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Presenter/author	Title	Abstract
Johnson, James S. **Foote**, K. L. **da Roza**, R. A. *Lawrence Livermore National Laboratory/L-379 P.O. Box 808 Livermore, CA 94550 USA*	**Simulated Workplace Protection Factor Results for a Variety of Powered-Air Purifying and Supplied-Air Respirator Configurations — A Model for Setting "Respirator Type" APFs**	Simulated workplace protection factor studies (SWPF) have been carried out at the Lawrence Livermore National Laboratory (LLNL) since the mid 1980s. We have evaluated a variety of powered-air purifying respirators (PAPRs) and supplied-air respirators (SARs) in our laboratory man-test chamber utilizing a large number of test subjects and similar exercises. These SWPF results of individual models of commercially available PAPRs and SARs can be used to assess the utility of "respirator type" assigned protection factors (APRs). PAPRs and SARs are ideal respirators to evaluate te feasibility of "respirator type" APRs because their performance is minimally influenced by the respirator wearer. If appropriate design requirements are utilized by respirator manufacturers, a consistent minimum performance level should be observed in SWPF studies of the same types of respirators. If one assigns the enforcement of a minimum set of design or performance requirements to an approval organization such as the National Institute for Occupational Safety and Health (NIOSH), the evaluation and approval process needs to be robust enough to assure minimum performance requirements for all approved respirator models in each "respirator type" designation. We have evaluated nine different NIOSH approved SAR models and ten different NIOSH approved PAPR models in six different SWPF studies. We have determined that NIOSH approval is not adequate to assure an acceptable minimum level of individual respirator model performance. Our evaluations found large variations in measured SWPFs of the same type of NIOSH approved SARs and PAPRs. Critical design parameters such as airflow rate, head enclosure envelope, neck seal, and tucked-in bib influenced the measured performance of individual respirators. Other design factors such as adjustable head harness, chinstrap, air hose length and battery life was also found to influence the respirator performance. The importance of the various design parameters was accented in the different exercises carried out by our test subjects. The need for a chinstrap was obvious during the running and touching-the-toes exercises. Airflow rate was critical, if a tucked-in bib or tight neck seal was not utilized in the design. A complete head enclosure design was found necessary to assure a consistent high level of protection. Poor performing models of NIOSH approved respirators make the assignment of meaningful "respirator type" APF for SARs and PAPRs very difficult. An agreed upon statistical treatment of the test data is required for all of the seven options discussed and safety factors should also be used where appropriate. At the present time, Establishing a two-tier APF system which uses the "respirator type" APF determined in one option, and the model-specific APF of another is the best model to follow for establishing "respirator type" APFs because it establishes an APF for the poor and high performing respirators of each "respirator type" designation. This option also provides the respirator manufacturer the ability to test specific respirator models to obtain a higher APF. The end user also benefits from this two-tier option because improved performance higher cost respirator models are available to be used where appropriate.