



CANCER AWARENESS AND PREVENTION PROGRAM

MEMORANDUM

DATE:

TO:

FROM:

SUBJECT:

Issue:

Manually activated station exhaust extraction systems create a barrier to use, resulting in unnecessary exposures to exhaust.

Background:

The International Agency for Research on Cancer (IARC) evaluates agents for carcinogenicity to humans (IARC, 2014). Agents are classified as:

- Group 1:** The agent is carcinogenic to humans
- Group 2A:** The agent is probably carcinogenic to humans
- Group 2B:** The agent is possibly carcinogenic to humans
- Group 3:** The agent is not classifiable as to its carcinogenicity to humans
- Group 4:** The agent is probably not carcinogenic to humans

The following Group 1 chemicals and metals are found in both diesel and gasoline exhaust:

Arsenic, Beryllium, Cadmium, 1,3-Butadiene, Formaldehyde, Benzo[a]pyrene, chromium, Benzene and dioxin (IARC, 2014). Additionally, 26 Group 2A & 2B agents are also found in both gasoline and diesel exhaust (IARC, 2014). Both forms of exhaust also contain particulate matter of varying sizes that has been associated with respiratory disease, cardiovascular disease and lung cancer (Wargo, et. al., 2006).

Diesel engine exhaust is classified as Group 1, meaning it causes cancer in humans (IARC, 2014). Gasoline engine exhaust is classified as Group 2B, meaning it is possibly carcinogenic to humans (IARC, 2014). While diesel exhaust presents a greater risk to human health due to differences in its gaseous and particulate composition when compared to gasoline exhaust, exposure to gasoline exhaust is not without risk. According to the CDC, numerous epidemiologic studies have demonstrated that exposure

to vehicular emissions resulting from living close to major roadways or in areas of high traffic density is associated with an increased incidence of respiratory and cardiovascular disease (Boehmer, et. al., 2013).

When incomplete combustion occurs in the context of a structure fire we call it smoke, when incomplete combustion occurs in an engine we call it exhaust. In either case, regardless of the source or what it is labeled, it is harmful to human health.

Discussion:

When SDFD exhaust extraction systems were originally installed more than two decades ago they operated automatically. No action on the part of Firefighters was required other than connecting the hose to the exhaust pipe. However, over the years, for a host of reasons many automatic systems have been converted to manually activated systems. Manual systems require Firefighters to manually activate exhaust extraction systems by depressing a button remote from the vehicle.

Converting previously automatic safety systems to manual systems is problematic for two reasons. First, not all personnel are familiar with which systems are automatic and which are manual, leading to confusion about proper system operation. Second, requiring manual activation of safety equipment that was previously automatic is a step in the wrong direction. The goal should be to reduce human interaction where possible, reducing barriers to use, rather than creating barriers. A parallel can be drawn with the old manually activated *Life Guard Pak Alarm* that was removed from SCBA's and replaced with the current version that automatically activates when the cylinder charges. A prime driver of that change was the fact that many Firefighters would forget to activate their *Life Guard Pak Alarm*, in the same way that many Firefighters forget to manually activate exhaust extraction systems.

Recommendations:

The overarching recommendation is to ensure all vehicles (diesel & gas) housed in Fire Stations be equipped with an exhaust extraction system that can be activated wirelessly from the vehicle cab, as well as manually.

Implementation of this recommendation is divided into two phases, based on priority. The first priority is to upgrade existing "manual" stations and associated vehicles with wireless systems. The second priority is to convert existing "automatic" stations and existing vehicles with wireless systems.

The wireless portion of an exhaust extraction system consists of the following three components: station mounted receiver, vehicle mounted transmitter, and electrical control/timer panel

Station 1 is equipped with an overhead extraction system and Stations 5 & 17 are in temporary housing. These three stations as well as the Airport F.S. were not included in the estimates.

Phase I

- Install wireless receivers in "manual" stations
 - 31 stations (9 double houses) report "manual" activation
 - 31 stations x \$740.00 per station mounted receiver = \$ 22,940.00

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- Install wireless transmitters in all vehicles (diesel & gas) housed in "manual" stations
 - (32 Engines [includes OES 304]) + (9 Trucks) + (2 Rescues) + (10 Brush) + (5 BC Rigs) + (1 Chem. Rig) + (3 Utility) + (1 Mod. Truck [9's]) + (1 Water Tender)
 - 64 vehicles x \$170.00 per vehicle mounted transmitter = \$ 10,880.00
- NEC panel upgrade with auto controls/timer
 - 31 stations x \$1467.00 per NEC panel= \$ 45,477.00
- Labor:
 - 31 stations x \$585.00 per station = \$ 18,135.00

Phase II

- Install wireless receivers in "automatic" stations
 - 13 remaining stations (3 double houses) report "automatic" activation
 - 13 remaining stations x \$740.00 per station = \$ 9,620.00
- Install wireless transmitters in all vehicles (diesel & gas) housed in remaining "automatic" stations
 - (13 Engines) + (3 Trucks) + (3 Brush) + (2 BC Rig) + (2 Water Tender) + (1 Light/Air) + (1 Utility) + (2 Hazmat) + (1 ERT)
 - 28 vehicles x \$170.00 per vehicle mounted transmitter= \$ 4,760.00
- NEC panel upgrade with auto controls/timer
 - 13 stations x \$1467.00 per NEC panel = \$ 19,071.00
- Labor
 - 13 stations x \$585.00 per station = \$ 7,605.00

Total costs:

- Phase I = \$ 97,432.00
- Phase II = \$ 41,056.00

Stations under construction and/or in the planning phase should be equipped with wireless exhaust extraction systems.

The estimates provided should be considered generally accurate. Exact estimates are not possible without consulting directly with Plymovent and visiting each station, because estimates do not include such things as re-wiring of non-code compliant wiring, installing new hose drops and other unexpected complications.

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Alternatives:

Continue as before, with a mix of manual and automatic systems. However, this is not optimal for the reasons stated previously.

CAPP Representative

INITIALS/initials

References

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