

CBRN Respirator Human Performance Standard Development

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OBJECTIVES

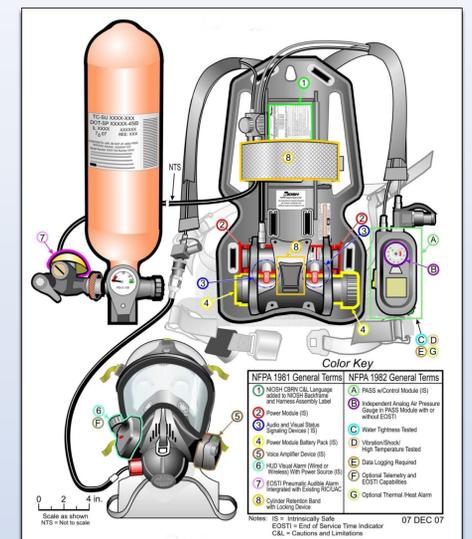
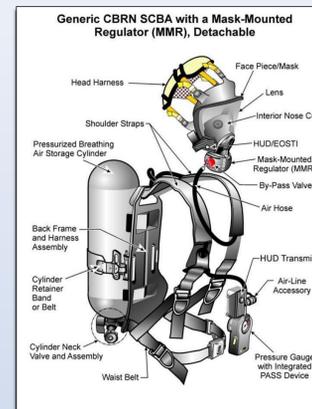
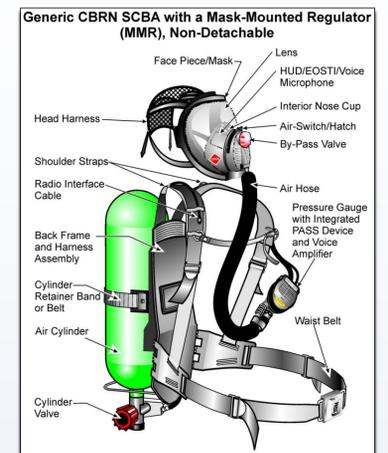
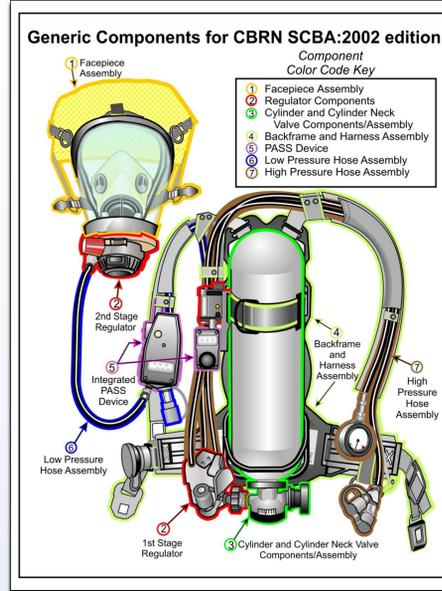
- Assess emergency responder ability to conduct human performance tasks consisting of 1) recognize, 2) inspect, 3) don, 4) seal, 5) gain a re-seal, 6) decontaminate, and 7) doff NIOSH-approved chemical, biological, radiological, and nuclear (CBRN) respirators within a time specified. Assess respirator user instructions (UI) for time standards.
- Propose templates that standardize user instructions and training per stakeholder interests and NIOSH initiatives.

EXTERNAL STAKEHOLDER USERS

- Inter Agency Board (IAB) for Equipment Standardization and Interoperability
- United States Air Force (USAF), Fire Service, Silver Flag Exercise Program, Tyndall AFB, Florida
- City of Las Vegas Fire and Rescue, Clark County, Nevada

EXTERNAL RESEARCH STAKEHOLDERS

- U.S. Department of Homeland Security, Federal Emergency Management Agency, Center for Domestic Preparedness, Anniston, Alabama
- U.S. Department of Health and Human Services, CDC, NIOSH Education and Research Center, Deep South Center for Occupational Health and Safety
- NIOSH approval holders of respiratory protective device technologies



15 Human Performance Requirements that Vary

- RECOGNITION:** Identify and recognize technical compliance of new and field deployed respirators.
- INSPECTION:** Understand description of respirator & conduct "routine" checks, inspections, and adjustments.
- RESPIRATOR SPECIFIC CHECKS:** Upon completion of inspection, conduct system pre-use function checks.
- DONNING:** Hold breath if surprised by respiratory hazards, don, and assure respirator protection.
- USER SEAL:** Conduct PPE checks and respirator-to-human face user seal checks, both negative & positive.
- SENSORY FEEDBACK:** Optical inserts, user interfaces, voice communications, and hearing tasks,
- DURING USE:** Use the device correctly, know when the seal is compromised, and know corrective actions.
- EMERGENCY EGRESS:** Detect seal breakage, reseal, and escape/continue mission. Start MAYDAY alert.
- ESCAPE:** Recognize device or subcomponent EOSTI or failure. Escape. Conduct decon. Validate "ALL CLEAR".
- RESCUE:** Know respirator built-in survival technologies and train on how to use them under austere conditions.
- CONTROLLED DECONTAMINATION:** Conduct decontamination & PPE removal while maintaining protection.
- MASK DISCIPLINE:** Human performance tips for success under short or long duration wear times.
- DURING/AFTER USE/CONTROLLED DISPOSAL:** Weather conditions, purging system, change-out schedules.
- RE-USE/STORAGE:** Designs for respirator and part reuse. Unique storage requirements. CBRN C&L "U/UU".
- CLEANING & DISINFECTING:** Use of recommended cleaning solutions, disinfectants, and contact time.
- MAINTENANCE LEVELS:** User/wearer, technician, overhaul, calibration, power sources, & RPP administrator.

Standards Development

- How Can UI Be Standardized?** "User instructions" (UI) are the one set of common instructions found with every respirator. They are used when training curriculums are developed so it is probable that the standardization of UI can contribute to more standardized training relative to the correct use of PPE, and form the basis for a standard.
 - NIOSH knows that field use of the respirators outside of the stated limitations occurs accidentally and intentionally. NIOSH knows this introduces variability and uncertainty in the approved configuration protections and product quality assurance.
 - RPP administrators charged with providing employees with technology that minimizes user burden while maximizing protection and mission success must be cognizant of the technology shortcuts that can place a NIOSH-approved respirator into an unapproved configuration. Standardized UI formats are needed.
 - The ease of donning, sustaining use, and doffing PPE vary by the type, brand, and model of PPE in use and the anthropometric variations of human physiology. Standardizing the minimum time standards for achieving levels of protection may contribute to greater protection of users in CBRN environments.



Research Completed

- OSHA:** OSHA offers a 30 hour general industry certification course with train-the-instructor focus.
 - HAZWOPER 40hr and 8hr course curriculum time frames are common minimum training requirements.
 - However, the only PPE requirement is that employees are proficient in the use of specified PPE.
 - And the definition of proficiency is determined by the employer. Donning times for PPE are not specified.
- USAF Silver Flag Exercise:** NPPTL observed CBRN SCBA-APR Mode-of-Use timed donning exercises.
- FEMA Center for Domestic Preparedness:** NPPTL, the CDC, and the FEMA Center for Domestic Preparedness (CDP) are exploring interagency efforts to integrate NIOSH-approved CBRN respirators.
- IAB Chair:** The IAB issued a letter to OSHA addressing the need for respirator standardized user instructions and the need for an emergency responder "Respiratory Protection 101" course.
- IAB Equipment/Training & Exercises Subgroups:** Joint session held discussing PPE training needs.
- NFPA 1404, 1500, & 1852:** A firefighter in turnout gear commonly has 1 minute to don SCBA and go-on-air.
- NIJ Standard-0116.00:** Specifies LERL protective ensemble average donning time standards of 8-7 minutes.
- User Instruction Review Snapshot:** User instructions contain sequential user actions and technology end-states that must be achieved within various time constraints to successfully place the respirator into its approved pre-use, during use, and after use configuration. For example, donning and use time standards in a SCBA UI indicate that a wearer must know over seven "time-centric" actions for pre-use. As part of the approval process, NIOSH does a basic review ensuring that the technology performs the way the UI specifies, that special functions are accurate, that the final caution and limitation statements are applicable and verbatim, that the full label is present and correct, and that the correct adhesive labels are assigned per the drawings. Recently, NIOSH purchased CBRN respirators from the field and the user instructions were read and reviewed. One output was that NIOSH created a series of generic SCBA and APR drawings to demonstrate variability in terminology. Another output was NIOSH identified 15 tasks that have definition variability. NIOSH is creating a database to collate and create a generic UI template.

Interim Conclusions

- Quantity of User Instructions:** Paper manuals, DVD, and quality assurance documents issued with newly purchased respirator number, on average, 10 to 16 to 25 documents per CBRN SCBA model, 3-5 for CBRN APR. Of the 16, a minimum of 5-7 different manuals are specific to individual subcomponents required to be with the SCBA. Individual facepiece manuals are specific to the brand. A master UI binder is needed.
 - Technical maintenance manuals are issued to the maintenance technicians and are separate from the user level manuals.
 - User instruction formats have common themes but vary in technical content and time standards across the approval holder spectrum.
 - Unique legal counsel language is specific to each proprietary technology and is needed to support approval holder concerns in the areas of caution, warning, and important stand-out notes required to be in UI.
- Public Meeting:** NIOSH held a public meeting respirator labels workshop on November 19, 2010; participants included NIOSH approval holders and other NIOSH stakeholders. One of the topics discussed was the need to create a standardized set of user instructions.

Disclaimer: The findings and conclusions in this poster have not been formally disseminated by NIOSH and should not be construed to represent any agency determination or policy.

