

**State of California
AIR RESOURCES BOARD**

**2009/2010 Report on Air Emissions from Facilities
Burning Waste Tires in California**

June 2010

Errata

After publishing the *2009/2010 Report on Air Emissions from Facilities Burning Waste Tires in California* in June 2010, several facilities updated their reported number of tires burned. The table below should replace Table 1 on page 4 of this report. Since the number of tires burned and emissions are reported separately, the emissions values did not change as they were reported correctly originally.

Table 1. Facilities permitted to burn waste tires in 2007 and 2008

Air District	Facility Name	Tires Burned in 2007	Tires Burned in 2008
South Coast	California Portland Cement Company Colton, CA	2.3 million	1.5 million
Kern County	California Portland Cement Company Mojave, CA	0	0
Mojave Desert	Cemex – California Cement, LLC Apple Valley, CA	0.5 million	0.9 million
Shasta County	Lehigh Southwest Redding, CA	1.5 million	1.3 million
Mojave Valley	Mitsubishi Cement Company Lucerne Valley, CA	1.9 million	2.0 million
Kern County	National Cement Company Lebec, CA	1.9 million	2.5 million
Mojave Desert	Riverside Cement Company Oro Grande, CA	0	0
San Joaquin Valley	Jackson Valley Energy Partners Ione, CA	0	0
San Joaquin Valley	Mount Poso Cogeneration Company Bakersfield, CA	0.4 million	0.3 million
San Joaquin Valley	Port of Stockton District Energy Stockton, CA	0	0
San Joaquin Valley	Rio Bravo Jasmin Bakersfield, CA	0	0
San Joaquin Valley	Rio Bravo Poso Bakersfield, CA	0	0
San Joaquin Valley	Stockton Cogeneration Company Stockton, CA	0.8 million	0.6 million
Total Tires Burned ⁽¹⁾		9.3 million	9.1 million

⁽¹⁾ Total may differ from the sum of tires burned at individual facilities due to rounding.

On page 1, the total number of tires burned should be changed from 8 and 8.5 million to 9.3 and 9.1 million tires burned in 2007 and 2008 respectively.

On page 10, the total number of tires burned should be changed from 8 and 8.5 million to 9.3 and 9.1 million tires burned in 2007 and 2008 respectively.

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“The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at www.arb.ca.gov.”

Executive Summary

This report has been prepared pursuant to section 42889.4 of the California Public Resources Code. This section requires the following:

If facilities are permitted to burn tires in the previous calendar year, the State Air Resources Board, in conjunction with air pollution control districts and air quality management districts, shall post on its Web site, updated on or before July 1 of the subsequent year, information summarizing the types and quantities of air emissions, if any, from those facilities.

This report provides information on emissions from facilities in California that burned waste tires as a supplemental fuel in 2007 and 2008, the most recent years for which complete data are available. The information was compiled from local air districts that have jurisdiction over these facilities. Under State law, the local air districts are responsible for granting air quality permits, establishing and enforcing emissions limits, and tracking facility emissions.

Thirteen facilities in the state are permitted to burn waste tires in combination with coal, coke, and, in some cases, biomass fuel. However, only five cement plants and two cogeneration facilities actually burned tires as a supplemental fuel in 2007 and 2008. These facilities burned 8 million tires in 2007 and 8.5 million tires in 2008.

This report focuses only on the emissions from the combustion devices (kilns and boilers) where waste tires were actually burned. It does not include emissions from other processes such as internal combustion engines, process heaters, etc. The table below summarizes the total emissions from kilns and boilers at the seven facilities where waste tires were burned in 2007 and 2008. The emissions are for the whole combined-fuel process (e.g., coal, coke and tires), not just the waste tire portion.

Criteria and toxic pollutant emissions from devices where waste tires were burned as a supplemental fuel in 2007 and 2008

	2007	2008	Units
<i>Criteria Pollutants</i>			
Total Organic Gases	152	163	tons/year
Reactive Organic Gases	111	121	tons/year
Oxides of Nitrogen	9,666	9,691	tons/year
Oxides of Sulfur	559	490	tons/year
Carbon Monoxide	5,460	6,300	tons/year
Total Particulate Matter	700	645	tons/year
Particulate Matter ≤ 10 Microns	529	498	tons/year
<i>Toxic Pollutants</i>			
Acetaldehyde	131	124	pounds/year
Benzene	119	110	pounds/year
Formaldehyde	507	480	pounds/year
Hydrogen Chloride	94,528	93,353	pounds/year
Total Metals	623	612	pounds/year
Total Polycyclic Aromatic Hydrocarbons	11	10	pounds/year
Hexavalent Chromium	87,276	86,111	milligrams/year
Dioxins	78	77	milligrams/year
Furans	106	104	milligrams/year

Introduction

Since 2001, the Air Resources Board (ARB) has tracked criteria and toxic air pollutant emissions generated from facilities that burn waste tires as a supplemental fuel. This report has been prepared pursuant to section 42889.4 of the California Public Resources Code. This section requires the following:

If facilities are permitted to burn tires in the previous calendar year, the State Air Resources Board, in conjunction with air pollution control districts and air quality management districts, shall post on its Web site, updated on or before July 1 of the subsequent year, information summarizing the types and quantities of air emissions, if any, from those facilities.

Section 42807 of the Public Resources Code defines waste tires as follows:

“Waste tire” means a tire that is no longer mounted on a vehicle and is no longer suitable for use as a vehicle tire due to wear, damage, or deviation from the manufacturer’s original specifications. A waste tire includes a repairable tire, scrap tire, altered waste tire, and a used tire that is not organized for inspection and resale by size in a rack or a stack in accordance with Section 42806.5, but does not include a tire derived product or crumb rubber.

Tires have a heating value of approximately 13,000 to 15,000 BTU per pound, roughly the same as a superior quality coal. According to the most recent report on waste tires (www.calrecycle.ca.gov/Publications/Tires/62008001.pdf) by the California Department of Resources Recycling and Recovery (CalRecycle), tire-derived fuel represents the biggest market for waste tires nationwide. Per the CalRecycle report, 44.4 million waste tires were generated in California in 2006, and 8.3 million were burned as fuel. Other uses for waste tires include production of crumb rubber and rubberized asphalt concrete, daily cover for landfills, application in civil engineering projects, and agricultural uses such as haystack tarp weights.

Thirteen facilities in the state are permitted to burn waste tires in combination with coal, coke and, in some cases, biomass fuel. However, only five cement plants and two cogeneration facilities actually burned tires as a supplemental fuel in 2007 and 2008. This report focuses only on the emissions from the combustion processes (kilns and boilers) where waste tires were actually burned, rather than the total facility emissions. A more comprehensive emissions inventory for all the operations at each facility is available in our website at www.arb.ca.gov/app/emsinv/facinfo/facinfo.php.

Facility Information

The facilities permitted by local air districts to burn waste tires as a supplemental fuel are listed in Table 1. The volume of tires burned was compiled from data that were reported by the facility operators to the local air districts. Under State law, the local air districts are responsible for granting air quality permits, establishing and enforcing emissions limits, and tracking facility emissions.

Only seven facilities in the state burned waste tires as a supplemental fuel during 2007 and 2008. Five of these facilities are cement plants that burn waste tires in their cement kilns; the other two are cogeneration facilities using waste tires to produce electricity. In all of these facilities, the tires are burned in combination with coal or coke, usually in a mixture that contains less than twenty percent waste tires.

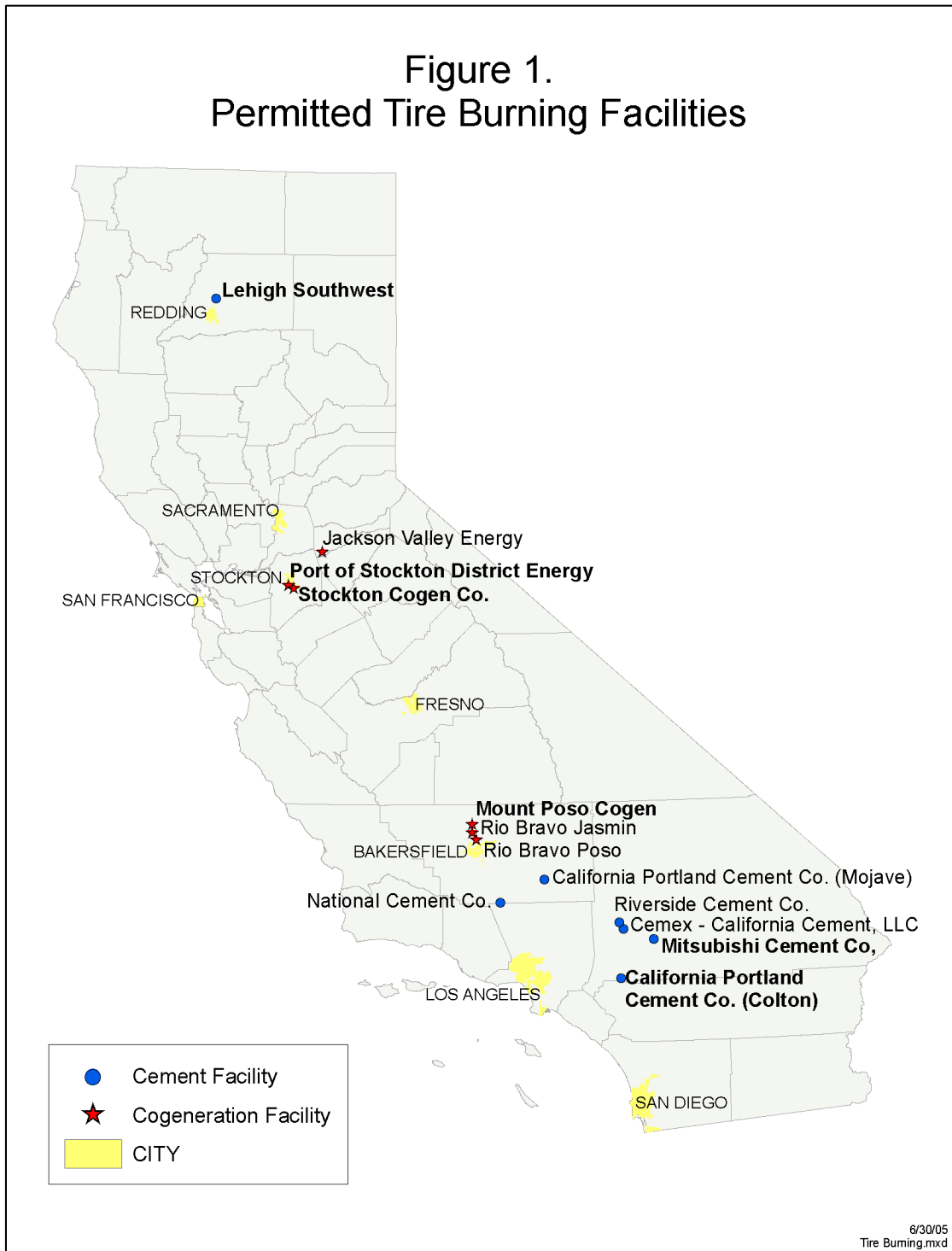
Table 1. Facilities permitted to burn waste tires in 2007 and 2008 ⁽²⁾

Air District	Facility Name	Tires Burned in 2007	Tires Burned in 2008
South Coast	California Portland Cement Company Colton, CA	0.8 million	0.6 million
Kern County	California Portland Cement Company Mojave, CA	0	0
Mojave Desert	Cemex – California Cement, LLC Apple Valley, CA	0.5 million	0.9 million
Shasta County	Lehigh Southwest Redding, CA	1.5 million	1.3 million
Mojave Valley	Mitsubishi Cement Company Lucerne Valley, CA	2.1 million	2.2 million
Kern County	National Cement Company Lebec, CA	1.9 million	2.5 million
Mojave Desert	Riverside Cement Company Oro Grande, CA	0	0
San Joaquin Valley	Jackson Valley Energy Partners Lone, CA	0	0
San Joaquin Valley	Mount Poso Cogeneration Company Bakersfield, CA	0.4 million	0.3 million
San Joaquin Valley	Port of Stockton District Energy Stockton, CA	0	0
San Joaquin Valley	Rio Bravo Jasmin Bakersfield, CA	0	0
San Joaquin Valley	Rio Bravo Poso Bakersfield, CA	0	0
San Joaquin Valley	Stockton Cogeneration Company Stockton, CA	0.8 million	0.6 million
Total Tires Burned ⁽¹⁾		8.0 million	8.5 million

⁽¹⁾ Total may differ from the sum of tires burned at individual facilities due to rounding.

⁽²⁾ Table 1 has been updated since the original publishing in June 2010, see errata page

Figure 1 below shows the location of the facilities that are permitted to burn tires as a supplemental fuel.



Criteria Pollutant Emissions

Tables 2 and 3 summarize the criteria pollutant emissions from the cement kilns or boilers where tires were burned in 2007 and 2008, as reported by the local air districts to the ARB's California Emissions Inventory Database and Reporting System (CEIDARS). Because tires are burned in combination with other fuels, the data represent emissions from the whole combined-fuel process (e.g., coal and tires), not just the tire fuel portion.

The pollutants reported below are total organic gases (TOG), reactive organic gases (ROG), oxides of nitrogen (NOx), oxides of sulfur (SOx), carbon monoxide (CO), total particulate matter (PM) and particulate matter 10 microns or less in diameter (PM₁₀).

Table 2. Criteria pollutant emissions from kilns and boilers where waste tires were burned as a supplemental fuel in 2007 (tons per year)

	TOG	ROG	NOx	SOx	CO	PM	PM ₁₀
Cement Facilities							
California Portland Cement	9	7	774	106	72	35	33
Cemex – California Cement	61	61	4,743	2	574	402	302
Lehigh Southwest	10	8	599	13	1,604	63	63
Mitsubishi Cement	36	25	2,272	224	1,628	67	65
National Cement	11	9	991	9	1,427	24	22
Total Cement Facilities	127	110	9,379	354	5,305	591	485
Cogeneration Facilities							
Mount Poso Cogeneration	<1	<1	189	70	84	42	17
Stockton Cogeneration	25	1	98	135	71	67	27
Total Cogeneration Facilities	25	1	287	205	155	109	44
Grand Total ⁽¹⁾	152	111	9,666	559	5,460	700	529

⁽¹⁾ Grand total may differ from the sum of individual facility emissions due to rounding.

Table 3. Criteria pollutant emissions from kilns and boilers where waste tires were burned as a supplemental fuel in 2008 (tons per year)

	TOG	ROG	NOx	SOx	CO	PM	PM ₁₀
Cement Facilities							
California Portland Cement	7	6	599	46	70	25	23
Cemex – California Cement	61	61	4,743	2	574	354	278
Lehigh Southwest	9	7	532	12	1,299	67	66
Mitsubishi Cement	36	25	2,272	224	1,628	67	65
National Cement	25	21	1,259	5	2,572	24	22
Total Cement Facilities	138	120	9,405	289	6,143	537	454
Cogeneration Facilities							
Mount Poso Cogeneration	<1	<1	189	70	84	42	17
Stockton Cogeneration	25	1	97	131	63	66	27
Total Cogeneration Facilities	25	1	286	201	157	108	44
Grand Total ⁽¹⁾	163	121	9,691	490	6,300	645	498

⁽¹⁾ Grand total may differ from the sum of individual facility emissions due to rounding.

Toxic Pollutant Emissions

Tables 4 and 5 summarize the estimated toxic air pollutant emissions from the cement kilns and boilers where tires were burned at each facility in 2007 and 2008. These estimates are based on source tests in which tires were burned in combination with other fuels; therefore, the data represent emissions from the whole combined-fuel process (e.g., coal and tires), not just the tire fuel portion.

The emission factors for all the cement plants were derived from a source test at Mitsubishi Cement, and the emission factors for cogeneration facilities are based on a source test at Stockton Cogeneration. In most cases, the toxic emission estimates are reported in pounds per year. However, due to the comparatively lower emission rates of hexavalent chromium, dioxins and furans, the estimates for these substances are reported in units of milligrams per year.

Table 4. Estimated toxic pollutant emissions from kilns and boilers where waste tires were burned as a supplemental fuel in 2007

	Acetaldehyde	Benzene	Formaldehyde	Hydrogen Chloride	Total Metals	Total PAHs ⁽²⁾	Hexavalent Chromium	Dioxins	Furans
	Pounds per year					Milligrams per year			
Cement Facilities									
California Portland Cement	5	6	17	574	6	1	587	1	1
Cemex – California Cement	30	38	107	3,518	36	4	3,596	3	3
Lehigh Southwest	7	9	24	786	8	1	803	1	1
Mitsubishi Cement	20	25	70	2,295	24	3	2,345	2	2
National Cement	9	11	31	1,010	10	1	1,033	1	1
Total Cement Facilities	70	89	248	8,183	85	10	8,363	8	8
Cogeneration Facilities									
Mount Poso Cogeneration	27	13	113	37,934	237	1	34,669	31	43
Stockton Cogeneration	34	17	145	48,411	302	1	44,245	39	55
Total Cogeneration Facilities	61	30	258	86,345	539	1	78,914	70	98
Grand Total ⁽¹⁾	131	119	507	94,528	623	11	87,276	78	106

⁽¹⁾ Grand total may differ from the sum of individual facility emissions due to rounding.

⁽²⁾ Polycyclic Aromatic Hydrocarbons

Table 5. Estimated toxic pollutant emissions from kilns and boilers where waste tires were burned as a supplemental fuel in 2008

	Acetaldehyde	Benzene	Formaldehyde	Hydrogen Chloride	Total Metals	Total PAHs ⁽²⁾	Hexavalent Chromium	Dioxins	Furans
	Pounds per year						Milligrams per year		
Cement Facilities									
California Portland Cement	3	3	10	317	3	<1	324	<1	<1
Cemex – California Cement	28	35	98	3,236	33	4	3,307	3	3
Lehigh Southwest	5	6	17	570	6	1	583	1	1
Mitsubishi Cement	18	23	65	2,136	22	3	2,182	2	2
National Cement	9	12	33	1,077	11	1	1,101	1	1
Total Cement Facilities	63	80	223	7,336	76	9	7,497	7	7
Cogeneration Facilities									
Mount Poso Cogeneration	27	13	113	37,934	237	1	34,669	31	43
Stockton Cogeneration	34	17	144	48,083	300	1	43,945	39	54
Total Cogeneration Facilities	61	30	257	86,016	537	1	78,614	70	97
Grand Total ⁽¹⁾	124	110	480	93,353	612	10	86,111	77	104

⁽¹⁾ Grand total may differ from the sum of individual facility emissions due to rounding.

⁽²⁾ Polycyclic Aromatic Hydrocarbons

Conclusions

Of thirteen facilities permitted to burn waste tires in California, only seven actually burned tires as a supplemental fuel in 2007 and 2008. These facilities burned 8 million waste tires in 2007 and 8.5 million in 2008 in combination with coal or coke. By far, the bulk of emissions for the combined fuel were criteria pollutants, particularly NO_x and CO, with comparatively lower SO_x, PM₁₀, TOG and ROG, as would be expected for combustion sources. ARB's estimates of the toxic pollutant emissions for both years ranged from over 45 tons per year for hydrogen chloride down to about 100 milligrams per year for dioxins and furans.

References

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6. Year 2008 Criteria Pollutants Data: Extracted from CEIDARS database. Report Run dates: March 16, 2010 and May 18, 2010.
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8. 2008 Report on Air Emissions from Facilities Burning Waste Tires in California, State of California Air Resources Board: July 2008
9. California Waste Tire Generation, Markets, and Disposal: 2006 CIWMB Staff Report, <http://www.calrecycle.ca.gov/Publications/Tires/62008001.pdf>.