

**State of California  
AIR RESOURCES BOARD**

**2016 Report on Air Emissions from Facilities Burning  
Waste Tires in California**

**July 2016**

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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 website at [www.arb.ca.gov](http://www.arb.ca.gov)”*

## **Executive Summary**

This report summarizes pollutant emissions from facilities in California that burned waste tires as a supplemental fuel in 2014, the most recent year for which complete data are available. The report has been prepared pursuant to section 42889.4 of the California Public Resources Code.

Thirteen facilities in the state of California are permitted to burn waste tires in combination with coal, coke, or biomass. Of these, five facilities burned 10.8 million tires as a supplemental fuel in 2014. These data were compiled from local air districts that have jurisdiction to grant air quality permits, and establish, track, and enforce emissions limits.

Emissions data reported are 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 following table summarizes the total emissions from kilns and boilers at the five facilities where waste tires were burned in 2014. Tires make up between less than one percent and 44 percent of the total fuel burned. Because tires are burned with other fuels, 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 which burn tire-derived fuel in 2014**

<b>Criteria Pollutants</b>	
Total Organic Gases	155 tons/year
Reactive Organic Gases	143 tons/year
Oxides of Nitrogen	6,015 tons/year
Oxides of Sulfur	393 tons/year
Carbon Monoxide	4,872 tons/year
Total Particulate Matter	298 tons/year
Particulate Matter ≤ 10 micrometers	247 tons/year
Particulate Matter ≤ 2.5 micrometers	148 tons/year
<b>Toxic Pollutants</b>	
Acetaldehyde	57 pounds/year
Benzene	154 pounds/year
Formaldehyde	234 pounds/year
Hydrogen Chloride	6,660 pounds/year (3.3 tons/year)
Total Metals	69 pounds/year
Total Polycyclic Aromatic Hydrocarbons	8 pounds/year
Hexavalent Chromium	12,286 milligrams/year (12.3 grams/year)
Dioxins	6 milligrams/year
Furans	7 milligrams/year

## Introduction

Pursuant to section 42889.4 of the California Public Resources Code, since 2002, the Air Resources Board (ARB) has published a report summarizing criteria and toxic air pollutant emissions generated from facilities that burn waste tires as a supplemental fuel. Specifically, 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.*

Waste tires are defined in section 42807 of the Public Resources Code 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.*

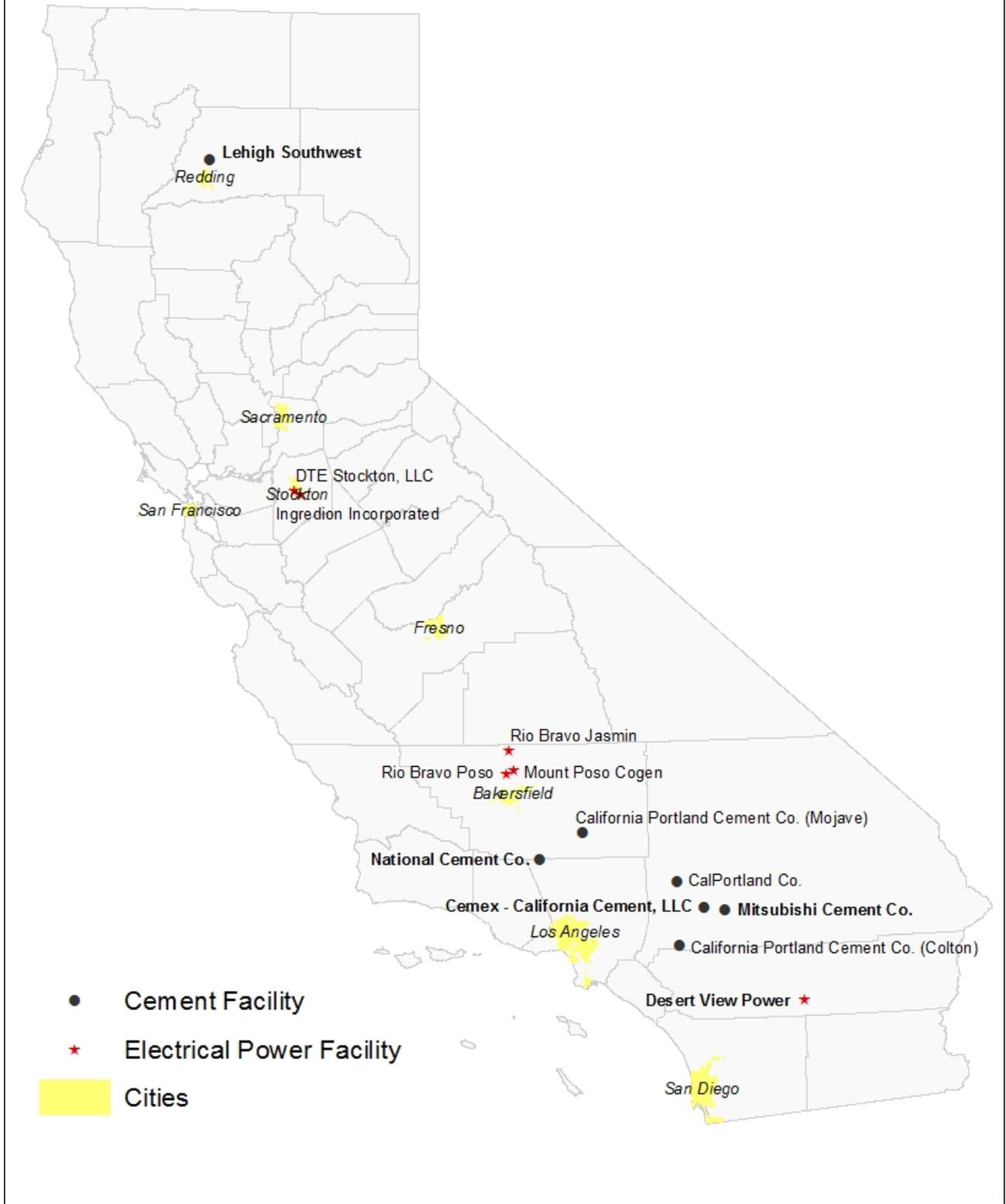
Tires have a heating value of approximately 13,000 to 15,000 British Thermal Units (BTUs) per pound, roughly the same as a superior quality coal. In California, waste tires are used as tire-derived fuel in two applications: cement kilns that often burn coal or coke, and facilities producing electric power, generally from biomass.

This report summarizes the emissions from the combustion processes (kilns and boilers) where tires were actually burned, rather than the total facility emissions. A more comprehensive emissions inventory for all the operations at each facility is available on the website [www.arb.ca.gov/app/emsinv/facinfo/facinfo.php](http://www.arb.ca.gov/app/emsinv/facinfo/facinfo.php).

## Facility Information

Thirteen facilities in the State are permitted to burn tire-derived fuel. Figure 1 shows the names and location of these facilities. Of these, five facilities reported burning tires as a supplemental fuel in 2014 and are bolded in Figure 1. Four facilities are cement plants and one is an electrical power facility.

# Figure 1. Permitted Tire Burning Facilities



In 2014, about 10.8 million waste tires were burned by these facilities. In all of these facilities, the tires were burned in combination with coal, coke, or biomass. Table 1 displays the number of tires burned at facilities in 2014, along with the percentage of tires used as part of the total fuel mix.

**Table 1. Number of tires burned and percentage of tires in total fuel burned by facilities permitted to burn waste tires in 2014**

<b>Air District</b>	<b>Facility Name And Location</b>	<b>Tires Burned in 2014</b>	<b>Total Fuel (Tons)</b>	<b>Tires in Fuel (%)</b>
South Coast	California Portland Cement Company Colton, CA	0	--	0
Eastern Kern	California Portland Cement Company Mojave, CA	0	--	0
Mojave Desert	Cemex – California Cement, LLC Apple Valley, CA	3.3 million	276,351	12
Shasta County	Lehigh Southwest Redding, CA	1.1 million	49,344	23
Mojave Desert	Mitsubishi Cement Company Lucerne Valley, CA	2.0 million	205,096	10
Eastern Kern	National Cement Company Lebec, CA	4.3 million	96,895	44
Mojave Desert	CalPortland Company Oro Grande, CA	0	--	0
San Joaquin Valley	Mount Poso Cogeneration Company Bakersfield, CA	0	--	0
San Joaquin Valley	DTE Stockton, LLC 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	Ingredion Incorporated Stockton, CA	0	--	0
South Coast	Desert View Power Mecca, CA	0.1	380,358	<1
<b>Total Tires Burned <sup>(1)</sup></b>		<b>10.8 million</b>		

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

As shown in Table 1, the percentage of tires burned as part of the total fuel mix ranged from less than one percent to 44 percent. The number of tires burned and total weight were reported by the facility operators to the local air districts. Under State law, local air districts are responsible for granting air quality permits, establishing and enforcing emissions limits, and tracking facility emissions.

## Criteria Pollutant Emissions

Table 2 summarizes the criteria pollutant emissions from the cement kilns or boilers where tires were part of the fuel mix burned in 2014. The data were reported by the local air districts to ARB's California Emissions Inventory Database and Reporting System (CEIDARS). 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), particulate matter 10 micrometers or less in diameter (PM<sub>10</sub>), and particulate matter 2.5 micrometers or less in diameter (PM<sub>2.5</sub>).

**Table 2. Criteria pollutant emissions from kilns and boilers where tire-derived fuel was burned in 2014 (tons per year)**

	TOG	ROG	NOx	SOx	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>
<b>Cement Facilities</b>								
Cemex – California Cement	102	102	2,301	63	555	205	158	90
Lehigh Southwest	24	19	637	18	773	38	37	23
Mitsubishi Cement	0	0	1,886	247	1,747	50	46	31
National Cement	18	17	994	9	1,769	5	5	3
<b>Total Cement Facilities</b>	<b>144</b>	<b>138</b>	<b>5,817</b>	<b>337</b>	<b>4,844</b>	<b>298</b>	<b>246</b>	<b>147</b>
<b>Electrical Power Facility</b>								
Desert View Power	11	5	198	56	28	1	1	1
<b>Grand Total <sup>(1)</sup></b>	<b>155</b>	<b>143</b>	<b>6,015</b>	<b>393</b>	<b>4,872</b>	<b>298</b>	<b>247</b>	<b>148</b>

<sup>(1)</sup> Total may differ from the sum of individual facility emissions due to rounding.

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-derived fuel portion. As shown in Table 1, tires make up between less than one percent to 44 percent of total fuel burned.

## Toxic Pollutant Emissions

Table 3 summarizes the estimated toxic air pollutant emissions from the cement kilns and boilers where tires were part of the fuel mix burned in 2014. 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 3. Estimated toxic pollutant emissions from kilns and boilers where tire-derived fuel was burned in 2014**

	Acetaldehyde	Benzene	Formaldehyde	Hydrogen Chloride	Total Metals	Total PAHs <sup>(2)</sup>	Hexavalent Chromium	Dioxins	Furans
	Pounds per year						Milligrams per year		
<b>Cement Facilities</b>									
Cemex – California Cement	25	32	89	2,932	30	4	2,997	3	3
Lehigh Southwest	4	6	16	524	5	1	535	<1	<1
Mitsubishi Cement	19	24	66	2,176	23	3	2,224	2	2
National Cement	9	11	31	1,028	11	1	1,051	1	1
<b>Total Cement Facilities</b>	<b>57</b>	<b>73</b>	<b>202</b>	<b>6,660</b>	<b>69</b>	<b>8</b>	<b>6,806</b>	<b>6</b>	<b>7</b>
<b>Electrical Power Facility</b>									
Desert View Power	<1	81	32	0	<1	<1	5,479	0	0
<b>Grand Total <sup>(1)</sup></b>	<b>57</b>	<b>154</b>	<b>234</b>	<b>6,660</b>	<b>69</b>	<b>8</b>	<b>12,286</b>	<b>6</b>	<b>7</b>

<sup>(1)</sup> Total may differ from the sum of individual facility emissions due to rounding.

<sup>(2)</sup> Polycyclic Aromatic Hydrocarbons

The estimated emissions in Table 3 are primarily based on source tests in which tires were burned in combination with other fuels. As such, the data represent emissions from the whole combined-fuel process (e.g., coal and tires), not just the tire-derived fuel portion. Cement plant emission factors were derived from a source test at Mitsubishi Cement. The emissions for the electrical power facility were reported by the air district to the ARB's California Emissions Inventory Database and Reporting System (CEIDARS).

## Conclusions

Of thirteen facilities permitted to burn waste tires in California, five burned tires as a supplemental fuel in 2014. These facilities burned approximately 10.8 million waste tires in combination with coal, coke, or biomass. As is typical for combustion sources, the bulk of emissions for the combined fuel were criteria pollutants, particularly NO<sub>x</sub> and CO, with comparatively lower SO<sub>x</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, TOG and ROG. As mentioned previously, emission values in this report represent total emissions only from devices which burned tires.

## References

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6. Year 2014 Criteria Pollutants Data: Extracted from CEIDARS database. Report Run date: June 2, 2016.
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