

Quantitative Fit Testing of Powered Air Purifying Respirators with TSI Portacount Plus Model 8020

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We have conducted quantitative fit testing (QNFT) on two powered air purifying respirators (PAPR) using the TSI Portacount Plus Model 8020. The two PAPR systems evaluated were: the 3M BE-10 and the powered PC4 respirator. Initial fit factor (FF) data showed that both systems behaved similar to a negative pressure respirator when the blower was off. When the blower on turned on, the FF increased as ambient aerosol increased for the BE-10 system, but dropped drastically for the PC4 system. In an attempt to explain this effect, we measured the aerosol generated when the motor-blower was turned on for both systems. We found that the amount of aerosol generated was significant, and was higher for the powered PC4 system. Although the amount of aerosol generated by the 3M BE-10 system was quite low, on average it was comparable to the amount of subject-generated aerosol measured previously in this laboratory. Inserting these numbers of blower-generated aerosol into the model we proposed for "modeled respirator fit factor" (Harrison & Liang, 2005), the observed fit factor data were readily explained.