U.S. Department
of Transportation

**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, D.C. 20590

MAY 0 1 2012

Mr. Andy Abrams
Global Passive Safety System Ltd.
761 West Sproul Road, Suite 208
Springfield, PA 19064

Ref. No.: 12-0005

Dear Mr. Abrams:

This responds to your January 4, 2012 letter requesting clarification of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) applicable to hose assemblies. Specifically, you inquire whether a metallic hose assembly made with a corrugated tube of 316SS and an outer braid of 304SS with a working pressure of 400+ p.s.i. and a burst of 2000 can be used in liquefied petroleum gas (LPG) and anhydrous ammonia (NH3) cargo tanker service.

In accordance with § 173.315(n)(2), for a cargo tank motor vehicle in other than metered delivery service, there are no specific HMR provisions dictating the material from which a delivery hose must be comprised. However, Pipeline and Hazardous Materials Safety Administration (PHMSA) does specify in § 178.337-9 the requirements (burst pressures, weights, damage protection, free from leaks, etc.) for piping, valves, hoses, and fittings on MC 331 cargo tanks intended to contain compressed gases. Further, the hose identification, inspection, and testing requirements for a delivery hose assembly on a cargo tank used to transport liquefied compressed gases are specified in § 180.416 of the HMR, including the rejection criteria in paragraph (g). Additionally, it is the responsibility of the person offering a hazardous material for transportation to ensure that the packagings and its appurtenances (piping, valves, hoses, fittings, etc.) are compatible with its lading.

Please be aware that these hoses may be subject to the Occupation Safety and Health Administration (OSHA) Standards in 29 CFR, and specific questions about requirements for equipment such as a hose should be directed to OSHA and any applicable state regulatory authorities. However, a review of 29 CFR § 1910.111(b)(8) states that hoses used in ammonia service shall conform to the joint Agricultural Ammonia Institute - Rubber Manufacturers Association (RMA) Specifications for Anhydrous Ammonia Hose. Subsequently, a cursory

analysis of the documents published by RMA make no mention of a metallic hose assembly as is described above. For further assistance, you may contact Jeffrey J. Wanko, Safety Engineer for OSHA Directorate of Enforcement Programs, by phone at (202) 746-2667 or email at JWanko@dol.gov.

I hope this satisfies your inquiry. Please contact us if we can be of further assistance.

Sincerely,

T. Glenn Foster

T. Glenn Foster
Chief, Regulatory Review and Reinvention Branch
Standards and Rulemaking Division

Nickels
3173.315
Cargo Tanks
12-0005

January 4 2012

Director – Office of Hazardous Materials Standards
Pipeline and Hazardous Materials Administration
US Department of Transportation
1200 New Jersey Avenue, SE Building 2nd Floor
Washington, DC 20590

Letter of Interpretation

Dear Sir/Madam

We are writing in connection with the regulations set forth below to **inquire specifically if a metallic hose assembly made with a corrugated tube of 316SS and an outer braid of 304 SS with a working pressure of 400+PSI and a burst of 2000 can be used in LPG and NH3 Cargo Tanker service.**

A. **GPSS USA Regulatory Position**: Under 49 CFR 315, the following Passive Device Requirements are promulgated.

> (2) *Cargo tank motor vehicles in other than metered delivery service.* A cargo tank motor vehicle in other than metered
> delivery service must have a means to automatically shut off the flow of product without the need for
> human intervention within 20 seconds of an unintentional release caused by a complete separation of a liquid delivery
> hose (passive shut-down capability).
> (i) Designed flow of product through a bypass in the valve is acceptable when authorized by this subchapter.
> (ii) The design for the means to automatically shut off product flow must be certified by a Design Certifying Engineer.
> The certification must consider any specifications of the original component manufacturer and must explain
> how the passive means to shut off the flow of product operates. It must also outline the parameters (e.g., temperature,
> pressure, types of product) within which the passive means to shut off the flow of product is designed to operate.
> All components of the discharge system that are integral to the design must be included in the certification. A
> copy of the design certification must be provided to the owner of the cargo tank motor vehicle on which the equipment
> will be installed.
> (iii) Installation must be performed under the supervision of a Registered Inspector unless the equipment is installed

and removed as part of regular operation (e.g., a hose). The Registered Inspector must certify that the equipment
is installed and tested, if it is possible to do so without damaging the equipment, in accordance with the Design
Certifying Engineer's certification. The Registered Inspector must provide the certification to the owner
of the cargo tank motor vehicle.
(3) *Cargo tank motor vehicles in metered delivery service.* When required by the table in paragraph (n)(1) of this section,
a cargo tank motor vehicle must have an off-truck remote means to close the internal self-closing stop
valve and shut off all motive and auxiliary power equipment upon activation by a qualified person attending the unloading
of the cargo tank motor vehicle (off-truck remote shut-off).

It is our position that the metallic hoses we are providing are being used on DOT application and OSHA jurisdictions. As such, they are subject to the standards set forth under 49 CFR 173.315 which **does not specify hose material** or out of service standards. It is our position that when we provide hoses in OSHA jurisdictional service, we comply with the hose performance standards and even comply with 1910.111(b)(8)(iv) independent of additional valves since our system has internally integrated shut-off valves. We recognize that you can not opine over OSHA standards but there is some overlap.

B. **Technical Standards** – Why is a metallic hose equal to or greater than a rubber hose? There are many different types of hose available on the market, including metal, rubber, composite, PTFE, and fabric. There are eight factors that make a metal hose a superior choice to rubber hose:

1. **TEMPERATURE EXTREMES**
If either the temperature of the media going through the hose or the surrounding atmospheric temperature is very cold or hot, metal may be the only material that can withstand such temperature extremes.

2. **CHEMICAL COMPATIBILITY- NO ERROR IF USED IN EITHER LPG OR NH3**
Metal hose can handle a wider variety of chemicals than most other hose types. If the hose will be exposed to aggressive chemicals (either internally or
externally), metal hose should be RECOMMENDED. Case in point: In the article below a RUBBER LPG hose was erroneously used in NH3 service because the layline on the hose was worn away.

Posted on Thu, Jul. 16, 2009

Ammonia cloud kills woman, injures 7

Leak at chemical plant near Swansea prompts evacuation

By SAMMY FRETWELL, JOHN MONK AND TIM FLACH
sfretwell@thestate.com jmonk@thestate.com tflach@thestate.com

Donna Petrey got a call just after 8 a.m. Wednesday from her son, telling her the chemical plant across the street had sprung a leak.

"I grabbed my 7-year-old grandson, Hunter, and our dog, Oreo, and put them in the car," she said.

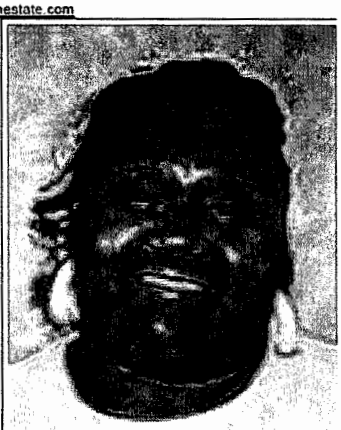
At the end of the driveway, she glanced left and was stunned.

"It looked like a huge cotton ball. It was so thick, you couldn't see anything through it," said Petrey, 50, who lives across from Tanner Industries, just south of Swansea in Lexington County.

Petrey didn't know it, but a motorist already had driven into that cloud — a vast poisonous mist of a deadly chemical called anhydrous ammonia, typically used in cleaning products — and hadn't made it out.

Jacqueline Patrice Ginyard, 38, of Wagener couldn't get her car out of the fog and tried to flee on foot, according to the Lexington County Sheriff's Department. Her body later was found next to her car.

Wednesday's leak also sent seven people to area hospitals and prompted the evacuation of numerous nearby homes. By late afternoon, roughly 20 homes were being tested for contamination, though authorities found none.



Jacqueline Patrice Ginyard, 38, of Center Street

Had a metallic hose been used the incident would have been avoided and no injury would have occurred.

3. **PERMEATION CONCERNS**
Nonmetal hose is susceptible to gas permeation through the hose wall and into the atmosphere. Metal hose, on the other hand, does not allow permeation. If containing the gases inside the hose is important, metal hose may be required.

4. **POTENTIAL FOR CATASTROPHIC FAILURE**
When a metal hose fails, it usually develops small holes or cracks. Other hose types tend to develop larger cracks or come apart completely. If a sudden hose failure is potentially catastrophic, a metal hose may help minimize the effects of a failure by leaking product at a slower rate.

5. **FIRE SAFETY – EXCESSIVE HEAT**
Other hose types will melt when exposed to fire, while metal hose maintains its integrity up to 1300 degree F.

6. **FRIGID/CRYOGENIC CONDITIONS – EXCESSIVE COLD**
LPG and NH3 hoses frequently are used in below zero conditions which can cause or contribute to hose tube failures. Metallic hoses are designed with a substantially wider temperature range.

7. **ACHIEVING FULL VACUUM**
Under full vacuum, metal hose maintains its shape while other hose types may collapse.

8. **FLEXIBILITY IN FITTING CONFIGURATION DUE TO WELDING**
Metal hoses are welded which avoids the risk of crimping and crimp failures..

C. Other Standards – OSHA speaks in a very limited manner to this issues.

1. In **1926.153(h)(7)** - Hose shall be designed for a working pressure of at least 250 p.s.i.g. Design, construction, and performance of hose, and hose connections shall have their suitability determined by listing by a nationally recognized testing agency. The hose length shall be as short as practicable. Hoses shall be long enough to permit compliance with spacing provisions of paragraphs (h)(1) through (13) of this section, without kinking or straining, or causing hose to be so close to a burner as to be damaged by heat.

2. **OSHA 29 1910.111(b)(8)(i)**

- Hose used in ammonia service shall conform to the joint Agricultural Ammonia Institute - Rubber Manufacturers Association Specifications for Anhydrous Ammonia Hose.
- 1910.111(b)(8)(ii)
- Hose subject to container pressure shall be designed for a minimum working pressure of 350 p.s.i.g. and a minimum burst pressure of 1,750 p.s.i.g. Hose assemblies, when made up, shall be capable of withstanding a test pressure of 500 p.s.i.g.
- 1910.111(b)(8)(iii)
- Hose and hose connections located on the low-pressure side of flow control of pressure-reducing valves shall be designed for a bursting pressure of not less than 5 times the pressure setting of the safety relief devices protecting that portion of the system but not less than 125 p.s.i.g. All connections shall be so designed and constructed that there will be no leakage when connected.
- 1910.111(b)(8)(iv)
- Where hose is to be used for transferring liquid from one container to another, "wet" hose is recommended. Such hose shall be equipped with approved shutoff valves at the discharge end. Provision shall be made to prevent excessive pressure in the hose.

3. **State Regulations**

The use of Rubber hoses is also being phased out of many state regulations. For example in Texas, **Texas Administrative Code**, TITLE 16 ECONOMIC REGULATION PART 1 RAILROAD COMMISSION OF TEXAS, CHAPTER 9 LP-GAS SAFETY RULES , SUBCHAPTER B LP-GAS INSTALLATIONS, CONTAINERS, APPURTENANCES, AND EQUIPMENT REQUIREMENTS RULE §9.143 Bulkhead, Internal Valve, API 607 Ball Valve, and ESV Protection for Stationary LP-Gas Installations with Individual or Aggregate Water Capacities of 4,001 Gallons or More provides:

g) In addition to NFPA 58 §§5.9.6 and 6.9.6.1, by February 1, 2003, rubber flexible connectors which are 3/4-inch or larger in size installed in liquid or vapor piping at an existing liquid transfer operation shall have been replaced with a stainless steel flexible connector. Stainless steel flexible connectors shall be 60 inches in length or less, and shall

comply with all applicable *LP-Gas Safety Rules*. Flexible connectors installed at a new installation after February 1, 2001, shall be stainless steel.

4. **NFPA 58 Section 2.4.6** provides the working/operational pressures of hoses but makes no mention except to provide that the must be corrosion resistant such as stainless steel.

Therefore, we are of the opinion that the metallic hose that we are offering is compliant with the DOT, OSHA, NFPA and Federal/State regulatory standards. We welcome any comment or opinion on our conclusion.

Regards,

Global Passive Safety Systems Ltd.
761 West Sproul Road, Suite 208
Springfield, PA 19064
Toll Free 855-GPSS-USA (855-477-7872)
M-267-307-0949
F- (267) 937-2081
E-Mail: AndyAbrams@GPSafetySystems.Com
WWW.GPSAFETYSYSTEMS.COM