CB Quarterly

Edgewood Chemical Biological Center
Aberdeen Proving Ground, MD

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Department of Justice Recognizes ECBC

Also:

- Fieldings and End Item Updates
- Secretarial and Clerical Appreciation Breakfast

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APG Technology Showcase See page 33

Headquarters of the U.S. Army Soldier and Biological Chemical Command is located at the Edgewood Area of Aberdeen Proving Ground, MD. Within SBCCOM's RDA Enterprise are the PM-Soldier Systems, PM-Soldier Support, PM-Force Provider, PM-NBC Defense Systems, Integrated Materiel Management Center, and the Research, Development and Engineering Center (RDEC). The RDEC consists of the Natick Soldier Center and the Edgewood CB Center. This publication is prepared at the Edgewood CB Center, incorporating CB-related information from the entire RDA Enterprise.

We publish this information under the auspices of AR 70-45, R&D Scientific and technical Information Program, which states that "The objectives of the S&TI Program are to—

a. Improve the flow of technical information into, through and from the Department of the Army in order to

(1) Secure economies by reducing RDTE lead time and by eliminating unnecessary duplication of effort,
(2) Improve RDTE program management and execution, and
(3) Support the information needs of scientists, engineers, and managers."

AR 70-45 further states "Department of the Army elements will provide for adequate interchange of technical information among themselves and with their contractors, the other military departments and Federal agencies, and, to the maximum extent consistent with national security, the US scientific, technical, and academic communities."

This document is distributed to over 1,200 addressees throughout the Joint Services, industry, and academic R&D community, and it could be a vehicle to publicize what is going on where you are. Please submit articles to Director, Edgewood Chemical Biological Center, ATTN: AMSSB-RAS-C, Aberdeen Proving Ground, MD 21010-5424, or by electronic mail to cet@sbccom.apgea.army.mil. All submissions are accepted at the discretion of the editor and are subject to editing.

Managing editor is Dr. James J. Savage. For additional information, please contact our copy editor, Ms. Joanne Coale at (410) 436-5385 or DSN 584-5385.

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The CB Quarterly is available on our web site:

http://www.sbccom.apgea.army.mil/RDA/quarterly/index.htm

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DEPARTMENT OF JUSTICE RECOGNIZES ECBC

Working together to protect the United States against terrorist attacks

by Mary Soubie, Kelly Buckingham, and Joanne Coale

The U.S. Department of Justice recently recognized the Edgewood Chemical Biological Center (ECBC) at a ceremony held in April at the Center for Domestic Preparedness in Anniston, AL. ECBC provided assistance to DOJ in training 5,000 first responders to effectively recognize and respond to terrorist incidents involving chemical and biological agents and to enhance the capabilities of state and local jurisdictions to respond to terrorist incidents.

Dr. James J. Savage, ECBC, and Mr. LZ Johnson, Director, Center for Domestic Preparedness, at the COBRA Training Facility, in January 1999.

Specifically, ECBC provides an on-site liaison as well as technical assistance in the areas of chemical agent risk management, chemical agent applications, and equipment consultation and testing.

SBCCOM initiated an Interagency Agreement with the Department of Justice in 1998. A significant milestone was reached exemplifying the commitment of the partnership last fall when SBCCOM played an integral part in preparing the Center for Domestic Preparedness for a surety inspection by the Army Inspector General.

The Center for Domestic Preparedness received an excellent rating and was recognized as a model for future inspection sites to follow. ECBC will continue to provide its expertise and technologies to the Justice Department to help the nation and its communities prepare for a terrorist incident. SBCCOM has more than 50 years of experience in responding to chemical and biological incidents and assists a variety of public and private organizations in preparing for such incidents.

Presenters and speakers at the ceremony included: Senator Jeffrey Sessions and Congressman Robert Riley of Alabama; the Honorable Mary Lou Leary, Acting Assistant Attorney General, Office of Justice Programs; Mr. LZ Johnson, Director, Center for Domestic Preparedness; and Mr. Michael Parker, Deputy to the Commander, SBCCOM.

Senator Sessions and Mr. Parker

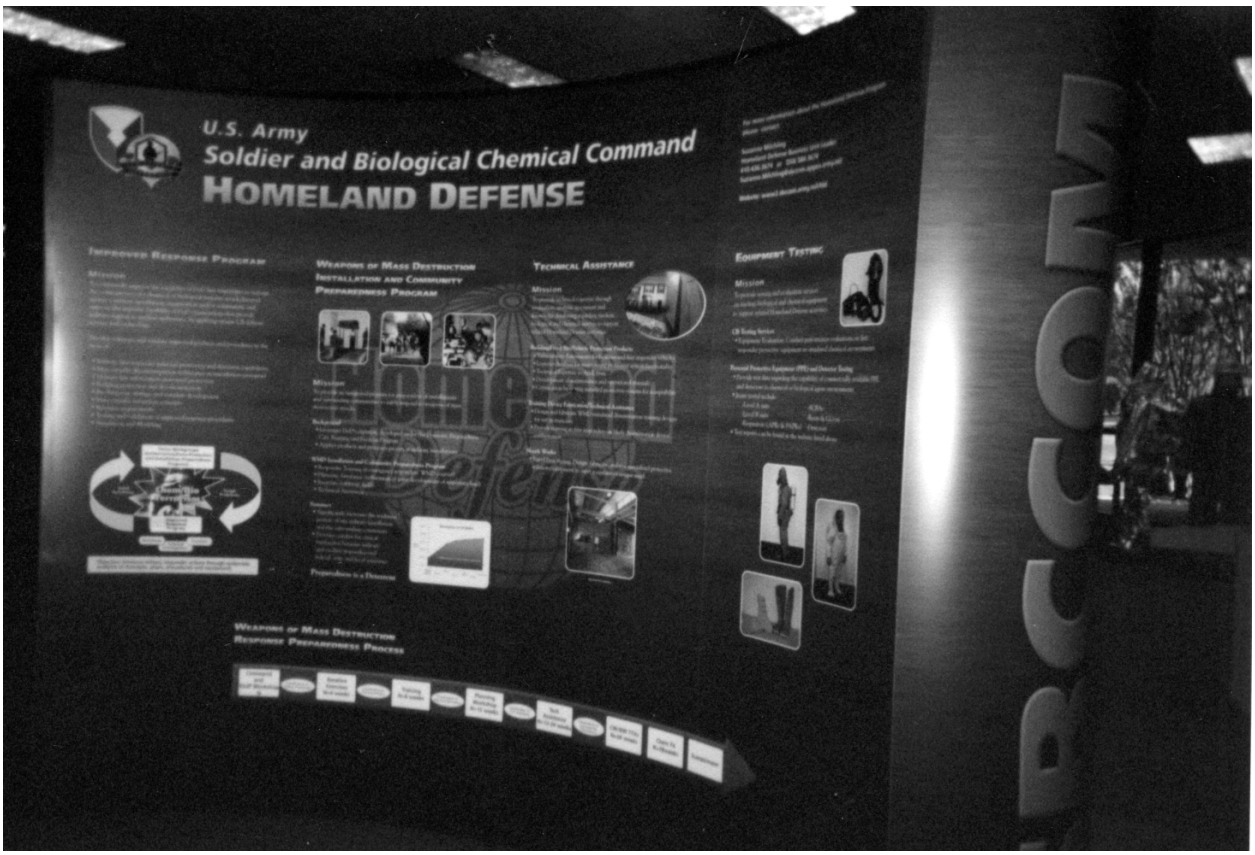
During the celebration, Mr. Parker presented Mr. Johnson with a Commander's coin on behalf of Major General John Doesburg, SBCCOM Commander, to commemorate the event and to recognize the partnership between ECBC and the Center for Domestic Preparedness.

ECBC team (*left to right*): Mr. Jim Zarzycki, Mr. Rod Pearce, Mr. Michael Parker, Ms. Mary Soubie, Dr. James Savage, Ms. Emma Forrest; and Mr. George Collins.

Prior to the celebration, SBCCOM unveiled an exhibit that will permanently reside at the Center for Domestic Preparedness headquarters. This exhibit highlights areas within SBCCOM that play an important role in the fight against domestic terrorism. First, ECBC's Chemical Biological Applications and Risk Reduction (CBARR) Business Unit has provided extensive expertise and assistance to the Center for Domestic Preparedness' Chemical Ordnance Biological Radiological Training Facility (COBRATF) where responders train in an actual chemical agent environment. As the recognized leader in applying CB solutions, the CBARR offers a variety of services that include Hazard Analysis/Risk Assessment, Development of Standards and Test Criteria for CB Respiratory Protection, Environmental Safety and Health Program Assessments, Development of Safe Methods and Procedures for CB response, Comprehensive Chemical and Biological Training Programs, Chemical Agent Monitoring and Personal Protective Equipment Servicing.

Second, ECBC's Homeland Defense Business Unit features their Weapons of Mass Destruction Installation and Community Preparedness Program, Improved Response Program, technical assistance in building and vehicle protection, training device fabrication and rapid prototyping, and equipment testing services.

The third module of the exhibit centers around formal agreements, developed and maintained by ECBC's AP&I Directorate, between SBCCOM and various organizations within the Department of Justice. Information on ECBC's successful Technology Transfer Program is also available as well as specific SBCCOM partnerships in the area of emergency response.



For additional information, please contact Dr. James J. Savage, Commercial (410) 436-2456, DSN 584-2456 or email james.savage@sbccom.apgea.army.mil.

ECBC'S PROCESS ENGINEERING FACILITY TO PRODUCE RECOMBINANT DENGUE ANTIGENS

Treatment strategies can be radically enhanced by the quick identification of an infection as dengue

by Dr. James J. Valdes

Dengue viruses belong to the family Flaviviridae, and are the mosquito-borne causative agents of yellow fever, West Nile virus, St. Louis encephalitis, and Japanese encephalitis. They are found in the tropics and subtropics worldwide, including Mexico and South Texas, and the World Health Organization (WHO) labels these viruses "a major international public health concern." With two-fifths of the world's population at risk, the WHO estimates that there are 50 million cases of dengue infection annually worldwide.

There are four serotypes of dengue. Recovery from infection by one serotype confers life-long immunity against that serotype but does not provide the same against the others. Infection with one serotype followed by infection with a different serotype can lead to Dengue Hemorrhagic Fever (DHF), or Dengue Shock Syndrome (DSS), either of which can be fatal. Without proper treatment, DHF case fatality rates can exceed 20%, although with modern intensive supportive therapy fatalities can be reduced to less than 1% (WHO). Treatment strategies can be radically enhanced by the quick identification of an infection as dengue, and accurately ascertaining serotypes can help predict DHF/DSS outbreaks. However, accurate diagnosis of each dengue virus has been very difficult due to the cross-reactivity of the four dengue serotypes and other flaviviruses that co-circulate in endemic regions.

PanBio InDx is a Baltimore based biotechnology company specializing in the production of serological diagnostic kits for tick and mosquito borne infectious diseases. The Edgewood Chemical Biological Center's Molecular Engineering Team (MET) was awarded a contract by PanBio InDx to produce four recombinant dengue virus antigens for use in their diagnostic kits. This work was funded by a Phase I Small Business Innovative Research grant (SBIR) awarded to PanBio InDx by the National Institutes of Health, Department of Health and Human Services. GEO-CENTERS, Inc. was listed as the subcontractor. The MET and GEO-CENTERS, Inc. performed this work at the Process Engineering Facility of the Aberdeen Proving Ground, Edgewood Area. The Process Engineering Facility is a research and development facility dedicated to providing the Department of Defense with equipment and physical plant requirements for research and development of proteins, enzymes, antibodies, and other cellular products.

Current diagnostic tests are based on whole virus antigens which are only flavivirus (i.e., "family") specific. To enhance the specificity of serodiagnosis (diagnosis based on reactions in blood serum), dengue recombinant antigens (DEN) were developed at the Naval Medical Research Center. A small part of the dengue virus envelope protein specific to each serotype was cloned into the bacterium *Escherichia coli*. To simplify the purification process, the cloned gene was inserted downstream from the *E. coli* gene encoding maltose binding protein (MBP) resulting in the fusion protein DEN-MBP, and fusion proteins were created for each of the four dengue serotypes.

The production of each DEN-MBP recombinant antigen was done at ECBC's Process Engineering Facility. The recombinant *E. coli* was fermented in 30L fermentors to

produce a large quantity of bacterial cell mass. During the fermentation process, the *E. coli* was induced to produce the recombinant antigen. After fermentation, the cells were lysed and the cell debris was removed by centrifugation. The MBP of each fusion protein binds to amylose affinity resin during a purification process called column chromatography. Amylose affinity resin is tightly packed into a column and the supernatant from the DEN-MBP producing *E. coli* is pumped through the column. The DEN-MBP fusion protein binds the amylose affinity resin while most of the bacterial proteins wash through the column and exit without binding. DEN-MBP is eluted from the column using a buffer that interferes with MBP and amylose binding.

Because of the high specificity of affinity chromatography, the resulting product requires only one more purification step before it can be considered greater than ninety percent pure. This second step uses a high resolution gel filtration column which separates proteins by size. The movement of protein off each column is tracked by measuring UV absorbance at a wavelength of 280 nm. As the protein exits the column, the UV_{280} will detect it as a peak. A fraction collector collects the protein peaks which contain the recombinant antigen. Analyses are done to measure the concentration of the purified recombinant antigen, to ensure that the antigen is of the correct size and to determine the level of purity. Each purified antigen is tested against human blood sera that has been exposed to the different dengue serotypes to ensure that the anti-dengue antibodies in the sera specifically recognize each of the recombinant dengue antigens.

The purified recombinant dengue antigens were delivered to PanBio InDx for further testing. Delivery of the antigens completed the Process Engineering Facility's obligation to Phase I of the SBIR. If it can be demonstrated that each of these recombinant antigens reacts well in PanBio InDx's detection format, substantially more support may be awarded for clinical trials under Phase II of the SBIR.

For additional information, please contact Dr. James J. Valdes,Commercial (410) 436-1396, or email james.valdes@ sbccom.apgea.army.mil

NEUTRALIZING ENZYMES

Army patents technology designed to neutralize chemical agents

by Dr. Joseph J. DeFrank

The Edgewood Chemical Biological Center (ECBC) patented a technology designed to neutralize chemical agents that may be used in terrorist attacks. The technology consists of neutralizing enzymes that can be added to water or any water-based application system, e.g., fire-fighting foams and sprays, aircraft de-icing solutions, aqueous degreasers or laundry detergent.

In an incident where chemical agents may have been released, these enzymes can be used by first responders, such as firefighters, police, bomb squads, and hazardous material response teams, to quickly neutralize the agents before they have a chance to contaminate a wider area. Catalytic enzymes can be developed to neutralize a wide range of chemicals. The patented technology is designed to work against organo-phosphorus nerve agents and pesticides. In addition, the technology is non-toxic, non-corrosive, environmentally safe and affordable.

On page 35, read about the international symposium we held on the application of enzymes in chemical and biological defense.

The U.S. Army is now looking to enter into licensing agreements with fire-fighting foam manufacturers and research and development firms to make this technology available for commercial use.

For additional information, please contact Dr. Joseph J. DeFrank, Commercial (410) 436-3749, DSN 584-3749 or email joseph.defrank @sbccom.apgea.army.mil.

PYROLYSIS-GAS CHROMATOGRAPHY-ION MOBILITY SPECTROMETER

A shoebox size biological and chemical agent detector

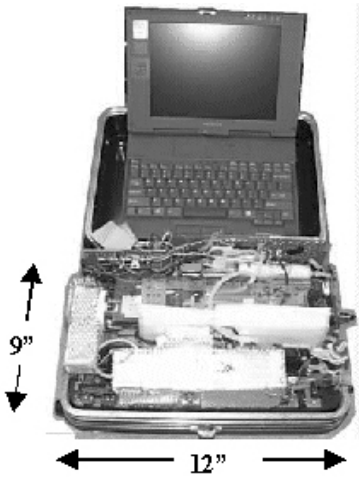
by Dr. A. Peter Snyder

The ECBC is currently developing a device to perform both biological warfare and chemical warfare agent detection in the field.

The device, which is easy to operate, is comprised of a quartz tube pyrolysis-gas chromatography-Chemical Agent Monitor ion mobility spectrometer or Py-GC-IMS. It is an outdoor, autonomous, stand-alone system that performs trigger, detector, and classification functions for biological aerosols and identification for chemical aerosols and vapors in pure compound and mixture form.

The Py-GC-IMS system works on a very simple principle of "sniff and tell." Heating the biological agent to about 400 ºC (pyrolysis) produces the "sniff" vapors. For chemical agents, the vapors are present in the air, so no heating is required. The "sniffed" vapors are injected into a gas chromatography column where the vapors are separated into individual compounds. These compounds are then sequentially introduced into a standard military issue Improved Chemical Agent Monitor (I-CAM), which identifies the compounds (e.g. DNA, proteins, spore picolinic acid, chemical warfare agents).

The Joint Field Trials-6 (JFT) in Canada provided an outdoor bioaerosol test site for the XM-2 and XMX aerosol concentrators interfaced to separate Py-GC-IMS systems.



The Py-GC-IMS detection results are encouraging in that indi-vidual and mixtures of bio-simulants (BG, Erwinia herbicola and ovalbumin protein) were detected even in the presence of smoke interferences.

The system is scheduled to transition to the Joint Biological Point Detection System for Engineering Material Development in FY02. Other applications include antiterrorism and counterproliferation.

Features:

- Uses I-CAM as the detector
- Characterizes biological threat agents, such as anthrax
- Identifies chemical agents
- Compact size, 10 lb, 0.3 ft^3, includes palmtop computer
- 1-5 ACPLA of BG and EH detected
- 1 ppb chemical vapor sensitivity
- 120 W power
- Field proven (JFT 4, 5, and 6)
- Fast detection (3 min biodetection, 10 sec chemical identification)
- Modular
- Cost $15 K in quantity
- Full wireless remote operation
- Minimal post data processing
- Minimal operator training
- Fast deployment (under 10 minutes)
- No chemicals required
- Solid, aerosol, liquid or vapor sample analysis

For additional information, please contact Dr. Peter Snyder, Commercial 410-436-2416 or DSN 584-2416, or by E-mail to apsnyder@sbccom.apgea.army.mil.

NBC BATTLESPACE DIGITIZATION

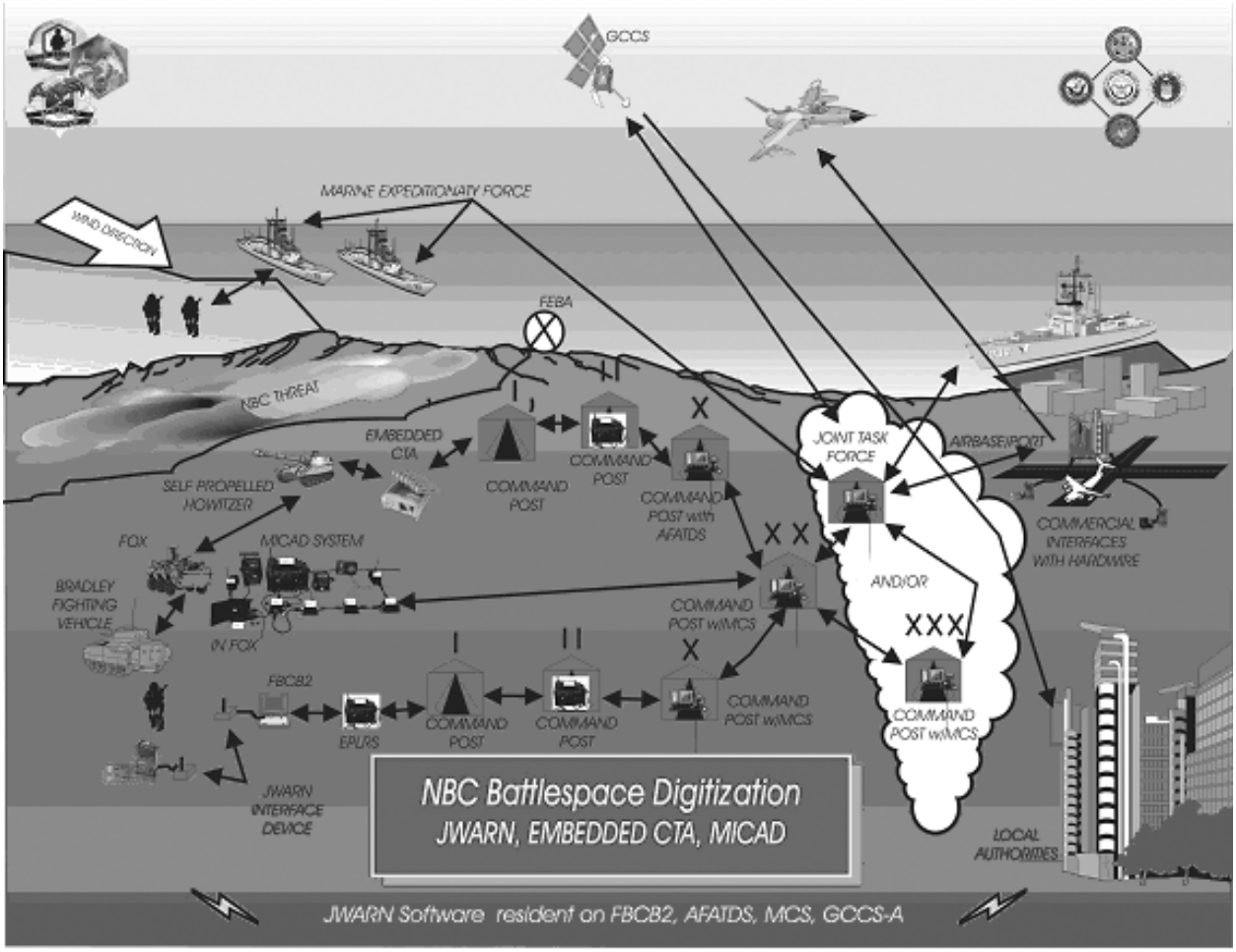
BATTLESPACE information is vital to tactical, operational, and strategic warfighting

by Russell Williams, Romel Gallamoza, Edward Conley, and Richard Noel

Joint Vision 2010/2020 focuses on information superiority as the key to victory. Traditionally, battle space information has been provided by text and voice communications. But, in Joint Vision, digital information and communications systems will undoubtedly become the American warfighter's best defense – fusing all source intelligence with sensors, platforms, and command and control systems. In fact, these systems will give commanders and warfighters an unsurpassed view of the Battlespace.

Networking of command and control elements will allow the entire force to operate in concert, giving leaders a clear picture of operations, so they can act quickly and decisively.

One of the new thrusts in force digitization is the communication of detected nuclear, biological, and chemical (NBC) threats. Using networked communications systems, sensors mounted on the ground or on combat vehicles will alert ground forces of potential contamination in a fraction of a second. Within moments, these systems will send data through the tactical internet to command



operation centers for automated processing, then relay precise, nearly instantaneous NBC hazard zone predictions back to the affected forces on the battlefield. Additionally, the network will notify local civilian authorities in the hazard area. The NBC hazard warning and reporting system will greatly enhance the warfighter's ability to fight and survive on the NBC battlefield.

NBC Force Digitization Thrust. The Joint Vision requirement of information superiority can only be met by the digitization of the BATTLESPACE, including the NBC arena. The Army's PM-NBC Defense Systems is supporting several programs to meet the goals of NBC Battlespace Digitization. Among these programs are the Joint Warning and Reporting Network (JWARN) and the Multipurpose Integrated Chemical Agent Alarm (MICAD).

JWARN. As an important step toward the goal of NBC Battlespace Digitization, the JWARN program provides a standardized NBC warning and reporting package across all services, provides capabilities for enhanced downwind prediction and battle management, and interfaces with command and control systems and NBC sensor devices. The JWARN program is divided into multiple blocks to push these needed capabilities to the field more quickly.

JWARN Block I is an interim COTS/GOTS package that will be used until the objective JWARN is developed and procured under the JWARN Block II program. JWARN Block I is divided into three variants:

• JWARN Block IA is a DOS and 16-bit Windows bundle that provides basic capabilities NBC warning and reporting and downwind hazard prediction

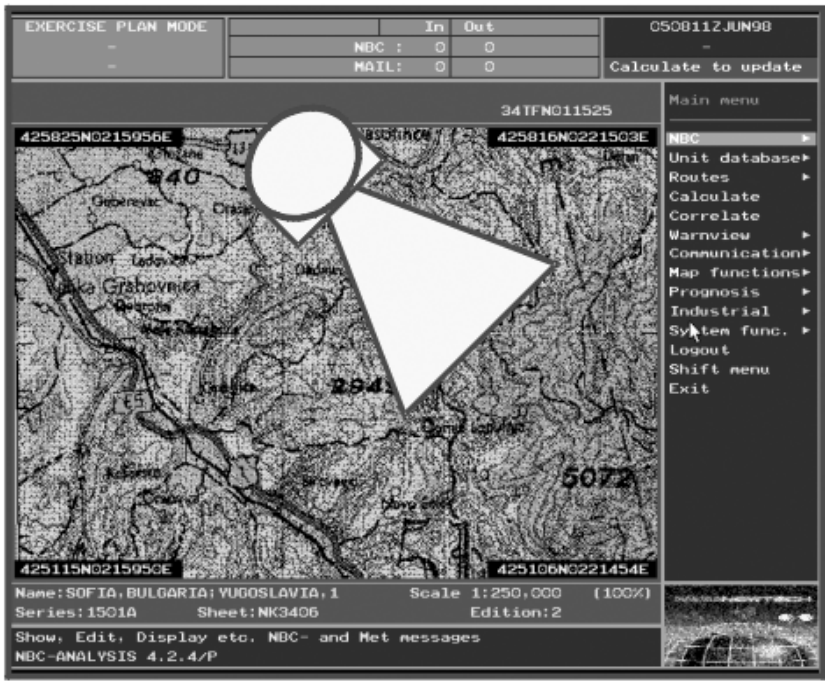
• JWARN Block IB is a Unix variant that was integrated with the Army's Maneuver Control System (MCS).

• JWARN Block IC is a 32-bit Windows bundle that extends the capabilities of JWARN Block IA

Starting in June 1998, with the release of the initial JWARN Block I software, JWARN has been acquired for all services.

JWARN Distribution, Training, and Support. PM NBC Defense Systems provided over 600 copies of JWARN to the field and trained hundreds of soldiers to use the various versions of JWARN.

With the arrival of Blocks IA and IC, the Marine Corps Systems Command (MARCORSYSCOM) provided Instructor Key Personnel Training (IKPT) for each service. The IKPT was limited in availability and time due to the available funding and the expected arrival of the JWARN Block II program. PM-NBC Defense Systems coordinated formal JWARN Block IC training to six Army garrisons, and MARCORSYSCOM contractors conducted the training. The training period lasted 8 months. After the training contract ended, it was up to PM-NBC Defense Systems' subject matter experts (SMEs) to provide the remaining JWARN Block IC instruction. The JWARN



instructor base has expanded to PM-NBC Defense Systems' New Equipment Training (NET) and Fielding Team. Training is conducted on a request basis only.

PM-NBC Defense Systems has provided or coordinated JWARN Block IA and IC support in warfighter exercises. PM-NBC Defense Systems has supported the use of the IA version by the 32nd Army Air and Missile Defense Command (32nd AAMDC) for their Home Station Training (HST) for Roving Sands. Block IC training and support was provided to 4ID Division Chem. Later, 4ID participated in Ulchi Focus Lens (UFL) and PM-NBC Defense Systems provided JWARN support. The V Corps used JWARN in Warrior Focus and V Corps Battle Command Training Program (BCTP) and again, PM-NBC Defense Systems provided training and support. The most needed type of JWARN support was in communication networking. NBC Analysis is the only JWARN software that has the capability to directly connect to a Local Area Network, serial interface, Mail Application Program Interface (Microsoft Outlook, Exchange, etc.), and modem. The Government off-the-shelf (GOTS) software has cut and paste functions where the user can put NBC plots on any Windows application like Power Point, Word, Corel Draw, etc.

Although PM-NBC Defense Systems supported and continues to work with Army users, there is a JWARN help desk that supports users from all services. Marine Corps Tactical Systems Support Activity (MCTSSA) provides live 24 hours a day and 7 days a week technical support. There is a toll free number for immediate help, and there is also an E-mail address for getting JWARN support. The JWARN Help Desk number is 800 808-7634. The JWARN E-mail address for technical assistance is c4ihelpdesk@mctssa.usmc.mil. Comments for improvement are also welcomed by E-mail or phone. Another avenue for obtaining JWARN technical support or sending comments are the JWARN Integrated Process Teams (IPTs). Each service has one. The Army JWARN IPT representatives are from PM-NBC Defense Systems. They can be used to formally solicit JWARN Block I software, technical support, training, and software improvements. To obtain JWARN Point of Contact information, go to the web site: http://www.sbccom.apgea.army.mil/RDA/pmnbc/products.htm and click on the JWARN section under Program Director (PD) Detection.

Other JWARN Efforts. PM-NBC Defense Systems realizes that it will take time to integrate JWARN Block II into the Army C4I infrastructure; so to bridge the gap, PM-NBC Defense Systems will build upon JWARN Block IB to integrate with other systems within the Army Battle Command System (ABCS). For example, JWARN Block IB for MCS will continue to evolve with the latest and future versions of MCS because the ACBS continues to march in evolutionary steps.

In addition, JWARN IB has been ported to the Force XXI Battle Command Brigade and Below (FBCB2) environment for the NBC Reconnaissance Systems. Work is on-going to integrate JWARN Block IB with the FBCB2 services similar to that in MCS. Upon completion of this effort, the JWARN software will reside on FBCB2 systems throughout the Army to provide a comprehensive NBC warning and reporting network.

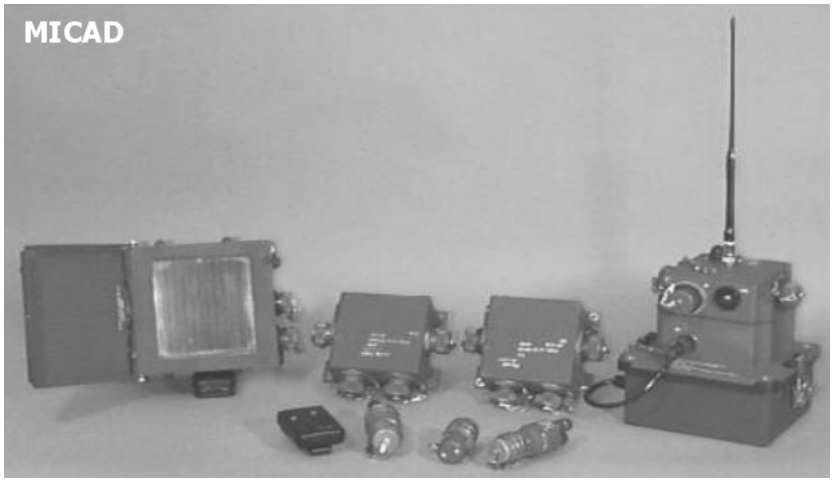
Other planned efforts include integration with MCS-Light and Global Command Control System – Army (GCCS-A). Other efforts are also being considered. For example, there has been interest in integrating with GCCS, Air and Missile Defense Warning System (AMDWS) and Advanced Field Artillery Tactical Data System (AFATDS).

JWARN User Feedback. Within the last 3 years, JWARN Block I software was distributed to users from all the Joint Services and to U.S. Government Agencies. Ease of use and rapid calculation of NBC plots has made NBC-Analysis the most popular software in the JWARN package.

Feedback from the field indicates a strong desire to merge JWARN with their C4I systems. For example, 4ID can use JWARN effectively if it is integrated with MCS and FBCB2. 32nd AAMDC could

provide more adequate warning to subordinate units if JWARN were an application in AMDWS and GCCS.

PM-NBC Defense Systems has responded to these needs by initiating integration with additional C4I systems. JWARN will not only be integrated in a major C4I system such as MCS but will be integrated in FBCB2, MCS-Light, and GCCS-A. More C4I systems will surely follow.



Background, left to right: Display control, universal interface unit, communication interface unit, and telemetry link radio.
Foreground, left to right: Personnel alarm, output binding post, terminator, and input binding post.

MICAD. MICAD is the first step for digitizing the NBC battlefield. It automates NBC detection, warning, and reporting in armored vehicles, tactical wheeled vehicles, vans and shelters. Using standard detectors or sensors, MICAD automatically detects a threat, issues a local alarm (both within a vehicle and to dismounted troops), senses its position, and formats and digitally transmits NBC messages over tactical communication networks to command and control systems at higher headquarters. The modular components of MICAD require a minimum of human interaction for operation and maintenance. The size of the components permits them to be located in any available space (under platforms, behind equipment, under seats, etc.), which greatly simplifies integration with existing host systems.

MICAD Distribution, Training and Support. The M27 MICAD is an integral part of the M93A1 NBCRS Fox vehicle and is currently fielded with the M93A1 at multiple sites within the U.S. Army and with the U.S. Marines at Camp Pendleton, CA. The MICAD information is incorporated in the M93A1 Technical Manuals and is trained as part of the M93A1 training course.

The M32 MICAD was fielded to the U.S. Army 4th Infantry Division at Ft. Hood, TX, as part of the U.S. Army's First Digitized Division (FDD). The distribution within the 4ID consists of 56 systems in HMWWV's and M1068 shelters. Fielding to HMWWV platforms was conducted in November 2000, and PM-TOC began installations of MICAD in M1068's in February 2001. MICAD Technical Manuals were provided and New Equipment Training was conducted at Ft. Hood in October 2000 in support of all 4ID MICAD systems. The MICAD system participated in the FDD Division Capstone Exercise (DCX) I in April 2001.

The support for MICAD hardware installed on vehicles comes in two parts. First, all MICAD hardware comes with a 1-year warranty. When a unit determines that an item is not functional they will notify the PM. The PM will coordinate the defective item's return to the production contractor for repair. In addition, the PM has MICAD assets that permit us to provide the user with an immediate replacement while the repair process is ongoing. Second, MICAD spare and repair parts are being purchased and placed in the Army's supply system to support MICAD. The MICAD is utilizing life-cycle Contractor Logistics Support (CLS). Beyond the warranty period, all depot level MICAD repairs will be conducted through CLS. The unit will order replacement components through the Army wholesale supply system.

The Way Ahead. To effectively meet the goals expressed in Joint Vision, the digitization of the NBC battlefield must occur. This digitization will be most effective if the concept is implemented as a "system of systems." The NBC battlefield

of the future will no longer contain disparate, stovepiped contamination avoidance systems that require large numbers of soldiers to operate. The NBC battlefield of the future will contain a single NBC battlefield management system. JWARN will be the heart of future NBC battlefield management. As a system of systems, it will integrate advanced hazard prediction models, provide data reachback capabilities, and be capable of processing input from many sensor types, including non-NBC sensors. In the future, JWARN will leverage many of the current advances in computer and information technology. By combining these abilities into a single system, the goals expressed in the Joint Vision will be realized. Information Superiority will be the key to a clear picture of the NBC battlefield.

For additional information, please contact Mr. Romel Gallamoza, Commercial (410) 436-2905, DSN 584-2905, or Mr. Robert Lyons, Commercial (410) 436-6587, DSN 584-6587, or Russell Williams, Commercial (410) 436-2796, DSN 584-2796.

M157A2 SMOKE GENERATOR SET TO TRANSITION TO INTEGRATED MATERIEL MANAGEMENT CENTER

System produces large-area smoke screens

by Willard R. Betts

The Product Manager for Obscuration and Decontamination Systems is in the process of transitioning management of the M157A2 to the Integrated Materiel Management Center (IMMC) at Rock Island Arsenal, IL. The system, known as the M157A2 Smoke Generator Set, produces large-area smoke screens, which can be used by U.S. soldiers to obscure the vision and sensors of enemy forces.

The M157A2 features an innovative method for igniting and burning mid-viscosity fuels, producing heat to vaporize fog oil in the M54A2 generator. The fog oil condenses as an aerosol, producing the smoke screen, when it hits the cooler air providing visual screening. The multi-fuel improvement allows the generator engine to run off of diesel or JP8 fuel rather than MOGAS.

The personnel working on this new method were awarded a patent in 1997, entitled "Multi-fuel Combustion Engine and Use in Generating Obscurant Smoke." Mr. Betts, M157A2 system engineer stated, "In addition to being multi-fuel compatible, the M157A2 incorporates a number of enhancements making it easier to maintain and operate, more reliable, and with lowered operating costs."

The management of more than 800 M157A2 systems will be transitioned to the IMMC by the end of the fiscal year. The IMMC will provide support, as needed, to troops for these systems, including maintaining the spare parts inventory, updating technical manuals, and providing additional training to the troops.

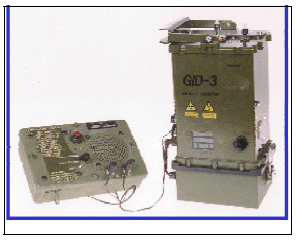
Using standard Army fuel, the M157A2 can produce up to 90 minutes of mobile visual obscuration without refueling. Six systems can screen an area of approximately 5 km^2.
The Army's first mobile smoke system, the M157, was fielded in 1986. In 1991, the Army began a program to improve the reliability of the system. In July 2001, the Product Manager for Obscuration and Decontamination Systems will complete the upgrade of all fielded systems to the M157A2, which includes an improved fuel filter/water separator assembly that protects the fuel pump, several engine improvements, and a smaller control panel.

For additional information, please contact Mr. Richard Dixon, Commercial (309) 782-7153, DSN 793-7153 or E-mail dixon@ria.army.mil

M157A2 Smoke Generator Set

FIELDINGS...

 M58 Smoke Generator	APS 3, Goose Creek, SC POC: Peter F. Annunziato AMSSB-PM-RSM, DSN 584-2362	Jul 01
 M157A2 Motorized Maintenance Work Order (MWO)	Boston, MA POC: Peter F.Annunziato AMSSB-PM-RSM, DSN 584-2362	Jun 01
 Light Vehicle Obscuration Smoke System (LVOSS)	Bahrain (FMS) Ft. Riley, KS Ft. Bliss/Hood, TX Cml School, Ft. Leonard Wood, MO Ft. Hood, TX POC: Henry St.Pierre AMSSB-PM-RSM-R, DSN 584-5527	Jun 01 Aug 01 Sep 01 Sep 01 Nov 01
 Driver's Vehicle Enhancement	Cml School, Ft. Leonard Wood, MO Ft. Bragg, NC Ft. Hood, TX Ft. Campbell, KY Anniston, AL POC: Randal H. Loiland AMSSB-PM-RSM-M, DSN 584-2806	Jun 01 Aug 01 Sep 01 Oct 01 Nov 01

 Improved Chemical Agent Monitor	USARPAC, Ft. Shafter, HI 10th Mtn. Div., Ft. Drum, NY Ft. Richardson, AK POC: CPT Scott Morris AMSSB-PM-RNN-T, DSN 584-6551	Jun 01 Jul 01 Sep 01
 *M22 Automatic Chemical Agent Alarm*	IBCT-1, Ft. Lewis, WA I Corps, Ft. Lewis, WA 4th ID, Ft. Hood, TX 2nd ID, Korea 1 25th ID Ft. Shafter, HI POC: CPT Scott Morris AMSSB-PM-RNN-A, DSN 584-6551	Jun 01 Aug 01 Sep 01 Oct 01 Dec 01

AMC ARMY ELECTRONIC PRODUCT

Network of fielded CB defense equipment

AMC's password-protected Army Electronic Product Support or AEPS Network, http://aeps.ria.army.mil, incorporates the Soldier and Biological Chemical Command or SBCCOM web site for fielded Chemical Defensive Equipment (CDE). The SBCCOM website contains the latest up-to-date information, such as the Chemical Go-to-War Program, Shelf Life Information, Advisory Messages, Demilitarization instructions, and all kinds of CDE product information.

The user-friendly website is designed to keep the customer informed about their equipment, points of contact, as well as related hyperlinks. This website is password protected; however, the user can apply on line using the access request form and gain access in a short amount of time.

The SBCCOM Home Page is continuously adding new information, diversified functions, and providing the user with a valuable CDE resource.

If you have problems, questions, or comments concerning this website please contact Len Guldenpfennig, guldenpfennigl@ria.army.mil, Commercial (309) 782-7180 or DSN 793-7180 or Mary H. Wischoff, wischoffm@ria.army.mil Commercial (309) 782-1936 or DSN 793-1936.

For general information on SBCCOM products, please visit our public web site at http://www.sbccom.army.mil/products/index.htm

NBC DEFENSE EQUIPMENT

Contamination Avoidance –

M22 Automatic Chemical Agent Alarm – Wipe test requirements for chemical agent detectors is posted on the web page for the M22 ACADA at http://www.sbccom.apgea.army.mil/products/m22.htm

M272 Water Test Kit – The Configuration Control Board and the Configuration Manager extended the shelf life of the M272 Water Test Kit from 5-6 years. After real-time surveillance testing, the water test kit is confirmed to have a reliable shelf life of at least six years. A message will be sent out to inform field users and storage depots of the shelf life extension. Real-time Surveillance Testing will continue on kits 6 years and older to determine if shelf life can be extended further. Savings will be realized as a result of this shelf life extension as procurement of new kits can be delayed.

NBC Marking Kit -- The government has approved the limited First Article Test (FAT) on the NBC Marking Kit from Pluribus, Inc. The government waived the full FAT since Pluribus is using the same tooling and manufacturing equipment from the last contract, and has been the sole U.S. producer of this kit. Instead of the full FAT, Pluribus sent one kit to the SBCCOM-RI Detection/Decon team for inspection and testing. A second kit was inspected and tested at the contractor's plant and witnessed by the government Quality Assurance Representative. The Detection/Decon team performed inspections and tests on the kit and found it meets all requirements called out in the FAT. This simplified way of doing the FAT results in cost savings and also expedites delivery. The NBC Marking Kit contains flags, ribbons, and stakes and is used to mark areas suspected of chemical warfare agent contamination.

M93 Simulator -- The Acting PM-NBC Defense Systems signed a Memorandum of Agreement with PM-Combined Arms Tactical Trainer to formalize the relationship in the effort to design, develop, and field the M93 Simulator at Ft. Hood.

AN/UDR-13 RADIAC APTEC - NRC completed delivery of the FY01 contractual requirements. These were delivered 13 months ahead of schedule.

Individual Protection –

M40/42 Series Mask –

• A new part is being developed for the M40/M42 Series Mask, which enables the user to repair unserviceable face pieces. Cost to replace these face pieces is approximately $67 to the user. As an interim solution, we are providing nosecup repair kits until the new part is available. As of April, nosecup valve seat repair kits continue to be requested. To date, over 8,000 valve seats have been shipped to customers at an estimated savings directly to the customer of over $350K. This effort will continue until the Nosecup Valve Seat Improvement operating and support cost reduction (OSCR) is completed.

• In May, a delivery of 5,500 Skull Cap Head Harnesses was received from the contractor, Cambria County Association for the Blind. All back orders were released. Back orders had accumulated because the U.S. Air Force adapted this head harness as the standard for their masks, creating an unforeseen demand.

M43 Chemical-Biological Aviator Protection Mask – Masks repaired with alternative adhesives subjected to thermal shock testing and rough handling were examined visually and found to contain no defects. Masks that are currently undergoing 30-day desert and arctic exposures will be examined for defects. All masks will be reevaluated by leak testing, and leakage data will be compared to preenvironmental exposure results.

M48 Chemical Biological Apache Aviator Mask – ECBC personnel observed Emergency Egress (EE) tests conducted to determine an aviator's ability to quickly and safely exit the Apache aircraft in the event of an emergency while wearing the M48 Mask and full MOPP ensemble. A prototype mounting bracket, developed by the Center's Computer Aided Engineering team, was used to mount the M48 Mask's motor blower in the cockpit. The bracket must be able to withstand the g-loading and vibration requirements of the airframe while also featuring a quick release mechanism. Six pilots completed a total of 72 trials demonstrating EE in the pilot and copilot-gunner crew stations of both the AH-64A and D-model Longbow Apache. All of the EE trials were successfully completed in the required 30 seconds.

Collective Protection –

200 CFM Gas and Particulate Filter Unit – As a result of the operating and support cost reduction (OSCR) project performed on the 200 CFM gas particulate filter unit (GPFU), an engineering change proposal (ECP) for the redesigned packaging of the GPFU was approved. The next step of this OSCR project is to incorporate the ECP into existing and future contracts with an anticipated significant saving in GPFU unit price. This is a joint effort among ECBC, Pine Bluff Arsenal, and SBCCOM-RI.

M28 Collective Protection Equipment (CPE) –

• The CPE Team drafted an annex to the existing Supply Bulletin (SB) to cover M20A1 Simplified CPE and M28 CPE systems and components. This SB is being revised as part of a Rock Island effort to update a number of SBs covering chemical/biological defense equipment. A new evaluation methodology for leakage of the Hermetically Sealed Filter Canister (HSFC) is being investigated for inclusion in the SB. The intent is to non-destructively verify the integrity of the hermetic seal on the filter canister.

• In support of the CPE SB, efforts are underway to revise the shelf life codes for 47 part numbers under the M20A1 and M28 CPE. The part numbers reflect end items; (i.e., pre-packaged complete systems, major sub-assemblies, and some second-tier parts). The shelf-life codes are being changed from "0" (meaning non-deteriorating or not determined) to "9" (5 years extendable). The Special Packaging Instructions for the 47 items will be revised to include a shelf life code on the item's outer packaging. The Provisioning Master Record for these items will also be revised.

• Representatives from Edgewood, Natick, SBCCOM-RI, and an Air Force contractor participated in an inspection of M28 CPE Liners at Pine Bluff Arsenal in April. This effort was a follow-on to inspections conducted in December 2000 at Ogden Depot. Liners manufactured by Intellitec Manufacturing were inspected for conformance to construction and workmanship requirements, with emphasis on reported heat-sealed seam separations. The results were consistent with the Ogden inspections last December. There were no defects observed that would impact on the overall serviceability of these liners. A small number of liners manufactured by ILC Dover were also inspected for comparison of workmanship characteristics with similar results. Based on the results of both inspections, no further inspections of Army non-Type II liners are warranted. Detailed results will be included in the final report of the M28 CPE Liner Tiger Team.

• A Statement of Work (SOW) is being prepared to document a modified center section liner configuration to be produced on the Production Products requirements contract. The purpose of the SOW is to support a new Air Force customer requirement. Per customer guidance, an SOW is being prepared in lieu of technical data. The rationale for this approach is that quantities will be small and supportability for these liners is not required at this time. The modified liners will be the same general construction and materials as

existing Air Force configurations, except without vestibule membranes along the sides.

M48A1 Gas & Particulate Filter Unit (GPFU)

• Parmatic Filter Corporation (PFC) passed the retest of production lot 43. This is one of the production lots from 1,800 M48A1 filters that had previously failed destructive gas testing. Rather than a complete teardown of the failed filters, government and PFC engineers used measurable physical characteristics (carbon weight and pressure drop across the filters) to screen the 1,800 filters and drop out filters that did not meet this newly established criteria. Production lots will be retested. While this is not a cost savings to the government (PFC estimates that the approximate value to them is $1,000,000), there is some future value to the government; that is, using physical characteristics to determine if a filter will pass gas testing. This can possibly lead to reduced samples required for destructive testing.

• Two ECPs and two deviations were approved for the M48A1 GPFU in March. The First Article Test Report for the M48A1, under production contract with Hunter Manufacturing Company, was approved by SBCCOM-RI in March. Hunter's first production delivery is scheduled to start in May at a rate of 300 filters per month. The M48A1 Filter is used in armored combat vehicles such as the M1A1/M1A2 Abrams tank.

M19 Particulate Filter – At our request, the Rock Island Arsenal Materials Laboratory recently tested three M19 Particulate Filters. Based on information in some item descriptions (e.g., FEDLOG), users were concerned that filters in our stockpile might contain asbestos. Three of our oldest filters, made in 1981, were tested. The lab determined that none of these filters contained any asbestos. Based on these results, we conclude that the stockpile (composed entirely of filters made in or after 1981) is asbestos-free. We are working to remove reference to asbestos in any descriptions of the M19 Particulate Filter.

M3 Electric Air Heater -- The SBCCOM offices at Edgewood and Rock Island are collaborating on a new design for the packaging of the M3 Heater. The current packaging method is very stringent and is intended to provide protection for long-term storage and worldwide distribution. Historically, heaters were bought strictly as spares and placed in depot storage for an indefinite period. Now, however, heaters are being purchased for the M13A1 Gas-Particulate Filter Units that will be supplied for the new Interim Armored Vehicle. These heaters will be stored from a few months up to 1 year at most, before they are assembled into vehicles. The packaging for these heaters will be modified on this contract to use lesser grade materials that will provide the necessary short-term protection. Implementation of these modified requirements will make this product available faster and at a lower cost. Revised materials are planned to be used in the next production of heaters, due to begin in July.

OBSCURATION AND DECONTAMINATION SYSTEMS

Obscuration –

M8 Floating Smoke Pot – A Configuration Control Board approved an ECP to release the M8 wax-lined Smoke Pot. This covers approximately 1,500 smoke pots that were produced in 1998 with a wax liner and will be restricted to training use for the Chemical School only. The ECP served as the collection point for all of the support documentation required for a Training Release.

Smoke Generating Systems, M56 – A Configuration Control Board approved two ECPs for the M56. One ECP included revising basic item issue HMMWV parts and the other included changing threaded inserts (mainly on power module frame) from cadmium plated to stainless steel (cadmium is no longer available).

Smoke Generating System, M58 – The M58 Smoke Generating System will transition to Rock Island on September 30th.

Smoke Generating System, M157A2 - The M157A2 Smoke Generating System will transition to Rock Island on September 30th.

Projectile, 155mm, Smoke, WP, M110A2 Metal Parts – An approved ECP allows a higher Zinc phosphate coating on the Case, Projectile, Burster, M1E1 Assembly. The contractor is having difficulty meeting low range of coating weight when using the dip method. Increasing the coating weight will provide more protection for the part.

M6 Discharger –

• Planning is underway to transition the M6 Discharger to Rock Island. We are detailing the necessary program documentation as well as funding requirements and a modification of the current contract to support the interim armored vehicle (IAV) for the Brigade Combat Team. Plans are to formally transition the M6 Discharger to Rock Island in FY2002; however, immediate modification of the existing M6 production contract may be necessary to coincide with the IAV production schedule.

• The M6 Discharger installation guide was revised to reflect the current aluminum discharger design. The installation guide is intended to assist host vehicle PMs in integrating the M6 into the vehicle design. The guide was updated to include new figures reflecting the current design, electrical interface requirements, and discharger quantity selection and placement guidelines. The guide was approved for distribution to U.S. Government agencies and their contractors. The updated installation guide was provided to PM-Brigade Combat Team and their contractor to use in integrating the M6 into the IAV family.

XM98/XM99 NL Grenades – Army Cataloging Division issued the following nomenclatures: XM98: GRENADE, LAUNCHER: non lethal, distraction, XM98 and XM99: GRENADE , LAUNCHER: non lethal, blunt trauma, XM99.

LVOSS -- Fourteen LVOSS M305 kits were delivered to the freight forwarder in Sterling, VA, in May for forwarding to Bahrain. Fielding will begin in June, pending arrival of the equipment in country. PM-Obscuration and Decontamination Systems and contractor personnel will install LVOSS onto Bahrain Defense Force's HMMWVs and train their personnel on LVOSS operation and maintenance. The Bahrain Defense Force is paying all fielding costs.

Decontamination –

M291 Decontamination Kit – The Detection/Decontamination Team, SBCCOM-RI, recently received Congressional Plus-up funding in the amount of $1,330,979.00, specifically earmarked for the production of M291 Kits at Pine Bluff Arsenal. Prior to receipt of the Congressional funds, a Procurement Request Order Number (PRON) in the amount of $3.7M had to be initiated to cover this year's production costs. We will now reduce the $3.7M PRON by $1,330,979.00, and return this money to the Army Working Capital Fund (AWCF) to assist in the purchase of the decontaminating powder contained within the M291 kits that is provided as government furnished material.

M295 Decontaminating Kits – In April, the newly formed TACOM-RI Acquisition Review Board examined the solicitation for sorbent decontaminating powder managed by SBCCOM-RI. This solicitation was reviewed because of the high dollar value and the high visibility. The Acquisition Review Board found no major issues or questions with the solicitation. The 108,000 pounds of sorbent powder are being bought to support a War Reserve buy of M295 Kits and will be provided to Pine Bluff Arsenal as government furnished material.

Joint Service Sensitive Equipment Decontamination (JSSED) Program – BG Mattox, Deputy for Acquisition and Readiness, signed the Milestone I package. This milestone package supports Block I of the program to satisfy the JSSED Joint Operational Requirements Document, J5-002-1. All four Services actively support this program.

Standardization:

ASTM Committee D 26 - Halogenated Organic Solvents and Fire Extinguishing Agents. Technical review of a revision to ASTM D5632 Standard Specification for Halon 1301, Bromotrifluoromethane was completed. The nature of the changes in revising the standard was to reflect up-to-date test method techniques and to add explicit reference to the methanol impurity as an organic contaminant. Balloted concurrence was forwarded to the technical point of contact for ASTM D26 main committee on Halogenated Organic Solvents and Fire Extinguishing Agents.

HELP LINES/TOLL-FREE NUMBERS

	Telephone No.	*fax no.*
Chemical Equipment	Germany 0130810280 Korea 0078-14-800-0335 CONUS 1-800-831-4408	1-410-436-3912 (TOLL CALL)
Smoke/Obscurants	1-888-246-1013	1-410-436-2702 (TOLL CALL)
Environmental Quality	1-410-436-6588 (TOLL CALL)	1-410-436-8484 (TOLL CALL)
Operational Forces Interface Group (OFIG)	1-508-233-5341 (TOLL CALL) DSN 256-5341	

PARTNERING...

COOPERATIVE R&D WITH INDUSTRY AND ACADEMIA

Recent achievements and significant actions in our continuing commitment to ***technology transfer*** follow:

Cooperative Research and Development Agreements (CRADA)

In April -

A CRADA was signed with Schwartz Electro-Optics, Inc. The objective is to pursue dual-use applications for the Counter-proliferation Long-Range Biological Detection System to include potential commercial, military, and other government agencies' use.

A CRADA with Claragen, Inc., was signed. Claragen, Inc., is a development-stage biopharmaceutical company and is developing pharmaceutical products based on a recombinant human protein referred to as CC10. The objective of this CRADA is to conduct collaborative R&D towards an optimal fermentation process for CC10 and to collaborate on related issues such as scale-up, purification, characterization, and biological activity.

In May -

A CRADA with Prime Manufacturing Technologies, Inc. (Prime), was signed. Prime is a technology-based manufacturing company located in Savage, MD. The objective of this CRADA is for Prime and ECBC's Computer Aided Engineering Team to conduct collaborative R&D in the areas of rapid tooling and reverse engineering.

We were recently notified that a proposal submitted to DARPA, entitled "High Content Toxicology Screening Using Massively Parallel, Multiphasic Cellular Biological Activity Detector," was selected to receive Phase I funding. The Molecular Engineering Team was selected by the Department of Physics and Astronomy at Vanderbilt University - the project's lead organization - to apply its expertise in assessing in vitro cellular toxicity to perform the initial dose-response and assay validation studies for identifying cell lines that generate discrete bio-signatures on exposure to a wide range of toxicants. Of the seven projects submitted in the original proposal, the Molecular Engineering Team's proposal was one of only two selected by DARPA's external reviewers for funding. A CRADA between ECBC and Vanderbilt University is being established to coordinate the project, which is expected to begin on July 1, 2001.

In June -

A CRADA with Fibertek, Inc., to pursue dual-use applications for the Short Range Biological Standoff Detection System to include commercial, military, and other Government agencies' use.

A CRADA with BioMat Sciences, Inc., was signed. This CRADA is a product of the recent Biotechnology Showcase. The objective of this CRADA is to conduct collaborative R&D in the areas of surface analysis of novel materials for biomedical applications and related product development, testing, and analyses. This R&D will be performed using instrumentation and resources of ECBC's MicroLand.

Test Services Agreement (TSA)

The Technology Transfer Office executed a TSA for the PM-Obscuration and Decontamination Systems with United Defense LP. United Defense funded the PM to test the "Stretch" M113A3 an additional 3,000 miles beyond the scheduled 2,000-mile U.S. Army testing. ECBC has the only technology transfer signatory authority at the Edgewood Area of SBCCOM.

Through another TSA, SRI International will use the unique capabilities of CB Services Directorate to decommission their chemical surety laboratory. Ventilation systems, hoods, refrigerators, filters, test chambers, and similar equipment will be dismantled and decontaminated to a certified safe level.

A TSA was signed between ECBC and Flanders/CSC Corporation to perform simulant testing on filter systems provided by Flanders.

A TSA has been signed with Titan Systems Corporation, DBA Systems Division. The objective of this TSA is to perform obscuration performance measurements on several candidate disseminators in support of a development contract with PM-Obscuration and Decontamination to add a millimeter wave capability to the M56 and M58 Large Area Screening Systems.

POC: Office of Research and Technology Applications, DSN 584-4438, commercial (410) 436-4438

TECHNICAL INDUSTRIAL LIAISON

Small Business Innovation Research (SBIR)

In May, we received four proposals for review as a result of the 00.2 Phase II SBIR solicitation. Evaluations are complete, and selections will be made in July.

Four new Phase I contracts were awarded from the 01.1 SBIR solicitation. These contracts are:

- Chesapeake PERL, Inc. (Title: Mass Customization Biomanufacturing Process)

- Envirogen, Inc. (Title: Integrated Expression & Process Monitoring System for Biomanufacturing)

- South Bay Science & Technology Co. (Title: Optimized OPO Converter for Solid State Standoff CB Sensors)

- Coherent Technologies, Inc. (Title: Compact, Efficient, Rapidly-Tunable LWIR Transmitter)

New Phase II Awards:

EIC Laboratories was awarded a Phase II contract to develop a prototype Joint Service Agent Water Monitor based on the technology of Surface Enhanced Raman Spectroscopy.

Triton Systems was also awarded a Phase II contract to develop a prototype JSAWM based on a "reactive chemical cascade detection process" in which single chemical agent molecules illicit multiple responses from a sensor array.

Soldier APBI

SBCCOM Warrior Systems' APBI was held in May in Nevada. This APBI show cased protective individual and collective equipment, clothing, and integrated soldier and soldier support systems for military and civilian personnel. Camouflage face paint, ballistics items, chemical suits, air beam technology, airdrop leaflet delivery system, space heaters, Objective Force Warrior, and a live demonstration of the Land Warrior system were exhibited. A food safety workshop covered sensor development and efforts within the government to respond to the food safety initiative.

For additional information on the Technical Industrial Liaison Office at Edgewood, please contact Mr. Ronald P. Hinkle, AMSSB-RAS-C, Commercial (410) 436-2031 or DSN 584-2031.

PARTNERING...

INTERNATIONAL COOPERATIVE R&D

The Technical Cooperation Program (TTCP)

Chemical Biological Radiological (CBR) Defense Group

The annual meeting of the CBD Group of The Technical Cooperation Program, was held in June at the Naval Postgraduate School, Monterey, CA. It was hosted by Dr. James Savage, the U.S. National Representative. He and the other national representatives (Dr. Richard Hall, UK, Dr. Robert Angus, CA, and Dr. Brent Paul, AS) reviewed the current and proposed programs of each Technical Panel and Action Group and recommended modifications to the programs where appropriate. In general the National Representatives were pleased with the quadrilateral collaboration and encouraged the members to continue to identify areas for future cooperation. The next annual meeting will be held in Canada in 2002.

http://www.ttcp.osd.mil

NATO, Project Group 31 Meeting

NATO Project Group 31 (PG.31), "Non-Corrosive, Biotechnology-Based Decontaminants for CBW Agents," conducted its 13th meeting in May in Orlando, FL, in conjunction with the Enzyme 2001 conference. PG.31 consists of France, Germany, Italy, Turkey, UK, and the United States and is chaired by Dr. Joseph DeFrank, SBCCOM. The mission of PG.31 is the development of a standardized enzyme-based decontaminant for NATO forces. The primary emphasis of this meeting was to begin planning for a demonstration of enzyme-based decontamination systems for NATO representatives in September 2002. The demonstration will be conducted at the military testing facility near Cazaux, France. Upcoming meetings of PG.31 will be in Rome, IT, 25-26 September 2001, and Paris, FR, in April 2002.

Project Agreements:

Negotiations with Canada are complete on a project arrangement (PA) for the cooperative development of the next Smallpox vaccine. This PA will fall under the US/UK/CA CBR MOU, of which SBCCOM is the executive agent. The development of this PA and the subsequent negotiations was conducted by the Dr. George Famini on behalf of the Program Management Office for the Joint Vaccine Acquisition Program (PMO JVAP). This PA will provide the U.S. with a cost avoidance of approximately $10M. This PA will now be staffed to DA and OSD, with final signature expected in the September/October timeframe.

Ms. Renata Price, AMC, signed a PA between ECBC and the DSO National Laboratories, Singapore, on research related chemical and biological agent water monitoring. This PA, which has been under discussion for approximately 2 years, represents the first substantive collaboration between the U.S. DOD and SN Ministry of Defense, and provides the United States access to several unique SN capabilities. This PA will become effective upon countersignature by SN.

Visits

In April:

MG Andrew Figgures, UK DEC (Land) visited the command to discuss current and future US/UK cooperation in chemical and biological defense. In addition to a tour of ECBC facilities, MG Figgures also received briefings by PM-NBC Defense Systems, Natick Soldier Center (on collective protection), PM-Soldier, and the Aberdeen Chemical Disposal Facility. Key discussions revolved around the potential

for increased cooperation in collective protection, to include both the shelter and the filtration, better cooperation between Land Warrior and FIST, and cooperation on volumetrics. Accompanying MG Figgures were Group Captain Lawrence Barnes, Director Equipment Capabilities NBC, LTC John Wallis, MAJ Elizabeth Morgan, and Mrs. Selina Wright.

In May:

The Canadian Master Gunner Course consisting of about 15 students from the Artillery School, CFB Gagetown, visited the command. This visit provided the students with an understanding of the current and in development NBC Defense technologies within the U.S. Army. Points of interest and briefings given to the students included a Command Overview as well as overviews and briefings from PM-NBC Defense Systems and PM-Obscuration and Decontamination Systems. They concluded their visit at Technical Escort Unit where they were given a Command Overview and tour.

In June:

Approximately 30 participants (students/staff) from the Land Force Technical Staff Course (LFTSC), Royal Military College of Canada, visited. They were led by COL James Holsworth, Director, LFTSCwho indicated a visit to SBCCOM was an integral part of their curriculum to introduce the students to NBCD capabilities. Major points of interest and briefings given to the students included briefings from PM-Obscuration and Decontamination Systems, PM-NBC Defense Systems, and a Research and Technology Overview. The visit concluded with a tour of the Process Engineering Facility.

POCs: Dr. George R. Famini, (SBCCOM RDA), Commercial (410) 436-2552/5376, DSN 584-2552/5376, E-mail george.famini@apgea.army.mil; Susan Luckan (ECBC), Commercial (410) 436-5252, DSN 584-5252, E-mail susan.luckan@apgea.army.mil; and Tom Tassinari (NSC), Commercial (508) 233-4218, E-mail Thomas.Tassinari@ natick.army.mil

NEW YORK CITY PREPARES FOR POTENTIAL BIO-TERRORISM ATTACK

ECBC supported NYC's "Red Ex" exercise in May

by Laurel O'Connor, LTC Joel Wall, and Kelly Buckingham

The Edgewood Chemical Biological Center's Homeland Defense Team supported the "Red Ex" exercise conducted in New York City (NYC) in May. "Red Ex" was an interactive exercise that focused on the progression of response to a biological terrorist (bio-terrorism) attack in NYC.

The purpose of the "Red Ex" exercise was to test executive-level decision-making as well as exercise and validate contingency plans for responding to a bio-terrorism incident in NYC. The exercise also tested the city's crisis decision-making processes, emergency response communication and notification, and their public health surveillance system.

The Homeland Defense Team oversaw the planning and execution of "Red Ex" and provided funding for contractor support to the exercise. Laurel O'Connor, system administrator for the exercise, stated, "'Red Ex' successfully illustrated the types of decisions that will have to be made if the city is a target of bio-terrorism."

State and local participants in the exercise included New York City Mayor's Office of Emergency Management led by NYC Mayor, The Honorable Rudolph W. Giuliani, New York law enforcement agencies, NYC fire departments and Department of Public Health, the New York State Department of Health, and the New York State Emergency Management Office. Federal agencies involved included the Department of Defense, Federal Emergency Management Agency, the Federal Bureau of Investigation, the Environmental Protection Agency, the Department of Health and Human Services and the Center for Disease Control and Prevention.

Exercises such as "Red Ex" are referred to as Federal, State and Local (FSL) exercises and are required by the Nunn-Lugar-Domenici Legislation passed in 1997. The law mandates that the Department of Defense develop and execute an interagency exercise every year for five successive years. The "Red Ex" Exercise was the next to last exercise required by Congress.

For additional information, please contact Ms. Suzanne S. Milchling, Commercial (410) 436-3674, DSN 584-3674 or E-mail suzanne.milchling@ sbccom.apgea.army.mil

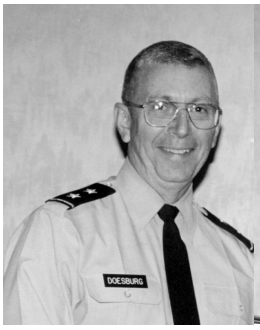
SECRETARIAL AND CLERICAL APPRECIATION BREAKFAST

A delightful way to honor our support staff

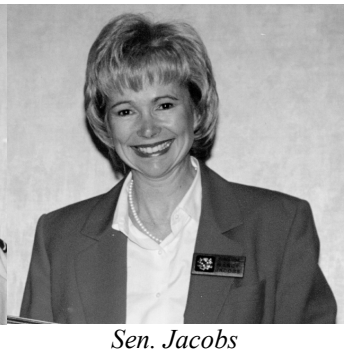
by Joanne N. Coale

In April, the U.S. Army Soldier and Biological Command (SBCCOM) sponsored the annual **Secretarial and Clerical Appreciation Breakfast** at the Richlin Ballroom in Edgewood. SBCCOM's event is held to coincide with Secretaries' Week, which is sponsored by the National Secretaries Association to remind secretaries of their responsibilities to their profession and to bring recognition to secretaries for their vital role in business, industry, education, government, and the professions.

COL Edward W. Newing, SBCCOM's Chief of Staff, introduced MG John C. Doesburg, SBCCOM's commanding general, who gave the welcoming remarks. The invocation was offered by Ms. Theresa M. Lewis prior to the delicious buffet breakfast.



MG Doesburg



Sen. Jacobs

Following breakfast, MG Doesburg introduced the guest speaker, The Honorable Nancy C. Jacobs, Maryland State Senator for District 34. Sen. Jacobs discussed how she had become a politician and provided some insight as to how her life is affected by this career. She emphasized the importance of her support staff and how they enhance her career, enabling her to be successful. She said that SBCCOM's annual breakfast was a wonderful way to recognize our secretarial and clerical staff.

Drawings for special prizes for the secretaries were conducted throughout the event.

Dr. James Savage draws a ticket from the container being held by Ms. Belcher. Secretarial and clerical staff were recipients of lovely flower arrangements and other surprises. Ms. Fran Morris *(insert)* was one of the lucky recipients.

The last event of the morning was of special interest to many of the attendees. It was the presentation on **SBCCOM's Executive Secretary Trainee Program**. Mr. Michael A. Parker, Deputy to the Commander, talked about this program and its inception. Ms. Suzanne L. Schultz had an idea, which she presented to Mr. Parker. He told her to develop a concept plan, which she did; and the program soon became a reality.

Since its inception, 10 secretaries have participated in **SBCCOM's Executive Secretary Trainee Program**. Several of the participants spoke of the

benefits to their career development as a result of participating in this program. Ms. Eva Mims, who completed the trainee program in 1998, was recently selected as the Secretary to the Director of the Edgewood Chemical Biological Center.

Left to right: Mr. Michael A. Parker, Ms. Suzanne L. Schultz, Ms. Eva Mims, and Ms. Churon Ringgold

This special event is made possible by the efforts of members of SBCCOM's Federal Woman's Program committee. This year's members, who deserve a special thanks for an excellent breakfast and program are

Ms. Patricia Belcher
Ms. Emily Fowler
Ms. Mary Hagy
Ms. Karen Kennedy
Ms. Barbara Knapp
Ms. Pamela Lamb
Ms. Theresa Lewis
Ms. Helen Mearns
Ms. Phyllis Ostrom
Ms. Mary Ann Ricketts

Left to right: Ms. Mary Ann Ricketts, Ms. Phyllis Ostrom, Ms. Mary Hagy, Ms. Theresa Lewis, Ms. Patricia Belcher, and Ms. Emily Fowler.

For additional information, please contact Ms. Patricia Belcher, Chairman, SBCCOM's Federal Women's Program, Commercial (410) 436-5639, DSN 584-5730 or email patricia.belcher@sbccom.apgea.army.mil

STUDENTS PARTICIPATE IN PRACTICE SCHOOL

Hands on research opportunity

by Lynn Valcourt

In April, Seven University of Massachusetts students finished the Natick Soldier Center's (NSC) Practice School program by presenting their research findings at the Conference Center.

The presentations were the capstone of the Practice School program that provides a hands-on research opportunity in a research and development environment. Students receive three credits for spending approximately 100 hours conducting an experiment, running tests, drawing conclusions, writing a paper and presenting their findings to an audience of project mentors and professors.

Presentations are open to the NSC work force, and the audience is allowed to question the students on their results and conclusions.

"I learned a lot from the program and would definitely recommend it to others," said Charles Roche, a junior in plastics engineering at the Lowell campus. "The most important lesson I learned was how to give a briefing!" Roche was so impressed with his experience at Natick that he has offered to continue his research during the summer. Other participants have also benefited from the unique practical experience.

"There aren't many opportunities like this that take you out of the academic environment and into a real world setting. With our mentor helping us along, we were able to apply what we've learned in school and use it to make recommendations and actually effect change and in the process, help the soldier," said Patrick Gallagher, UMass-Dartmouth Practice School participant.
It's not only the students who gain from the experience. Rick Cowan, a first-time mentor, said his experience with the students positively impacted his work. "As a first time Practice School mentor, I thought the experience was great because the students came in with fresh ideas and approaches to problem-solving, and given guidance, you get to see them work through various situations," he said.

One of last year's program participants was so pleased with her Natick experience that she has applied for a Career Related Experience in Science and Technology (CREST) internship at Natick. Faculty members are satisfied with the program as well.

"The mentor-student interaction seems to work very well to

enhance student exposure to the real world environment and improve their communication skills," said Alton Wilson, interim chairperson of the Department of Textile Sciences at UMass-Dartmouth. "We have had nothing but complete success with this Natick Practice School/UMass Dartmouth relationship."
The Practice School program is one example of the cooperative spirit between UMass and the U.S. Army Soldier and Biological Chemical Command. Many UMass alumni have chosen career paths with the Natick Soldier Center while maintaining their ties with the university by working on joint projects.

Last year, UMass President William Bulger and Natick Soldier Center Director Philip Brandler signed a Memorandum of Understanding, formalizing and strengthening the relationship between the two institutions. Since the agreement, the Practice School has been expanded to all five UMass campuses across all disciplines. The program is an example of the positive impact students and project officers can have on each other when working together.

The UMass students who completed the program and received an NSC certificate of recognition are:

Development of Facilitated Transport Membranes for Chemical Biological Protection – Debbie Chaves and Catherine Duffy (UMass-Dartmouth), Charles Roche (Umass-Lowell).

Characterization of Camouflage Uniforms through SWIR Camera -- Victoria Tsatsis and Patrick Gallagher (UMass-Dartmouth).

A Blown Film Extrusion Study of Nanocomposites -- James Biggins and Jon Whitney (UMass-Lowell).

For additional information, please contact the Public Affairs Office at Natick, Commercial (508) 233-4300 or DSN 256-4300.

UMass Students, Faculty Advisors, and Natick Soldier Center Mentors

PEOPLE...

On June 26th, Mr. Jim Zarzycki, Director of ECBC, announced that Mr. George E. Collins, Jr., was selected as the new **Director of Chemical Biological (CB) Services** at the Center. In his announcement, Mr. Zarzycki said, "I know I've found the right individual." Mr. Collins brings to the job a wealth of knowledge, a depth of experience, and a passion for his work.

In Mr. Collins, ECBC will have a dynamic individual to lead a vital and complex organization. ECBC's core competency is its ability to work with the most toxic and hazardous materials. First and foremost, CB Services provides the Center with the ability to operate, while ensuring environmental compliance and accomplishing safety, surety, and security management. During the course of his career, Mr. Collins has demonstrated great expertise in these areas and is extremely well respected in the DA safety community. CB Services must be a customer focused organization, satisfying both internal and external clients. Mr. Collins has demonstrated a passion for expanding the CB Services business base, which now includes such external clients as the Department of Justice, DTRA, the Corps of Engineers, and PM-Non-Stockpile.

And finally, Mr. Collins is an individual who has people and administrative skills that will bring further efficiencies to service functions that are also an important part of the CB Services mission. These include our Library Operations, the Administrative Office function, the Property Book Operations management function, and the Facilities and Logistics management function.

Ms. Sherilyn. Keck

The Office of the Deputy Chief of Staff for Logistics, Department of the Army announced Ms. Sherilyn Keck is a recipient of their **Integrated Logistics Support (ILS) Achievement of the Year Award**. This office recognizes individuals who have made exceptional contributions to the ILS community that resulted in improved acquisition logistics processes and products, improved supportability and readiness of new and fielded systems, and most importantly, reliable and sustainable equipment for the soldiers in the field.

Ms. Sherilyn L. Keck, a Logistics Specialist for the PM-Obscuration and Decontamination Systems, received this award by virtue of her performance as the ILS Manager for the M58 Wolf Mechanized Smoke Obscurant System. She led a combined ILS management team that included SBCCOM, TACOM, and CECOM. Ms. Keck's leadership and expertise guided the M58 Wolf System in overcoming many intra-command obstacles in logistics, fielding, and training areas.

Ms. Keck was presented the award by Director of Sustainment, ODCSLOG, at the Joint-Government/ Industry Supportability Information Exchange Symposium held in Huntsville, AL, on May 7, 2001.

The Army Materiel Command (AMC) awarded the **Joint Service General Purpose Mask (JSGPM) Joint Service Integrated Product Team (JSIPT) the AMC Outstanding Integrated Product/Weapon System Team of the Year Award for 2001.** The JSGPM Team is assigned to the Project Manager for Nuclear, Biological and Chemical Defense Systems, SBCCOM, a major subordinate command of the Army Materiel Command. This award is presented to the AMC Integrated Product Team making the most significant contributions in the area of materiel management during the preceding calendar year and significantly contributing to the execution of the AMC mission while honoring all traditional American military values. The basis for selection of the JSGPM JSIPT is the extraordinary record of achievement while inspiring others to improve quality and quantity of their work during the calendar year 2000.

Joint Service General Purpose Mask IPT

The award consists of monetary awards for all DoD civilian employees and military awards to joint service members. The JSGPM JSIPT was specifically cited for the outstanding manner in which the team evaluated, awarded, and executed a clearly defined performance-based "benchmark cradle-to-grave" long-term contract, embracing the total life-cycle acquisition management concept, implementing acquisition and logistics reform initiatives, and partnering with a contractor for a new protective mask system. The JSIPT accomplished these efforts within the time and budget constraints of the program requirements while employing novel and innovative concepts. In comparison to previous mask programs, this unique, streamlined acquisition approach will field a revolutionary mask in less then half the time and with an estimated cost avoidance of over $50 million RDT&E, $105 million production, and $250 million sustainment over the total life-cycle of the JSGPM.

AMC's Commanding General presented the award to team members on July 3, 2001, at Aberdeen Proving Ground.

Members of **SBCCOM's Volunteers for Medical Engineering (VME) Team** were spotlighted by the Geriatric Task Force of Harford County, MD. This task force is composed of members of the County government, businesses, and non-profit organizations dedicated to providing services to the geriatric community. The Team was invited to give a 3-minute presentation to the Task Force in April. This was an opportunity for the Task Force to learn about the team and the services they offer. Many questions were asked and responded to by the team; particularly regarding the wheelchair backpack designed and made for Katie, a local High School student. There was recognition by the attendees that this item could be used by many of their elderly clients.

Additionally, Messrs. Mark Schlein and Bob Coen of the VME Team received a plaque during an awards ceremony sponsored by the APG Directorate of Information Management in April. The plaque was given by SBCCOM's commander in recognition of the team's focus on providing "One of a Kind" devices that can be designed and built specifically for the disabled or elderly. These devices are not available from commercial sources. Since 1998 the group has designed, completed, and delivered nine projects.

After serving for 5 years, Bill White retired as Chairman of the **Remsen Award** committee following the 2001 award ceremony. This award is sponsored by the ***Maryland Section of the American Chemical Society***. It was established in 1946 to recognize the achievements of outstanding chemists and to honor Dr. Ira Remsen, the first chair of the chemistry department and the second president of Johns Hopkins University. This year's award was presented to Dr. Ad Bax, an NMR spectroscopist at the National Institutes of Health, during an evening session of the Mid Atlantic Regional ACS Meeting. More information on Dr. Bax and the award ceremony can be found in the June 18 issue of Chemical and Engineering News. The other recipients selected while White was chairman were William Miller, (theoretical chemist at U Cal Berkeley), Peter Dervan (biorganic chemist at Cal Tech), Tom Meyer (inorganic chemist at Univ of North Carolina), and Alex Pines (an NMR spectroscopist at U Cal Berkeley).

Dr. Akbar Khan was the recipient of the **2001 Federal Executive Board Silver Medal** in the category Rookie of the Year. Dr. Khan is a molecular biologist with the Molecular Engineering Team (MET), Research & Technology Directorate, U.S. Army Edgewood Chemical Biological Center. He was honored for his research efforts in applying genomic approaches to biological threat detection, and for assisting in the development of peptide libraries as alternate reagents for biodetection. The high quality of his work is evidenced by a paper on human genetic sequencing which he co-authored for "Nature," perhaps the most prestigious scientific journal in the world.

Mr. Paul Schabdach, ECBC, was accepted as a member of the **International Association of Bomb Technicians and Investigations (IABTI)**. The IABTI has been in existence for 28 years and has a membership of over 3,000 people, located in 63 nations. They also publish a bimonthly publication called "The Detonator." Its primary mission is to provide training and information to those that do work in the explosives field. This membership will lend further qualification to Mr. Schabdach's teaching credentials.

Dr. Peter Emanuel was selected by Dr. Delores Etter, Deputy Undersecretary of Defense for Science and Technology, to represent the United States in the **2001 U.S./UK Young Scientists Laboratory Visit Program**. Dr. Emanuel is currently the scientific advisor to the Director of CB Services Directorate at ECBC. The program allows young scientists working in their respective Defense Agencies to jointly visit select laboratories in each of the nations. It is designed to be an educational opportunity for leading scientists and to foster increased cooperative activities between the United States and the United Kingdom.

APG TECHNOLOGY SHOWCASE

Getting better connected "outside the wire"

by Kelly Buckingham, Donna Cannella, and Joanne Coale

On June 12th and 13th, the Aberdeen Proving Ground (APG) held its first ever Technology Showcase: "A Partnering Event for Businesses and Universities." The Technology Showcase provided an opportunity for colleges and companies to learn how to access APG resources and begin partnerships with the U.S. Army. Attendees included representatives from the Dow Chemical Company, Steel International, Inc., Johns Hopkins University, the University of Maryland, and the Oklahoma State University.

During the 2-day showcase, presentations and tours were given that demonstrated APG's initiatives and capabilities in the areas of biotechnology, chemistry, medical research, environmental sciences and engineering, materials science and research, computing and simulation, physics used to predict product failure, test capabilities, and training opportunities.

The APG Science and Technology Board was integral in conceptualizing and implementing the Technology Showcase, along with the Harford County Office of Economic Development. The APG Science and Technology Board's purpose is to highlight APG's capabilities among tenants, businesses, academia, and local and state government. The Board provides a simplified mechanism to work with APG tenants on new business opportunities.

Mr. Brian Simmons, chair of the Science and Technology Board, stated in his opening remarks, "The collective capabilities of APG are world renowned; we desire to expand our partnerships." He also said that the Science and Technology Board was developed to help APG get better connected "outside the wire" (outside of the installation area).

On the first day of the showcase, Major General John C. Doesburg, commander of the U.S. Army Soldier and Biological Chemical Command, the Honorable Robert Ehrlich (R-MD), and the Honorable Curt Weldon (R-PA) spoke to attendees. Weldon stated, "I came down today because APG is a crown jewel of the American infrastructure." Weldon discussed a new initiative called the Mid-Atlantic Research Consortium (MARC). The goal of MARC is to perform state-of-the-art research in the interest of federal requirements and commerce emphasizing regional collaboration.

Currently more than 50 educational institutions, research-oriented companies, and government laboratories located in Delaware, Maryland, New Jersey, and Pennsylvania comprise MARC membership. Both Weldon and Ehrlich discussed raising awareness and increasing partnerships for APG "outside the wire" with private industry and universities.

After the opening remarks, a Memorandum of Agreement was signed between APG's Science and Technology Board and its newest partner, Ben Franklin Technology Partners of Southeastern Pennsylvania. Ben Franklin Technology Partners facilitate partnerships and agreements for businesses and academic institutions in Pennsylvania.

The Edgewood CB Center was an integral part to the Technology Showcase. Mr. Jim Zarzycki, Director of Edgewood CB Center, welcomed attendees the second day of the showcase. He stated, "APG has world-class facilities and scientists that can help industry be more competitive in today's fast-paced marketplace."

Three scientists from the Edgewood CB Center gave presentations on APG's capabilities and technologies. Dr. James Valdes presented on biotechnology capabilities, Dr. H. Dupont Durst presented on chemistry, and Mr. Ronald Pojunas presented on engineering capabilities.

Showcase participants toured a number of facilities including MicroLand, the Process Engineering Facility, and the Berger Laboratory Complex at the Edgewood CB Center. Other tours at APG included the automotive and technology testing areas, the Materials Research Lab in the Rodman Building, and training facilities.

In addition to the Science and Technology Board and the Harford County Office of Economic Development, other sponsors of the showcase included:

- Northeastern Maryland Technology Council
- Greater Baltimore Technology Council
- Technology Council of Maryland
- MdBio, Inc.
- Mid-Atlantic Research Consortium
- Maryland Technology Development Corporation

In addition, the Army Alliance, Inc., sponsored an evening social on June 12th. The Army Alliance was formed 3 years ago by former Harford County Executive Eileen Rehrmann to inform business and citizens of the economic and cultural benefits of APG and assist with the attraction of government and industry organizations to increase economic viability at the post.

The purpose of the Technology Showcase was to raise awareness so that businesses and academic institutions know of the capabilities available to them on APG. In his closing, Congressman Weldon summed it up succinctly by stating, "The best ideas do not come from government; they come from entrepreneurs. I want this region to be the premiere economic driver for the nation."

To provide a streamlined and cooperative environment for industry to work with APG, the APG Science and Technology Board developed the APG Business Development Office. Companies and organizations can contact the office directly for information on research, testing, product development, and training capabilities available at APG. This office will attempt to partner private industry and universities with complimentary facilities at APG.

For more information, please contact Mr. Blake Sajonia or Mr. Roy Albert in the APG Business Development Office at (410) 273-5062 or visit its web site at http://stb.apg.army, or Ms. Donna Cannella, ECBC's New Business Development Office, (410) 436-5379.

SYMPOSIUM ON APPLICATION OF ENZYMES IN CB DEFENSE

First international symposium

by Dr. Joseph J. DeFrank and Ms. Kelly Buckingham

The Edgewood Chemical Biological Center (ECBC) of the U.S. Army's Soldier and Biological Chemical Command (SBCCOM) sponsored the first International Symposium on Application of Enzymes in Chemical and Biological Defense. The symposium, held in Orlando, FL, included researchers from eleven nations (Denmark, Finland, France, Germany, Israel, Italy, The Netherlands, Russia, Singapore, United Kingdom, and the United States). Some of the U.S. organizations represented included the Walter Reed Army Institute of Research, Oak Ridge National Laboratory, Harvard Medical School, Texas A&M University, Battelle Memorial Institute, and the Mayo Clinic.

The keynote speakers for the conference were Dr. John Deutch of the Massachusetts Institute of Technology (MIT), former Director of the Central Intelligence Agency, and Dr. Alexander Klibanov, a leading authority on the use of enzymes in extreme environments, also of MIT. In his speech on Chemical and Biological Threat, Dr. Deutch stated, "The use of chemical and biological warfare is widely recognized as a viable threat to the United States and other nations." He continued to discuss the new features of chemical and biological agents that make them a growing threat to countries, including the proliferation of technology in agent production, terrorist organizations operating on an international level, and the potential for new chemical and biological agents to be anufactured. Dr. Klibanov discussed his groundbreaking work in determining that enzymes could function in organic solvents and other environments once thought to be incompatible with their existence.

During the conference, scientists presented and shared the latest research on both medical and non-medical applications of enzymes.

In addition to the presentation sessions, there were opportunities for the scientists to interact one-on-one during the many breaks and poster sessions that occurred each day of the conference. During poster sessions, scientists displayed their research and engaged in

Dr. Joseph DeFrank, co-chair of the conference, speaks to conference attendees during one of the poster sessions on *Enzymatic Degradation of Hydrolyzed V and G-Agents*.

open dialogue with other attendees. Topic areas at the conference included detection, protection, decontamination, prophylaxis, and therapy. Emphasis was on the sensitivity of enzymes in detecting chemical agents and the neutralizing effects of enzymes on chemical and biological warfare agents, pesticides, and related materials.

ECBC sponsored the conference along with the U.S. Army Research Office, the U.S. Army Medical Research and Materiel Command, and the Defense Advanced Research Projects Agency. Dr. Joseph DeFrank of ECBC, who co-chaired the conference, stated in his welcoming remarks, "The purpose of the conference is to generate interaction and hopefully collaborations between scientists in the enzyme area." According to comments by participants, this purpose was achieved to a very great extent.

The conference was so well received that a second symposium is tentatively being planned for 2003 or 2004.

For a list of the titles of the presentations, see page 39.

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34th MID-ATLANTIC REGIONAL MEETING OF THE AMERICAN CHEMICAL SOCIETY

Researchers exchange information on what members of their local community are doing in the field of chemistry

by Dr. Alan C. Samuels

The **34th Middle Atlantic Regional Meeting of the American Chemical Society** was held May 30-June 1, 2001, at Towson University in Baltimore, MD. Edgewood CB Center (ECBC) personnel were integral in this year's regional meeting. The technical chairperson of the meeting was Dr. Alan Samuels of ECBC.

During the conference, Dr. Samuels also chaired a symposium, entitled "Environmental Sensing." Presenters in this session included representatives from the National Institutes of Standards and Technology, the Naval Research Laboratory, the National Aeronautics and Space Administration (NASA) Stennis Space Center, and the U.S. Food and Drug Administration.

In addition, Dr. William White, Mr. David Sickenberger, and Dr. John Weimaster of ECBC also presented at the meeting on Chemical Defense. Dr. White, who chaired the symposium, provided an overview and background on chemical warfare agents. Mr. Sickenberger discussed detection of chemical warfare agents, and Dr. Weimaster presented on the decontamination of the agents. Other members involved in the session included CPT Stephen Hobson of the Army's Medical Research Institute for Chemical Defense and Mr. Robert von Tersch of the U.S. State Department who discussed the Chemical Weapons Convention and its impacts on Chemical Defense. Dr. Randolph Long, also from ECBC, presented an invited paper on the environmental monitoring of chemical and biological agents. Several other ECBC scientists presented papers at the meeting, including a paper on nerve agent analysis by Barry Williams, Dr. Dupont Durst, and Dr. David McGarvey; a paper on chemical agent decontamination and demilitarization by Dr. George Wagner, Lawrence R. Procell, and Dr. Yu-Chu Yang; and a paper on vibrational frequencies by Mike Ellzy and Dr. James Jensen.

The regional meetings of the American Chemical Society give researchers the opportunity to exchange information on what members of their local community are doing in the field of chemistry. More than 750 participants from the mid-Atlantic region attended this year's meeting including presenters from DuPont, SmithKline Beecham, Clairol, Inc., U.S. Secret Service, Walter Reed Army Institute of Research, and Johns Hopkins University.

For a listing of the papers of significant interest to the CB defense community, please see page 41.

For additional information, please contact Dr. Alan C. Samuels, Commercial (410) 436-5874, DSN 584-5874 or E-mail alan.samuels@sbccom.apgea.army.mil, or Dr. William White, Commercial (410) 436-3058, DSN 584-3058, or E-mail william.white@sbccom.apgea.army.mil

SYMPOSIA...

In March:

The Improved Response Program (IRP) team held its first **Multi-Service Task Force (MSTF) meeting** at SBCCOM. Beginning in FY01, the IRP's focus is to enhance the readiness of DoD response units and installation responders to manage the consequences of a chemical or biological terrorist attack. The purpose of the MSTF, which includes appropriate service members from the Army, Navy, Air Force, and Marines, is to provide an inclusive forum to discuss and coordinate military IRP efforts with current on-going and related Antiterrorism/Force Protection Weapons of Mass Destruction (WMD) efforts. This is an attempt to reduce duplication of efforts and optimize integration of effective WMD response solutions into all Services' response plans.

Two representatives, from ECBC's Detection/ Decontamination Core Team attended the **Medical and Chemical Defense review Conference XI**. Topics included NBC and environmental exposures, associated risks, patient decontamination issues, homeland security, and sample management procedures between the chemical and medical branches of the Army. The Edgewood representatives also participated in the Patient/ Casualty Decontamination Working Group.

Dr. Paul Fedele and Mr. William Lake, members of the IRP Team, attended the **Fire and Emergency Services Technologies Innovation Conference** at Natick and presented an introduction to chemical terrorism, an overview of the chemical weapons IRP fire community initiatives, and a detailed discussion of the IRP firefighter protective clothing study. Leaders from many of the national fire, law enforcement and emergency services organizations were in attendance.

In April:

Mr. Dean Hansen, ECBC, was a guest speaker at the **School of Military Packaging Technology**. The 2-hour presentation was on redeployment operations during Operation Desert Storm/ Operation Desert Return. Approximately 35 students were in the Advanced Packaging course from both industry and Government. The presentation focused on logistics problems that were faced during packaging redeployment operations and their solutions. This is the third time this presentation was presented at the school.

Mr. Richard Vigus presented two papers at the **First World Congress on Chemical and Biological Terrorism** in Dubrovnik, Croatia. The international conference attracted roughly 200 attendees from 43 countries. The papers, entitled "Improving Local and State Agency Response to Terrorist Incidents Involving Biological Weapons" and "Helping the Civilian Community: The Improved Response Program (IRP)," describe the IRP's mission, process, major products, and findings. Presentation of our products in this international forum expands the command's customer base from a national to a multi-national focus.

Dr. Mohamed Mughal and Dr. Paul Fedele made four individual presentations of IRP products at the **Weapons of Mass Destruction (WMD) Terrorism Preparedness and Response Conference**. As a result, ECBC's Homeland Defense Business Unit has received invitations for presentations and assistance from the National Memorial Institute for Prevention of Terrorism in Oklahoma City; the Milwaukee Health Department; the Las Vegas Metropolitan Police Department; and the Downers Grove Fire Department in Illinois.

In May:

Dr. Bill Seegar was invited by the government of Israel and the Tel Aviv University to

participate, as a leading international authority in satellite tracking and monitoring, in **an international meeting** of 25 countries to discuss the **use of global tracking systems to assist the peace process** in the Middle East. This is the second time the subject of the talk pertains to the use of space based tracking systems in support of Public Health, Environmental Health, Conservation, Education, and the Middle East Peace Initiative. Over 25 countries in Africa, the Middle East, and Europe attended the meeting.

The **International Symposium on Applications of Enzymes in Chemical and Biological Defense**, described on page 35, drew approximately 110 scientists and researchers from 11 nations. Most of the world's leading experts in areas such as cholinesterases, and use of enzymes in prophylaxis, therapy, and decontamination were present. Following is a listing of the titles of the presentations and the authors:

1. Unmasking Tandem Site Cooperation in Acetyl-cholinesterase - Terrone L. Rosenberry, J.L. Johnson, M.P. Davies, B.M. Cusack, W.D. Mallender, and T. Szegletes.

2. Comparative Structural Studies on Conjugates of *Torpedo californica* and Human Acetylcholinesterases with Organophosphate Nerve Agents - Joel L. Sussman.

3. Interactions of Chemical Warfare Agents with Acetylcholinesterase - Jeffrey B. Wright, M.M. Hurley, G.L. Lushington, and William E. White.

4. What Are the Targets of Organophosphate Toxicity in a Mouse That Has No Acetylcholinesterase? - Oksana Lockridge, Ellen G. Duysen, and Clarence A. Broomfield

5. The Scope and Limitations of Human Butyrylcholinesterase as Antidote Against Organo-phosphates Poisoning - Yacov Ashani.

6. Generation of a Pharmaco-kinetically Improved Recombinant Version of Acetylcholinesterase by Modulations of Post-translation Protein Processing - Theodor Chitlaru, C. Kronman, N. Zeliger, S. Lazar, R. Velan, and A. Shafferman.

7. Evolution of Phosphotriesterase for the Detoxification of a Broad Spectrum of Organophosphate Nerve Agents - Frank M. Raushel, Craig Hill, Wen-Shan Li, and Karin Lum.

8. Structure and Function of a Diisopropylfluorophosphatase from *Loligo vulgaris* - Heintz Rüterjans.

9. Adapting Enzymes to Novel Environments and Substrates by Molecularbreeding™ Directed Molecular Evolution Technology - Pascal Longchamp, Sandra Ramer, Rini Ghosh, Kaija Beard, Bjoern E. Christensen, and Steffen Danielsen.

10. Organophosphorus Hydrolase with Enhanced Hydrolysis of Methyl Parathion - Catherine M. Cho, Wilfred Chen, and Ashok Mulchandani.

11. Stabilization of Organophosphate Hydrolase: High Temperature, Low pH, and Organic Solvents - Sergey D. Varfolomeev and Elena N. Efremenko.

12. Enzymes in Monolayers and Their Interactions with Organophosphorus Compounds – Roger M. Leblanc.

13. Highly Robust Biosensor Based Swipe Detectors for Nerve Agent – Alan Russell and Keith LeJune.

14. Genetic and Biochemical Manipulation of Broad-Spectrum Organophosphate Hydrolases for the Detection, Decontamination, and Clinical Prophylaxis or Neurotoxic Poisoning - James R. Wild and J.K. Grimsley.

15. A Biosensor for the Direct Detection of Fluorine Containing Organophosphates - Alex L. Simonian, Janet K. Grimsley, A. William Flounders, J.S. Schoeniger, Tu-Chen Cheng, Joseph J. DeFrank, and James R. Wild.

16. Novel Phosphorothiolates as Potential Scavengers of Sulfur Mustard - Gabriel Amitai, R. Adani, I. Rabinovitz, G. Sod-Moriah, H. Meshulam, M. Hershkovitz, R. Barak,

L. Leibovitz-Persky, and Y. Hadar.

17. Biological Decontamination of Nerve Agent VX, Tetriso, and Demeton S-Methyl by *Corynebacterium glutamicum* - Didier Hilaire.

18. Phospho/Phosphonoester Hydrolysis by *Streptomyces* Di-zinc Aminopeptidase - A Unique Alternative Hydrolysis - Li-June Ming, Hyun Ik Park, and Altan Ercan.

19. Cholinesterases, Oximes, and Organophosphorus Hydrolases: An Ideal Combination for the Detoxification of Organo-phosphorus Compounds - Chunyuan Luo, Ashima Saxena, Yacov Ashani, Zoran Radic, Palmer Taylor, and Bhupendra P. Doctor.

20. Bioschavengers for Prophylaxis Against Organophosphates Based on Cholinesterases Entrapped In Bioadhesive Liposomes - Illana Schumacher, Sharon Fischer, Aya Arad, and Bimona Margalit.

21. A New Approach to the Antagonism of the Lethality of OP with Recombinant Enzymes within Liposomes and Dendrimeric Polymers - James L. Way, Patrikovics, K. Hong, Tu-Chen Cheng, Joseph J. DeFrank, Ray Yin, and D. Papahadjopoulos.

22. Induction of Protection Against Organophosphate Poisoning by Liposome Mediated Delivery of the Human Butyrylcholinesterase (HuBChE) Gene to the Lungs - Nahum Allon, Clarence A. Broomfield, and Bhupendra P. Doctor.

23. Destruction of Diisopropyl Fluorophosphate by Organophosphorus Acid Anhydrase Covalently Coupled to the Cornified Layer of Human Epidermis - R. Parsa and Howard Green.

24. Useful Chemical Transformations Employing Hydrolytic Enzymes - Arthur C. Watterson and Virinder S. Parmar.

25. An Enzyme-based, Fog Technology for the Decontamination of Chemical and Biological Threat Agents with Multiple Applications in Civilian and Military Situations - Evguenia I. Rainina, Mark T. Kingsley, James R. Wild, and William R. Rigby.

26. DNA Reductase: A Synthetic Enzyme with Opportunist Clinical Activity Against Radiation Sickness - Merrill Garnett and John L. Remo.

27. Enzyme Based Biosensor Can Discriminate Between Different Classes of Inhibitors and Heavy Metal Ions in Multiple Contaminated Sample - Alex L. Simonian, Elena N. Efremenko, and James R. Wild.

28. Application of OPA-Anhydrase for the Detoxification and the Detection of Chemical Warfare (CW) Agents - Krishna S. Rajan, Stephen Mainer, and Francis C.G. Hoskin.

29. A New Purified Cholinesterase from Fish's Blood Plasma for Separate Detection of Organophosphates and Barbamates - Valerii Tonkopii

30. Biocatalytic Polyurethane Coatings for Agent Degradation - Alan Russell.

31. Incorporation of OPAA in Fibers and Textile Coatings for Protective Clothing Applications - Heidi Schreuder-Gibson, Francis Hoskin, John Walker, Tu-Chen Cheng, Ray Yin, Christine (Qin) Sun, and Dong Zhang.

32. Immobilized Enzymes on Polyurethane Foams: Tools for Decontamination of Nerve Agents and Sensors for Organophosphate Chemical Toxins - Richard K. Gordon, Alper R. Gunduz, Shawn R. Feaster, Bhupendra P. Doctor, Edward D. Clarkson, Rudy C. Macalalag, Donald M. Maxwell, David E. Lenz, John P. Skvorak, Michelle C. Ross, and Tracey Cronin.

33. Removal and Destruction of CWA Simulants Using "Dry" Enzyme-Impregnated Fabrics and Coatings - Brian H. Davison, John W. Barton, K. Thomas Klasson, and Laurel O'Connor.

34. Scavenger Protection Against Organophosphate Agents by Cholinesterases - Ashima Saxena, Donald M. Maxwell, David E. Lenz, Yacov Ashan, and Bhupendra P. Doctor.

The **34th Middle Atlantic Regional Meeting of the Americal Chemical Society** is discussed on page 37. Following is a listing of those papers of significant interest to the CB defense community.

1. LIBS: A Powerful New Tool for Detecting Lead and Other Toxic Chemicals in the Field - A.W. Miziolek, K.L. McNesby, R.T. Wainner, R.S. Harmon, and P.D. French (U.S. Army Research Laboratory).

2. Pulsed Discharge Ionization Source with Fluidized Electrode for Fast Gas Chromatography/ Ion Mobility Spectrometry - Glenn E. Spangler (Technispan LLC).

3. Microfabricated Gas Chromatographic Columns - Glenn E. Spangler (Technispan LLC).

4. Retention Indices and Mass Spectral Study of Analogs of the Nerve Agent O-ethyl-s-(2-diisopropylamino) Ethyl Methylphosphonothioate (Vx) - Barry R. Williams and David McGarvey (EAI Corporation), H. Dupont Durst (U.S. Army Edgewood CB Center), and W. Gary Mallard (National Institute of Science and Technology).

5.Single-Molecule Spectroscopy of Adsorbed DNA Molecules Undergoing Both Lateral Diffusion and Strong Adsorption at Chromatographic Interfaces - Derrick J. Swinton and Dr. Mary J. Wirth (University of Delaware).

6. NMR Detection of Chemical Warfare Agent Simulants in Perfluorinated Solvents - Stephen T. Hobson and David A. Sartori (U.S. Army Medical Research Institute of Chemical Defense).

7. Analysis of Diagnostic Markers of Disease Using Matrix-Assisted Laser Desorption Mass Spectrometry - Miquel D. Antoine and Wayne A. Bryden (Johns Hopkins University Applied Physics Laboratory).

8. Applications of Gas Chromatography Negative Chemical Ionization Mass Spectrometry for the Analysis of Biological Samples - Ronald D. Snelling, Charles R. Lyle, Michael Marrale, Jr., and Elizabeth J. Tierney (Shimadzu Scientific Instruments, Inc.).

9. Fourier Transform Microwave Spectrometry - Richard Suenram (National Institute of Science and Technology).

10. Sol-Gel Tin Oxide Gas Sensors for the Detection of Trichloroethylene - Nancy Ortins Savage, Richard E. Cavicchi, and Steve Semancik (National Institute of Standards and Technology).

11. Evanescent Field Probes for Surface-specific Binding - Christopher Davis (University of Maryland College Park).

12. Multianalyte Monitoring Using Raptor, A Portable Fiber-Optic Biosensor - George Anderson (Naval Research Laboratory).

13. Design for an Environmental Remote Sensing System 'Tool Box' - George Lane (NASA Stennis Space Center).

14. Fourier Transform Near Infrared Spectrometry for Food and Water Contamination Monitoring - Luis Rodriguez and Elizabeth Calvey (U.S. Food and Drug Administration).

15. New Technologies for Miniaturizing TOF Mass Spectrometers - Robert J. Cotter (The Johns Hopkins University School of Medicine).

16. Strain-Specific Differentiation of Bacteria and the Detection of Virulence-Related Proteins by MALDI TOF MS - Jackson O. Lay (National Center for Toxicological Research/FDA).

17. The Challenge of Detection of Chemical and Biological Agents in the Ambient Environment - S. Randolph Long (Edgewood CB Center).

18. MALDI TOF MS for the Detection of Aerosolized Bacterial Spores in the Presence of Environmental Clutter - Peter Scholl (Johns Hopkins Applied Physics Laboratory).

19. Chemical Images of Surfaces with Two-Step Laser Desorption Ionization Mass Spectrometry - John H. Callahan, J.L. Fye, P.H. Pritchard, H.H. Nelson, and A.P. Baronavski (Naval Research Laboratory).

20. In-Water Mass Spectrometry for In-situ Chemical Analysis and Environmental Monitoring - Tim Short (University of South Florida).

21 Mineralization of Chemical Warfare Agents Using Hydrogen Peroxide PD/C - George W. Wagner, Lawrence R. Procell, and Yu-Chu Yang (U.S. Army Edgewood CB Center).

22. Life-Saving Nanoparticles: Concepts, Experimental Proof, and Implications for In-vivo Detoxification of Overdosed Chemicals - Richard Partch (University of Florida).

23. Molecularly-Imprinted Polymers for the Detection of Chemical Agents in Water - Amanda L. Jenkins (U.S. Army Research Laboratory).

24. Dielectrophoretic On-Chip Assembly of Colloidal Particles to Form Electrically-Functional Structures - Orlin D. Velev (University of Delaware).

25. Bicontinuous Polymer-Silica Nanocomposites Prepared via Sol-Gel Process with Polymerizable Template - Yen Wei (Drexel University).

26. Chemical Warfare Agents - William E. White (Edgewood CB Center).

27. Chemical Warfare Agents: Biological Effects and Medical Countermeasures - Stephen Hobson (U.S. Army Medical Research Institute for Chemical Defense).

28. Detection of Chemical Warfare Agents - Dave Sickenberger (Edgewood CB Center).

29. Approaches for Chemical Warfare Agent Decontamination - John Weimaster (Edgewood CB Center).

30. Chemical Weapons Convention - Robert L. von Tersch (U.S. State Department).

31. Vibrational Frequencies and Structural Determinations of Di-vinyl Sufone - M.W. Ellzy and J.O. Jensen (Edgewood CB Center) and Jack G. Kay (Drexel University).

Members of our Biosensors Team attended the **American Society for Microbiology (ASM) Meeting**. The team presented four posters: Menking, D.L., et. al., "Rapid and Sensitive Detection of Clostridium botulinum and Staphylococcus enterotoxin B using an Immunomagnetic One-Step Assay," Myers, E. D., et. al., "Detection of C. botulinum and Staphylococcus enterotoxin B using Dissociation Enhanced Lanthanide Fluoroimmuno Assays," Ruffner, D.C., et. al., "Optimization and Quality assurance Study of Biosimulant Bacillus subtilis var niger Spore Production Protocols," and Lindsey, M.H. et.al., "Comparison of LightCycler and SmartCycler for Rapidity of Detection of Microbial Pathogens by Real-Time TaqMan Assay."

Dr. Richard Hutchinson attended the **Operational Medical Issues in Chemical and Biological Defense, NATO Human Factors and Medicine Panel (HMF) Symposium**. He presented a paper, entitled "Civilian & Military Emergency Response to Biological Attacks." Follow-up questions indicated interest in the work. Allies are giving consideration to possible terrorist use of chemical and biological weapons against civilian cities and military bases, but programs to improve preparedness were not indicated. A total of 32 papers were presented and 150 participants from 16 countries attended.

In June:

ECBC's Decision Analysis Team presented two papers at the **69th Annual Military Operations Research Society (MORS) Symposium** The first presentation was on BW SimLab, a validation and planning tool that could be used by local and state governments to help develop response plans for mass-casualty incidents. SimLab was an outgrowth of 2 years of support provided by the team to the Biological Weapons Improved Response Program in developing the BW Response Template. The second presentation covered the Front End Analysis and Master Planning process that the team used to assess technologies and develop business area road maps for Decontamination, Individual Protection, and Collective Protection. The symposium provided a good forum to exchange information with other government agencies, private industry, and academia.

Upcoming:

The paper, "Investigation of Polyurethane Adhesives for use in the Apache Aviator NBC Protective Mask," was accepted for presentation at the Coatings, Adhesives, Sealants, and Elastomers session of the **API Expo 2001** in October. Session coordinators from Bayer Chemical Company and Huntsman Chemical Company chose our presentation to be among the 70 presented papers from over 1000 abstracts submitted and characterized the work as excellent. The API Expo 2001 is sponsored by the American Plastics Council.

PUBLICATIONS...

BOOKS, JOURNALS, AND MAGAZINE ARTICLES

In March, the ECBC hazardous waste treatability report for calendar year 2000 was submitted to the Maryland Department of the Environment (MDE). The MDE requires annual reporting of the "cradle to grave" tracking of hazardous wastes used in treatability studies as well as projected studies for the forthcoming year. A "Treatability study" is a study in which a hazardous waste is subjected to a treatment process to gather data about how the waste reacts to the treatment process. This could include determining whether the waste is amenable to the treatment process, the optimal process conditions, if pre-treatment is needed, the efficiency of the treatment process, and characteristics of residues. Programs that conducted or will conduct treatability studies are Alternative Technology, Assembled Chemical Weapons Assessment, and Non-stockpile.

Book Chapter, "Phosphorofluoridates: Biological Activity and Biodegradation," by Dr. Joseph DeFrank and Dr. William White was in **The Handbook of Environmental Chemistry: Volume: Organic Fluorine Compounds**, published by Springer-Verlag GmbH & Co., Berlin, Germany.

"Automated Detection of Sulfur Dioxide in Stack Emissions by Passive Fourier Transform Infrared Spectrometry," by Messrs. Koehler, Small, Combs, Knapp, and Dr. Kroutil, was published in **Vibrational Spectroscopy**.

"Testing a Biological Weapon Detection System in a Distributed Virtual Reality Environment," by Drs. Paul Beckman and John White was published in the *J. Virtual Reality*, IPI Press International.

"Optical properties of ovalbumin in 0.130 - 2.50 mm Spectral Region," by E. T. Arakawa, P.S. Tuminello, B. N.Khare and M. E. Milham (corresponding author) was published in the *J. Biospectroscopy*. The paper presents the latest in a continuing series of measurements of the complex refractive index for representative samples of biological materials. In this paper the authors measured the optical properties of ovalbumin (egg albumin) over the spectral region from 0.130 (76,923 cm-1) to 2.50 mm (4,000 cm-1). Films of ovalbumin suitable for optical analyses were prepared and measured in addition to solutions of ovalbumin in water. Several examples are shown of how the methods used in this study produced accurate results for this complex and difficult to measure material. This work is applicable to quantitative optical studies involving ovalbumin and other serpin proteins, as well as the study of proteinaceous toxins.

"Thermal Luminescence Water Monitor," by Arthur Carrieri (ECBC) and Erik S. Roese (QuetronSystems, Inc.) was published the June 20, 2001, issue of the *J. Applied Optics*; Lasers, Photonics and Environmental Optics division. A thermal luminescence (TL) spectroscopy method for detecting organic impurities in water solution is presented. Infrared emissions by the dissolved organic are measurable once thermal gradient between it and the water medium builds, at those TL frequencies absorbed by the contaminant, following irradiation by a pulsed microwave beam. This detection window of opportunity closes as the liquid attains thermal equilibrium at elevated temperature and collapse of the gradient. TL radiance liberated by a suspect contaminated water sample is scanned interferometrically about the maximum thermal gradient event where N interferograms are acquired and grouped in contiguous sets of 2 with N/2 interferogram elements per set. They are co-added per set to enhance sensitivity of measurement to a small emissivity variance, Fourier-transformed, and the adjacent spectra are subtracted. The difference-spectrum is preprocessed with linear baseline, noise filtration, scaling, and parity operators to

reveal a clear emissions band signature of the solute of dimethylmethylphosphonate to parts per thousand concentrations and less. An artificial neural network facilitates detection of the contaminant by pattern recognition of its infrared band signature. This work received strong positive criticism from journal reviewers with a recommendation that the manuscript be published without revision.

"Preliminary Study on the Fate of VX in Concrete," by G.W. Wagner, R.J. O'Connor, and L.R. Procell, was accepted for publication in *Langmuir*. Using in situ NMR methods, droplets of neat VX on the order of several microliters were shown to quickly sorb into concrete within a matter of minutes. Very little degradation occurs during this initial uptake. Characteristics of the NMR spectra suggest formation of a solid, protonated VX species, in agreement with the low vapor pressure detected for concrete-sorbed VX in other studies. Sorbed VX was observed to slowly hydrolyze over several months, with the rate possibly dependent on initial droplet size. The hydrolysis appeared selective for ethyl methylphosphonate (EMPA) as toxic EA-2192 was not observed in the NMR spectra.

"Molybdate/Peroxide Oxidation of Mustard in Microemulsions," by G.W. Wagner, L.R. Process, Y.-C. Yang, and C.A. Bunton, was accepted for publication in *Langmuir*. Microemulsions containing molybdate-activated hydrogen peroxide rapidly dissolve and oxidize HD initially to the non-vesicant sulfoxide. Secondary oxidation to the vesicant sulfone does occur, but this reaction is about two orders of magnitude slower. A micro-emulsion found to be stable at low temperature enabled the oxidation of HD at -30 EC. The mild basicity of molybdate-peroxide microemulsions also affords the perhydrolysis of nerve agents GD and VX; thus, they are broad-spectrum decontaminants.

TECHNICAL REPORTS

Published technical reports, when available, should be requested from the Administrator, Defense Technical Information Center, ATTN: DTIC-FDRB, 8725 John J. Kingman Road, Ste 0944, FT Belvoir, VA 22060-6218.

Report No.	*Title*	*Author(s)*
ECBC-CR-036	Shear Horizontal Acoustic Plate Mode (SHAPM) Sensor for Biowarfare Toxins, February 2001, UNCLASSIFIED - public release.	J. Andle
ECBC-CR-037	Reactive Fragment Studies, January 2001, UNCLASSIFIED - limited	M. Riley
ECBC-CR-040	Linear Discriminants for IR Detection of Bioaerosols, February 2001, UNCLASSIFIED - public release.	D. Flanigan
ECBC-CR-041	Novel Shaped Charge Follow-Through Warhead Design, Analysis, And Testing, March 2001, UNCLASSIFIED - limited.	D.J. Butz M.D. Bohm J.S. John G. Fenton M. Matthews

ECBC-CR-042	Measurement of Absolutely Calibrated UV-LIF Cross-Sections of Aerosolized Agents of Biological Origin, February 2001, UNCLASSIFIED - limited.	C.B. Carlisle J.E. van der Lann S.A. Carlisle
ECBC-CR-043	Development of a Bullet Trap Rifle Grenade Screening Projectile, April 2001, UNCLASSIFIED - limited.	N. Gonzales D.J. Hartman W.G. Rouse R.J. Malecki
ECBC-CR-044	Propellant Dissemination Technology Program Demonstration, June 2001, UNCLASSIFIED - limited.	N. Gonzales D.J. Hartman W.G. Rouse R.J. Malecki
ECBC-CR-045	CFD of Complex Three-Dimensional Multiphase Flowfields, April 2001, UNCLASSIFIED - public release.	E.R. Perrell N.A. Tonello A. Hosangadi N. Shinha S. Dash
ECBC-CR-046	Final Report on JSLSCAD Infrared Chemical Spectra of VX, RVX, Vx DK, and HN-3, May 2001, limited.	W. Ivancic K.J. Ewing B.W. Wabuyelle G. Stickel D.C. Seibert
ECBC-CR-047	Frequency Agile Laser and Chemical Sensor, April 2001, UNCLASSIFIED - public release.	D.B. Cohn L.F. Klaras J.R. Becker H.C. Marciniak
ECBC-CR-048	Feasibility Study for the Mini-Frequency Agile Laser (MFAL), LIDAR System, April 2001, UNCLASSIFIED - public release.	D.B. Cohn D. Fink J.H. Wang R.E. Warren
ECBC-CR-049	Smoke System Performance Model and Cloud Density Visualization Utility, Version 3.0 WHEN PUBLISHED, WILL SUPERSEDE ECBC-CR-035, June 2001, UNCLASSIFIED - limited.	D.J. Johnston W.G. Rouse
ECBC-TN-007	Production Qualification Test (PQT) Report, April 2001, UNCLASSIFIED - limited.	O. Melles
ECBC-TR-012	Biological Aerosol Trigger (BAT) Design, January 2001, UNCLASSIFIED - public release.	M.S. DeSha
ECBC-TR-086	Evaluation of Chemical Warfare Agent Vapor Transfer Efficiency Through Typical MINICAMS Sampling System, January 2001, UNCLASSIFIED - limited.	J.C. Cajigas K.K. Ong

ECBC-TR-089	Investigation of Countermeasure Materials and Techniques for the Defeat of Non-Lethal Rigid Foams and Adhesives, October 2000, UNCLASSIFIED - limited.	G.L. Goldsmith H. Klapper W.J. Bruchey
ECBC-TR-105	L11A1 and L14 CS Anti-Riot and Practice 66MM Grenades, Foreign Material Exploitation Program, January 2001, UNCLASSIFIED - limited.	G.L. Goldsmith
ECBC-TR-110	Characterization of Background Aerosols in a Subway Atmosphere, February 2001, UNCLASSIFIED - limited.	A. Birenzvige J. Eversole M. Seaver S. Francesconi E. Valdes H. Kaluga J.C. Crookston P. Coon C.H. Wick M. Williamson S. DiCecca S.R. Long
ECBC-TR-117b	Development of XM89 Enhanced Incendiary Grenade, Vol. II: Engineering Design Data/Test Report, December 2000, UNCLASSIFIED - limited.	E. Song G.V. Tracy
ECBC-TR-121	Hydrolysis of 15 wt% HD in Water, October 2000, UNCLASSIFIED - public release.	S.P. Harvey J.E. Kolakowski K.B. Sumpter L.L. Szafraniec M.V. Haley D.K. Rohrbaugh
ECBC-TR-122	Health Hazard Evaluation of Candidates for the Joint Service Fixed Site Decon (JSFXD) Program, May 2001, UNCLASSIFIED - limited.	M.V. Haley L.L. Miller
ECBC-TR-124	Joint Service Agent Water Monitor (JSAWM) Program Technology Evaluation, March 2001, UNCLASSIFIED - limited.	J.L. Jensen W.R. Loerop J.D. Walther S. Hyde
ECBC-TR-125	Guidelines for Mass Casualty Decontamination During a Terrorist Chemical Agent Incident, January 2001, UNCLASSIFIED - public release.	W.A. Lake P.D. Fedele S.M. Marshall

ECBC-TR-126	Three Investigative Reports of the Encapsulation of Energetic Materials, January 2001, UNCLASSIFIED - limited.	R.J. Malecki I.D. Swahn I.Y. Cho J.B. Koen H.L. Collier R.P. Dues B.B. Johnson S.T. Schwab S.A. Royal
ECBC-TR-131	Chemical Protective Clothing for Law Enforcement Patrol Officers and Emergency Medical Services When Responding to Terrorism with Chemical Weapons, January 2001, UNCLASSIFIED - public release.	V.J. Arca S.M. Marshall W.A. Lake P.D. Fedele
ECBC-TR-132	Guidelines for Incident Commander's Use of Firefighter Protective Ensemble (FFPE) with Self-Contained Breathing Apparatus (SCBA) for Rescue Operations During a Terrorist Chemical Agent Incident, January 2001, UNCLASSIFIED - public release.	S.M. Marshall P.D. Fedeele W.A. Lake
ECBC-TR-133	Summary Report for Use of Positive Pressure Ventilation (PPV) Fans to Reduce the Hazards of Entering Chemically Contaminated Buildings, January 2001, UNCLASSIFIED - public release.	V.J. Arca S.M. Marshall W.A. Lake P.D. Fedele
ECBC-TR-134	Temperature Dependence of Wilson Coefficients: Vapor-Liquid Equilibria of Aqueous Ammonia, January 2001, UNCLASSIFIED - public release.	P.E. Fields R.J. Combs
ECBC-TR-136	Interim Planning Guide - Improving Local and State Agency Response to Terrorist Incidents Involving Biological Weapons, February 2001, UNCLASSIFIED - public release.	J.K. Church R. Hutchinson M.A. Mughal S.T. Sergio J.D. Morgan S.L. Losch J.W. Wilson W.J. Byrd M.D. Phillips
ECBC-TR-137	Comparison of Sampler Collection Efficiency Measurements Using a Polydisperse Solid Aerosol and a Monodisperse Liquid Aerosol, June 2001, UNCLASSIFIED - public release.	J. Kesavan R.W. Doherty
ECBC-TR-139	Industrial Stack Evaluation with Ground-Based Passive FT-IR Spectrometry, January 2001, UNCLASSIFIED - public release.	R.J. Combs

ECBC-TR-140	IR Absorbance Measurement of Variable Composition Aqueous VOCs, February 2001, UNCLASSIFIED - public release.	P.E. Field R.J. Combs
ECBC-TR-141	Quantitative Vapor-Phase FTIR Spectra of Dimethyl Methylphosphonate and Methyl Salicylate, April 2001, UNCLASSIFIED - public release.	B.R. Williams D.E. Tevault L.C. Buettner
ECBC-TR-142	Domestic Preparedness Program: Testing of M90-D1-C Chemical Warfare Agent Detector Against Chemical Warfare Agents Summary Report, February 2001, UNCLASSIFIED - public release.	T.L. Longworth K.Y. Obg J.L. Barnhouse
ECBC-TR-143	Domestic Preparedness Program: Testing of MIRAN SapphIRe Portable Ambient Air Analyzers Against Chemical Warfare Agents Summary Report, February 2001, UNCLASSIFIED - public release.	T.L. Longworth J.L. Barnhouse K.Y. Ong
ECBC-TR-144	Domestic Preparedness Program: Testing of MSA Detector Tubes Against Chemical Warfare Agents Summary Report, February 2001, UNCLASSIFIED - public release.	K.Y. Ong T.L. Longworth J.L. Barnhouse J.C. Cajigas
ECBC-TR-147	Acute Inhalation Toxicity of RDTE Dilute GB/Hexane in Rats, March 2001, UNCLASSIFIED - public release.	W.T. Muse, Jr. J.S. Anthony C.L. Crouse L.C.B. Crouse S.A. Thomson
ECBC-TR-148	Vapor Generation Methods for Chemical Warfare Agents, March 2001, UNCLASSIFIED - public release.	D.E. Tevault K. Ong M. Wasserman W. Ahearn
ECBC-TR-149	Infrared Obscurant Belt-Alternative Packaging Design, March 2001, UNCLASSIFIED - limited.	R.J. Malecki W.G. Rouse W.C. Schimpf D. T. Schimpf J.M. Stevens
ECBC-TR-150	Critical Evaluation of Background Data Obtained with the Biological Advance Warning System (BAWS) Tier 1, April 2001, UNCLASSIFIED - limited.	A. Birenzvige
ECBC-TR-151	Domestic Preparedness Program: Testing of APD2000 Chemical Warfare Agent Detector Against Chemical Warfare Agents, Summary Report, April 2001, UNCLASSIFIED - public release.	K.Y. Ong T.L. Longworth J.L. Barnhouse

ECBC-TR-152	Methodology for Measurement of Fog Oil Smoke Penetration Into a Red-Cockaded Woodpecker Nest Cavaity, March 2001, UNCLASSIFIED - public release.	M.A. Guelta R.T. Checkai
ECBC-TR-153	Propellant Dissemination Technology, Electronically-Controlled Smoke Pot Aerosol Dispenser Initial Field Experiment, April 2001, UNCLASSIFIED - limited.	R.J. Malecki W.G. Rouse
ECBC-TR-156	Decontamination Efficacy and Reactivity of Triosyn PP3 with Chemical Warfare Agents, April 2001, UNCLASSIFIED - limited.	P.W. Bartram L.R. Procell D.K. Rohrbaugh G.W. Wagner
ECBC-TR-157	Effect of HD on the GD/GB Defluorinating Activity of the OPAA and OPH Enzymes, March 2001 UNCLASSIFIED - public release.	S.P. Harvey J.J. DeFrank
ECBC-TR-158	Alternative Synthesis of VX and Its Analogs via Phosphonocyanidate Intermediates, May 2001, UNCLASSIFIED - limited.	D.I. Rossman L.J. Szafraniec F.J. Berg L.R. McMahon
ECBC-TR-159	Bacillus Spore Inactivation Methods Affect Biological Detection, April 2001, UNCLASSIFIED - limited.	P.A. Emanuel K. Herous J. Kearney A. Arasteh M. Gostomski J.L. Dang
ECBC-TR-160	Robotic System Design for Preparing Military Chemical Agent Standards and Extraction of Military Chemical Agents in Environmental Samples, April 2001, UNCLASSIFIED - public release.	E.L. Vickers
ECBC-TR-161	Simulants for Transition States, April 2001, UNCLASSIFIED - public release.	W.E. White
ECBC-TR-162	Domestic Preparedness: Sarin Vapor Challenge and Corn Oil Protection Factor (PF) Testing of 3M BE10 Powered Air Purifying Respirator (PAPR) with AP3 Cartridge, April 2001, UNCLASSIFIED - public release.	L.E. Campbell R. Lins A.G. Pappas
ECBC-TR-167	Rapid Identification of Irritant Type Chemicals Through the Use of the Thunderdome FTIR Accessory, April 2001, UNCLASSIFIED - public release.	J.M. Lochner
ECBC-TR-168	Protective Capability Tests of the Collectively Protected Expeditionary Medical Support System (CP EMEDS) Shelter, April 2001, UNCLASSIFIED - limited.	W.K. Blewett

ECBC-TR-170	Organoarsenic Compounds, II. Separation and Stereochemical Determination of 5-Substituted 2-Phenyl-1,3,2-Dithiarsenanes, May 2001, UNCLASSIFIED - public release.	P.C. Bossle F.-L. Hsu G.W. Wagner
ECBC-TR-174	Polyurethan Adhesives for Use in the Apache Aviator NBC Protective Mask, June 2001, UNCLASSIFIED - public release.	G.P. Young S. Ciborowski D. May L. Oswald S. Gross
ECBC-TR-182	Industrial Stack Evaluation Using a Ground-Based 3 to 5 Micron Fourier Transform Infrared Spectrometer, May 2001, UNCLASSIFIED - public release.	R.J. Combs R.B. Knapp R.T. Kroutil M.J. Thomas
ECBC-TR-183	ECBC Low Level Operational Toxicology Program: Phase I - Inhalation Toxicity of Sarin Vapor in Rats as a Function of Exposure Concentration and Duration, June 2001, UNCLASSIFIED - public release.	R.J. Mioduszewski J.H. Manthei R.A. Way D.C. Burnett B.P. Gaviola W.T. Muse, Jr. J.S. Anthony H.D. Durst D.R. Sommerville R.B. Crosier S.A. Thomson C.L. Crouse
ECBC-TR-189	Chemical Characterization of the Pyrotechnically Disseminated XM30 Main Gun Signature Simulator, June 2001, UNCLASSIFIED - public release.	J.S. Anthony M.V. Haley S.A. Thomson C.L. Crouse
ECBC-TR-190	Efficacy Evaluation of A-200SiC-1005S Sorbent Decon Material Against VX and HD Contamination in New Zealand White (NZW) Rabbits, June 2001, UNCLASSIFIED - limited.	J.H. Manthei R.A. Way B.I. Gaviola K.P. Cameron D.C. Burnett D.A. McCaskey