U.S. Department
of Transportation

Administrator

1200 New Jersey Avenue, SE
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**Pipeline and Hazardous
Material Safety
Administration**

August 10, 2012

The Honorable Deborah A. P. Hersman
Chairman
National Transportation Safety Board
490 L'Enfant Plaza, SW
Washington, DC 20594

Dear Chairman Hersman:

This letter provides an update on PHMSA's position on Safety Recommendations I-07-1 and I-07-2. These recommendations were issued following NTSB's extensive investigation of a motor coach accident on September 23, 2005, near Wilmer, Texas, which occurred during the Hurricane Rita evacuation. The motor coach was transporting assisted-living facility residents and their medical oxygen aluminum cylinders. In the sequence of events of the accident, the right rear tire hub on the motor coach overheated and caught fire, which engulfed the motor coach. The fire caused some of the aluminum cylinders to rupture and some of the cylinders to release oxygen through a properly functioning pressure relief device (PRD).

<u>I-07-1</u>

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

An internal review of the findings of the accident report, incident data collected by our Office of Hazardous Materials Safety, and requirements in the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) leads us to conclude that safeguards under the current HMR provide a level of safety consistent with the public interest. Regarding NTSB's view that "use of aluminum cylinders to transport compressed gas presents a threat to transportation safety," we note the following:

- Millions of aluminum cylinders, including over 50 million in oxygen service alone, are safely transported commercially each year either fully or partially pressurized;

- The majority of the partially pressurized cylinders are empty or so close to empty as defined in the HMR (25 psig) as to be considered empty;
- The partially filled state of the cylinders involved in the incident was because of the associated personal use and is not representative of the millions of commercial shipments;
- The manner in which the cylinders in the incident were loaded and transported in the motor coach is not representative of the manner in which cylinders are commercially transported under the requirements of the HMR; and
- Most commercially transported aluminum cylinders are shipped on open body trucks; and there are no comparable incident(s) to the Wilmer, Texas incident in our database.

Pertaining to NTSB's concern over the loss of material strength of aluminum in a fire and the associated risk of overpressure failure, the HMR provide safety measures appropriate for this risk through the application of requirements for use of a PRD. The HMR require that a PRD be tested and selected in accordance with Compressed Gas Association (CGA) standards.[1] These standards provide for pressure-actuated and temperature-actuated PRDs, and address use of these PRDs based on the gas type and the associated risks in transportation. The PRD must be capable of preventing the rupture of a normally filled cylinder subjected to a fire test conducted in accordance with a CGA standard.[2] Additionally, for a cylinder containing certain types of gas (e.g., flammable), the PRD setting must provide a tolerance on the set-to-discharge pressure of ±0 to -10% of the cylinder test pressure. This tolerance ensures that no unintended release of gas will occur during the fast filling or during transportation under high temperature weather conditions. See 49 CFR 173.301(f). PRD requirements help to ensure that a fully charged cylinder does not rupture during filling or an engulfing fire. It is important to realize that normal transportation of gas cylinders include either fully charged or almost empty (partially filled) conditions. The current PRD requirements under 49 CFR 173.301(f) will ensure safe transportation of a full charged cylinder that has a significant amount of stored energy. The worst case failure mode for a fully charged cylinder is rupture of the cylinder and sudden release of energy. Even though a PRD may not properly function on a partially filled cylinder, the amount of stored energy is not significant and the most common failure mode in a fire will be a leak rather than a rupture. The HMR requirements thus balance the need to prevent the dangers from a hazardous material release into the environment through a properly functioning PRD and the need to prevent the dangers associated with the rupture of a cylinder. It is also noted that although a cylinder is equipped with a PRD to prevent a rupture under abnormal conditions, a PRD is not designed to prevent a failure under all conditions. For example, when the heat from a fire transferred to a cylinder is intense, localized (e.g., a torch fire), and away from the PRD, the cylinder may weaken quickly (prior to expansion of the internal gas pressure) and rupture before or while the PRD operates. The HMR establishes the minimum safety standards for conditions normally incident to transportation.

In summary, it is our position that: 1) the Wilmer, Texas incident was unique and does not reflect the commercial transportation of compressed gas in an aluminum cylinder; 2) the accident was

[1] S-1.1, *Pressure Relief Device Standards Part 1 –Cylinders for Compressed Gases*, and S-7, *Method for Selecting Pressure Relief Devices Compressed Gas Mixtures in Cylinders*.
[2] C-14, *Procedures for Fire Testing of DOT Cylinder Pressure Relief Device Systems*.

not related to the malfunction of a PRD; 3) the HMR currently provides for measures to prevent failure of an aluminum cylinder during transportation; and 4) incident data of nationwide transport of aluminum cylinders does not support amendments to the HMR. Therefore, PHMSA plans no further action with regard to 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 Sheriff's 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.*

PHMSA shares your concern for the safety of emergency responders and the general public. After the Wilmer, Texas incident and in the interest of improving public safety, PHMSA developed and issued guidance to bus and train operators to help assure that a medical oxygen cylinder being transported for a passenger's personal use is handled and transported safely. The guidance included instructions to protect the cylinder valve from damage and to limit the quantity of cylinders. Following this guidance reduces the risk of overpressure failure of an aluminum cylinder used for medical oxygen should it become involved in a vehicle fire.

In addition, PHMSA continues to work diligently to ensure that emergency responders have immediate access to information about the risks associated with the overpressure failure of cylinders whether constructed of aluminum or other material, or, whether fully or partially pressurized. PHMSA develops, publishes and distributes the Emergency Response Guidebook (ERG), which is used by firefighters, police, and other emergency services personnel who are often the first to arrive at the scene of a transportation incident involving hazardous material. The ERG is primarily a guide to aid first responders in: 1) quickly identifying the specific or generic classification of the material(s) involved in an incident, and 2) protecting themselves and the general public during the initial response phase of the incident. The ERG warns of the hazards of compressed gas in receptacles, such as a ruptured cylinder rocketing, and specifically addresses response measures and protective action distances in the case of compressed gas involved in a fire, such as instruction to move a receptacle from the fire, if possible.

Finally, PHMSA continually issues safety advisory notices and safety alerts regarding improper requalification and marking of cylinders, aluminum cylinders included. These notices and alerts, available at our website at http://phmsa.dot.gov/hazmat/regs, result from PHMSA investigations and assist the public in understanding and resolving significant safety risks. Publication of such notices promotes safety by decreasing the potential for emergency responders and the public to

be exposed to a cylinder that may not possess structural integrity in the event of a vehicle accident and fire.

Thus, based on PHMSA guidance issued to operators following the Wilmer, Texas incident, the emergency response guidance on incidents involving compressed gas offered in the ERG, and the cylinder safety notices and alerts issued by PHMSA, I consider PHMSA's actions complete with regard to Safety Recommendation I-07-2.

Regards,

Cynthia L. Quarterman