North Carolina Department of Labor
Occupational Safety and Health Division

Raleigh, North Carolina

Field Information System Standards Notice 10

Subject: Requirements for Portable Lamps in Vehicle Service Garages

A. <u>Standards</u>.

1. **29 CFR 1910.303(b)(1) Examination.** Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined using the following considerations:

   a. Suitability for installation and use in conformity with the provisions of this subpart. Suitability of equipment for an identified purpose may be evidenced by listing or labeling for that identified purpose.
   b. Mechanical strength and durability, including for parts designed to enclose and protect other equipment, the adequacy of the protection thus provided.
   c. Electrical insulation.
   d. Heating effects under conditions of use.
   e. Arcing effects.
   f. Classification by type, size, voltage, current capacity, specific use.
   g. Other factors which contribute to the practical safeguarding of employees using or likely to come in contact with the equipment.

2. **29 CFR 1910.307(b)** - Equipment, wiring methods, and installations of equipment in hazardous (classified) locations shall be intrinsically safe, approved for the hazardous (classified) location, or safe for the hazardous (classified) location.

3. **<u>National Electrical Code - 1999</u>**

   i. *Article 511-1 Scope*. These occupancies shall include locations used for service and repair operations in connection with self-propelled vehicles (including, but not limited to, passenger automobiles, buses, trucks, and tractors) in which volatile flammable liquids are used for fuel or power

   ii. *Article 511-2.* Areas in which flammable fuel is transferred to vehicle fuel tanks shall conform to Article 514. Parking garages used for parking or storage and where no repair work is done except exchange of parts and routine maintenance requiring no use of electrical equipment, open flame, welding, or use of volatile flammable liquids are not classified.

   iii. *Article 511-3(a).* Up to a level of 18 inches above the floor. For each floor the entire area up to a level of 18 inches above the floor shall be considered to be a Class I, Division 2 location. Exception: Where the

enforcing agency determines that there is mechanical ventilation providing a minimum of four air changes per hour.

iv. *Article 511-3(b).* Any Pit or Depression below Floor Level. Any pit or depression-below floor level shall be considered to be a Class I Division 1 location which shall extend up to said floor level, except that any pit or depression in which six air changes per hour are exhausted at the floor level of the pit shall be permitted to be judged by the enforcing agency to be a Class I, Division 2 location.

v. *Article 511-3(f).* Portable Lighting Equipment. Portable lighting equipment shall be equipped with handle, lamp holder, hook, and substantial guard attached to the lampholder or handle. All exterior surfaces that might come in contact with battery terminals, wiring terminals, or other objects shall be of nonconducting material or shall be effectively protected with insulation. Lampholders shall be of unswitched type and shall not provide means for plug-in of attachment plugs. The outer shell shall be of molded composition or other suitable material. Unless the lamp and its cord are supported or arranged in such a manner that they cannot be used in the locations classified in Section 511-3, they shall be of a type approved for Class I, Division 1 locations.

B. **Discussion.**

Since the adoption of the revised electrical standards in 29 CFR 1910, Subpart S, there has been confusion and questions regarding the requirements for portable lamps in vehicle service garages. Questions regarding which standard to cite for unsafe portable lamps used in garage operations increased following the revision of Subpart S.

The National Fire Protection Association and the National Electrical Code designate a vehicle service garage as a "special occupancy". This special occupancy identification is due to the likely presence of flammable vapors from leaks and spills from vehicles being serviced. With the possibility of the flammable vapors, it is important to eliminate any ignition sources. Ignition sources include electric arcs, sparks, and hot surfaces.

Hazardous location classifications have been applied to all pits or depressions within the garage and all areas within 18 inches of the garage floor. The area within 18 inches above the floor may be considered non-classified if mechanical ventilation provides four air changes per hour.

Any portable hand lamp which is used when working on a vehicle must be a non-switched, receptacle free, insulated guard/reflector type. If this lamp can reach within 18 inches of the floor, and four air changes per hour of exhaust ventilation are not provided, or if it can reach into a pit or depression, then it must be approved for Class I hazardous locations.

Experience has shown that the majority of fires and explosions associated with portable lamp use in service garages are caused by flammable liquid contacting an exposed hot lamp bulb. The thermal shock from the liquid shatters the lamp bulb glass and the hot

filament ignites the vapors. To reduce the likelihood of such an ignition in situations where Class I approved fixtures are not required, enclosed and gasketed fixtures, shatterproof rough service bulbs, or Class I approved fixtures should be voluntarily used. Rooms adjoining a service garage are similarly classified unless separated by a vapor-tight barrier, elevated more than 18 inches above the shop floor, pressurized, or provided with mechanical exhaust ventilation providing four air changes per hour. Such rooms might include storage rooms, specialty shops, electrical rooms, and waiting rooms.

C. **Interpretation.**

1. If a CSHO observes a portable lamp with a switch, receptacle, or conductive guard/reflector being used in a vehicle service garage during vehicle repair, alteration, or maintenance, then a citation for a violation of 1910.303(b)(1) will be issued.

2. If the same portable lamp can reach within 18 inches of the floor and four air changes per hour of exhaust ventilation are not provided, or if the lamp can reach into any pit or depression, then a citation for a violation of 1910.307(b) will be issued. (See Appendix A.) Only a fixture approved for Class I hazardous locations may be used in these areas. The employer should order such a fixture with an insulated coating on the guard.

3. If there are four air changes per hour of mechanical ventilation provided, then the area within 18 inches above the floor is non-classified and the portable lamp of the non-switched, receptacle free, insulated guard/reflector type is acceptable.

4. If the portable lamp is installed so that it cannot reach within 18 inches of the floor but is used while working beneath vehicles on lifts, then the CSHO should recommend to the employer that a Class I approved fixture, an enclosed and gasketed fixture, or at least a rough service shatterproof lamp be used.

5. Portable lamps used in rooms adjoining the service garage which are not properly separated, elevated, or ventilated shall be evaluated the same as those used in the garage.

6. Appendix B provides illustration of several issues pertaining to electrical safety in commercial repair garages.

D. **Effective Date.**

SN 9A is canceled. This SN is effective on the date of signature. It will remain in effect until revised or canceled by the Director.

Signed on Original
Kevin O'Barr
Safety Standards Officer

Signed on Original
Allen McNeely
Director

8/09/05
Date of Signature

APPENDIX A: Evaluation of Ventilation in Vehicle Service Garages

For the purposes of determining what portable lamp requirements should apply in a vehicle service garage, it may be necessary to evaluate the ventilation provided. This evaluation should consist of the following:

A. Source.

1. Is the ventilation mechanical (provided by a fan)?
2. Is the ventilation continuous during the time that service and repair operations are conducted?
3. Who is responsible for assuring that the ventilation system is turned on and working?

B. Quantity.

1. Does the mechanical ventilation provide at least four air changes per hour throughout the garage area?

   a. To calculate the ventilation required in order to assure four air changes per hour in a garage, one should multiply the average width of the garage in feet, times the average length, times the average height, times four changes per hour, and divide by sixty minutes per hour. The resultant figure will be in cubic feet per minute.

      Formula:

      $$\frac{\text{width (ft) x length (ft) x height (ft) x 4 changes/hour}}{\text{60 minutes/hour}} = \text{cu. ft/min (cfm)}$$

   b. To determine whether existing ventilation in a garage is adequate, a velometer is used to measure the average air flow across the face of all exhaust fans and grills. This flow rate is then multiplied by the area in square feet of each exhaust opening. This measurement should be done with all doors closed. At least six readings at different locations must be taken on each exhaust opening and these readings averaged to determine the velocity for the exhaust air through that opening. The individual volume of air flow from each exhaust opening is added together to determine the total exhaust rate for the garage.

   c. If the existing ventilation level does not equal or exceed the calculated ventilation requirement for four air changes per hour, then the area up to 18 inches above the garage floor must be classified as a Class I Division 2 hazardous location.

SN 10 cont'd.

APPENDIX B: Electrical Safety in Commercial Garages