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State of California
AIR RESOURCES BOARD

2008 Report on Air Emissions from Facilities Burning Waste Tires in California

July 2008

California Environmental Protection Agency

Air Resources Board

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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

Since 2001 the Air Resources Board has tracked criteria and toxic emissions generated from facilities that burn waste tires as a supplemental fuel. This report, titled "2008 Report on Air Emissions From Facilities Burning Waste Tires in California," 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 uses the most recent information available, 2006 emissions data from facilities in California burning waste tires. Under State law, the local districts are responsible for establishing and enforcing emissions limits, granting air quality permits, and tracking facility emissions.

Over 40 million tires are discarded each year in California. These waste tires are landfilled, stockpiled in tire dumps, exported, burned for energy, used in whole tire applications, processed into useable products, or illegally dumped. This report focuses only on those waste tires that are burned as supplemental fuel.

Thirteen facilities in California are permitted to burn waste tires in combination with coal or coke, natural gas, and, in some cases, biomass fuel (as is the case with Jackson Valley Energy). However, only seven of the permitted thirteen facilities actually burned tires during 2006, including five cement kilns and two cogeneration plants. In 2006, about 9.3 million tires were burned in these facilities. In all of these facilities, the solid fuel consists primarily of coal or coke fuel that is burned in combination with tires. Natural gas is also combusted. Historically, the percentage of solid fuel that consists of tires is small. For some facilities, this percentage has increased, with the biggest increase occurring at California Portland Cement (Colton). During 2006, the two cogeneration facilities burned less than 5% tires, two of the cement kilns burned 10% or less of tires, and the remaining three cement kilns burned between 15% and 20% tires.

This report focuses only on devices that actually burned waste tires (e.g., cement kilns, boilers etc.) during 2006. It does not include emissions from other operations at a given facility (e.g., internal combustion engines, process heaters, etc.) The following table shows total emissions from devices at the seven facilities that burned waste tires in 2006. The emissions are for the whole combined fuel process (e.g., coal and tires), not just the waste tire portion. Since our last report in 2005, emissions have increased due to the addition of two facilities (Cemex and National Cement) that started using tires as a supplemental fuel, rather than just coal.

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Summary of Air Emissions from Devices That Burned Waste Tires in 2006

Pollutant	Tons/Year	Pounds/Year	Milligrams/Year
Criteria Pollutants			
Total Organic Gases	277		
Reactive Organic Gases	197		
Oxides of Nitrogen	9,126		
Oxides of Sulfur	572		
Carbon Monoxide	5,037		
Total Particulate Matter	502		
Particulate Matter (<10 Microns)	421		
Toxic Pollutants			
Acetaldehyde		130	
Benzene		121	
Formaldehyde		497	
Hydrogen Chloride		87,538	
Total Metals		580	
Total Polycyclic Aromatic Hydrocarbons		12	
Hexavalent Chromium			80,934
Dioxins			72
Furans			98

Note: From 2003 to 2006, criteria and toxic pollutants increased because two facilities were added to the emissions table after they started burning tires as a supplemental fuel (Cemex and National Cement). These facilities had been in operation in previous years and were permitted to burn tires, but their emissions were not listed in the 2005 report, because they did not burn waste tires during 2003.

Introduction

This report, titled "2008 Report on Air Emissions From Facilities Burning Waste Tires in California, 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."*

In addition waste tires are defined in Public Resources Code section 42807 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.*

This 2008 report is based on the most recent facility data available, which reflects tire burning activity during 2006. The purpose of this report is to focus on only the devices that burned waste tires, rather than the total facility emissions. If you are interested in seeing the total air emissions from all operations at these facilities please visit our website at (*http://www.arb.ca.gov/app/emsinv/facinfo/facinfo.php*). At this website, users can search for a particular facility and see the total air emissions from all operations at that facility.

In 2005, the California Integrated Waste Management Board reported that 40.8 million waste tires were generated and 9.1 million were burned as tire-derived fuel (*http://www.ciwmb.ca.gov/Publications/Tires/62006017.pdf*). Waste tires are landfilled, stockpiled in tire dumps, exported, burned for energy, used in whole tire applications, processed into useable products, or illegally dumped. Tires have a high heating value of approximately 13,000 to 15,000 BTU per pound, roughly the same as a superior quality coal.

Thirteen facilities in California are permitted to burn waste tires in combination with coal or coke, natural gas, and, in some cases, biomass fuel (as is the case with Jackson Valley Energy). However, only seven of the permitted thirteen facilities actually burned tires during 2006, including five cement kilns and two cogeneration plants. In 2006, about 9.3 million tires were burned in these facilities. In all of these facilities, the solid fuel consists primarily of coal or coke fuel that is burned in combination with tires. Natural gas is also combusted. Historically, the percentage of solid fuel that consists of tires is small. For some facilities, this percentage has increased, with the biggest increase occurring at California Portland Cement (Colton). During 2006, the two cogeneration facilities burned less than 5% tires, two of the cement kilns burned 10% or less of tires, and the remaining three cement kilns burned between 15% and 20% tires.

This report only focuses on devices that actually burned waste tires (e.g., cement kilns, boilers, etc.) This report does not include emissions from other operations at a given facility (e.g., internal combustion engines, process heaters, etc.)

Facility Descriptions

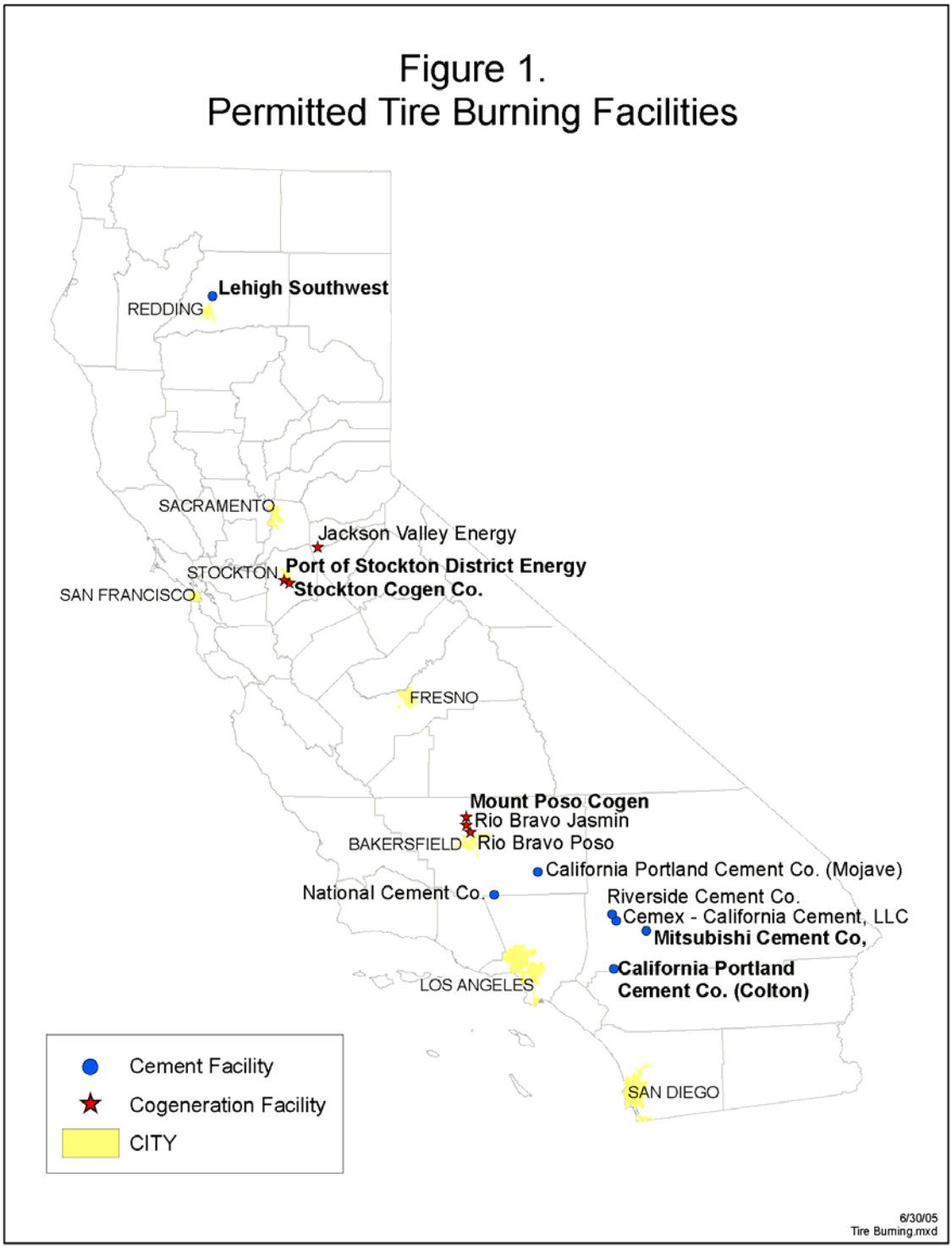
The facilities included in this report and summarized in Table 1, are those permitted by local air districts to burn waste tires as a supplemental fuel. The quantity of tires burned is a compilation of data that were reported to the local air districts, ARB, and the California Integrated Waste Management Board. In California during 2006, only seven facilities burned waste tires as a supplemental fuel. Five of these facilities are cement companies that burn waste tires in their cement kilns. The remaining two facilities are cogeneration companies using waste tires to produce electricity. In all of these facilities, the tires are burned in combination with coal or coke fuel, usually in a mixture that contains less than twenty percent waste tires.

Table 1: Facilities That Were Permitted to Burn Waste Tires in 2006

Dis	Facility Name	Facility Address	Tires Burned in 2006
Cement Facilities			
SC	California Portland Cement Company (Colton)	695 South Rancho Avenue Colton, CA 92324	2.4 million tires (22,429 tons of tires)
KER	California Portland Cement Company (Mojave)	9350 Oak Creek Road Mojave, CA 93502	None
MOJ	Cemex – California Cement, LLC	25220 Black Mountain Quarry Road Apple Valley, CA 92307	0.1 million tires (1,316 tons of tires)
SHA	Lehigh Southwest (formerly Calaveras Cement Co.)	15390 Wonderland Boulevard Redding, CA 96003	1.4 million tires (13,104 tons of tires)
MOJ	Mitsubishi Cement Company	5808 State Highway 18 Lucerne Valley, CA 92356	2.1 million tires (19,654 tons of tires)
KER	National Cement Company	5 Miles East Of I-5 Off Hwy 138 Lebec, CA 93243	1.7 million tires (15,940 tons of tires)
MOJ	Riverside Cement Company	19409 National Trails Highway Oro Grande, CA 92368	None
Cogeneration Facilities			
SJU	Jackson Valley Energy Partners	4655 Coal Mine Road Ione, CA 95640	None
SJU	Mount Poso Cogeneration Company	36157 Famoso Road Bakersfield, CA 93308	None
SJU	Port of Stockton District Energy Facility (POSDEF)	2526 West Washington Street Stockton, CA 95203	0.4 million tires (3,379 tons of tires)
SJU	Rio Bravo Jasmin	11258 Porterville Highway Bakersfield, CA 93308	None
SJU	Rio Bravo Poso	16608 Porterville Highway Bakersfield, CA 93308	None
SJU	Stockton Cogeneration Company	1010 Zephyr Street Stockton, CA 95206	1.1 million tires (9,902 tons of tires)
		Total Tires Burned in 2006	**9.3 million tires (85,725 tons)**

Dis = District: SC-South Coast; KER-Kern; MOJ-Mojave Desert; SHA-Shasta; SJU-San Joaquin

Figure 1 shows a map of California with the facility locations indicated. Not all of these permitted facilities actually burned tires in 2006.



Criteria Pollutant Emissions

Table 2 shows the criteria pollutant emissions from those facilities that burned tires in 2006. If a facility did not burn tires in 2006, it is not included in this table.

The facility emissions presented in Table 2 only include emissions from the individual devices that burned tires at each facility (e.g., boilers and/or cement kilns). The emissions in Table 2 are for the whole combined fuel process (e.g., coal and tires), not just the tire fuel portion. The emissions data come from the California Emissions Inventory Database and Reporting System (CEIDARS), which is updated by the local air pollution control districts and air quality management districts. 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 of less than 10 microns in diameter (PM10).

Table 2: Criteria Pollutant Emissions from Devices That Burned Waste Tires As A Supplemental Fuel During 2006 (Tons/Year)

Facility Name	TOG	ROG	NOx	SOx	CO	PM	PM10
Cement Facilities							
California Portland Cement (Colton)	9	7	774	106	71	55	51
Cemex – California Cement	177	140	4,238	12	218	232	194
Lehigh Southwest	10	8	493	40	1,643	65	65
Mitsubishi Cement	45	31	2,479	262	1,415	68	65
National Cement	11	9	991	9	1,427	24	22
Total Cement Facilities	**251**	**195**	**8,974**	**429**	**4,774**	**444**	**398**
Cogeneration Facilities							
Port of Stockton District Energy Facility	<1	<1	66	45	182	17	7
Stockton Cogeneration	25	1	86	99	80	41	16
Total Cogen. Facilities	**25**	**1**	**152**	**143**	**263**	**58**	**23**
Grand Total	**277**	**197**	**9,126**	**572**	**5,037**	**502**	**421**

Note: From 2003 to 2006, criteria pollutants increased because two facilities were added to the emissions table after they started burning tires as a supplemental fuel (Cemex and National Cement). These facilities had been in operation in previous years and were permitted to burn tires, but their emissions were not listed in the 2005 report, because they did not burn waste tires during 2003.

Toxic Pollutant Emissions

Table 3 shows the toxics emissions from those facilities that burned tires in 2006. If a facility did not burn tires in 2006, it is not included in this table. The facility emissions

presented in Table 3 only include emissions from the individual devices that burned tires at each facility (e.g., boilers and/or cement kilns). The emissions in Table 3 are for the whole combined fuel process (e.g., coal and tires), not just the tire fuel portion. The toxics data are based on two facility source tests obtained from the local air districts, one from Stockton Cogeneration and the other from Mitsubishi Cement. The emission factors derived from these source tests were used with the process rates of the other facilities to estimate their toxic emissions. The toxic emissions for the following facilities are based on the source test from the Mitsubishi Cement plant: California Portland Cement (Colton); Cemex; Lehigh Southwest; Mitsubishi Cement; and National Cement. The toxic emissions listed for Port of Stockton and Stockton Cogeneration are based on the Stockton Cogeneration source test. Reported emissions are in pounds/year as opposed to the criteria pollutants that are in tons/year. Additionally, due to the low emissions mass of hexavalent chromium and dioxins, these are reported in Table 4 in units of milligrams/year.

Table 3: Toxic Pollutant Emissions from Devices That Burned Waste Tires As A Supplemental Fuel During 2006 (Pounds/Year)

Facility Name	Acetaldehyde	Benzene	Formaldehyde	Hydrogen Chloride	Total Metals	Total PAHs*
Cement Facilities						
California Portland Cement (Colton)	10	13	36	1,184	12	1
Cemex – California Cement	28	36	100	3,310	34	4
Lehigh Southwest	7	9	26	871	9	1
Mitsubishi Cement	18	23	65	2,128	22	3
National Cement	10	12	34	1,118	12	1
Total Cement Facilities	**74**	**94**	**261**	**8,611**	**89**	**11**
Cogeneration Facilities						
Port of Stockton District Energy Facility	20	10	86	28,658	178	<1
Stockton Cogeneration	36	17	150	50,269	313	1
Total Cogen. Facilities	**56**	**27**	**236**	**78,927**	**491**	**1**
Grand Total	**130**	**121**	**497**	**87,538**	**580**	**12**

*(Polycyclic Aromatic Hydrocarbons-PAHs)

Note: From 2003 to 2006, toxic pollutants increased because two facilities were added to the emissions table after they started burning tires as a supplemental fuel (Cemex and National Cement). These facilities had been in operation in previous years and were permitted to burn tires, but their emissions were not listed in the 2005 report, because they did not burn waste tires during 2003.

Table 4: Toxic Pollutant Emissions from Devices That Burned Waste Tires As A Supplemental Fuel During 2006 (Milligrams/Year)

Facility Name	Hexavalent Chromium	Dioxins	Furans
Cement Facilities			
California Portland Cement (Colton)	1,210	1	1
Cemex – California Cement	3,383	3	3
Lehigh Southwest	890	1	1
Mitsubishi Cement	2,175	2	2
National Cement	1,142	1	1
Total Cement Facilities	**8,800**	**8**	**9**
Cogeneration Facilities			
Port of Stockton District Energy Facility	26,191	23	32
Stockton Cogeneration	45,943	41	57
Total Cogen. Facilities	**72,134**	**64**	**89**
Grand Total	**80,934**	**72**	**98**

Note: From 2003 to 2006, toxic pollutants increased because two facilities were added to the emissions table after they started burning tires as a supplemental fuel (Cemex and National Cement). These facilities had been in operation in previous years and were permitted to burn tires, but their emissions were not listed in the 2005 report, because they did not burn waste tires during 2003.

Emissions Inventory Summary

The following table shows total criteria and toxic emissions from the seven facilities that burned waste tires in 2006. The emissions in Table 5 are for the whole combined fuel process (e.g., coal and tires), not just the waste tire portion.

Table 5: Summary of Air Emissions from Devices That Burned Waste Tires in 2006

Pollutant	Tons/Year	Pounds/Year	Milligrams/Year
Criteria Pollutants			
Total Organic Gases	277		
Reactive Organic Gases	197		
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Acetaldehyde		130	
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Hydrogen Chloride		87,538	
Total Metals		580	
Total Polycyclic Aromatic Hydrocarbons		12	
Hexavalent Chromium			80,934
Dioxins			72
Furans			98

Note: From 2003 to 2006, criteria and toxic pollutants increased because two facilities were added to the emissions table after they started burning tires as a supplemental fuel (Cemex and National Cement). These facilities had been in operation in previous years and were permitted to burn tires, but their emissions were not listed in the 2005 report, because they did not burn waste tires during 2003.

Conclusions

Thirteen facilities are permitted to burn waste tires in California. However, only seven of these facilities actually burned waste tires as a supplemental fuel in 2006. About nine million waste tires were burned in 2006.

In total, the facilities burning waste tires in 2006 emitted 9,126 tons per year of oxides of nitrogen, 5,037 tons per year of carbon monoxide, 502 tons per year of particulate matter and 197 tons per year of reactive organic gas from those devices that burned waste tires as a supplemental fuel. These facilities also emitted toxic air pollutants including acetaldehyde, benzene, dioxins, formaldehyde, furans, hexavalent chromium, other heavy metals, and polycyclic aromatic hydrocarbons.