The Hidden Danger of Emergency Service

There was a time when loud sirens on emergency vehicles were generally considered a good thing. Recent tests reveal that they can be too noisy. Firefighters and other emergency service personnel will presumably think nothing of this hidden hazard while facing the extreme danger of their duties to save lives. Firefighting and emergency services have many scenarios that involve high levels of noise exposure including: sirens, diesel engines, air horns, power saws, and power ventilators. The sad part is this hazard has irreversible outcomes.

If you are one of the many emergency responders who rides in a vehicle with a siren mounted on the cab roof, or if you keep the windows down while the siren is blasting, you have an increased risk of hearing loss. Additionally you may still be at risk from the low frequency engine sounds which are transmitted through the bones in your skull to your ear. Headsets and ear plugs will provide protection from the sounds of the blaring sirens but unfortunately will have little protection from the low frequency sounds.

Several tests conducted by sound experts of the volume of the sirens on crews, pedestrians, motorists and garage staff revealed sound levels ranging upwards to 112dB in some engines tested. The general public is not thought to be at risk of long-term hearing loss, because they generally only hear the piercing sounds of emergency vehicles as they pass by.

The ear-splitting sound of the sirens seems obvious. Nevertheless low frequency exposure to emergency service personnel works this way: Large engines with their heavy rotating and reciprocating engines set up a low frequency harmonic effect of substantial amplitude. This type of noise doesn’t need your ears - it is transmitted through the bone around your ears. Instead of the eardrum gently working the malleus (hammer) in your middle ear, all of the middle ear is overwhelmed. It’s not hard to imagine the devastating effect that long-term exposure could have. Hearing protection has little impact to protect against low frequency harmonic effect, and in some cases, can actually exacerbate it. This exposure can be resolved by utilizing vibration-absorbing materials.

Engineering controls is the obvious approach to managing this exposure. The standards specifically require an effective hearing conservation program. This program should not only address personal protective devices, audiometric testing, but also include engineering controls in the reduction of noise exposure by modifying existing equipment or changing procedures. A long-term approach to hearing conservation should allow the purchase of vehicles and equipment that is less noisy by design, with noise standards included in the specifications.

Steps to take in protecting emergency personnel from hearing loss:

1. Incorporate a hearing conservation program in accordance with applicable standards. This program should include training and accountability, and be part of the department’s discipline program.
2. Wear hearing protection when responding to calls, or utilize communication
headsets which utilize speakers inserted in a protective muff and incorporate a noise blanking microphone. Some of these communication sets now incorporate active noise cancellation to further reduce background noise.

3. Hearing protection should be used when operating generators, power units, pumping stations, and other motorized hand tools.

4. Garage and support staff should wear ear protection when starting engines for maintenance and testing sirens inside of the garage.

5. Turn off the siren when you don’t need it.

6. Keep the windows up while responding.

7. Avoid standing in front of vehicle, sirens and speakers without hearing protection.

8. When participating in parades, do not blast the sirens or air horns.

9. Engineering controls to consider:
   a. Use noise and vibration-absorbing materials, as well as sound barrier insulation to reduce specific noise sources.
   b. Completely enclose apparatus cabs and jump seats.
   c. Reduce the low frequency harmonic effects and engine noise by installing specially- treated oil pans, valve covers, air intakes, engine exhaust mufflers, and appropriate tires.
   d. Install air conditioning to allow firefighters to ride with the windows closed.
   e. Move the sirens and horns either below the front bumper, in an opening in the front bumper, or in the front grill of the apparatus. The vehicle structure should be used as a shield from noise energy when ever possible.
   f. All mechanical sirens should be fitted with a metal shroud to direct the sound forward. Such shrouds have resulted in 70% reductions in sound energy to the firefighter/EMTs.
   g. Improved radio equipment that produces higher clarity of sound with less output volume.