5	**15.0**
E	Emission rate (lb/hr)	8.79	6.80	10.5	**8.68**
E	Emission rate (lb/ton of trona)	0.0486	0.0376	0.0578	**0.0480**
2-Butanone					
C	Concentration (ppmcv)	1.38	1.54	1.91	**1.61**
E	Emission rate (lb/hr)	1.05	1.14	1.52	**1.24**
E	Emission rate (lb/ton of trona)	0.0058	0.0063	0.0084	**0.0068**
Acrylonitrile					
C	Concentration (ppmcv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**
Benzene					
C	Concentration (ppmcv)	4.42	3.21	4.22	**3.95**
E	Emission rate (lb/hr)	3.64	2.58	3.64	**3.29**
E	Emission rate (lb/ton of trona)	0.0201	0.0143	0.0201	**0.0182**
Ethyl Benzene					
C	Concentration (ppmcv)	0.541	0.343	0.358	**0.414**
E	Emission rate (lb/hr)	0.606	0.376	0.420	**0.467**
E	Emission rate (lb/ton of trona)	0.0034	0.0021	0.0023	**0.0026**
Hexane					
C	Concentration (ppmcv)	2.02	1.30	1.80	**1.70**
E	Emission rate (lb/hr)	1.84	1.15	1.71	**1.57**
E	Emission rate (lb/ton of trona)	0.0101	0.0064	0.0094	**0.0087**
Methylene Chloride					
C	Concentration (ppmcv)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/hr)	BDL	BDL	BDL	**BDL**
E	Emission rate (lb/ton of trona)	BDL	BDL	BDL	**BDL**
Styrene					
C	Concentration (ppmcv)	0.861	0.685	0.733	**0.760**
E	Emission rate (lb/hr)	0.946	0.736	0.843	**0.842**
E	Emission rate (lb/ton of trona)	0.0052	0.0041	0.0047	**0.0047**
Toluene					
C	Concentration (ppmdv)	1.73	1.25	1.67	**1.55**
E	Emission rate (lb/hr)	1.68	1.18	1.70	**1.52**
E	Emission rate (lb/ton of trona)	0.0093	0.0065	0.0094	**0.0084**
Trichloroethene					
C	Concentration (ppmdv)	1.01	0.395	0.380	**0.594**
E	Emission rate (lb/hr)	1.39	0.535	0.551	**0.827**
E	Emission rate (lb/ton of trona)	0.0077	0.0030	0.0030	**0.0046**
Xylene					
C	Concentration (ppmdv)	1.36	0.99	1.03	**1.12**
E	Emission rate (lb/hr)	1.52	1.08	1.20	**1.27**
E	Emission rate (lb/ton of trona)	0.0084	0.0060	0.0066	**0.0070**

BDL indicates value was below the detection limit. A value of zero was used for BDL in the average calculation.
[1] Process conditions provided by Solvay Minerals, Inc.
[2] Gas conditions were obtained from concurrent particulate testing.

RESULTS

Table 2-9:
CA-3 Calciner Stack - Volatile Organic Compounds, Condition 3

Run No.		8
Date (1997)		May 30
Start Time (approx.)		08:17
Stop Time (approx.)		09:20
Process Conditions[1]		
	Feed rate (ton of trona/hr)	215.62
Gas Conditions[2]		
B_{wo}	Moisture (% by volume)	33.48
Q_{std}	Volumetric flow rate, standard (dscfm)	75,910
1,1,1-Trichloroethane		
C	Concentration (ppmdv)	BDL
E	Emission rate (lb/hr)	BDL
E	Emission rate (lb/ton of trona)	BDL
1,3 Butadiene		
C	Concentration (ppmdv)	9.27
E	Emission rate (lb/hr)	5.93
E	Emission rate (lb/ton of trona)	0.0275
2-Butanone		
C	Concentration (ppmdv)	0.56
E	Emission rate (lb/hr)	0.74
E	Emission rate (lb/ton of trona)	0.0034
Acrylonitrile		
C	Concentration (ppmdv)	BDL
E	Emission rate (lb/hr)	BDL
E	Emission rate (lb/ton of trona)	BDL
Benzene		
C	Concentration (ppmdv)	2.39
E	Emission rate (lb/hr)	2.21
E	Emission rate (lb/ton of trona)	0.0102
Ethyl Benzene		
C	Concentration (ppmdv)	0.298
E	Emission rate (lb/hr)	0.374
E	Emission rate (lb/ton of trona)	0.0017
Hexane		
C	Concentration (ppmdv)	0.910
E	Emission rate (lb/hr)	0.927
E	Emission rate (lb/ton of trona)	0.0043
Methylene Chloride		
C	Concentration (ppmdv)	BDL
E	Emission rate (lb/hr)	BDL
E	Emission rate (lb/ton of trona)	BDL
Styrene		
C	Concentration (ppmdv)	0.310
E	Emission rate (lb/hr)	0.381
E	Emission rate (lb/ton of trona)	0.0018
Toluene		
C	Concentration (ppmdv)	0.964
E	Emission rate (lb/hr)	1.05
E	Emission rate (lb/ton of trona)	0.0049
Trichloroethene		
C	Concentration (ppmdv)	0.534
E	Emission rate (lb/hr)	0.83
E	Emission rate (lb/ton of trona)	0.0038
Xylene		
C	Concentration (ppmdv)	0.510
E	Emission rate (lb/hr)	0.640
E	Emission rate (lb/ton of trona)	0.0030

BDL indicates value was below the detection limit.
[1] Process conditions provided by Solvay Minerals, Inc.
[2] Gas conditions were obtained from concurrent particulate testing.

PROJECT OVERVIEW

The tuning of the burners was performed June 17 - 19. The results for the diagnostic tests are contained within this report, a Summary of Test Results is shown in Table 1-3.

Table 1-3:
Summary of Test Results

Source Constituent	Sampling Method	Average Emission	Permit Limit[1]
CA-3 Stack at 128 TPH[2]			
Nitrogen Oxides (lb/hr)	EPA M5	3.57	15.00
Carbon Monoxide (lb/hr)	EPA M5	369	N/A
CA-3 Stack at 200 TPH[2]			
Nitrogen Oxides (lb/hr)	EPA M5	9.67	15.00
Carbon Monoxide (lb/hr)	EPA M5	328	N/A
CA-3 Stack at 202 TPH[3]			
Nitrogen Oxides (lb/hr)	EPA M5	12.82	15.00
Carbon Monoxide (lb/hr)	EPA M5	294	N/A

[1] Permit limits obtained from Solvay Minerals, Inc. permit number: MD-132
[2] Approximate production rate.
[3] Process data provided by Solvay Minerals, Inc. and is shown in Appendix D.

The test conditions and results of analysis are presented in Tables 2-1 and 2-3.

PROJECT OVERVIEW

The tuning of the burners was performed June 17 - 19. The compliance testing at the 185 TPH production rate was performed June 20 and conformed to 40 CFR part 60 test criteria using Methods 1-4, 5/202 7E and 10. The results for the compliance tests are contained within this report, a Summary of Test Results is shown in Table 1-3.

Table 1-3:
Summary of Test Results

Source Constituent	Sampling Method	Average Emission	Permit Limit[1]
CA-3 Stack at 185 TPH			
Particulate (lb/hr)	EPA M5	7.11	9.30
Nitrogen Oxides (lb/hr)	EPA M5	10.08	15.00
Carbon Monoxide (lb/hr)	EPA M5	206	N/A

[1] Permit limits obtained from Solvay Minerals, Inc. permit number: MD-132

The test conditions and results of analysis are presented in Tables 2-1 and 2-2.

RESULTS

Table 2-1:
CA-3 Calciner Stack - Particulate

Run No.		1	2	3	Average
Date (1998)		January 21	January 21	January 21	
Start Time (approx.)		09:55	11:45	13:24	
Stop Time (approx.)		11:04	12:54	14:31	
Process Conditions[1]					
	Feed Rate (tons/hr)	185	183	187	**185**
	Fuel flow (scfm)	2,980	2,954	2,975	**2,969**
Gas Conditions					
T_s	Temperature (°F)	312	314	315	**314**
B_{wo}	Moisture (volume %)	30.29	30.03	29.88	**30.07**
O_2	Oxygen (dry volume %)	11.3	11.4	11.3	**11.3**
CO_2	Carbon dioxide (dry volume %)	11.5	11.5	11.5	**11.5**
Volumetric Flow Rate					
Q_a	Actual conditions (acfm)	199,500	200,200	201,600	**200,400**
Q_{std}	Standard conditions (dscfm)	75,040	75,370	75,930	**75,450**
Front Half Particulate					
C	Concentration (gr/dscf)	0.0011	0.0021	0.0025	**0.0019**
E	Emission rate (lb/hr)	0.7	1.4	1.6	**1.2**
E	Emission rate (lb/ton of trona)	0.0039	0.0075	0.0088	**0.0067**
Back Half Organic Particulate					
C	Concentration (gr/dscf)	0.0291	0.0244	0.0253	**0.0263**
E	Emission rate (lb/hr)	18.7	15.8	16.5	**17.0**
E	Emission rate (lb/ton of trona)	0.1009	0.0861	0.0883	**0.0918**
Back Half Inorganic Particulate					
C	Concentration (gr/dscf)	0.0041	0.0047	0.0042	**0.0043**
E	Emission rate (lb/hr)	2.7	3.0	2.7	**2.8**
E	Emission rate (lb/ton of trona)	0.0143	0.0166	0.0145	**0.0151**
Back Half Total Particulate					
C	Concentration (gr/dscf)	0.0332	0.0291	0.0295	**0.0306**
E	Emission rate (lb/hr)	21.3	18.8	19.2	**19.8**
E	Emission rate (lb/ton of trona)	0.12	0.10	0.10	**0.1069**
Front and Back Half Inorganic Particulate					
C	Concentration (gr/dscf)	0.0053	0.0068	0.0067	**0.0063**
E	Emission rate (lb/hr)	3.4	4.4	4.4	**4.0**
E	Emission rate (lb/ton of trona)	0.0183	0.0240	0.0233	**0.0219**

[1] Process conditions provided by Solvay Minerals, Inc.

RESULTS

Table 2-2:
CA-3 Calciner Stack - Total Non-Methane Hydrocarbons

Run No.		1	2	3	Average
Date (1998)		January 21	January 21	January 21	
Start Time (approx.)		09:55	11:45	13:24	
Stop Time (approx.)		10:55	12:45	14:24	
Process Conditions[1]					
Feed rate (ton/hr)		185	183	187	**185**
Fuel flow (scfm)		2,980	2,954	2,975	**2,969**
Gas Conditions[2]					
T_s	Temperature (°F)	312	314	315	**314**
O_2	Oxygen (dry volume %)	11.3	11.4	11.3	**11.3**
CO_2	Carbon Dioxide (dry volume %)	11.5	11.5	11.5	**11.5**
B_{wo}	Moisture (volume %)	30.29	30.03	29.88	**30.07**
Q_{std}	Standard conditions (dscfm)	75,040	75,370	75,930	**75,447**
Total Hydrocarbons (as propane)					
C	Concentration (ppmdv)	300.7	284.4	308.1	**297.7**
E	Emission rate (lb/hr)	155.0	147.2	160.6	**154.3**
E	Emission rate (lb/ton of trona)	0.8367	0.8034	0.8608	**0.8337**
Methane					
C	Concentration (ppmdv)	357.9	342.4	377.6	**359.3**
E	Emission rate (lb/hr)	67.1	64.5	71.6	**67.7**
E	Emission rate (lb/ton of trona)	0.3623	0.3519	0.3839	**0.3660**
Total Non-Methane Hydrocarbons					
E	Emission rate (lb/hr)	87.9	82.7	89.0	**86.5**
E	Emission rate (lb/ton of trona)	0.4744	0.4515	0.4770	**0.4676**

[1] Process conditions provided by Solvay Minerals, Inc.
[2] Gas conditions obtained from concurrent Method 5/202 testing.

RESULTS

Table 2-3:
CA-3 Calciner Stack - Nitrogen Oxides & Carbon Monoxide

Run No.		1	2	3	Average
Date (1998)		January 21	January 21	January 21	
Start Time (approx.)		09:55	11:45	13:24	
Stop Time (approx.)		10:55	12:45	14:24	
Process Conditions[1]					
Feed rate (ton/hr)		185	183	187	**185**
Fuel flow (scfm)		2,980	2,954	2,975	**2,969**
Gas Conditions[2]					
T_s	Temperature (°F)	312	314	315	**314**
O_2	Oxygen (dry volume %)	11.3	11.4	11.3	**11.3**
CO_2	Carbon Dioxide (dry volume %)	11.5	11.5	11.5	**11.5**
B_{wo}	Moisture (volume %)	30.29	30.03	29.88	**30.07**
Q_{std}	Standard conditions (dscfm)	75,040	75,370	75,930	**75,447**
Nitrogen Oxides					
C	Concentration (ppmdv)	23.5	23.5	21.0	**22.7**
E	Emission rate (lb/hr)	12.7	12.7	11.4	**12.2**
E	Emission rate (lb/ton of trona)	0.0683	0.0692	0.0611	**0.0662**
Carbon Monoxide					
C	Concentration (ppmdv)	733.2	753.5	798.2	**761.6**
E	Emission rate (lb/hr)	240.0	247.7	264.4	**250.7**
E	Emission rate (lb/ton of trona)	1.2958	1.3521	1.4168	**1.3549**

[1] Process conditions provided by Solvay Minerals, Inc.
[2] Gas conditions obtained from concurrent Method 5/202 testing.

RESULTS

Table 2-1:
CA-3 Calciner Stack - Particulate Runs 1-3

Run No.		1	2	3	Average
Date (1998)		March 31	March 31	March 31	
Start Time (approx.)		10:30	13:00	15:13	
Stop Time (approx.)		11:48	14:17	16:31	
Process Conditions[1]					
	Feed Rate (tons/hr)	183	181	179	**181**
Gas Conditions					
T_s	Temperature (°F)	324	324	324	**324**
B_{wo}	Moisture (volume %)	30.16	29.46	28.93	**29.52**
O_2	Oxygen (dry volume %)	11.3	11.3	11.4	**11.3**
CO_2	Carbon dioxide (dry volume %)	11.4	11.4	11.4	**11.4**
Volumetric Flow Rate					
Q_a	Actual conditions (acfm)	195,600	200,000	199,100	**198,200**
Q_{std}	Standard conditions (dscfm)	72,210	74,570	74,800	**73,860**
Front Half Particulate					
C	Concentration (gr/dscf)	0.0074	0.0035	0.0030	**0.0046**
E	Emission rate (lb/hr)	4.56	2.21	1.92	**2.90**
E	Emission rate (lb/ton of trona)	0.0249	0.0122	0.0107	**0.0159**
Back Half Organic Particulate					
C	Concentration (gr/dscf)	0.0607	0.0421	0.0356	**0.0461**
E	Emission rate (lb/hr)	37.6	26.9	22.8	**29.1**
E	Emission rate (lb/ton of trona)	0.2053	0.1488	0.1275	**0.1605**
Back Half Inorganic Particulate					
C	Concentration (gr/dscf)	0.0150	0.0116	0.0071	**0.0112**
E	Emission rate (lb/hr)	9.27	7.39	4.58	**7.08**
E	Emission rate (lb/ton of trona)	0.0507	0.0408	0.0256	**0.0390**
Back Half Total Particulate					
C	Concentration (gr/dscf)	0.0757	0.0537	0.0427	**0.0574**
E	Emission rate (lb/hr)	46.8	34.3	27.4	**36.2**
E	Emission rate (lb/ton of trona)	0.2560	0.1896	0.1530	**0.1995**
Front and Back Half Inorganic Particulate					
C	Concentration (gr/dscf)	0.0223	0.0150	0.0101	**0.0158**
E	Emission rate (lb/hr)	13.8	9.60	6.49	**9.97**
E	Emission rate (lb/ton of trona)	0.0756	0.0530	0.0363	**0.0550**

[1] Process conditions provided by Solvay Minerals, Inc.

RESULTS

Table 2-2:
CA-3 Calciner Stack - Particulate Run 4

Run No.		4	Average
Date (1998)		April 2	
Start Time (approx.)		13:00	
Stop Time (approx.)		14:20	
Process Conditions[1]			
	Feed Rate (tons/hr)	186	**186**
Gas Conditions			
T_s	Temperature (°F)	336	**336**
B_{wo}	Moisture (volume %)	30.63	**30.63**
O_2	Oxygen (dry volume %)	11.3	**11.3**
CO_2	Carbon dioxide (dry volume %)	11.3	**11.3**
Volumetric Flow Rate			
Q_a	Actual conditions (acfm)	213,300	**213,300**
Q_{std}	Standard conditions (dscfm)	76,910	**76,910**
Front Half Particulate			
C	Concentration (gr/dscf)	0.0028	**0.0028**
E	Emission rate (lb/hr)	1.87	**1.87**
E	Emission rate (lb/ton of trona)	0.0101	**0.0101**
Back Half Organic Particulate			
C	Concentration (gr/dscf)	0.0269	**0.0269**
E	Emission rate (lb/hr)	17.7	**17.7**
E	Emission rate (lb/ton of trona)	0.0952	**0.0952**
Back Half Inorganic Particulate			
C	Concentration (gr/dscf)	0.0069	**0.0069**
E	Emission rate (lb/hr)	4.56	**4.56**
E	Emission rate (lb/ton of trona)	0.0245	**0.0245**
Back Half Total Particulate			
C	Concentration (gr/dscf)	0.0338	**0.0338**
E	Emission rate (lb/hr)	22.3	**22.3**
E	Emission rate (lb/ton of trona)	0.1197	**0.1197**
Front and Back Half Inorganic Particulate			
C	Concentration (gr/dscf)	0.0097	**0.0097**
E	Emission rate (lb/hr)	6.42	**6.42**
E	Emission rate (lb/ton of trona)	0.0345	**0.0345**

[1] Process conditions provided by Solvay Minerals, Inc.

RESULTS

Table 2-3:
CA-3 Calciner Stack - Total Non-Methane/Ethane Hydrocarbons Runs 1-3

Run No.		1	2	3	Average
Date (1998)		March 31	March 31	March 31	
Start Time (approx.)		10:30	12:57	15:10	
Stop Time (approx.)		11:41	14:08	16:21	
Process Conditions[1]					
Feed rate (ton/hr)		183	181	179	**181**
Gas Conditions[2]					
T_s	Temperature (°F)	324	324	324	**324**
O_2	Oxygen (dry volume %)	11.3	11.3	11.4	**11.3**
CO_2	Carbon Dioxide (dry volume %)	11.4	11.4	11.4	**11.4**
B_{wo}	Moisture (volume %)	30.16	29.46	28.93	**29.52**
Q_{std}	Standard conditions (dscfm)	72,210	74,570	74,800	**73,860**
Total Hydrocarbons (as propane)					
C	Concentration (ppmdv)	739.0	662.4	621.0	**674.1**
C	Concentration (ppmwv)	516.1	467.2	441.3	**474.9**
E	Emission rate (lb/hr)	366.4	339.2	319.0	**341.5**
E	Emission rate (lb/ton of trona)	2.002	1.874	1.782	**1.886**
Methane					
C	Concentration (ppmdv)	986.3	1021	971.2	**992.8**
C	Concentration (ppmwv)	680.4	720.0	669.2	**689.9**
E	Emission rate (lb/hr)	177.9	190.1	181.5	**183.2**
E	Emission rate (lb/ton of trona)	0.9723	1.051	1.014	**1.012**
Ethane					
C	Concentration (ppmdv)	54.7	57.7	55.9	**56.1**
C	Concentration (ppmwv)	38.9	40.7	38.4	**39.3**
E	Emission rate (lb/hr)	18.5	20.1	19.5	**19.4**
E	Emission rate (lb/ton of trona)	0.1009	0.1111	0.1091	**0.1070**
Total Non-Methane/Ethane Hydrocarbons					
E	Emission rate (lb/hr)	170.0	128.9	117.9	**139.0**
E	Emission rate (lb/ton of trona)	0.9292	0.7123	0.6589	**0.7668**

[1] Process conditions provided by Solvay Minerals, Inc.
[2] Gas conditions obtained from concurrent Method 5/202 testing.

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RESULTS

Table 2-4:
CA-3 Calciner Stack - Total Non-Methane/Ethane Hydrocarbons Run 4

Run No.		4	Average
Date (1998)		April 2	
Start Time (approx.)		12:48	
Stop Time (approx.)		13:48	
Process Conditions[1]			
Feed rate (ton/hr)		186	**186**
Gas Conditions[2]			
T_s	Temperature (°F)	336	**336**
O_2	Oxygen (dry volume %)	11.3	**11.3**
CO_2	Carbon Dioxide (dry volume %)	11.3	**11.3**
B_{wo}	Moisture (volume %)	30.63	**30.63**
Q_{std}	Standard conditions (dscfm)	76,910	**76,910**
Total Hydrocarbons (as propane)			
C	Concentration (ppmdv)	580.2	**580.2**
C	Concentration (ppmwv)	402.4	**402.4**
E	Emission rate (lb/hr)	306.4	**306.4**
E	Emission rate (lb/ton of trona)	1.647	**1.647**
Methane			
C	Concentration (ppmdv)	1207	**1207**
C	Concentration (ppmwv)	837.1	**837.1**
E	Emission rate (lb/hr)	231.8	**231.8**
E	Emission rate (lb/ton of trona)	1.246	**1.246**
Ethane			
C	Concentration (ppmdv)	86.4	**86.4**
C	Concentration (ppmwv)	60.4	**60.4**
E	Emission rate (lb/hr)	31.0	**31.0**
E	Emission rate (lb/ton of trona)	0.1669	**0.1669**
Total Non-Methane/Ethane Hydrocarbons			
E	Emission rate (lb/hr)	43.5	**43.5**
E	Emission rate (lb/ton of trona)	0.2340	**0.2340**

[1] Process conditions provided by Solvay Minerals, Inc.
[2] Gas conditions obtained from concurrent Method 5/202 testing.

Combine with 2-3

RESULTS

Table 2-5:
CA-3 Calciner Stack - Nitrogen Oxides & Carbon Monoxide Runs 1-3

Run No.		1	2	3	Average
Date (1998)		March 31	March 31	March 31	
Start Time (approx.)		10:30	12:57	15:10	
Stop Time (approx.)		11:41	14:08	16:21	
Process Conditions[1]					
Feed rate (ton/hr)		183	181	179	**181**
Gas Conditions[2]					
T_s	Temperature (°F)	324	324	324	**324**
O_2	Oxygen (dry volume %)	11.3	11.3	11.4	**11.3**
CO_2	Carbon Dioxide (dry volume %)	11.4	11.4	11.4	**11.4**
B_{wo}	Moisture (volume %)	30.16	29.46	28.93	**29.52**
Q_{std}	Standard conditions (dscfm)	72,210	74,570	74,800	**73,860**
Nitrogen Oxides					
C	Concentration (ppmdv)	36.6	32.7	35.0	**34.7**
E	Emission rate (lb/hr)	18.9	17.5	18.7	**18.4**
E	Emission rate (lb/ton of trona)	0.1034	0.0965	0.1046	**0.1015**
Carbon Monoxide					
C	Concentration (ppmdv)	1760	1617	1605	**1661**
E	Emission rate (lb/hr)	554.4	525.9	523.5	**534.6**
E	Emission rate (lb/ton of trona)	3.030	2.905	2.925	**2.953**

[1] Process conditions provided by Solvay Minerals, Inc.
[2] Gas conditions obtained from concurrent Method 5/202 testing.

RESULTS

Table 2-6:
CA-3 Calciner Stack - Nitrogen Oxides & Carbon Monoxide Run 4

Run No.		4	Average
Date (1998)		April 2	
Start Time (approx.)		12:48	
Stop Time (approx.)		13:48	
Process Conditions[1]			
Feed rate (ton/hr)		186	**186**
Gas Conditions[2]			
T_s	Temperature (°F)	336	**336**
O_2	Oxygen (dry volume %)	11.3	**11.3**
CO_2	Carbon Dioxide (dry volume %)	11.3	**11.3**
B_{wo}	Moisture (volume %)	30.63	**30.63**
Q_{std}	Standard conditions (dscfm)	76,910	**76,910**
Nitrogen Oxides			
C	Concentration (ppmdv)	20.7	**20.7**
E	Emission rate (lb/hr)	11.4	**11.4**
E	Emission rate (lb/ton of trona)	0.0613	**0.0613**
Carbon Monoxide			
C	Concentration (ppmdv)	993.8	**993.8**
E	Emission rate (lb/hr)	333.4	**333.4**
E	Emission rate (lb/ton of trona)	1.792	**1.792**

[1] Process conditions provided by Solvay Minerals, Inc.
[2] Gas conditions obtained from concurrent Method 5/202 testing.

RESULTS

Table 2-3:
CA-3 Calciner Stack - Particulate, 197 TPH

Run No.		7	8	9	Average
Date (1998)		May 1	May 1	May 1	
Start Time (approx.)		08:22	10:13	12:06	
Stop Time (approx.)		09:42	11:33	01:25	
Process Conditions[1]					
	Feed Rate (tons/hr)	196	197	198	**197**
	Fuel Flow (scfm)	3,472	3,477	3,474	**3,474**
Gas Conditions					
T_s	Temperature (°F)	406	413	413	**410**
B_{wo}	Moisture (volume %)	31.64	31.65	31.76	**31.68**
O_2	Oxygen (dry volume %)	10.3	10.2	10.3	**10.3**
CO_2	Carbon dioxide (dry volume %)	12.4	12.5	12.5	**12.5**
Volumetric Flow Rate					
Q_a	Actual conditions (acfm)	217,200	226,700	230,100	**224,700**
Q_{std}	Standard conditions (dscfm)	71,820	74,310	75,290	**73,810**
Front Half Particulate					
C	Concentration (gr/dscf)	0.0031	0.0018	0.0017	**0.0022**
E	Emission rate (lb/hr)	1.93	1.16	1.07	**1.39**
E	Emission rate (lb/ton of trona)	0.0099	0.0059	0.0054	**0.0070**
Back Half Organic Particulate					
C	Concentration (gr/dscf)	0.0243	0.0259	0.0205	**0.0236**
E	Emission rate (lb/hr)	14.93	16.51	13.22	**14.89**
E	Emission rate (lb/ton of trona)	0.0762	0.0838	0.0668	**0.0756**
Back Half Inorganic Particulate					
C	Concentration (gr/dscf)	0.0057	0.0060	0.0053	**0.0057**
E	Emission rate (lb/hr)	3.50	3.84	3.41	**3.58**
E	Emission rate (lb/ton of trona)	0.0179	0.0195	0.0172	**0.0182**
Back Half Total Particulate					
C	Concentration (gr/dscf)	0.0299	0.0320	0.0258	**0.0292**
E	Emission rate (lb/hr)	18.43	20.35	16.63	**18.47**
E	Emission rate (lb/ton of trona)	0.0940	0.1033	0.0840	**0.0938**
Front and Back Half Inorganic Particulate					
C	Concentration (gr/dscf)	0.0088	0.0078	0.0069	**0.0079**
E	Emission rate (lb/hr)	5.43	5.00	4.48	**4.97**
E	Emission rate (lb/ton of trona)	0.0277	0.0254	0.0226	**0.0252**

[1] Process conditions provided by Solvay Minerals, Inc.

RESULTS

Table 2-4:
CA-3 Calciner Stack - NOx & CO, 197 TPH

Run No.		7	8	9	Average
Date (1998)		May 1	May 1	May 1	
Start Time (approx.)		08:20	10:11	12:02	
Stop Time (approx.)		09:23	11:14	13:05	
Process Conditions[1]					
Feed rate (ton/hr)		196	197	198	**197**
Fuel flow (scfm)		3,472	3,477	3,474	**3,474**
Gas Conditions[2]					
T_s	Temperature (°F)	406	413	413	**410**
O_2	Oxygen (dry volume %)	10.3	10.2	10.3	**10.3**
CO_2	Carbon Dioxide (dry volume %)	12.4	12.5	12.5	**12.5**
B_{wo}	Moisture (volume %)	31.64	31.65	31.76	**31.68**
Q_{std}	Standard conditions (dscfm)	71,820	74,310	75,290	**73,807**
Nitrogen Oxides					
C	Concentration (ppmdv)	19.4	20.4	17.3	**19.0**
E	Emission rate (lb/hr)	10.0	10.8	9.3	**10.1**
E	Emission rate (lb/ton of trona)	0.0508	0.0551	0.0472	**0.0510**
Carbon Monoxide					
C	Concentration (ppmdv)	1372	1447	1441	**1420**
E	Emission rate (lb/hr)	429.9	468.9	473.3	**457.4**
E	Emission rate (lb/ton of trona)	2.1935	2.3804	2.3906	**2.3215**

1 Process conditions provided by Solvay Minerals, Inc.
2 Gas conditions obtained from concurrent Method 5/202 testing.

3474 MSCFM x60 x1060 =

10.1 ppm

10.1 ppm / 221 @ 1060 = 0.05

10.1 ppm / 213 = 0.05

Summary of Results

Table 1 – CA-3 Calciner Stack Nitrogen Oxides Emissions Summary of Results

Test Parameters	**Run 1**	**Run 2**	**Run 3**	**Average**
Date	3/12/99	3/12/99	3/12/99	
Start time	9:49	11:05	12:17	
Stop time	10:49	12:05	13:17	
Process Conditions*				
Natural gas usage rate (scfh)	193,584	181,586	183,133	**186,101**
Trona ore feed rate (ton/hr)	169	168	169	**168**
Gas Conditions				
Oxygen (%)	11.9	12.0	11.9	**12.0**
Carbon dioixide (%)	10.8	10.7	10.9	**10.8**
Moisture (%)	29.2	28.9	29.4	**29.1**
Temperature (^{0}F)	337	345	337	**341**
Volumetric flow (acfm)	217,200	209,900	204,600	**207,300**
Volumetric flow (scfm)	114,300	109,400	107,600	**108,500**
Volumetric flow (dscfm)	80,940	77,850	76,020	**76,940**
NOx				
Concentration, NOx (ppmdv)	5.3	6.6	6.3	**6.4**
Mass emission rate, NOx (lb/hr)	3.05	3.67	3.41	**3.54**

* Natural gas usage rates and Trona ore feed rates provided by Solvay Minerals are the average of two hourly readings for each run.

AIRTECH Environmental Services Inc.

Summary of Results

Table 1 – CA-3 Calciner Stack Emissions Summary of Results

Test Parameters	**Baseline**	**Test No. 1**	**Test No. 2**	**Test No. 3**
Date (1999)	10-May	10-May	10-May	10-May
Start time (approx.)	7:13	8:49	9:55	10:10
Stop time (approx.)	8:17	9:21	10:08	10:20
Process Conditions[1]				
Burner excess air (%)[2]	70	75	65	60
Total gas flow (scfh)	170,000	170,000	170,000	170,000
Primary gas flow (scfh)	145,500	145,500	145,500	145,500
Jet gas flow (scfh)	17,000	17,000	17,000	17,000
Flat gas flow (scfh)	7,500	7,500	7,500	7,500
Trona ore feed rate (ton/hr)	160	160	160	160
Gas Conditions				
Oxygen (%)	13.3	12.1	11.7	11.5
Carbon dioxide (%)	8.3	10.0	10.3	10.6
Moisture (%)[3]	29.50	29.25	29.96	30.18
Temperature (^{0}F)[3]	340	334	326	328
Volumetric flow (acfm)[3]	209,900	201,000	200,800	199,400
Volumetric flow (dscfm)[3]	76,700	74,290	74,230	73,220
Nitrogen Oxides				
Concentration, NOx (ppmdv)	9.4	8.2	7.2	9.6
Mass emission rate, NOx (lb/hr)	5.2	4.3	3.8	5.1
Carbon Monoxide				
Concentration, CO (ppmdv)	175	152	261	273
Mass emission rate, CO (lb/hr)	59	49	84	87

[1] Process conditions provided by Solvay Minerals, Inc.
[2] Velocity parameters at 60 percent excess air are calculated from the average velocity parameters of the 55 percent and 65 percent excess air parameters.
[3] Moisture, temperature and volumetric airflows are from a single set of velocity determination data.

Table 1 (continued) – CA-3 Calciner Stack Emissions Summary of Results

Test Parameters	**Test No. 4**	**Test No. 5**	**Test No. 6**
Date (1999)	10-May	10-May	10-May
Start time (approx.)	10:30	10:48	11:02
Stop time (approx.)	10:41	11:03	11:36
Process Conditions[1]			
Burner excess air (%)	75	65	55
Total gas flow (scfh)	170,000	170,000	170,000
Primary gas flow (scfh)	137,000	137,000	137,000
Jet gas flow (scfh)	25,500	25,500	25,500
Flat gas flow (scfh)	7,500	7,500	7,500
Trona ore feed rate (ton/hr)	160	160	160
Gas Conditions			
Oxygen (%)	12.2	11.8	11.3
Carbon dioxide (%)	9.8	10.3	10.7
Moisture (%)[2]	29.25	29.96	30.40
Temperature (^{0}F)[2]	334	326	331
Volumetric flow (acfm)[2]	201,000	200,800	198,000
Volumetric flow (dscfm)[2]	74,290	74,230	72,220
Nitrogen Oxides			
Concentration, NOx (ppmdv)	8.2	13	18
Mass emission rate, NOx (lb/hr)	4.4	6.7	9.4
Carbon Monoxide			
Concentration, CO (ppmdv)	259	242	268
Mass emission rate, CO (lb/hr)	84	78	85

[1] Process conditions provided by Solvay Minerals, Inc.
[2] Moisture, temperature and volumetric airflows are from a single set of velocity determination data.

Table 1 (continued) – CA-3 Calciner Stack Emissions Summary of Results

Test Parameters	**Test No. 7**	**Test No. 8**	**Test No. 9**
Date (1999)	10-May	10-May	10-May
Start time (approx.)	11:50	12:06	12:22
Stop time (approx.)	12:02	12:16	12:37
Process Conditions[1]			
Burner excess air (%)	75	65	55
Total gas flow (scfh)	170,000	170,000	170,000
Primary gas flow (scfh)	128,500	128,500	128,500
Jet gas flow (scfh)	34,000	34,000	34,000
Flat gas flow (scfh)	7,500	7,500	7,500
Trona ore feed rate (ton/hr)	160	160	160
Gas Conditions			
Oxygen (%)	12.0	11.8	11.3
Carbon dioxide (%)	10.0	10.4	11.0
Moisture (%)[2]	29.25	29.96	30.40
Temperature (^{0}F)[2]	334	326	331
Volumetric flow (acfm)[2]	201,000	200,800	198,000
Volumetric flow (dscfm)[2]	74,290	74,230	72,220
Nitrogen Oxides			
Concentration, NOx (ppmdv)	13	17	22
Mass emission rate, NOx (lb/hr)	7.2	9.2	11
Carbon Monoxide			
Concentration, CO (ppmdv)	308	287	300
Mass emission rate, CO (lb/hr)	100	93	94

[1] Process conditions provided by Solvay Minerals, Inc.
[2] Moisture, temperature and volumetric airflows are from a single set of velocity determination data.

Table 1 (continued) – CA-3 Calciner Stack Emissions Summary of Results

Test Parameters	**Test No. 10**	**Test No. 11**	**Test No. 12**
Date (1999)	10-May	10-May	10-May
Start time (approx.)	12:48	13:06	13:20
Stop time (approx.)	12:58	13:18	13:29
Process Conditions[1]			
Burner excess air (%)	75	65	55
Total gas flow (scfh)	180,000	180,000	180,000
Primary gas flow (scfh)	127,500	127,500	127,500
Jet gas flow (scfh)	45,000	45,000	45,000
Flat gas flow (scfh)	7,500	7,500	7,500
Trona ore feed rate (ton/hr)	160	160	160
Gas Conditions			
Oxygen (%)	11.9	11.6	11.1
Carbon dioxide (%)	10.1	10.2	10.8
Moisture (%)[2]	29.25	29.96	30.40
Temperature (^{0}F)[2]	334	326	331
Volumetric flow (acfm)[2]	201,000	200,800	198,000
Volumetric flow (dscfm)[2]	74,290	74,230	72,220
Nitrogen Oxides			
Concentration, NOx (ppmdv)	13	17	25
Mass emission rate, NOx (lb/hr)	6.9	9.2	13
Carbon Monoxide			
Concentration, CO (ppmdv)	574	555	669
Mass emission rate, CO (lb/hr)	186	180	211

[1] Process conditions provided by Solvay Minerals, Inc.
[2] Moisture, temperature and volumetric airflows are from a single set of velocity determination data.

Table 1 (continued) – CA-3 Calciner Stack Emissions Summary of Results

Test Parameters	**Test No. 13**	**Test No. 14**	**Test No. 15**
Date (1999)	10-May	10-May	10-May
Start time (approx.)	13:54	14:12	14:22
Stop time (approx.)	14:07	14:18	14:30
Process Conditions[1]			
Burner excess air (%)	65	65	65
Total gas flow (scfh)	170,000	170,000	170,000
Primary gas flow (scfh)	137,000	139,500	142,000
Jet gas flow (scfh)	25,500	25,500	25,500
Flat gas flow (scfh)	7,500	5,000	2,500
Trona ore feed rate (ton/hr)			
Gas Conditions			
Oxygen (%)	11.6	11.6	11.6
Carbon dioxide (%)	10.3	10.3	10.4
Moisture (%)[2]	29.96	29.96	29.96
Temperature (^{0}F)[2]	326	326	326
Volumetric flow (acfm)[2]	200,800	200,800	200,800
Volumetric flow (dscfm)[2]	74,230	74,230	74,230
Nitrogen Oxides			
Concentration, NOx (ppmdv)	12	12	12
Mass emission rate, NOx (lb/hr)	6.4	6.2	6.3
Carbon Monoxide			
Concentration, CO (ppmdv)	606	586	551
Mass emission rate, CO (lb/hr)	196	190	178

[1] Process conditions provided by Solvay Minerals, Inc.
[2] Moisture, temperature and volumetric airflows are from a single set of velocity determination data.

2.0 SUMMARY OF RESULTS

2.1 CA-3 Nitrogen Oxides and Carbon Monoxide Results, 1/29

Operating Conditions CA-3	Run 1	Run 2	Run 3	Average
Fuel Flow, MSCFH	169.8	173.2	170.3	**171.1**
Fuel Btu Value, scf/10^6Btu	1,023	1,023	1,023	**1,023**
Opacity, %	0.8	0.7	0.8	**0.8**
Production rate, ton/hr	173	177	174	**174.6**

NOx and CO Results	Run 1	Run 2	Run 3	Average
Nitrogen Oxides, ppmdv	11.5	10.9	11.3	**11.2**
Nitrogen Oxides, lb/hr	6.5	6.3	6.2	**6.4**
Carbon Monoxide, ppmdv	242.9	262.8	305.7	**270.5**
Carbon Monoxide, lb/hr	83.7	93.2	103.1	**93.3**

Parameters	Run 1	Run 2	Run 3	Average
Date (2004)	1/29	1/29	1/29	
Start Time	12:50	14:10	15:30	
Stop Time	13:30	14:50	16:10	
Stack Temp, °F	284	282	282	**283**
O_2, %	12.00	11.95	12.00	**11.98**
CO_2, %	10.62	10.69	10.63	**10.65**
Moisture, %	32.0	31.9	32.1	**32.0**
Velocity, ft/sec	39.9	40.9	39.0	**39.9**
Acfm	205,630	210,580	200,960	**205,720**
Scfm	116,150	119,280	113,820	**116,420**
Dscfm	79,000	81,280	77,320	**79,200**

2.2 CA-3 Nitrogen Oxides and Carbon Monoxide Results, 1/30

Operating Conditions CA-3	Run 1	Run 2	Run 3	Average
Fuel Flow, MSCFH	176.9	179.6	176.1	**177.5**
Fuel Btu Value, scf/10^6Btu	1,023	1,023	1,023	**1,023**
Opacity, %	1.0	0.9	0.9	**0.9**
Production rate, ton/hr	181	183	180	**181.2**

NOx and CO Results	Run 1	Run 2	Run 3	Average
Nitrogen Oxides, ppmdv	16.9	16.5	16.2	**16.5**
Nitrogen Oxides, lb/hr	9.6	9.2	9.3	**9.4**
Carbon Monoxide, ppmdv	182.2	166.5	161.0	**169.9**
Carbon Monoxide, lb/hr	63.4	56.7	55.9	**58.7**

Parameters	Run 1	Run 2	Run 3	Average
Date (2004)	1/30	1/30	1/30	
Start Time	7:10	8:30	9:50	
Stop Time	8:10	9:30	10:50	
Stack Temp, °F	283	284	285	**284**
O_2, %	11.79	11.77	11.80	**11.78**
CO_2, %	11.16	11.12	11.00	**11.09**
Moisture, %	31.9	31.7	32.1	**31.9**
Velocity, ft/sec	40.3	39.4	40.4	**40.0**
Acfm	207,760	203,010	208,280	**206,350**
Scfm	117,130	114,330	117,180	**116,210**
Dscfm	79,750	78,100	79,560	**79,140**

2.0 SUMMARY OF RESULTS

2.1 CA-3 Nitrogen Oxides Results

Operating Conditions CA-3	Run 1	Run 2	Run 3	Average
Fuel Flow, MSCFH	176.9	179.6	176.1	**177.5**
Fuel Btu Value, scf/10^6Btu	1,023	1,023	1,023	**1,023**
Opacity, %	1.0	0.9	0.9	**0.9**
Production rate, ton/hr	181	183	180	**181.2**

Nitrogen Oxides Results	Run 1	Run 2	Run 3	Average
Nitrogen Oxides, ppmdv	16.9	16.5	16.2	**16.5**
Nitrogen Oxides, lb/hr	9.6	9.2	9.3	**9.4**

Parameters	Run 1	Run 2	Run 3	Average
Date (2004)	1/30	1/30	1/30	
Start Time	7:10	8:30	9:50	
Stop Time	8:10	9:30	10:50	
Stack Temp, °F	283	284	285	**284**
O_2, %	11.79	11.77	11.80	**11.78**
CO_2, %	11.16	11.12	11.00	**11.09**
Moisture, %	31.9	31.7	32.1	**31.9**
Velocity, ft/sec	40.3	39.4	40.4	**40.0**
Acfm	207,760	203,010	208,280	**206,350**
Scfm	117,130	114,330	117,180	**116,210**
Dscfm	79,750	78,100	79,560	**79,140**

2.0 SUMMARY OF RESULTS

2.1 CA-3 Nitrogen Oxides and Carbon Monoxide Results

Operating Conditions	Run 1	Run 2	Run 3	Average
Fuel Flow, MSCFH	164	161	170	**165**
Feed Rate, TPH	162	159	168	**163.4**
Opacity, %	4.5	4.6	4.6	**4.6**
Fuel Btu Value, scf/10^6Btu	1,040	1,040	1,040	**1,040**

Pollutant Results	Run 1	Run 2	Run 3	Average
Nitrogen Oxides, ppmdv	30.3	24.7	22.1	**25.7**
Nitrogen Oxides, lb/hr	15.6	12.4	11.7	**13.2**
Carbon Monoxide, ppmdv	706.8	752.9	456.4	**638.7**
Carbon Monoxide, lb/hr	220.8	229.0	147.3	**199.0**

Parameter	Run 1	Run 2	Run 3	Average
Date (2004)	8/23	8/23	8/23	
Start Time	11:49	13:17	14:47	
Stop Time	12:49	14:17	15:47	
Stack Temp, °F	230	228	228	**229**
O_2, %	11.49	11.57	11.39	**11.48**
CO_2, %	12.09	12.06	12.65	**12.27**
Moisture, %	31.7	31.8	30.3	**31.3**
Velocity, ft/sec	33.4	32.6	33.8	**33.3**
Acfm	172,330	167,810	174,320	**171,490**
Scfm	104,780	102,240	106,160	**104,390**
Dscfm	71,630	69,740	73,980	**71,780**

2.0 SUMMARY OF RESULTS

2.1 CA-3 Particulate Results (Runs 1, 3, 4, & 5)

Operating Conditions	Run 1	Run 3	Run 4	Run 5
ESP Setting	All Fields	Field 2 Off	Field 4 Off	Field 5 Off
Production Rate, ton/hr	143.0	144.0	139.0	147.0
Opacity, %	3.3	2.9	2.9	3.3

Particulate Results	Run 1	Run 3	Run 4	Run 5
Front Half Particulate (TSP), gr/dscf	0.00312	0.00193	0.00153	0.00377
Front Half Particulate (TSP), lb/hr	2.07	1.25	1.02	2.50
Inorganic Condensible Particulate, gr/dscf	0.00444	0.00307	0.00375	0.00317
Inorganic Condensible Particulate, lb/hr	2.95	1.99	2.48	2.10
Organic Condensible Particulate, gr/dscf	0.00848	0.0117	0.00986	0.0111
Organic Condensible Particulate, lb/hr	5.63	7.60	6.54	7.37
Total Inorganic Particulate, gr/dscf	0.00756	0.00501	0.00528	0.00694
Total Inorganic Particulate, lb/hr	5.02	3.25	3.50	4.61

Parameters	Run 1	Run 3	Run 4	Run 5
Date (2005)	8/23	8/23	8/23	8/23
Start Time	8:15	12:00	14:20	16:35
Stop Time	9:26	13:10	15:30	17:45
Stack Temp, °F	239	243	250	244
O_2, %	13.2	13.6	13.5	13.7
CO_2, %	9.5	9.6	9.5	9.4
Moisture, %	23.6	25.7	24.4	25.4
Velocity, ft/sec	32.6	32.9	33.4	33.6
Acfm	167,990	169,730	172,060	173,150
Scfm	101,300	101,730	102,240	103,710
Dscfm	77,470	75,640	77,350	77,400
Isokinetics, %	104.6	98.4	98.0	99.6

2.2 CA-3 Particulate Results (Runs 6 – 9)

Operating Conditions	Run 6	Run 7	Run 8	Run 9
ESP Setting	Field 6 Off	Fields 2 & 4	Fields 3 & 5	Field 5 Off
Production Rate, ton/hr	147.0	148.0 off	148.0 off	151.0
Opacity, %	3.3	3.1	2.9	3.0

Particulate Results	Run 6	Run 7	Run 8	Run 9
Front Half Particulate (TSP), gr/dscf	0.00390	0.00272	0.000911	0.000926
Front Half Particulate (TSP), lb/hr	2.35	1.44	0.581	0.633
Inorganic Condensible Particulate, gr/dscf	0.00407	0.00325	0.00312	0.00422
Inorganic Condensible Particulate, lb/hr	2.45	1.73	1.99	2.88
Organic Condensible Particulate, gr/dscf	0.00961	0.0119	0.00654	0.00803
Organic Condensible Particulate, lb/hr	5.79	6.31	4.17	5.49
Total Inorganic Particulate, gr/dscf	0.00797	0.00597	0.00403	0.00515
Total Inorganic Particulate, lb/hr	4.81	3.17	2.57	3.52

Parameters	Run 6	Run 7	Run 8	Run 9
Date (2005)	8/24	8/24	8/24	8/24
Start Time	8:15	10:30	13:00	15:20
Stop Time	9:22	11:39	14:07	16:30
Stack Temp, °F	243	246	247	249
O_2, %	13.5	13.6	13.4	13.7
CO_2, %	9.5	9.7	9.5	9.3
Moisture, %	25.7	25.8	25.0	25.6
Velocity, ft/sec	30.7	27.2	32.4	35.1
Acfm	158,230	140,320	167,130	180,900
Scfm	94,580	83,480	99,230	107,060
Dscfm	70,340	61,970	74,420	79,720
Isokinetics, %	100.3	100.1	102.1	97.8

2.0 SUMMARY OF RESULTS

2.1 "C" Calciner Particulate Results

"C" Calciner Operating Data	Run 1	Run 2	Run 3	Average
Calciner Production Rate, ton/hr	179	178	179	**178.7**
Fuel Flow, MSCFH	168	164	168	**167**
Opacity, %	0.0	0.0	1.2	**0.4**

Particulate Results	Run 1	Run 2	Run 3	Average
Front Half Particulate, gr/dscf	0.00236	0.00389	0.00393	**0.00339**
Front Half Particulate, lb/hr	1.44	2.12	2.34	**1.97**
Back Half Inorganic Particulate, gr/dscf	0.00630	0.00596	0.00398	**0.00541**
Back Half Inorganic Particulate, lb/hr	3.83	3.25	2.37	**3.15**
Back Half Organic Particulate, gr/dscf	0.00428	0.00752	0.00454	**0.00545**
Back Half Organic Particulate, lb/hr	2.60	4.11	2.70	**3.14**
Total Inorganic Particulate, gr/dscf	0.00866	0.00984	0.00791	**0.00880**
Total Inorganic Particulate, lb/hr	5.26	5.37	4.71	**5.11**

Parameters	Run 1	Run 2	Run 3	Average
Date (2007)	10/2	10/2	10/2	
Start Time	11:24	14:28	16:37	
Stop Time	13:08	16:04	18:01	
Stack Temp, °F	268	270	268	**268**
O_2, %	13.8	13.6	13.7	**13.7**
CO_2, %	8.7	9.5	9.6	**9.3**
Moisture, %	32.5	33.1	32.4	**32.7**
Velocity, ft/sec	34.9	31.7	34.1	**33.6**
Acfm	180,130	163,520	175,900	**173,180**
Scfm	105,010	95,150	102,650	**100,940**
Dscfm	70,900	63,680	69,460	**68,010**
Isokinetics, %	99.4	105.0	99.3	**101.2**

2.0 SUMMARY OF RESULTS

2.1 CA-3 Nitrogen Oxides Results

Operating Conditions	Run 1	Run 2	Run 3	Average
Production Rate, Ton/hr	164.3	164.9	165.9	**165.0**
Opacity, %	0.44	0.26	0.19	**0.30**

Nitrogen Oxides Results	Run 1	Run 2	Run 3	Average
NOx, ppmdv	17.23	17.21	18.96	**17.80**
NOx, lb/hr	10.2	10.0	10.9	**10.4**

Parameters	Run 1	Run 2	Run 3	Average
Date (2011)	3/23	3/23	3/23	
Start Time	9:30	10:55	12:20	
Stop Time	10:30	11:55	13:20	
Stack Temp, °F	275	277	278	**277**
O_2, %	11.70	11.60	11.71	**11.67**
CO_2, %	11.25	11.29	11.13	**11.22**
Moisture, %	28.4	31.5	30.8	**30.2**
Velocity, ft/sec	38.7	39.7	39.1	**39.2**
Acfm	199,530	204,690	201,720	**201,980**
Scfm	115,260	117,990	116,160	**116,470**
Dscfm	82,590	80,870	80,410	**81,290**

Table 2 – Calciner 3 (ADQ # 48) Emissions Results

Test Parameters	**Run 1**	**Run 2**	**Run 3**	**Average**
Date	10/22/2013	10/24/2013	10/24/2013	
Start Time	14:26	9:47	12:20	
Stop Time	16:38	11:57	14:27	
Process Conditions				
Production Rate (ton/hr)	118	131	130	**126**
Opacity (%)	6.0	6.1	6.2	**6.1**
Gas Conditions				
Temperature (°F)	244	243	242	**243**
Volumetric Flow Rate (acfm)	156,000	168,000	165,000	**163,000**
Volumetric Flow Rate (scfm)	93,000	101,000	98,600	**97,500**
Volumetric Flow Rate (dscfm)	66,400	75,200	72,500	**71,300**
Carbon Dioxide (% dry)	8.00	8.20	8.33	**8.18**
Oxygen (% dry)	14.1	13.9	13.8	**13.9**
Moisture (%)	28.7	25.6	26.5	**26.9**
Filterable Particulate Results				
Concentration (grains/dscf)	0.00134	0.00117	0.000951	**0.00115**
Emission Rate (lb/hr)	0.760	0.751	0.591	**0.701**
Condensable Particulate Results				
Concentration (grains/dscf)	0.00538	0.00353	0.00444	**0.00445**
Emission Rate (lb/hr)	3.06	2.28	2.76	**2.70**
Nitrogen Oxides Results				
Concentration (ppmdv)	9.96	9.33	10.5	**9.92**
Emission Rate (lb/hr)	4.74	5.03	5.43	**5.06**

AIRTECH Environmental Services Inc.