

**Miller, Diane M. (CDC/NIOSH/EID)**

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**From:** Don Thompson [dthomps1@unity.ncsu.edu]  
**Sent:** Monday, April 20, 2009 12:04 PM  
**To:** NIOSH Docket Office (CDC)  
**Subject:** 146 - (PPT) Action Planning  
**Attachments:** NPPTL Plan Comments.docx; NPPTL Plan Comments.pdf

Greetings,

I am pleased to offer comments on the NIOSH/NPPTL plan to respond to the Insitute of Medicine Review of Personal Protective Technologies programming at NIOSH. I have included a document in both Word (2007) and PDF formats.

Regards,

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## Comments on NPPTL's Response to the Recommendations in the report "*The Personal Protective Technology Program at NIOSH.*"

### **Comments Overview:**

The staff and management of the National Personal Protection Technology Laboratory [NPPTL] has conducted a thorough review of the report and has obtain bottom-up input. It has conducted a thorough effort to develop a plan including participation in standards groups, and participation in prioritization efforts with key users and technologists. town hall meetings, program reviews, and technical meetings to review current projects. Those projects track the recommended directions identified in the report, particularly in the respiratory protection program. As the report notes, NPPTL needs to continue to strengthen its programs in dermal protection, use and usability of PPT, and workplace effectiveness and life-cycles of PPT. In order to accelerate and synergize its own efforts, NIOSH/NPPTL needs to develop and implement long-term plans. These plans should identify key research themes that will address major personnel protection technologies. NPPTL also needs to create focused, energetic partnerships with researchers and academic Centers of Excellence with demonstrated expertise in PPTs. The current plan is a good start toward that goal, but enhancements would make it even better.

### **Comments on specific recommendations follow:**

#### **[1] "Implement and Sustain a Comprehensive National Personal Protective Technology Program"**

The first of five issued identified to meet recommendation [1] is to develop a organize research efforts across all PPT. NPPTL has a very impressive history and established program to address the requirements for respiratory protection of workers. NPPTL has issued many recent standards for APRs, escape respirators, CBRN respirators, PAPRs, etc. Many issues remain, such as determining the effectiveness and durability of N95 and N99 respirators, particularly in the event of pandemic. Studies are ongoing in these areas.

NPPTL has initiated research and testing programs for thermal and chemical protection, and it has solicited input from the fire fighting and Hazmat community regarding needed standards and research. The effort in dermal protection is much smaller than respiratory protection, however; and NPPTL needs to significantly enhance its research, testing and standards for dermal protection. NPPTL has supported development of a new stored thermal energy test to create new testing technology for fire fighter steam burns. There are a number of related preconditioning and materials studies that need to be done to validate this testing approach. Significant gaps exist in understanding whether thermal protective gear is durable in the field, which has been partly addressed by a recent study;

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but the scope of this problem is large and complicated, and far more research needs to be done. Better testing systems and models for burn protection for structural fire fighting equipment, wildlands fire fighting and other thermal threats need to greatly enhanced.

Chemical and biological protection for medical, emergency response and industrial gear remains a critical need. Better materials tests for bacterial and viral penetration are needed. Better definition of test procedures and challenge chemicals for permeation through protective materials is needed. While some of that work is underway, the number of potential threats is large, and the program should be expanded to include a larger community of test developers. The relationship between aerosol particulate tests, corn oil aerosol tests, the SF<sub>6</sub> test, and the Man-in-Simulant Test are needed so that users and standards groups understand how whole ensembles perform in different environments. Recent additions of the oil aerosol chamber and chemical permeation testing capabilities are a beginning, but NPPTL needs to support expanded research into comparisons of test methods and into whole garment performance. Other areas related to CB protection will emerge as new standards are developed for technical rescue operations for divers in hazardous environments, and research into the combined effects of water, biological toxins and chemicals on PPT in those environments will be important.

NPPTL has recognized the need to look at personal protective technologies holistically, and it is active in developing physiological testing programs to look at the burdens encountered by users of PPT. There is an opportunity to expand this work by working with partners familiar with field use of PPT gear to perform comfort, user perception and ergonomics research to supplement NPPTL's own capabilities.

The broad range of technology and research needs for PPTs was recognized by the Institute of Medicine study, and NPPTL is deserving of greatly expanded funding to support the needed research. Table 1 of the NPPTL document on the PPT Implementation Plan provides a good overview of needed areas for expansion of the NPPTL program to address numerous PPT areas. It should be fully implemented.

The second issue identified was to support policy development and standards development across all areas of PPT. NPPTL has been active in leading the Inter Agency Board, which includes both users from a broad range of environments (fire, hazardous materials response, law enforcement, medical, military, bomb squads, and many others. It is also active across the board with the National Fire Protective Association standards committees, the ASTM, ISO and intergovernmental groups. One important role that NPPTL could play is to support subject matter experts who participate in the standards groups, but who do not have agencies to fund their participation. NPPTL has used the inputs of all of these groups in developing its research agenda, and it needs to continue to actively support these agencies.

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The third issue identified was to oversee certification of all PPT. This recommendation should be achieved by working with consensus standards groups to identify needed standards and by reviewing and evaluating the certification programs of existing certification laboratories. NPPTL does not need to get into actively certifying, except for the existing respiratory programs.

The fourth area identified was to promote technology development, standards, and certification of integrated PPT. This area can best be address by aggressively pursuing the first three areas. Development of an aggressive research program and active participation in standards groups and certification oversight will ensure that this area is successful.

The final focus area for recommendation 1 was to conduct outreach programs for PPT use and acceptance by workers. One of the keys to acceptance of PPT will be successful technology and standards development programs. NPPTL can promote acceptance of PPTs though participation in major user group national meetings, through publication of articles in both refereed journals and in trade publications and through organizing focused meetings for users.

### **[2] Establish PPT Research Centers of Excellence and increase Extramural PPT Research**

The program plan for NPPTL has reworded this recommendation as follows: "Recommendation 2: Establish PPT Research Priorities and Expand the Extramural Program." I believe that the original recommendation presented by the Institute of Medicine group has captured an important feature that needs to be supported by the final NPPTL plan. The IOM group noted, that "where possible the PPT Program should take advantage of existing expertise, laboratory infrastructure and outreach networks, which may be costly to duplicate." To achieve this goal, the IOM group stated that "the Program should develop and support research centers of excellence that work closely with the NIOSH intramural research program to improve PPT, increase field research, and explore and implement research to practice interventions." Further, the IOM recommended that the Program work with the NIOSH Office of Extramural programs to increase other research opportunities..."

The advantages cited in the IOM report for Centers of Excellence [COEs] are powerful. The expertise and infrastructure of such centers allows the development of coordinated research agendas that will accelerate and enhance technologies leading to safer workplaces. Such research agendas can be driven by boards that include NIOSH/NPPTL as leaders as well as users, other researchers, and subject matter experts. The advantages

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multiply when professionals are trained at the COEs through graduate programs, certificates and professional exchange programs. Extramural research programs are also important, but they often involve single research issues that do not lead to the synergies developed through long-term thematic projects to address broader issues. Omission of COEs would be a significant gap for the program.

### **[3] Enhance the Respirator Certification Process:**

The program plan has an excellent vision for the respirator certification process.

### **[4] Increase Research on the Use and Usability of PPT**

The plan for recommendation 4 has excellent elements. Research on user acceptance should include both surveillance activities and laboratory research. Inclusion of holistic approaches recommended in the proposal for PPT assessment and certification is an excellent approach. Holistic testing should be a part of standards, and doing so would go far toward achieving the goal of this recommendation.

NPPTL is active in physiological research and understanding respiratory and thermal burdens that accompany use of PPT. Increasing the emphasis on whole ensemble testing for PPT is one other way to achieve greater acceptance in the workplace. This would include both comfort/fit assessments of gear and ergonomic research and assessments.

Developing good laboratory predictive methods for assessing ergonomics of PPT gear should be a key research program of NPPTL, and then correlations with field assessments and surveillance results can be added to optimize these methodologies. The experience with protective ensembles and technologies and the close connections with the user community that COEs already have can accelerate the development of these protocols. In many cases, COEs may already have protocols that are appropriate starting points for this research. Alternatively, these research activities can be directed through the Office of Extramural Programs.

### **[5] Assess PPT Use and Effectiveness in the Workplace Using a Life-Cycle Approach"**

The first strategy identified in the proposed NPPTL Program is to "Assess and critically appraise PPT use and effectiveness across all types of PPT (e.g., gloves, eye protection, respirators) and across relevant industry sectors and workplace environments." Recent meetings of key fire fighter users have identified understanding the performance of turnout gear over its use life as a critical need of that community, and other groups have similar concerns. Some small programs are underway in this area, but significantly expanded research in this area is needed. The problems for firefighters are manifold

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- exposure to UV in normal operations for sensitive shell layers and moisture barriers (or similar layers for other user groups);
- the effect of exposure to extreme environments on the protective performance of PPT;
- contamination of PPT by exposures in hazardous environments (smoke, soot, fuel splashes, chemicals, bodily fluids) and in contact with sick or injured individuals;
- effects of laundering, cleaning and care on PPT;
- correlations between lab conditioning protocols for testing with wear experienced in the field.

Each of these issues varies greatly with the type of PPT being worn, the climatic conditions encountered by users, the operational procedures and tactics of the user group, the specific situations encountered in use, maintenance and care programs or users, and the age of gear. The second and third strategies for this recommendation are important in connecting laboratory programs with field experience. These strategies are

- "Require random periodic field-testing of an adequately sized sample of PPT to assess effectiveness, usability, and durability with reasonable accuracy and precision; and
- Build on existing government and private-sector surveys and surveillance activities that collect PPT-relevant data and facilitate linkages to other datasets."

Development of these databases should be a focus of ongoing activities at NPPTL, and connecting these programs with research activities will be an important aspect of making the surveillance activity valuable to developing new conditioning and testing methodologies that can be brought into Standards.

### **Summary**

The NPPTL Program Plan has identified many important elements and provides a template for creating better PPTs and enhanced user compliance. Appropriate funding and significant growth of the program to make the other protective technology programs as robust as the respiratory program will be the key to achieving the goals identified by the IOM study. In addition, re-emphasis of the need for COEs to amplify and synergize the NPPTL program is a critical recommendation of the study that should not be omitted from the plan. COEs provide many advantages for focused collaborations that are highlighted and explained in the IOM study.