

TITLE OPERATIONS MANUAL	STANDARD INSTRUCTION 02		DEPARTMENT FIRE-RESCUE
SUBJECT LARGE VEHICLE TIRE FIRES	SECTION 20	PAGE 1 of 6	EFFECTIVE DATE June 23, 2025

I. PURPOSE

The purpose of this policy is to establish operational guidelines for the safe and effective response to [large vehicle](#) tire fires, minimizing risks to responders, the public, and the environment while ensuring efficient incident management.

II. SCOPE

This policy shall apply to all sworn San Diego Fire-Rescue Department (SDFD) personnel, excluding Lifeguard personnel.

III AUTHORITY

The Fire Chief authorizes this policy.

IV. POLICY

A. Hazards

1. Large vehicle [tire fires](#) present unique challenges, including:
 - i. [Tire Failure](#):
 - a) Blowout
 - b) Explosion
 - ii. Toxic Smoke:
 - a) Burning tires release hazardous chemicals (e.g., benzene, sulfur dioxide, and polycyclic aromatic hydrocarbons).
 - iii. Additional hazardous materials present in exposures:
 - a) Fuel tanks
 - b) Trailer contents
 - c) Exposure to possible traffic and work site hazards

B. Personal Protective Equipment (PPE)

1. Wear self-contained breathing apparatus (SCBA) in the presence of fire or smoke/gas.
2. Wear structural firefighting gear.

C. Procedure

1. Scene Assessment and Size-Up
 - i. Approach the scene as close to in-line with the tread as possible, never more than 45 degrees from the tread.
 - ii. Approach from upwind and uphill if possible.
 - iii. Maintain a 360-degree awareness of hazards (e.g., downed power lines, traffic, other exposures, etc.).
 - iv. Assess
 - a) Rescue/Life hazard
 - b) Proximity to exposures

TITLE OPERATIONS MANUAL	STANDARD INSTRUCTION 02		DEPARTMENT FIRE-RESCUE
SUBJECT LARGE VEHICLE TIRE FIRES	SECTION 20	PAGE 2 of 6	EFFECTIVE DATE June 23, 2025

- c) Number of tires involved
 - d) Smoke plume direction and potential impact on surroundings
 - v. Identify the vehicle type/size.
- 2. Establish an initial hot zone of a minimum of 350 feet in all directions.
 - i. Use the following references to establish additional hazard zones (See [Appendix B](#)):
 - a) Tractor-Trailer or similar tires size:
 - 1) 10 feet – Exclusion Zone
 - (i) Lethal pressure waves will be generated in a tire explosion. Do not enter.
 - 2) 10 to 20 feet- Immediate Rescue Only Zone
 - (i) Pressure waves are likely to cause injury.
 - (ii) Only operate in this zone for immediate victim rescue.
 - 3) 20 to 350 feet (NOT in line with tread) – Rescue Only Zone
 - (i) Only operate in this zone to perform a rescue as [projectiles](#) may be expelled into this area.
 - 4) 20 to 350 feet (in-line with tread) – Limited Operation Zone
 - (i) Projectile hazard reduced but not eliminated.
 - (ii) Only operate if the incident priorities dictate.
 - (iii) Consider unstaffed hose streams.
 - b) Heavy Equipment or similar tire size:
 - 1) 10 feet – Exclusion Zone
 - (i) Lethal pressure waves will be generated in a tire explosion. Do not enter.
 - 2) 10 to 50 feet- Immediate Rescue Only Zone
 - (i) Pressure waves are likely to cause injury.
 - (ii) Only operate in this zone for immediate victim rescue.
 - 3) 50 to 350 feet (NOT in line with tread) – Rescue Only Zone
 - (i) Only operate in this zone to perform a rescue as projectiles may be expelled into this area.
 - 4) 20 to 350 feet (in-line with tread) – Limited Operation Zone
 - (i) Projectile hazard reduced but not eliminated.
 - (ii) Only operate if the incident priorities dictate.
 - (iii) Consider unstaffed hose streams.
- 3. Incident Command
 - i. Establish Unified Command (UC) with appropriate agencies (e.g., CHP, SDPD, etc.).
 - ii. Coordinate traffic control, evacuation, and/or shelter-in-place as appropriate.
- 4. Fire Suppression
 - i. Apply a defensive strategy to contain the fire and protect exposures.

TITLE OPERATIONS MANUAL	STANDARD INSTRUCTION 02		DEPARTMENT FIRE-RESCUE
SUBJECT LARGE VEHICLE TIRE FIRES	SECTION 20	PAGE 3 of 6	EFFECTIVE DATE June 23, 2025

- a) Consider Class A foam application on the tire fire.
 - b) Protect trailer and fuel tanks from extension with additional deployed lines.
 - ii. Flammable liquids may become involved:
 - a) Consider applying dry chem on fuel fire if a safe distance can be maintained from the tire fire.
 - b) Contain a fuel fire if immediate extinguishment is not safe.
 - iii. Even after the exterior fire is extinguished, tires exposed to heat may continue to undergo [runaway exothermic reaction](#) and explode.
 - iv. DO NOT immediately approach a tire that has been exposed to significant heat. Allow the tire to cool.
5. Environmental Protection
- i. Deploy absorbent materials (e.g., sand, dirt) or containment berms to control runoff.

V. DEFINITIONS

- A. Auto-ignition (also known as spontaneous combustion): the ignition of a substance without the need for an external ignition source (like a flame or spark), occurring when the substance reaches its auto-ignition temperature. [\(RETURN\)](#)
- B. Large Vehicle: a vehicle that is significantly larger than a standard sedan or compact car, often used for commercial purposes or transporting goods or many passengers. Typically, but not exclusively identified as a vehicle with a gross vehicle weight rating (GVWR) of over 10,000 pounds. [\(RETURN\)](#)
- C. Lower Explosive Limit (LEL): the lowest concentration of a gas or vapor in air that can ignite and propagate a flame in the presence of an ignition source. [\(RETURN\)](#)
- D. Projectiles: An object propelled through the air by an external force and continuing in motion by its own inertia. [\(RETURN\)](#)
 - 1. During tire explosions in an open pit, projectiles have been reportedly expelled up to 350 feet away.
- E. Runaway Exothermic Reaction (also known as thermal runaway): an uncontrolled, self-accelerating reaction where the heat generated by the reaction increases the reaction rate, leading to a rapid and dangerous increase in temperature and pressure. [\(RETURN\)](#)
- F. Shock Wave / Blast Wave: a sharp change of pressure in a narrow region traveling through a medium, especially air, caused by explosion or by a body moving faster than sound. Pressures and associated impacts to humans during tire explosions in an open pit are as follows:
 - 1. < 1.5 psi are considered safe
 - 2. 1.5 – 14.5 psi will cause injury
 - 3. 14.5 – 43.4 psi may cause fatal injury
 - 4. > 43.5 psi are fatal [\(RETURN\)](#)
- G. Tire Fires: A fire involving rubber tires, characterized by intense heat, toxic smoke, and difficulty in extinguishment due to the material's composition and structure. [\(RETURN\)](#)

TITLE OPERATIONS MANUAL	STANDARD INSTRUCTION 02		DEPARTMENT FIRE-RESCUE
SUBJECT LARGE VEHICLE TIRE FIRES	SECTION 20	PAGE 4 of 6	EFFECTIVE DATE June 23, 2025

H. Tire Failure (See [Appendix A](#)):

1. Blowout: A tire blowout occurs after the mechanical failure of the tire or rim assembly at pressures typically around 145 psi.
2. Explosion: There are three phases leading to a tire explosion:
 - i. Air pressure inside the tire will rise from 90 to 235 psi as temperatures rise.
 - ii. At approximately 365° Fahrenheit, the rubber undergoes a runaway exothermic reaction and releases flammable gases that increase pressure within the tire. This reaction can continue even if exterior fire is extinguished.
 - iii. An explosion will occur when the tire contains at least 5.5 percent oxygen, and the flammable gases reach their [lower explosive limit](#) and [auto-ignition](#) temperature. Explosion may generate [shock waves](#) and pressures over 1000 psi. Note, this explosive force is generated from tires inflated with ambient air and regardless of the rim assembly. [\(RETURN\)](#)

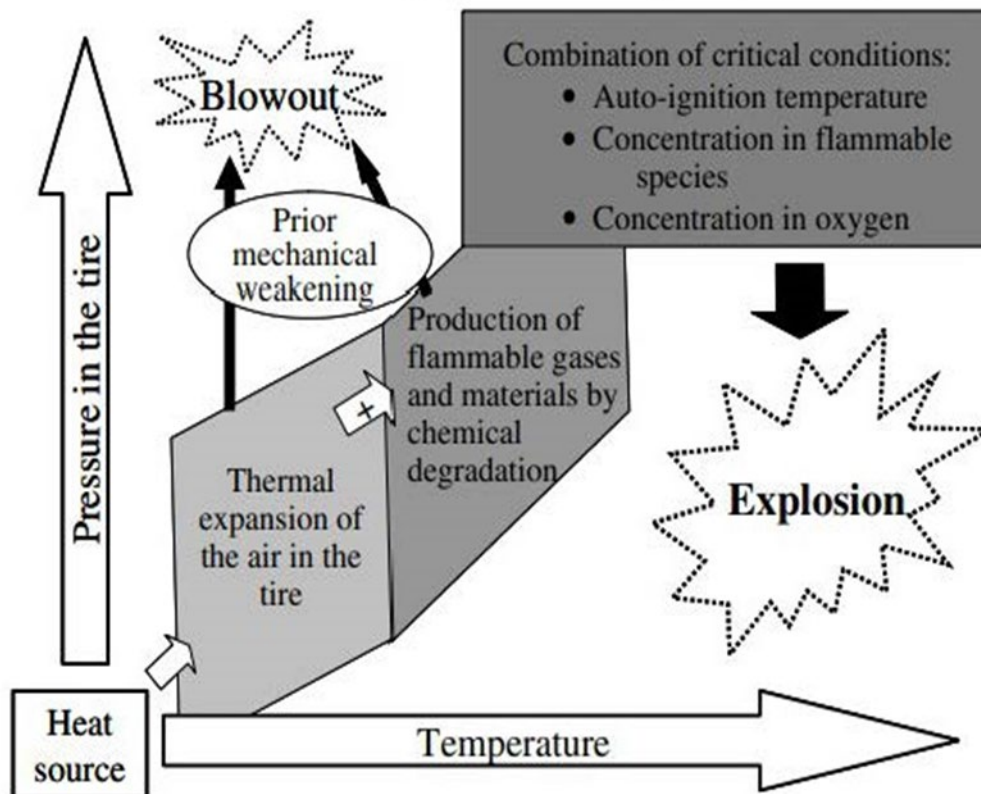
VI. REFERENCES:

- A. June 14, 2024, Fatality – Final Report. United States Department of Labor, Mine Safety and Health Administration, Report of Investigation, Littlerock Quarry, Hi-Grade Materials Co., Littlerock, Los Angeles County, California.
- B. Los Angeles County Safety Bulletin “Large Vehicle Tire Fires”. EA-322a.

TITLE OPERATIONS MANUAL	STANDARD INSTRUCTION 02		DEPARTMENT FIRE-RESCUE
SUBJECT LARGE VEHICLE TIRE FIRES	SECTION 20	PAGE 5 of 6	EFFECTIVE DATE June 23, 2025

VII. APPENDIX

A. Process Leading to Tire Blowout or Explosion

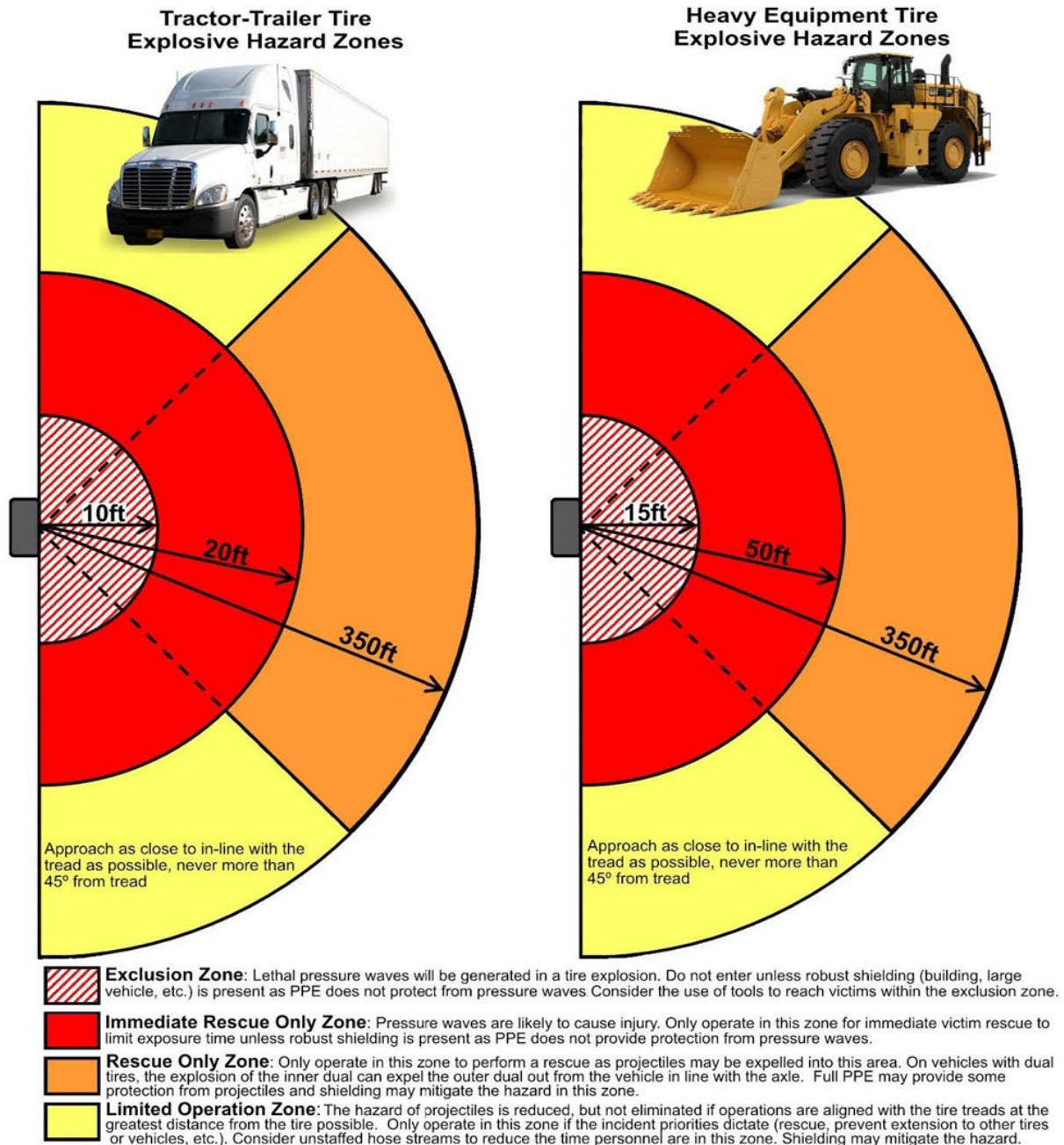


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TITLE OPERATIONS MANUAL	STANDARD INSTRUCTION 02		DEPARTMENT FIRE-RESCUE
SUBJECT LARGE VEHICLE TIRE FIRES	SECTION 20	PAGE 6 of 6	EFFECTIVE DATE June 23, 2025

B. Tractor-Trailer/Heavy Equipment Tire Explosive Hazard Zones



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