

**Event Type:** Dry Ice Outgassing

**Date:** August 21, 2020

**Location:** Pine Gulch Fire,  
Grand Junction, Colorado

## Dry Ice in Cooler Inside Van Leads to Carbon Dioxide Poisoning for Driver and Passenger

On August 21 two overhead personnel were in a cargo van delivering food in coolers packed with dry ice. The cargo van driving compartment was contiguous with the cargo area. Therefore, there was no barrier between occupants and the cargo area.



*The van and the cooler involved in this event.*

The van departed ICP for the delivery. After approximately 10 minutes, the driver became short of breath and began to make involuntary quick breaths. Next, the driver reported losing cognitive ability. For instance, when the passenger told the driver to turn left, the driver indicated that the instruction was not immediately understood.

The driver indicated that his condition continued to decrease. He felt an increased heart rate, was unable to concentrate, and began feeling as if he was going to pass out. The driver was about to inform the passenger that he was sick and needed to be relieved of driving. That's when the passenger said: *"I feel sick. I can't breathe."*

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#### **We Have to Get Out of Here**

The driver realized that the atmosphere inside their cargo van was most likely causing these adverse reactions. He told the passenger: *"We have a bad atmosphere. We have to get out of here."* The driver immediately pulled over. Both driver and passenger exited the vehicle.

Neither driver nor passenger were ambulatory. However, they were able to lie down near each other.

The driver said he was confused. At first, he thought his cell phone was in the van. Then he realized it was in his pocket. Even though the driver felt as if he was passing out, he knew he had to call for help. But when the driver grabbed his cell phone, he experienced confusion/concentration issues regarding how to operate it. Eventually he was able to call his supervisor.

#### **Recommended Breathing Technique**

The supervisor described the call as difficult to understand. The driver's attempts to communicate were confusing. The location and situation were finally discerned. 911 was called. Between the call to the supervisor and the ambulance responding, the driver called his wife who is a medical professional. His wife instructed him to take slow, deep breaths and exhale with his lips positioned as if he was whistling.

The driver communicated this breathing technique to the passenger. This breathing method helped significantly.

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*As of the publishing date of this RLS, the driver is under medical care for loss of cognitive abilities due to toxic carbon dioxide exposure.*

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When the ambulance arrived, both driver and passenger were able to walk to ambulance. However, neither had fully recovered, and requested medical care. The driver's cognitive ability remained impaired as evidenced by communicating to the EMTs: *"We were in a carbon monoxide atmosphere caused by dry ice."* The ambulance attendant corrected the driver by stating that would produce a carbon dioxide atmosphere. The driver responded: *"That is what I meant."*

Both patients were treated in the ambulance by receiving oxygen and had their oxygen levels along with their vitals monitored. Both patients, the driver and passenger, had low oxygen levels that quickly recovered with the oxygen treatment.

Ground Support provided transportation back to ICP.

As of the publishing date of this RLS, the driver is under medical care for loss of cognitive abilities due to toxic carbon dioxide exposure.

## Lessons

- ❖ Dry ice outgassing can cause an oxygen deficient atmosphere. (For more information, see “Carbon Dioxide and Dry Ice” box below.)
- ❖ Therefore, use caution when transporting dry ice in vehicle passenger compartments. If possible, roll down a window or two to circulate air into the vehicle. If this isn’t possible, consider alternate means to transport dry ice.
- ❖ The van driver and passenger wished to share this experience to prevent this safety issue from occurring to others in the future. It is unlikely that anyone would not depart their vehicle under similar circumstances. The driver is thankful that he realized that it was a hazardous atmosphere in the vehicle and that he and the passenger managed to stop and get out.

### **Three Weeks Later: Continued Harmful Effects**

At the time this RLS was finalized—three weeks after this incident occurred—both the van driver and passenger continue to have adverse cognitive ability effects from this toxic atmosphere exposure. They are currently undergoing further testing regarding their cognitive abilities and potential harmful effects to their vital organs.

### **Carbon Dioxide and Dry Ice**

The brief description (below) of the why and how dry ice can present a hazard to workers in confined spaces is taken from a Centers for Disease Control and Prevention (CDC) and National Institute for Occupational Safety and Health (NIOSH) Health Hazard Evaluation (HHE) report. While this report isn’t specific to wildland fire, the information, background and context it provides are relevant to the situation described in this RLS. The full HHE is available here: <https://www.cdc.gov/niosh/hhe/reports/pdfs/2011-0131-3222.pdf>.

*“Carbone Dioxide (CO<sub>2</sub>) is a colorless, odorless, and nonflammable gas [NIOSH 1976] that is normally present in our atmosphere at approximately 300-400 ppm. It is also a normal body constituent arising from cellular respiration. Commercial uses of solid CO<sub>2</sub> (dry ice) primarily includes refrigeration of food. Dry ice is much colder than regular ice, and can severely freeze the skin like frostbite. Insulated gloves should be worn when handling dry ice. Safety glasses and a face shield should be worn when cutting or chipping it. Dry ice can be a very serious hazard in a small space that is not well ventilated. As dry ice sublimates, it turns into CO<sub>2</sub> gas. In a small space with poor ventilation, like a walk-in freezer or cooler, CO<sub>2</sub> gas concentrations can build up. If enough CO<sub>2</sub> gas is present, a person can become unconscious, and in some cases, die of suffocation because the CO<sub>2</sub> will displace oxygen. Symptoms of overexposure to CO<sub>2</sub> include headache and difficulty breathing, and with greater exposure, nausea and vomiting.”*

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