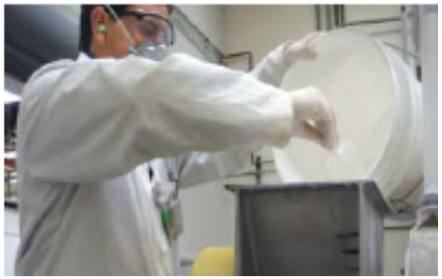
Respirator performance against nanoparticles under laboratory and workplace settings - FY13 (927ZJRL)

Objective

To validate that NIOSH-approved air purifying respirators provide expected levels of protection commensurate with their assigned protection factor for workers handling nanoparticles.



Applicable Standards

- 42 CFR, ASTM E56, ISO TC 229

Key Partners

- NIOSH NTRC – Funding
- NIOSH-Cincinnati – Equipment design and workplace protection factor studies
- Larry Janssen
- AIHA RPC

Stakeholders

- Respirator users
- Industrial hygienists
- Respirator manufacturers
- Filter media manufacturers
- Nanotechnology companies

Project scope

1) Measure SWPFs for N95 and P100 FFRs and elastomeric half-mask respirators, as a function of particle size (20–400 nm size range) donned by subjects exposed to salt aerosols in an exposure chamber
2) Determine if P100-class provides better protection than N95-class respirators under laboratory conditions
3) Validate that field portable instruments can be used to obtain count-based WPFs
4) Determine if respirators provide the expected level of protection to workers in real workplaces where engineered nanoparticles are produced & handled

Outputs

- Manuscript published or submitted to peer-reviewed journals **(2)**
- Manuscripts in the preparation process **(1)**
- Presentations to stakeholders or conferences **(4)**
- Standards committee meetings & public meetings **(0)**

Milestones FY13

- Q1: Complete set up a human-subject aerosol respirator testing system
- Q2: Compete round I (25-human subjects & 8 respirator models for each subject); submit 1st paper on a new test-system development for CNTs to JAS
- Q3: Complete rounds II-III (three replicates for each subject); submit 2nd paper on mass-based CNT penetration to OD for approval
- Q4: Complete data collection; submit an abstract to AIHce 2013 on SWPFs for nanoparticles

Outcomes

- Experimental data from project will be used in NIOSH, OSHA, ASTM, & ISO guidelines for worker protection against airborne nanoparticles
- Other researchers will use the methodology developed for nanoparticles to conduct additional WPF studies to validate the performance of other types of respiratory protective devices

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