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20th Support Command Turns One Year Old

by Cathy Kropp

The 20th Support Command (Chemical, Biological, Radiological, Nuclear and High Yield Explosives), also known as the 20th SUPCOM (CBRNE), celebrated its first birthday mid-October 2005. It has undergone a number of changes over the last year.

When the CBRNE headquarters was activated, members who made up the unit knew there was a lot of work to do and many changes to adapt to before they would reach what the Army considered full operational capability. Many didn't realize what those changes would encompass before the year was done.

The 20th SUPCOM (CBRNE) was activated last October 16th as a major subordinate command of U.S. Army Forces Command. The first item on the commander's agenda was to develop a plan to get the unit from where it was to full operational capability.

"With the shortness of resources and personnel at the start of our initial activation, we felt like the commander needed additional and focused visibility on tasks needed to activate our new subordinate organizations," said Col. Gene (Ed) King, former deputy commander of the 20th Support Command (CBRNE) and director of the integrated process action team, called the Tiger Team.

"This process really validated the concept of Department of the Army civilians, active duty Soldiers, reserve component soldiers, and contractors working together as one team to give our new organizations a central repository for data, assign areas of responsibilities, and to meet weekly by video teleconference to iron out tasks and receive guidance from our command leadership."

Like other parts of the Army, there was a shortage of people. The headquarters is staffed by Army Soldiers and civilians. A hiring freeze was placed on the unit that restricted the hiring of civilians; the war on terrorism had an impact on the number of Soldiers arriving at the unit.

The headquarters had little more than one-third of its authorized staff when it was activated. Increasing personnel strength was vital to enabling the headquarters to reach its goals of providing an operational headquarters to command and control CBRNE assets and operations; serving as the Army force provider of specialized CBRNE forces in support of combatant and joint force commanders, and other federal and state agencies; and becoming a center of excellence for CBRNE initiatives.

"In less than one year the headquarters has seen tremendous growth both in personnel and infrastructure," said Dave Parker, G-1 human resources manager. "In spite of substantial challenges we have successfully established and fostered a high level of esprit de corps and basic teamwork throughout the unit."

When the command was activated it was designed to provide a deployable headquarters. Equipment authorized to a unit expected to deploy is significantly different than a headquarters that remains in the rear and just deploys subordinate units. Filling those equipment requirements and providing the ability to sustain its people and equipment during a deployment requires coordination and planning by the logistics personnel.

Continued pg. 6

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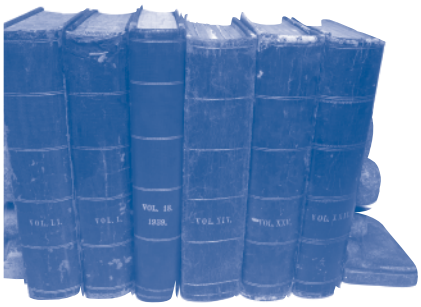


History of Chemical and Biological Detectors, Alarms, and Warning Systems†

Mr. Jeffery K. Smart, Command Historian

PRE-WORLD WAR I

17th Century Vapor Detection Concepts

One of the challenges early chemists faced was the identification of chemicals. Often the same chemical or gas would be identified differently when produced by different means. Developments in assaying in metallurgy during the 17th century led to some of the basic concepts of vapor detection and gravimetric analysis that were later used in the detection of chemical warfare agents.

For example, Johann Baptista van Helmont began to identify various gases given off by different processes like combustion, fermentation, and the heating of organic matter. While studying the chemistry of air, he shattered so many containers while generating gases from various chemical reactions, that he coined the term "gas" from the Greek word for chaos. In 1659, Johann Rudolph Glauber published information describing how the color of flame and fumes provided insight to the metal held in a flame. Robert Boyle utilized flame colors, spot tests, fumes, precipitates, specific gravity, and solvent action as ways to identify chemicals.

17th Century Spot Testing

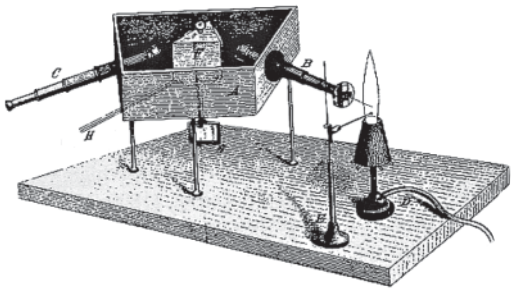
Other early chemists added to the concept of chemical and gas identification by developing specific tests for detection. Otto Tachenius helped establish the concept of qualitative chemical analysis when he developed a spot test consisting of nutgall extract (abnormal growth material caused by the deposited eggs of gallflies that contained tannic acid) for detecting iron compounds.[1]

18th Century Chemical Spectrum Analysis

Although the concept of the colored spectrum had been known since ancient times, the use of the spectrum for chemical identification did not develop until the 18th century. Thomas Melvill observed the spectra of metallic salts in 1752. Adreas Marggraf used flame colors to distinguish sodium and potassium salts in 1758.

19th Century Chemical Analysis Developments

During the 19th Century, chemists continued the developments of the 17th and 18th Centuries. John Herschel took Marggraf's concept one step further by demonstrating that when the flame colors of boric acid and the chlorides of barium, calcium, strontium, and copper were passed through a prism, they produced unique lines which could be used for identification of the item.[2] Justus von Liebig developed methods for analyzing sulfur and halogens that involved the oxidation of organic materials with a nitrate in an alkaline solution. George Ludwig Carius developed a method for analyzing sulfur and chlorine that involved the thermal decomposition of nitric acid. Robert Wilhelm Bunsen helped contribute the Bunsen burner in 1853 that produced a colorless flame that allowed the study of spectrums. In 1857, he published a book describing gas analysis of blast-furnace fumes in England. In 1859, with assistance of Gustav Robert Kirchhoff, Bunsen developed the spectroscope which included a prism that allowed a better way to view a color spectrum. Kirchhoff also expanded on the use of spectroscopy by demonstrating that hot gases absorb the same kind of light as they emit.[3]



An early chemical detector, the Spectroscope, developed in 1859.

WORLD WAR I

Chemical Agent Detectors

The Best Field Detector: The Sniff Test

When the United States entered World War I in April 1917, although chemists in laboratories had the ability to identify chemical agents, the U.S. Army had no ability to detect chemical agents either as vapor or on surfaces in the field. Instead, the American soldier on the chemical battlefield had to rely on their own senses (smell, and throat and nose irritation) to detect chemicals. Since most of the World War I chemical agents had identifiable unique odors, the sense of smell was the best detector of the presence of chemical agents. For example, troops learned that German mustard agent smelled like mustard. Allied mustard agent smelled like garlic.

†This article is Part I of a series of articles extracted from the "History of Chemical and Biological Detectors, Alarms, and Warning Systems," by Mr. Jeffery K. Smart, U.S. Army Research, Development and Engineering Command (RDECOM) Historian, June, 2000. This presentation is edited, with permission of the author, for the CBIAC Newsletter forum.

Continued pg. 7

Contract Awards • *by Mary Frances Tracy*

BAA, Real Time/Near Real Time Detection of Microbial Pathogens/Toxins Associated with Food, Water, Air and Human Specimens
University of South Florida
Tampa, FL
$3,776,657 July 29, 2005
By U.S. Army Research, Development, and Engineering Command Acquisition Center - Aberdeen Proving Ground - Edgewood Area, MD

Continued Development of Anthim(TM) – An Antibody Therapeutic for the Prevention and Treatment of Anthrax Infection
Elusys Therapeutics Incorporated
Pine Brook, NJ
$5,400,000 August 3, 2005
By National Institute of Allergy and Infectious Diseases (NIAID) ($4.4 million), Bethesda, MD and Department of Defense (DoD) ($1 million), Washington, D.C.

Development of Faster-acting Anthrax Testing
Genomic Profiling Systems
Bedford, MA
$1,200,000 (Part of a $4,100,000 multi-year grant) August 4, 2005
By The National Institute of Allergy and Infectious Disease, Bethesda, MD

THz Frequency Hopping Spectrometer for Biodetection
Physical Domains
Glendale, CA
$799,658 August 8, 2005
By U.S. Army Research, Development, and Engineering Command Acquisition Center - Research Triangle Park, NC

Provide Mission Support in the Former Soviet Union (FSU)
Raytheon Technical Services Company LLC
Reston, VA
$82,100,000 August 8, 2005
By Defense Threat Reduction Agency, Fort Belvoir, VA

Expansion of Pioneering Work to Develop a Comprehensive and Medically Sound Strategy to Deal with Bacillus Anthracis (Anthrax) and Yersinia Pestis (Plague) as Potential Biological Weapons
Ordway Research Institute
Albany, NY
$9,100,000 August 9, 2005
By National Institutes of Health, Bethesda, MD

Fabrication of a Specialized Spectrometer with the Potential to Differentiate the Terahertz (THz) Signatures of Hazardous Substances, Including Explosives and Chemical and Biological Agents
Goodrich Corporation, Electro-Optical Systems
Danbury, CT
$3,000,000 August 15, 2005
By U.S. Army Research Laboratory, Adelphi, MD

Management of the Military Vaccine/Anthrax Vaccine Immunization Program
Eagle Group International
Atlanta, GA
$6,093,344 August 19, 2005
By The Center for Healthcare Contracting, Fort Sam Houston, TX

Develop Vaccines to Protect Against Bioterrorist Attacks
Flinders University
Australia
$3,000,000 August 19, 2005
By National Institutes of Health, Bethesda, MD

Chemical and Biological Agent Destruction Technologies
Tiax LLC; Cambridge, MA and
NanoScale Materials Incorporated; Manhattan, KS
$883,954 and $1,381,180 August 22, 2005
By Defense Threat Reduction Agency, Fort Belvoir, VA

Assistance to State and Local Hospitals Respond to Mass Casualty Terrorism and Other Medical Crises
$1,300,000,000 September 2005
By Department of Health and Human Services, Washington, D.C.

Feasibility Studies of a New Approach for Rapidly Manufacturing Large Quantities of DNA Vaccines
Vical Incorporated
San Diego, CA
$500,000 September 22, 2005
By Defense Advanced Research Projects Agency, Arlington, VA

Design, Purchase, and Installation of Equipment to Modernize the White Phosphorous Facility
Shaw Environmental Incorporated
Stoughton, MA
$23,005,000 September 26, 2005
By U.S. Army Research, Development, and Engineering Command, Pine Bluff, AR

Rapid Identification and Treatment of Anti-Viral Diseases
SIGA Technologies, Incorporated
New York, NY
$3,200,000 September 27, 2005
By U.S. Army Medical Research and Material Command, Ft. Detrick, MD

Engineering and Technical Services to Support Air Force Operational Test and Evaluation Center in the Accomplishment of Chemical/Biological Evaluation
Battelle Memorial Institute
Columbus, OH
$98,000,000 (indefinite delivery/ indefinite quantity)
September 30, 2005
By Headquarters Air Force Operational Test and Evaluation Center, Kirtland Air Force Base, NM

Enzymes Interdict Nerve Agents in "Bioscavenger" Program

By Karen Fleming-Michael, U.S. Army Medical Research and Materiel Command

Plasma, goats and plants may one day hold the key to protecting warfighters—and the public—from nerve agents.

Boosting the amounts of an enzyme called butyrylcholinesterase, normally present in small quantities in blood plasma as detoxifiers, can interdict nerve agents when they enter the bloodstream so the nerve agents can't reach their targets.

Knowing this, researchers for 20 years have been finding ways of producing large amounts of the enzyme they call a "bioscavenger."

"The bioscavenger is being tested against all known nerve agents," said Col. Michelle Ross, deputy commander of the Army Medical Research Institute of Chemical Defense in Aberdeen Proving Ground, MD. "The objective is to develop a pretreatment that is broad spectrum and will work against all known nerve agents."

So far the Aberdeen researchers, working jointly with the Walter Reed Army Institute of Research in Silver Spring, MD., have come up with three versions of the bioscavenger. The most mature, they hope, will transition for funding under Project BioShield, the president's 2003 initiative to encourage companies to develop bioterrorism countermeasures.

"The bioscavenger approach is revolutionary because it works by preventing and destroying the nerve agent entering the body before it can reach its physiological target," Ross said.

"If you have people who are going into harm's way—whether it's the warfighter or the hospital worker who has incoming casualties or the first responder going into a hot zone (like the Tokyo subway after the 1995 liquid sarin attack)—if they have the bioscavenger in circulation, they're protected against the toxicity of nerve agents. If there's no vulnerability, there's no threat."

"The enzyme also lets the warfighter keep fighting," Ross said. "(Current) nerve agent antidotes all enhance survival and, in the best cases, reverse the toxicity of exposure, but they cause a performance decrement, and the recipient becomes a casualty (that needs to be) evacuated to a military treatment facility," she said. "In an operational context, what the combatant commander wants is a warfighter to continue the mission, not be a casualty, not be a logistical burden to the health care system but keep on trucking. The bioscavenger addresses that concern."

Use of the bioscavenger is similar in concept to the use of gamma globulin shots that travelers have taken for more than 50 years to boost their immunity.

"It's a passive protection," said Dr. David Lenz of the institute at Aberdeen Proving Ground. "You will be protected as soon as you get the shot and achieve adequate plasma levels if you're subsequently exposed to ... nerve agents."

An enzyme called butyrylcholinesterase, normally present in small quantities in blood plasma as detoxifiers, can interdict nerve agents when they enter the bloodstream so the nerve agents can't reach their targets. Army photo

The version researchers hope to get Food and Drug Administration (FDA) approval for first is the plasma-derived bioscavenger. Made from outdated human plasma, the enzyme, butyrylcholinestrase, is extracted and purified by a process perfected by researchers at the Walter Reed Army Institute of Research.

Baxter Healthcare Corporation received a contract April 6 from Dynport Vaccine Corporation LLC to produce batches of the plasma-derived bioscavenger to undergo a preliminary human clinical safety trial. If these trials are successful, the FDA may grant investigational new drug status to the bioscavenger, then the Department of Health and Human Services can move the product toward full FDA licensure for BioShield.

Although several thousand tons of outdated human plasma are available for preparing the enzyme, a liter of human plasma contains just a couple milligrams of the enzyme, so there's not enough plasma to meet demand.

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20th Support Command *cont.*

"Over the last year the G-4 focused and tailored its capability to fit and fix the immediate support requirements caused by unit activations and deactivations," said Gary Allen, G-4 logistics management specialist. "The 20th Support Command (CBRNE) transitioned from tables of distribution and allowances, or TDA unit, to a modification table of organization and equipment, or MTOE multi-component unit," he added.

"Our section initiates stationing studies, calculates space requirements, analyzes installation information, develops cost analysis for courses of actions, conducts decision briefs, acquires both commercial off-the-shelf and standard military equipment and supplies, identifies standard Army information management system requirements, and establishes property books for accountability," Allen explained.

"Our goal is to acquire all the equipment authorized and needed for our newly activating units, closely coordinating our actions with the Forces Command G-4 and the Department of the Army headquarters," said Allen.

In addition to the headquarters commanding and controlling its subordinate units, it also must provide operational capabilities, such as deployable communications suites, coordination elements, and a nuclear disablement team. Equipment is vital for those capabilities.

The deployable communications suites are used to link the operators in the field with the technical expertise. That expertise may be resident at the home installation, at a university or laboratory, or at another government agency. The communications capability provided by the headquarters ensures expert advice and information gets to where it is needed.

"It's vital that we continue to recruit and maintain a staff of highly motivated, top performing, information technology, and telecommunications professionals capable of performing under pressure and in high visibility situations," said Ty Bledsoe, chief of the Operational Services Division, G6. "It's also important to ensure we have state-of-the-art technology that makes the most efficient use of bandwidth."

The coordination elements deploy as required to synchronize and manage CBRNE technical assistance in support of combatant commanders, joint task force commanders, and managers and directors from lead federal agencies.

"Training in preparation for possible overseas operations, major field exercises, and participation in national special security events offer opportunities for the command to provide CBRNE planning assistance, subject matter expertise, and hazard prediction modeling in a variety of scenarios," said Maj. Steven Crusinberry, officer in charge of the CBRNE coordination element section. "These are examples of the services the command could be asked to provide to supported staffs in the First and Fifth Continental U.S. Armies, Northern Command, or other combatant commands."

Once the personnel and equipment were on hand, training became a priority. A variety of training exercises for the operational elements and the deployable headquarters were scheduled.

"Transferring the institutional knowledge of the relatively small Chemical-Biological Rapid Response Team to a rapidly expanding CBRNE coordination element, while transitioning from the Army Materiel Command to U.S. Army Forces Command was quite a challenge," said Lt. Col. William Schaff, the deputy chief of staff for plans, training and operations.

"Assuming command and control of multiple subordinate units, while supporting the Global War on Terrorism and maintaining current and new operations was another hurdle to jump. Teamwork and understanding that the paradigm must change were critical to success," he added.

Meeting with already established partner organizations, documenting new partnerships, and ensuring everyone understands how all the pieces fit together in a CBRNE-related event, is a priority for the coordination element. "Building a team not just with the 20th Support Command (CBRNE) but throughout the Department of Defense, industry, and academia will one day prove to be our key to success," said Schaff.

These are just a few of the tasks the headquarters needed to perform to get the command to full operational capability. Supporting and monitoring some very busy subordinate units is often a full time job by itself.

"It would have been relatively easy to get caught up in day-to-day operations and forget about movement toward full operational capability," Schaff commented. "However with teamwork and the leadership's vision we continued to progress each week, moving through a crawl-walk-run process," he explained.

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History of Detectors *cont.*

Gas scouts were trained and positioned so as to provide advance warning to the main trench line of an incoming gas cloud. When the troops already had their masks on and needed to check for chemical agents, they had to perform what became known as the sniff test. This involved pulling the edge of the gas mask away from the face to allow outside air to enter the mask. If a chemical agent was present, the specific odor would alert the soldier to remain masked.

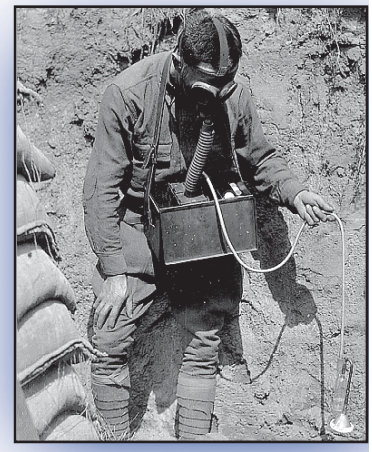
Unfortunately, the sniff test was inaccurate for low levels of chemical vapor. In addition, after conducting the sniff test for several hours, a soldier would gradually lose his ability to detect low levels of mustard agent. Of course, in high levels of mustard agent, the sniff test was extremely dangerous.[4]

Vapor Field Detectors

The dangers of the sniff test led to the Chemical Warfare Service's Research Division testing several concepts for a vapor field detector that did not involve removing the gas mask.

The Copper Flame Test Lantern was based upon halogen compounds burning with a green flame in the presence of copper. The process involved air passed through the suspected soil and then over copper oxide gauze heated by a Bunsen lamp burning acetylene. The mustard agent decomposed and the halogen reacted with the copper oxide gauze to produce a blue-green flame. Several versions of the lantern were developed that included a lantern, a Bunsen burner, a bulb aspirator, a tripod, and testing equipment. The test took anywhere from 2-10 minutes, but was not specific to mustard agent.

The Selenious Acid Field Detector utilized the concept that a dilute solution of selenious acid produced an orange colored suspension of selenium after contact with mustard agent. Selenious acid was prepared by mixing selenious dioxide with sulfuric acid. One of the more interesting ways to obtain the vapor was a device attached to a standard gas mask that allowed the soldier to pull the vapor into the detector by his own breath. This required inhaling repeatedly for anywhere from 30 seconds to 15 minutes depending upon the concentration of the mustard agent. This process was described as being "very sensitive to low concentration of mustard gas vapors." The problems with the detector were that it failed to detect large concentrations of some chemical warfare agents and could not differentiate between those agents it could detect.



The Iodine Pentoxide Test heated iodine pentoxide in a tube to oxidize mustard agent vapor and give off iodine. A strip of moist starch paper then detected the iodine. To avoid having to heat the tube, the Iodic Acid Test was developed for field use.

The Iodic Acid Test Field Detector used the concept that a solution of iodic acid in nitric acid released iodine that could then be detected by adding chloroform.

The Hydrogen Sulfide Field Detector involved a test that absorbed mustard agent vapor, decomposed it at a high temperature, and then tested for hydrogen sulfide on lead acetate filter paper. The device was similar to the Selenious Acid Field Detector and used a gas mask to pull an air sample into a quartz tube with an absorbent. A good sample required about five minutes of heavy breathing. The absorbent was then placed in a tube with the lead acetate filter paper and heated with a gasoline blow torch for about two minutes. The test was believed to be specific to mustard agent and could detect the agent on the ground even nine days after contamination. A comparable sniff test nine days after contamination found "The odor of mustard gas was detectable . . .only when the nose was brought very close to the ground."

None of these field detectors were perfected before the end of the war.[5]

Detector Paints

During the war, Chemical Warfare Service researchers at American University Experimental Station in Washington, D.C., copied German work involving the use of dyestuffs that changed color when in contact with mustard agent. The Germans began painting their mustard shells with the paint and thus had an instantaneous leak detection capability, although other oils had the same effect. The Germans also put the paint on the end of a long stick that could be used to test for mustard agent in a captured trench prior to entry. A German deserter, however, reported that reliance on this test alone often resulted in casualties. American researchers developed a linseed oil paint and a du Pont lacquer/linseed oil enamel paint, both of which turned from yellow to red within four seconds of contact

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In the News • *By Mary Frances Tracy*

Studies Reveal How Plague Disables Immune System, and How to Exploit the Process to Make a Vaccine

University of Chicago Hospitals Press Release
July 28, 2005
"Two studies by researchers at the University of Chicago show how the bacteria that cause the plague manage to outsmart the immune system and how, by slightly altering one of the microbe's tools, the researchers produced what may be the first safe and effective vaccine."
http://www.uchospitals.edu/news/2005/20050728-plague.html

Europe: Czech Scientists Hail Discovery to Neutralize Mustard Gas

By Tereza Nemcova
Radio Free Europe/Radio Liberty
August 5, 2005
"Czech scientists are touting what they describe as a significant biochemical breakthrough with the development of an environmentally friendly enzyme-based technology that eliminates the lethal effects of mustard gas."
http://www.rferl.org/features/features_Article.aspx?m=08&y=2005&id=FE1A6B05-095C-4A5D-9EA4-1BB175E0BF74

Government to Stock Up on Avian Flu Shots

By Anita Manning
USA TODAY
August 8, 2005
"The government is planning to buy bulk supplies of an experimental vaccine shown to be effective against an avian flu strain that scientists fear could spark a pandemic. But how much of it can be produced, and when, is unclear, health officials said Monday."
http://www.usatoday.com/news/health/2005-08-08-bird-flu_x.htm

Bioterrorism: Anthrax Test, Developed by Army and CDC, Receives FDA Approval

XagenaMedicine2005
September 2, 2005
"FDA has cleared a method for identifying *Bacillus anthracis*, the causative agent of anthrax, for diagnostic use by the UThe test, known as the Gamma Phage Assay."
http://www.xagena.it/news/medicinenews_net_news/191b624691ab236e4958bcac976a1de6.html

Animals Warn of Human Health Hazards in New "Canary Database"

Yale University Press Release
September 2, 2005
"Yale School of Medicine has launched a state-of-the-art database funded in part by the National Library of Medicine, called the Canary Database, containing scientific evidence about how animal disease events can be an early warning system for emerging human diseases."
http://www.yale.edu/opa/newsr/05-08-11-01.all.html

U of L Receives Federal Award to Build New Research Lab

University of Louisville Press Release
September 7, 2005
"The University of Louisville is receiving a federal grant of nearly $22 million to build a research lab geared to developing new vaccines to fight bioterrorism and emerging infectious diseases."
http://php.louisville.edu/news/news.php?news=432

George Mason University Receives $25 Million Federal Award for Construction of a Regional Biocontainment Laboratory

George Mason University Press Release
September 9, 2005
"George Mason University has been awarded $25 million from the National Institute of Allergy and Infectious Diseases, part of the National Institutes of Health, for construction of a Regional Biocontainment Laboratory at its Prince William Campus in Manassas."
http://condor.gmu.edu/newsroom/display.phtml?rid=509

British and Americans Join Forces to Develop Next Generation in Chemical and Biological Agent Protective Clothing

Texas Tech Press Release
September 22, 2005
"An international team announced Sept. 16 that they have come together to develop critically needed protective garments for first responders to natural disasters and bio-terror attacks. The garments will provide military and emergency personnel protective wear that is lighter, longer wearing, and offers increased protection from contaminants and a broad range of toxic chemicals."
http://texastechprotects.ttu.edu/

Continued pg. 9

Vol. 2 No. 4 of the Chem-Bio Defense Quarterly Magazine is Now Available!

In this issue we visit the West Desert Test Center at the U.S. Army Dugway Proving Grounds in Utah and the U.S. Air Force Operational Test and Evaluation Center at Kirkland Air Force Base, New Mexico. These are two of the organizations that help independently assure the Joint Project Manager that equipment is safe and effective before fielding. We also discuss avoiding hazards altogether. Identifying contaminated areas on the battlefield is a challenging and demanding mission. Once identified, ensuring the area is properly and visibly marked can be equally demanding. Through the efforts of the joint services at the U.S. Army Chemical School and the Joint Project Manager Contamination Avoidance, substantially improved contamination marking systems were evaluated, developed, and will soon be fielded.

http://www.jpeocbd.osd.mil/page_manager.asp?pg=4&sub=0

In the News *cont.*

STRATCOM Sets Up Center for Combating Weapons of Mass Destruction

Sebastian Sprenger
Inside the Pentagon
September 2, 2005
"U.S. Strategic Command chief Marine Corps Gen. James Cartwright last week established the 'Center for Combating Weapons of Mass Destruction' as one of STRATCOM's functional components, and recommended dual-hatting the director of the Defense Threat Reduction Agency as head of the new organization…"
http://www.poni-csis.org/news/article.asp?ARTICLE_ID=401&F_ CATEGORY_ID=7

Researchers Making Strides Against Botulism

Karen Fleming-Michael
Ft. Detrick Standard
September 15, 2005
"…Beginning in the early 1990s, USAMRIID scientists started work on recombinant versions of the (botulinum toxin) vaccines and have made one for each of the seven serotypes. The candidates for serotypes A and B transitioned to the Joint Vaccine Acquisition Program, called JVAP, for advanced development in 1999 and have now been examined in an initial safety trial… The phase 1 trial's objective is to evaluate the safety of the vaccine in a small population of volunteers and to choose one or two doses to examine in the Phase 2 clinical trial."
http://www.dcmilitary.com/army/standard/12_19/national_news/37047-1.html

NATO Centre for Weapons of Mass Destruction to Be in Vyskov

Czech Happenings
September 27, 2005
The NATO multinational strategic centre for the fight against weapons of mass destruction will be set up in Vyskov, south Moravia, within two to three years, deputy defence minister Martin Belcik said.
http://www.ceskenoviny.cz/news/index_view.php?id=149931

Also, see September 2005 issue of RDECOM Magazine online at:
http://www.rdecom.army.mil/rdemagazine/Current/index.html

Calendar of Events

Do you have a Chemical and/or Biological Defense or Homeland Security course or event to add to our Calendar? Submit the pertinent information via email to **cbiac@battelle.org**. *The CBIAC reserves the right to reject submissions. For a more extensive list of events, visit our website at* **http://www.cbiac.apgea.army.mil/**.

2005

December 4-7, 2005
U.S. EPA Region III Emergency Preparedness and Prevention and Hazmat Spills Conference
Baltimore, MD
http://www.2005conference.org

December 6, 2005
FBI Academy Vendor Fair
Quantico, VA
http://www.fbcinc.com/event.asp?eventid=Q6UJ9A008SSK

December 6-8, 2005
2005 USSOCOM CBRN Conference and Exhibition
Tampa, FL
http://www.ndia.org/Content/NavigationMenu/Meetings_and_Events/Schedule_of_Events/Events/6630/6630_CFP.pdf
http://register.ndia.org/interview/register.ndia?PID=Brochure&SID=_1LH0MMJS8&MID=6630

December 6-8, 2005
SENSORSGOV Expo & Conference
Virginia Beach, VA
http://www.sensorsgov.com/sensorsgov/v42/index.cvn

December 6-10, 2005
82nd Annual Congress of Cities and Exposition
Charlotte, NC
http://www.nlc.org/conferences___events/congress_of_cities___exposition/68.cfm

Chemical and Biological Defense
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20th Support Command *cont.*

The 52d Ordnance Group (Explosive Ordnance Disposal (EOD)) and the 22d Chemical Battalion (Technical Escort) are two subordinates of the 20th SUPCOM (CBRNE) that have continued to operate both in the homeland and overseas and remain prepared to respond to any chemical, biological, radiological, nuclear, or explosive hazards.

"The last year of the war has been one of the most stressful in the history of Army EOD," said Col. Michael J. Davis, commander of the 52d Ordnance Group (EOD). "The group's Soldiers have carried the fight to the terrorist bomb makers and, at great sacrifice, saved countless lives."

"Thirteen of our Soldiers have been killed in the line of duty and over 100 have been wounded or injured," stated Command Sgt. Maj. James H. Clifford, the highest ranking non-commissioned officer in the 52d Ordnance Group (EOD).

"Soldiers of the 52d Ordnance Group (EOD) conduct missions in Iraq, Afghanistan, Kuwait, Saudi Arabia, Qatar, and Kosovo to destroy hazardous weapons caches, unexploded ordnance and IEDs," Clifford explained.

"Our Soldiers have destroyed more than 200,000 unexploded ordnance (UXO) items and rendered safe over 5,000 IEDs and vehicle-borne IEDs, in support of the global war on terrorism," Clifford said. "Those Soldiers not deployed in the war are engaged in homeland security missions which include providing EOD support to military and civilian authorities. During 2004, Soldiers of the 52d Ordnance Group (EOD) conducted over 4,000 EOD missions in the continental U.S.," he said.

Soldiers for the 22d Chemical Battalion are also deployed to Iraq conducting sensitive site exploitations to gain intelligence and ensure terrorists do not employ chemical or biological weapons against coalition forces or the civilian population in Iraq. Additionally, Soldiers and civilians of the 22d continue to conduct emergency responses, disablement and elimination missions of old chemical munitions throughout the U.S., including Alaska and Hawaii.

"Over this past year the 22d Chemical Battalion has transformed from a stand-alone organization under Army Material Command to being an integral part of the 20th Support Command and FORSCOM," said Lt. Col. Patrick R. Terrell, commander of the 22d Chemical Battalion (Technical Escort). "We've done this without any interruption to our operational tempo and without any incidents," he said.

"Our great Soldiers and civilians continue rotations in Iraq and support throughout the United States. Every day they impress me with their professionalism and dedication," Terrell said.

The Army has recognized the need for more CBRNE response units like these. The 71st Ordnance Group (Explosive Ordnance Disposal) and the 110th Chemical Battalion (Technical Escort) will both be activated in the fall of 2005. They will provide additional capabilities to meet the ever-increasing demands for CBRNE expertise to support the Global War on Terrorism and requirements in the homeland.

"Under the 20th SUPCOM (CBRNE) we've already grown one additional EOD battalion headquarters and just in time for the command's first birthday, we'll have another EOD group headquarters," said Col. Davis.

While it was anticipated that this one-star headquarters would continue to grow and change, no one was expecting the early changeover of the command group. After less than 12 months in a two-year command, Brig. Gen. Walt Davis was selected to command the Joint Unmanned Aerial Vehicle Center of Excellence at Creech Air Force Base, Nevada. Just prior to his leaving, a new Deputy Commander and Chief of Staff replaced the retiring incumbents.

According to some, the leadership is what has helped the headquarters come to full operational capability in only one year.

"The leadership has really allowed the staff sections a lot of freedom to flesh out their own operations and focus their efforts where needed to meet the commander's intent," said Capt. Tony Dubay, an operations officer with the coordination section of the command. "This latitude allowed my section to determine the implied tasks of our mission, train, integrate with our partners, and begin executing our mission with a very high degree of success within a short time," he said.

"We have a great group of people here at the headquarters, all great Americans, who have worked hard over the last year to get this command ready to be what the Army needs for management of CBRNE operations," said Brig. Gen. Walt Davis, the first commander of the unit.

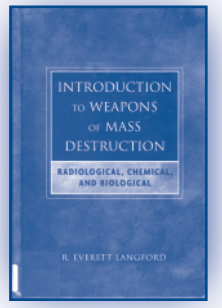
The 20th Support Command (CBRNE) will continue transforming, adding additional companies, battalions, and other subordinate units through at least 2012. For more information, visit http://www.cbrne.army.mil/

New CBIAC Information Resources • *By Richard M. Gilman*

Books

Langford, R. Everett. **Introduction to Weapons of Mass Destruction: Radiological, Chemical and Biological.** New York: John Wiley, 2004.

Topics receiving chapter-length treatment include "Nuclear Radiation," "Effects of Nuclear Weapons," "Nuclear Weapons Detection, Protection and Decontamination," "Delivery Systems for Bioweapons," "Biological Weapons Detection, Protection, and Decontamination," "Chemical Agent Safety, Protection, Detection, and Decontamination," and "Summary of Weapons of Mass Destruction." Includes an index.



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ISBN 0-471-46560-7
John Wiley & Sons
605 Third Avenue
New York, NY 10158
Phone: (877) 762-2974 Fax: (800) 597-3299

Lindler, Luther E. et al. **Biological Weapons Defense: Infectious Diseases and Counterbioterrorism.** Totowa, New Jersey: Humana Press, 2005.

The editors devote 21 chapters to exploring a broad range of scientific, medical and legal issues that confront the biodefense community. These challenges are grouped into four major categories: "Preparation and Military Support for a Possible Bioterrorism Incident," "Medical Countermeasures and Decontamination," "Emerging Threats and Future Preparation," and "Diagnostic Development for Biowarfare Agents." Specific topics discussed include modeling bioterrorism incidents, plague vaccines, medical countermeasures for filoviruses, antimicrobials for biological warfare agents, the use of genomics in biodefense, information resources for biodefense, and DNA-based tests for the detection of bioweapons. Includes an index.

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Humana Press
999 Riverview Drive, Suite 208
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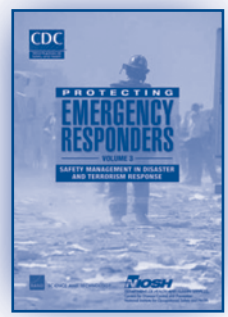
Documents

Jackson, Brian A., et al. **Protecting Emergency Responders. Vol. 3. Safety Management in Disaster and Terrorism Response.** Cincinnati, Ohio: NIOSH, 2004
http://www.cdc.gov/niosh/docs/2004-144/pdfs/2004-144.pdf

"This report addresses the protection of emergency responders against injury, illness, and death on just such occasions, when emergencies become disasters. It builds on a broad base of National Institute for Occupational Safety and Health programs and RAND corporation research on protecting emergency responders. This report focuses on preparedness (especially planning and training) and management as means of controlling and reducing the hazards emergency responders face. It provides a set of recommendations on how disaster site safety and health management might be improved." (Foreword)



CB-193169 through CB-193172 (*individual articles*)
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Disarmament Forum. No. 1, 2005.

This special theme issue on science, technology and the CBW regimes is published by the United Nations Institute for Disarmament Research. Topics receiving chapter length treatment include "The Malign Misuse of Neuroscience," "Assault on the Immune System," and "Biological Weapons and the Life Sciences: the Potential for Professional codes."

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United Nations Institute for Disarmament Research
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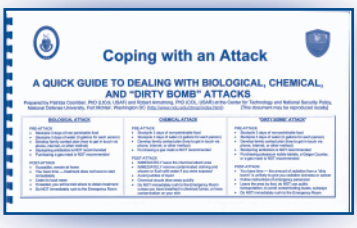
CH-1211, Geneva 10, Switzerland
Phone: +41 (0)22 917 31 86 Fax: +41 (0)22 917 01 76

Coomber, Patricia and Robert Armstrong. **Coping with an Attack: A Quick Guide to Dealing with Biological, Chemical and "Dirty Bomb" Attacks.** Washington, D.C.: National Defense University, 2005.

This seven page document presents in easily accessible tabular form key information about how civilians should cope with three types of WMD threats. For each of the threats the tables describe the nature of the threat, the immediate action to be taken, the symptoms, the treatment if exposed, and whether there is a possibility of contagion. In addition for each type of threat there is a list of key FAQs along with answers.



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History of Detectors *cont.*

with mustard agent. This research, however, was incomplete by the end of the war.[6]

Animal Detectors

Although dogs, pigeons, and canaries could be used to alert soldiers to the presence of toxic chemical agents, one of the more interesting investigations was that of using snails and slugs as chemical agent detectors. The objective was to find an organism that reacted differently to various gases. American researchers reported that "by combining observations on the tentacles, slime production and movements of the organism as a whole, it is possible with a little experience to tell with some degree of accuracy the kind of gas used, and in the case of chloropicrin and mustard gas distinguish certain concentrations of those gases." When a prominent French physiologist was asked to research this possibility, he burst out laughing when told it was the edible kind of snail and said French soldiers would eat the snails first. A test was conducted using French snails, but the conclusion was that the foreign snails were more conservative in their impulse to wave their tentacles. Tiger Slugs, which were a bit more sensitive and more resistant to mustard agent, were also investigated, but like the snail, became "useless" after repeated exposures to mustard agent. The final conclusion was that it "would appear unsafe to place too much reliance on their immediate behavior when placed in the presence of mustard gas in the field."[7]

Automatic Chemical Agent Alarm

The French may have been the first to experiment with a combination automatic detector and alarm. A chemical agent depolarizing electrically charged needles activated the unit. This, in turn, closed a circuit leading to an alarm. The detector portion, however, lacked sensitivity to be reliable for frontline use.[8]

Failure of World War I Field Detectors

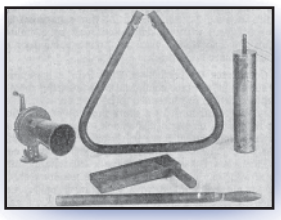
With the establishment of mustard agent as the "King of the Battlefield" during World War I, the need for a mustard agent detector was one of the greatest unfulfilled needs of the war. Augustin Prentiss, a lieutenant colonel in the Chemical Warfare Service, summed up the state of mustard agent detectors during the war and immediately afterwards:

> *The impossibility of detecting mustard gas in the field and the insidious action of this gas, which causes no noticeable symptoms until several hours after exposure, resulted in thousands of casualties in the war which might have been prevented had there been any positive means of detecting mustard and warning troops of its presence. The great importance of this problem caused much effort to be expended in attempts to devise a reliable chemical detector which was practicable for use at the front, but these efforts proved fruitless and the problem still remains unsolved.*[9]

Warning Systems

Sounding the Alert

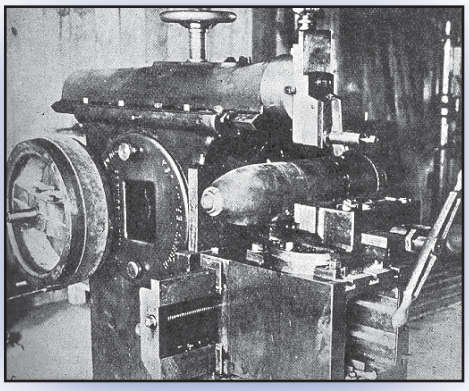
Once chemical agents were detected by either smell or by other means, almost anything that made a loud noise was utilized to alert the troops. This included: horns, rattles, whistles, signal horns, bells, color rockets, torches, sirens, signal lights, and even parachute whistles fired into the air. Some of these alarms, however, created problems of their own. The rattles often sounded like machine gun fire. It was also difficult to distinguish between other non-chemical alarms or loud sounds. For example, a car horn might be mistaken for a gas alarm and result in unnecessary masking.[10]



NBC Reconnaissance

The First Laboratory

On September 26, 1917, General John J. Pershing, Commander of the American Expeditionary Forces (AEF) in Europe, sent the War Department a cable stating: "Send at once Chemical Laboratory complete with equipment and personnel, including physiological and pathological sections, for extensive investigations of gases and powders. . . The laboratory. . .is for local emergency investigations to meet the constant changes in gases and powders used by the enemy and by ourselves." The inability to conduct chemical analysis for frontline troops over 4,000 miles of telegram cable led to the establishment of a European chemical laboratory near the front in 1918. The equipment for the laboratory weighed over 110 tons and consisted of over 1,300 boxes. It took eight freight cars to move the material. This laboratory, located at Puteaux, France, near Paris, proved a great asset to the Chemical Warfare Service. Staffed with chemists, one of the key jobs of the laboratory was identifying new chemical agents used against American soldiers (photograph shows a machine used to open German chemical shells for analysis). Although it was not mobile, it provided basic chemical analytical capabilities to the American Expeditionary Force in Europe and eventually led to the concept of the field laboratory.[11]



Continued pg. 15

Enzymes *cont.*

Bioscavenger's second generation form, however, uses recombinant technology to create the enzyme. Nexia, a Canadian company recently purchased by PharmAthene Inc., created genetically altered nanny goats that produce the enzyme in their milk. Their offspring also inherit that ability. The good news is a liter of the goats' milk may contain as much as 1 to 3 grams of the enzyme.

"This potentially gives us an unlimited source of the enzyme," Ross said. "The objective is to have enough enzyme available for not only the DoD to support four million warfighters, but now ... there's a potential to have a requirement to have 38 million doses for the population of the United States, hence the need to go with a different developmental strategy."

"As with adaptation of any new technology, one always proceeds with cautious optimism," Lenz said.

"It is indeed a human protein bioscavenger that's produced in the milk, but there are subtle differences in the form it takes versus the purified form that comes from human plasma," he said.

"Because it comes from a goat and not a human, the enzyme may be a little different in terms of its structure," said Ashima Saxena of the Walter Reed Army Institute of Research. "The question is whether the material works differently because of these slight differences in chemical structure."

"The plasma-based protein is made in people, so it's expected to be compatible with people," she said. "Goats are different. The milk based protein because it's made in goats may cause a potential reaction."

While researchers are determining if the goat-derived bioscavenger is as effective as the human-derived form, they're also exploring a third approach to harvesting bioscavenger. They're interested in a catalytic form of the bioscavenger whose molecules bind not just one-on-one with nerve agents as the current bioscavengers do, but one that would speed up the breakdown of the nerve agent in the bloodstream and is able to do this again and again.

"When you have the situation where you have one-to-one binding, a large amount of the enzyme is needed for a small amount of nerve agent," Lenz said. "If you can get something that can continuously destroy nerve agents for as long as it's in circulation, you can use less of it and improve its ability to protect."

Researchers have several proteins that they think hold promise, including a mutant form of the bioscavenger whose amino acid sequence is altered so it catalyzes the breakdown of the nerve agent. They're also looking at a naturally occurring human enzyme called PON, for paraoxonase, which catalyzes the nerve agents sarin, soman and VX.

"You're better off going with Mother Nature," said Dr. Bhupendra Doctor of the Walter Reed Army Institute of Research. "Enzymes that scavenge or hydrolyze organophosphates are all 'universal' antidotes, but when you go the mutation route, you have to add five to 10 years to the project because technologically it becomes more difficult. I think we will find a catalytic scavenger; we just haven't looked hard enough."

*This article also appeared in the July 21, 2005 issue of the **Fort Detrick Standard** and has been published with the permission of the author.*

*A related article, "Enzyme Research Shows Promise for Nerve Agent Pretreatment, Decontamination and Detection" can be found in the Spring 2003 issue of the **CBIAC Newsletter**, Volume 4, Number 2, and can be viewed in the newsletter archives on our Web site at http://www.cbiac.apgea.army.mil/awareness/newsletter/intro.html.*

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Community and Scope

SENSIAC serves all of the MST community including all of those organizations and individuals who generate and use information related to MST in defense related activities. MST technologies include the following:

- Passive Optical, Electro-Optical, UV, and Infrared sensors and seekers and their supporting technologies
- Laser based systems for sensing and energy projection
- Radar and passive RF systems and related technologies
- Air acoustic, seismic, magnetic, electric field and gravitational sensors and related technologies
- Optical and infrared materials and detectors
- EO/IR and RF countermeasures
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- Sensor and Data Fusion
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- Missile defense technologies
- Aroma sensors and related technologies
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- X-ray, chemical, and other sensing for homeland defense

SENSIAC services encompass everything from basic physics and phenomenology to training soldiers in the use of actual MST devices.

SENSIAC users are found throughout the military and homeland security community and include uniformed personnel, civil service and contractors supporting these communities. Also included are universities performing research that supports the infrastructure for national defense or homeland security.

Main Thrusts

SENSIAC has five main thrusts:

1) The MST Knowledge Base

2) Information Products and Services

3) SENSIAC Education Program

4) MSS Operation

5) SENSIAC University Research Portal.

MST Knowledge Base

The MST knowledge base consists of both basic and refined information regarding MST. SENSIAC is a value added center that is charged with anticipating the information needs of the community and synthesizing information products to satisfy those needs. SENSIAC has a library of over 60,000 documents that are being migrated to a machine-readable knowledge base indexed by an MST ontology that will enable the SENSIAC user community to rapidly access pertinent information. SENSIAC also maintains an extensive expert network of subject matter experts covering the entire MST field which is available to users upon request.

Continued pg. 15

SENSIAC *cont.*

Information Products and Services

SENSIAC products and services include on-call problem solving, automated alerts, knowledge based products, and the SENSIAC Newsletter of Military Sensing. Also included is the distribution of MST models and simulations such as the well-known NVTherm model for infrared sensors. SENSIAC's products and services include research, analysis, development, prototyping, training, consulting, T&E, and direct support activities provided through Technical Area Tasks (TATs). SENSIAC can support the military sensing needs of both Government and private sector organizations that themselves support national defense or homeland security through the TAT process.

Education Program

The SENSIAC Educational Program provides continuing education to satisfy the MST community's needs for training and technological update. The program includes individual course contributions from the SENSIAC multi-University team spanning the entire MST field. The program is intended to provide continuing education, help fill the mentor gap arising from the hiring freezes of the 1990s, address paradigm shifts in conflict and resulting design, and introduce new technological advances becoming available on a daily basis. The multi-university program includes both individual courses and certificate programs. The program is being initiated in 2005 with over 40 individual courses in radar and EO/IR technologies.

MSS Operation

SENSIAC operates the eleven (11) meetings of the Military Sensing Symposia and produces the classified and unclassified proceedings thereof. Conferences are operated at the SECRET level but can entail adjuncts at higher levels of classification as needed. This provides the much-needed opportunity for government and industry experts to meet and exchange technical information on related projects. The proceedings of the MSS meetings provide the most comprehensive record of the advances in MST available on a classified level.

University and Research Portal

The SENSIAC University Research Portal is designed to enhance the introduction of 6.1 research into the formal development process and foster communication between university researchers and the MST community.

For further information on SENSIAC and its ability to serve your military sensing information needs, go to http://www.SENSIAC.gatech.edu or contact:

David Shumaker
SENSIAC Director
(404) 385-7367 or 7370
(404) 520-1675
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History of Detectors *cont.*

Notes

[1] Aaron J. Ihde, *The Development of Modern Chemistry* (New York: Harper & Row, 1964), 21-28, 32.

[2] Ibid., 232-233.

[3] Ibid., 182-183, 189-190, 233-235, 291.

[4] "Detection of Gases," *Chemical Warfare* 5, no. 3 (1920): 1; Amos A. Fries and Clarence J. West, *Chemical Warfare* (McGraw-Hill Book Company, Inc, 1921), 416; War Department Document No. 999, *Chemical Warfare, Part VI, Defense Against Gas*, January 1920, 17.

[5] Melvin M. Falkof and Bernard Gehauf, *Detectors and Alarms* (Chemical Corps, 1951), 2; Research Division, Chemical Warfare Service (CWS), American University Experiment Station, CWM 15, *Analytical Methods: Chloropicrin and Mustard Gas*, April 1919: 91-97, 106-109, 141-160; Research Division, CWS, American University Experiment Station, Monograph No. I, Revised, *Dichloroethyl Sulfide and Homologues*, Part 1, 30 Aug 1918, 146-150b.

[6] Falkof and Gehauf, 1; Research Division, CWS, American University Experiment Station, CWM 15, *Analytical Methods: Chloropicrin and Mustard Gas*, April 1919: 128-141.

[7] "Gas Detection," Chemical Warfare Bulletin 29, no. 4 (1943): 27; Research Division, CWS, American University Experiment Station, Monograph No. I, Revised, *Dichloroethyl Sulfide and Homologues*, Part 1, 30 Aug 1918, 151-155; Research Division, CWS, American University Experiment Station, CWM 15, *Analytical Methods: Chloropicrin and Mustard Gas*, April 1919: 161-166.

[8] Falkof and Gehauf, 3.

[9] Augustin M. Prentiss, *Chemicals in War*, (McGraw-Hill Book Company, 1937), 187.

[10] Fries and West, 423; Falkof and Gehauf, 3.

[11] Fries and West, 108-109; Hilbert Sloan, *Field Laboratories*, (Technical Command, 1951), 3-10.

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DECEMBER 2005—JANUARY 2006

Product Manager Weapons of Mass Destruction Civil Support Systems (PM WMD-CSS) Commercial Off-The-Shelf (COTS) Modernization Program

The Product Manager, Weapons of Mass Destruction-Civil Support Systems (PM WMD-CSS) is conducting market research to determine potential sources with the capability to provide Commercial-Off-The-Shelf (COTS) Chemical, Biological, Radiological, and Nuclear (CBRN) Equipment that directly protects individuals from the effects of CBRN contamination. This entails Personal Protective Equipment (PPE), CBRN Detection and Identification Equipment, Sampling, and Decontamination Equipment to be utilized by Civil Support Teams. This announcement does not restrict the Government to any resultant acquisition approach. It should also not be construed as a commitment by the Government for any purpose other than market research.

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