

Billing Code 4910-60-p

DEPARTMENT OF TRANSPORTATION

Pipeline and Hazardous Materials Safety Administration

[Docket No. PHMSA-2007-29133; Notice No. 07-08]

Safety Advisory Guidance: Use of Mobile Acetylene Trailers

AGENCY: Pipeline and Hazardous Materials Safety Administration (PHMSA).

ACTION: Safety advisory notice; request for comments.

SUMMARY: This safety advisory is addressed to persons involved in the use, operation, fabrication, or other handling of mobile acetylene trailers. In this notice, we discuss recent acetylene incidents, requirements in the Hazardous Materials Regulations, national consensus standards issued by the Compressed Gas Association and National Fire Protection Association, operating procedures, fire mitigation and detection systems, and training of persons who operate, charge, and discharge mobile acetylene trailer systems. We urge companies and workers to review their operating practices to ensure that filling and discharge operations are conducted in the safest possible manner. In addition, we are requesting information on the effectiveness of current DOT regulations and industry best practices, as well as suggestions for enhancing the safety of these operations.

DATES: Submit comments by [insert date 60 days after publication in Federal Register].

ADDRESSES: You may submit comments identified by the docket number (PHMSA-2007-29133) by any of the following methods:

- Federal eRulemaking Portal: <http://www.regulations.gov>. Follow the instructions for submitting comments.

- Web Site: <http://dms.dot.gov>. Follow the instructions for submitting comments on the DOT electronic docket site.

- Fax: 1 202 493 2251.

- Mail: Docket Operations, U.S. Department of Transportation, West Building, Ground Floor, Room W12-140, Routing Symbol M-30, 1200 New Jersey Avenue, SE., Washington, DC 20590.

- Hand delivery: Docket Operations, U.S. Department of Transportation, West Building, Ground Floor, Room W12-140, Routing Symbol M-30, 1200 New Jersey Avenue, SE., Washington, DC 20590 between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

Instructions: You must include the agency name and docket number (PHMSA-2007-29133) for this notice at the beginning of your comment. Internet users may access comments received by the Department of Transportation at <http://dms.dot.gov>. Note that comments received may be posted without change to <http://dms.dot.gov> including any personal information provided.

FOR FURTHER INFORMATION CONTACT: Ben Supko, Office of Hazardous Materials Standards, Pipeline and Hazardous Materials Safety Administration, (202) 366-8553, or Charles Hochman, Director, Office of Hazardous Materials Technology, Pipeline and Hazardous Materials Safety Administration, (202) 355-4545.

SUPPLEMENTARY INFORMATION:

I. Background

Acetylene is highly flammable gas that requires special packaging and handling

procedures to be transported safely. Acetylene is regulated as a Division 2.1 flammable gas under the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) and is subject to stringent packaging and handling requirements. Acetylene is filled and transported in cylinders containing a porous mass and solvent; transportation in bulk containers is prohibited.

In place of bulk packaging, mobile acetylene trailers (MATs) are used to transport large quantities of acetylene. The Compressed Gas Association (CGA) defines a MAT as a group of cylinders, secured together as a unit, mounted on an open transport vehicle, and manifolded for containing and transporting acetylene.

On July 25, 2007, shortly after 9:00 am, at a Southwest Industrial Gases facility in Dallas, Texas, a MAT delivered by Western International Gas and Cylinders Inc. caught fire while the trailer was being prepared to discharge acetylene to the facility. The origin of the fire has not been identified. Witness reports state that a small fire began at the rear of the trailer and then spread to cylinders in the facility. The fire burned for more than an hour and ruptured a number of cylinders with explosive effects. Three people were injured. The fire caused the closure of local streets and Interstates 30 and 35E for much of the day and destroyed four trailers and the Southwest Industrial Gases facility. Both the Chemical Safety Board (CSB) and National Transportation Safety Board (NTSB) are investigating the incident; PHMSA is assisting with the investigations.

On August 7, 2007, just north of Houston, Texas, outside of the Hughes Christensen Co., a fire started on a MAT delivered by Western International Gas and Cylinders, Inc. None of the cylinders ruptured, and firefighters were able to douse the

acetylene cylinders with water and keep the fire confined to the trailer. No one was hurt, but 800 employees were evacuated. NTSB and CSB are also investigating this incident; PHMSA is participating in the investigations.

## II. PHMSA Regulations

The HMR specify requirements for the safe transportation of hazardous materials in commerce by rail car, aircraft, vessel, and motor vehicle. The hazardous material regulatory system is a risk management system that is prevention-oriented and focused on identifying a safety or security hazard and reducing the probability of and consequence from a hazardous material release. Under the HMR, hazardous materials are categorized into hazard classes and packing groups based upon the risks they present during transportation. The HMR specify appropriate packaging and handling requirements for hazardous materials, and require a shipper to communicate the material's hazards through use of shipping papers, package marking and labeling, and vehicle placarding. The HMR also require shippers to provide emergency response information applicable to the specific hazard or hazards of the material being transported. Finally, the HMR mandate training requirements for persons who prepare hazardous materials for shipment or who transport hazardous materials in commerce. The HMR also include operational requirements applicable to each mode of transportation. The HMR apply to each person who offers a hazardous material for transportation in commerce, causes a hazardous material to be transported in commerce, or transports a hazardous material in commerce (see 49 CFR 171.1(b) and (c)).

Under the HMR, acetylene is regulated as a Division 2.1 flammable gas.

Acetylene is only authorized for transportation in DOT specification 8 or 8AL cylinders or in UN cylinders conforming to ISO 3807-2 (see 49 CFR 173.303). Transportation of acetylene in bulk packagings, such as cargo tanks, portable tanks, or rail tank cars is prohibited. Section 173.301(f) requires cylinders to be equipped with one or more pressure relief devices sized and selected as to type, location, and quantity, and tested in accordance with CGA S-1.1 and S-7. For acetylene, CGA S-1.1 requires DOT 8 or 8AL cylinders to be fitted with a CG-3 fusible plug, which operates at 212°F. The plug must be proven using the fire test method specified in CGA publication C-12. To ensure the stability of the acetylene during transportation, cylinders are constructed with porous filler and are charged with solvent. The porous filler is typically calcium silicate, and the solvent is typically acetone or dimethylformamide. The amount of solvent and porous filler must be closely monitored to prevent overfilling. Sections 178.59(l)(4)(i) and 178.60(p)(4)(i) establish requirements regarding the amount and porosity of the porous filler and maximum amount of solvent authorized based on the water capacity of DOT 8 and 8AL cylinders.

The HMR permit acetylene cylinders to be manifolded during transportation (see 49 CFR 173.301(g)(1)(iii)). However, the manifolded cylinders must conform to the following conditions: (1) manifolded branch lines must be sufficiently flexible to prevent damage to the valves; (2) the cylinders must be supported and held together as a unit by structurally adequate means; (3) each cylinder must be equipped with an individual shutoff valve that is tightly closed in transit and an individual pressure relief device that discharges upward; and (4) the valves and pressure relief devices must be protected from

damage by framing, a cabinet, or other method.

The requirements for the transportation of hazardous materials by highway are found in Part 177 of the HMR, including requirements for loading and unloading hazardous materials from highway transport vehicles. When cylinders containing acetylene and other Class 2 gases are transported in commerce, they must be securely restrained in a manner that prevents shifting, overturning, or ejection from the motor vehicle under normal transportation conditions (see 49 CFR 177.840(a)(1)). Normal transportation conditions include vehicle starting, stopping, cornering, accident avoidance, and varied road conditions. We request comments pertaining to the adequacy of current securement requirements for cylinders, including whether existing securement measures would withstand the force of an accident or rollover. Comments should consider the protection from damage afforded to manifolded cylinders by framing, cabinets, or other methods, as required by § 173.301(g)(1)(iii).

Except for cargo tanks and portable tanks, the HMR generally prohibit the discharge or emptying of a package's contents prior to its removal from the motor vehicle (see 49 CFR 177.834(h)). However, this general prohibition does not apply in all circumstances. For example, it has been our longstanding interpretation that the prohibition in § 177.834(h) does not apply to tube trailers, which are 3AX, 3AAX, and 3T cylinders mounted to a transport vehicle, because removing them from the motor vehicle prior to discharging their contents is not practicable. We have long applied the same standard to discharge operations involving manifolded acetylene cylinders that are mounted to a transport vehicle.

### III. National Consensus Standards

Several national consensus standards apply to the generation, storage, movement, and use of acetylene. The standards cover filling and discharge operations for acetylene cylinders and the transportation of such cylinders. Persons involved in these operations should thoroughly review these standards to ensure that they are utilizing appropriate safety practices. Below we list and summarize applicable national consensus standards.

#### A. *CGA G-1, Acetylene.*

This standard, developed by the Compressed Gas Association (CGA), provides general information on the characteristics of acetylene and proper handling procedures. The publication begins by describing the manufacturing process, composition, properties, and the physiological effects of acetylene. It continues by detailing the HMR requirements that apply to shipments of acetylene. It describes authorized packaging, valves, pressure relief devices, filling limits, and hazard communication. In addition, it outlines safe methods for storing acetylene cylinders at a fixed facility location and safe methods for handling and using acetylene. The standard concludes by discussing the type of piping that is suitable for acetylene.

#### B. *NFPA 51A-Standard for Acetylene Cylinder Charging Plants.*

This standard, published by the National Fire Protection Association (NFPA), establishes safeguards for the design, construction, and installation of acetylene cylinder charging plants. The standard applies to plants that are engaged in the generation and compression of acetylene and charging of cylinders with acetylene. The standard applies to the location, arrangement, construction, design, and development of facilities used in

the generation of acetylene and also includes valuable information regarding the charging of manifolded cylinders. In fact, Chapter 10 of the NFPA 51A standard specifically addresses facility-based acetylene cylinder charging manifolds. Though the standard does not provide specific transportation-related information, the safety precautions recommended for facility-based charging stations are very similar to those used to charge MATs, including:

- Charging manifolds must have a shutoff and blowdown valve vented outside or to the low pressure system.
- A check valve must be installed in the facility pipeline at each cylinder charging manifold and lead.
- Pressure gauges must be protected by a device that stops a detonation of flame and limits a rise in pressure.
- Manifold outlets must have a shutoff valve.
- Manifolds must be arranged to limit stress in the cylinder charging leads.
- In order to prevent liquefying of acetylene at low ambient temperatures, specific maximum charging pressures based on ambient air temperature must be followed.
- Cylinder valves must be opened first at the start of charging and closed last at the end of charging.
- Acetylene cylinders connected to charging manifolds must have provisions for cooling by water spray applied from a manually activated spray nozzle system where needed for removing heat from solution acetylene, as determined by

ambient temperature and cylinder charging rate.

C. *CGA G-1.6, Recommended Practices for Mobile Acetylene Trailer Systems.*

In this publication, CGA provides safe practices for the design, construction, and operation of MATs. The publication also provides recommended safe practices for auxiliary equipment used in conjunction with MATs, including piping, regulators, flash arrestors, and meters. The standard specifically addresses the following areas:

1. Design and construction (CGA G-1.6, section 4)
  - Trailer must conform to all applicable Federal, state, and local regulations.
  - A grounding system for the piping that conforms to NFPA 70, National Electrical Code, must be provided to ground the piping system.
  - Piping must: be carbon steel, stainless steel, wrought iron, malleable iron, or copper alloys containing not more than 65% copper; conform to the American National Standard Institute A13.1, Scheme for Identification of Piping Systems; be braced and supported; and meet the appropriate Schedule based on pressure.
  - Leads between cylinders and manifolds must be sufficiently long and flexible to minimize strain on valves and leads.
  - Manifolds must be equipped with a shut-off valve, pressure gauge, and vent.
  - Vents and pressure relief devices must be directed upwards above the acetylene piping.
  - Protective equipment must be installed between a MAT and facility piping.
  - Cylinders must: conform to the HMR; be vertical, supported, and secured;

have valves that are capable of being closed in the event of an emergency;  
have similar functional characteristics, including dimensions, porous mass,  
solvent, and solvent quantity; and be arranged in aisles to allow access.

2. Operation (CGA G-1.6 section 5)

- To be charged, cylinders must conform to applicable HMR requirements.
- Cylinders must be marked in accordance with CGA C-7, “Guide to the Preparation of Precautionary Labeling and Marking of Compressed Gas Containers.”
- In order to prevent liquefying of acetylene, specific maximum charging pressures based on ambient air temperature must be followed.
- During charging cylinder, valves are to be opened first and closed after the pressure between manifolded cylinders equalizes (takes several hours).
- Valves must be closed during transportation.
- Acetylene pressure must be maintained in leads and manifolds during delivery and return shipments.
- Legible instructions must be posted at the discharge location when consumers use any equipment to discharge the acetylene.
- The trailer must be chocked or secured to prevent movement during discharge.
- During any manual valve operations, or when the trailer is being connected or disconnected, a trained person must be in attendance.
- When acetylene is discharged in an enclosure, appropriate venting to the

outside must be used.

- The flow rate of acetylene for intermittent withdrawal from the trailer must not exceed 10% of the trailer capacity per hour, for continuous withdrawal the flow rate should not exceed 6.6% (1/15) of the trailer capacity per hour.

3. Associated equipment (CGA G-1.6, section 6)

- The trailer discharge station must be in conformance with NFPA 50, “Standard for Bulk Oxygen Systems at Consumer Sites” and be a minimum distance of 50 feet from property lines, bulk flammable liquid storage, and non-acetylene bulk flammable gas storage.
- The trailer must be a minimum distance of 25 feet from property lines, 50 feet from combustible construction, and 15 feet from non-combustible construction.
- The trailer site must: provide adequate space for positioning the trailer and be protected with curbing or guardrails; be not exposed to power, flammable liquid, flammable gas, or oxidizing lines; be equipped with signage stating “ACETYLENE—FLAMMABLE GAS—NO SMOKING-NO OPEN FLAMES”; and have a grounding system for the trailer.
- Appropriate hoses, meters and electrical equipment must be used.

4. General provisions (CGA G-1.6, section 7)

- MATs must be marked and placarded in accordance the Part 172, Subparts D and F of the HMR.
- Charging and discharging stations for MATSs must be provided with

conspicuously located and easily accessible fire hoses or fixed spray systems and dry chemical fire extinguishers. Nozzles on fire hoses should be of the type that adjusts from full stream to a fog pattern.

- Exits and fire protection equipment may not be blocked or obstructed.

#### IV. Recommended Practices

The standards summarized above outline specific procedures for filling, discharging, and transporting acetylene cylinders and for storing and using acetylene. Based on our review of the recent incidents and the applicable national consensus standards, we recommend that entities involved in the transportation of acetylene, particularly the filling and discharge of manifolded cylinders mounted on a motor vehicle, implement safety procedures conforming to applicable sections of CGA G-1, “Acetylene (1990), NFPA 51A Standard for Acetylene Charging Plants” (2006 Edition), and CGA G-1.6, “Recommended Practices for Mobile Acetylene Trailer Systems,” (1996, Fourth Edition, Reaffirmed 2001). In addition, entities must ensure that acetylene cylinders fully comply with all HMR requirements applicable to the specification cylinder, including cylinder components such as valves, pressure relief devices, porous filler, and solvent.

The CSB website provides several examples of best practices to mitigate fires, including the use of fire monitors and water deluge and sprinkler systems. We strongly recommend that entities involved in the transportation of acetylene review the best practices highlighted by CSB and implement those that apply to their operations. In particular, facility operators should consider the installation of fire monitors and water

deluge or sprinkler systems. In the event of a cylinder fire, the presence of such fire mitigation systems will help cool the cylinders, reducing the likelihood of additional gas releases, cylinder ruptures, and other potentially catastrophic consequences. For additional information, the CSB's website provides best practices based on a Praxair Flammable Gas Cylinder Fire that occurred in St. Louis, MO on June 24, 2005. A safety bulletin and video addressing the Praxair incident can be found at [http://www.csb.gov/index.cfm?folder=completed\\_investigations&page=info&INV\\_ID=59#](http://www.csb.gov/index.cfm?folder=completed_investigations&page=info&INV_ID=59#).

The acetylene accidents covered in this safety advisory notice occurred in conjunction with our assessment of the safety risks associated with bulk loading and unloading operations. On June 14, 2007, we hosted a public workshop to examine industry data, identify industry best practices and standards, discuss the role of recommended practices, and consider industry actions that have the potential to reduce risk during loading and unloading. Representatives from industry, federal agencies, state and local government, standards organizations, the emergency response community, employee groups, environmental and public interest organizations, and the public participated in the meeting. As a result of this collaborative effort between PHMSA and our stakeholders, we developed a set of recommended practices that are generally applicable to loading and unloading operations involving hazardous materials in many different types of packagings and a number of different operational and modal contexts. Consistent with these recommended practices, we recommend that shippers and carriers of acetylene develop and implement specific procedures for loading and unloading

operations that are based on an assessment of the safety risks associated with the type of loading or unloading operation being conducted and the material or materials involved. Please consider the following guidelines when developing operating procedures for acetylene:

(1) Make sure employees know and understand their specific responsibilities during loading and unloading operations, including attendance or monitoring responsibilities.

(2) Identify and implement appropriate safety precautions, including measures specific to the material transported, such as pressure or temperature controls and maximum filling limits; necessary protective equipment; controlling access to the area where the operations take place; procedures for connecting and disconnecting piping, hoses, and connections; ignition sources; and procedures for monitoring the loading and unloading operations.

(3) Identify and implement appropriate pre-transfer procedures, including pre-transfer inspections of the transport unit, packaging, transfer area, and piping, hoses, or other connections are free of defects, leaks, or other problems that could result in an unsafe condition.

(4) Identify and implement appropriate transfer procedures;

(5) Identify and implement appropriate emergency procedures, including identification of emergency response equipment and individuals authorized in its use; incident response; use of emergency shut-down systems; and emergency communication and spill reporting.

In addition, we remind entities that offer for transportation or transport acetylene cylinders that their employees must be trained. In accordance with the requirements in Subpart H of Part 172 of the HMR, persons who directly affect hazardous materials transportation safety must complete training that covers the following:

1. General awareness training designed to familiarize each employee with the requirements of the HMR and to enable each employee to recognize and identify hazardous materials.
2. Function-specific training designed to ensure that each employee understands how he is to perform the functions or operations for which he is responsible. Training for employees responsible for loading or unloading operations should include training on established procedures applicable to such operations, as well as national consensus standards that have been incorporated into such procedures.
3. Safety training concerning emergency response information applicable to the specific hazardous material(s) handled, measures to protect the employee from the hazards associated with the materials to which the employee may be exposed in the work place, and methods and procedures for avoiding incidents.
4. Security training that provides an awareness of the security risks associated with hazardous materials transportation and methods to enhance transportation security.

We believe that the procedures outlined above, including those contained in the CGA and NFPA standards, combined with a rigorous training program, will ensure that persons responsible for filling, operating, and discharging MATs have the knowledge and

information to enable them to conduct these operations safely. We urge shippers and carriers engaged in these operations to evaluate their current operations, review the national consensus standards, and make adjustments in procedures and practices where necessary to minimize the safety risks associated with the transportation of acetylene on MATs.

#### VI. Enhanced Safety Program for Mobile Acetylene Trailers

We plan to work with acetylene shippers and carriers, emergency responders, associations such as CGA and NFPA, government agencies concerned with the safe handling and use of acetylene, and other stakeholders to assess the effectiveness of current safety procedures used for filling, operating, and discharging MATs to determine whether additional safety procedures should be implemented. To this end, we request that persons who use such transportation systems to provide us with information on the effectiveness of the current DOT regulations, consensus standards, and industry best practices. We are also interested in any other procedures utilized to ensure that operations related to the transportation of acetylene on MATs are performed safely.

We would also like to work with shippers, carriers, and facilities that receive shipments of acetylene in MATs to develop and implement a pilot program to test the effectiveness of current or alternative procedures or methods designed to enhance the safety of transportation operations involving acetylene on MATs. As part of this program, we will assist individual companies or facilities to evaluate the effectiveness of their current procedures and to identify additional measures that should be implemented. We welcome suggestions concerning how such a program should be structured and the

entities that should participate.

To ensure that our message reaches all stakeholders affected by these risks, we plan to communicate this advisory through our public affairs notification and outreach processes. . For additional visibility, we have made this advisory available on the PHMSA homepage at <http://www.phmsa.dot.gov> and the DOT electronic docket site at <http://dms.dot.gov>. In addition, if you are aware of other companies that are involved in the charging, operating, and discharging MATs, please share this advisory notice with them and, if possible, identify them in your correspondence with this agency. We believe a collaborative effort involving an integrated and cooperative approach will help us to address safety risks, reduce incidents, enhance safety, and protect the public.

Issued in Washington, D.C. on .

Theodore L. Willke  
Associate Administrator for Hazardous Materials Safety