Tire Fires

Overview

Tire fires present the same potential threat to the environment that an incident involving an oil tanker or a railroad tank car carrying hazardous substances. The average passenger car tire holds 2.5 gallons of oil. When exposed to extreme heat, the tires reach a state of combustion where volumes of pyrolytic oil can be produced. This could turn the tire pile into a running oil fire. Exposure hazards associated with the smoke plume, water runoff, and soil include:

- Volatile organic chemicals
- Polynuclear aromatic hydrocarbons
- Carbon monoxide
- Heavy metals

These toxins can be absorbed either through the skin, mucus membranes or respiratory system.

The success of any fire suppression operation begins at the company level. The Company Officer should familiarize his/her crew with all scrap tire piles located within their area of response. Information gathered should be entered into the CAD system

Areas of consideration during pre-planning should include:

- Site location
- Type of operation
  - Salvage or recycling
  - Managed or unmanaged
- Tire piles composition (e.g., whole, burned, shredded, random stack, etc.)
- Tire pile size
- Available equipment (e.g., backhoes, front-loaders, etc.)
- Hazards
- Exposures (e.g., storm drains and dry wells if applicable)
- Utilities (e.g., overhead wires, underground gas lines, communication equipment, etc.)
- Response conditions
- Geographical information
- Topography (e.g., to include possible runoff containment locations)
- Emergency contacts

Deployment Considerations

It is recommended that major tire fires be handled as hazardous materials incidents. The incident taker will obtain all available information from the caller to determine what is on fire. A hazardous 3-1 will be dispatched if it is determined that a tire pile is on fire.

Size-Up

Upon arrival the Company Officer must determine the stage of combustion:

1. Incipient
2. Free burning
3. Smoldering

The incipient stage of a tire fire begins with a point of ignition. Once a tire has gained an open flame front, the heat of the fire is absorbed by the surrounding tire material. Immediately separating the burning tire from the rest of the pile and/or applying water and foam would eliminate the threat to the remaining tires.

During the free burning stage, fire spreads quickly and there is a dramatic increase in smoke and heat. Use of water in this stage of a tire fire could increase the products of incomplete combustion like carbon monoxide and particulate matter. The cooled tires may continue to pyrolize, producing large quantities of oil. A crust may form over the pile while internal temperatures reach about 2,000 degrees Fahrenheit. The smoldering stage has begun.

Oil not consumed by the fire will leach into the soil, pool, and begin to flow under the pile. Heat from the fire could ignite the oil, resulting in a three-dimensional fire. Products of incomplete combustion continue to be a health hazard.

During the initial size-up, the Company Officer has to determine if the fire can be extinguished quickly without endangering personnel. If the fire is in the free burning or smoldering stage the most immediate concern will be the life safety of Firefighters and the community. Approach to the incident should be in accordance with tactics common to other potential hazardous materials incidents.

Initial size-up should include the evaluation of the emergency in terms of:

- Personnel safety
- Public health
- Environmental impact
- Threatened exposures
- Extent of fire
- Need for additional resources

Personnel Safety

Awareness of the hazards involved in a tire fire can be the best personnel protection. Heat exhaustion and working in less than ideal conditions is a reality in a large tire fire. Command will want to prepare for total exposures, health hazards and personal injury hazards.

Full turnout gear is the minimum level of protection required for everyone working the tire fire.

1. Boots
2. Turnout pants
3. Turnout coat
4. Gloves
5. Helmet
6. Nomex hood
7. S.C.B.A. with Mask

NOTE: Conditions permitting E.M.S. gloves under the leather gloves will give added protection from contact with the contaminated water, oil, and mud.

The risk of exposure to toxic chemicals continues after the fire is out. Smoldering tires are as toxic as tires in a free burning state. Flying ash and contaminated soil are also potential hazards. The temptation to dress down for overhaul should be resisted until the hazardous materials team has determined the appropriate level of protective clothing required.

Command will establish a Lobby Sector to ensure personnel accountability. When multiple points of entry to the incident exist, geographic sectors should be established (e.g., lobby north, lobby east, etc.). Hazard sectors, zones and Rehab Sector will be established according to the Standard Operating Procedures.
The Incident Commander will establish a Decontamination Sector for all personnel leaving the

fire area. All protective clothing, firefighting equipment and apparatus will need to be decontaminated as well.

Sectors such as environmental, safety, PIO and any other sectors/branches listed under "Command Concerns" in this procedure will be established as the incident progresses.

Personnel must be aware of other hazards involving scrap tire fires. Contact with rodents, mosquitoes, snakes, spiders and scorpions will be reduced with protective clothing.

Be aware of the dangers of machinery and heavy equipment operating on the fire scene. Collapsing walls of tires can block escape routes or cut off water supplies.

Public Health

Command should determine early whether to evacuate the surrounding areas. Tire fires are extremely difficult to extinguish. Given this knowledge, no strategy for managing the incident should bypass evacuation considerations.

Evacuation Sector should be established early. The process will be managed according to the Evacuation Sector procedure (M.P. 201.05E).

Environmental Impact

Command should size-up the potential environmental consequences of the fire and begin notifying the appropriate agencies. Emergency contacts can be notified according to the Environmental Sector procedure (M.P. 201.05D). Early notification will facilitate their timely placement into the Command structure and involvement in the incident.

Areas of concern will include:

- Life safety
- Proximity of wildlands
- Potential toxic run-off
- Bodies of water
- Smoke plume
- Wind direction/speed

Tactics

Important tactical considerations include:

- Life safety
- Protecting exposures
- Isolating burning tires
- Use of heavy equipment
- Overhead or underground utilities

Immediate evacuation of the incident scene is a high priority. Every effort should address life safety of the incident scene. Protection of the fire crews safety will be addressed continuously. On-deck crews will be established according to the In-Transit, On Deck, Company Recycle procedure (M.P. 201.01A). Buildings, equipment and utilities in the proximity of the fire will need to be protected. Command needs to determine the amount of fuel actively burning and the total amount of fuel available. Estimate the rate of spread to determine what will be allowed to burn and where fire breaks will be cut through the pile.

Creating fire breaks in a large tire pile is a long and time consuming process. It can be accomplished with heavy machinery and front-end loaders. Use of City Equipment at Emergency Scenes procedure will allow Command to implement the process (M.P. 206.15).

Strategy

Successful options for fighting a tire fire have been employed individually and in many cases, in combination with one another. Reduced to the lowest common denominator, these options are:

1. Burn it
2. Bury it
3. Drown it

Burn It

Letting a tire pile burn has its merits. Soil and water pollution may be drastically reduced when many of the products of combustion go up in smoke. The clean up costs can be reduced when compared to other options.

A precedent for the burn it strategy appears in fire responses to chemical fires. Adding water to fires or hazardous materials which react to water could exacerbate the emergency.

Importantly, the fire service must manage and control the burn. Protecting exposures and separating tires from the burn area will continue to be a tactical priority.

Bury It

The decision to bury a tire pile also has merits. Sand, cement dust, quick lime, and crushed coral rock are all high in calcium content. Calcium scrubs sulfur from the emissions, creating calcium sulfate or gypsum.

The bury it strategy could be employed in areas that have minimal water supply or in areas that are densely populated. The decision to bury a tire fire would take into consideration reducing toxic smoke for the sake of public health.

Geological considerations play an important role in the bury it strategy. While the tire fire is entombed, fires can still pyrolize and push toxic oil into the soil and underground water sources. Burying a tire fire that is on top of clay soils may delay the oil from filtering to underground water supplies. To determine the release of pyrolytic oil, check down gradient from the pile for contamination.

Drown It

Water, foam, and additives have their own place as an option. The drown it strategy is best employed with forethought and careful pre-planning. Knowing in advance the topography and exposure hazards to water sources will be critical.

Drawbacks to the drown it strategy include:

- An increase in the toxic air emissions as the fire is cooled causing the combustion process to slow down.
- An inordinate amount of water run-off combined with pyrolytic oil will be the result of trying to drown out a fire.
- Effectiveness of working lines applied to a tire fire is questionable. Handlines alone cannot reach the interior spaces of a tire fire.

The use of working lines on chunk and chipped tires, however, can be effective when used in a fog application. Here again, separating the inventory from the burn area is important to the control and extinguishment of chipped and chunk tire materials.

The use of foam would best be employed on small tire fires or when the fire is in the incipient stage. Pulling a larger tire pile apart with heavy machinery and applying foam would be a prudent use of the product. Foam should only be employed as part of a predetermined strategy.

Clean-Up and Overhaul

Unlike traditional structural fires or wildland fires, clean-up on tire fires will; in all probability, be turned over to an appropriate environmental protection agency. Hazards to personnel exist long after the fire is out. Toxicity levels of tire fire sites suggest high concentrations of contaminates. Flying ash and contaminated soil blown around the site may increase your exposure risks.

Command Concerns

Scrap tire fires can potentially last days, weeks, or months. Combined with the fact they are highly toxic and dangerous, Command must consider or address the following concerns:

Emergency Operations Center	Lobby Sector	Police Liaison
Emergency Operations Plan	Environmental Sector & ADEQ	Resource Sector
Accountability	Evacuation Sector	Rehabilitation Sector
On-Deck	Public Information Sector	Staging Sector
Safety Sector	Welfare Sector	Hazardous Materials Sector
Air Operations	Decontamination Sector	Evacuation Sector
Water Department Communications	Mutual Aid Response	Code Enforcement & C99