



# California Tire Fire Council

## *Response Guide for Tire Fires*

May 15, 2005



The goal of this document is to provide a quick resource guide for a large-scale tire fires. Although many of these issues are present at all tire fires, depending on the magnitude, surrounding communities, and location of the scrap tire fire some of these suggestions may not be applicable. This guide is for local fire departments, environmental response agencies, health departments, and media outlets.

### **Tire Fires**

In the United States we discard over 285 million vehicle tires each year. The sheer volume of scrap tires has generated many large-scale disposal sites that threaten surrounding communities. When a large tire fire erupts the local responders find themselves overwhelmed and understaffed. Fire departments are generally ill equipped and untrained in the management and suppression of these incidents. Even relatively small tire fires (e.g., 50,000 scrap tires) can require significant commitment of community resources. Costs to manage and suppress a scrap tire fire can exceed a fire department budget. Responding agencies must understand the environmental consequences of their suppression options and the associated impacts to air, water, soil and the surrounding community.

### **Hazardous Material Incident**

Tire fires must be treated as a hazardous material incident due to the chemical decomposition of a tire and the associated exposures to personnel and the environment.

### **Emergency Response Notifications**

State and Local

- Emergency Management Agencies
- Environmental Quality Agencies
- Health Agencies
- Law Enforcement

U.S. Environmental Protection Agency (National Response Center 1-800-424-8802)

### **Incident Command**

Since no one agency can manage all aspects of a tire fire, a unified command is typically developed to manage this incident.

### **Strategies for Fire Suppression**

To quickly address some of the issues facing first responders during a tire fire the following tactical list was compiled from past tire fires.

1. Treat the fire as a hazardous material incident, set up control zones;
2. Establish a unified command system;
3. Set up for crowd control and possible evacuations;
4. Save your water for protection of equipment, personnel and structures;
5. Initial steps should focus on separating what is on fire from what is not on fire;
6. Request heavy equipment (e.g., excavator, bulldozer, front end loader) and trained hazardous waste operators;
7. Request air monitoring support for both on-site and off-site;
8. Work up wind and beware of shifting winds;
9. Watch out for pooling or flowing pyrolytic oil (i.e., one vehicle tire can generate up to two gallons of oil);
10. Be prepared to collect, store and/or transport significant amount of contaminated water and pyrolytic oil;
11. Beware of animals, reptiles, and rodents in the pile(s);
12. Plan for a long-term event that can range from weeks to months;
13. Do not make any definitive statements concerning the timelines to the media;
14. Remember tire fires release an enormous amount of energy and emit all types of chemicals; fire fighters must be in full turnouts with supplied breathing air or at a minimum full-face respirator

with organic vapor and acid gas protection and with carbon monoxide monitors (*Note: some compounds may exceed maximum-use concentration established by regulatory standards; hence, respirators may not be a viable option at times*);

15. Other responders outside the fire area should wear Occupational Safety & Health Administration (OSHA) approved Level B protection; and
16. Expect the unexpected.

## Evacuations

It is essential that the threat to the surrounding community be quickly evaluated. If the community is in direct contact with heavy dark smoke then shelter-in-place orders or evacuations should be implemented by the local enforcement and health agencies. Follow your standard procedures for hazmat emergencies.

## Suppression Options

**Burn Down/Out**- Allowing the tire fire to completely burn is recommended.

**Disjointing of Tires**- Separate the tires, not already involved in the fire, from the burning tire pile.

**Soil Cover/Cap**- Buried tire fires will continue to release oil runoff adding to environmental impact.

**Suppression Agents**- Class A foam is recommended to protect exposures and put out bucket loads of burning tires pulled from the pile.

**Combination Method**- Covering unburned tire piles, with earth, sand, or similar material, to protect them from the radiant heat of the burning tire pile, using water and foam to protect exposures while the main tire pile continues to burn, and then pulling the burning tire pile apart to extinguish is the most practical response to the tire fire.

## Suppression Agents

While Class A foams and other agents have shown to be effective on smaller tire fires, the use of large appliances with agents directly on the fire is not recommended. The unified command should only consider using Class A foams and other additives during the initial stages of the tire fire, while breaking apart the burning tire, or during the smoldering stage of the fire. It has also been shown that the Class A foams and agents are effective in preventing ignition of unburned tire. As with all large-scale suppression efforts, you should not mix the suppression agents unless they are compatible according to their manufacturers.

Class B foams have proven not to be effective in extinguishing scrap tire fires and are not recommended. Class B foams should only be used to prevent ignition of pyrolytic oil or to extinguish a flammable liquid fire.

## Guidebooks and Publications (Emergency Response, Firescope, NIOSH, ACGIH)

Information about tire fires in response guides is unusually limited given the occurrence and impact to communities and the environment. Although many of the chemicals released during a tire fire are listed, a tire is not listed under the guide books. To assist the first responder the following mock-up National Fire Protection Association (NFPA) Hazard Label (Health 3, Flammability 2, and Reactivity 1) was created. Additional chemical information from tire fires can be found in the section below.



## Environmental Contaminants

The byproducts of a tire fire are smoke, pyrolytic oil, ash and carbon black. The first three pose a serious threat to first responders and the environment. Depending on how a fire is suppressed, the environmental concentrations will vary dramatically. Basically one can presume the following during a tire fire:

**Smoke** - Volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), Polynuclear aromatic hydrocarbons (PAHs), particulate matter, heavy metals, carbon monoxide, sulfur and nitrogen oxides, and acid gasses

**Pyrolytic Oil** – Petroleum hydrocarbons, VOCs, SVOCs, heavy metals

**Soil/Ash** – Heavy metals, sulfates, SVOCs, VOCs, petroleum hydrocarbons, dioxins, and furans

Responder Table: Approximate Level of Contaminants for Tire Fire Byproducts

Environmental Contaminants	Smoke	Ash/Soil	Pyrolytic Oil
Acid Gasses	High	N/A	Low
Benzene	High	Low	Medium
1,3-Butadiene	High	Low	Medium
Other VOCs	High	Low	Medium
Benzoic Acid	Medium	High	Med/Low
Other SVOCs	Medium	Medium	Med/Low
Carbon Monoxide	High	N/A	N/A
Dioxins and Furans	Low	Low	Low
Lead (older tires contained lead oxide)	Medium	Med/High	Low
Zinc	Medium	High	Low
Other Heavy Metals	Medium	High	Low
PAHs	High	Low/Med	High
Sulfur Compounds	High	High	Med/Low

Note: This is only a quick guide and does not indicate the toxicity or hazards of each contaminants

NA = not applicable

VOCs = volatile organic compounds

SVOCs = semi-volatile organic compounds

PAHs = Polynuclear aromatic hydrocarbons

## Health and Safety Issues

By law all site work should be conducted under a written Health and Safety Plan designed for a tire fire.

Key elements are:

- Safe working environment
- Chain of command
- Communications
- Heavy equipment operations
- Protection zones
- Personnel protective equipment
- Supplied air, SCBAs, other respiratory equipment
- Air and carbon monoxide monitoring
- Compliance with appropriate governmental regulations (e.g., OSHA, US EPA)

## Reference Documents:

- California Fire Marshal's Office, 2004, Rings of Fire
- California Integrated Waste Management Board, 2002. Tire Pile Fires: Prevention, Response, Remediation, <http://www.ciwmb.ca.gov>
- Missouri Department of Natural Resources, 1999. Response to Tire Fires, <http://www.dnr.state.mo.us/oac/pub2062.pdf>
- Scrap Tire Management Council, 1992 Guidelines for the Prevention and Management of Scrap Tire Fires, 1992, <http://www.rma.org>
- United States Environmental Protection Agency, 1997. Air Emission from Scrap Tire Combustion, [http://www.epa.gov/ttn/catc/dir1/tire\\_eng.pdf](http://www.epa.gov/ttn/catc/dir1/tire_eng.pdf)
- United States Fire Administration, Federal Emergency Management Agency, 1998. Scrap and Shredded Tire Fires, <http://www.usfa.fema.gov/downloads/pdf/publications/tirefirerep.pdf>

*The California Tire Fire Council is comprised of fire personnel, technical and industrial advisors, and environmental responders. This document was prepared by the State of California, Integrated Waste Management Board and Fire Marshal's Office, and the Rubber Manufacturers Association.*