

Report on Air Emissions from Facilities Burning Waste Tires in California in 2021

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TABLE OF CONTENTS

Executive Summary.....	1
Introduction	3
Facility Information	3
Criteria Pollutant Emissions	6
Toxic Pollutant Emissions.....	7
Conclusions.....	9
References	10

Executive Summary

This report summarizes pollutant emissions from facilities in California that burned waste tires as a supplemental fuel in 2021, 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 2021 in combination with coal, coke, or biomass. Of these, five facilities burned 4.39 million tires as a supplemental fuel in 2021. 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 2021. Tires make up between less than one percent and 17 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 2021.

Criteria Pollutants	Emissions	Units
Total Organic Gases	144	tons/year
Reactive Organic Gases	129	tons/year
Oxides of Nitrogen	5,861	tons/year
Oxides of Sulfur	598	tons/year
Carbon Monoxide	7,333	tons/year
Total Particulate Matter	203	tons/year
Particulate Matter ≤ 10 micrometers	147	tons/year
Particulate Matter ≤ 2.5 micrometers	96	tons/year

Table 2. Total toxic pollutant emissions from all devices which burn tire-derived fuel in 2021.

Toxic Pollutants	Emissions	Units
Acetaldehyde	60	pounds/year
Benzene	148	pounds/year
Formaldehyde	242	pounds/year
Hydrogen Chloride	7,050	pounds/year
Total Metals	73	pounds/year
Total Polycyclic Aromatic Hydrocarbons	9	pounds/year
Hexavalent Chromium	11,988	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.

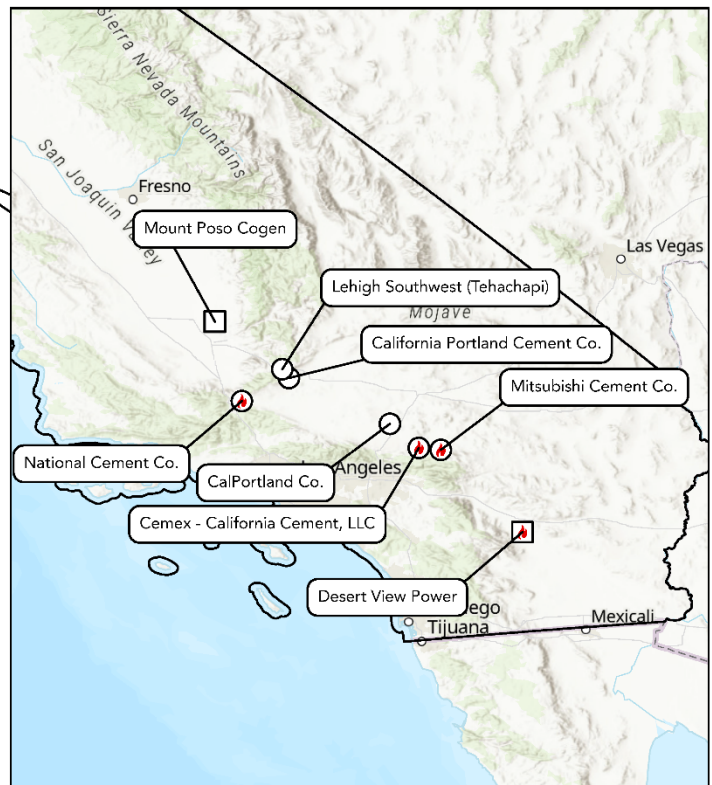
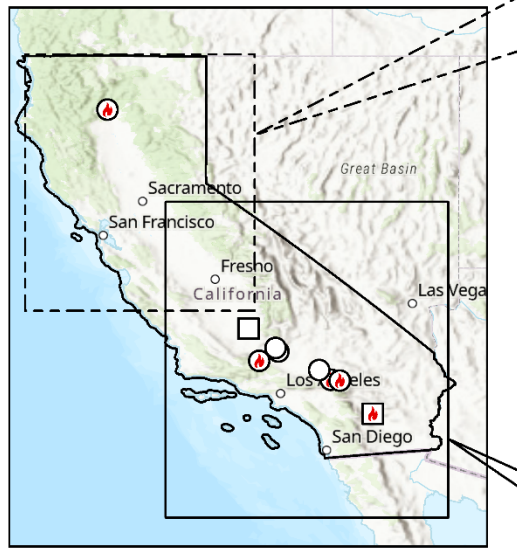
This report summarizes the emissions from the combustion processes (kilns and boilers) where tires were actually burned, rather than the total facility emissions. A more comprehensive emissions inventory for all the operations at each facility is available on the website www.arb.ca.gov/app/emsinv/facinfo/facinfo.php.

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 2021 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 2021.

In 2021, about 4.39 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 2021, 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 2021.

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	1.72	123,121	12.24
	Lehigh Southwest Cement Tehachapi, CA	0	NA	0
Mojave Desert	Cemex – California Cement, LLC Apple Valley, CA	0.36	306,834	1.15
	CalPortland Company Oro Grande, CA	0	NA	0
	Mitsubishi Cement Company Lucerne Valley, CA	1.44	148,726	8.81
Shasta County	Lehigh Southwest Redding, CA	0.87	42,596	16.89
San Joaquin Valley	Mount Poso Cogeneration Company Bakersfield, CA	0	NA	0
South Coast	Desert View Power Mecca, CA	0.01	330,641	0.04
Overall ⁽¹⁾	NA	4.39	951,918	4.61

⁽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 17 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, Table 5, and Table 6 summarize the criteria pollutant emissions from cement and electrical power facility kilns or boilers where tires were part of the fuel mix burned in 2021. 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 2021 (tons per year).

Cement Facility	TOG	ROG	NO _x	SO _x	CO	PM	PM ₁₀	PM _{2.5}
National Cement Company Lebec, CA	26	24	1,003	19	2,923	20	19	19
Cemex – California Cement, LLC Apple Valley, CA	66	66	2,119	187	746	123	75	37
Mitsubishi Cement Company Lucerne Valley, CA	27	26	1,844	311	2,683	54	47	36
Lehigh Southwest Redding, CA	6	5	704	25	951	4	4	3

Table 5. Criteria pollutant emissions from kilns and boilers at electrical power facilities where tire-derived fuel was burned in 2021 (tons per year).

Electrical Power Facility	TOG	ROG	NO _x	SO _x	CO	PM	PM ₁₀	PM _{2.5}
Desert View Power Mecca, CA	19	9	192	56	30	2	2	2

Table 6. Total criteria pollutant emissions from kilns and boilers where tire-derived fuel was burned in 2021 (tons per year).

Total Emissions ⁽¹⁾	TOG	ROG	NO_x	SO_x	CO	PM	PM₁₀	PM_{2.5}
Cement Facilities	124	120	5,669	542	7,303	202	145	94
Electrical Power Facilities	19	9	192	56	30	2	2	2
Grand Total	144	129	5,861	598	7,333	203	147	96

⁽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 7, Table 8, and Table 9 summarize the estimated toxic air pollutant emissions from the cement kilns and boilers where tires were part of the fuel mix burned in 2021. 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 7. Estimated toxic pollutant emissions from kilns and boilers at cement facilities where tire-derived fuel was burned in 2021.

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	13	16	45	1,487	15	2	1,521	1	1
Cemex – California Cement, LLC Apple Valley, CA	28	36	100	3,290	34	4	3,365	3	3
Mitsubishi Cement Company Lucerne Valley, CA	15	19	53	1,729	18	2	1,768	2	2
Lehigh Southwest Redding, CA	5	6	17	543	6	< 1	556	< 1	< 1

⁽¹⁾ Polycyclic Aromatic Hydrocarbons

Table 8. Estimated toxic pollutant emissions from kilns and boilers at electrical power facilities where tire-derived fuel was burned in 2021.

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	71	28	NR	< 1	< 1	4,778	NR	NR

⁽¹⁾ Polycyclic Aromatic Hydrocarbons

NR - Indicates that no emissions were reported.

Table 9. Total estimated toxic pollutant emissions from kilns and boilers where tire-derived fuel was burned in 2021.

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	60	77	214	7,050	73	9	7,210	7	7
Electrical Power Facilities	NR	71	28	NR	< 1	< 1	4,778	NR	NR
Grand Total	60	148	242	7,050	73	9	11,988	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 7 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 2021. These facilities burned approximately 4.39 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 NOx and CO, with comparatively lower SOx, 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

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