

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

October 31, 2022



This page intentionally left blank.

TABLE OF CONTENTS

Executive Summary.....	1
Introduction	3
Facility Information	3
Criteria Pollutant Emissions	6
Toxic Pollutant Emissions.....	6
Conclusions.....	7
References	8

Executive Summary

This report summarizes pollutant emissions from facilities in California that burned waste tires as a supplemental fuel in 2016, 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 2016 in combination with coal, coke, or biomass. Of these, four facilities burned 9.22 million tires as a supplemental fuel in 2016. 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 four facilities where waste tires were burned in 2016. Tires make up between less than one percent and 41 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 2016.

Criteria Pollutants	Emissions	Units
Total Organic Gases	139	tons/year
Reactive Organic Gases	136	tons/year
Oxides of Nitrogen	5,157	tons/year
Oxides of Sulfur	373	tons/year
Carbon Monoxide	7,691	tons/year
Total Particulate Matter	332	tons/year
Particulate Matter ≤ 10 micrometers	250	tons/year
Particulate Matter ≤ 2.5 micrometers	137	tons/year

Table 2. Total toxic pollutant emissions from all devices which burn tire-derived fuel in 2016.

Toxic Pollutants	Emissions	Units
Acetaldehyde	63	pounds/year
Benzene	80	pounds/year
Formaldehyde	223	pounds/year
Hydrogen Chloride	7,343	pounds/year
Total Metals	76	pounds/year
Total Polycyclic Aromatic Hydrocarbons	9	pounds/year
Hexavalent Chromium	7,510	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.

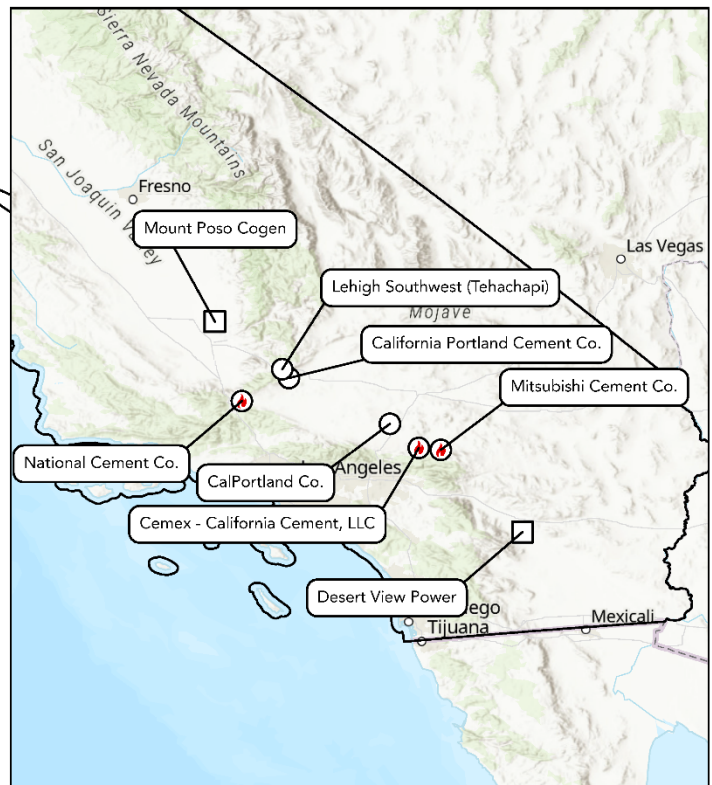
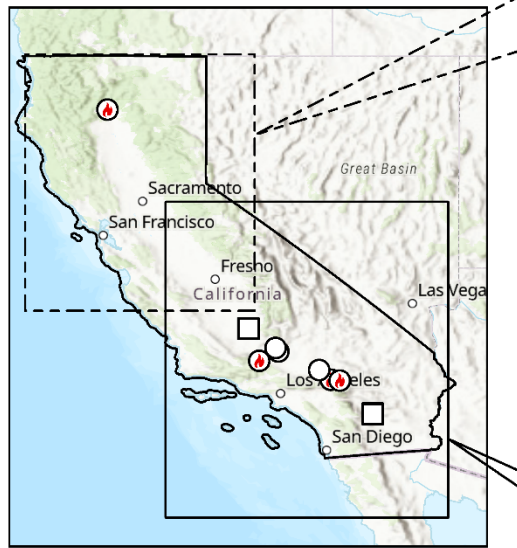
This report summarizes the emissions from the combustion processes (kilns and boilers) where tires were actually burned, rather than the total facility emissions. A more comprehensive emissions inventory for all the operations at each facility is available on the website www.arb.ca.gov/app/emsinv/facinfo/facinfo.php.

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, four facilities reported burning tires as a supplemental fuel in 2016 and are labeled as such in Figure 1. All four facilities are cement plants.

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 2016.

In 2016, 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 2016, 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 2016.

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	4.18	62,562	40.05
	Lehigh Southwest Cement Tehachapi, CA	0	NA	0
Mojave Desert	Cemex – California Cement, LLC Apple Valley, CA	2.28	303,693	6.98
	CalPortland Company Oro Grande, CA	0	NA	0
	Mitsubishi Cement Company Lucerne Valley, CA	2.05	215,021	8.72
Shasta County	Lehigh Southwest Redding, CA	0.71	19,210	26.95
San Joaquin Valley	Mount Poso Cogeneration Company Bakersfield, CA	0	NA	0
South Coast	Desert View Power Mecca, CA	0	NA	0
Overall ⁽¹⁾	NA	9.22	600,487	9.34

⁽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 41 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 4 summarizes the criteria pollutant emissions from cement facility kilns or boilers where tires were part of the fuel mix burned in 2016. 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 4 are total organic gases (TOG), reactive organic gases (ROG), oxides of nitrogen (NO_x), oxides of sulfur (SO_x), 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 4. Criteria pollutant emissions from kilns and boilers at cement facilities where tire-derived fuel was burned in 2016 (tons per year).

Cement Facility	TOG	ROG	NO _x	SO _x	CO	PM	PM ₁₀	PM _{2.5}
National Cement Company Lebec, CA	12	11	1,130	10	2,298	37	20	8
Cemex – California Cement, LLC Apple Valley, CA	96	96	1,478	126	1,572	196	145	85
Mitsubishi Cement Company Lucerne Valley, CA	25	23	2,133	228	3,167	60	46	20
Lehigh Southwest Redding, CA	7	5	418	10	654	40	39	24
Grand Total ⁽¹⁾	139	136	5,157	373	7,691	332	250	137

⁽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 5 summarizes the estimated toxic air pollutant emissions from the cement kilns and boilers where tires were part of the fuel mix burned in 2016. 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 5. Estimated toxic pollutant emissions from kilns and boilers at cement facilities where tire-derived fuel was burned in 2016.

Cement Facility	Acetaldehyde	Benzene	Formaldehyde	Hydrogen Chloride	Total Metals	Total PAHs ⁽²⁾	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	34	1,106	11	1	1,131	1	1
Cemex – California Cement, LLC Apple Valley, CA	30	38	105	3,461	36	4	3,539	3	3
Mitsubishi Cement Company Lucerne Valley, CA	21	27	76	2,497	26	3	2,554	2	2
Lehigh Southwest Redding, CA	2	3	8	279	3	< 1	285	< 1	< 1
Grand Total ⁽¹⁾	63	80	223	7,343	76	9	7,510	7	7

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

⁽²⁾ Polycyclic Aromatic Hydrocarbons

The estimated emissions in Table 5 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.

Conclusions

Of nine facilities permitted to burn waste tires in California, four burned tires as a supplemental fuel in 2016. These facilities burned approximately 9.22 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.

References

1. Coal, Coke, and Tires burned process rates and activity data. Excel file provided by Monica Stant, Shasta County Air Quality Management District, July 5, 2022.
2. Coal, Coke, and Tires burned process rates and activity data. Excel file provided by Sherri Haggard, Mojave Desert Air Quality Management District, July 15, 2022.
3. Coal, Coke, and Tires burned process rates and activity data. Excel file provided by Samuel Johnson, Eastern Kern Air Pollution Control District, July 20, 2022.
4. Coal, Coke, and Tires burned process rates and activity data. Excel file provided by Seth Lane, San Joaquin Valley Air Pollution Control District, July 13, 2022.
5. Coal, Coke, and Tires burned process rates and activity data. Excel file provided by Eugene Kang, South Coast Air Quality Management District, July 21, 2022.
6. Year 2016 Criteria Pollutants Data: Extracted from CEIDARS database. Report Run date: July 22, 2022.
7. Year 2016 Toxic Pollutants Data: Extracted from CEIDARS database. Report Run date: July 22, 2022.
8. Report on Air Emissions from Facilities Burning Waste Tires in California in 2015, State of California Air Resources Board: October 2022.