



**USAPHC**  
**U.S. ARMY PUBLIC HEALTH COMMAND**

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## Toxicology Portfolio

### Mission

The mission of the Toxicology Portfolio is to promote health and prevent disease, injury and disability of Soldiers and Department of the Army civilians by identifying the toxicity of military-unique and military-relevant compounds and the risks they pose to humans and the environment. Current efforts focus on maintaining Soldier and civilian health and readiness through the evaluation and clearance of products, materials and compounds proposed for military use.

### Background

Elements of the Toxicology Portfolio have provided support for the safety of Soldiers for more than 40 years. In the 1960s, toxicologists and other scientists working for the U.S. Army Environmental Hygiene Agency, a predecessor organization to the current U.S. Army Public Health Command, conducted initial work on understanding the effects of exposure to DEET insect repellent and permethrin on Army personnel.

### Clients

The majority of work currently performed by the Toxicology Portfolio's scientists is sponsored by organizations external to the USAPHC. These organizations require a detailed understanding of the potential health effects from exposure to various compounds and substances used or proposed for use by the military. The portfolio has a wide range of customers within the Department of Defense and collaborates with the Environmental Protection Agency, various environmental and state organizations, universities and industry.

### Structure and Organization

The Toxicology Portfolio is one of nine portfolios making up the Army Institute of Public Health, a subordinate unit of the USAPHC. The portfolio has two separate programs and a toxicologic pathology division.

- **Health Effects Research Program**—Experts in health effects research conduct basic and applied research, development, testing, and evaluation in the fields of toxicology, environmental biology and chemistry.

Scientific efforts work toward establishing safe exposure criteria for new and existing DOD products, chemicals and compounds.

The program develops toxicity data providing researchers and weapon system program managers with essential feedback relative to the acquisition and use of new and existing compounds and materials. As subject-matter experts in munitions toxicology, the program staff works closely with customers to develop information used in the decision-making process regarding sustained use of these compounds. Program scientists also provide expert reviews of important regulatory criteria affecting a variety of Army and DOD activities and conduct the toxicology studies needed for refinement of environmental health criteria.

The program also conducts environmental toxicology assessments, making highly specific and detailed determinations regarding how, and how quickly, military-relevant compounds move into air, water or soil. These assessments help to characterize and refine their potential to cause adverse health effects.

Program scientists also serve as consultants and study directors for toxicity studies of various chemicals and compounds using laboratory tests, cell culture techniques, computer models or animals to determine potential toxicity of a particular product

- **Toxicity Evaluation Program**—Scientists in this program provide expertise in the protection of Soldiers and other personnel by ensuring the safety of products proposed for use by the Army. They do so by identifying chemical hazards and providing recommendations for avoiding or minimizing exposures. They support the Army's preventive medicine program and personnel readiness by means of consultations, evaluations and laboratory testing.

The program directly supports the USAPHC and DOD's public health mission by conducting occupational toxicity studies that examine the toxicity of select substances and compounds found in the workplace.



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Results of these studies are used to determine safe occupational exposure levels that are of particular importance to industrial hygienists who study health hazards and diseases in the work environment.

In recent years, significant efforts have focused on inhalation toxicology studies of various colored smoke materials used by the military as signaling devices or to mark landing zones. Results of these studies help to characterize and determine potential effects of smoke exposure to soldiers in the field. Program scientists' recent work also includes characterizing the toxicity of new fire-suppression chemicals and insensitive munition materials.

Program scientists also conduct "Toxicity Clearances" that are mandated by regulation. This process includes comprehensive toxicity reviews and evaluations. Results are used as a basis for granting the required authorization for continued development, use and eventual deployment of various chemicals, compounds, materials and equipment. In 2014, more than 35 toxicity clearances were provided for a variety of products undergoing development, including plastic, rubber and adhesive compounds, as well as fabrics, filter materials and inks used in the production of military protective masks and fire extinguishing agents.

- **Toxicologic Pathology Division**—The division provides necropsy services for the Toxicology Portfolio protocols and maintains a full-service histology laboratory. Division services also include consultation, microscopic evaluation and report generation.

Pathology division personnel work closely with veterinary support and scientific staff to ensure that all studies are conducted in accordance with Good Laboratory Practice Standards. The USAPHC also has an Animal Care and Use Program that since 1973 has consistently maintained accreditation with the Association for

Assessment and Accreditation of Laboratory Animal Care International. Oversight of the program is provided by the USAPHC Institutional Animal Care and Use Committee, the USAPHC Quality Systems and Regulatory Compliance Office, and the U.S. Army Medical Research and Materiel Command's Research Protection Animal Care and Use Review Office.

### **Toxicology's People**

Approximately 30 people work in the portfolio. They include military and civilian personnel who are biologists, chemists, toxicologists, veterinary pathologists, laboratory animal veterinarians, animal care technicians and administrative personnel. Many staff members are multi-disciplinary, holding advanced degrees in highly specialized technical areas. More than half of the Toxicology Portfolio's staff holds doctorates and several are board certified in general toxicology.

### **Portfolio Contributions**

The Toxicology Portfolio is a prolific producer of information for the public health community. Experts in the portfolio specialize in understanding the toxicology of military-unique compounds (for example, energetics, explosives, pyrotechnics) and in specific functional areas of toxicology. They frequently publish in scientific peer-reviewed literature. The portfolio has helped to produce technical guides used DOD-wide to identify safe exposure limits for industrial and military-unique chemicals.

The work performed in Toxicology Portfolio has a significant impact on protecting human and environmental health and on operational readiness and sustainment.