

## **Appendix A - Tables**

**Table 1A – Chemicals Detected in CEMEX Stack Gases**

CHEMICAL	AVERAGE WITHOUT TIRES	AVERAGE WITH 19.2% TIRES	AIR COMPARISON VALUES		EVALUATION
	PPB*	PPB*	PPB*	SOURCE	
NOx	517,700	391,200	NO <sub>2</sub> 53 3,000 5,000	NAAQS annual ave. TWA STEL	Further evaluation is needed. See Table 2.
SOx	26,200	15,700	SO <sub>2</sub> 10 30 500 5,000 2,000	Acute EMEG NAAQS annual ave. NAAQS 3-hour STEL TWA	Further evaluation is needed. See Table 2.
Particulate (lb/ton of feed) <sup>†</sup>	1,600 µg/m <sup>3</sup>	1,600 µg/m <sup>3</sup>	50 µg/m <sup>3</sup> 150 µg/m <sup>3</sup> 10,000 µg/m <sup>3</sup>	NAAQS annual PM <sub>10</sub> NAAQS 24-hr PM <sub>10</sub> TWA	Further evaluation is needed. See Table 2.
	0.09 <sup>†</sup>	0.10 <sup>†</sup>	0.275 <sup>†</sup>	EPA NESHAP	Below EPA standard
Carbon Monoxide	50,300	120,200	35,000 25,000	NAAQS 1-hour ave. TWA	Further evaluation is needed. See Table 2.
Hydrogen Chloride	1,800	1,200	20 µg/m <sup>3</sup> 5,000	RfC Intermediate STEL ceiling	Further evaluation is needed. See Table 2.
Acetaldehyde	68.4	300	0.5 µg/m <sup>3</sup> 5 µg/m <sup>3</sup> 25,000	CREG (B2) RfC Intermediate STEL ceiling	Further evaluation is needed. See Table 2.

Acetone	110	133	13,000 13,000 26,000	Chronic EMEG Intermediate EMEG Acute EMEG	Not a health hazard
Benzene	1.7	55.5	0.1 µg/m <sup>3</sup> 4 50	CREG (A) Intermediate EMEG Acute EMEG	Further evaluation is needed. See Table 2.
Bromomethane	2.0	2.7	5 50 50 5 µg/m <sup>3</sup>	Chronic EMEG Intermediate EMEG Acute EMEG RfC Intermediate	Not a health hazard
Carbon Disulfide	17	<7	300 700 µg/m <sup>3</sup>	Chronic EMEG RfC Intermediate	Not a health hazard
Chloromethane	<1.2	<4.5	50 200 500 90 µg/m <sup>3</sup>	Chronic EMEG Intermediate EMEG Acute EMEG RfC Intermediate	Not a health hazard
1,4-Dioxane	12	<4.4	20,000	TWA B2 carcinogen	Not a health hazard
Dioxins/Furans TEQ	0.016 E-3 µg/m <sup>3</sup>	<0.016 E-3 µg/m <sup>3</sup>	0.2 E-3 µg/m <sup>3</sup>	EPA NESHAP 2B carcinogen	Not a health hazard
Ethanol	4.8	<4.4	1,000,000	TWA	Not a health hazard
Formaldehyde	75.3	200	8 30 40 0.08 µg/m <sup>3</sup>	Chronic EMEG Intermediate EMEG Acute EMEG CREG (B1)	Further evaluation is needed. See Table 2.
Methylene Chloride	1.9	6.7	300 300 600 3 µg/m <sup>3</sup>	Chronic EMEG Intermediate EMEG Acute EMEG CREG (B2)	Not a health hazard

Naphthalene (Highest concentration PAH)	0.166	0.776	2 3 µg/m <sup>3</sup> 10,000 15,000	Chronic EMEG RfC Intermediate TWA STEL	Not a health hazard
PAH as B(a)P Equivalents				B2 carcinogen	No values
PCB Total	<0.00901 µg/m <sup>3</sup>	<0.0095 µg/m <sup>3</sup>	0.01 µg/m <sup>3</sup> 1 µg/m <sup>3</sup> 0.0001 µg/m <sup>3</sup>	CREG (B2) TWA Unit Risk – Acute	Not a health hazard
Propylene	<4.7	<7.6	200,000	TWA proposed	Not a health hazard
Tetrachloroethene	<1.2	<3.6	40 200	Chronic EMEG Acute EMEG 2A carcinogen	Not a health hazard
Toluene	<1.2	<4.2	80 1000 400 µg/m <sup>3</sup>	Chronic EMEG Acute EMEG RfC	Not a health hazard

\* Units are in parts per billion (ppb) unless other units are specified for that number.

Data Sources: ACGIH 2002; ATSDR 2003; Dunmire 2003; Klingensmith 2003.

**Table 1B – Metals Detected in CEMEX Stack Gases**

CHEMICAL	AVERAGE WITHOUT TIRES	AVERAGE WITH 19.2% TIRES	AIR COMPARISON VALUES		EVALUATION
	MG/M3	MG/M3	MG/M3	SOURCE	
Arsenic	0.000465	0.00147	0.0000002 0.0000043 0.01	CREG (A) Unit Risk – Acute TWA	Further evaluation is needed. See Table 2
Barium	0.0244	0.0334	0.5	TWA	Not a health hazard
Beryllium	<0.0000433	0.0000343	0.0000004 0.00002 0.0000024 0.002 0.01	CREG (B1) RfC Intermediate Unit Risk - Acute TWA STEL	Further evaluation is needed. See Table 2
Cadmium	0.00188	0.00502	0.0000006 0.0000018 0.01	CREG (B1) Unit Risk – Acute TWA	Further evaluation is needed. See Table 2
Chromium	0.00209	0.00358	0.5	TWA	Further evaluation is needed. See Table 2
Chromium 6	NA	NA	0.001 0.00000008 0.0001 0.000012	Intermediate EMEG CREG (A) RfC Intermediate Unit Risk	Further evaluation is needed. See Table 2
Copper	0.00195	0.00467	0.2 1	Fume TWA Dust/mist TWA	Not a health hazard
Cobalt	0.00085	0.000684	0.0001 0.02	Chronic EMEG TWA	Further evaluation is needed. See Table 2
Lead	0.0029	0.00597	0.0015 0.05	NAAQS quarterly TWA B2 carcinogen	Further evaluation is needed. See Table 2
Manganese	0.0191	0.0266	0.00004 0.00005 0.2	Chronic EMEG RfC Intermediate TWA	Further evaluation is needed. See Table 2

CHEMICAL	AVERAGE WITHOUT TIRES	AVERAGE WITH 19.2% TIRES	AIR COMPARISON VALUES		EVALUATION
	MG/M3	MG/M3	MG/M3	SOURCE	
Mercury	0.0175	0.0225	0.0002 0.0003 0.025	Chronic EMEG RfC Intermediate TWA	Further evaluation is needed. See Table 2
Nickel	0.00231	0.00371	0.0002 1.5-0.1	Chronic EMEG TWA varies w/ cpd.	Further evaluation is needed. See Table 2
Selenium	0.00464	0.0121	0.2	TWA	Not a health hazard
Silver	0.000424	0.000373	0.1-0.01	TWA varies w/ cpd.	Not a health hazard
Thallium	0.009	0.0166	0.1	TWA	Not a health hazard
Zinc	0.0248	0.0363	5 10 10	Fume TWA Fume STEL Dust TWA	Not a health hazard

Data Sources: ACGIH 2002; ATSDR 2003; Dunmire 2003; Klingensmith 2003.

**Table 2 – Health Evaluation of Ground Level Concentrations\* of CEMEX Stack Emissions  
Exposure Concentrations for the Maximal Exposed Individual Resident (MEIR)**

CHEMICAL	AVERAGE WITHOUT TIRES		AVERAGE WITH 19.2% TIRES		AIR COMPARISON VALUE	
	LB/HR STACK	µG/M3 MEIR	LB/HR STACK	µG/M3 MEIR	µG/M3	SOURCE
NO <sub>x</sub> NO <sub>2</sub> MW = 46.01	5116	Annual 43	3866		NO <sub>2</sub> 100	NAAQS annual ave.
		24-Hour 606			5645	TWA
		8-Hour 1379			9409	STEL
		1-Hour 6230				
SO <sub>x</sub> SO <sub>2</sub> MW = 64.07	360.7	Annual 3	216		SO <sub>2</sub> 80	NAAQS annual ave.
		24-Hour 43			1300	NAAQS 3-hour ave.
		1-Hour 439			26	Acute EMEG
Particulate	9.2		9.4	Annual 0.079 24-Hour 1.1	PM10 50 150	NAAQS annual ave. NAAQS 24-hour ave.
Carbon Monoxide MW = 28.01	302.6		723	Annual 6 1-Hour 880	40,000	NAAQS 1-hour ave.
Hydrogen Chloride MW = 36.47	0.66	Annual 0.0056 1-Hour 0.77	0.63		20 7458	RfC Intermediate STEL ceiling
Acetaldehyde MW = 44.05	0.0694		0.26	Annual 0.0022	0.5	CREG
				1-Hour 0.32	5 45,041	RfC Intermediate STEL ceiling
Benzene MW = 78.11	0.00321		0.101	Annual 0.0008	0.1	CREG
				24-Hour 0.012	13	Intermediate EMEG
				1-Hour 0.12	160	Acute EMEG
Formaldehyde MW = 30.03	0.0515		0.10	Annual 0.0008	10 0.08	Chronic EMEG CREG
				24-Hour 0.012	37	Intermediate EMEG
				1-Hour 0.12	49	Acute EMEG



CHEMICAL	AVERAGE WITHOUT TIRES		AVERAGE WITH 19.2% TIRES		AIR COMPARISON VALUE	
	LB/HR STACK	µG/M3 MEIR	LB/HR STACK	µG/M3 MEIR	µG/M3	SOURCE
<b>METALS</b>						
Arsenic	1.77E-4		4.69E-4	Annual 3.9E-6	200E-6	CREG
				24-Hour 0.56E-4	43E-4	Unit Risk – Acute
				1-Hour 5.7E-4		
Beryllium	11.1E-6	Annual 0.094E-6	11.0E-6		400E-6	CREG
		24-Hour 1.3E-6			0.02	RfC Intermediate
		1-Hour 14E-6			0.0024	Unit Risk - Acute
Cadmium	7.17E-4		16.1E-4	Annual 13.5E-6	600E-6	CREG
				24-Hour 0.19E-3	1.8E-3	Unit Risk – Acute
				1-Hour 1.96E-3		
Chromium	0.796E-3		1.15E-3	Annual 9.6E-6 24-Hour 0.00014 1-Hour 0.0014	Assume all Cr is Cr+6	Compare to Cr+6 values below
Chromium 6	NA		NA	Annual 9.6E-6	80E-6	CREG
				24-Hour 1.4E-4	1	Intermediate EMEG
				1-Hour 14E-4	0.1	RfC Intermediate
Cobalt	3.25E-4	Annual 2.7E-6	2.2E-4		100,000E-6	Chronic EMEG
		1-Hour 3.96E-4			20	TWA
Lead	1.11E-3		1.92E-3	Annual 16E-6	1.5	NAAQS quarterly
				1-Hour 0.0023		
Manganese	7.3E-3		8.56E-3	Annual 72E-6	0.04	Chronic EMEG
				1-Hour 0.010	0.05	RfC Intermediate
Mercury	6.69E-3		7.23E-3	Annual 61E-6	0.2	Chronic EMEG
				1-Hour 0.0088	0.3	RfC Intermediate
Nickel	0.882E-3		1.19E-3	Annual 10E-6	0.2	Chronic EMEG



CHEMICAL	AVERAGE WITHOUT TIRES		AVERAGE WITH 19.2% TIRES		AIR COMPARISON VALUE	
	LB/HR STACK	µG/M3 MEIR	LB/HR STACK	µG/M3 MEIR	µG/M3	SOURCE
				1-Hour 0.0014	100-1500	TWA varies w/ cpd

\* Ground level concentrations calculated for the higher stack emission concentration for each chemical, whether or not tires were being burned. In calculating averages, ½ the detection limit was used for non-detected values.  
 Data Sources: ACGIH 2002; ATSDR 2003; Dunmire 2003; Klingensmith 2003.

**Table 3 – Health Evaluation of Maximum Ground Level Concentrations\* of CEMEX Stack Emissions  
Exposure Concentrations for the Maximal Exposed Individual Resident (MEIR)**

CHEMICAL	MAXIMUM WITHOUT TIRES		MAXIMUM WITH 19.2% TIRES		AIR COMPARISON VALUE	
	LB/HR STACK	µG/M3 MEIR	LB/HR STACK	µG/M3 MEIR	µG/M3	SOURCE
NO <sub>x</sub> †	Not available		Not available		NO <sub>2</sub> 100	NAAQS annual ave.
					5645 9409	TWA STEL
SO <sub>x</sub> †	Not available		Not available		SO <sub>2</sub> 80	NAAQS annual ave.
					1300 26	NAAQS 3-hour ave. Acute EMEG
Particulate	10.2	Annual 0.086 24-Hour 1.2	9.4	Annual 0.079 24-Hour 1.1	PM10 50 150	NAAQS annual ave. NAAQS 24-hour ave.
Carbon Monoxide†	Not available		Not available		40,000	NAAQS 1-hour ave.
Hydrogen Chloride MW = 36.47	0.98	Annual 0.008 1-Hour 1.2	0.79		20 7458	RfC Intermediate STEL ceiling
Acetaldehyde MW = 44.05	0.2		0.43	Annual 0.0036	0.5	CREG
				1-Hour 0.52	5 45,041	RfC Intermediate STEL ceiling
Benzene MW = 78.11	0.00321		0.258	Annual 0.0022	0.1	CREG
				24-Hour 0.03	13	Intermediate EMEG
				1-Hour 0.31	160	Acute EMEG
Formaldehyde MW = 30.03	0.0588		0.12	Annual 0.001	10 0.08	Chronic EMEG CREG
				24-Hour 0.014	37	Intermediate EMEG
				1-Hour 0.15	49	Acute EMEG
<b>METALS</b>						

CHEMICAL	MAXIMUM WITHOUT TIRES		MAXIMUM WITH 19.2% TIRES		AIR COMPARISON VALUE	
	LB/HR STACK	µG/M3 MEIR	LB/HR STACK	µG/M3 MEIR	µG/M3	SOURCE
Arsenic	2.18E-4		4.96E-4	Annual 4.2E-6	200E-6	CREG
				24-Hour 0.59E-4 1-Hour 6.0E-4	43E-4	Unit Risk – Acute
Beryllium	1.68E-5	Annual 0.14E-6	1.65E-5		400E-6	CREG
		24-Hour 2E-6			20,000E-6	RfC Intermediate
		1-Hour 20E-6			2400E-6	Unit Risk - Acute
Cadmium	8.55E-4		1.8E-3	Annual 15.2E-6	600E-6	CREG
				24-Hour 0.2E-3 1-Hour 2.2E-3	1.8E-3	Unit Risk - Acute
				Annual 10.3E-6 24-Hour 1.4E-4 1-Hour 14.9E-4	Assume all Cr is Cr+6	Compare to Cr+6 values below
Chromium 6	NA		NA	Annual 10.3E-6	80E-6	CREG
				24-Hour 1.4E-4 1-Hour 14.9E-4	1 0.1 0.012	Intermediate EMEG RfC Intermediate Unit Risk
				Annual 4.6E-6 1-Hour 6.6E-4	100,000E-6 20	Chronic EMEG TWA
Lead	1.26E-3		2.14E-3	Annual 18E-6 1-Hour 2.6E-3	1.5	NAAQS quarterly
Manganese	7.71E-3		9.05E-3	Annual 76E-6	0.04	Chronic EMEG
				1-Hour 0.011	0.05	RfC Intermediate
Mercury	7.09E-3		7.27E-3	Annual 61E-6	0.2	Chronic EMEG
				1-Hour 0.0089	0.3	RfC Intermediate
Nickel	1.08E-3		1.34E-3	Annual 11E-6	0.2	Chronic EMEG
				1-Hour 0.0016	100-1500	TWA varies w/ cpd

\* Ground level concentrations were calculated for the highest stack concentration for each chemical in any stack sample without regard to whether tires were being burned.

† NO<sub>x</sub>, SO<sub>x</sub>, and carbon monoxide values in Table 2 are from continuous emissions monitors. Only rolling averages were reported; maximum values were not available.

Data Sources: ACGIH 2002; ATSDR 2003; Dunmire 2003; Klingensmith 2003.