New Jersey State
Firemen's Mutual Benevolent
Association
1447 CAMPBELL STREET RAHWAY, NEW JERSEY 07065-3212
1-732-499-9250
FAX 1-732-499-9633

Diesel Exhaust

Introduction

According to the National Fire Protection Association (NFPA) Standard, Fire Department Occupational Safety and Health Program (NFPA 1500-2002) "The fire department shall prevent exposure to fire fighters and contamination of living and sleeping areas to exhaust emissions." With the advent of diesel-powered apparatus, the occupational exposure to diesel exhaust has increased. While diesel fuel is not classified as a known carcinogen, diesel exhaust has been determined to be carcinogenic and has been shown to aggravate respiratory illnesses. As with other types of fumes, diesel exhaust is composed of particulates, which are 50 to 80% higher than those of conventional gasoline engines. There are approximately 100 components contained within diesel exhaust. Some of the most notable components are water, nitrogen, nitric oxide, carbon, carbon monoxide, carbon dioxide, aldehydes, nitrogen dioxide, oxides of sulphur, benzene, methane, phenol, 1,3-butadiene, acrolein, arsenic, formaldehyde and polynuclear aromatic hydrocarbons. When the 100 components combine they can create any one of 10,000 different compounds.

Health Effects

Short-Term (Acute) Effects:

Eye irritation
Throat irritation
Nose irritation
Headaches
Light-headedness
Nausea
Aggravate existing conditions; asthma, other chronic lung conditions, and allergies
Numbness
Wheezing

Long-Term (Chronic) Effects:

NIOSH recommends that diesel exhaust be treated as a carcinogen.

Control Suggestions

Suggested controls include Work Practices and Engineering controls.

Work Practices:

According to NJDHSS Division of Environmental and Occupational Health Services, The following recommended procedures and work practices should be implemented;

1. Garage doors should be opened before engines are started and vehicles should not be allowed to idle in the fire station.
2. All drivers should be instructed to keep vehicular operation to an absolute minimum in the fire station.
3. Garage doors should be left open, when weather conditions permit, for at least 10 minutes following the operation of the vehicles.
4. Doors leading directly from the garage to other areas of the fire station should be kept closed whenever possible. Consideration should be given to installing an automatic door-closing device.
5. All doors leading from the garage to stairwells, hose towers, living quarters, kitchen or offices should be modified by the addition of weather stripping (or similar material) in order to prevent diesel exhaust infiltration.
6. All pole hose that are not essential should be permanently sealed. Active pole should have flexible covers with airtight seals. An alternative is to install airtight booths around poles.

Engineering controls

1. Positive pressure may be used to reduce diesel exposure for living spaces and office areas.
2. Ventilation systems should be able to control/remove vehicle exhaust. There are two types of exhaust ventilation systems which may be used: Local and dilution ventilation. Local ventilation is a method of ventilation where the exhaust is removed directly from the apparatus and is vented from the station. A hose, filter and fan make up this type of system. This method of ventilation is more efficient since the amount of air required and moved by the ventilation system is less than that used in dilution ventilation. A make up source of air must be available and once the diesel exhaust has been vented, it should not be able to reenter the building through windows or fresh air intakes. Dilution ventilation involves the use of fans to remove the exhaust from the building. These fans should be placed near ceiling level, and be able to move 100cfm per horse power when the engines are idling. A make up source of air must be available and once the diesel exhaust has been vented, it should not be able to reenter the building through windows or fresh air intakes. Of these two types of ventilation, local ventilation is the preferred method of ventilation since it removes the exhaust at the source.
3. The installation of high efficiency filter systems which would filter particulates from the diesel engines.

There are control measures which may be used that would reduce diesel emissions which do not require additional equipment. These include:

Additives which reduce the creation of sludge, algae and amount of water in the fuel tank.

Maintaining the injectors by keeping them clean.

When determining the criteria for engine selection, the mechanical performance and emissions data should be included.

Perform proper preventative and regular maintenance. A properly functioning engine reduces the amount of diesel exhaust produced.

Personal Protective Equipment

The use of personal protective equipment is the least desirable means of controlling exposure to diesel exhaust. NIOSH has not approved respirators that use air cartridges for protection against diesel exhaust. In the event that there are exceptionally large concentrations of diesel exhaust, SCBA may be utilized. Any PPE utilized must be maintained in accordance with all applicable standards.

Proper personal hygiene should be employed to reduce the amount of particulate exposure. This would include hand washing.
It has been demonstrated that exposure to diesel exhaust and smoking increases the risk of cancer.

PEOSHA/OSHA Standards
29 CFR 1910.1200 Hazard Communication Standard
New Jersey Public Employees Occupational Safety and Health Act, at N.J.A.C. 12:100-7.
OSHA 1910.94 Ventilation
OSHA 1910.1000 Air contaminants
NFPA 1500, Fire Department Safety and Health Program

Organizations

New Jersey Firemen's Mutual Benevolent Association
www.njfmba.org
New Jersey State Department Health, Public Employees Occupational Safety and Health
http://www.state.nj.us/health/eoh/peoshweb/
New Jersey State Department Health, Division of Environmental and Occupational Health Services Right to Know Program
http://www.state.nj.us/health/eoh/rtkweb/
National Fire Protection Association
www.nfpa.org
National Institute of Occupational Safety and Health
http://www.cdc.gov/niosh/homepage.html
National Safety Council
http://www.nsc.org/


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