ISRP 1999 abstract

Presenter/author	Title	Abstract
Sreenath, Avula *TSI Inc.* *500 Cardigan Road* *Shore View, MN 55126* *USA*	**Statistical Investigation of Accelerating Quantitative Fit Testing of Respirators**	Quantitative fit testing is a method to characterize and evaluate the respirator fit for individual users. It is also helpful in selecting appropriate respirator for individual workers and help gain insights into potential contaminant leakage. The most common method of testing involves fitting a respirator on to a worker and measuring the ambient and in−mask aerosol concentration, a ratio, which is called the fit factor. During this test, the worker is required to perform a set of exercises designed to produce head and facial movements thereby testing the respirator face−piece to face seal. OSHA specifies the various activities the worker should be performing in 29CFR1910.134. The purpose of this study is to shorten the length of time for the testing. The number of tasks and the order of exercises the worker has to perform cannot be changed since it is an OSHA requirement. Hence, the goal of the statistical analysis is to find ways to reduce the sample time during each test. There are a number of ways to analyze the data. Our approach is to introduce simple statistics to look at correlation between different exercises and between different test time periods. This will help us determine which exercises are critical and how fit factors tend to change with test time. By simple statistical analysis of comparing overall fit factors obtained at different time intervals with the "true" full 60 seconds fit test results, one can choose the lowest time interval that yields results similar to the overall fit factor. However, the analysis does not stop here. Our approach will also determine the probability of occurrence of a "pass" when the true 60 seconds fit test would yield a "fail". By limiting the probability that such an event to occur, we can establish a new fit test protocol which would be more efficient that the existing method without compromising the quality of the test. The statistical analysis will also consider the probability of occurrence of failure during the shortened test cycle that would have otherwise passed during a full 60 seconds test, information very critical for the employers who would not like too many good fits to be rejected. The analysis requires determination of specificity and sensitivity for various conditions that are then used to determine optimum sample time. The statistical analysis is in progress and it is hoped that the results will be discussed in detail at the conference.