National Transportation Safety Board

Washington, D.C. 20594

Office of the Chairman

NOV 07 2008

The Honorable Carl T. Johnson
Administrator
Pipeline and Hazardous Materials Administration
1200 New Jersey Avenue, S.E.
Washington, D.C. 20590

Dear Mr. Johnson:

Thank you for the January 22, 2008, letter signed by Ms. Stacey L. Gerard, Associate Administrator/Chief Safety Officer, to the National Transportation Safety Board regarding Safety Recommendations I-07-1 and -2, stated below. These recommendations were issued to the Pipeline and Hazardous Materials Administration (PHMSA) on June 27, 2007, as a result of the Safety Board's investigation of the September 23, 2005, motorcoach fire on Interstate 45 near Wilmer, Texas.

I-07-1

> Develop standards for the safe transportation of partially pressurized aluminum cylinders by, for example, requiring the addition of temperature-actuated pressure relief devices [PRDs] or the reduction of residual pressure to safe limits, to ensure that such cylinders do not experience overpressure failure when exposed to a fire.

The Safety Board is concerned that PHMSA's response does not address the intent of Safety Recommendation I-07-1. The Board issued this recommendation to address its concerns regarding aluminum cylinders containing any gas under high pressure. Through the investigation of the Wilmer, Texas, accident, the Board found that Federal hazardous materials regulations are designed for the transportation of fully pressurized cylinders and require that a pressure relief device (PRD) prevent the failure of these cylinders. These regulations do not address the safety of partially pressurized cylinders. Although this was not an issue prior to 1981 when all specification cylinders were designed of steel, amendments to the hazardous materials regulations allow the use of aluminum cylinders to transport compressed gases that present a threat to transportation safety. The Board's investigation found that aluminum cylinders will lose material strength in a fire, and partially pressurized cylinders can fail catastrophically before their PRD actuates.

PHMSA's Associate Administrator and Deputy Associate Administrator for Hazardous Materials Safety and Safety Board staff discussed the above information at meetings held in the fall of 2007. During these meetings, PHMSA staff said they did not believe that a change in the PRD or reduction of pressure in cylinders would be practical, and they believed that such measures would increase the risk of injuries. They further stated that current temperature-activated PRDs

would actuate at lower temperatures than that of the current burst disk and would have released oxygen into the fire earlier in the accident. They added that the function of both the PRD and the cylinder should be to delay the release of oxygen as long as possible in order to provide an opportunity to evacuate people from the scene, to extinguish the fire, and to cool the cylinders. They also stated that the potential for danger to the public and emergency responders is significantly less from the failure of an aluminum cylinder than from the failure of a steel cylinder.

The Safety Board agrees that providing additional oxygen to a fire presents a hazard and should be delayed as long as possible; however, the failure of a pressure vessel containing several hundred to nearly 3,000 pounds per square inch of pressure (psig) also poses a significant hazard to emergency responders and others. Aluminum cylinders can be transported as cargo in any mode of transportation, and the presence of aluminum cylinders containing any compressed gas may pose a significant hazard in transportation fires. For a PRD to be functional, it must prevent the catastrophic failure of the cylinder under all conditions. PRDs mounted on steel cylinders have been shown to prevent the failure of the cylinder in a fire in all loading conditions. The aluminum cylinders retrieved from the Wilmer accident demonstrated that the PRDs on two cylinders did not activate, and those cylinders failed catastrophically. The catastrophic failure of a cylinder should not be considered a safe method of relieving pressure.

PHMSA staff have indicated that under conditions such as those of the Wilmer accident, a partially pressurized cylinder with a currently available temperature-actuated PRD would release sooner than one equipped with a pressure-activated PRD and thereby intensify the fire. While this may be true, Safety Board calculations contained in Materials Laboratory Study 05-124 show that, for a fully pressurized cylinder of the type in service at the time of the Wilmer accident, a pressure-activated PRD disk would actuate at a temperature in the range of 250° F to 320° F. Since the Wilmer accident, the Compressed Gas Association has reduced the pressure activation range for this type of PRD to between 2,700 psig and 3,000 psig. As a result, a fully pressurized cylinder can now be equipped with a PRD that will actuate between 200° F and 260° F. As noted in the Safety Board's accident report, a manufacturer of the cylinders stated that these cylinders lose strength well below their melting point of 1,020° F to 1,206° F, and a fully pressurized cylinder would maintain its integrity for only minutes at temperatures of about 600° F. Therefore, use of a temperature-actuated PRD rated for the same temperature range between 200° F and 260° F would afford partially pressurized cylinders a similar level of protection as that for fully pressurized cylinders. Further, a temperature-activated PRD rated for 350° F delays the discharge of a partially pressurized cylinder without the catastrophic rupture of the cylinder, and by discharging at a higher temperature would thereby surpass the existing level of protection afforded by a pressure-activated PRD on a fully pressurized cylinder.

Supplemental information accompanying PHMSA's January 22, 2008, response indicates that "designing a PRD to release oxygen just prior to an overpressure failure, although a worthy goal, is one that is extraordinarily complex and expensive." The Safety Board disagrees. A relatively simple system of a pressure-activated device in parallel with a temperature-activated device could prevent the premature release of cylinder contents while minimizing the risk of a catastrophic failure for both fully pressurized and partially pressurized cylinders.

The Safety Board points out that this Safety Recommendation was not limited to oxygen-filled cylinders. PHMSA's January 22 response has focused on oxygen-filled cylinders, but many other compressed gases are also currently transported in aluminum cylinders. According to Luxfer, the only domestic manufacturer of industrial-sized aluminum cylinders, Division 2.3 poisonous gases are transported in aluminum cylinders as well. Hazard Zone A poisonous materials, because of their extremely hazardous nature, may not be transported in cylinders containing PRDs; their internal pressures are limited to 1/4 to 1/2 of the marked service pressure to prevent the release of these materials under any circumstance. However, the Safety Board's investigation of aluminum cylinders, and the relatively low temperatures at which aluminum loses its material strength and fails, is cause for additional concern in the transportation of poisonous—and other materials—in these cylinders.

Because PHMSA's efforts to date to address the safe transportation of partially pressurized aluminum cylinders do not address the Safety Board's recommendation, Safety Recommendation I-07-1 is classified "Open—Unacceptable Response." The Board urges PHMSA to reconsider its position on this recommendation and to provide the Board with information on any alternative solutions it may undertake to address Safety Recommendation I-07-1.

I-07-2

> Issue guidance to, at a minimum, the Fraternal Order of Police, International Association of Chiefs of Police, International Association of Fire Chiefs, International Association of Fire Fighters, National Association of State EMS Officials, National Sheriffs' Association, and National Volunteer Fire Council, describing the risk of overpressure failure of partially pressurized aluminum cylinders and the steps that should be taken to protect responders and the general public from a vehicle fire when aluminum cylinders are present.

The Safety Board notes that soon after the Wilmer, Texas, accident, PHMSA developed and issued guidance to bus and train operators to ensure the safe transportation and handling of medical oxygen being transported for passengers' personal use. The Board further notes that PHMSA is working with the emergency response community to develop and disseminate guidance and training material concerning the risks associated with fires involving aluminum cylinders and the steps that should be taken to protect both emergency responders and the general public when such cylinders are involved in a vehicle fire. To that end, PHMSA is partnering with the International Association of Fire Chiefs to develop a shared information network for first responders—the Hazmat Fusion Center—of which a key function will be information dissemination of updated guidance and training. PHMSA is also working with the National Fire Academy to review the compressed gas cylinder training that is part of the Hazardous Material Responder curriculum, as well as with other emergency response organizations, such as the National Association of State Fire Marshals, and industry groups, such as the Compressed Gas Association, to develop and disseminate guidance and training information. As these actions address the intent of this recommendation, Safety Recommendation I-07-2 is classified "Open—Acceptable Response" pending the completion and dissemination of the emergency response guidance. The Board would appreciate receiving a

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projected completion date for these efforts, confirmation once the guidance has been distributed, and a copy of the guidance distributed, for our records.

Sincerely,

Mark V. Rosenker
Acting Chairman

cc: Ms. Linda Lawson, Director
Office of Safety, Energy, and Environment
Office of Transportation Policy