

# **An Assessment of CBRN PPE Audible Signature**

Daniel J. Barker and Dr. Karen M. Coyne

Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD, USA

Current commercial chemical, biological, radiological and nuclear (CBRN) respiratory protection standards do not consider many requirements that are needed for tactical Law Enforcement operations. Examples of tactical Law Enforcement operations that would likely require the utilization of CBRN personal protective equipment (PPE) include but are not limited to clandestine laboratory response, barricaded CBRN terrorist response or downed officer evacuation under hazardous atmospheric conditions. During these operations that require CBRN PPE wear, it is imperative that officers be able to perform their missions in a tactical manner as similar as possible to those that are not performed in a CBRN environment. A critical tactical requirement is the minimization of audible signature. Audible signature refers to noise a tactical officer or his/her equipment may make that could lead to detection by a threat. Along with sometimes noisy suit materials, many CBRN respiratory PPE design features (e.g. blowers, low oxygen warning signals, amplified breathing noises, etc.) increase a wearer's audible signature and can make stealth operations more challenging or impossible. This effort was undertaken to quantitatively measure the audible signature created by various CBRN PPE ensembles, obtain a baseline of existing CBRN PPE audible signatures, assess the contributions of respiratory protection on overall audible signature and assess potential modifications to the existing NIJ CBRN PPE standard for Law Enforcement. The resultant sound level data was then compared to non-CBRN tactical PPE as well as the existing NIJ audible signature requirements. As expected, suit materials were found to be a significant contributor to the PPE audible signature. However, results also indicate that PAPRs and SCBAs assessed created audible signatures in excess of NIJ limitations, even when worn with the quietest suits. The APRs tested did not significantly contribute to the audible signature. For the suit found to be quietest in this study, the average peak sound pressure level increase ranged from 2.04 to 5.39 dBA when adding the PAPR to the APR. The addition of the SCBA to the APR facepiece was found to create a less significant increase, ranging from 0.25 to 4.16 dBA.