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The Development of Instrumentation and Analysis Tools to Assess Respirator Performance in the Field

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ABSTRACT

Dstl Porton Down has been at the forefront in the development of equipment to assess respirator performance outside the confines of the laboratory environment. In addition to protection, the latest system generation is capable of capturing (i) audio / video data, (ii) internal mask pressure, (iii) respirator movement in the x,y and z planes, and (iv) subject position (GPS). The entire system is mounted on UK load-carrying equipment with a single umbilical connecting the helmet-mounted pod containing the camera and other transducers to the control unit. Subjects find the arrangement comfortable and are not encumbered, allowing them to operate without constraint.

In all, four systems have been constructed, permitting performance data to be captured for small teams conducting military-style activities. In conjunction with improving the instrumentation, effort has been given to developing a range of standard vignettes that are pertinent to CBRN scenarios and represent the diverse nature of activities that the military user may be asked to conduct. Typically, vignettes are scheduled to last between 1-2 hours and are designed to stress the respirator in a manner of ways e.g. interaction with equipment platforms, elevated work rates etc.

Analysis tools have also been developed. As an interim measure, simple macros have been written to permit the captured data to be compressed and displayed in standard spreadsheet format. In addition to tabulating the data, the developed macros translate the information into graphical form, allowing visual correlation of protection, in-mask pressure and x,y,z movement. Software currently under development will enable periods of interest to be selected for closer interrogation. Once selected, the developed software will simultaneously display the relevant graphical data with the time correlated video footage, thus synchronising the protection, accelerometer and pressure information with subject activity. The instrumentation and analysis tools are described, together with recent trails.