Total Inward Leakage Is Only Part of the Equation in Understanding Respirator Performance

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The results of respirator performance as measured in the laboratory, simulated workplace protection factor (SWPF) or in the workplace, workplace protection factor (WPF) don't agree. The information from these studies provides inconsistent results for the level of respiratory protection provided to an individual worker. Powered air-purifying and supplied air respirators (PAPR & SAR) are thought to provide a high level of worker protection based on design parameters in many commercial respirator models using loose fitting facepieces. In a SWPF study of sixteen NIOSH certified PAPRs and SARs using loose fitting facepieces, a wide variety of respirator performance was observed. Because of the simple designs used in these types of respirators the results question the current practice of placing respirator models in general respirator classes with assigned protection factors (APF). Component testing may not be adequate and actual human subject testing of individual respirator models may be needed to demonstrate an acceptable SWPF before a model can be included in the general class of respirators with an assigned APF. The total inward leakage testing currently proposed by NIOSH for inclusion in the certification process should address this specific problem. The larger problem is how to properly utilize respirator performance testing and APFs to improve worker respirator performance in actual use. Respirator program options will be presented to better understand and utilize this information.