1. Revise Section 10.10 as follows:

10.10 MATS Fire Protection.

10.10.1 Fire protection requirements for MATS shall apply to discharging stations located indoors or outdoors.

10.10.1.1 A deluge sprinkler or water spray fixed system shall be provided for MATS fire areas used as indoor and or outdoor charging or discharging stations.

10.10.1.2 Deluge sprinkler or water spray fixed systems shall provide a minimum design density of 0.3 gpm per square foot in accordance with the design documents for the MATS fire area being protected.

10.10.1.3 The deluge or water spray fixed system shall be able to be activated automatically by a fast acting fire detection system and also by manual actuator.

10.10.1.3.1 Manual activation controls shall be identified and marked with a sign and shall be positioned for use in an emergency.

10.10.1.3.2 Fire protection equipment and manual activation controls serving the MATS fire protection system shall not be blocked or obstructed.

10.10.1.4 Existing acetylene discharging stations shall be protected by an automatic deluge sprinkler or water spray fixed system in accordance with 10.10.1 not later than January 1, 2015. See also Section 1.4.

10.10.1.4.1 The requirements of 10.10.1.1 shall not apply to existing indoor or outdoor facilities, equipment, structures, or other installations where MATS are discharged that existed or were approved for construction or installation prior to the effective date of this standard providing the MATS are protected with an automatic sprinkler system with a minimum design density of not less than 0.25 gpm per square foot (10.1 L/min per square meter).

10.10.1.5 At least one listed portable fire extinguisher rated in accordance with NFPA 10, Standard for Portable Fire Extinguishers, at not less than 20 B:C shall be mounted on the mobile acetylene trailer.

10.10.1.6 Fire protection equipment shall be identified and located so that it is visible and accessible in an emergency.

A.10.10.1.1 The system should be designed to provide water as a means of cooling the containers located on the trailer that are potentially exposed to fire and not as a means to extinguish the fire. To extinguish a gas fire, the flow of gas must be shut off at the source.

A.10.10.1.2 For additional information on mobile acetylene trailer systems, see CGA G-1.6, Standard for Mobile Acetylene Trailer Systems.

Submitter’s Substantiation: This TIA is being presented with the purpose of coordinating the approved revision text for the 2013 edition of NFPA 51, Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes with TIA#1036 on NFPA 51A, Standard for Acetylene Cylinder Charging Plants, 2012 Edition which was issued by the Standards Council with an effective date of March 26, 2012.

NFPA 51 has just completed the Annual 2012 Code Revision Cycle and will be issued on May 29, 2012 having been placed on the consent agenda for Standards Council following the completion of the ROC phase of the revision process. The Industrial & Medical Gases (IMG-AAA) Technical Committee developed a new Section for the use of Mobile
Acetylene Trailer Systems (MATS) in discharge stations which has been added to NFPA 51, *Compressed Gases and Cryogenic Fluids Code* and which integrates the requirements for acetylene cylinder discharge stations currently found in NFPA 51A, *Standard for Acetylene Cylinder Charging Plants 2012 Edition*. It is the expressed intent of the IMG TC to withdraw the NFPA 51A publication when NFPA 51A goes back into cycle and the ongoing evolution of requirements for acetylene charging facilities will be located in NFPA 55, *Compressed Gases and Cryogenics Fluids Code*.

Provisions for fire protection systems to be utilized for fire protection systems for Mobile Acetylene Trailer Systems (MATS) were the subject of TIA#1036 issued on NFPA 51A. Coordination is now needed to carry the provisions of the TIA relative to the fire protection systems for discharge stations into NFPA 51 in order to eliminate a potential conflict between NFPA 51, 51A and 55 and to establish a proposal that will be subject to all of the procedures of the standards-making process.

**REASONS WHY OPEN HEAD FIRE PROTECTION SYSTEMS SHOULD BE REQUIRED**

Closed head fire protection systems do not provided the same level of protection as a deluge or water spray fixed system. During a fire inside a building, the ceiling forces the hot combustion products to travel outward ahead of the fire. These hot combustion products activate closed head sprinklers allowing sprinklers not directly above the fire to activate and help keep the adjacent areas cool helping to prevent the spread of the fire.

Acetylene cylinders have a thermally activated fusible metal plug located near the valve or on the top of the cylinder that melts at approximately 212°F. The plug is designed to release the gas as it expands in order to prevent rupture of the container. When this plug melts acetylene vents directly to atmosphere in effect making a large torch (with temperatures greater than 5700°F). On a Mobile Acetylene Trailer (MAT) the cylinders are nested closely together with the typical cylinder diameters generally 12 inches or less. The result is that the fusible metal plugs are typically only 10 to12 inches apart. (See Figure 1 below) In the event of a fire if adjacent cylinders are not quickly cooled, the fusible metal plugs will continue to melt allowing the fire to quickly spread from cylinder to cylinder throughout the array. (See Figure 2).

Figure 1. Distance between cylinder fusible metal plugs that are located on the head of the cylinder near the base of the cylinder shutoff valve.
Acetylene Specific Hazards
Acetylene (stabilized) is a flammable gas and also an unstable reactive gas that can decompose and generate heat in the absence of oxygen. Cylinders on a trailer are connected through a common manifold that allows the gas to be transported into or out of the containers in the process of being charged or discharged (See Figure 2). In a fire acetylene can decompose inside the piping system which can lead to further decomposition of acetylene inside of cylinders as heat is transmitted through the manifold. The heat from the decomposition of acetylene is sufficient to melt the fusible metal plugs installed to prevent cylinder rupture. If cylinders are not cooled immediately the release of gas from melted fusible metal plugs will likely result in initiating a fire at a different location on the trailer, or even on adjacent trailers. Immediate cooling of all cylinders on the trailer reduces the possibility of a flashover fire and prevents a decomposition reaction and potential mass release of gas thereby limiting the size of the incident accordingly.

In the absence of fire it is also possible, based on the increased pressures (greater than 15 psig), for decomposition to occur inside the piping due to mechanical shock or adiabatic compression with insufficient heat to initially melt a fusible metal plug. Until a fire occurs there will be no external heat available that would activate a closed head sprinkler system. In that particular situation the operator will most likely identify the event when it occurs by either an audible or visual cue before a fire occurs. Having a deluge or water spray fixed system available that can be manually activated provides the operator with a system that can be used to cool the cylinders and piping before an external fire, mass release from multiple fusible metal plugs, or potential cylinder rupture occurs.

Activation
Outdoors deluge or water spray fixed systems can either be activated manually from a remote point or by automatic means using optical flame detectors such as UV/IR or other approved early warning detection systems. Indoors deluge or water spray fixed systems can also be activated manually or activated by automatic means by using optical flame detection or a high sensitivity smoke detection system. Flame detectors have the advantage of being used to detect small flames where open headed deluge or water spray fixed systems can quickly be effective. By contrast there is no way to manually or automatically activate a closed head system.

Water Density
Acetylene trailers vary in size. Typical trailers are approximately 8 feet wide ranging in length from 15 to 50 feet although longer and shorter trailers may exist. The maximum trailer dimensions allowed under DOT regulations are 8.5 ft. wide by 65 ft. long. The 1984 Edition of NFPA 51A contained the first reference to MATS in Section 8-6.1, requiring that the MATS be in compliance with the 1981 Edition of CGA Pamphlet G-1.6. The 1981 Edition of G-1.6 required fire protection to be provided in the form of fire hoses or fixed spray systems. In 1996 the requirements for MATS in 51A Section 8-6 were deleted as an “editorial change”...”to make the standard more useable, adoptable and enforceable.” A reference to CGA G-1.6 was included as an informational note. Within the
regulatory scheme described by NFPA 51A the need for fire protection systems was to be determined by an analysis of local conditions of hazard within the plant, exposure to other properties, water supplies and the probable effectiveness of plant fire brigades to include the time of response and probable effectiveness of fire departments. Where automatic water spray systems were installed NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection* were installed water coverage was to be not less than a minimum of 0.25 gpm per sq. ft. of floor area directly wetted by the stream. An NFPA 13 extra hazard open or closed head sprinkler system was allowed to be used as an acceptable alternate; however, the provisions were general requirements for fire protection including general use and the use of MATS was not mentioned. There is a concern that limited water supplies may prevent being able to deluge a large area. In these instances it is possible to reduce the total water flow required by constructing fire barrier walls to divide the trailers into groups or compartments. Each area so divided can be equipped with separately controlled deluge or water spray fixed systems provided for each area bounded by the fire barriers. Alternatively, an increased separation distance between MAT systems can be provided to limit the exposure accordingly.

**OTHER CONCERNS**

**Applicability to Cylinder Charging or Discharging Facilities**

The valves on cylinders in storage are closed as compared to valves on a MAT system which are normally open when the MAT is being charged or discharged. Cylinders on a MAT are manifolded together as compared with typical cylinders in storage. Stored cylinders are less likely to be involved in an event where heat can spread internally from cylinder to cylinder through a common manifold system. This primary difference requires that a distinction be made between the fire protection systems provided for a MAT system versus the typical arrangement where cylinders are simply stored.

**Freezing Conditions**

Due to the possibility of freezing (< 40°F) ambient conditions in outdoor locations a wet pipe closed head sprinkler system is not acceptable in many locations. A dry pipe closed head system can be used but it will be much slower to react.

**Hot Conditions**

When closed head fire sprinkler systems are used NFPA 13 7.7.1.3.1.3 requires the use of intermediate or high temperature-rated sprinklers when the water temperature of the fire protection water being used exceeds 100°F. This is not an uncommon occurrence in areas of the southwestern United States where fire protection water is stored in aboveground tanks and day time temperatures exceed 100°F. NFPA 13: Table 6.2.5.1 lists the following temperature ratings or operating ranges.

- Ordinary temperature-rated sprinklers operate between 135 and 170°F.
- Intermediate temperature-rated sprinklers operate between 175 and 225°F.
- High temperature-rated sprinklers operate between 250 and 300°F.

During the winter season the length of time it takes to achieve a temperature above 175°F at the sprinkler head could allow a fire to become larger than what might otherwise occur in a system protected by an open head deluge or water spray fixed system.

**Emergency Nature:**

- The document contains an error or an omission that was overlooked during a regular revision process.
- The proposed TIA intends to correct a previously unknown existing hazard.
- The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.

When the IMG-AAA TC considered this issue in the NFPA 51A code revision cycle the unstable nature of acetylene, particularly when Mobile Acetylene Trailer Systems (MATS) were being charged or discharged was not the focus of the group. In recognition of the need to address the specific hazards of flammability and unstable nature of this material TIA #1036 was prepared and accepted by the IMG-AAA TC. It was then submitted for consideration by an inter-committee consisting of three members each from the NFPA 13, 15 and 55 Technical Committees including the Staff Liaisons from each of these three committees. The recommended position of the inter-committee was accepted with the recognition that the provisions would again be subject to review in the next code revision cycle for NFPA 55.

Concurrently, CGA’s G-1.6, *Standard for Mobile Acetylene Trailer Systems* was revised in the fall of 2011, with contributions from a joint task group that was formed between CGA’s technical committee and principal members (fire protection engineers) of NFPA’s IMG-AAA TC to determine a protection strategy suitable for systems of this nature recognizing the need for fire protection for these systems whether used indoors or outdoors. Past editions of NFPA 51A were reviewed and the specialized needs of MATS systems were recognized. The revisions made to CGA G-1.6 represent
a reduction of risk to the public and are in keeping with the recommendations of the National Transportation Safety Board (NTSB) and the Department of Transportation.

The document contains a conflict within the document or with another NFPA document.
A new Chapter 15 of the 2013 Edition of NFPA 55 now contains the requirements of NFPA 51A as they existed prior to the acceptance of TIA#1036. The requirements of TIA#1036 must now be carried forward to NFPA 51 and NFPA 55 in order to eliminate the conflict between these documents and NFPA 51A by coordinating requirements. A separate TIA has been submitted for consideration to coordinate NFPA 55 with NFPA 51A. Acceptance of this TIA to NFPA 51 will resolve the conflict between NFPA 51A and 51 thereby coordinating the requirements between these two documents.

Anyone may submit a comment by the closing date indicated above. To submit a comment, please identify the number of the TIA and forward to the Secretary, Standards Council, 1 Battery March Park, Quincy, MA 02169-7471.