2022

YEAR IN REVIEW







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For more than a century, the U.S. Army Combat Capabilities **Development Command Chemical Biological Center** (DEVCOM CBC) has been at the forefront of the Army's chemical and biological defense capabilities. Founded in 1917, the Edgewood Arsenal (as it was then known) was established to provide chemical weapons research and manufacturing during World War I. Although initially slated to be disbanded after the war, Edgewood Arsenal had proven itself essential to the Army and experienced a period of tremendous growth and expansion after the war ended. Throughout the 20th century, the Edgewood facilities provided munitions manufacturing and chemical biological defense resources that were critical to the U.S. military. As the global climate shifted towards chemical biological demilitarization, DEVCOM CBC again expanded its scope to become the industry's expert in the safe and lawful disposal of chemical agents and has been an Organization for the Prohibition of Chemical Weapons-accredited laboratory since 1997. Today, DEVCOM CBC is a leader in chemical, biological, radiological, nuclear, and explosive (CBRNE) defense, bringing the nation's experts together to provide innovative, cutting-edge solutions to the Army, Department of Defense, the nation, and our allies.

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Development Command Chemical modernization solutions in order to allow the Joint Force, employing Army capabilities, to achieve overmatch in the future operation environment. discovery, development, and delivery of technology-based capabilities to enable Soldiers to win our nation's wars and come home safely. DEVCOM CBC is the Army's principal research and biological defense technology, engineering, and field operations. DEVCOM CBC is headquartered at Review is an authorized publication for members of the DoD. The contents of endorsed by, the U.S. Government or responsibility of the DEVCOM CBC Office of Public Affairs. References to commercial products or entities in this publication do not constitute endorsement by the U.S. Army of the products or services offered.



For more information about DEVCOM CBC, or to contact us, visit us on the Web at https://www.cbc.devcom.army.mil/

DIRECTOR'S MESSAGE

"DEVCOM CBC is the Nation's premier provider of chemical biological defense solutions from the bench to the battlefield and beyond. We have the people, partners, and capabilities to apply more than a century of experience to the challenges of tomorrow."

MICHAEL BAILEY Director, DEVCOM CBC

DIRECTOR'S MESSAGE

2022 Marked by Outstanding People, Partnerships



As you read about the Center's accomplishments in this edition of The Year in Review, you will see we used 2022 to build upon who we are and what we have always been for more than a century. From our beginning as the Edgewood Arsenal, the Center has always been its people – coupled with our specialized facilities and partnerships. That combination

places us in a unique position to conduct innovative CBRNE defense research and development in support of the warfighter and the protection of the nation.

Our portfolio is broad. We develop better technologies for chemical biological threat protection, detection, and decontamination. We also develop battlefield obscurants and conduct field operations where chemical biological agent may be present. Our technical expertise touches every phase of the acquisition lifecycle: from basic and applied research; to concept and product development; to chemical and biological surety and non-surety product testing; to system development and engineering; to prototyping, production and sustainment of chemical biological technology.

What you will see in these pages are accomplishments across this broad portfolio. For example, the Center is at the forefront of materials production using synthetic biology. In 2022, we began producing melanin in the Center's one-of-a-kind biomanufacturing facility. We also held a field demonstration with the Defense Threat Reduction Agency showing how unmanned aerial vehicles combined with chemical biological sensors can transform chemical biological preparedness in the battle space.

On the world stage, we contributed to efforts for the global elimination of chemical weapons, placing a senior scientist on the Organisation for the Prohibition of Chemical Weapons Scientific Advisory Board. Additionally, our annual OPCW accreditation makes us one of two OPCW-designated laboratories within the U.S. for analysis of environmental and biomedical samples from locations worldwide, and the only OPCW-designated laboratory within the Department of Defense.

Not all our accomplishments in 2022 occurred in the lab. Center experts worked hard to create new technology transfer agreements which invigorate the economy and expand the nation's chemical biological defense industrial base. Members of the Center workforce volunteered their time to provide STEM outreach in local schools, including using virtual reality to teach chemistry. We also doubled down on our investment in people -- I appointed a diversity, equity and inclusion officer whose mission is to advance the Center's people-centric culture.

We will carry on with these technology development initiatives and continue investing in our people. I invite you to read about our accomplishments over the past year and join us on our exciting and innovative journey into 2023 and beyond.

Sincerely,

Michael Bailey Director U.S. Army Combat Capabilities Development Command Chemical Biological Center

CENTER OVERVIEW

"We bring together scientists from across the nation and around the globe so we can tackle difficult chemical biological challenges, and through these collaborations, we leverage our unique strengths, expand our body of knowledge, and provide solutions to the warfighter."

> DR. PATRICIA MCDANIEL Senior Research Scientist for Chemistry

DEVCOM CBC | 2022 Year In Review

CENTER OVERVIEW

CBRNE Defense Solutions

The U.S. Army Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC) is the primary Department of Defense (DoD) technical organization for non-medical chemical and biological defense. The Center's mission is to provide innovative CBRNE defense capabilities to enable the joint warfighter's dominance on the battlefield and interagency defense of the homeland. The Center has a unique role in technology development that cannot be duplicated by private industry or research universities. It fosters research, development, testing, and application of technologies for protecting warfighters, first responders, and the nation from chemical and biological warfare threats.

DEVCOM CBC specializes in research, development, and engineering combined with testing, training, and field operations to create new, effective CBRNE defense solutions. The Center is currently developing better ways to remotely detect chemical and biological materials – before the warfighter or first responder ever enters the threat zone. DEVCOM CBC is also developing a new generation of technologies to counter future and unconventional threats. The Center is dedicated to helping the Army transform into a multi-domain force so that we can meet our responsibility as part of the Joint Force and contribute to keeping the U.S. the dominant global power.

The Center's workforce is a highly skilled group of scientists, engineers, technicians, and specialists who work together to combat the world's most serious chemical and biological challenges. The Center works collaboratively with the entire CBRNE community to protect our warfighters and the nation from the chemical biological threats of the 21st century.

DEVCOM CBC Mission

Provide innovative CBRNE defense capabilities to enable the joint warfighters' dominance on the battlefield and interagency defense of the homeland.

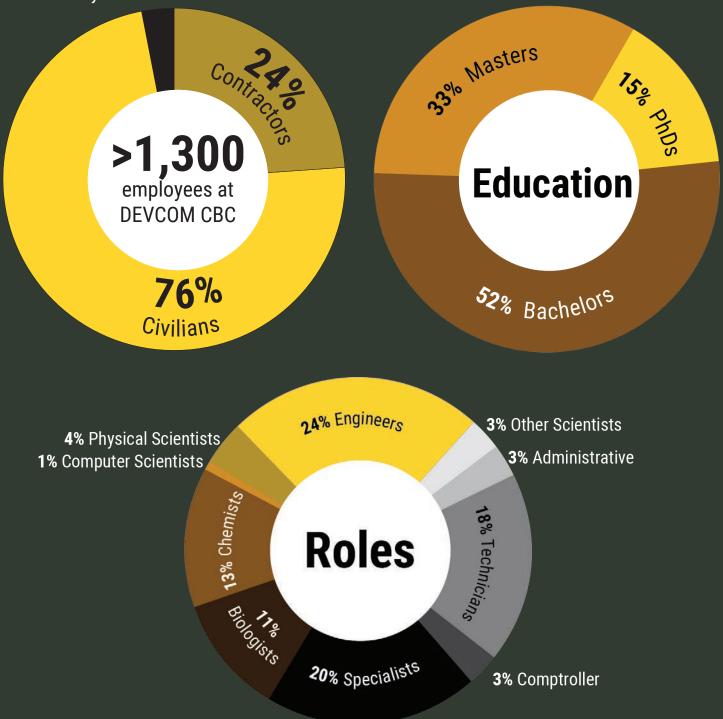
DEVCOM CBC Vision

Be the premier provider of innovative CBRNE solutions for the Army, DoD, the nation and our allies.



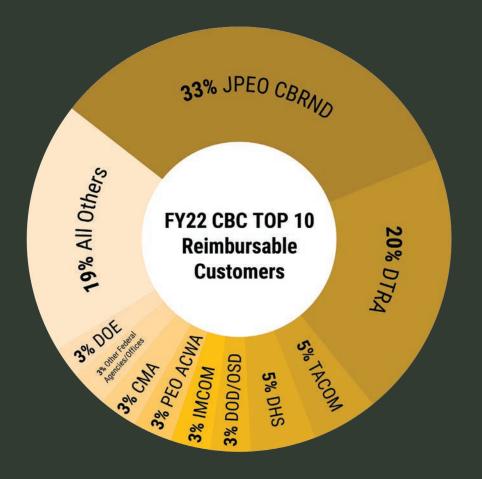


0.2% Military Personnel





Budgetary Information



>\$3.2M

DEVCOM CBC researchers received in funding through the FY22 In-House Laboratory Independent Research (ILIR) and Chemical Biological Advanced Materials and Manufacturing Science (CBAMMS) programs.

87%

of DEVCOM CBC's programs were funded by external customers using a fee-for-service model, distinguishing the Center from other Army laboratories in FY22.

>\$400K

was invested into Seedling research projects, which are smaller-scale exploratory basic research projects with a high potential for future funding opportunities.

DEVCOM CBC | 2022 Year In Review

Number of Technology Transfer Agreements:

Active Interagency Agreements

Active Cooperative Research and Development Agreements (CRADAs)

Active Memoranda Of Understanding (MOUs)/ Memoranda Of Agreement (MOAs)

Active Technology Support Agreements (TSAs)

50 Active University Agreements

28 International Agreements/Annexes

Our key objectives for partnering are to increase warfighter operational readiness and effectiveness through interoperability and partnership with allies and coalition partners. Additionally, this gives us access to the best technologies available for equipping the U.S. Army.

PARTNERSHIPS AND OUTREACH

Technology Transfers and Research Awards

DEVCOM CBC has a long history of collaborative research through technology transfer. Technology transfer, or T2, involves cultivating technology in government laboratories and then formally transferring that intellectual property to a nongovernment organization for the purpose of commercialization. These important agreements allow for more rapid development of emerging technologies and foster collaboration between government and industry partners.

The Center's laboratories have extensive technical capabilities, research, development, testing and evaluation facilities, and data that our partners may choose to leverage. Ultimately, the goal of T2 is to increase warfighter operational readiness and effectiveness through interoperability and partnership with allies and coalition partners, providing the best technologies available for equipping the U.S. Army.



Committee on Foreign Investment in the United States and Merger and Acquisitions Review Processes

The Center Provides Expertise to Facilitate Expansion

DEVCOM CBC personnel participated in the Industrial Security of the Chemical Biological Defense Sector Committee on Foreign Investment in the United States (CFIUS) and Merger and Acquisitions (M&A) review processes. CFIUS is an interagency committee led by the Department of the Treasury that reviews foreign acquisitions, mergers, or takeovers of U.S. businesses to determine the effect on national security. The Under Secretary of Defense for Acquisition and Sustainment, Foreign Investment Review Office manages the CFIUS process for the Department of Defense. The M&A review process, which is led by the Department of Justice, performs similar functions as CFUIS, but deals only with domestic companies that operate in the defense sector.

The mission of both the CFIUS and M&A efforts is to conduct research, analysis, and evaluation to determine if the acquisition or merger in question will have an impact on the U.S. Army Chemical Biological Defense sector. The research on proposed business combinations occurs on a case-by-case basis. It assesses whether the merger or acquisition will overly reduce or eliminate competition, limit innovation, and/or raise credible threats to national security with respect to the chemical biological defense sector.

In FY22, DEVCOM CBC provided evaluation and responses to three different types of CFIUS filings, including 271 CFIUS cases, 171 CFIUS declarations, and 4 real estate cases. DEVCOM CBC also provided findings and analysis for 26 M&As, gathering data from commercial sources, government procurement sources, and internal DEVCOM CBC databases.

DEVCOM CBC will continue to support both CFIUS and M&A reviews in the coming year. It is expected that caseloads will continue to trend upwards and the scope of case evaluations will continue to expand as the foreign investment review process remains a priority in an evolving national security landscape. DEVCOM CBC | 2022 Year In Review

Strategic Partnerships

The Center's Technology Transfer Office facilitates collaborations and works to reach mutually agreeable terms and conditions and appropriate legal mechanisms for other CBRNE organizations to expand upon our work or find private sector applications for it.

Our government laboratories have extensive technical capabilities, research, development, test, and evaluation facilities, and data that add tremendous value to our collaboration partners.

Through our technology transfer collaborations we're able to:



Enable accomplishment of technology transition objectives while benefiting U.S. industry



Enable industry, academia and other organizations to leverage the Center's unique assets including:

- The Center's intellectual property portfolio
- Its science and engineering
 expertise
- Its unique infrastructure and rapid prototyping capabilities

PARTNERSHIPS AND OUTREACH

Electronic Resellers Association International Subscription Collaboration

The Center Ramps Up Effort to Combat Electronic Counterfeit Risks

The U.S. Army Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC) organized and oversaw a collaboration with three additional U.S. Army organizations—the Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance and Reconnaissance Center (DEVCOM C5ISR); the Tank-Automotive and Armaments Command (TACOM); and the Computer Electronics Command (CECOM)—to determine the most cost-effective counterfeit parts risk management tracking software for their use. The Center led the effort to procure a subscription that can be used by all these organizations. This was a subscription the other three organizations had been attempting to procure, but were unable to complete. Upon learning of the problem, DEVCOM CBC offered to research, recommend, and establish a subscription across these organizations. This tool would not have been possible to acquire by any individual organization due to the costs, and no organization had successfully collaborated across the other groups prior to DEVCOM CBC's leading the task. This work will support the workforce in each organization in preventing counterfeit parts from entering the supply chain.

Using this software, the workforce will be able to track the most up-to-date suspected counterfeit electronics. This will make more visible counterfeit threats that potentially affect a wide variety of systems managed by multiple Army Commands.

These organizations will use this subscription throughout FY23 to continue counterfeit risk management practices across the Army. DEVCOM CBC is the administrative representative between the government and Electronic Resellers Association International.



PARTNERSHIPS AND OUTREACH

Engineering More Efficient and Accessible Components

The U.S. Army Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC) demonstrated the suitability of additive manufacturing (AM) for the production of component parts used with the Joint Biological Point Detection System (JBPDS). The JBPDS is used by the Army, Army Reserves and National Guard, and Navy to detect and identify biological warfare agents, but the system requires intake and exhaust plugs that have been historically difficult to obtain. DEVCOM CBC solved this problem by successfully re-designing and producing these plugs through AM, resulting in numerous benefits, including:

- Projected cost reduction of 80 to 90 percent
- Increased availability in the Defense Logistics Agency supply chain
- Eliminated supply availability issue for plug repair at depots
- Improved interface for desiccant packs used in the JBPDS, eliminating the exact- size requirements that caused further supply issues
- Increased readiness of the Biological Integrated Detection System and Nuclear Biological Chemical Reconnaissance Vehicle

These AM parts will be added to the Defense Logistics Agency supply chain and the AM technical data package, and will be used for future production. Additionally, DEVCOM CBC is investigating the suitability of other parts for AM production, leveraging this new technology for real-world solutions.



Interagency Agreement with the FBI

The Center Implements Projects to Aid Federal Agency

The U.S. Army Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC), in coordination with the Defense Threat Reduction Agency and the Joint Program Executive Office for Chemical, Biological, Radiological and Nuclear Defense, have research projects in development which can aid in the FBI's Chemical/Biological Advanced Detection Technology program.

The first project manufactured by the center was Deep Purple III (DP3) which is a small unmanned quadrotor created with existing commercial technologies that can aid in intelligence, surveillance, and reconnaissance plus chemical, biological, and radiation/nuclear (CBRN) detection.

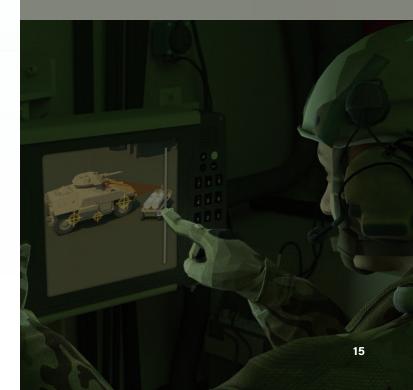
The second project, the Array Configured of Remote Networked Sensors (ACoRNS), is a mechanical, electrical, communications and software interface that fits sensors on the DP3, allowing the DP3 operator to select only the specific chemical and biological surveillance sensors needed for that particular flight. The sensors in the ACoRNS stack provide real-time detection data back to a command and control center. These two projects, upon maturity, may provide a unique unmanned aerial system-based CBRN detection platform for use by the FBI, federal agencies, and state, local, tribal and territorial hazardous material teams and fire departments.

Autonomous Decontamination

Using Advanced Technology to Analyze Chemical and Biological Contamination of Vehicles

The U.S. Army Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC) is pursuing autonomous decontamination in partnership with DEVCOM's Ground Vehicle Systems Center and Army Research Laboratory, the Defense Threat Reduction Agency, the Joint Project Manager CBRN Protection, the Army CBRN School, the Army Maneuver Support Capability Development and Integration Directorate, and Teledyne-FLIR.

The Autonomous Decontamination System is a multi-year project that aims to develop and demonstrate an automated approach to conducting chemical/biological decontamination of vehicles on the modern battlefield. The concept combines unmanned systems, artificial intelligence/machine learning, and autonomous behaviors to identify, map, and decontaminate combat vehicles on the battlefield. The system uses other advanced technologies to remotely identify which exposed vehicles can stay in the fight and which ones need to be gathered in the rear for more intensive decontamination. This will ultimately reduce the time and manpower needed for manual decontamination of vehicles and increase the safety of soldiers engaged in decontamination activities.



PARTNERSHIPS AND OUTREACH



West Point Summer Research Internships

Cadets Learn Onsite Through Mentorship

As part of a long-standing summer internship program, five cadets from the U.S. Military Academy (USMA) at West Point came to the U.S. Army Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC) to complete research projects. Cadets Gwendolyn Houser, Brianna Brasko, Jakob Quanbeck, Daniel Woolsey, and Shine Lim were mentored by DEVCOM CBC scientists and had the opportunity to learn new laboratory techniques while working on real-world chemical biological defense projects. USMA and DEVCOM CBC enjoy a well-established research partnership, and these internships benefit both the cadets, who gain technical expertise and career guidance, and Center researchers, who have an opportunity to work with the next generation of scientists and military leaders.

2022 CES Conference

Center Successfully Participated in the Annual Consumer Electronics Show

The U.S. Army Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC) supported the Joint Program Executive Office for Chemical, Biological, Radiological and Nuclear Defense Wearables program at CES 2022 in Las Vegas, Nevada. The Consumer Electronics Show (CES) is the world's largest IT exhibition providing attendees an opportunity to engage with a global audience. DEVCOM CBC personnel were able to establish new relationships with major leaders in the wearables technology space including such major technology companies as Garmin, Samsung, and Abbott. In addition, several startup companies presented novel wearable technologies that have the potential to expand capabilities within the Wearables program.





Educational Outreach

Army Scientists Use Virtual Reality to Teach Chemistry

U.S. Army Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC) chemists teamed up with Harford County, Maryland students as part of the Magic of Science Fair and Family Festival held by the Discovery Center at Water's Edge, an organization whose mission is to leverage the expertise of the area's science, technology, engineering and math (STEM) researchers, especially from Aberdeen Proving Ground, bringing science and technology to the local community.

As part of this event, students were challenged to use a virtual reality laboratory to solve problems similar to those faced by Department of Defense scientists and engineers. In this experiment, students created their own designer molecules, known as metal-organic frameworks (MOFs), to extract water from the atmosphere and store it inside the material's pores. The students selected combinations of organic struts such as oxygen, hydrogen and carbon; plus metal nodes such as copper, zinc or zirconium to create the MOF best suited to the job. A Center research chemist provided a virtual voice that guided the students through their experience, which included virtually mixing the appropriate chemicals in a beaker, heating their creations in a virtual oven, and ultimately testing their MOF's efficacy for adsorbing water in a virtual test chamber. During the process, the students were able to virtually hold the molecules they constructed and rotate them in three dimensions to decide how they might improve on their design.

This effort was funded by the Army Educational Outreach Program (AEOP) and led by eCYBERMISSION, an AEOP STEM competition for students in grades six through nine, administered by the National Science Teaching Association.

Educational Outreach

The U.S. Army Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC) participates in a number of educational outreach programs with the ultimate goal of training and mentoring the next generation of scientists and engineers. Historically, these programs have led a number of trainees and students to full time employment as staff scientists at CBC.



DEVCOM CBC Army Educational Outreach Program Summer Apprenticeship

This program provides high school and undergraduate students the opportunity to participate in an eight-week summer research project. In 2022, thirteen students from nine different academic institutions participated in the AEOP Summer Apprenticeship. These projects covered a range of research topics, including chemical engineering, materials science, and molecular biology. Student apprentices had the opportunity to conduct hypothesisbased research in Chemical Biological Center research facilities while being mentored by CBC researchers.



National Research Council and ORISE Postdoctoral Candidates

The National Research Council (NRC) Research Associateship Program and the Oak Ridge Institute for Science and Education (ORISE) associateship program are highly competitive and provide postdoctoral researchers and senior scientists the unique opportunity to contribute to research conducted at DEVCOM CBC. These prestigious fellowships provide both early career development, and an opportunity to conduct research in a federal government laboratory by allowing them to build their knowledge and advance their research capabilities through participation in the Center's cutting-edge chemical biological research. In 2022, DEVCOM CBC hosted four NRC fellows and three ORISE scientists.



Science, Mathematics, and Research for Transformation (SMART) Scholarship for Service Program

The SMART scholarship program is a combined educational and workforce development program established by the DoD for both undergraduate and graduate students in STEM degree programs. It provides a pathway to employment as a civilian scientist or engineer. In 2022, four SMART scholarship recipients conducted research at the Chemical Biological Center. Two of these students were also awarded nearly \$500,000 in funding for their own independent research projects in 2022; one researcher was funded through the Chemical Biological Advanced Materials and Manufacturing Science program, and the other researcher was awarded money by the Seedling program (see page 19).



Historically Black Colleges and Universities & Minority-Serving Institutions (HBCU/MI) Summer Research Internship Program

As part of the Chemical Biological Center's commitment to diversity and inclusiveness, its HBCU/MI program provides research opportunities for current students and recent HBCU/MI graduates interested in pursuing STEM-based careers. The ultimate goal is to recruit talented minority scientists to DoD research positions. Of the 52 interns that took part in the program across the DoD, six completed their summer research at DEVCOM CBC. These students completed a summer research project mentored by a DEVCOM CBC scientist, and then had the opportunity to present their research at symposiums attended by DoD scientists and engineers.

Program	Number of Students	Education Level
Army Educational Outreach Program (AEOP)	13	Undergraduate
National Research Council (NRC) Research Associateship Program	4	Postdoctoral
Oak Ridge Institute for Science and Education (ORISE) Associateship Program	3	Postdoctoral
Science, Mathematics, and Research for Transformation (SMART) Scholarship for Service Program	4	Graduate
Historically Black Colleges and Universities (HBCU)/ Minority-Serving Institutions (MI) Summer Research Internship Program	6	Undergraduate and Graduate



ILIR, CBAMMS, and Seedling Programs

DEVCOM CBC's In-House Laboratory Independent Research (ILIR) and Chemical Biological Advanced Materials and Manufacturing Science (CBAMMS) programs provide basic research funding to Center scientists and engineers. Smallerscale "outside-the-box" research is funded through the Center's Seedling program, which is used to support projects which can later be transitioned to larger projects funded through ILIR, CBAMMS, or external funding sources. Funding by all three of these programs is highly competitive, and projects are selected for funding through a rigorous review process. The projects funded by these programs cover a range of CBRNE topics relevant to the warfighter.

In addition to providing research funding, the ILIR and CBAMMS programs provide opportunities for collaboration with academic and industry partners, as well as other Department of Defense organizations.

Additional information regarding the activities of the ILIR and CBAMMS programs are published in the annual publication, Proceedings of the Chemical Biological Center ILIR and CBAMMS Programs. DEVCOM CBC | 2022 Year In Review

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ILIR AND CBAMMS ACTIVE COLLABORATIONS

Case Western Reserve University

Massachusetts Institute of Technology

Johns Hopkins University

Northwestern University

University of Houston

University of New South Wales

Rutgers University

Pennsylvania State University

University of California San Diego

University of California Berkeley

United States Food and Drug Administration

Argonne National Laboratory - Advanced Photon Source

National Institute of Standards and Technology

National Institute for Occupational Safety and Health

Environmental Protection Agency

Air Force Research Laboratory

Defense Threat Reduction Agency

National Research Laboratory

St. Jude Children's Research Hospital

DEVCOM Army Research Laboratory

DEVCOM Soldier Center

PARTNERSHIPS AND OUTREACH

CB Defense Today Podcast

In 2022, Dr. Eric Moore produced two episodes of the CB Defense Today podcast, which was established to provide the CBRNE community conversational interviews with leading partners in chemical biological defense.

In Episode 3 the CB Defense Today podcast spoke with Dr. James E.K. Hildreth, President and Chief Executive Officer at Meharry Medical College. Hildreth is known for his groundbreaking research on HIV and AIDS and was the first African American to achieve full tenure in basic research at the Johns Hopkins School of Medicine. Moore and Hildreth discussed the critical importance of partnerships between government research laboratories and educational institutions, including the educational partnership agreement between DEVCOM CBC and Meharry Medical College.

In Episode 4 the CB Defense Today podcast spoke with retired Maj. Gen. John C. Doesburg. Doesburg's final active duty assignment was as the Commanding General of the United States Army Research, Development, and Engineering Command (RDECOM) at Aberdeen Proving Ground. During his military career, he worked to establish Aberdeen Proving Ground as the Army's preeminent location for CBRNE research and testing. Moore and Doesburg discussed the importance of growth and modernization in chemical and biological defense research. As an expert in navigating the intersection between the laboratory and the field, Doesburg also described ways to unite scientists and Soldiers, highlighting the need for CBC researchers to engage with the warfighter to stay informed on the actual real-world needs of Soldiers in the field.



Innovation-Driven DEVCOM CBC Team Pushes Envelope on Deployable Microsensor

A team at the U.S. Army Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC) have put their minds together to come up with the art-of-the-possible for deployable chemical, biological, radiological and nuclear (CBRN) microsensors (DMS) and recently held an integration experiment to showcase their concept.

This effort was the product of the third iteration of a program called Warfighter Innovation Leveraging Expertise and Experimentation (WILE-E 3.0). WILE-E is a CBC-led initiative to bring a multidisciplinary team of Center scientists, engineers, technicians, analysts, and logisticians together to solve real-world operational challenges. It is based on the concept of design thinking with upfront and continued engagement with the end user, the warfighter, as well as a commitment to prototyping and experimentation.

On October 20, 2022, the WILE-E 3.0 team hosted a Deployable CBRN Microsensor Integration Experiment at Aberdeen Proving Ground in Edgewood, Maryland to showcase the concept they had developed over the prior six months. The event highlighted current technologies and the integration of several of them. Key stakeholders from the Defense Threat Reduction Agency and Joint Project Manager for CBRN Sensors were in attendance and the team was supported by partners from the DEVCOM C5ISR (Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance and Reconnaissance) Center.

One of the goals of the project is to refine how future requirements for DMS will be developed. The team discovered that a system of systems approach will be needed. It should include five integrated modules – sensing, communication, processor, power and deployment. System modularity is a key element of the team's concept as it will allow the technology to advance without impacting the ability to integrate, allow use of multiple types of sensors within a common architecture and minimize the training burden required to use the microsensors.

ARMY SCIENTISTS SEEK CAPABILITY AGAINST WATERBORNE TOXINS

A Team of Center Researchers have Begun Planning Extensive Aquatic Lab Design and Research

Scientists at the Center are laying the foundations for aquaculture capabilities while studying a diverse class of biological threats: toxic microalgae. Harmful naturally occurring algae blooms can be found around the world, which means Soldiers could be exposed. Not all of these microorganisms are well-studied, so the particular species of algae in a given area may not yet be characterized. By building a repository of known aquatic toxins, researchers will be able to provide the warfighter with the tools to anticipate and detect the presence of waterborne toxins such as microalgae and to protect themselves while conducting missions in the field.



MAKERGEAR ADDITIVE MANUFACTURING PRINTER

New Smaller Technology Demonstrates Big Capabilities

The Center successfully obtained and set up for operation a MakerGear Additive Manufacturing printer to replicate the capabilities provided in the field-level Metal Working & Machining Shop Set (MWMSS). The MWMSS is an example of an Army Mobile Maintenance Equipment System, and consists of machining and metal-working equipment in a mobile container. By comparison, the MakerGear printer has a much smaller footprint, DEVCOM CBC engineers successfully printed several items: spacers used in the production of MWMSS systems at the Joint Manufacturing Technology Center, spare and repair parts for fielded MWMSS systems, and the portable toolbox associated with the General Mechanics Tool Kit. The additive manufacturing capability allows the team to prove out designs and create data part files that Army Allied Trade Specialists (MOS 91E) can retrieve to field-print spares and repairs, increasing Army operational readiness. Engineers will also gain valuable experience as they experiment with the machine in the field.

DEVCOM CBC SCIENTIST APPOINTED TO GLOBAL BOARD FOR CHEMICAL WEAPONS ELIMINATION

Center Expert Helps Combat Worldwide Threats

Dr. Robert Kristovich, a scientist at the Center, has been appointed to the Organisation for the Prohibition of Chemical Weapons (OPCW) Scientific Advisory Board. The OPCW is a global body that oversees the Chemical Weapons Convention treaty and pursues the permanent elimination of chemical weapons across the world. Dr. Kristovich has devoted his professional life to researching the science behind harmful chemical weapons by supporting the U.S. Chemical Biological Defense Program and the Office of the Secretary of Defense as a senior advisor. His strategic plan and vision for the future of science and technology (S&T) has helped guide the program on how best to use S&T to help the warfighter. Dr. Kristovich's appointment fills a key role in the OPCW's efforts and is another example of how the Center continues to successfully provide the nation with leaders in chemical biological defense.



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DEVCOM CBC 2022 HIGHLIGHTS



MICROSENSOR DEVELOPMENT CAPABILITIES

CBC Teams Explore Low Cost, Lightweight Sensors for Warfighter Use

Army scientists and engineers are using their diverse skills to establish a microsensor development capability at the Chemical Biological Center. They are working to miniaturize sensors so that they can communicate with Soldiers and their equipment through a universal interface. This will allow users to select and customize sensor capabilities for each unique mission. Center researchers envision sensors that are suitable for deployment while being cost-effective enough to discard after use. This proof-of-concept study seeks to provide warfighters with "stealth" sensors that are light in weight, low in cost, small in size and easy to carry. The long-term vision for the microsensor program is not only to bring new technologies to the Center, but also to advance existing technologies.

CORONAVIRUS DEFENSE MEASURES

Army Applies Lung-ona-Chip Technology to COVID-19 Research

A team of Center scientists performed cutting-edge research using alveolus and small airway lung chips. These new technologies, developed by a Boston-based company, recreate true-to-life human biology systems in microenvironments-in this case, transparent cassettes containing lung organoids grown in a laboratory. The research is being performed to better understand how the novel coronavirus attacks human lung cells. The researchers introduced the SARS-CoV-2 virus into the lung organoid and measured dysregulations that occurred to RNA, protein, and metabolites at various times post-infection. The team plans to continue using this technique to identify which specific proteins in lung cells act as receptors for the virus and its routes of entry. As the team compiles this information, it will be shared with the entire global medical community.

GROUND MAINTENANCE AND EQUIPMENT PREPARATION

Center Assists Army Units with Equipment Readiness

The Center provided direct support to the field by assisting Army units in improving their overall readiness of fielded Chemical Biological Radiological Nuclear (CBRN) defense equipment. U.S. Army Forces Command (FORSCOM) and the U.S. Army Nuclear and Countering Weapons of Mass Destruction Agency requested integration of the Equipment Assistance Unit into the Ground Readiness Evaluation, Assessment and Training (GREAT) program and potentially into the Army Campaign Plan pilot program to assess CBRN readiness. This led to a proof-of-concept mission, during which the Chemical Biological Center partnered with the Joint Project Manager for CBRN Sensors to assess the Nuclear Biological Chemical Reconnaissance Vehicle. The team will continue to partner with JPM Sensors to provide support to FORSCOM's GREAT program at its midpoint assessment at the National Training Center in FY23 and the final assessment in early FY24 as they go to Joint Multinational Readiness Center.



OBSCURANT EXPERTISE

Center Engineers Provide Demonstration to Assist Marine Corps

DEVCOM CBC is developing new and emerging obscurants technology in support of the top priorities of the Army Modernization Strategy. Improved obscurants will stay aloft longer and be more effective at blocking detection along the electromagnetic spectrum. This work has led to a collaboration with the U.S. Marine Corps Warfighting Laboratory to evaluate the tactical utility of current obscurant technologies developed through the Advanced Obscurants Top Attack program. A demonstration day, held at Aberdeen Proving Ground, allowed Marine Corps personnel and other stakeholders to witness these capabilities firsthand and to explore opportunities to collaborate directly with Center engineers and scientists on future research and development possibilities.



Army Scientists Produce Critical Chemical Through Biomanufacturing

Scientists from DEVCOM CBC are partnering with the U.S. Naval Research Laboratory to continue research on one of the first projects of the Center's Biomanufacturing Modernization Initiative: the biomanufacturing of melanin. Center researchers are using synthetic biology to develop new materials that will enhance and improve the nation's supply chains. Natural melanin is a substance that produces pigmentation for skin, eyes and hair. When produced using biomanufacturing, it can be of use for both the warfighter and the American public for new applications such as an alternative to sunscreen and improving battery performance and bio-electronics. The Center has submitted a provisional patent application for this novel melanin production process.



OPENING OF NEW EXPERIMENTAL LAB

DHS, Army Partner to Provide New Capability

The Chemical Security Analysis Center (CSAC), overseen by the Department of Homeland Security Science and Technology Directorate, has partnered with DEVCOM CBC to open a new Chemical Security Laboratory at Aberdeen Proving Ground. This laboratory space will unite CSAC and DEVCOM CBC researchers, allowing shared use of instrumentation and equipment and facilitating collaboration between researchers from both centers. The laboratory will also function to provide analysis and information in the event of large-scale chemical incidents or acts of terrorism, connecting CSAC and DEVCOM CBC scientists with emergency planners and first responders to ensure the best response to chemical threats.

SCIENTIST TO SEA PROGRAM

Scientists Gain Understanding of CBR Defense Requirements at Sea

Three scientists from DEVCOM CBC participated in the Defense Threat Reduction Agency sponsored Scientist to Sea program, spending time aboard the USS Gunston Hall, one of the U.S. Navy's eight Whidbey Island-class dock landing ships. While aboard the ship, Janlyn Eikenberg, Dr. Jennifer Soliz, and Dr. Anne Walker met with Navy personnel, learned about the ship's chemical, biological, and radiological (CBR) defense technologies, and participated in a mock decontamination drill. This provided Center researchers with a first-hand look at the operational challenges that sailors experience when faced with CBR threats, such as the limited access to repairs and replacement parts while out at sea. Additionally, this program strengthened the partnership between the U.S. Army and the U.S. Navy.

OPCW PROFICIENCY TEST

Center Scientists to Maintain Accreditation

The DEVCOM CBC recently achieved an A grade on two proficiency tests administered by the Organisation for the Prohibition of Chemical Weapons (OPCW).

The OPCW is a multinational organization which was established to implement the Chemical Weapons Convention with the goal of preventing the reemergence of chemical weapons. Center scientists had to successfully identify an extensive series of blind samples they were given. The A grade means that the Center maintains its OPCW accreditation to perform analysis of chemical samples collected worldwide by OPCW inspectors from chemical production facilities, storage depots and installations, or from the site of an alleged use of chemical weapons. The tests included both environmental and biomedical sampling.

DEVCOM CBC is one of two OPCW-designated laboratories within the U.S. for environmental and biomedical samples, and the only OPCW-designated laboratory within the Department of Defense.

The team responsible for the recent OPCW designation is the Center's Forensic Analytical Branch. Dr. Joy Ginter, a research chemist at the Center, leads the team for the

Not only does this designation highlight the team's ability to analyze these chemicals, but it also displays readiness. The team is poised to analyze samples from any suspected chemical event anywhere in the world. The Center has maintained OPCW accreditation since the start of the program in 1997, highlighting both the technical expertise and tactical readiness of DEVCOM CBC.



DEEP GREEN CHALLENGE

DEVCOM Chemical Biological Center Places Third in Machine Learning Challenge

A team of six Center researchers competed against 11 other teams from around the Army in the Deep Green Challenge to see which team could develop the most accurate prediction model for unmanned ground vehicles (UGV) to use for its computer vision algorithm. The challenge was to build AI perception models to solve the real-world challenge of getting UGVs to navigate over land. UGVs must be able to distinguish between an obstacle that requires rerouting, such as a lake or a fallen tree, and nonobstacles, such as a puddle or fallen branch. The team consisted of a team captain, Dr. Samir Deshpande, a computer engineer, plus two toxicologists, a mathematician, a biologist and a chemical engineer. For the members of the team, the prize is much more than a third-place trophy-it is having increased their artificial intelligence and machine learning skills so that they can apply it to their day-to-day research.

9 - KAPPLER

CENTER PARTICIPATES IN COMBINED EVENT

CBC Co-Hosted NCT USA Conference Enables Future Readiness in CBRNE Defense

In September, DEVCOM CBC co-hosted the 2022 Non-Conventional Threat (NCT) USA conference, held at the Chemical Demilitarization Training Facility on Aberdeen Proving Ground. This event provided a venue for CBRNE and Explosive Ordnance Disposal (EOD) professionals to engage with local and federal first responders. The conference spanned three days and provided over 450 attendees and 30 vendors with the opportunity to network, attend panel discussions, and tour the Center's facilities. One of the most unique components of the conference was the NCT PRO Training sessions, which provided multidisciplinary scenario-based training to allow first responders to avail themselves of the newest CBRNE/EOD technology.

25

ENVIRONMENTAL SITE SAMPLING AT THE MARSHALL SPACE FLIGHT CENTER AT REDSTONE ARSENAL

Team Recovers Crucial Items

A DEVCOM CBC field team performed sampling at a 54-acre former chemical agent production area located at what is now part of the Marshall Space Flight Center on Redstone Arsenal near Huntsville, Alabama. The U.S. Army produced mustard agent at the site during World War II. NASA now uses the site to develop, test, and manufacture space vehicles and components. To ensure the safety of NASA operations there, the Chemical Biological Application and Risk Reduction field team searched for and recovered munitions and explosives of concern, laboratory glassware and wastes, and contaminated soil. The team monitored for airborne concentrations of chemical agent during excavations and safely shipped environmental samples to DEVCOM CBC's Edgewood, Maryland research campus at Aberdeen Proving Ground for low level agent and agent breakdown product analysis.





ABERDEEN PROVING GROUND BUILDING DEMOLITION PROGRAM

Thorough Decontamination Ensures Safe Demolition

DEVCOM CBC completed demolition operations in 13 buildings categorized as Group 1 in the garrison-directed Aberdeen Proving Ground Building Demolition Program and seven out of the eight buildings in Group 2. They were located on the 3200 and 3300 blocks of Blackhawk Road in the Edgewood Area of Aberdeen Proving Ground and had housed chemical agent research laboratories for decades. Prior to the buildings being turned over to a demolition contractor, Center personnel removed potentially contaminated equipment and their associated components. Chemical Biological Application and Risk Reduction operators started by removing materials with a low probability of contamination such as benches and ceiling tiles - items which most likely were not exposed to agent. The team then moved to the planning and removal of higher probability items like fume hoods and drains, which experts suspected were exposed to agent. Through this work, the site was rendered safe for conventional demolition.

WORLD WAR II MUNITIONS RECOVERY AND DISPOSAL IN AUSTRALIA

Center Researchers Team Up with Australia in Joint Effort

In 2022, DEVCOM CBC continued executing a multiyear foreign military sales agreement with the Australian Department of Defense (ADOD) to detect, remove and render safe suspected World War II chemical agents and munitions at sites across the country. To date, the Center's Chemical Biological Application and Risk Reduction team has investigated more than 500 individual suspect ground anomalies and seven suspect burial pits. The team also recovered metal from suspected old chemical weapons material such as drum fragments, munition end caps and semi-intact 30-Ib. light cased bombs. They disposed of recovered items following permitted hazardous waste management procedures. DEVCOM CBC's partnership with the ADOD is expected to last for at least the next five years.







SHELF-LIFE EXTENSION TESTING

Longer Shelf-Life Greatly Reduces Procurement Expenses

DEVCOM CBC analysts successfully completed shelf-life extension testing of 17 M61 filter lots, a lightweight filter used in conjunction with the M50 joint service general purpose mask; five C2A1 filter lots, a filter used in conjunction with the M40 field protective mask and the JSAM Rotary Wing (MPU-5 & MPU-6) masks; and four M98 filter lots, which remove toxic gases and particulates to provide purified air for mobile shelters, vehicles and ship-borne collective protection systems. The work was performed from April through September, 2022, for the U.S. Army Tank-Automotive and Armaments Command (TACOM). The testing included dimethyl methylphosphonate, and cyanogen chloride gas life testing. Gas life testing allows TACOM to extend the shelf life of each filter lot, thereby reducing logistical and financial burdens of procuring new filters. Extending the shelf life of these filters saved approximately \$12.5 million in procurement costs.

PRE-TRANSFER SAMPLING AND VERIFICATION OF CLEAN IGLOOS AT THE PUEBLO CHEMICAL DEPOT

Chemical Agent Storage Units Successfully Closed and Transfered

DEVCOM CBC field personnel from the Chemical Biological Application and Risk Reduction unit continued a multi-year environmental sampling project at the U.S. Army Pueblo Chemical Depot in Colorado to ensure the clean closure and turnover of igloos, once used to store chemical agent to a local community organization for reuse. Field teams had already sampled and verified as clean 80 igloos, and in 2022 they completed work on six more igloos. This included developing permit documentation for state approval for the transfer.





Domestic Production Strengthens Supply Chain Stability

DEVCOM CBC continued work developing a domestic cyanogen chloride (CK) production process. CK is a critical chemical necessary to ensure key performance requirements of every CBRN filter in the nation's inventory are met. This effort is funded by the U.S. Army Tank-Automotive and Armaments Command. The first small-scale batch of CK was produced in May of 2022 and large-scale production began in September. Production is performed by a contractor under the supervision of Center engineers. This effort is expected to be complete in May of 2023 and will supply the nation's future needs for this important test gas.



CBRN Support to Command and Control Integrated Early Warning System Integration

In 2022, the DEVCOM CBC BioTesting Division (BTD) located at Dugway Proving Ground, Utah, performed simulated biological weapons defense testing of an Integrated Early Warning (IEW) system currently under development by CBRN Support to Command and Control (CSC2). The testing was performed on a two-square mile test grid on Dugway Proving Ground's unique West Desert testing range. BTD tested the system using a suite of chemical biological sensors that are networked into a command and control system called Open Architecture Data Management System. The BTD team performed 119 simulated attacks to demonstrate the capabilities of IEW. A range of state-of-the-art instruments collected data on the simulated attacks that showed range, volume, amount and particle size. The equipment included aerodynamic particle sizers, wideband integrated bioaerosol sensors and various weaponizing techniques such as explosive releases, air pressure assisted releases and liquid spray releases. From these data, CSC2 program and acquisition experts can determine the effectiveness of the IEW defense system. CSC2 is returning to BTD for more testing each year until 2027.

OUR WORKFORCE

Army Leader Honored with Consortium's Laboratory Director of the Year

The Federal Laboratory Consortium, a network of over 300 federal laboratories, agencies, and research centers, awarded Dr. Eric Moore the 2022 Laboratory Director of the Year award. Moore, who stepped down as DEVCOM CBC director in October 2022, was recognized for his work advancing technology transfer, especially during the COVID-19 pandemic, where the Center was able to develop new methods of detecting COVID-19 by training scent-detection dogs.

Technology transfer is the practice of taking technologies developed by federal government researchers and forming agreements with nongovernment organizations that will allow them to be commercialized for mass production. The government's use of technology transfer not only gets technology innovations into the hands of the warfighter and available for the protection of the nation faster, it creates jobs and boosts the American economy The Center has a long track record of launching technologies it has developed into the private sector where they are applied to real-world needs.



OUR WORKFORCE

2022 Major General Harold J. Greene Competition

Two DEVCOM CBC employees received awards for their submissions to the 2022 Major General Harold J. Greene Competition. The Major General Harold J. Greene Competition is an Army writing competition that was established in 2014 to promote Army acquisition through the exploration of one of four topics: lessons learned, innovation, future operations, or acquisition reform. The acquisition writing competition is named after Major General Harry Greene, the Deputy Commanding General of the Combined Security Transition Command-Afghanistan, who was killed on Aug. 5, 2014, while making a visit to Marshal Fahim National Defense University in Kabul, Afghanistan. In 2009, Greene served as the deputy commanding general of the Army Research, Development and Engineering Command, which later became DEVCOM.

Mike Cress, a technology advocate for DEVCOM CBC, was awarded in the category of innovation for his manuscript "Leveraging Innovation to Modernize Decontamination," which explains how to apply technology to solve future user problems. DEVCOM CBC engineer Daniel O'Neil was awarded in the category of acquisition reform for his piece "Overcoming our Complexity Complex: Emerging Insights from Model Based Design," co-authored by O'Neil and Joseph Novick, which discusses the development of a systems model for protective covers, coatings and overlays. Cress, a recently re-hired annuitant, has over 46 years of experience in the chemical biological defense space, while O'Neill is on the other end of the spectrum as a young employee who is leaning forward in his field. Their diverse backgrounds represent the breadth of knowledge and experience at the Center.





CBC Inducts Late Deputy Director of Engineering into Hall of Fame

DEVCOM CBC posthumously inducted William C. Klein into the Center's Hall of Fame on July 14, 2022. Klein served as deputy, and before that, associate director of engineering at the center for 25 years, across several organizational name changes and 12 directors.

The DEVCOM CBC Hall of Fame is designed to recognize and preserve the rich history of the organization. Klein was a champion of many of the Center's workforce programs such as Women in Leadership, Black Engineer of the Year, Balanced Scorecard, Seal of Excellence, Fit-to-Win, Aberdeen Proving Ground Cohort, and Workforce Engagement Teams. Klein was also honored with the dedication of the Berger Building auditorium, which will now be known as the William C. Klein Auditorium. His leadership and contributions throughout his career helped to drive the evolution of chemical and biological defense within the DoD and the nation.

SIMEON SYKES

- Evaluation Engineer

The U.S. Army Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC) hosts students from various colleges for summer internships every year. In 2022, the Center had the opportunity to extend full-time employment to a long-term intern, Simeon Sykes.





DEVCOM CBC | 2022 Year In Review

DEI Officer/ Initiatives

Center Takes Steps to Promote Inclusion, Wellness

Eugene L. Vickers, Sr. was appointed diversity, equity and inclusion (DEI) officer for the Center to uphold its mission to identify its employees as the organization's number one priority and embrace a people-centric culture. As part of his responsibilities, Vickers is leading three initiatives within the Center: workforce engagement (WE) teams, personnel recruitment and a Center-wide wellness program. The newly formed WE team is comprised of representatives from across the workforce who meet periodically to improve communication, workforce performance and well-being and review Center issues. The work that Vickers does for the Center highlights the programs in place to allow the workforce the opportunity to feel represented and enhance their health, fitness and quality of life. Vickers's appointment as the new DEI officer has helped the Center by providing mental health support, wellness, diversity, inclusion and, most importantly, giving employees a voice.

ELIZABETH DURAND

- Army Regulation 702-20 Counterfeit Risk Management Product Assurance

In September of 2022, Elizabeth Durand was recognized by the Deputy Assistant Secretary of the Army for Sustainment, Mr. Timothy Goddette, for her contributions to Army Regulation 702-20 Counterfeit Risk Management Product Assurance. Her work aligns Army procedure with all applicable statutory and Federal Acquisition Regulation requirements and strengthens the Army's ability to address counterfeit material.

Awards

The Department of the Army presents honorary awards to civilians in recognition of individual achievements. In 2022, 103 DEVCOM CBC employees received honorary awards.

individuals received Certificate of Achievements

OUR WORKFORCE

> 38 individuals received Civilian Service Achievement Medals



individuals received Civilian Service Commendation Medals



individuals received the Meritorious Civilian Service Medals individual received the Superior Civilian Service Medal.

CERTIFICATE OF ACHIEVEMENT Tara L. Sewell Jay Watson

CIVILIAN SERVICE ACHIEVEMENT MEDAL

Mark Colgan Samir Deshpande Patrick Riley Christopher Ellis Tamara Gee-Winfrey Courtney H. Conner Bret M. Chinander Dwayne B. Fox Joe M. Grodecki Adrian C. Henry Ryan R. McClain Cory S. Rauch Stephen P. Richard Rebecca L. Rockwell Matthew A. Schade Pat M. Schlue Paul M. Tady Bob F. Wang Marvin T. Wink Danielle L. Zabloudil Frank B. Campbell Chad C. Devorak John H. Fok Stephen G. Hall Anthony J. Salvatore Jillian M. Santarlas Mark A. Shifflett Adam D. Smelser Amy Ramsey Glenn Stanford Melissa A. Bettinger Roberta Witherspoon Shawn Davies Maxine Burgher William Shewchuk Patricia Low Jonathon M. Hogan Edward Longo

CIVILIAN SERVICE

MEDAL Dale McClellan Dr. Lynn Hoffland Nathan A. Adams Emilio C. Alonso Kyle E. Applen Bryan W. Batey Imani S. Bynum Alexander J. Carlson Spenser M. Carlson Rachel L. Davidson Jeremiah P. Dietel Benjamin C. Eilers Katelyn M. Fitzsimmons Joseph A. Gardner Charles E. Harris Adrian C. Henry Michael R. Herman Brian D. Heyderman Jonathan N. Hoback Adam J. Hutson Maureen D. Jacobs James C. Lenth Ryan R. McClain Gregory L. Middleton Ryan D. Mitchell Triet M. Nguyen Mohammadou Njoya Matthew H. Noel Andrew N. Pham Spencer T. Phelps Nicholas D. Rashall Cory S. Rauch Yuliya I. Rutherford Matthew A. Schade Patrick M. Schlue Paul M. Tady Bradley R. Wachtel Bob F. Wang Leslie L. Wells Marvin T. Wink Mikel R. Wismer Kelly A. Zimmerman

Morya Wallace Heather Robbie Suzanne Procell Dana Nunley Jennifer Buchness Warren Gardner Jorge Christian Idalee Bilka **Robin Matthews** Susan Hancock Joseph Mashinski Nicole Umberger **Timothy McLaughlin** Dennis Bolt William Conlon Jasper Alan Swim

MERITORIOUS CIVILIAN SERVICE MEDAL Jared Stafford

David Lee Jason Adamek Michael Scott Mills

SUPERIOR CIVILIAN SERVICE MEDAL Fredric Bera



OUR WORKFORCE

Length of Service Awards

50 YEARS

Moeller, Robert Albert Sneeringer, Jr, Paul V

40 YEARS

Blankenbiller, Robert A Conlon, Angela S Faison, Linda A Hawk, Barbara L Karwacki, Christopher J Mcgill, Andre Roberts, John W Schlein, Mark S Valdes, Erica R Washok, Kevin Ray Whalley, Christopher E Williams, Jr, Joseph D Woloszyn, Thomas F

35 YEARS

Auber, Vincent D Brooksharris, Deborah A Bucci, Michael R Campbell, James W. Caudill, Lisa A Collins, Kenneth R Damico, Jr, Francis M Evans, Timothy West Gatto, Mary Hild, Bryan L Kaminsky, Steven A Kang, Pyong C Keberle, Janelle E Soto-Acevedo, Ricardo Sumpter, Kenneth B Tavlor, Russell E Valcourt, Jeanmary K

30 YEARS

Anderson, Carl T Duff, Todd Brannan Lawson, Donald James Luo, Steven Mengzhi Myers, Mark A Thompson, Thomas P Yim, Susan

25 YEARS

Buckingham, Rose D Gehring, David G Mcelheny, Shawn A Tucker, Willie J. Watson, Jay Eleman

20 YEARS

Arndt, Richard M Backhaus, Joseph H. Betters, Janet Lee Blethen, Gretchen Eyet Brooke, Will C. Carter, Stephen D Chadwick, Zachary D. Congdon, Patricia Craten Cox, Jessica A Davis-Collins, Torrey L. Dorsey, Robert Warren Dorsey, Russell Martin Druyor, Christopher R Exelby, Jennifer P Farnschlader, David Lee Gross, Chad Edward Hughes, James Michael Hulet, Stanley Warren Hyre, Aaron Micah Krakowski, Timothy Robert Kuperman, Roman Gregory Lagan, Steven John Loss, John J Lyons, Timothy Richard Malik, Azra J. Maxwell, Amy Hyland Mcnutt, Wyatt D Moskunas, Melissa A. Mott, Jeffrey W Rastogi, Vipin Kumar Roese, Erik Scott Rogers, Adam Z Santarlas, Jillian Marie Shavers, Dedrick M. Shefcheck, Kevin J. Simini, Michael

Soethe, Melinda Aileen Struba, Eric Robert Thermos, Marcus N. Thomas, Aaron B Warwick, Jeffrey A Witherspoon, Roberta B

15 YEARS

Bae, Sue Y. Bedwell, Thomas L. Biggerman, Michael J Burrell, Dianne C Byers, Susan Lynn Chinander, Bret M. Dennis, Darrus E. Gunnell, Mark K. Horsmon, Michael S. King, Bruce E. Lawrence, Richard J Mantooth, Brent A. O'malley, Christopher M Osborne, Nicco Pinto, Nirmala A. Poore, Carrie A. Rockwell, Rebecca L. Steinert, Charles Robert Tallagsen, Carl W. Thompson, Troy D Wade, Mary M. Ward, Daniel C. Williams, Joseph L. Williams, Leslie I. Young, Anna Deitz

10 YEARS

Basi, Kelly Ann Cooper, Brandon J Harrison, Sean Michael Katoski, Sarah Elizabeth Kong, Li Mitchell, Ryan D Morris, Sidney Allen Noel, Matthew Harold Reed, Michael Edward Walizer, Chad E.

5 YEARS

Applen, Kyle E. Belasco, Laura G Berk, Kimberly Lynn Bowman, Shannon Clair Campbell, Frank B Cataldi lii, Frank Vincent Clifton, Joshua Christopher Cummings, James R. Curtiss, Justin Michael Deford, Daniel Jeffery Fitzsimmons, Katelyn M. Gee-Winfrey, Tamara J. Geschwilm, Karli Newcity Haas, Samantha C. Hankla, Jr, Lorenzo W Harris, Charles E. Hawkins, Mckinley Alene Herndon, Gabrielle A King Ii, David S Le, Nghi T. Mcentee, Monica Lynn Morrissey, Kevin Michael Pardoe, lan James Pennington, Theresa E Pettiway, Jr, Jeffrey Dwayne Ruprecht, Clare H. Rutherford, Yuliya I. Salgado, Aaron M Schindler, Bryan Joseph Schuster, William J. Smedley, Zachary Michael Smelser, Adam D Steinbach, Christopher B Watson, Jr, James Ambrose Wismer, Mikel R. Wood, Michelle R. Zeigler, Angela MariE

FY22 Patents

Patent Number	Title	Names	Issue Date
11,221,319	Sampling and Detection Kit for Chemical and Biological Materials	Peter Emanuel, Calvin Chue, Gregory Thompson, Colin Graham, Aleksandre Miklos, Jacob Shaffer	11 JAN 2022
11,231,404	Sampling and Detection Kit for Chemical and Biological Materials	Peter Emanuel, Calvin Chue, Gregory Thompson, Colin Graham, Aleksandre Miklos, Jacob Shaffer	25 JAN 2022
11,258,210	Cable Having Built-In Web Portal Hosting Capability	Jeremy D. Penry, Richard D. Wallace, III, Jeffrey S. Loftus	22 FEB 2022
11,275,977	System and Method for On Demand Production of Custom Indicator Assays	Aleksandre E. Miklos, Gary K. Kilper, Charles Davidson, Christian J. Whitchurch	15 MAR 2022
11,280,490	Combustion Aerosol Generator System	Jerold R. Bottiger, Jana S. Kesavan, Deborah R. Schepers	22 MAR 2022
11,371,916	Passive Sampling of Airborne Particles with the Aid of Natural Air Flow	Jana S. Kesavan, Nathan Kesavan, Jerold R. Bottiger	28 JUN 2022
11,385,169	Self-Indicating Colorimetric Response Materials for Removal and Sensing of Toxic Chemicals and Narcotics	Jennifer R. Soliz, Darren K. Emge, Ian J. Pardoe, Gregory W. Peterson	12 JUL 2022
11,402,322	Self-Indicating Colorimetric Response Materials for Removal and Sensing of Toxic Chemicals and Narcotics	Jennifer R. Soliz, Darren K. Emge, Ian J. Pardoe, Gregory W. Peterson	02 AUG 2022
11,405,126	Simplified Radio Frequency Emissions Tester and method of Use Thereof	Colin W. Graham, Jefferson M. Durham, Jerry Huen	02 AUG 2022
11,433,262	Positive Pressure Dog Respirator	Douglas E. Wilke, Daniel E. Barker	06 SEP 2022
11,459,342	Multivariate Carboxylate Derivatized Phenyl-based Metal-organic Frameworks	Gregory W. Peterson, Thomas H. Epps, III	04 OCT 2022
11,465,121	Protective Technology With Reactive Solid Sorbent For Oxidative Decontamination Of Toxic Materials	Jason K. Navin, Christopher J. Karwacki	11 OCT 2022
11,524,266	Metal-Organic Framework Polymer Foam Composite Materials and Their Uses in Decontamination and/or Ballistic Protection	Gregory W. Peterson, Joseph L. Lenhart, Randy A. Mrozek	13 DEC 2022

2022 DEVCOM CBC Peer-Reviewed Publications

- Arevalo, M. T.; Karavis, M. A.; Katoski, S. E.; Harris, J. V.; Hill, J. M.; Deshpande, S. V.; Roth, P. A.; Liem, A. T.; Bernhards, R. C. A Rapid, Whole Genome Sequencing Assay for Detection and Characterization of Novel Coronavirus (SARS-CoV-2) Clinical Specimens Using Nanopore Sequencing. *Frontiers in Microbiology* 2022, 13. DOI: 10.3389/fmicb.2022.910955.
- Bernhards, C. B.; Liem, A. T.; Berk, K. L.; Roth, P. A.; Gibbons, H. S.; Lux, M. W. Putative Phenotypically Neutral Genomic Insertion Points in Prokaryotes. *ACS Synthetic Biology* 2022, 11 (4), 1681-1685. DOI: 10.1021/acssynbio.1c00531.
- Chandler, C. E.; Hernandez, F. G.; Totten, M.; Robinett, N. G.; Schatzman, S. S.; Zhang, S. X.; Culotta, V. C. Biochemical Analysis of CaurSOD4, a Potential Therapeutic Target for the Emerging Fungal Pathogen Candida auris. *ACS Infectious Diseases* 2022, 8 (3), 584-595. DOI: 10.1021/ acsinfecdis.1c00590.
- Curtiss, J. M.; Emge, D. K. Split flow humidity generator equilibration and stability study. *Scientific Reports* 2022, 12 (1). DOI: 10.1038/s41598-021-04073-2.
- de Koning, M. C.; Ma, K. K.; van Grol, M.; Iordanov, I.; Kruijne, M. J. L.; Idrees, K. B.; Xie, H. M.; Islamoglu, T.; Bross, R. P. T.; Farha, O. K. Development of a Metal-Organic Framework/ Textile Composite for the Rapid Degradation and Sensitive Detection of the Nerve Agent VX. *Chemistry of Materials* 2022, 34 (3), 1269-1277. DOI: 10.1021/acs.chemmater.1c03895.
- De Lucia, F. C.; Giri, L.; Pesce-Rodriguez, R. A.; Wu, C. C.; Dean, S. W.; Tovar, T. M.; Sausa, R. C.; Wainwright, E. R.; Gottfried, J. L. Commercial aluminum powders, Part I: Particle size characterization and slow heating rate thermal analysis. *Powder Technology* 2022, 399. DOI: 10.1016/j. powtec.2022.117162.
- Dhummakupt, E.; Jenkins, C.; Rizzo, G.; Melka, A.; Carmany, D.; Prugh, A.; Horsmon, J.; Renner, J.; Angelini, D. Proteomic, Metabolomic, and Lipidomic Analyses of Lung Tissue Exposed to Mustard Gas. *Metabolites* 2022, 12 (9). DOI: 10.3390/metabo12090815.

- Eagleton, A. M.; Ko, M. C.; Stolz, R. M.; Vereshchuk, N.; Meng, Z.; Mendecki, L.; Levenson, A. M.; Huang, C. N.; MacVeagh, K. C.; Mahdavi-Shakib, A.; et al. Fabrication of Multifunctional Electronic Textiles Using Oxidative Restructuring of Copper into a Cu-Based Metal-Organic Framework. *Journal of the American Chemical Society* 2022, 144 (51), 23297-23312. DOI: 10.1021/jacs.2c05510.
- Fang, H.; Wilhelm, M. J.; Ma, J. Q.; Kuhn, D. L.; Zander, Z.; Dai, H. L. Quantitative Modeling of Electron Dynamics and the Effect of Diffusion in Photosensitized Semiconductor Nanocomposites. *Accounts of Chemical Research*. DOI: 10.1021/acs.accounts.2c00073.
- Fang, H.; Wilhelm, M. J.; Ma, J. Q.; Rao, Y.; Kuhn, D. L.; Zander, Z.; DeLacy, B. G.; Dai, H. L. Ag nanoplatelets as efficient photosensitizers for TiO2 nanorods. *Journal of Chemical Physics* 2022, 156 (2). DOI: 10.1063/5.0074322.
- Ha Cheung, Y.; Ma, K. K.; Wasson, M. C.; Wang, X. J.; Idrees, K. B.; Islamoglu, T.; Mahle, J.; Peterson, G. W.; Xin, J. H.; Farha, O. K. Environmentally Benign Biosynthesis of Hierarchical MOF/Bacterial Cellulose Composite Sponge for Nerve Agent Protection. *Angewandte Chemie-International Edition* 2022, 61 (19). DOI: 10.1002/anie.202202207.
- Hauck, B. C.; Ruprecht, B. R.; Riley, P. C. Accurate and ondemand chemical sensors: A print-in-place ion mobility spectrometer. *Sensors and Actuators B-Chemical* 2022, 362. DOI: 10.1016/j.snb.2022.131791.
- Kassick, A. J.; Treat, A.; Tomycz, N.; Feasel, M. G.; Kolber, B. J.; Averick, S. Design, synthesis, and biological evaluation of C-6-difluoromethylenated epoxymorphinan Mu opioid receptor antagonists. *RSC Medicinal Chemistry* 2022, 13 (2), 175-182. DOI: 10.1039/d1md00285f.
- Kong, L.; Walz, A. J. Metabolism of the active carfentanil metabolite, 4-Piperidinecarboxylic acid, 1-(2-hydroxy-2phenylethyl)-4- (1-oxopropyl)phenylamino -, methyl ester in vitro. *Toxicology Letters* 2022, 367, 32-39. DOI: 10.1016/j. toxlet.2022.07.006.
- Kotagiri, Y. G.; Sandhu, S. S.; Morales, J. F.; Fernando, P.; Tostado, N.; Harvey, S. P.; Moores, L. C.; Wang, J. Sensor Array Chip for Real-Time Field Detection and Discrimination of Organophosphorus Neurotoxins. *ChemElectroChem* 2022, 9 (13). DOI: 10.1002/celc.202200349.

- Lee, D. T.; Dai, Z. J.; Peterson, G. W.; Hall, M. G.; Pomerantz, N. L.; Hoffman, N.; Parsons, G. N. Highly Breathable Chemically-Protective MOF-Fiber Catalysts. *Advanced Functional Materials* 2022, 32 (6). DOI: 10.1002/adfm.202108004.
- Leonard, M. B.; Bruni, E.; Hall, M.; Li, T. Y.; Rodriguez, E. E.; Durke, E. M. Experimental Study of the Adsorption and Decomposition of Sarin on Dry Copper(II) Oxide. *Journal of Physical Chemistry Letters*. DOI: 10.1021/acs.jpclett.2c03187.
- Li, T. Y.; Algrim, L.; McEntee, M.; Tsyshevsky, R.; Leonard, M.; Durke, E. M.; Karwacki, C.; Kuklja, M. M.; Zachariah, M. R.; Rodriguez, E. E. Aliovalent-Doping Effects on the Surface Activity of Mesoporous CeO2 toward Nerve Agent Simulant DMMP Decomposition. *Journal of Physical Chemistry C.* DOI: 10.1021/acs.jpcc.2c04853.
- Li, T. Y.; Tsyshevsky, R.; McEntee, M.; Durke, E. M.; Karwacki, C.; Rodriguez, E. E.; Kuklja, M. M. Titania Nanomaterials for Sarin Decomposition: Understanding Fundamentals.
 ACS Applied Nano Materials 2022, 5 (5), 6659-6670. DOI: 10.1021/acsanm.2c00693.
- Maughan, M. N.; Best, E. M.; Gadberry, J. D.; Sharpes, C. E.; Evans, K. L.; Chue, C. C.; Nolan, P. L.; Buckley, P. E. The Use and Potential of Biomedical Detection Dogs During a Disease Outbreak. *Frontiers in Medicine* 2022, 9. DOI: 10.3389/ fmed.2022.848090.
- McDonald, N. D.; Rhea, K. A.; Davies, J. P.; Zacharko, J. L.; Berk, K. L.; Buckley, P. E. Evaluating the persistence and stability of a DNA-barcoded microbial system in a mock home environment. *Synthetic Biology* 2022, 7 (1). DOI: 10.1093/synbio/ysac016.
- McKetney, J.; Jenkins, C. C.; Minogue, C.; Mach, P. M.; Hussey, E. K.; Glaros, T. G.; Coon, J.; Dhummakupt, E. S. Proteomic and metabolomic profiling of acute and chronic stress events associated with military exercises. *Molecular Omics* 2022, 18 (4), 279-295. DOI: 10.1039/d1mo00271f.
- Morgan, S. E.; Willis, M. L.; Peterson, G. W.; Mahle, J. J.; Parsons, G. N. Green MOF-Fabrics: Benign, Scalable Sorption-Vapor Synthesis of Catalytic Composites to Protect against Phosphorus-Based Toxins. *ACS Sustainable Chemistry & Engineering* 2022, 10 (8), 2699-2707. DOI: 10.1021/acssuschemeng.1c07512.

- Peterson, G. W.; Iii, T. H. E. Impact of zinc salt counterion on poly(ethylene oxide) solution viscosity, conductivity, and ability to generate electrospun MOF/nanofiber composites. *Polymer* 2022, 252. DOI: 10.1016/j.polymer.2022.124816.
- Peterson, G. W.; Mundy, L. Incorporation of Metal-Organic Frameworks onto Polypropylene Fibers Using a Phase Inverted Poly(ether-block-amide) Glue. *Industrial & Engineering Chemistry Research* 2022, 61 (35), 13298-13302. DOI: 10.1021/acs.iecr.2c02633.
- Rhea, K. A.; McDonald, N. D.; Cole, S. D.; Noireaux, V.; Lux, M. W.; Buckley, P. E. Variability in cell-free expression reactions can impact qualitative genetic circuit characterization.
 Synthetic Biology 2022, 7 (1). DOI: 10.1093/synbio/ysac011.
- Song, Y. F.; Peng, C.; Iqbal, Z.; Sirkar, K. K.; Peterson, G. W.; Mahle, J. J.; Buchanan, J. H. Graphene Oxide and Metal-Organic Framework-Based Breathable Barrier Membranes for Toxic Vapors. *ACS Applied Materials & Interfaces* 2022, 14 (27), 31321-31331. DOI: 10.1021/acsami.2c07989.

DEVCOM CBC Presentations and Conference Participation

JANUARY

Dr. Erik Emmons presented his research on "Waveguide-Enhanced Raman Spectroscopy for Field Detection of Threat Materials" at SPIE Photonics West held in San Francisco, CA.

FEBRUARY

Ms. Amy Dean gave a presentation titled "CBARR Capabilities/Partnerships with Industry and Academia" at the Indoor Air Quality Association (IAQA) 2022 Annual Meeting and Expo in Tucson, AZ.

MARCH

Dr. Alan Samuels, Tech Manager on the Hyperspectral Chemical Airborne Reconnaissance Sensor (HyCARS) RIF BAA project with USINDOPACOM, was invited to attend POST 2022 in Honolulu, HI to present to senior leaders.

- Multiple CBC researchers presented their work at the ACS Spring Meeting, held in San Diego, CA.
 - Dr. Thomas Pearl delivered an oral presentation entitled "Determination of chemical warfare agent distilled mustard, HD, mass uptake trends in polyurethane and polysiloxane-based polymers and associated composites using liquid and vapor chemical exposure conditions."
 - Mr. Shaun Debow will presented his work investigating "Interface Catalysis of NiMo Alloys on 2D MXene for Superior Hydrogen Electrochemistry."
 - Mr. Jeffrey McGuire presented a poster about "Analysis of soil extracts for the insensitive munitions DNAN and NTO via HPLC following ecotoxicological testing."
- Dr. Eric Moore, director of DEVCOM CBC, presented "Bridging the Valley between Concepts and Requirements to Enhance CBRN Protection of Warfighters, First Responders and the Nation" at DSI's 10th Annual Joint Civil & DoD CBRN Symposium in Oxon Hill, MD.
- Multiple CBC researchers presented at the Society of Toxicology Annual Meeting in San Diego, CA.
 - Mr. Michael Horsmon present his research on "Physiological Biomarkers of Low-Level Anticholinesterase Exposure."
 - Dr. Erin Gallagher presented a poster titled "Normalization of Organ-on-a-Chip Samples for Mass Spectrometry-Based Proteomics and Metabolomics via Dansylation-Based Assay."
 - Dr. Daniel Angelini gave a presentation titled "Multiomic Analysis of EpiAirway Tissue Following Sulfur Mustard Exposure."
 - Dr. Jennifer Sekowski gave a presentation titled "RNASeq of VX-Exposed Human Primary Liver Cells in Emulate Chip Reveals Interruption of Glycolysis and other Energyrelated Pathways."

APRIL

- Five CBC researchers participated at the SPIE Defense + Commercial Sensing conference in Orlando, FL.
 - Dr. Jason Guicheteau presented his research and also chaired SPIE CBRNE Sensing XXIII. Dr. Ashish Tripathi gave a presentation titled "Sequential Raman Chemical Imaging Scanning Electron Microscopy of Deactivated Bacterial Spores."
 - Mr. Patrick Riley presented his work about "Interpreting chemical detection alarms with live analysis of ML algorithms."
 - Mr. Justin Curtiss gave a presentation titled "Active Illumination source for hyperspectral spectrometer in UAV/UGV mounted applications."
 - Dr. Eric Languirand gave a talk titled "Performance analysis through predictive modeling: Application to an anomaly detection algorithm in operational scenarios."
- Dr. David McGarvey delivered a presentation titled "HR-MAS Analysis of Skin Exposed to Chemical Warfare Agents" at the 63rd Experimental NMR Conference in Orlando, FL.

MAY

- Two CBC researchers presented at 2022 Synthetic Biology: Engineering, Evolution & Design held in Arlington, VA.
 - Dr. Casey Bernhards gave a presentation titled "Putative phenotypically neutral genomic insertion points in prokaryotes."
 - Dr. Marilyn Lee gave a presentation titled "Protein-Generating Plastics: Embedding Cell-Free Systems in Polymer Materials."
- Dr. Matthew Lux delivered a presentation titled "Rapid Genetic Sequence Characterization and Expression Optimization with Cell-Free Systems" at the 18th Annual PEGS Boston Conference & Expo in Boston, MA.
- Dr. Carrie Poor was a session presenter for "Biological Warfare Agents (BWA) and Agents of Biological Terrorism" and "The Use of Biowarfare - Then and Now" at the 15th Annual Delaware HAZMAT Workshop held in Dover, DE.

- Dr. Anne Walker gave a presentation titled "Integration of solution blow spun fiber materials into flexible 3D printed constructs for scalable production of responsive materials" at the 2022 Materials Research Society (MRS) Spring Meeting in Honolulu, HI.
- Dr. Erik Emmons served as chair for the Active Optical Sensing (Science and Innovations 13) sub-committee at CLEO: Conference on Lasers and Electro-Optics in San Jose, CA.
- Three DEVCOM CBC researchers participated in the Trace Explosives Detection Workshop in New Orleans, LA.
 - Dr. Patricia McDaniel, ST for chemistry at DEVCOM CBC, gave a presentation titled "Portable Chemical Fingerprint Identification System (PCFIS): A Portable Raman Microscope."
 - Mr. Erik Roese presented a poster.
 - Dr. Phillip Wilcox was an invited panel member.
- Dr. Roman Kuperman shared his research investigating biomagnification of per- and polyfluoroalkyl substances (PFAS) in terrestrial food-webs at the Soil Ecology Society (SES) Biennial Meeting in Richland, WA.
- Three researchers presented their work at the Microphysiological Systems (MPS) World Summit in New Orleans, LA.
 - Dr. Tyler Goralski gave two presentations: "A novel approach to interrogating the effects of Chemical Warfare Agent Exposure Using Organ-on-a-Chip Technology and Multiomic Analysis" and "Utilizing Organs-on-Chips to Fill Human Health Data Gaps on Exposure to Per- and Polyfluoroakyl Substances."
 - Dr. Erin Gallagher presented a poster titled "Normalization of Organ-on-a-Chip Samples for Mass Spectrometry Based Proteomics and Metabolomics via Dansylation-based Assay."
 - Ms. Priscilla Lee presented a poster titled "Design and Application of an Adept Aerosol Lung-on-Chip and Aerosol/Vapor Delivery Systems."

JUNE

- Three researchers presented at the 70th American Society for Mass Spectrometry (ASMS) Conference on Mass Spectrometry & Allied Topics, held in Minneapolis, MN.
 - Mr. Jeffrey McGuire presented a poster titled "Assessment of Microsomal Stability Using Liver Microsomes in Support of in vitro ADME Assays of Toxic Compounds"
 - Dr. Elizabeth Dhummakupt chaired a session and gave an oral presentation titled "Metabolic and Proteomic Profiling of Organophosphorus CWA Exposure on Human Liver-on-a-Chips"
 - Mr. Conor Jenkins presented a poster titled "A Multiomic Pathway Investigation of SARS-CoV-2 Infection Utilizing a Lung Organ-on-a-Chip Model"
- Four CBC researchers participated in the DoD-sponsored Military Operations Research Society Symposium (MORSS) held in Quantico, VA.
 - Mr. Michael Kierzewski was invited to give two presentations. The talks covered recently derived human toxicity estimates for A-series agents to support protective gear programs as well as a wrap-up of the decade-long Low Level Toxicity program at CBC.
 - Mr. John (Jay) Davies gave a presentation titled "Estimation of ISO 5725 Intermediate Precision Standard Deviation (IPSD) for multiple process/equipment configurations using design of experiments dispersion."
 - Ms. Theresa Pennington gave a presentation titled "Evaluation of Long-Term Health Effects from Acute Exposure to Toxic Chemicals (AECE)."
 - Additionally, Mr. John (Jay) Davies served as the Chair of CBRNE Defense Working Group. Dr. Steven Lagan served as the Chair of the Military Assessments Working Group, and also created and served as Chair of a new working group (Process & Performance Improvement) for the 2023 Symposium. Mr. Mike Kierzewski served as the Co-Chair of the Wargaming Working Group.

- Ms. Helen Mearns, CBC liaison to the American Society of Mechanical Engineers (ASME) Board on Nuclear Codes and Standards was invited to the ASME Annual & Nominating Committee Meetings held in Scottsdale, AZ.
- Ms. Amee Polk presented a poster title "Composite Microstructure and Ignition Properties of Aluminum-Zirconium Ball Milled Powders in Immiscible Liquid Process Control Agents" at the Gordon Research Conference: Energetic Materials Research held in Manchester, NH.
- Dr. Nathan McDonald presented his work on "Engineering the Escherichia coli Lipopolysaccharide to mimic Yersinia pestis" at a poster session during the Gordon Research Conference: Bacterial Cell Surfaces held in Mount Snow, VT.

JULY

- Dr. Brian C. Hauck was invited to chair a session at the International Society for Ion Mobility Spectrometry (ISIMS) 2022 conference held in Memphis, TN.
- Mr. David McCaskey was invited to present a poster entitled "Novel Glovebox and Exposure Chamber Design to Conduct Full Immersion Aerosol Testing of Large Items with Super Toxic Materials" at the American Glovebox Society Annual Meeting in Nashville, TN.
- Dr. Eric Moore, director of DEVCOM CBC, was an invited speaker at "Emerging Science & Technology to Counter CBRN Threats" session during the 2022 National Defense Industrial Association (NDIA) CBRN Defense Conference & Exhibition in Baltimore, MD.
- Ms. Jessica Cox moderated a session on "Food Defense: Proactive Approaches to Risk Mitigation" at the International Association for Food Protection (IAFP) 2022 Annual Meeting in Pittsburg, PA.

AUGUST

- Dr. Anna Crumbley gave a presentation titled "Strategic Scale-Up of Bioproducts for Materials Testing Applications" Society for Microbiology & Biotechnology (SIMB) Annual Meeting, held in San Francisco, CA
- Dr. Phillip Wilcox presented his DHS-funded work on "Classification of Unknown Fentanyl Analogs using Raman Spectroscopy" at the Customs and Border Protection -Advanced Developments Encompassing Processes and Technologies (CBP-ADEPT) workshop in Boston, MA.
- Eight DEVCOM CBC researchers presented at the American Chemical Society (ACS) 2022 Fall Meeting held virtually and in Chicago, IL.
 - Dr. George Hondrogiannis gave a presentation titled "Acid degradation of hexamine in aqueous and aqueousorganic mixtures."
 - Dr. Casey Bernhards gave an oral presentation titled "Paper-based, cell-free detection of heavy metals for infield water quality testing."
 - Mr. Conor Jenkins served as a panel member
 - Dr. Wesley Gordon gave a presentation titled
 "Degradation of chemical warfare agent simulants on photoactive composite titania and ceria aerogels: Operando studies under ambient conditions"
 - Mr. Shaun Debow gave a presentation titled "Immobilization of NiFe layered double hydroxide on MXene for superior water oxidation."
 - Dr. Stephanie Cole gave a presentation titled
 "Development of a paper-based cell-free expression device for biological sensing."
 - Ann Kulisiewicz gave a presentation titled "Controlling the heterogeneous catalysis of zirconium clusters bound to modified SBA-15."
 - **Katherine Rhea** gave a presentation titled "Establishment of a cell-free protein synthesis system from Francisella tularensis for rapid genetic prototyping."

- Mr. Justin Curtiss delivered a presentation titled "Characterization of Powell lens with a broadband light source input" at SPIE Optics & Photonics in San Diego, CA.
- Ms. Helen Mearns and Ms. Jessica Cox presented on the Chemical Security Analysis Center (CSAC) and the Jack Rabbit Program at the Emergency Management Issues Special Interest Group Meeting held in San Jose, CA.
- Dr. Elizabeth Dhummakupt presented a poster titled "Proteomic, Metabolomic, and Lipidomic Analyses of Lung Tissue Exposed to Mustard Gas" at the International Mass Spectrometry Conference 2022 held in Maastricht, The Netherlands.

SEPTEMBER

- Multiple CBC personnel took part in the Chemical Weapons Demilitarisation 2022 conference in London, United Kingdom.
 - Mr. Timothy A. Blades and Mr. Robert J. Malone served as Chairpersons.
 - Mr. Kris N. Perkins served on the Organizing Committee.
 - Mr. Raymond Diberardo gave two presentations:
 "Demonstration Testing of the Expeditionary Destruction System (EXDS) Diesel Engine and Modular Post Treatment with Chemical Warfare Agent Simulants" and
 "Prototype Demilitarization Process for Chemical and Biological Weapons."
 - Mr. Brandon Bruey gave a presentation titled "Overview of the United States Single Small-Scale Facility (SSSF) and its support to chemical demilitarization efforts."
 - **Mr. Michael Marinelli** gave a presentation on the Compact Rapid Chemical Agent Neutralization System (CRaCANS).

- Ms. Leslie McMahon attended and represented DEVCOM CBC for the presentation of scientific research conducted by the Agent Chemistry Branch in collaboration with Dr. Scott Pegan (University of California Riverside) at the 14th International Meeting on Cholinesterases held in Bologna, Italy.
- Three CBC researchers presented their work at the 14th CBRNe Protection Symposium in Malmo, Sweden.
 - Dr. Vipin Rastogi gave a presentation titled "Disinfection Studies with SARS-CoV-2 Surrogates."
 - Dr. Jason Guicheteau presented on current DEVCOM CBC research associated with locating, detecting, and identifying chemical threats on contaminated surfaces.
 - **Dr. Eric Languirand** gave a presentation titled "Research and Applications of Hyperspectral Imaging."
- Dr. Erik Emmons and Dr. Ashish Tripathi gave two presentations, "Use of Surface-Enhanced Raman Spectroscopy (SERS) with Field forward Raman Microscopy and Mass spectrometry: Triaging the Detection Problem" [tentative and pending Security review] and "Waveguide-Enhanced Raman Spectroscopy for Detection of Chemical Vapors" at the 8th Confocal Raman Imaging Symposium held in Ulm, Germany.
- Dr. Nathan McDonald presented his research on "Remodeling the Bacterial Outer Membrane for Synthetic Designer Microbes" at the inaugural DOD 6.1 Research Conference, held virtually.

OCTOBER

- Dr. Erik Emmons gave an oral presentation entitled "Waveguide-Enhanced Raman Spectroscopy for Detection of Chemical Vapors" at SciX 2022 in Covington, KY. Dr. Eric Languirand gave two talks at the same conference: "Sensor Agnostic Threat Anomaly Detection (ThreAD) for Explosives" and "MOF-based Janus Micromotor Locomotive characterization."
- In Raleigh, NC, Dr. Jana Kesavan chaired a session and presented a poster on "Determining the Effect of Age and Head Position on Aerosol Delivery to Turbinate Regions of Human Intranasal Airways" at the America Association for Aerosal Research 40th Annual Conference.
- Mr. Michael Bailey, acting director of DEVCOM CBC, delivered a presentation "U.S. Army Collaboration with Other U.S. Agencies and the Private Sector to Better Prepare for CBRNE Surprises" at the CBRNe Summit USA held in Denver, CO.
- Dr. Cory Berhards presented a poster entitled "Bioaerosol Surveillance via Untargeted Nanopore Sequencing" at the American Society for Microbiology Sequencing in Baltimore, MD.
- Ms. Jessica Cox served as a subject matter expert for the Food Defense Panel at the Food Safety Consortium Conference & Expo in Parsippany, NJ, and also presented on "Intentional Adulteration Trends" during panel proceedings.
- The University of New Hampshire Chemistry
 Department invited Dr. Wesley Gordon to present at
 their departmental seminar in Durham, NH.

Dr. Patricia McDaniel, ST for Chemistry at DEVCOM CBC, attended CBRNe Convergence in Boston, MA, where she delivered a presentation addressing U.S. Army collaboration with other U.S. agencies and the private sector to better prepare for CBRNE incidents. Mr. Lester Strauch also attended the conference and gave a presentation on drones.

NOVEMBER

Dr. Roman Kuperman and Dr. Michael Simini both presented their work at the Society for Environmental Toxins and Chemistry (SETAC) North America 43rd Annual Meeting in Pittsburgh, PA. Dr. Kuperman and Dr. Simini both shared their research on the biomagnification of per- and polyfluoroalkyl substances (PFAS) in terrestrial food-webs, which was funded by the Strategic Environmental R&D Program (SERDP). Additionally, Dr. Simini chaired a platform and poster session on soil contaminants, and the SETAC Global Soils Interest Group meeting.

DECEMBER

Numerous CBC researchers presented their work at the DTRA CBD S&T Conference poster session, held in San Diego, CA.

IN MEMORIAM



In Memory of Jude Height

February 29, 1951-September 9, 2022

2022 was marked by the untimely passing of Jude Height, an esteemed researcher and beloved member of the DEVCOM CBC community for over 40 years. Jude enlisted in the U.S. Army in 1978 and after completing his basic and advanced individual training, he began work at the Center (then known as Chemical Systems Laboratory). In 1982, he was honorably discharged from the Army and continued working at DEVCOM CBC as a civilian. He will be remembered for his commitment to rigorous chemical biological research, his enthusiasm for living life to its fullest potential, and his great love of family, including his daughter Kristin, son Will, and grandsons Aden and Michael.

U.S. ARMY

Send questions or comments to:

DEVCOM CBC Public Affairs Officer Richard Arndt at

richard.m.arndt.civ@army.mil

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