

# **Evolution And Relationship Of Inward Leakage Testing To Workplace Testing - Have We Gone Full Circle?**

**Craig E. Colton**

3M Occupational Health and Environmental Safety Division, St. Paul, Minnesota  
E-mail: [cecolton@mmm.com](mailto:cecolton@mmm.com)

During the 1970s in the United States, laboratory inward leakage testing was first done to establish protection factors of various respiratory protective devices. In some cases the inward leakage testing results were extrapolated using professional judgment to “similar” respiratory protective devices. In addition, high protection factor values were often obtained from inward leakage testing. Questions about whether this type of testing was appropriate for setting these numbers, lead to the conduct of workplace protection factor (WPF) studies as an alternative approach to setting protection factors. WPF studies for powered air purifying respirators with loose fitting facepieces indicated dramatically different performance values than those from inward leakage testing. As the challenges of conducting WPF studies were recognized, proponents of laboratory inward leakage testing pushed for a return to doing inward leakage testing without resolving the differences between the laboratory and the workplace despite the results having been shown to be reproducible. In going full circle it appears the differences in testing have never been reconciled, as shown by the many studies performed on respirators with loose fitting facepieces.