



January 31, 2022

Maryann M. D'Alessandro, PhD  
Director  
National Personal Protective Technology Laboratory (NPPTL)  
626 Cochran's Mill Rd  
Pittsburgh, PA 15236

Re: The Need To Establish Personal Protective Technology Centers of Excellence To Address  
Research and Practice Gaps // CDC-2021-0115, NIOSH- 343

Dear Dr. D'Alessandro,

As you know, the International Safety Equipment Association (ISEA) is the U.S. trade association for companies that design, test, manufacture and supply personal protective equipment (PPE). The association is the secretariat for American National Standards for dropped object prevention solutions (ANSI/ISEA 121); emergency eyewash and shower equipment (Z358.1); eye and face protection (ANSI/ISEA Z87.1), first aid kits (ANSI/ISEA Z308.1); gloves (ANSI/ISEA 107), head protection (Z89.1), high visibility apparel (ANSI/ISEA 107); gas detectors and coveralls.

Nationwide, the safety equipment industry supports **345,000** total jobs and generates economic activity of more than **\$71.6 billion**. In addition, more than **111.1 million** workers across the U.S. are protected by the safety equipment our members produce and ISEA represents<sup>1</sup>.

ISEA asks that at least two manufacturers be part of any advisory group established to set priorities and review applications for research funding. The manufacturer perspective can point to research that could lead to a successful transition to scalable manufacturing, and where there are immediately viable markets.

I recognize this list, plus the table on hearing protection research, is extensive. But, it shows the areas where we can work together to improve health and safety of the nation's workforce.

Please feel free to contact me at [sgardner@safetysafetyequipment.org](mailto:sgardner@safetysafetyequipment.org) or at (202) 550-3309 to further discuss these matters.

Sincerely,

A handwritten signature in black ink that reads 'Stephen Gardner' in a cursive script.

Stephen Gardner  
Interim President and CEO

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<sup>1</sup> More information on this is available at <https://safetysafetyequipment.org/industryimpact/>

## **Safety eyewear - Effects of UV radiation between 380 and 400 nm on ocular health**

There are significant global debates and different approaches about whether and how to address the effects of UV radiation between 380 and 400 nm. Many safety standards end UV filtration at 380 nm and below, but there is growing concern about whether there should be restrictions up to 400 nm. The problem with effectively establishing PPE performance up to 400 nm is that there is little specific knowledge about the effect of UV radiation on the human eye, including dangerous exposure levels or durations, safe exposure levels or durations, and the actual injurious effects on the eye.

## **Chemical protective apparel research**

Occupational skin exposure to hazardous substances is significantly under-researched and as such workers and occupational safety and health researchers do not benefit from the same science-led guidance. For example, in respiratory protection, Occupational Exposure Limits and Assigned Protection Factors are well-researched for a wide variety of hazardous exposures. The majority of toxicological research focuses on the health effects of exposure to a single substance. However, little research has been conducted on dermatological exposure of chemical mixtures.

## **Public-private partnerships**

Question 7 (86 [FR](#) 60462) asks “are there alternate or additional needs that have not been identified in this notice?” One area is Public-Private Partnerships, which could address the three broad areas and the six other questions on this Fed. Reg. page. Federal labs and facilities have, or may acquire, machines and their related operating systems, that are economically but not technologically out of reach for public or private researchers. NIOSH should recommend a program to share federally-owned advanced machinery and technology with manufacturers, who could use such devices to research and design new and innovative PPE and PPT.

## **Heat stress and climate change**

Data on heat stresses are needed by PPE manufacturers to both revise and innovate PPE and PPT. Safety equipment manufacturers have products to mitigate heat stress. These companies and occupational safety and health researchers welcome opportunities to better understand the dangerous levels of exposure and how to best protect against them. Further, some PPE is designed to be protective in foreseeable environments such as elevated heat and cold. As the occupational health and safety community considers whether it needs to adjust certain test parameters to better reflect new, warmer, user environments, it needs studies on what those extreme environments might be (e.g., working aloft at heights of 500+ feet in various locations around the nation).

## **Hand protection research – better grip in wet working conditions**

Questions 2, 3 and 4, when taken together, suggest research is needed to improve hand protection grip in wet conditions. One critical area is for the nation’s tower climbing workforce. Congress

approved more than \$45 billion for broadband expansion. This funding will, in part, result in an expanded telecommunications workforce, many who will be climbing towers in all types of weather conditions, including wet. In fact, OSHA has established a work group to address the safety of the communication tower climbing workforce. These workers need to know their gloves will retain a secure grip if tools or climbing structures are wet from rain, mist, condensation, or other similar conditions. Materials science research could greatly aid in this area.

### **Anti-vibration glove research**

Daily occupational exposure from many, but not all, pneumatic, electric, hydraulic, or gasoline powered vibrating hand-tools, have been causally linked to and-arm vibration syndrome (HAVS) and other conditions. The US Navy assessed that 2.5 million Americans are at risk of Hand-Arm Vibration Syndrome ([link](#)). An ISO-10819 addresses this, but the standard is nearly 10-years old. Intramural or extramural research could assess this ISO standard, and make recommendations for a US-based national voluntary consensus standard.

*(ISO 10819:2013 specifies a method for the laboratory measurement, data analysis, and reporting of the vibration transmissibility of a glove with a vibration-reducing material that covers the palm, fingers, and thumb of the hand. ISO 10819:2013 specifies vibration transmissibility in terms of vibration transmitted from a handle through a glove to the palm of the hand in one-third-octave frequency bands with centre frequencies of 25 Hz to 1 250 Hz.)*

### **Respiratory Protection Comments**

#### *Source Control*

The use of N95 respirators by the public as part of the COVID response highlighted the need for a simple fit test that can be done at home with commonly-found household items like tape measures, matches, nail polish or paint remover, etc. The current fit test is designed for execution by trained test administrators using specialty equipment and substances. The current test is also meant for cases where a tight seal is critical because the worker is actually exposed to dangerous aerosols and particles. The *Birkner* At-Home Test would be to assure that the fit is reasonably tight and adequate for protection against intermittent and incidental exposures such as passing an infected person in the grocery store aisle, waiting on a subway platform, or standing in a line, etc...

#### *CO<sub>2</sub> Build-Up in respirators*

The effect of carbon dioxide build-up inside a mask is poorly understood. Manufacturers could better design safe and comfortable products with a better understanding of the effect of long N95 wearing sessions in which exhaled carbon dioxide could accumulate inside the device.

“N95 respirator can make it more difficult for the wearer to breathe due to carbon dioxide build up, which reduces the intake of oxygen, increased breathing rates and heart rates.” ([link](#)) This

faulty warning came not from a small, random group, but from the Sacramento Public Health Department, related to use of N95 to keep safe from wildfire smoke. Other groups and individual have spread this misinformation, too ([link](#)). NIOSH should support research that can address this misnomer in a complete, final manner. This could be done with intramural or extramural research.

### *Exhalation research*

Finally, COVID created an urgent need for source-capture masks to help limit the spread, but there wasn't a single existing test (or understanding) of this type of protection anywhere in the world. Modeling human exhalation, coughs and sneezes for the purpose of informing mask designs for source capture is needed.

### **Dropped objects - Physical forces on the body from dropped objects**

The occupational safety and health community has studied at length the impact on the body of a personal fall arrest system when a worker falls from height. Similar studies are needed regarding dropped objects prevention solutions. These products prevent a tool or other personal object from falling when workers are working at heights. These tool tethers are attached to a worker's belt or other harness and to the tool. If a tool falls, what will be the impact on the body based on the various lengths and elasticity of the tether and the weight of the tool or object? This research is needed to better train workers about safe use of dropped objects prevention solutions.

### **Eye wash - Anthropometric research**

What are the optimal spray patterns and flow rates for emergency decontamination showers? What is the optimal spray pattern and flow rate to completely rinse the contaminant from the worker? Research on these questions will aid in the design and placement of shower heads for emergency decontamination showers and the spray patterns for emergency facewashes based on anthropometric data of current workers.

### **Fall protection - Active fall protection**

Current fall protection PPE is tested on manikins. There is little to no knowledge about whether and how the effectiveness of fall protection is affected by being worn over clothing. Of particular concern is whether wearing fall protection harnesses over bulky winter clothing creates stress points on the harness that compromises the ability of the harness to arrest a fall.

### **High Visibility Apparel to Promote Worker and Pedestrian Safety from Struck-by Hazards**

Struck-by hazards from vehicles and equipment on roadways and in construction zones continue to be a persistent cause of worker injuries and fatalities. Existing, effective regulations prescribing mitigation approaches including engineering controls and mandatory worker PPE have helped reduce worker fatalities. An ongoing issue for high visibility safety apparel is understanding the

decline in a garment's ability to identify the wearer as a person over the product's lifetime and discerning the point of necessary garment retirement.

### **Connected Worker Issues and Research**

1. Executing on any of the seven strategic goals for the next 2-3 years proposed by NIOSH NPPTL has the potential to improve worker safety incrementally, but due to the overall maturity of the field, they are unlikely to produce any kind of step-change improvement in measurable outcomes. The one new development with a true potential for step-change improvements to occupational health and safety is **data connectedness**, i.e., connected PPE and connected workers. NIOSH NPPTL could position itself strategically to investigate and develop this subject matter and provide expertise centrally to help develop the networked, data-connected US worker occupational safety environment.
2. Areas of worker safety data connection NIOSH could study include cataloging the current state and availability of technology for sensing at the user/PPE interface, means and methods of data collection, data processing and analytics, and the need for regulations and protocols that protect user data privacy and security rights. This new technology can be applied to any area of PPE but could be immediately suitable to existing data-intensive aspects of worker protection compliance programs such as hearing conservation and respiratory function/fit testing.
3. The new connected and autonomous vehicle (CAV) roadway user group is now emerging and will create a new category of hazards for workers and pedestrians on the nation's public roads and highways. NIOSH could speed the development of a new occupational safety and health protocol around CAVs by characterizing and cataloging the new threats this could present to workers and pedestrians, describe how it differs from the current roadway user threat environment, and produce an initial list of recommendations within a hierarchy of potential remediations.

### **Comfort and fit of PPE**

At various times, NIOSH has sought to research fit and comfort. ISEA members, and likely all manufacturers, are always working on comfort and fit, as these are key features that differentiate products in the marketplace. While anthropometric data is welcomed, federal funds should not be used to study such subjective use areas of comfort and fit.

<b>NIOSH Center of Excellence – Hearing Protection</b>		
<b>Hearing Conservation Research Ideas/Questions</b>	<b>Likely Benefits</b>	<b>Research Category</b>
What is the recommended frequency of hearing protector fit testing? How often does one need to fit test a worker before behavior has changed?	Improving hearing protection selection and worker compliance, better hearing health outcomes for people who use hearing protection at work, public and private health care savings	Human factors/ergonomics approaches to evaluating the factors that influence the adoption and usage of PPT such as performance, comfort, fit, and usability; sociotechnical systems analyses of the influences of factors such as health and safety management systems, safety culture and regulatory requirements.
How can the occupational safety and health community integrate health behavior change into hearing conservation?	Improving hearing protection selection and worker compliance, better hearing health outcomes for people who use hearing protection at work, public and private health care savings	Human factors/ergonomics approaches to evaluating the factors that influence the adoption and usage of PPT such as performance, comfort, fit, and usability; sociotechnical systems analyses of the influences of factors, such as health and safety management systems, safety culture and regulatory requirements.
What are cultural differences regarding the use of hearing protection? How can safety managers and the research community approach the multi-cultural workforce to improve hearing protection use? Fit testing may help as it provides one-on-one training and the opportunity to find the best hearing protector.	Cultural considerations to increase understanding and acceptance leading to improved compliance. Also, improved hearing protection selection and worker compliance, better hearing health outcomes for people who use hearing protection at work, public and private health care savings	Human factors/ergonomics approaches to evaluating the factors that influence the adoption and usage of PPT such as performance, comfort, fit, and usability; sociotechnical systems analyses of the influences of factors such as health and safety management systems, safety culture and regulatory requirements.

<p>How does the employer balance the need to protect workers from hazardous noise yet maintain the ability to communicate while wearing hearing protection?</p>	<p>Improving worker compliance with need to communicate</p>	<p>Human factors/ergonomics approaches to evaluating the factors that influence the adoption and usage of PPT such as performance, comfort, fit, and usability; sociotechnical systems analyses of the influences of factors such as health and safety management systems, safety culture and regulatory requirements.</p>
<p>What populations have the most to gain from fit testing? Which workers are at highest risk for noise-induced hearing loss that could benefit most from fit testing?</p>	<p>Prioritizing Fit Testing when resources are constrained will prevent noise induced hearing loss from those most at risk.          - or -          Employers who cannot afford to fit test, or whose scheduling does not permit uniform workforce fit-testing can prioritize fit-testing for those most at risk of noise induced hearing loss.</p>	<p>Human factors/ergonomics approaches to evaluating the factors that influence the adoption and usage of PPT such as performance, comfort, fit, and usability; sociotechnical systems analyses of the influences of factors such as health and safety management systems, safety culture and regulatory requirements</p>
<p>What benefit does octave band attenuation information give when selecting hearing protection for hearing-impaired workers? Does the occupational safety and health community need more data to make better recommendations on attenuation?</p>	<p>Hearing protection selection for hearing impaired           Also, improved hearing protection selection and worker compliance, better hearing health outcomes for people who use hearing protection at work, public and private health care savings</p>	<p>Human factors/ergonomics approaches to evaluating the factors that influence the adoption and usage of PPT such as performance, comfort, fit, and usability; sociotechnical systems analyses of the influences of factors such as health and safety management systems, safety culture and regulatory requirements</p>