U.S. Department
of Transportation
Pipeline and Hazardous Materials Safety Administration

1200 New Jersey Ave., S.E.
Washington, DC 20590

JAN 22 2008

The Honorable Mark V. Rosenker
Chairman
National Transportation Safety Board
490 L'Enfant Plaza, SW
Washington, DC 20594

Dear Chairman Rosenker:

Thank you for your June 27, 2007 letter concerning Safety Recommendations I-07-1 and I-07-02. The recommendations were issued following the National Transportation Safety Board's (NTSB) investigation of a motor coach incident on September 23, 2005, near Wilmer, Texas. The incident involved a motor coach carrying 44 assisted living facility residents and nursing staff. In the incident, the right rear tire hub overheated and caught fire; heavy smoke and fire quickly engulfed the vehicle. The intensity of the fire was increased by the release of medical oxygen from cylinders inside the passenger cabin and luggage compartment of the motor coach. The recommendations state:

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 or the reduction of residual pressure to safe limits, to ensure that such cylinders do not experience overpressure failure when exposed to a fire.

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.

The Pipeline and Hazardous Materials Safety Administration (PHMSA) was pleased to support NTSB's investigation of the Wilmer, Texas accident, particularly with the metallurgical evaluation of the aluminum oxygen cylinders. As you know, we have extensive expertise in this area. Our examination of the cylinders showed that the oxygen contained in the cylinders was released both through the proper operation of the cylinder pressure relief

devices (PRDs) and as a result of cylinder rupture. PHMSA estimates that millions of oxygen cylinders are safely being transported and used every year.

In response to I-07-1, we share your concern about the potential safety hazards posed by the transportation of oxidizing gases such as oxygen in pressurized aluminum cylinders. We recently amended the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) to require the set pressure for PRDs installed on cylinders used to transport flammable and poisonous gases to be set at the cylinder test pressure with a tolerance of +0/-10%. This action will extend the time before PRDs actuate without compromising the strength of the cylinder or significantly increasing the probability that the cylinder will burst because of extreme pressure build-up. We have an active rulemaking project to consider applying this requirement to cylinders containing oxidizing gases such as oxygen, which should further enhance safety for both partially pressurized and full cylinders.

PHMSA met with NTSB on October 26 and November 1 and discussed each of the above NTSB recommendations. PHMSA technical experts provided technical rationale (e.g. test data, charts) describing the operation and performance of aluminum cylinders fitted with PRDs used for the transport of oxygen under various fire scenarios. During our meeting, PHMSA presented test data and charts to demonstrate that the use of temperature-activated PRDs would not have reduced the probability of a cylinder rupture in the Wilmer, Texas incident. Our analysis of the factors affecting the effectiveness of PRDs on partially filled cylinders is provided in the enclosed paper. PHMSA will continue to work with the Compressed Gas Association to explore possible options for enhancing oxidizing and flammable gas cylinder survivability in various fire situations.

In response to I-07-02, we will work with the emergency response community to develop and disseminate guidance and training material. Soon after the Wilmer, Texas accident, we developed and issued guidance to bus and train operators to assure that medical oxygen being transported for passengers' personal use is handled and transported safely. We agree that emergency responders should receive guidance and training 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. We are partnering with the International Association of Fire Chiefs (IAFC) to develop a Hazmat Fusion Center, a shared information network for first responders. A key function of the Hazmat Fusion Center will be information dissemination, including updated hazardous materials training and guidance material for first responders. We are also working with the National Fire Academy to review the compressed gas cylinder training that is part of the Hazardous Material Responder curriculum. We will also work 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.

We request that you classify recommendations I-07-1 and I-07-2 as "Open – Acceptable Action." We thank you for consideration of our request.

If you have any questions, please contact me at (202) 366-4831.

Sincerely,

Stacey L. Gerard
Assistant Administrator/Chief Safety Officer

Enclosure

PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION
OFFICE OF HAZARDOUS MATERIALS SAFETY

Operation of Temperature-Actuated Pressure Relief Devices
On Partially Filled Cylinders

- In the Wilmer, Texas incident, the use of temperature-actuated pressure relief devices (PRDs) would not have reduced the probability of a cylinder rupture. Since temperature actuated PRDs are designed to vent at 165^0 F or 212^0 F, if these oxygen cylinders were equipped with only temperature-actuated PRDs the oxygen would have released earlier. Even if there were a temperature-actuated PRD designed to operate with partially filled cylinders, the initial release of oxygen from one or more of the partially filled cylinders into the confined space of the luggage bay would have introduced enough oxygen to locally intensify the fire and cause the catastrophic rupture of the adjacent cylinders. Further, in the case of partially filled cylinders that are exposed to a fire, the PRD of each cylinder may operate differently based on each cylinder's proximity to the fire and the means of heat transfer. For example, the PRD on a cylinder exposed to an engulfing fire would operate differently from the PRD on a cylinder exposed to an impinging fire. A temperature activated PRD will not prevent cylinder rupture in the case of localized heating, for instance from flame impingement. In most cases, flame impingement can be avoided by stowing cylinders vertically or, for instance, in the case of a bus or passenger train compartment by separating them from each other. This was one of the recommended practices that we identified in the guidance that PHMSA issued to bus and train operators on June 30, 2006, entitled "DOT Guidance for the Safe Transportation of Medical Oxygen for Personal Use on Buses and Trains." We believe that this guidance will help prevent incidents such as the Wilmer, Texas incident in the future.

- With regard to the recommendation that the cylinder pressures be reduced to limits that would increase transportation safety, PHMSA believes that the function of the PRD on fully or partially charged cylinders would not significantly change the outcome of an accident such as the Wilmer, Texas occurrence. Consumers who use oxygen cylinders are not trained or equipped to discharge oxygen to a predetermined pressure level. The proposal to place this responsibility in the hands of the public would increase the risk of cylinder explosions due to improper cylinder discharging techniques (e.g. use of greasy hands or equipment at the time of discharge).

- Our analysis supports the concept that in some circumstances a partially-filled cylinder can experience overpressure failure before the pressure causes the PRD to activate. However, we believe that in all of these potential cases, the cylinder will fail in ductile fracture rather than brittle fracture. Therefore the potential for danger to the public and emergency responders is significantly less than would be expected from the shrapnel created in a brittle failure. We also believe that a condition for overpressure failure depends upon two major factors, high temperature and exposure to high temperature for an extended period of time. These are temperature regimes in which unprotected

personnel cannot be exposed without harm. In other words, there is less chance of exposure to such overpressure events because of the need to keep a distance from the extremely hot environment.

- Release of oxygen into a superheated environment, or in the presence of an ignition source, presents the greatest danger to personnel. In fact, 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 and give emergency responders the opportunity to extinguish the fire and cool the cylinders. Once the environment surrounding the cylinder(s) becomes superheated, the release of oxygen or the overpressure failure are both dangerous. We firmly believe that the release of oxygen presents the greatest hazard. Finally, 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 environment in which such an intelligent PRD would be useful is very rare.