



## Engineering Sciences Section - 2013

### C23 Performance Evaluation of Firearm Silencers

John Nixon, MBA\*, ARC, PO Box 66, Bippus, IN 46713

After attending this presentation, attendees will gain knowledge of what a firearm silencer is, how it is constructed, the safety and environmental advantages of silencers, and how silencer performance is evaluated. It is anticipated that the presentation will be of particular interest to medical professionals and criminal defense attorneys—particularly those who work in the federal arena.

This presentation will impact the forensic science community by changing the way firearm silencers are viewed, dispelling common misconceptions, and promoting research into evaluation techniques, plus health, environmental, and legal issues.

Firearms use comes with a number of potential health and environmental hazards due to the high noise levels generated. Clearly, noise reduction is a desirable goal. Firearm silencers are often more correctly referred to as sound suppressors, sound moderators, or mufflers—in the interests of consistency with federal legislation, the term “silencer” is used throughout this presentation. Firearm silencers are legal for civilian ownership and use in the majority of the U.S., though they are heavily regulated. In states where silencers are legal, their regulation is typically accomplished at the federal level, though many states do have their own laws. This presentation focuses on issues pertinent to federal legislation.

Until 1934, there were no restrictions on silencer ownership and use by private individuals. In 1934, Congress passed the National Firearms Act (NFA) which effectively made silencer manufacture and possession by private citizens, a prohibitively costly and administratively burdensome endeavor.

The NFA legislation is articulated in Title 26 of the United States Code, and this federal law is administered and enforced by the U.S. Department of Justice (DOJ) via the Bureau of Alcohol, Tobacco, Firearms and Explosives (BATFE).

The U.S. Code defines, in part, a silencer or muffler, as “any device for silencing, muffling, or diminishing the report of a portable firearm.” This is a very vague definition, and in strict technical terms, it could include legitimate technologies, such as a lengthened barrel, a muzzle brake, or a flash hider, all of which will diminish, or redirect, the noise of a gunshot.

Commercially available silencers reduce firearm peak sound pressure by 30 to 40 decibels (dB). A 223 Remington (5.56mm NATO) caliber rifle will typically generate around 160dB without a silencer and just 120dB to 130dB with a typical commercially available silencer installed. Some individuals construct homemade silencers, with varying degrees of success.

Understanding sound and sound measurement is not easy, and this fact, coupled with the loose legal definition of what constitutes a silencer, leads to the prosecution of many individuals who, either deliberately or inadvertently, have procured or created a device for their firearm that reduces the measured report by only a small amount.

A study published by the American Medical Association revealed that recreational shooters suffered hearing damage following only very limited exposure to firearms noise and that damage occurred even when shooters wore hearing protection. Paradoxically, in an age when both legislators and the population at large are obsessed with environmental and health and safety issues, there exists outdated legislation in place that actually works to make an everyday item less safe for the user and less environmentally friendly from the perspective of those in the vicinity of the user.

Sound measuring equipment with a data sample time interval short enough to accurately capture a gunshot is expensive, and interpretation of results is difficult for those not well versed in the technical intricacies of acoustics.

This presentation includes a case study to illustrate the difficulty in applying the U.S. Code relating to silencers in a criminal prosecution.

It is concluded that current legislation relating to silencers provides vague technical definitions, leads to unnecessary and expensive prosecutions, has a significant adverse effect on the health of the nation, and raises significant legal, administrative, and financial barriers to those firearm owners who wish to maximize safety and minimize environmental impact.

**Firearm Silencer Evaluation, Hearing Damage, Environmental Impact**