

Report on Air Emissions from Facilities Burning Waste Tires in California in 2015

October 31, 2022



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Executive Summary

This report summarizes pollutant emissions from facilities in California that burned waste tires as a supplemental fuel in 2015, 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.

Nine facilities in the state of California were permitted to burn waste tires in 2015 in combination with coal, coke, or biomass. Of these, five facilities burned 9.72 million tires as a supplemental fuel in 2015. 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. **Table 1 and Table 2** summarize the total criteria and toxic pollutant emissions from kilns and boilers at the five facilities where waste tires were burned in 2015. Tires make up between less than one percent and 45 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.

Table 1. Total criteria pollutant emissions from all devices which burn tire-derived fuel in 2015.

Criteria Pollutants	Emissions	Units
Total Organic Gases	201	tons/year
Reactive Organic Gases	186	tons/year
Oxides of Nitrogen	5,318	tons/year
Oxides of Sulfur	395	tons/year
Carbon Monoxide	7,528	tons/year
Total Particulate Matter	421	tons/year
Particulate Matter ≤ 10 micrometers	282	tons/year
Particulate Matter ≤ 2.5 micrometers	139	tons/year

Table 2. Total toxic pollutant emissions from all devices which burn tire-derived fuel in 2015.

Toxic Pollutants	Emissions	Units
Acetaldehyde	61	pounds/year
Benzene	114	pounds/year
Formaldehyde	232	pounds/year
Hydrogen Chloride	7,166	pounds/year
Total Metals	74	pounds/year
Total Polycyclic Aromatic Hydrocarbons	9	pounds/year
Hexavalent Chromium	9,757	milligrams/year
Dioxins	7	milligrams/year
Furans	7	milligrams/year

Introduction

Pursuant to Section 42889.4 of the California Public Resources Code, since 2002, the California Air Resources Board (CARB) 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 California 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 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.

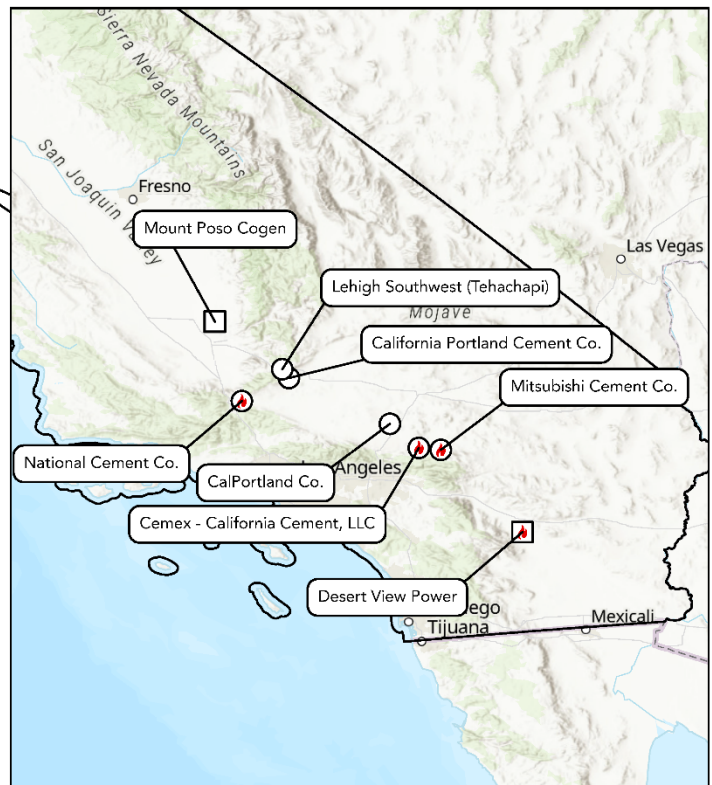
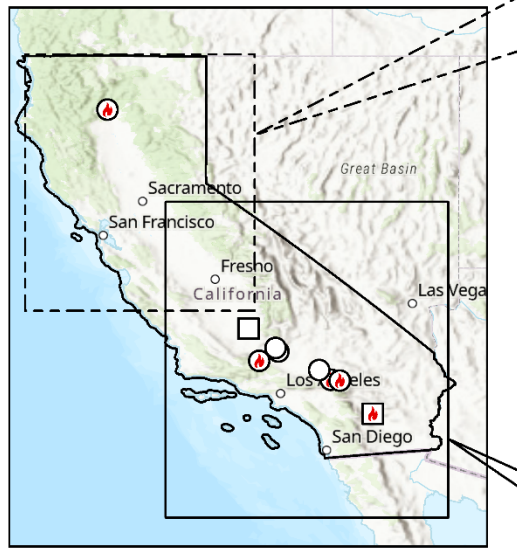
This report summarizes the emissions from the combustion processes (kilns and boilers) where tires were actually burned, rather than the total facility emissions. A more comprehensive emissions inventory for all the operations at each facility is available on the website www.arb.ca.gov/app/emsinv/facinfo/facinfo.php.

Facility Information

Nine facilities in the State are permitted to burn tire-derived fuel. **Figure 1** shows the names and locations of these facilities. Of these, five facilities reported burning tires as a supplemental fuel in 2015 and are labeled as such in Figure 1. Four facilities are cement plants and one is an electrical power facility.

Figure 1.

Facilities Permitted to Burn Tires in California



- Cement facility permitted to burn tires
- Cogeneration facility permitted to burn tires
- 🔥 Indicates whether tires were burned

Base map source: California State Parks, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community,

Figure 1. Facilities permitted to burn tires in 2015.

In 2015, about 9.72 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 3** displays the number of tires burned at facilities in 2015, along with the percentage of tires used as part of the total fuel mix.

Table 3. Number of tires burned and percentage of tires in total fuel burned by facilities permitted to burn waste tires in 2015.

Air District	Facility Name and Location	Tires Burned (millions)	Total Fuel (tons)	Tires in Fuel (%)
Eastern Kern	California Portland Cement Company Mojave, CA	0	NA	0
	National Cement Company Lebec, CA	4.63	55,637	45.43
	Lehigh Southwest Cement Tehachapi, CA	0	NA	0
Mojave Desert	Cemex – California Cement, LLC Apple Valley, CA	2.01	303,577	6.22
	CalPortland Company Oro Grande, CA	0	NA	0
	Mitsubishi Cement Company Lucerne Valley, CA	1.95	180,898	9.74
Shasta County	Lehigh Southwest Redding, CA	1.11	38,779	22.32
San Joaquin Valley	Mount Poso Cogeneration Company Bakersfield, CA	0	NA	0
South Coast	Desert View Power Mecca, CA	0.01	336,131	0.02
Overall ⁽¹⁾	NA	9.72	915,022	10.62

⁽¹⁾ Total may differ from the sum of each individual facility due to rounding.

NA - Not applicable. Facilities that did not burn tires are not required to report total fuel for this survey.

As shown in Table 3, the percentage of tires burned as part of the total fuel mix ranged from less than one percent to 45 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.

Starting in 2015, five facilities that were previously permitted to burn tires had these permits expire. These facilities are listed in **Table 4**.

Table 4. Facilities no longer permitted to burn waste tires beginning in 2015.

Facility Name and Location	Air District
DTE Stockton, LLC Stockton, CA	San Joaquin Valley
Rio Bravo Jasmin Bakersfield, CA	San Joaquin Valley
Rio Bravo Poso Bakersfield, CA	San Joaquin Valley
Ingredion Incorporated Stockton, CA	San Joaquin Valley
California Portland Cement Company Colton, CA	South Coast

No tires were burned at the facilities listed in Table 4, and these facilities will no longer be included in future reports unless a permit to burn tires is reissued.

Criteria Pollutant Emissions

Table 5, Table 6, and Table 7 summarize the criteria pollutant emissions from cement and electrical power facility kilns or boilers where tires were part of the fuel mix burned in 2015. The data were reported by the local air districts to CARB’s California Emissions Inventory Database and Reporting System (CEIDARS). The pollutants reported in Table 5 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 (PM₁₀), and particulate matter 2.5 micrometers or less in diameter (PM_{2.5}).

Table 5. Criteria pollutant emissions from kilns and boilers at cement facilities where tire-derived fuel was burned in 2015 (tons per year).

Cement Facility	TOG	ROG	NO _x	SO _x	CO	PM	PM ₁₀	PM _{2.5}
National Cement Company Lebec, CA	23	22	1,143	8	2,392	129	54	10
Cemex – California Cement, LLC Apple Valley, CA	96	96	1,478	126	1,572	196	145	85
Mitsubishi Cement Company Lucerne Valley, CA	45	43	1,872	182	2,422	56	43	18
Lehigh Southwest Redding, CA	26	21	645	29	1,115	41	40	25

Table 6. Criteria pollutant emissions from kilns and boilers at electrical power facilities where tire-derived fuel was burned in 2015 (tons per year).

Electrical Power Facility	TOG	ROG	NO _x	SO _x	CO	PM	PM ₁₀	PM _{2.5}
Desert View Power Mecca, CA	10	5	180	50	27	< 1	< 1	< 1

Table 7. Total criteria pollutant emissions from kilns and boilers where tire-derived fuel was burned in 2015 (tons per year).

Total Emissions ⁽¹⁾	TOG	ROG	NO _x	SO _x	CO	PM	PM ₁₀	PM _{2.5}
Cement Facilities	191	182	5,138	345	7,501	421	282	138
Electrical Power Facilities	10	5	180	50	27	< 1	< 1	< 1
Grand Total	201	186	5,318	395	7,528	421	282	139

⁽¹⁾ Total may differ from the sum of each individual facility 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.

Toxic Pollutant Emissions

Table 8, Table 9, and Table 10 summarize the estimated toxic air pollutant emissions from the cement kilns and boilers where tires were part of the fuel mix burned in 2015. In most cases, the toxic emission estimates are reported in pounds per year (lbs/yr). 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 (mg/yr).

Table 8. Estimated toxic pollutant emissions from kilns and boilers at cement facilities where tire-derived fuel was burned in 2015.

Cement Facility	Acetaldehyde	Benzene	Formaldehyde	Hydrogen Chloride	Total Metals	Total PAHs ⁽¹⁾	Hexavalent Chromium	Dioxins	Furans
Units	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	mg/yr	mg/yr	mg/yr
National Cement Company Lebec, CA	9	12	33	1,081	11	1	1,105	1	1
Cemex – California Cement, LLC Apple Valley, CA	29	38	104	3,431	36	4	3,509	3	3
Mitsubishi Cement Company Lucerne Valley, CA	18	23	65	2,124	22	3	2,173	2	2
Lehigh Southwest Redding, CA	5	6	16	529	5	< 1	541	< 1	< 1

⁽¹⁾ Polycyclic Aromatic Hydrocarbons

Table 9. Estimated toxic pollutant emissions from kilns and boilers at electrical power facilities where tire-derived fuel was burned in 2015.

Electrical Power Facility	Acetaldehyde	Benzene	Formaldehyde	Hydrogen Chloride	Total Metals	Total PAHs ⁽¹⁾	Hexavalent Chromium	Dioxins	Furans
Units	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	mg/yr	mg/yr	mg/yr
Desert View Power Mecca, CA	NR	36	14	NR	< 1	< 1	2,429	NR	NR

⁽¹⁾ Polycyclic Aromatic Hydrocarbons

NR - Indicates that no emissions were reported.

Table 10. Total estimated toxic pollutant emissions from kilns and boilers where tire-derived fuel was burned in 2015.

Total Emissions ⁽²⁾	Acetaldehyde	Benzene	Formaldehyde	Hydrogen Chloride	Total Metals	Total PAHs ⁽¹⁾	Hexavalent Chromium	Dioxins	Furans
Units	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/yr	mg/yr	mg/yr	mg/yr
Cement Facilities	61	78	218	7,166	74	9	7,329	7	7
Electrical Power Facilities	NR	36	14	NR	< 1	< 1	2,429	NR	NR
Grand Total	61	114	232	7,166	74	9	9,757	7	7

⁽¹⁾ Polycyclic Aromatic Hydrocarbons

⁽²⁾ Total may differ from the sum of each individual facility due to rounding.

NR - Indicates that no emissions were reported.

The estimated emissions in Table 8 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 CEIDARS.

Conclusions

Of nine facilities permitted to burn waste tires in California, five burned tires as a supplemental fuel in 2015. These facilities burned approximately 9.72 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_x and CO, with comparatively lower SO_x, PM₁₀, PM_{2.5}, TOG and ROG. As mentioned previously, emission values in this report represent total emissions only from devices which burned tires.

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