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## CHEMICAL SUPPORT DIVISION SUPPORTS U.S. FISH AND WILDLIFE SERVICE ON LAYSAN ISLAND

W

hen Tim Blades, Chief of the Chemical Support Division at the Edgewood RDE Center, got the call, there was good news and bad news. The good news was that he and three other Edgewood experts were going to a South Pacific island. The bad news was that their destination was called the *Dead Zone*.

The Pacific Island Office, U.S. Fish and Wildlife Service (USFWS), Department of the Interior located in Honolulu, Hawaii, contacted us in early 1997. They were concerned about a zone of toxicity at a remote wildlife refuge in the Pacific with potential chemical warfare contamination, among other toxins. The USFWS was seeking assistance in performing a follow-up survey of an area of Laysan Island known as the *Dead Zone* on the northwest side of the island.

Laysan Island is part of the Hawaiian Islands National Wildlife Refuge which consists of a chain of islands, reefs, and atolls extending about 800 miles in a northwesterly direction from the main Hawaiian Islands. Laysan Island is owned in fee title by the U.S. Government and administered by the USFWS.

Approximately ½ mile by 2 miles, Laysan Island is considered a low island and the largest within the Refuge, encompassing approximately 1,000 emergent acres and 700 submergent acres. A brackish lake is located in the center of the island. The majority of the desolate island is covered with sparse, low-lying vegetation. Few trees are on the island. The Refuge's remote location has allowed a unique ecosystem to develop and flourish. Many of the endemic floral and faunal species found on the islands exist nowhere else in the world.



*First Sight of Laysan Island, June 23, 1997*

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This newsletter is distributed to over 800 addressees throughout the Joint Services and would be a good vehicle to publicize what is going on where you are. Please submit articles to Technical Director, Edgewood Research, Development and Engineering Center, ATTN: SCBRD-ASC, Aberdeen Proving Ground, MD 21010-5423, or by electronic mail to [scbrd-asc@apea.army.mil](mailto:scbrd-asc@apea.army.mil). The editors reserve the right to edit, including verification of facts, removing redundant or ambiguous language, and proofreading. The newsletter is prepared for publication by the Corporate Enhancement Team:

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(continued from the front cover)

The Refuge is home to several endangered species: Laysan duck, Laysan finch, and Hawaiian monk seal. The island also provides significant breeding grounds for the threatened Hawaiian green turtles. The only permanent civilian population on the island are two to four USFWS scientists and volunteers from the National Marine Fisheries Service (NMFS) of NOAA who reside on the island for 4-month intervals to monitor the seals and to work on eradication of alien species. Additionally, two NMFS staff members are present from March to June.

In Executive Order 1019, 3 February 1909, President Theodore Roosevelt “set apart” the “islets and reefs” of the Refuge “as a preserve and breeding ground for native birds.” This order included Laysan Island as part of the Refuge. The USFWS has stored and used herbicides on the island to control the spread of non-native plants since the 1980s.

All information reviewed has indicated that bird migration and banding activities were conducted on Laysan Island. No conclusive evidence has been discovered concerning past Army activities on the island.

There is an area approximately 15' X 15' in size, and 50' above mean tidal line, on the north beach of Laysan Island in which certain species of animals have been found dead. Ghost crabs and houseflies appear to die when they enter this area.

The **Dead Zone** was first discovered in May of 1988 by personnel studying Hawaiian monk seals and was marked with stakes. Personnel reported a *funny* smell in addition to finding dead animals. Refuge personnel and researchers did not observe dead animals there in 1989 and 1990. The area was again found to contain dead albatross chicks, crabs, and flies in the spring of 1991. Dead albatross chicks are not unusual on Laysan. However, the amount of dead flies around the albatross carcasses and the rings of dead crabs around them distinguishes the **Dead Zone** from other areas. This phenomenon has never been

observed anywhere else on the island or on other Northwestern Hawaiian Islands. The USFWS personnel stationed at the island between April and July 1993 reported dead flies and crabs were always present in varying numbers and that this phenomenon was mostly observed in one area of the site.

A preliminary study was done by EBASCO Services, Inc. in August 1993. This field investigation involved air, soil, and radiation sampling of the zone as well as the use of electromagnetic induction to detect buried metallic components. The Final Summary Report indicated the possible presence of a pesticide constituent known as carbofuran, capable of causing the observed effects and recommended that a follow-up survey be performed to verify the presence of carbofuran so that any remaining actions could be properly focused.

Upon review of the USFWS request for assistance, the Chemical Support Division entered into a cooperative agreement with the Department of the Interior to participate in a remedial investigation of the site to determine the cause of the Dead Zone phenomenon and identify any possible sources. Investigation would include visual inspection, ground penetrating radar, collection of samples and analysis. The USFWS assembled a team consisting of three individuals from their home office (transportation, oversight, ensuring environment of the island was not adversely impacted), two Foster-Wheeler contractors, and Mr. Tim Blades, Mr. Dennis Beattie, and Mr. Jef Franchere from the Edgewood RDE Center.



Additionally, the Edgewood Team was responsible for designing the sampling plan, assembling equipment, and shipment to Honolulu to be inspected for alien seeds/species to protect the fragile ecosystem of the island. Laysan Island is geographically remote and accessible only by ship. It is an adventure getting from Hawaii to Laysan Island. The 3-day trip begins with a flight to Lihue, Kauai, to meet a plane chartered to Midway Island and concludes with a sea voyage on a chartered boat for approximately 360 miles from Midway to Laysan Island. Due to the site's isolated location and the logistical difficulties of mobilizing equipment, supplies, and personal items, everything was shipped ahead of time and delivered by chartered boat to the Midway.

The USFWS is greatly concerned about the introduction of alien species onto the island. All equipment being sent to Laysan Island must be decontaminated to prevent alien plants and animals from being carried onto the island. As much of the equipment and supplies as is possible is frozen to 70 degrees below zero to kill possible infestation. Additionally, personnel are requested to wear new clothes and shoes. All items going are carefully inspected prior to reaching the island.

On Day 1 (June 23, 1997), the area of concern, including the original *Dead Zone* was surface cleaned and a 60' x 60' area was mapped into a 3' x 3' grid. Ground



Penetrating Radar was used first to determine differences in soil densities down to the water table.

The following day (June 24, 1997), soil samples were taken from the center of the grid and at 5-grid intervals in four directions from the center point. Initial samples were taken from each point at a depth of less than 6 inches. Additional samples were taken, using a gas-powered auger, at the center of the grid and at 5-grid intervals in three directions from the center at depths of 2 feet and 5 feet.

Soil samples taken on Day 3 were at one point at depths of less than 6 inches, 1 foot, 2 ½ feet, 3 feet, and 4 feet. Additionally, air samples were taken Day 2 at ground level over the hole left from the auger sampling performed on Day 1 using two Depot Agent Air Monitoring System tubes.

According to Mr. Jef Franchere, Edgewood Center Safety Office, "While my primary task on the island was to collect and document all data gathered on the island, it was exciting to be able to observe all the diverse, endangered species in their natural environment."

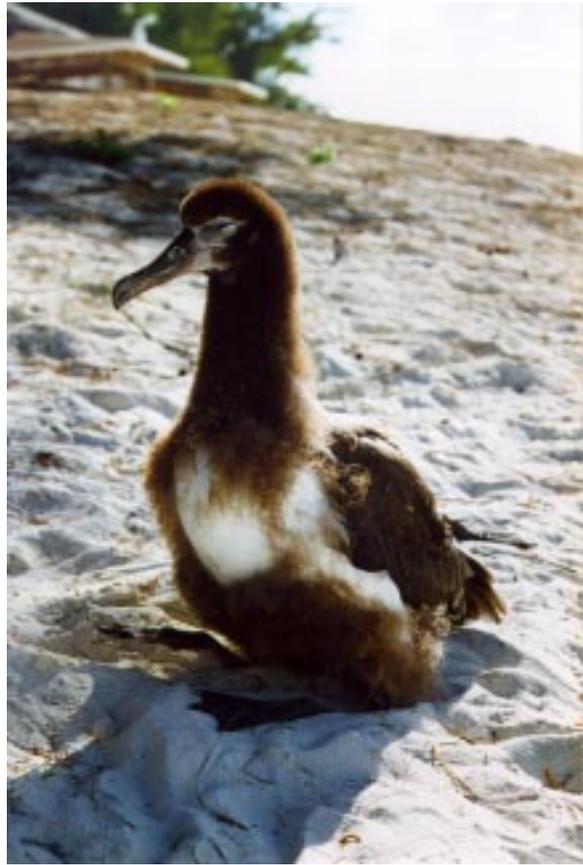
After returning to Edgewood, Mr. Dennis Beattie stated, "It was great to lend a helping hand to the USFWS to preserve endangered species. It's nice to know that our expertise and experience are recognized outside the expected military applications."

Soil and air samples were returned to the Edgewood RDE Center at Aberdeen Proving Ground, Maryland, to be analyzed for chemical agents, carbofuran and pesticide constituents. Soil samples were analyzed by the Analytical Chemical Team, Research Directorate, and showed only trace

levels of organic hydrocarbons. Air samples were analyzed by the Monitoring Branch, Operations Directorate, and indicated a presence of small amounts of carbofuran or its hydrolysis products. None of the analysis indicated the presence of chemical warfare agents on the island. However, it was recommended that the USFWS perform a risk assessment of the threat presented by the site to determine further action.

Chemical Support Division's involvement with the USFWS is the continuation of the customer work associated with our core competencies. The cooperative venture is based on the Edgewood RDE Center's principal area of expertise with possible chemical warfare toxicity in environmental systems. This effort is a prime example of the tremendous benefits of Government agencies working together.

According to Mr. Tim Blades, Chief, Chemical Support Division, "The opportunity to work with the USFWS on a project of this sensitivity and importance to wildlife was a truly gratifying experience and an excellent opportunity to employ one of our core competencies in a novel application."



*A Laysan Albatross Basking in the Sun*

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# CHEMICAL WEAPONS CONVENTION UPDATE

**O**n November 8<sup>th</sup>, a big sigh of relief was heard from CBDCOM's Arms Control and Treaty Assistance Directorate. On this date, the first round of United States' inspections under the Chemical Weapons Convention (CWC), some 33 major inspections and visits, were completed. The Directorate serves as the program management office supporting Major General George E. Friel in his role as the Department of the Army's Implementing Agent for Chemical Weapons Treaties and Arms Control Agreements.

The Directorate includes the AMC Executive Agent for Chemical Treaty Compliance (EA CTC), led by Ned Colburn. The EA CTC team prepared the U.S. Army declaration and has the continuing mission to assure that all Army sites worldwide have the resources, training, and guidance to be compliant with the provisions of the CWC. In this role, EA CTC staff also went on site and supported all Army and Department of Defense CWC inspections, acting as the Army's representative to the Host Team, the DoD policy and decision making body during inspections under CWC.

## *CWC Scope*

The CWC is the broadest and most intrusive international arms control agreement ever put into place, serving as a tool for non-proliferation, arms control, and disarmament. Ratifying nation states are required to declare their CW production and storage related facilities, CW equipment, and materiel. They are required to destroy such items within a 10-year time frame. Ratifying nations must also be willing to submit to "no right of refusal" challenge inspections and to produce any new chemical agent only in carefully controlled amounts and for specific permitted medical, pharmaceutical, research, and protective purposes. To date 167 nations have signed the Convention but only 105 nations have ratified it.

## *OPCW's Role*

This body who administers the CWC is the Organization for the Prohibition of Chemical Weapons or OPCW, which is headquartered at the Hague in the Netherlands. The OPCW is an international body similar to the United Nations. It employs its own staff of inspectors from its member states, which conduct the inspections of declared sites and "challenge" inspections where breeches in CWC requirements are suspected.

## *Declaration Frenzy*

The November 1997 completion of the initial set of U.S. inspections ended more than 6 months of intense effort, which was triggered by the United States Senate's ratification of the Chemical Weapons Convention on April 24<sup>th</sup>. Five days later, the treaty entered into force for the initial ratifying State Parties. By late May, the EA CTC furnished the U.S. Army's declaration to the Department of Defense for forwarding to the OPCW. The Army declaration contained approximately 1,500 pages of information, identifying some 3 million items that had to be declared, tracked, and ultimately disposed of under CWC. The initial inspections were to determine the accuracy of the U.S. declaration and plan for the subsequent re-inspections as the CW related materiel is being destroyed.

## *U.S. Compliance*

The U.S. declaration will eventually be comprised of two parts, the existing one from DoD covering the military and another for Department of Commerce, covering the commercial sector. To date, only the DoD declaration (98% of which was the Army's declaration) has been prepared and submitted. Additional legislation and Presidential directives are required before the Department of Commerce can execute its responsibilities. With the commercial portion of the U.S. declaration

“overdue,” the U.S. is technically out of compliance with the CWC. The required Legislation will be addressed by our Congress when they return for their next session.

### *U.S. Inspections*

By mid June 1997, the first wave of OPCW inspectors was in the United States, receiving safety training here at Edgewood. The objective of the training was to allow the inspectors to take up residency (establish continuous presence) at the U.S. active chemical demil plants. The residency was established on June 28<sup>th</sup>, and inspectors are currently on site (in residence) at JACADS (Johnson Island), TOCDF and CAMDS (Utah) and at the binary munition disposal site in Hawthorne Nevada. The OPCW’s systematic inspections of declared storage and [former] production sites were very thorough, involved 100% inventories of declared items and exercised all the rights accorded to the OPCW by the CWC. At the conclusion of the 33 inspections and visits, the U.S. declaration was found to be exceptionally thorough and accurate for each and every site.

With some 3 million items to account for, the inspections were far from boring. While no serious problems were found in the Army’s declaration, approximately a dozen national policy level issues arose which must still be discussed and negotiated between the U.S. Government and the OPCW.

An example of a policy issue, which typically involved different interpretations of treaty language, dealt with non-agent filled munitions (often simulant munitions) used to safely start-up and repair our demil plants. We view these munitions as integral to the disposal operations, never to receive a CW agent fill. The Convention, however, calls for destruction of unfilled CW munition bodies within 5 years of treaty entry into force. The timetable for destruction of actual filled CW stockpile munitions is twice as long, 10 years. Following the OPCW’s interpretation of the Convention, we would have no non-agent filled munition bodies to safely start-up and repair our demil plants over the last 5 years of CW munition disposal operations. The lesson learned?

Negotiated treaty provision can later cause unanticipated, post-Entry into Force problems which must be resolved at the national policy level.

### *World Class Performance*

While our command has the vision of providing world class NBC defense products and services, opportunities to perform on a world stage do not often appear. Implementation of this nations CWC responsibilities was one of those rare opportunities that allowed the Directorate to be measured on a “world class” scale. The United States currently has the largest declared CW inventory in the world; it is also the most complex, the only dynamic inventory changing on a daily basis because of on-going demilitarization activities. Additionally, while the CWC activities were on-going, the Directorate’s AMC Treaty Laboratory, led by Dr. Dennis Reutter, competed in the OPCW’s international round robin analytical exercises in support of the OPCW’s search for designated laboratories. Approximately 30 laboratories competed for designation status. Only a handful of laboratories received perfect scores on all three round robins, including our Treaty Lab. This Lab is the only U.S. laboratory, commercial or Government, to accomplish this status.

### *Keys to Success*

Keys to our successes were several fold. First, there is a strong base of treaty technology and expertise, which has been built up in the Directorate over the last 6 years. This base was started prior to the implementation of the successful bilateral agreements with the former Soviet Union. This allowed the EA CTC staff to serve as the Army’s representative on the Host team, the team which manages the conduct of inspections. The host team is comprised of managers from DoD, the inspected site, OSIA, and Army. A second success factor was the flexibility and expertise that resides in the Army site’s Treaty Compliance Officers. For example, Ms. Lynn Hoggins relocated on a developmental assignment from Tooele, Utah, to Edgewood to augment the EA CTC staff. The other major success factor was



the pride and drive that the sites showed in supporting their on-site inspection activities. The inspections often required them to work long, difficult hours - which they did, unflinchingly.

### *Worldwide Impact of CWC*

The CWC received U.S. Senate ratification only after serious, prolonged debate as to whether or not CWC would truly make the world safer. While that outcome is still unclear, the CWC is having unanticipated impacts on the world scene. As of November, it has been reported that at least seven nations have submitted declarations indicating past or existing CW related activity. Three nations have reportedly declared possession of CW stockpiles, including the United States, India, and South Korea. The last two disclosures were not anticipated. Additionally, the world is now looking to receiving the declarations of two of the latest ratifying states, Iran and Russia. Russia has previously declared under the Wyoming Memorandum of Understanding the world's largest stockpile of CW. It ratified despite reporting financial problems in maintaining, much less destroying, its CW stockpile. This stockpile has been estimated at 44,000 metric tons; the cost to destroy has been estimated as \$5 billion dollars. Iran's declarations will be looked at with great interest. Iran has been suspected of having the third world's largest stockpile of CW materiel.

It is now reported that the OPCW has conducted approximately 115 inspections worldwide, in 21 member states. A reported 80% of their man-hours were used in the U.S. inspections. To date, their inspections have focused on chemical weapon production, storage, and destruction sites as well as "permitted" facilities where chemical agent can be produced in limited quantities for medical, pharmaceutical, protective, and R&D purposes. Despite these successes, a number of rogue

nations have not yet signed the treaty, including Syria, Libya, North Korea, and obviously Iraq.

### *The Future Ahead*

With the initial rounds of CWC inspection complete, the EA CTC's immediate focus will be to revise the Army's declaration to reflect changes agreed to during the initial inspections and to prepare for the re-inspections that will be occurring. DoD planning guidance for FY 00-05 calls for approximately 20 U.S. inspections annually by the OPCW. Additionally, there will be resident OPCW inspectors at our Demil plants.

As the re-inspections occur and US procedures mature, there will be a anticipated lessening of Directorate's involvement in storage, production, and permitted activities.



*Team members meet site escorts at Anniston Chemical Activity, October 31, 1997.*

Appropriate Directorate downsizing is anticipated as part of Quadrennial Defense Review, as the work focus evolves to long term Treaty Program management, start-up support for new demil plants, world wide challenge inspections, treaty policy issues, and future CW/BW treaties. Even as the dust from CWC settles, a new verifiable Biological Weapons Convention (BWC) is being

discussed in Geneva, and the Directorate's BW lead, Tom Gervasoni, is gathering data to support that potential development.

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## DOMESTIC PREPAREDNESS

**F**ollowing Congressional Law, the Department of Defense (DOD) formed the Domestic Preparedness Program to assist federal, state, and local agencies in enhancing preparedness for terrorist attacks using weapons of mass destruction. The DOD, Department of Energy (DOE), Environmental Protection Agency, Federal Bureau of Investigation (FBI), Federal Emergency Management Agency (FEMA), and Public Health Services formed a partnership to execute this program. This interagency partnership is working to better prepare our nation for nuclear, biological, and chemical (NBC) terrorist attacks.

CBDCOM, through its Domestic Preparedness Office, has prepared a program to train first responders among firefighter, hazardous material and emergency medical response, and law enforcement personnel on what to do if faced with NBC material from a terrorist incident. Our people are visiting one to two cities per week to prepare for training these “first responders.” So far, we have trained more than 6,688 emergency responders in six cities. This program has been extremely successful and well received in each city. The success of the program appears to have surpassed everyone’s expectations. We have contracted with Battelle Laboratories to survey all the cities that have been visited to get their reactions on the success of the program. Initial feedback is positive, and we are considering their suggestions and concerns as we continue this program.

The Edgewood Center’s Domestic Preparedness Team’s Hospital Course was recently accredited (Nov 97) with seven Continuing Medical Education units by the U.S. Army Medical Command, Fort Sam Houston, TX. This course is a train-the-trainer course targeting hospital emergency room doctors and nurses who would render assistance in the event of a terrorist attack. The City of Los Angeles, CA, was the first to receive this added bonus as part of the Domestic

Preparedness Training Program. The Continuing Medical Education accreditation normally takes a minimum of 8 weeks; however, through the efforts of Helen Matthews of SAIC, Rosalie Holland of the Medical Research Institute of Chemical Defense, and Stephanie Coley of the U.S. Army Medical Command the accreditation was achieved in only 2 days after applying. This was a tremendous team success and we are anticipating increased emergency medical support.

Our Chemical Response Improvement Team, Domestic Preparedness Program, attended the **13<sup>th</sup> Annual South Baltimore Industrial Mutual Aid Plan (SBIMAP) HAZMAT Drill**. SBIMAP is the annual HAZMAT exercise for the Baltimore region. The exercise is hosted by the City of Baltimore and includes representatives from local governments, State and Federal agencies, as well as industrial corporations in the Baltimore region.

Training and Exercise feedback indicates that firefighters want to know what, if any, health risk they face if they unknowingly enter a CB-contaminated area. To address these concerns, we are doing some testing to gather data that will allow firefighters to make informed, emergency decisions that are consistent with their role in fire rescue and improve first response and public protection.

### *CB Helpline*

The Chemical Biological Domestic Preparedness Helpline, 1-800-368-6498, was activated on August 1<sup>st</sup>. This CB Helpline provides non-emergency technical assistance to Federal, State, and local responders on CB material, training, equipment, operations, exercises and emergency planning.

Our first subject matter inquiry was forwarded to the Engineering Directorate in the Edgewood RDE Center for action, responded to by an employee in the Office of the Program Manager for NBC

Defense Systems, and completed within one work day.

The CB Helpline is now linked to the interagency Domestic Preparedness web page at <http://www.nbc-prepare.org>. The Helpline is also

receiving requests for technical assistance via electronic mail. Email address is [cbhelp@cbdcom.apgea.army.mil](mailto:cbhelp@cbdcom.apgea.army.mil).

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## PFIESTERIA RESEARCH

**T**he toxic dinoflagellate *Pfiesteria piscicida* has recently been implicated in fish kills in local estuaries, and may be responsible for a variety of neurologic symptoms in waterman and laboratory workers. The toxin(s) produced by this organism are incompletely characterized, and available evidence suggests that they pose an aerosol threat.

The University of Maryland Biotechnology Institute's Center of Marine Biology (COMB) is leading a study of the *Pfiesteria* outbreak. Because of the unresolved biosafety issues, COMB is constructing a Biosafety Level III (BL 3) laboratory. BL-3 containment is applicable to clinical, diagnostic, teaching, research, or production facilities in which work is done with indigenous or exotic agents which may cause serious or potentially lethal disease as a result of exposure by the inhalation route.

Because of their inexperience with BL-3 containment, COMB's project leader requested assistance from the U.S. Army Chemical and Biological Defense Command in designing the facility and in devising standard operating procedures. Dr. Jay Valdes (Scientific Advisor for Biotechnology), Mr. Raymond Mastnjak (Safety Officer) and Mr. Timothy Williams (Industrial Hygienist) met with the COMB Director and staff, and the University of Maryland's Department of Environmental Health and Safety, to review the engineering controls of COMB's BL-3 facility and to advise on SOP's and training. As a result of this meeting and subsequent recommendations by the CBDCOM team, a consensus was reached on how to best proceed with final construction of the BL-3 facility and for the formulation of realistic safety procedures for studying *Pfiesteria*.

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## FROM GENES TO MARKET: BIOPROCESSING AT THE EDGEWOOD RDE CENTER

The Edgewood RDE Center, in 1992, initiated the development of a recombinant antibody program whose aim was to apply the emerging tools of molecular immunology to the development of high quality reagents for the Biodefense Program<sup>1</sup>. Combinatorial phage display libraries enable the production of high affinity antibodies without the need for animals. Selection of anti-biothreat antibodies uses a procedure called biopanning to save time and to increase the number of highly specific clones isolated<sup>2</sup>.

The resulting recombinant antibodies are now in full-scale production in bacterial fermentation systems<sup>3</sup>. The Process Engineering Facility (PEF) at the Edgewood Center represents a unique pilot scale production capability within the DoD with the flexibility to perform fermentations as large as 1500 liters. Within the PEF the Molecular Recognition Team (MRT) works hand in glove with the Bioprocess Engineering Team (BET) to take research and development projects directly into large scale bio-manufacturing. Bacterial bio-manufacturing has the advantage of rapid expansion and lower cost per milligram of product compared to either existing cell culture or chemical synthesis approaches. The use of recombinant antibodies has allowed us to alter the clones' DNA genome to incorporate affinity purification handles for scale-up production, and epitope tags for product tracking.

The resulting product is a high quality reagent with exquisite specificity which is being incorporated into various detection platforms. One such configuration is an advancement on the "SMART" ticket (New Horizons, Columbia MD) which represents a first generation immunoassay employing purified animal sera. The use of anti-botulinum toxin (BoTx) recombinant antibodies, new tagging strategies, and a new flow membrane design has resulted in higher sensitivities and fewer false positive results, problems which had

plagued the earlier versions deployed during Operation Desert Storm.

This new lateral flow immunoassay is called "ALERT" and it incorporates bacterially produced recombinant antibody fragments. More than 1000 ALERT tickets for BoTx A/B are being produced for the Joint Program Office for Biodefense and are available as a reagent for the Critical Reagents Integrated Product Team (CRIPTS) program. The BoTx ALERT will also be used by the APG Garrison for confirming BoTx clearance from the former Pilot Plant prior to demolition of that building.



MRT is nearing production of the Dengue ALERT, which detects intact Dengue virus 1, 2, and 3. Kits on the market today differ from Dengue ALERT in that they do not detect the virus itself, but detect antibodies directed against the virus in order to confirm prior infection. Border patrol and environmental monitoring groups in Puerto Rico have expressed interest in purchasing units for tracking Dengue virus in mosquito populations. Since a mosquito can harbor as many as 70 million infectious doses, the Dengue ALERT can be a field hardy and cost-effective way to track this global epidemiological threat<sup>4</sup>.

Additional ALERT assays directed against the viral simulant MS-2 are expected to be tested at the upcoming Joint Field Trials at Dugway Proving Ground. We are currently constructing huge human "Superlibraries" which will be

capable of producing antibodies to any threat agent and deliver one gram of human antibody to a customer within six weeks<sup>5</sup>. In partnership with the FDA, this recombinant immunoassay technology is being designed to test food and animal feed to support Counter-Terrorism programs. Retention of core technologies in molecular biology placed in close proximity to biomanufacturing facilities has allowed ERDEC to rapidly transition these R&D projects into products within 18 months. In this way, we have streamlined the development process for supporting CBDCOM's mission objectives.

This article was written by Peter A. Emanuel and James J. Valdes of the Process Engineering Facility, located at the Edgewood Research, Development and Engineering Center, Aberdeen Proving Ground, MD 21010-5423

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<sup>1</sup> Emanuel, P.A.; Eldefrawi, M.E.; and Valdes, J. J. (1997) Production of Recombinant Antibodies for Biosensor Applications. 20<sup>th</sup> Army Science Conference: Award Winning Papers. World Scientific Publishing, River Edge, N.J. p. 56-60.

<sup>2</sup> Eldefrawi, M.; Eldefrawi, A.; Wright, J.; Emanuel, P.; Valdes, J.J.; Rogers, K. (1995) Immunosensors for detection of Chemical Mixtures. ACS Symposium Series 613 Biosensor and Chemical Sensor Technology, Chapter 3. 19-32.

<sup>3</sup> Emanuel, P.A.; O'Brien, T.; Burans, J.; DasGupta, B.R.; Valdes, J.J.; Eldefrawi, M. (1996) Directing antigen specificity towards botulinum neurotoxin complex with combinatorial phage display libraries. *Journal of Imm. Meth.* 193. 189-197.

<sup>4</sup> Rosen, L. and Gubler, D. (1974) The use of mosquitos to detect and propogate dengue viruses. *American Journal of Trop. Med. Hygiene* Vol. 23, No. 6. Pp. 1153-1160.

<sup>5</sup> Valdes, J.J.; Emanuel, P.A.; and Eldefrawi, M.E. (1996) Biological agent detection and the third revolution. *Army RD&A PB-70-96-6.* p. 31-32.



## ADVANCES IN ENZYMATIC DECONTAMINATION

**T**he potential use of enzymes for the decontamination of chemical warfare (CW) agents has been a subject of study for over 50 years. The first article in the open literature on the characterization of an enzyme from animal tissues that could hydrolyze and detoxify toxic organophosphorus compounds was published in 1946. Its author was CPT Abraham Mazur, from the then Chemical Warfare Service, Edgewood Arsenal. While some interest in this field was maintained on and off over the years, it has been over the last decade that the most significant advances have taken place. The Environmental Technology Team at the U.S. Army's Edgewood Research, Development and Engineering Center (ERDEC) is the lead DOD group conducting basic and applied research in the use of enzymes for the decontamination of equipment, vehicles, and large fixed sites.

Currently fielded decontaminants are quite effective in dealing with chemical and biological warfare agents. However, they can also be quite corrosive and toxic thus limiting their potential use in the decontamination of sensitive equipment or large areas. Since these decontaminants are often bulk liquids, they can also pose a considerable logistical burden on mobile units. Enzyme-based decontaminants, in contrast, will be non-toxic, non-corrosive, environmentally safe, and have the potential to reduce the logistical burden by 25- to 50-fold. Because of the potential advantages of enzyme-based systems, this program became a Defense Technology Objective (DTO) in FY97. In addition, because of their safety, enzymatic systems could be used in dealing with the mass civilian casualties that might result from a terrorist incident.

The basic emphasis of current research is on the development of a mixture of enzymes and other components that would be packaged as a dry powder. When needed, the powder would be added to any available water-based liquid and

sprayed onto the contaminated equipment or area using conventional decon equipment, fire-fighting equipment, or any other pumping or spraying apparatus. The decontaminant can be thought of as being similar in nature to the enzyme-containing laundry detergents that have been on the market for a number of years.

The research program at the Edgewood RDE Center has concentrated on the identification and characterization of bacterial enzymes. The greatest success has been in the development of enzymes that have activity against the G-type nerve agents such as soman and sarin. A variety of bacterial enzymes with significant G-agent activity have been identified and characterized. Unlike the cholinesterases that react with a single agent molecule and are then inactivated, these bacterial enzymes are catalytic. Depending on the type of agent, pH, and temperature, each enzyme molecule can hydrolyze from 1-8000 agent molecules per second. Therefore, under controlled conditions, one gram of enzyme could degrade from 0.5 to 6 kilograms of agent in 10 minutes.

While many similar enzymes, from a wide variety of organisms (bacteria, protozoa, crustaceans, birds, and mammals), have been described in the literature since the time of Mazur's original publication, the role that these enzymes played in normal metabolic activities remained unknown until 1996. The cloning and sequencing of the genes for the bacterial G-agent degrading enzymes revealed that they are actually a type of peptidase that hydrolyze the cleavage of dipeptides with the general structure of X-Proline (with X being an amino acid such as Leucine, Isoleucine, or Alanine). Surprisingly, the bacterial enzymes appear to play no role in the metabolism of phosphorus compounds, as had once been believed. The activity on the agents appears to be due to the structural similarity of the agents to the dipeptides.

In order for any enzyme-based system to be practical, the enzymes must be available in large quantities. To achieve this goal, two parallel technical approaches are being taken:

- clone the genes for the enzymes into high expression vectors with appropriate *E. coli* host cells so that they can be produced at higher levels and simplify the purification procedure
- optimize the growth and enzyme yield of the recombinant bacteria in large-scale fermentation systems

Using these approaches, a recombinant strain was constructed that produces from 50-60% of its cell protein as the enzyme. The original bacteria from which the G-agent degrading enzyme were obtained, less than ~0.01% of cell protein was enzyme. With this “super clone” the cost and effort involved in producing large quantities of enzyme will be greatly reduced. Efforts are now underway, in conjunction with the Bioprocess Engineering Team, to determine the fermentation conditions that will permit the most efficient production of cells and enzymes. Improvements in enzyme production of at least 25-fold have already been achieved with the “super clone.”

A number of possible matrices for the enzyme-based decontaminants are also being examined. These include fire-fighting foams and sprays, environmentally safe detergents and degreasers, and aircraft deicing liquids. Although the enzyme activity in such systems varies considerably, preliminary results have been very promising. For the enzyme itself, it can be stored as a freeze-dried powder and maintained at room temperature with no loss in activity for at least 18 months.

So far, several enzymes with catalytic activity against the V-type nerve agents and pesticides have been identified and are under evaluation.

A new program aimed at sulfur mustard decontamination by enzymatic means was recently initiated at the Edgewood Center.

The use of these enzymes in a number of other areas has also been proposed. These include: neutralization of agents in the demilitarization of stockpiles and the decon of the demilitarization equipment in case of leaks or spills; cleanup of organophosphorus pesticides from spills, terrorist incidents, or as a part of normal agricultural operations; prophylactic protection of personnel or therapeutic treatment of casualties. In addition, discussions have also been held with researchers at Dugway Proving Ground about the use of enzymes in a large area decontamination effort that involves a C-130 aircraft fitted with a 2,000 gallon spray tank. Tests have demonstrated the feasibility of thoroughly covering an area of about 10 acres with multiple passes of the aircraft with a single 2000 gallon load of fire-fighting spray solution. The inclusion of the enzymes in a fire-suppressant material could provide for dual use capabilities.

Our effort has also involved collaboration with researchers in other government agencies, academia, and industry. Two Cooperative Research and Development Agreements (CRADAs) were recently established with Altus Biologics (developer of cross-linked enzyme crystals, CLEC's) and FireFreeze Worldwide (manufacturer of ColdFire, a plant extract based, environmentally safe fire-suppressant material). Both companies have expressed an interest in potentially marketing products that include the agent- and/or pesticide-degrading enzymes. In addition, the United States is the lead nation in NATO Project Group 31 which has the goal of developing “Non-Corrosive, Biotechnology-Based Decontaminants for Chemical and Biological Warfare agents.”

POC: Dr. Joseph J. DeFrank, Environmental Technology Team, Commercial (410) 671-3749, DSN 584-3749, or email [jjdefran@apea.army.mil](mailto:jjdefran@apea.army.mil), or Dr. Tu-chen Cheng, Environmental Technology Team, Commercial (410) 612-8632, DSN 584-8632, or email [tcheng@apea](mailto:tcheng@apea)



## THE FATE OF AGENT VAPORS ADSORBED ON ACTIVATED CARBON FILTERS

Activated carbon filters are used extensively in military and commercial applications for the removal of toxic vapors from chemical process and ventilation airstreams. One area of increasing concern is the rapid expansion of the use of activated carbon filters as pollution abatement controls in facilities for the destruction of CW agent munitions and waste. It is estimated that in excess of 50 tons of activated carbon filters contaminated with CW agents reside in U.S. based agent storage and destruction facilities.

The health and safety issues for the handling, transport, and destruction of agent spent filters have received considerable attention in recent years. A specific concern is the desorption or offgassing of agent and product vapors from activated carbon filters that may occur at elevated temperatures and humidities. Understanding the fate of these agents (offgassing and chemical decomposition) when adsorbed on carbon filters is an important step in estimating the potential hazards and for establishing guidance for safe handling and destruction.

Initiated out of a basic research program in 1996, the Chemical Biological Filtration Team at the Edgewood RDE Center began investigating the properties and conditions that could lead to the desorption of HD, GB, and VX from activated carbons. The work involved developing analytical methodologies to characterize at low levels the adsorbed- and vapor-phase concentrations of agents in equilibrium on activated carbons. Two methods were identified:

To measure the adsorbed-phase concentration of agents and reaction products,  $^{13}\text{C}$  MAS NMR was selected. This method developed by George Wagner at the Edgewood Center offers an in situ technique for determining agent degradation kinetics and products adsorbed on activated

carbon. To measure the vapor-phase concentration as a function of adsorbed-phase loading, thermal desorption accompanied by GC-MS was selected. This method, developed by Leonard Buettner and James Buchanan at the Edgewood RDE Center, provides the identification of ultra-low concentrations of agents and decomposition products offgassing from the carbon at various temperatures and flow conditions. The thermal desorption technique has allowed for the first time to measure vapor and adsorbed phase concentrations of low vapor pressure agents at near equilibrium conditions.

Experimental work conducted on mustard (HD) adsorbed on activated coconut shell carbon (CSC) shows that HD is moderately stable when dry, yet decomposes on CSC with the rate of reaction increasing with temperature and coadsorbed water.  $^{13}\text{C}$  MAS NMR measurements of samples containing 0.1 g-HD/g-CSC and ca. 0.08 g/g water show that hydrolysis is the primary reaction pathway at 30 °C. At 60 to 90 °C, hydrolysis is accompanied by ether formation and thermal decomposition to yield 1,4-dithiane and 1,4-thioxane, 2-chloroethanol and 1,2-dichloroethane at elevated temperatures. When stored for 4 months, the decomposition of HD results in ca. 71, 36, and 32% HD remaining at 30, 60 and 90 °C, respectively.

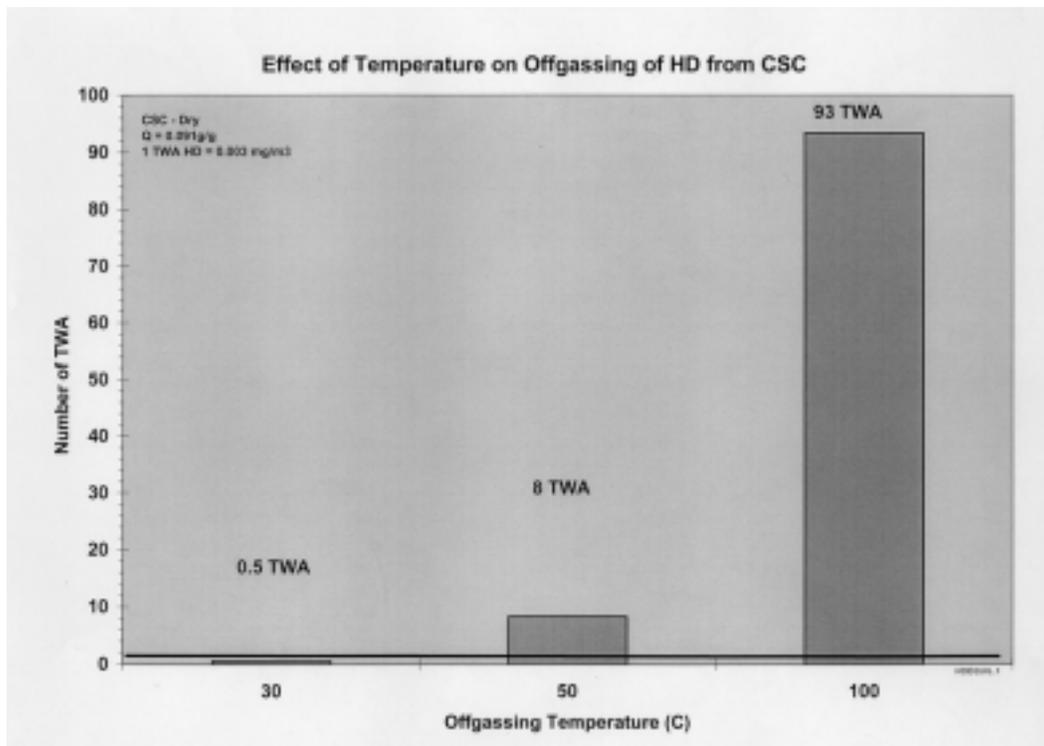
The desorption of HD and its products from CSC is influenced by the adsorbed-phase composition and increases with temperature on both dry carbon and carbon containing water. The major products of reaction desorbed are 2-chloroethylvinylsulfide, 1,4-dithiane, and 1,4-thioxane, dichlorobutane and 2-chloro-2<sup>1</sup>-hydroxydiethylsulfide. Between 50 and 100 °C the ratios of HD to volatile product offgassing from CSC remains fairly stable at ca. 8 to 1, yet increases significantly to ca. 2 to 1 at 200 °C.

From the measured offgassing experiments a relationship of vapor phase concentration and temperature is obtained. The Figure shows that when CSC contains 0.091 g-HD/g-CSC the number of TWAs that can offgas ranges from 0.5 to 93 (1 TWA-HD is 0.003 mg/m<sup>3</sup>) when the sample is exposed to temperatures between 30 and 100 °C.

Recent experiments with GB adsorbed on CSC under the same loading and temperature conditions show that the number of TWAs in the vapor phase increases by several orders of magnitude (TWA-GB = 0.0001 mg/m<sup>3</sup>). The primary reason for the higher offgassing concentrations of GB from CSC is that the vapor pressure of GB (2.10 mm Hg at 20 °C) is significantly greater than HD (0.072 mm Hg at 20 °C).

Fundamental studies of the type described above will be used to develop a model that will predict the level of hazard for spent carbon filters that can be extended to a variety of temperature, humidity, and wind conditions. Concurrently, samples of spent carbon will be obtained from CW destruction sites (JACADS, TOCDF, CAMDS) and characterized to determine the adsorbed-phase concentrations of HD, GB, and VX. An important part of this effort is to develop an appropriate methodology to sample spent carbon contained in filter elements and in waste drums. This data will be used to validate a suitable 3X testing methodology for agent contaminated carbon filters that accounts for the effect of temperature on offgassing concentrations.

POC: Christopher J. Karwacki, Research and Technology Directorate, DSN 584-5704, Commercial 410-671-5704, email: [cjkarwac@apea.army.mil](mailto:cjkarwac@apea.army.mil)



## THERMAL TREATMENT FACILITY NOT INCLUDED IN PERMIT RENEWAL APPLICATION

The Controlled Hazardous Substance Permit No. A-190 (RCRA Part B) Renewal Application covering N Field and the Chemical Transfer Facility was submitted to the Maryland Department of Environment on November 14<sup>th</sup>. The Thermal Treatment Facility at the Edgewood Area of Aberdeen Proving Ground was not included in the Renewal Application.

The decision was based on a cost comparison of operating the facility in compliance with the proposed revised standards for Hazardous Waste Incinerators under joint authority of the Clean Air Act and the Resource Conservation and Recovery Act versus disposing of the waste normally treated at the facility in existing commercial facilities. The revised standards are extremely stringent and would require expensive monitoring systems to ensure compliance.

The Thermal Treatment Facility will formally close its doors May 13, 1998. All individuals currently assigned to the facility will be reassigned within the organization.

The Thermal Treatment Facility was originally licensed on May 16, 1985, for the thermal treatment of spent decontamination solutions as well as solids that may have been exposed to agent and then decontaminated or monitored to prove the

absence of agent vapors. Treatment of liquid spent decontamination solution in the Thermal Treatment Facility was discontinued several years ago and since then, liquids have been sent to commercial facilities for treatment.

Laboratory waste, laboratory equipment, and building debris have been processed at the Thermal Treatment Facility. When the Thermal Treatment Facility is closed, solid and liquid wastes resulting from decontamination of agent and agent-contaminated solids will be sent to commercial facilities.

The facility is managed by one team leader and four chemical plant operators working two shifts to ensure that the thermal treatment unit operates efficiently by running 14 continuous hours each day. As of December 5th, 1997, 6,524,397 total pounds have been processed through the facility. The Edgewood RDE Center's Environmental



*Thermal Treatment Facility at Edgewood Area of Aberdeen Proving Ground*

Office has prepared written notification to Maryland Department of Environment of intent to close the Thermal Treatment Facility and is coordinating with the Directorate of Safety, Health, and Environment at the Aberdeen Proving Ground for review and submittal. A preliminary meeting with the Maryland Department of Environment; the Directorate of Safety, Health Environmental; and the Edgewood RDE Center was held in October to discuss the overall strategy for closing the facility.

An official closing plan will be prepared by the Edgewood Center's Operations Directorate, in coordination with Aberdeen's Directorate of Safety, Health, and Environment, and will be submitted to the Maryland Department of Environment prior to ceasing operations at the Thermal Treatment Facility. On December 2<sup>nd</sup>, Edgewood Center personnel met with Defense Reutilization and Marketing Office to consider placing the entire unit out on bid to private industry concerns.

POCs: Mr. Dennis G. Hall, Operations Directorate, Commercial (410) 671-2393 or DSN 584-2393, or email [dghall@apega.army.mil](mailto:dghall@apega.army.mil), or Ms. Cindy Dietz, Operations Directorate, Commercial (410) 671-4427 or DSN 584-4427, or email [ckdietz@apega.army.mil](mailto:ckdietz@apega.army.mil).

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## INVENTORS RECEIVE ROYALTY MONEY

Three inventors at the Edgewood Research, Development and Engineering Center ( Hugh Carlon, Mark Guelta, and Bernard Gerber) recently received royalty income checks from the Pharmacia & Upjohn Company as a result of a non-exclusive Patent Licensing Agreement (PLA). This PLA is for a series of patents that cover the use of polyalphaolefins (PAOs) as a replacement material for dioctylphthalate, a suspected carcinogen to test filters. Following extensive testing and analysis at Edgewood, which validated the use of PAOs, they were approved by the Surgeon General of the Army. We also have another non-exclusive PLA with Abbott Laboratories. So far, a total of \$25,000 in royalties have been generated from PLAs.

The PLAs are a result of the intensive marketing and negotiation efforts by the technology transfer and legal team at the Center. Technology transfer is a program mandated by Congress to promote the transfer of federally-funded technology and expertise to industry and academia. The primary purpose of technology transfer is to enhance the competitiveness of the United States in international markets, stimulate economic growth, and create more manufacturing and high-technology jobs. In addition, there is direct monetary benefit to scientists and to the federal laboratory: Inventors receive 20%, and the laboratory (i.e., ERDEC) receives 60%, and the Army Materiel Command receives 20% of the royalties generated.



## ACWA/DACWA - Truly A New Way of Doing Business



Since coming on board as Program Manager for the Assembled Chemical Weapons Assessment (ACWA) program, Mike Parker, also Deputy to the Commander of CBDCOM, has hardly taken a moment's rest. Along with his Deputy Program Manager, Bill Pehlivanian, Parker and his entire staff have been hard at work keeping on top of this new and innovative program. In fact, they have given new meaning to the words "teamwork" — "dialogue" — "innovation" and most certainly — "fast track."

"We have accomplished a great deal with this program, all in a very short time," remarks Pehlivanian. "We are seeing Department of Defense technical staff, Dialogue participants and even potential technology providers sitting around the same table working on solutions to very complex issues and we are seeing some great results. This program truly symbolizes a new way of doing business for the Department of Defense."

At the core of the ACWA program's initial development has been the creation of the Dialogue on Assembled Chemical Weapons Assessment. The Dialogue is facilitated by the Keystone Center, a not-for-profit, neutral organization that specializes in environmental mediation. The Dialogue's goal is to incorporate stakeholder input into this Congressionally mandated program to identify and demonstrate two or more alternatives to baseline incineration.

Thus far, the entire Dialogue team has convened with unparalleled success. Over the course of three meetings in Colorado, Kentucky and Maryland, the Dialogue worked directly with the program's technical staff to develop technical criteria that DOD used as the framework to establish the program's formal request for technology proposals. DOD released a Request for Proposal (RFP) on July 28. The proposals, due by September 15, are now being evaluated based on the criteria.

Craig Williams, Dialogue participant and Director of the Kentucky Environmental Foundation, is impressed by the Dialogue and its progress. "Clearly, it is encouraging that the common objective which brings us together can be worked on in such a diverse group with this kind of focus on accomplishing the same mission," said Williams. Williams also sees the ACWA program as a big step forward for the entire stockpile disposal program, adding that "had the current program included community input 13 years ago, we would be much further along in the process of disposing of the United States stockpile."

Pehlivanian also is encouraged by the impact the Dialogue has had on the program thus far. "Involving community members, regulators and special interest groups throughout this process is key to the overall success of the program," says Pehlivanian. "The Dialogue members are dedicated and focused on achieving this success."

The program's staff includes technical, environmental, business and public outreach teams. In addition to participating in the Dialogue meetings, the ACWA staff has been hard at work gearing up for a successful program. Joe Novad, head of the ACWA Program's Technical Team, spent many hours with a dedicated team of scientists and engineers from government and industry developing the technical approach to finalizing the RFP. During the Dialogue meeting in Maryland, Novad summarized the main objectives of

the Program's Technical Team. "In order to make sound recommendations [to Congress], the Team has established three goals and objectives. They include: develop sound program evaluation criteria; conduct a detailed assessment of the proposed alternative technologies using the criteria; and demonstrate the best alternative technologies to baseline incineration."

Novad adds that each of these objectives will be met with the help of Dialogue members. "The entire technical staff has worked very closely with the Dialogue group over the past several months to develop the criteria that was published in the RFP. To ensure continued success, we must maintain an open, productive communication channel between DOD, the community and industry representatives," said Novad.

"The technical staff would like to see companies team with each other to combine technologies and create total solution concepts to safely dispose of assembled chemical weapons. In other words, we are looking for proposals that start with an assembled chemical weapon and result in environmentally acceptable wastes," said Novad. "We also would like to have unanimous agreement between DOD and the Dialogue on technologies selected to go to demonstration."

The ACWA program is a result of legislation passed by Congress in December 1996. This legislation allocates \$40 million to identify and demonstrate at least two alternatives to the baseline incineration process for the demilitarization of assembled chemical weapons. Although the mandate requires demonstration of at least two alternative technologies, DOD hopes to demonstrate more than two technologies by late Fiscal Year 1998.

For more information on the ACWA program, please access the program's World Wide Web site at <http://dialogue.pmacwa.org>.



# Fieldings

 <p><i>M56 Smoke Generator</i></p>	<p>Ordnance Center and School, Aberdeen Proving Ground, MD</p> <p>POC: Randal H. Loiland AMCPM-SM, DSN 584-2806</p>	<p>Aug 97</p>
 <p><i>M157A2 Motorized Maintenance Work Order (MWO) Retrofit Kit</i></p>	<p>Ordnance Center and School, Aberdeen Proving Ground, MD</p> <p>POC: Richard W. Decker AMCPM-SM/157, DSN 584-8374</p>	<p>Aug 97</p>
 <p><i>New M157A2 Smoke Generator/M284A1 Mounting Kit on M1097 HMMWV</i></p>	<p>327<sup>th</sup> Cml Co. (reserves), Waco, TX 224<sup>th</sup> Cml Co., Fort Knox, KY</p> <p>POC: Richard W. Decker AMCPM-SM/157, DSN: 584-8374</p>	<p>Sep 97 Oct 97</p>
 <p><i>M157A2 Mechanized Maintenance Work Order (MWO) Retrofit Kit</i></p>	<p>4<sup>th</sup> Cml Co., Camp Casey, Korea War Reserve, Camp Carroll, Korea 31<sup>st</sup> Cml Co., 4ID, Fort Hood, TX</p> <p>POC: Richard W. Decker AMCPM-SM/157, DSN 584-8374</p>	<p>Sep 97 Sep 97 Oct 97</p>

## Fieldings (continued)

 <p style="text-align: center;"><i>M41 Protection Assessment Test System</i></p>	<p>PA National Guard Fort Lewis, WA WA National Guard Fort Wainwright, AK</p> <p>POC: Michael E. Busch, SCBRD-ENS, DSN 584-5773</p>	<p style="text-align: right;">Aug 97 Nov 97 Nov 97 Nov 97</p>
 <p style="text-align: center;"><i>M42A2 Combat Vehicle Mask</i></p>	<p>Fort Bragg, NC Fort Hood, TX Fort Stewart, GA Fort Benning, GA</p> <p>POC: CPT John M. O'Regan AMCPM-NNL, DSN 584-6551</p>	<p style="text-align: right;">Aug 97 Sep 97 Nov 97 Dec 97</p>

### HELP LINES/TOLL-FREE NUMBERS

	<i>Telephone No.</i>	<i>fax no.</i>
Chemical Maintenance	Germany 0130810280 Korea 0078-14-800-0335 CONUS 1-800-831-4408	1-410-671-3912 (TOLL CALL)
Smoke/Obscurants	1-888-246-1013	1-410-671-2702 (TOLL CALL)
CB Helpline (NONEMERGENCY TECHNICAL ASSISTANCE)	1-800-368-6498	1-410-612-0715 (TOLL CALL)
Environmental Quality	1-410-612-6588 (TOLL CALL)	1-410-671-8484 (TOLL CALL)

## CBDCOM/ACALA CHEMICAL WARFARE DEFENSE EQUIPMENT WEB SITE

**I**n addition to CBDCOM's outstanding Internet and Intranet websites, the ERDEC Product Engineering Office located at Rock Island Arsenal has created a web site to help the soldier use fielded chemical defense equipment. The site is part of the Soldier Support Network (SSN) created and maintained by the Armament and Chemical Acquisition and Logistics Activity (ACALA). The SSN is a password-protected website that contains logistics, supply, maintenance, and operational information on weapon systems to support the soldier. The SSN now has a Logistics Assistance Representative (LAR) locator, some online weapon system training, technical manuals, supply catalogs, supply and maintenance newsletters, online forms (e.g. QDRS, material returns, RODs, etc), online requisitioning, Safety of Use Messages, Maintenance Advisory Messages, and more.

Our Chemical Defense Equipment portion of the site contains information for much of the currently fielded ERDEC equipment. Each individual piece of equipment has its own page which presents logistic/supply info such as national stock number and part number, pictures of the equipment, a description of the equipment and how it works, and links to the most recent supply, maintenance, safety, and operational information. Chemical Newsletter articles are available from the past year and a half. Users are notified of the Chemical Maintenance Hotline. Though not yet complete, all chemical defense equipment demilitarization and disposal instructions as well as Material Safety Data Sheets are available. A few Technical Manuals are now available on-line.

The site was initiated in June 97 by two high school apprentices we employed through the George Washington University Science and Engineering Summer Apprentice Program. The site was made available to the SSN in August. In January 98 we plan on having a part-time college student contractor employed on updating and expanding the site information.

We hope to eventually expand the site to cover all fielded equipment. In order to do this we need all product teams and program managers to review the site to make sure the information presented is correct and complete. In today's changing world of information technology we believe this website may represent the best method to get up to date information to the user.

The Chemical Defense Equipment website can be found at the following URL:

<http://147.217.198.7/ssn/cbdcom/peo/home.html>

Remember that the site is password protected. A password can be obtained by following the directions on the site home page.

POC: Mr. Rich McInnis, Engineering Directorate (Rock Island) DSN 793-7180, e-mail: [rmcinnis@ria-emh2.army.mil](mailto:rmcinnis@ria-emh2.army.mil)



## END ITEM UPDATES

### TYPE CLASSIFICATIONS:

LIGHT VEHICLE OBSCURATION SMOKE SYSTEM end items type classified-standard:

GRENADE, LAUNCHER, SMOKE: screening, TA, M90

DISCHARGER, GRENADE, SMOKE, COUNTERMEASURE: lightweight, M7

INSTALLATION KIT, GRENADE LAUNCHER: smoke, light vehicle, 1-M7 discharger, turret mounted, M304

INSTALLATION KIT, GRENADE LAUNCHER: smoke, light vehicle, 4-M7 dischargers, roof mounted, M305

INSTALLATION KIT, GRENADE LAUNCHER: Smoke, Up-Armored HMMWV, 4-M7 Dischargers Roof Mounted, M310

### CONDITIONAL MATERIEL RELEASE :

PERSONAL DYE MARKER, GRENADE, HAND HELD, PAINT MARKER — Conditional release is limited to the current military operations in Bosnia and expires on 30 June 1998 or upon cessation of operations in Bosnia, whichever comes sooner.

### NOMENCLATURE/TYPE DESIGNATOR:

**OLD:** DECONTAMINATING APPARATUS: DS2 pumper w/scrubber module, XM21

**NEW:** DECONTAMINATING APPARATUS: decontaminant pumper module, XM21

**OLD:** ALARM MONITOR GROUP: NBC, area warning/tactical vehicles, XM27

**NEW:** ALARM MONITOR GROUP: NBC, vehicles/vans/shelters, XM27

**ASSIGNED:** TEST SET: alarm monitor group, XM180

DETECTION SYSTEM, BIOLOGICAL AGENT: joint point, fixed site, XM95

DETECTION SYSTEM, BIOLOGICAL AGENT: joint point, man-portable, XM96

DETECTION SYSTEM, BIOLOGICAL AGENT: joint point, S788 shelter, XM97

DETECTION SYSTEM, BIOLOGICAL AGENT: joint point, ship, XM98

### ENGINEERING CHANGE PROPOSALS (ECP):

**M40 Mask** — The team is finalizing a proposal that will reduce Government testing at the contractor 4-fold. If implemented, this Value Engineering Proposal (VEP) will save approx \$500,000 dollars in the next year.

**M28 Simplified Collective Protection Equipment (SCPE)** — The self-locking strap VECP for the M28 liner was approved in July; however, the modification will be applied to the Air Force quantities only. Because the Army did not incorporate the change, quantities were reduced, which negated the savings for this production contract. The Air Force is willing to pay for the implementation cost for the change.

**M17 Decontamination System** — An ECP was approved to change the color of the M17's float ball from blue to red. This ball allows the M17's suction hose to remain close to the surface when extracting water from a

deep water source. The ECP was a product of a Defense Logistics Agency request for engineering support and was initiated since a source for the blue color ball was no longer available. The change in color was coordinated with the Chemical School.

## **EQUIPMENT UPDATES:**

### ***M93A1 Fox NBC Reconnaissance System*** —

- Representatives from Hutchinson Tire and Equipment Company demonstrated for the Fox Team new equipment designed to remove and install tires similar to those used on the Fox. The system operates on air pressure/hydraulics and is compact for ease in transporting. We are interested in this system because current inventory equipment is not safe for use with the Fox tires. The equipment worked well and could be used for other like tires used in the Army inventory.

- The NBCRS MANPRINT effort in support testing has yet again been hailed a success story in Modeling and Simulation in the October 1, 1997, House Congressional Record. The MANPRINT contribution is used as an illustrative example of success in modeling through optimization of the Fox Vehicle's crew compartment. The total cost of the MANPRINT effort is identified as \$60,000. The associated cost avoidance in operational testing is identified as \$2-4 million in conjunction with affording successful elimination of one crew member from each M93A1 Fox Vehicle variant.

### ***Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD)*** —

- In September, Intellitec Division of Technical Products Group, Deland, Florida, was awarded a \$7,890,000 increment as the first part of a \$30,228,070 Engineering and Manufacturing Development contract for the JSLSCAD.

- We successfully employed two chemical standoff detectors, the M21 Remote Sensing Chemical Agent Alarm and the developmental JSLSCAD, in a series of foreign military field trials. Harmless vapors were released to simulate a chemical attack and the detectors successfully detected, alarmed, and tracked the vapors on an airbase and in an urban environment. The tests provided valuable developmental information on chemical vapor behavior in populated areas and also served as an excellent example of cooperative international testing.

***M22 Advanced Chemical Agent Detector Alarm (ACADA)*** — The Nuclear Regulatory Commission registration was approved in August; each service can now apply for a license for delivery and use of the M22. A Nuclear Regulatory License for the Army was approved in September, which allows us to use the M22 ACADA. The ACADA is an "off-the-shelf" automatic chemical agent alarm system capable of detecting and identifying standard blister and nerve agents. It is manportable, will operate with no human interface after system start-up, and provides an audio and visual alarm. It also has a communications interface to support battlefield automation systems. It will replace or complement the M8A1 Alarm and will augment the Chemical Agent Monitor as a survey instrument. It will be used by the Army, Navy, Air Force, and Marines for area warning. The ACADA will be used to monitor protection shelters and is mountable on vehicles.

***M42 Alarm*** — The M8A1 Chemical Agent Alarm Integrated Process Team completed a review of the maintenance concept for the M42 Alarm. Computer modeling techniques (COMPASS-lite, Palman analysis, and a CECOM program) were used to assess what changes should be made in repair/discard decisions. All the modeling techniques indicated that the alarm should continue to be repaired; however, because of high

part costs and low failure rate, the wiring harness and bottom case should no longer be repaired. It is more economical to replace the M42 than to repair these items. An M42 Alarm only costs \$107. The Source, Maintenance, Recoverability code will be changed on the M42 wiring harness and bottom case to replace until all spare part stock is exhausted. When the stock is exhausted, M42s requiring replacement of a harness or bottom case will be discarded and the user will requisition a new M42 Alarm.

**M8A1 Chemical Agent Alarm** —There are approximately 3,000 unserviceable M8A1 Chemical Agent Alarms in storage awaiting depot rebuild. A recent engineering study estimates that many of these alarms are not unserviceable but have been incorrectly coded and their condition is actually unknown. This incorrect coding is most likely attributable to troop reduction actions such as RetroEurope in which turned-in assets were not screened for true condition, and up to 1,800 of these alarms may actually be field-issuable with minor repair. Actions are being taken to reprogram the FY98 depot rebuild funds to implement an inspection and minor repair program on the 3,000 assets. This program could result in a depot rebuild cost avoidance of over \$1.2M and quickly fill nearly 3 times as many M8A1 requisitions as previously expected for FY98.

**Long Range Biological Standoff Detection System (LR-BSDS)** — Commandants of the U.S. Army Chemical School and the U.S. Army Aviation School signed a Memorandum of Agreement (MOA) to participate in the BIO.SIM study and accept its results. The Program Director, Biological Defense Systems, CBDCOM, who is responsible for execution of the study, has also signed the MOA. The BIO.SIM effort is a study to mature existing tactics, techniques and procedures, and doctrine for employment of the LR-BSDS on the UH60 helicopter. The study will employ the LR-BSDS and UH60 simulators on the Distributed Interactive Simulation network to evaluate concepts of employment, which aims to ensure success of the LR-BSDS mission while minimizing aircraft vulnerability.

**Radiacs** — The Radiac Team began shipping the 52 Radiological Protection Officer Kits that were developed and procured this year. The kits, which add two probes to the AN PDR-77 Radiac Set, will provide Radiological Protection Officers with a standard instrument. The funding to procure the kits was provided by the U.S. Army Communications and Electronics Command as a result of a recommendation made by the U.S. Army Materiel Command's Radiation Protection Advisory Committee. The kit was developed under an informal IR&D with the small business that developed the AN PDR-77, Nuclear Research Corporation. If adopted Army-wide, the estimated annual calibration cost savings is \$350K.

**Protective Mask Fit Testers** — Beginning October 1<sup>st</sup>, all protective mask fit testers in the Army inventory are to be maintained by the U.S. Army Test, Measurement and Diagnostic Equipment (TMDE) Activity, Huntsville, AL. As such, the Chemical Activity/Chemical Depots will ship their mask fit testers directly to the TMDE Activity for maintenance and calibration. The TMDE Activity will support both the M41 (militarized version) and the Model 8020M (commercial version). This is a centrally-funded service provided at no cost to the CA/CDs. In the past, the testers were supported by the manufacturer. The users paid for support for the commercial versions. The militarized versions were direct exchange with the National Inventory Control Point.

**M40 Protective Masks** — The first year of a 2-year pilot program conducting Joint Service surveillance of fielded protective masks is complete. The Department of Defense Inspector General is a "partner" in this effort (per previous M40 Mask audit mediation agreements) and receives all data at quarterly updates. Preliminary analysis indicates lack of routine preventive maintenance checks and services of masks. Joint Service representatives agree. The lack of proper "preventive maintenance checks and services" concern has been raised through messages, PM Magazine articles, and the CBDCOM Commander's address at the World Wide Chemical Conference.

***M42 Mask Upgrade Program*** — In September, a team from the Office of the Program Manager for NBC Defense Systems and Pine Bluff Arsenal upgraded all the M42 Combat Vehicle Masks at Fort Bragg to the M42A2 configuration. In October, an upgrade was conducted at Fort Hood. This upgrade program converted M42 and M42A1 combat vehicle masks via a remanufacturing process at Pine Bluff Arsenal to the latest configuration, the M42A2. The M42A2 mask provides superior reliability and reduces support costs associated with the earlier versions.

***M45 Aircrew Protective Mask*** — In August, the U.S. Army Tank-Automotive Command and the Armament and Chemical Acquisition and Logistics Activity in conjunction with CBDCOM signed a 3-year, multi-year contract for the M45 CB Aviator and Land Warrior Mask, with an additional 2-year priced option, with ranges for both the Aviator and Land Warrior versions and 5 years of spares, using Indefinite Delivery Indefinite Quantity provisions, for an approximate total 5-year value of \$30M. The FY97 funded quantity for 11,550 M45 CB Masks, as well as various spares, for \$5.12M was obligated. This acquisition successfully used the ALPHA method of contracting. The awardee is a small disadvantaged firm, Campbell Plastics Engineering & Manufacturing, Inc., located in Corona, CA.

***CS Filled Grenade*** —

- The Program Manager for Smoke/Obscurants has entered into a cooperative program with the United Kingdom for a launcher fired 66mm CS filled grenade (XL96E1) and a companion training grenade (XL97E1). These grenades will fulfill a U.S. requirement for a riot control grenade for the Light Vehicle Obscuration Smoke System (LVOSS). This cooperative agreement cuts the U.S. development cost from an estimated \$12M to \$1.2M, while the UK benefits from shared development costs and increased production quantities.

- A contract was awarded to the United Kingdom's Chemical and Biological Defence Enterprise, Porton Down, to fund the U.S. share of the XL97E2 riot control grenade re-design efforts. The United States and the United Kingdom are each funding half of the redesign costs.

***Light Vehicle Obscuration Smoke System (LVOSS)*** —

- The DOD Non Lethal Weapons Program will fund a 5 year (FY98-02) development of a 66mm Non-Lethal grenade. Technologies under consideration for the Non-Lethal grenade include a rubber ball dispensing "stinger" grenade and an acoustics grenade. The Non-Lethal grenade will be fired from the LVOSS platform as a non-lethal crowd control.

- A Commerce Business Daily Announcement was published requesting information on non lethal methods to disperse a rioting crowd. The Light Vehicle Obscuration Smoke System Operational Requirements Document contains a riot control requirement. Concepts we are exploring include explosively dispersed rubber balls and sound/flash pyrotechnics.

***M157A2 Lynx Smoke Generator System (SGS)*** —

- Patent Number 5,665,272, which was granted in September to Mr. Bill Adams of the STEAM Team and Ms. Janice Fritz and Mr. Terry Thurman of PM Smoke for a "Multifuel Combustion Engine And Use In Generating Obscurant Smoke" was for development of the M157A2 SGS. The M157A2 is the first smoke generator that can operate on any light to middle distillate fuel, including gasoline, JP4, JP5, JP8, and all

grades of Diesel Fuel. The M157A2 SGS is currently in production and is being fielded to Army units worldwide, and foreign military sales are pending.

- The M157A2 -10 TM and the M284A1 -20&P TM have been updated and are at the printing plant.

- On October 30<sup>th</sup>, TACOM-ACALA Acquisition Center exercised an unevaluated option to fulfill an outstanding FY92 approved Foreign Military Sales (FMS) requirement for a quantity of 80 M157A2 Smoke Generator Sets. The unevaluated option was awarded at the same unit price as the basic contact, which was awarded as a result of a best value evaluation using a system performance specification. The total value of the FMS award is \$2,195,680.00.

***Advanced Integrated Collective Protection System (AICPS)*** — The Life Cycle Environmental Assessment was approved and a notice will be published in local county newspapers near APG. The purpose of this effort is to inform the community that there are no significant environmental impacts anticipated as a result of the development, test, use, or disposal of the AICPS in accordance with procedures and regulations described by the National Environmental Policy Act (NEPA).

***M48A1 Gas-particulate Filter*** — In September, a new contract for 9,600 M48A1 Filters at a unit price of \$540.00 each was awarded to Parmatic Filter Corporation located in Denville, NJ. Contract deliveries will begin in January 1998 at a rate of 400 per month and accelerate to 800 per month in March 1998, with last delivery in January 1999.

***Modular Decontamination System (MDS)*** -- The Team thanks Ben Yolken, a George Washington student, for his contributions to the MDS project. Ben conducted a test that will help soldiers in the field decide which nozzles and pressure to use with the XM21 Decontaminant Pumper, depending on the environmental climates of DS2. His results will be included as a chart in the operational procedures of the XM21 Technical Manual.

***Sorbent Decontamination Systems (SDS)*** — During Phase I of the SDS program, the contractor, Guild Associates, Inc., prepared and evaluated three sorbent candidates: Gamma Alumina, DVB-PNP, and CAL-DKM. The results obtained were then compared to historical data on XE-555 (the resin currently used in the M295 Individual Equipment Decontamination Kit) and DS2. Gamma Alumina performed best and met or exceeded half of the twenty requirements of the sorbent. In addition, Guild projects low risk for meeting the remaining criteria in Phase II. CAL-DKM and DVB-PNP, however, met or exceeded only five and eight of the twenty requirements, respectively. Furthermore, the risk associated with meeting the remaining requirements is moderate, although more moderate for CAL-DKM than for DVB-PNP. In September, the SDS contract with Guild Associates, Inc., was modified to include agent testing of the reformulated DS2P. As such, Guild will compare the performances of DS2P and the sorbent candidates against chemical agent and perform material compatibility testing with DS2 and DS2P.

***Tap Clothing*** — The Department of the Army Safety Office has approved the use of detergents on TAP Clothing and authority for a local waiver until the change is incorporated into the next revision of the DA PAM 385-61.

***Demilitarization/Disposal Instructions*** — The Chemical Product Pages on the Soldier Support Network will be the primary location for the most up-to-date demilitarization/disposal instructions for Edgewood RDE Center-developed materiel. The most up-to-date demilitarization/disposal instructions should be available on the web site by the end of October 1997. The URL for the Chemical Product Page on the Soldier Support Network is <http://147.217.198.7/ssn/cbdcom/peo/home.html>

## SECDEF REVIEWS CBDCOM NBC DEFENSE SYSTEMS AT PENTAGON

**O**n November 25<sup>th</sup>, Secretary of Defense William Cohen held a press conference at the Pentagon to release the second edition of a report, entitled “Proliferation: Threat and Response 1997.” The first was released in April 1996.

This report details the nature of the security challenge posed by the proliferation of nuclear, biological, and chemical (NBC) weapons and their delivery systems and the Department of Defense’s response to the challenge. The document also contains updated information about the countries that possess or may be developing NBC weapons and the means to deliver them. It describes the threat of NBC terrorism and describes DoD’s efforts since the end of the Gulf War to ensure that U.S. forces are equipped and trained to fight and win in NBC-contaminated environments.

To highlight this DoD initiative to equip, train, and prepare U.S. forces to prevail over an adversary who could use NBC weapons, the Joint Service Materiel Group partnered with the U.S. Army Chemical and Biological Defense Command planned and directed a display and demonstration of NBC defense systems from all of the armed services outside the Pentagon.



Master Sergeant Samuel Sharps (left) and SSG Gilbert Hurte, both of the PM NBC Defense Systems, brief Secretary of Defense William Cohen (Right) on the Chemical Agent Monitor and the Advanced Chemical Agent Detector Alarm, both products of the U.S. Army Chemical and Biological Defense Command. (U.S. Army photo by Conrad Johnson)

Following his press conference (which was covered live by several networks), Secretary Cohen led the Pentagon Press Corps outside to see the more than 60 different defense systems that were on display, the largest exhibition of NBC defense systems ever at the Pentagon. He joined the press in listening to briefings by members of the Army, Navy, Air Force, and Marine Corps. For the next 2 hours, the press representatives filmed, photographed, and interviewed the service members.

POC: Ms. Brenda C. Eckstein, Corporate Enhancement Team, Commercial (410) 671-2879, D S N 5 8 4 - 2 8 7 9 , o r e m a i l bceckste@apea.army.mil

# BRIEFS

**CHEMICAL WARFARE CONVENTION.** The number of ratifying states is up to 104. Russia is the latest, ratifying on November 5th. Iran, long suspected of possessing the Third World's largest Chemical Weapons stockpile was the 103<sup>rd</sup> ratifier. Russia ratified despite reports it did not have the finances to even maintain its stockpile; funding of the destruction of Russia's Chemical Weapons stockpile will be discussed at the meeting of State's Parties in the Hague December 1-5.

**RIBBON CUTTING CEREMONY FOR EDGEWOOD AREA CHILD DEVELOPMENT CENTER.** In September, the Commander of the Test and Evaluation Command at Aberdeen Proving Ground hosted the official opening ceremony for the Child Development Center at the Edgewood Area. Senator Paul S. Sarbanes spoke about how important child care is to soldiers and families and President Clinton's recent recognition of the quality of Army child care. This 122-child capacity Center replaces two WWII combustible facilities that had a history of asbestos and lead paint contamination as well as structural problems.

**CBDCOM WINS SILVER MARYLAND QUALITY AWARD.** In July, CBDCOM applied for the 1997 U.S. Senate Productivity Award. This award program is administered at the state level in conjunction with state awards for quality. The Senate award is the highest award for quality presented in the state of Maryland. There are also Gold, Silver, and Bronze awards presented by the state. The Quality Directorate has been notified that the CBDCOM application package was reviewed and that we did not make it to the Senate Award level. However, we have won the Maryland Quality Award - Silver. The Maryland Excellence Conference was held in October and the awards were presented to the winners. The criteria for these awards is based on the Malcolm Baldrige National Quality Award. Applying for the U.S. Senate award is our first step towards meeting the Command's strategic goal of becoming a President's Quality Award finalist. The application package included a comprehensive account of how we at CBDCOM comply with the categories in the Malcolm Baldrige Award criteria. These categories are Leadership, Strategic planning, Customer and Market Focus, Information and Analysis, Human Resource Development and Management, Process Management, and Business Results. The primary goal of this application was not to win one of the awards but to learn from the process and to improve based on the comments we will receive from the experts who made up the selection panels.

**EDGEWOOD RDE CENTER PART OF PBC DOCUMENTARY.** Mr. Jeff Goldberg, of Paladin Productions, recently visited our Biological Integration Detection System team to do some background work for an upcoming documentary for PBS/BBC on Biological Warfare. The documentary will be filmed sometime between October and December and will air in the May 1998 time frame.

**PBS PROGRAM.** The Palfreman Film Group is also preparing a documentary on Desert Storm for broadcasting on PBS in January 1998. The filming captured operational and interferent testing of detection equipment. False positives were filmed with some of the detection items. The Detection Core Team, Edgewood RDE Center, supported this filming by providing detection equipment (M8 and M9 papers, M256A1 Kits, and M8A1 Alarms). The FOX/Mobile Mass Spectrometer and the Chemical Agent Monitor were also filmed.

**PUEBLO CHEMICAL DEPOT DEVELOPS NEW FISH AND WILDLIFE MEMORANDUM OF AGREEMENT.** This cooperative agreement allows Pueblo Chemical Depot to fund the U.S. Fish & Wildlife Service and Colorado Division of Wildlife for managing its wildlife areas and participating in Team Pueblo.

**FOOD SERVICE COMING TO PUEBLO CHEMICAL DEPOT.** Pueblo Chemical Depot has reached tentative agreement with Pueblo Diversified Industries for food service operations at the depot beginning in October. Pueblo Diversified Industries will use the Pueblo Chemical Depot's Community Club; have an exclusive, full-service cafeteria; offer a fine-dining environment and catering for special events; provide a snack concession in the swimming pool area;

and use a “roach coach” for employees not able to get to the Club. Pueblo Diversified Industries, a school for physically and mentally challenged individuals, is one of Pueblo’s largest and oldest employers. It currently provides Pueblo Chemical Depot janitorial services. Its food-service goals for Pueblo Chemical Depot are to serve nutritious and affordable food; establish a community image beneficial to the Depot, and surrounding area; and, use the Club to train its clients for employment in the food-service industry. Pueblo Chemical Depot currently has no food service operation.

**GULF WAR ILLNESS SUPPORT.** The Program Manager for NBC Defense Equipment again reviewed copies of FOX NBCRS mass spectrometer tapes obtained at a Kuwaiti Girls’ School in 1991. All analyses indicate a high potential for the presence of Red Fuming Nitric Acid and not Mustard or Phosgene agents. Our unclassified interpretation will be provided for placement in the GulfLINK maintained by the Special Assistant for Gulf War Illness.

**ROCKY MOUNTAIN ARSENAL REMEDIATION** -A ribbon-cutting ceremony was held in September to dedicate the construction of a pipeline that will hook-up approximately 175 homes to a municipal water supply. The homes are located in Adams County, northwest of the Rocky Mountain Arsenal. The 13-mile pipeline is the fulfillment of a Record of Decision requirement that addresses the off-post contamination of ground water by Rocky Mountain Arsenal. The \$3.6-million cost of the pipeline is being shared by the Army and Shell Oil Company as a response cost. The ceremony was attended by approximately 100 people including municipal leaders and a representative of the Colorado Governor’s office. The work is expected to be completed by the spring of 1998.

**ANNUAL CSEPP EXERCISE AT TOOEELE, UT.** Deseret Chemical Depot supported by Tooele Army Depot completed a successful Chemical Stockpile Emergency Preparedness (CSEPP) exercise in September. The scenario began with a bulk container that leaked half its contents of nerve agent GB in a storage bunker. In the scenario, very low concentrations of agent drifted off post. Army, FEMA, State of Utah, and Tooele, Utah, and Salt Lake Counties participated in the exercise. The Joint Information Center, military and civilian medical systems, and civilian emergency response organization participation was solid reflecting continued improvement. Observers from Anniston and Umatilla were impressed with the level of preparation at Tooele.

**UTAH CITIZENS’ ADVISORY COMMISSION REPORT ON TOOEELE CHEMICAL DISPOSAL FACILITY UPBEAT.** The Utah Citizens’ Advisory Commission released an upbeat report on the Tooele Chemical Disposal Facility. A consultant team hired by the Commission prepared the 113-page report. The team noted prospects for continued safe operation are very good and should improve based on its observations of continued improvement in plant safety and management systems.

**INVESTIGATOR USES QUANTUM MECHANICAL CALCULATIONS TO IDENTIFY PATHWAY FOR VX NEUTRALIZATION.** Professor Chris Cramer, Chemistry Department, University of Minnesota, is funded by the Army Research Office to explore reaction pathways for chemical weapons DEMIL using quantum mechanical calculations. His research describes the pathway for neutralization of the nerve agent VX. The results propose a mechanism for the cleavage of the phosphorus-sulfur bond, which is critical to rendering VX nontoxic. Prof. Cramer was a Captain in the Army, served in the Gulf War as a Chemical Officer, and was a chemist at Edgewood before joining the faculty of the University of Minnesota.

**SHORT-TERM ANALYTICAL SERVICE (STAS) PROGRAM.** This was another successful year for the STAS program with 10 contracts, totaling \$750,000.00, being awarded by the end of FY97. This program is sponsored by the Army Research Office and allows us to contract expert scientists on a short term basis to solve a specific scientific or technological problem.

**SPECIAL REPORT.** The Department of Defense has published a two-volume study entitled: “Report on Search for Human Radiation Experiment Records, 1944-1994.” This report contains some information on radiological activities by the Chemical Corps at Aberdeen Proving Ground.



**ASSOCIATION FOR THE ASSESSMENT AND ACCREDITATION OF LABORATORY ANIMAL CARE INTERNATIONAL (AAALAC).** A recent site visit was conducted by Drs. Howard and Ellenberger of AAALAC. The visitors praised our management, staff, institutional animal care and use committee, facilities, and Veterinary Support Team. They will recommend a continuation of full accreditation to council (highest rating). They also thought our program and facilities were in excellent shape due to the efforts of the assigned personnel.

**CONTRACTOR PERFORMANCE CERTIFICATION PROGRAM.** On November 3rd, CBDCOM Quality Directorate assessors conducted the final audit of our Chemical Evaluation Laboratory (CEL) with respect to subject program requirements and determined that CEL operations comply. The formal certificate will be presented in December 1997 and will conclude a CEL effort of 1 year 3 months to achieve this certification. In addition to its current international accreditations with respect to ISO 9002 and ISO Guide 25, the (CP)2 will enhance CEL's reputation and thereby aid in securing, increasing and maintaining its customer base.

**EDGEWOOD SURETY OFFICE RECOMMENDED FOR ISO REGISTRATION.** In October, our Surety Office was recommended for ISO 9002 Registration with National Quality Assurance (NQA). The registration is for the Surety Office's management of the Contractor Chemical Agent Laboratory Program. The NQA assessor praised the Surety Office staff for their commitment and to the meticulous execution of their quality program. Our Surety Office succeeded in its registration attempt on its first try. The NQA, USA, is accredited to perform quality system registration by the American National Standards Institute/Registrar Accreditation Board and is a member of the European Accreditation of Certification. NASA (Johnson Space Center, Houston, TX) is also a government client of NQA.

**CENTER FOR NBC ENVIRONMENTAL TECHNOLOGY.** We are developing a proposal for submission to the Environmental Protection Agency's Intra-agency Announcement of Opportunity on Advanced Measurement Initiatives. The initiative is to improve EPA's measurement and monitoring capabilities. The EPA anticipates awarding approximately \$1 million for demonstration projects and technology transfer activities, with a projected award range from \$75,000 to \$350,000 per award. The Chemical Support Division's proposal includes the Open Path Fourier Transform Infrared Spectroscopy (OP-FTIR), the Ultra Violet Differential Optical Absorption Spectroscopy (UV-DOAS), remote sensing for automotive emissions and meteorological measurements. Their focus is on identifying, adapting, applying, and utilizing technologies to measure and monitor environmental variables in innovative ways, reducing costs, improving accuracy, and moving the technologies into practice quickly and effectively.



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**WEB SITE ON LINE**

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Please visit the NBC RDA Business Area of CBDCOM, known as the Edgewood Enterprise, on the world wide web. Our url address is:

**<http://www.apgea.army.mil/RDA>**

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## COOPERATIVE R&D WITH INDUSTRY AND ACADEMIA

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

### *Cooperative R&D Agreement (CRDA)*

Two CRDAs are being developed between the Science and Technology Corporation (STC), Hampton, VA, and the Edgewood RDE Center. One of them is to conduct collaborative R&D work using our flow cytometry facility, while the other one is to perform R&D work using our Biosensor Laboratories. These efforts will promote and develop technology advances in microbiological applications and biochemical/chemical analyte detection.

In September, as a follow-up to a CRDA action, we provided a decontaminant enzyme to FireFreeze Worldwide, Inc., Rockaway, NJ, for compatibility testing with their firefighting material. In October they informed us that their tests indicated that the enzyme is compatible with the foam and does not affect its firefighting capability. Now we plan to run more extensive tests on the used foam to determine if there was any effect on the enzyme, and expect to produce a new dual-use product under a Patent License Agreement. We are also pursuing CRDA opportunities with two other companies on this enzyme.

A CRDA was signed by the Edgewood RDE Center and Altus Biologics, Inc., in November. The signed copy was forwarded to the Department of the Army for final approval. We have developed organophosphorous acid anhydrolase (OPAA) enzymes, which are useful in the decontamination of various chemical agents. Altus Biologics, Inc., has developed a patented technology called Cross Linked Enzyme Crystals (CLECs), which is generally applicable to enzymes. The purpose of this CRDA is for the research and development of CLECs containing OPAA enzymes, which are useful to both the U.S. Army and Altus Biologics,

Inc., in the decontamination of chemical warfare agents. We will test the new product against live agents. In addition, we expect to determine if the enzymes useful in the decontamination of chemical agents are capable of decontaminating pesticides in a commercially-viable manner.

Mr. Charles Henry received a letter of appreciation from Viking Instrument Company for assistance he provided under a CRDA. Charles gave the company a better understanding of the sample collection and preparation requirements pertaining to the Chemical Weapons Convention.

### *Testing Service Agreement (TSA)*

In Testing Service Agreements (TSAs), Government laboratories are authorized, for an appropriate fee, to test materials, equipment, models, computer software, and other items for any person or entity. TSAs provide an opportunity for the use of Edgewood RDE Center's unique testing capabilities and services by private companies and also generates funds for the Center. The only stipulation is that the testing services *should not* constitute undue competition with private industry.

- A TSA was signed by our U.S. Army Materiel Command Treaty Laboratory and the Science Applications International Corporation (SAIC) in September. SAIC is assisting a U.S. company in obtaining samples and providing them to a certified U.S. laboratory for analysis. The purpose is to determine the presence or absence of chemicals relevant to the Convention on the Prohibition of the Development, Production, Stockpiling, and Use of Chemical Weapons and Their Destruction. The work will involve analysis of environmental samples collected at a chemical facility and its adjacent area.

- A TSA was signed by the Edgewood RDE Center and PPG Industries, Inc., in October. The

purpose of this TSA is to test eight coated panels provided by PPG with chemical agents, according to MIL-C-46165.

- A TSA was signed by Edgewood RDE Center and AlliedSignal, Inc., in October. The purpose of this TSA is to study VX/NaOH hydrolyzate biodegradation using AlliedSignal's ICB system.

### *Marketing*

In September, we sent letters to companies who provide glucose-level indicators. We have a pending patent for a new use for existing glucose-level indicator sticks. (Inventor: Maryalice Miller).

### *“Lab to Market” Program*

The Edgewood RDE Center continuously supports this program with the University of Baltimore. The purpose is to train Maryland professional graduate students in the business aspects of technology transfer and commercialization of technologies emerging from federal laboratories. We recently provided our newest issued patents for commercialization potential evaluation, and four of them were selected for inclusion in the program. It's an excellent opportunity not only to help graduate students but also to take advantage of their free services to evaluate our patents.

### *Miscellaneous*

In August, Dr. Henry Everitt, Physics Division at the Army Research Office, and four guest scientists, who have received grants from ARO for work on subjects with possible application to C B Defense, visited the Center. Linked Cluster Networks and submillimeter wave spectroscopy were discussed, respectively. The purpose of the visit was to increase interaction between the grantees and the Center, thereby increasing applicability of the research to our needs.

Dr. Pamela Sweeney, Ms. Jennifer Anderson, and Dr. Michael Ciocci, Geo-Centers, delivered freeze-dried recombinant organophosphorous acid

anhydrolase to Dr. Joseph DeFrank and Dr. T.C. Cheng, of Edgewood's Environmental Technologies Team. This was used in a joint US-NATO pilot demonstration of enzyme-based decontamination of G-type nerve agents, for testing under the terms of a CRDA with Firefreeze, Inc., and for studies at Boston University.

In September, we participated in the **Technology 2007 Seminar and Exhibit** in Boston, MA. Three U.S. Army laboratories, the Armament Research Development and Engineering Center, the Army Research Laboratory, and the Edgewood Research, Development and Engineering Center, set up a booth together to market the U.S. Army's newest technologies and patents, which are available for transfer to the commercial market.

POCs: Mr. Roy C. Albert, Technology and Science Information Team, DSN 584-4438, email rcalbert@apea.army.mil or Ms. Stella Lee, Office of Research and Technology Applications, DSN 584-5386, email sychung@apea.army.mil

### **TECHNICAL INDUSTRIAL LIAISON**

#### *Small Business Innovation Research (SBIR)*

DOD SBIR Solicitation 98.1 opened October 1st. For the first time, a section is included devoted to the Joint Service CB defense program. It includes seven Army topics, seven Navy topics, and one topic from the Air Force. The Army topics, all originating at the Edgewood RDE Center, are:

- (1) Label-Less Methods of Biodetection
- (2) Microfabrication Based Biodetectors
- (3) Large Scale Production of Antibodies in Transgenic Animals
- (4) Intermolecular Force Measurements for Molecular Identification
- (5) Automated Bacterial Detection with Electrospray Ionization Mass Spectrometry

(6) Fast, Low Power Consumption Gas Chromatograph

(7) Hand-Held Gas Chromatography-Mass Spectrometry

The entire solicitation, including topic descriptions, can be found on the worldwide web at the following address [http://www.nttc.edu/solicitations2/current/dod\\_sbir981/](http://www.nttc.edu/solicitations2/current/dod_sbir981/)

Ten Phase I SBIR proposals, totaling approximately \$1M, have been selected for award as a result of the 97.2 SBIR Solicitation. These proposals address the following four topics:

(1) Biologically Generated Multi-Spectral Obscurants(4)

(2) Optimizing and Modeling Genetic & Bioreactor Parameters of Recombinant Protein Products(2)

(3) Frequency Domain Imaging Sensor for Advanced Standoff Chemical Detection(3)

(4) Handheld Chemical and Biological Detection(1)

This office is currently entertaining topic suggestions for DoD SBIR Solicitation 98.2, which opens in June 1998. The Center has been allotted four topics in this solicitation.

#### *Broad Agency Announcement (BAA) 98-1*

The latest Edgewood RDA Center BAA can be accessed via the worldwide web on our home page at <http://www.apgea.army.mil/RDA/baa98.html>.

Prospective contractors who are interested in supporting our tech base program should be referred to the BAA. The solicitation will remain open until June 30<sup>th</sup>, 1998. Proposals can be received at any time. Contracts can be awarded as a result of BAA proposals even before the BAA closes.

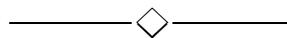
#### *Second Independent Research & Development (IR&D) Conference on Chemical and Biological (CB) Science & Technology (S&T)*

This conference was held in October at the Edgewood Conference Center. Over 160 representatives from government and industry attended to exchange ideas. The first day of the conference involved government presentations concerning the CB defense S&T program. Attendees heard presentations from the Office of the Deputy Assistant for Counterproliferation and CB Defense, the Program Manager for Biodefense, the Joint Service Materiel Group, and the Joint Service Integration Group. Each one of the business areas within CB defense was also briefed. On the second day, companies were provided with an opportunity to brief a panel of government experts on the status of their IR&D efforts as they relate to CB defense. A total of 17 industry presentations were heard.

#### *Advance Planning Briefing for Industry (APBI)*

Planning is underway for the next DoD CB Mission Area APBI, scheduled for April 1-2, 1998. Once again, it will be held at the Johns Hopkins Applied Physics Laboratory in Laurel, MD. The APBI focuses on upcoming contract opportunities and long-range requirements.

POC: Mr. Ronald P. Hinkle, Technical Industrial Liaison, DSN 584-2031, commercial (410) 671-2031, or email [rphinkle@apgea.army.mil](mailto:rphinkle@apgea.army.mil)



#### *Multi-Disciplinary University Research Initiative*

The Northwestern University was awarded a Multi-disciplinary University Research Initiative (MURI) in the area of "Atomic Clusters and Nanotechnology." Northwestern University was a unanimous selection and their work is directly relevant to stand-off detection, sensors, and materials, and potentially applicable to obscurants. This award was for \$1M a year for five years, with

a significant additional amount for equipment, and supports the Office of the Secretary of Defense and Army After Next Strategic Research objectives in “Biometric Materials” and “Nanoscience.” Dr. Valdes, the Center’s Scientific Advisor for Biotechnology, was selected to chair the tri-service Executive Advisory Committee for this MURI, and will be selecting members of the Technical Advisory Committee who will work directly with Northwestern University scientists. The committee has been charged by the Office of the Secretary of Defense with finding areas of collaboration which support the Department of Defense missions.

A two day meeting was scheduled with bench-level scientists to meet with the Northwestern University scientists, with the first day at the Naval Research Laboratory and the second day at the Edgewood RDE Center. There were several very productive break-out sessions during the meeting which identified areas of potential collaboration in sensors, decontamination/demilitarization, and biodegradable obscurant materials.

POC: Dr. James J. Valdes, Research and Technology Directorate, DSN 584-1396, commercial (410) 671-1397, or email [jjvaldes@apega.army.mil](mailto:jjvaldes@apega.army.mil)

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*1997 Army Summer Faculty Programs*

In August, on behalf of Mr. Parker, Deputy to the Commander, Mr. James McKivrigan presented certificates to the CBDCOM summer faculty participants to recognize their service and scientific contributions to CBDCOM’s mission. At the ceremony, all faculty participants expressed the immense benefit they received by being involved in the research and development activities at CBDCOM. They all expressed great interest in coming back next year in a short social event after the recognition ceremony. Sincere appreciation is due to the CBDCOM sponsors for their unceasing support. Six faculty members participated in this year’s summer faculty programs, including one university professor and five high school science and mathematics teachers.

The participating university professor is Dr. Daniel Chen [sponsor: MAJ Eric Dietz]. The participating high school science and mathematics teachers are Charles W. Cross II [sponsor: Mr. Michael Goode]; Roma S. Dogra [sponsor: Dr. Peter Snyder]; William M. Forster, Jr., [sponsor: Dr. Ronald Checkai]; Tran H. Pham [Sponsor: Dr. Edward Stuebing]; and Aaron M. Thompson [sponsor: Mr. Ralph Falcone].

POC: Mr. Keith T. Knight, Advanced Systems Concepts, DSN 584-2621, commercial (410) 671-2621, or email [ktknight@apega.army.mil](mailto:ktknight@apega.army.mil)

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**REVIEW OF PROPOSALS  
FOR DEPARTMENT OF ENERGY**

Dr. John Weimaster, Research and Technology Directorate, was asked to review decontamination proposals submitted to the Department of Energy under their Chemical Biological Nonproliferation Program as Department of Defense Business Area Manager for Chemical and Biological Defense Decontamination Science and Technology efforts. This review is to advise the Department of Energy of the technical feasibility and program relevance. The Department of Energy asked that the proposals be ranked and that recommendations on funding be made. The aim is to avoid duplication of efforts between Department of Energy and Department of Defense programs. This is the first step in an ongoing effort to integrate programs between the two agencies.

POC: Dr. John F. Weimaster, DSN 584-4148, commercial (410) 671-4148, or email [jfweimas@cbdcom.apega.army.mil](mailto:jfweimas@cbdcom.apega.army.mil)

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## INTERNATIONAL COOPERATIVE R&D

### *Foreign Visits and Briefings*

Mr. Sennett, Rapid Obscuration Systems Team Leader, briefed the US/UK cooperative development L11 riot control grenade program at the July Program Officers' Requirements Officers' meeting on the *US/UK/Canada Memorandum of Understanding on Chemical and Biological Defense*. The briefing was very well received and the program was proposed to be used as the lead/model program at the US/UK/Canada meeting held in Sep 97.

The Director General of the Swedish National Defence Research Establishment, Dr. Bengt Anderberg, visited CBDCOM and the Edgewood RDE Center in September. The purpose of the visit was to provide Dr. Anderberg, who had not previously visited Edgewood, an update on the organization, the current mission of CBDCOM and the Center, and a brief description of current programs. This was accomplished by the CBDCOM overview, a briefing on Research and Technology Directorate, and a briefing and demonstration by Program Manager for NBC Defense Systems. In addition, Dr. Anderberg expressed a desire to develop a closer working relationship with CBDCOM in the area of chemical and biological defense. With the implementation of a recently signed technical research and development program MOU, it is possible to identify and execute collaborative programs with Sweden in the 6.1-6.3a arena. Dr. Anderberg, after his visit, stated he felt there is a strong overlap between Sweden and U.S. CB defense programs, and that both countries should strive to improve our defensive posture by closer collaboration. Further discussions are planned in order to ascertain the appropriate level of cooperation with Sweden, and identify programs (if applicable) for closer collaboration.

The Product Manager for Smoke and Obscurants hosted a very successful visit by Mr. Peter Collins,

Ms. Ann Marshall, and Mr. Phil Strudley from Ft. Halstead, DERA, UK in September. The visit under the UK/US/CAN MOU covered a myriad of topics/briefings concerning smoke and obscurants from basic research through items already in production.

MAJ(P) Martin Bagley, the incoming U.S. Exchange Officer to the Nuclear, Biological and Chemical Center at Winterbourne Gunner, UK, visited CBDCOM and the Edgewood RDE Center in October to receive a briefing of current efforts in the development of new CB equipment. MAJ(P) Bagley was given an update on systems currently in development by the Program Manager for NBC Defense Systems, the Program Director for Biological Defense Systems, and the Center's Engineering Directorate. Although MAJ(P) Bagley will not be functioning in a liaison role, he will be assisting the UK in developing NBC related doctrine and operational requirements, enabling him to integrate some U.S. doctrine and requirements.

### *Visit to the Czech Republic*

Dr. George Famini, International Office, and Mr. D. G. Parekh, Research and Technology Directorate, visited the Czech Military Institute of Protection. Personnel from the Institute provided information on current research and development efforts in chemical detection being addressed by the Czech military. In particular, a nerve agent biosensor was discussed, and it was suggested a cooperative program in this area might be possible. A Memorandum of Understanding on the development effort was deemed feasible. Dr. Famini and Mr. Parekh also visited the Vyscov test facility, where the new Czech decontamination vehicle and personal decontamination stations were demonstrated.

### *UK/US Cooperative Program*

The Product Manager for Smoke and Obscurants has entered into a cooperative program with the UK for a launcher fired 66mm CS filled grenade and a companion training grenade. These grenades will fulfill a U.S. requirement for a riot control

grenade for the Light Vehicle Obscuration Smoke System. More on this agreements is found in our section on *Equipment Updates*.

*Program Officers’/  
Requirement Officers’ Meeting*

The Program Officers’/Requirements Officers’ Meeting was hosted by Canada at the Defence Research Establishment Suffield, in September. In preparation for this meeting, we hosted a U.S. Position Meeting in July, to review the progress of the International Task Forces (ITFs) on Virus Materials; Biological Hazard Assessment; Assessment of Hazardous Materials; and Medical Countermeasures to Materials identified by the ITF on Hazard from the Modification of Industrial Chemicals. The progress of the Points of Contact (POC) Groups on Site Decontamination and Remediation and Implications of CWC Entry into Force was discussed as well. A briefing on the “Way Ahead” for the Bio-Chemical Detector Development Program Management Team was also provided. In addition, the status of the cooperative development programs on the Joint Chemical Agent Detector and the L11 Riot Control Grenade was presented. Representatives from the Air Force, Navy, user, and medical communities participated in this meeting.

*Training for NATO Representative*

The Office of the Deputy Under Secretary of the Army for International Affairs conducted a Training Session for U.S. Army Representatives to North Atlantic Treaty Organizations (NATO) and American/British/Canadian/Australian (ABCA) Standardization Fora in September at the Logistics Management Institute, McLean, VA. The purpose of the session was to provide common training policy guidance and procedural direction for individuals who work in the international standardization fora on a continuing basis.

Following a welcome, briefings on current issues; a Resource Overview; MACOM presentations by TRADOC and AMC; and briefings on the ABCA Program, NATO Military Agency for

Standardization (MAS), and NATO Army Armaments Group (NAAG) were provided.

At the conclusion of the overview briefings, attendees participated in individual workshops to address draft AR 34-1, Multinational Force Compatibility (MFC), from an ABCA, NATO MAS, and NATO NAAG perspective. AR 34-1 establishes DA policy on MFC, defines Army MFC objectives, and prescribes responsibilities for implementing, managing, and integrating Army participation in MFC activities. The consensus of all workshops was that the AR, as currently written, lends itself to DUSA(IA) micro-management of the programs. DUSA(IA) agreed that this should be changed to allow more flexibility within the Major Subordinate Commands. Funding was also viewed as a significant problem. With decreasing budgets, and if funding is not provided from other sources, the possibility exists that MSCs may be forced to limit their participation in MFC forums. All workshops agreed that training is a major issue. It is imperative that training be provided when new representatives are appointed to international programs. The attendees also concluded that continuity is extremely important. Individuals with longevity should be appointed as representatives to the programs. These issues, along with others, will be considered in the re-write of the draft, which is expected to be issued for official review in the December time frame.

*NATO Land Group 7 Presentation*

The United States presented a Concept Paper on the Detection and Identification of Biological Warfare Agents to NATO Land Group 7 (LG.7). The paper represented a coordinated effort among heads of delegation of both NATO LG.7 and the NATO NBC Operations Working Party, which was chaired by the United States. The Chairman of LG.7 praised the United States for its prompt and successful action on this effort. LG.7 approved publication of the concept paper as an official LG.7 document. The paper will also be forwarded through channels to the NATO Senior Defence Group on Proliferation.

*Meeting of the Quadripartite Working Group  
on Nuclear, Biological, and Chemical Defense  
and the Air Standardization Coordinating  
Committee Working Party 84  
on NBC Defensive Measures*

The Quadripartite Working Group on Nuclear, Biological, and Chemical Defense met at CBDCOM in October. Two of the six meeting days involved joint sessions with the Air Standardization Coordinating Committee Working Party 84 on NBC Defensive Measures and achieved preliminary agreement on standardized protective dress states, and a revised plan of action that includes standardized tasks to:

- (1) Achieve Common Command Guidance to Enable Forces to Operate Effectively in an NBC Environment;
- (2) Achieve Compatible Procedures for the Dissemination of Early Warning and Reporting of NBC Strikes and Predicting Associated Hazards;
- (3) Achieve an Interoperable Capability to Detect, Identify, and Monitor NBC Hazards to Include NBCD Survey and Reconnaissance;
- (4) Achieve a Common Approach to Enable Forces to Support the Management of a Situation Involving Improvised Chemical, Biological, and Radiological Devices;
- (5) Achieve a Compatible Approach to Enable Forces to Operate Effectively in a Low Level Radiation Environment;
- (6) Achieve a Compatible Approach to Enable Forces to Operate Effectively in a Toxic Industrial Chemical Environment;
- (7) Achieve Common Critical Procedures for the Use of Individual NBC Protective Equipment;
- (8) Achieve Interchangeable Individual NBC Protective Equipment;

(9) Achieve Common Critical Procedures and Compatible Equipment for Controlling NBC Contamination; and

(10) Achieve Common Design Criteria to Ensure Survivability of Mission Critical Equipment on the NBC Battlefield.

Dr. John Ferriter, CBDCOM, and Dr. Claude Eon, CEB, held the annual meeting of the United States/France General Officers' Working Group on NBC Defense in November. Current and future activities involving U.S./France bilateral efforts, to include the five DEAs on Biological Defense, Chemical Agents, Defense Against Chemical Agents, Detection Methods of Chemical Warfare, and Radiac Equipment and Systems; and the MOU/PA on the Laser Standoff Detector were discussed. Both parties agreed that valuable information is being exchanged on a routine basis under the DEAs and the MOU. Actions were agreed to address future work under the programs.

POCs: Dr. George R. Famini or Ms. Juanita M. Keesee, International Programs Office, Commercial (410) 671-2552/5376, DSN 584-2552/5376, email [grfamini@apega.army.mil](mailto:grfamini@apega.army.mil) or [jmkeesee@apega.army.mil](mailto:jmkeesee@apega.army.mil)



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## CUSTOMER SATISFACTION AT THE EDGEWOOD ENTERPRISE

*“Satisfaction of our customers’ requirements defines quality for us.”*

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e are striving to improve customer satisfaction. Our customer service standards are listed below. We expect every member of the Enterprise to follow these seven rules when dealing with their customers, be they internal customers or external customers.

### CUSTOMER SERVICE STANDARDS

1. Give customers what they want, not what we think they need.
2. Provide products and services that meet or exceed customers’ requirements.
3. Be on schedule, at or below cost, and provide complete and accurate data.
4. Respond to inquiries within 24 hours.
5. Handle complaints and emergencies IMMEDIATELY.
6. Involve customers in all phases of the process and decision making.
7. Provide customers easy avenues for comments, complaints, or information.

CUSTOMER SERVICE: We have been conducting classes to train 50 Enterprise personnel who interface with our outside customers in Service Plus(R), a three-part, 8-hour course. Some of the skills and techniques that the students will learn are:

- Understanding the relationship between customer satisfaction and loyalty, business success, and their own job satisfaction;
- Understanding the definition, purpose, and importance of the *Key Principles* in meeting customers’ personal needs; and
- How to turn a dissatisfied customer into a satisfied customer.

We formed a *Customer Satisfaction Survey Team*, who made visits to users of our products to assess their level of satisfaction with the Command and the RDE Center. The Survey Team gave those they visited copies of CBDCOM’s Strategic Plan, explaining the Command’s Vision, Goals, and Measures of Success. Our commander, MG Friel, is committed to customer satisfaction and uses Customer Satisfaction Surveys to measure progress against three of his six Strategic Goals. The team pointed out that the surveys are a direct channel to Edgewood’s leadership, and we are committed to ensure appropriate responses to issues raised from returned surveys. We also explained the additional mission of this Team to determine mutual areas of interest that can be developed. The following customers were visited:

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- August 12<sup>th</sup>, U.S. Army Chemical School, Fort McClellan, Alabama. The team interviewed the Director and the Deputy Director of Combat Developments as well as representatives of the Materiel Logistics Support Division and the Battle Lab Support Division.

- On August 13<sup>th</sup>, Deputy Chief, Space & Missile Defense Battle Lab, Huntsville, AL. The Space & Missile Defense Battle Lab is the newest Battle Lab, having been established by Space & Strategic Defense Command through a Memorandum of Agreement with TRADOC in February 1997. The Battle Lab has some of the most modern computers available and is willing to join with the Edgewood RDE Center in the area of Chem/Bio M&S.

- On August 14<sup>th</sup>, Acting Director of Combat Developments, U.S. Army Military Police School, Fort McClellan, AL.

- On August 14<sup>th</sup>, the Air Maneuver Battle Lab, Fort Rucker, AL.

The results of the 1997 Customer Survey have been reviewed and entered into our data base. Overall satisfaction rating has increased from about 3.4 in 1996 to 3.6 percent in 1997.

Remember our email address for customers to send their comments or inquiries is [cu-team@apgea.army.mil](mailto:cu-team@apgea.army.mil)



## RETIRED EDGEWOOD RDE CENTER TECHNICAL DIRECTOR RECEIVES THE PRESIDENTIAL RANK OF MERITORIOUS EXECUTIVE

**I**n October, Mr. Joseph J. Vervier, recently retired Technical Director of the Edgewood Research, Development and Engineering Center, was notified he is the recipient of the Presidential Rank of Meritorious Executive.

Mr. Vervier was recognized for playing an instrumental part in shaping this country's chemical and biological defense program. Under his leadership the Edgewood RDE Center delivered many new and superior systems to our soldiers. He is a recognized pioneer in novel work structures and his organizational vision resulted in the transformation of the Edgewood RDE Center from a bureaucratic, hierarchical organization to a streamlined, Integrated Product Team structure. He created an acquisition board that consists of the customers, suppliers, and support elements, all of whom are stakeholders in the acquisition process. Mr. Vervier also pioneered human resources initiatives, linking together technical, teaming, and behavior skills into one integrated personnel management system. A great leader and visionary, Mr. Vervier has made a difference for us all.



Mr. Vervier previously served as the Director of Research and Technology in ERDEC's predecessor organization, the Chemical Research, Development and Engineering Center; Technical Director for Chemical Matters at the Armament, Munitions and Chemical Command; the Technical Director for the Chemical Research, Development and Engineering Center; and principal advisor to the Technical Director on technology base matters.

A native of Union City, New Jersey, Mr. Vervier holds a Bachelor of Science degree in Physics from St. Peter's College, Jersey City, NJ. He also attended the Johns Hopkins University and is a graduate of the U.S. Army War College, Carlisle Barracks, PA. Among his awards and decorations are the Army Decoration for Exceptional Civilian Service, Army Meritorious Civilian Service Award, the Commander's Award for Civilian Service, and the Lt. Gen. Lewis Kicks Campbell award.

Mr. Vervier and his wife resided in Bel Air until his retirement. They now reside in Indiatlantic, Florida. They have four grown children and three grandchildren.



## WOMEN OF COLOR TECHNOLOGY AWARDS LUNCHEON AND SYMPOSIA

**T**he *Second Annual Women of Color Technology Awards Luncheon & Symposia*, jointly sponsored by the US Black and Hispanic Engineer and Information Technology magazines, was held September 29<sup>th</sup> through October 1<sup>st</sup> at the Sheraton Inner Harbor Hotel in Baltimore, Maryland. This Awards Luncheon & Symposia is a three-day conference that includes seminars and workshops focusing on issues facing minority women in the fields of sciences and technology, an awards luncheon, career fair, and networking opportunities. This annual conference fills an incredible void for women in technology striving for advancement opportunities and success in what remains a male-dominated industry. Further, the event recognizes the extraordinary achievements of women of color during the annual awards luncheon.

The Women of Color Technology Awards Luncheon and Symposia celebrates the superior achievements of minority women. Recognizing the accomplishments of women leaders in the fields of math, science, technology, and engineering, provides encouragement and promotes educational opportunities for inspiring professional women embarking in these fields. The Women of Color Technology Awards Ceremony helps identify exceptional women who are making outstanding contributions in their industries. This celebration also provides role models for professional women and college students, and helps them with their career development.

The women at the symposia, drawn from technology companies across the country, ranged in experience from first-job holders who only recently had finished their collegiate studies, to senior managers, government administrators and accomplished entrepreneurs. During these three days, over 15 topics were addressed in the

symposia, ranging from career development and technology, to forming personal and professional relationships while maintaining your health and fitness. An additional feature is the EEO Career Fair, where human resource departments have an opportunity to tap into a reservoir of incredible technical talent.

Women hold a legacy of innovation, and statistics show that there is an increasing number of women of color entering the fields of science and technology. Not only does this conference recognize the exceptional achievements of the winners, it provides an excellent opportunity for networking with some of the world's top engineers and scientists. These symposia acknowledge the ingenuity and singular talents of women who have excelled and have become pioneers in their fields.

This year's event was attended by over 600 people, including the Mayor of Baltimore, Mr. Kurt L. Schmoke, and Maryland's first woman Lieutenant Governor, Ms. Kathleen Kennedy Townsend, who gave the welcoming address.

Last year's event, which was the first, was held at the Willard Hotel in Washington, D.C. At that Luncheon and Symposium, the accomplishments of 86 women who have excelled in their fields were recognized. The symposia provided those in attendance with valuable information to assist them in their professional development.

When our headquarters, the U.S. Army Materiel Command, decided to participate in the awards program, they encouraged their subordinate commands to nominate individuals who deserved to be recognized at the event. Awards are presented in eight categories: Technical Innovation, Managerial Leadership, Government Leadership, Business Innovation, Government



Innovation, Education Leadership, Corporate Responsibility, and Student Innovation.

The U.S. Army Materiel Command submitted ten nominations to the Career Communications Group, Inc., coordinator of the **Women of Color Technology Awards**. Two of the nominees won the top award in their category. **Ms. Modina Gooley**, Headquarters, U.S. Army Materiel

Command, won in the *Government Innovation* category. **Ms. Rita Gonzalez**, Natick Research, Development and Engineering Center took top honors in the *Managerial Leadership* category. Second highest honors, the *Publisher's Award*, went to **Ms. Roberta Clay**, U.S. Army Chemical and Biological Defense Command, and **Ms. Adrienne Raglin**, U.S. Army Research Laboratory. Each of the other U.S. Army Materiel Command's six nominees received a Certificate of Merit.

Two of these award winners are employees of the U.S. Army Chemical and Biological Defense Command:



*Ms. Roberta L. Clay*

Ms. Clay, an Operations Research Analyst, of the Quality Directorate within CBDCOM, received the *Publisher's Award* for her invaluable contributions to the development and implementation of the U.S. Army Materiel Command (AMC) Treaty Laboratory's quality management system. The quality system was subsequently accredited by the American Association of Laboratory Accreditation (A2LA) as ISO 9001 compliant.

Roberta, who has worked in the quality area for over 30 years, acknowledges the encouragement and support she received from her associates in the Quality

Directorate especially the Director, Mr. Eugene Cantemiry, and Senior Project Team Leader, Mr. Howard Elbaum, who nominated her for this prestigious international award. Roberta is also most grateful to Dr. Dennis Reutter and the entire staff of the AMC Treaty Laboratory, without whom the specific accomplishments on which this award was based, would not have been possible.

When asked about the significance of the award to her personally, Roberta said "It was nice to be considered but even nicer to have been selected. Something like an Academy Award nomination and then winning. It was an award that represented not just the work for the Treaty Laboratory but recognition for a career of accomplishments on all projects that were equally important. I felt honored to be a representative of the Quality Directorate, the AMC Treaty Laboratory, and CBDCOM among the national and international attendees."



Ms. Sandra J. Johnson, Team Leader for Technical Releases, Research & Technology Directorate, Edgewood Research, Development and Engineering Center, CBDCOM, received a *Certificate of Merit* for her outstanding achievements and contributions to the technology industries.

As a Team Leader and supervisor, Ms. Johnson not only provides employees training and consultative services, she is responsible for producing a high volume of technical publications. This includes the editing/review of a variety of research and development, engineering, and conference material for over 1,400 people. In addition, Ms. Johnson provides individual editorial consultations in support of her customers. Within one year, Ms. Johnson instituted and improved processes that have greatly enhanced the timeliness of publication releases and the quality and quantity of reports printed. Ms. Johnson also conducted workshops for command personnel to train them in the preparation of technical reports.



*Ms. Sandra J. Johnson*

Notification letters to the recipients stated: “In addition to honoring you at the ceremony, the centerpiece of the *Women of Color Technology Awards and Symposia*, Career Communications Group will recognize you in both our *US Black Engineer and Information Technology* and *Hispanic Engineer and Information Technology* magazines.”

POC: Ms. Joanne N. Coale, Writer-Editor, Edgewood RDE Center, Commercial (410) 671-5385, DSN 584-5385, or email [jxcoale@apea.army.mil](mailto:jxcoale@apea.army.mil)

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## APG 1997 OUTSTANDING WOMAN OF THE YEAR

We are proud to announce that two of our exceptional women were nominated for the **APG 1997 Outstanding Woman of the Year** award as part of the Federal Woman’s Program. They were Ms. Patricia Belcher, of the Edgewood Enterprise’s Program Director for Biological Defense Systems and Ms. Carol Eason of the Edgewood RDE Center’s Operations Directorate. The awards ceremony was held in late August at the Top of the Bay at Aberdeen Proving Ground. Traditionally, the Federal Woman’s program recognizes individuals and entire departments for their ability to both open and step through doors of opportunity that allow women to excel, thereby promoting and facilitating its mission. Although neither of our nominees received an award, we are proud that they are part of our team!



## OTHER PEOPLE IN THE NEWS

**M**any of our employees are recognized by outside organizations for their exemplary performance, and it is our pleasure to share this information. These people have made significant, positive contributions toward achieving our vision of being recognized as the world leader in chemical and biological related science, technology, engineering, and service.

We are proud to announce the Integrated Logistics Support Team, NDI Long Range Biological Standoff Detection System, was selected by the Department of the Army for its ***ILS Achievement of the Year*** Award. The team members are Robert Silks, Guy Matricciani, Andrew Vaccaro, Judy Sage, Charles McDermott, Trudy Shackelford, and Andy Petrucci. Together they developed an affordable, effective, and deployable logistics support system; expedited procurement; developed, tested, and deployed Associated Support Items of Equipment; identified and resolved an Integrated Logistic Support problem that could have resulted in decreased readiness; and developed an effective state-of-the-art XM94 operator training package. This provided the Army with a first time standoff biological detection capability.

One of our scientists, Dr. Hugh Carlon, recently received a letter of appreciation from an investigator of the Dallas District Office of the

Food and Drug Administration. The ***FDA has approved the Edgewood RDE Center-developed poly alpha olefins (PAOs)*** as a safe replacement for dioctyl phthalate (DOP), which is a suspected carcinogen, in integrity testing of HEPA filters now in widespread use. The letter thanked Dr. Carlon for explaining the use of this material, how it is to be applied, and for other information regarding filter testing.

Ms. Marjorie Roberts, Procurement Technician, was competitively selected for the ***Army Tuition Assistance Program (ATAP)***. Mr. Keith Charles, Acquisition Career Management, was extremely gratified to see so many GS-1106s interested and committed to career progression. Acceptance in this program means DA will pay tuition costs for college courses in pursuit of a Bachelor's Degree.

We are proud to announce that Dr. J.B. Wright has joined our Threat Agent Team as a ***National Research Council Postdoctoral Fellow***. He recently received his doctoral degree from the University of Arkansas where he performed ab initio computational studies to elucidate the mechanisms and traditional structures of the Diels-Alder reaction. While here, he will use various computational techniques to study organophosphorus reactions and will concentrate on refining the geometry and electronic structure of the intermediates and transition structures.



## PROFESSIONAL DEVELOPMENT PROGRAM

*The CBDCOM “will be an organization that values people as our most important resource and one where people are motivated, cared for, feel like they belong, and want to work.” This Command value is the foundation for our annual **Professional Development Conference**.*

**T**he 1997 **Professional Development Conference** was held in September for 200 U.S. Army Chemical and Biological Command (CBDCOM) employees. The conference, which is sponsored by the four major directorates of the Command’s Edgewood RDE Center, is an annual training forum designed to bring all levels of the command together for a day of personal, professional, and organizational growth. Format for the conference allows participants to gather three times during the day to hear motivational speakers. Two concurrent sessions allow participants to select a topic best suited to their interests. This year’s theme was “Future Focus” and featured seven professional, motivational, and educational speakers.

Major General George E. Friel, Commander, CBDCOM, and Dominick DiGiacomo, USDA’s Graduate School Program Manager, each delivered opening remarks. DiGiacomo also served as master of ceremonies. Friel encouraged CBDCOM employees to “think outside the box” and set “stretching goals” for both their careers and their personal lives. He commended conference organizers for their innovative program.

Mr. James Amps, entrepreneur and author, gave a rousing keynote address on “Turning Obstacles Into Opportunities.” He said that in order for leaders to be successful in today’s society, they must challenge themselves, risk the unthinkable, and make decisions with swiftness. You need to run your job like you own it. “You need to get away from negative people,” he advised. “Anything that

happens in your life is because you decided to do it. It’s not the problems we have that make changes in our lives but how we handle the problems.”

Following Mr. Amps’ address, participants chose one of the topics from the two concurrent sessions:

- *Flexing for the Future* by Ms. Miriam Kimball, Adjunct Faculty for the USDA Graduate School, who discussed the challenges and changes faced each day as we move into the millennium.

- *Meeting the Challenges of a Balanced Lifestyle* by Ms. Carol Higbe, Adjunct Faculty for the USDA Graduate School. Ms. Higbe provided tools for changing our lifestyle to avoid burnout.

After lunch, the audience was treated to **Commentary With Olesker** with Mr. Michael Olesker, columnist, Baltimore Sun, and commentator for WJZ-TV. This entertaining segment touched on the changes technology is making in our lives and with mass media. Mr. Olesker shared some of his thoughts on journalism and the path it has taken him on.

Following Mr. Olesker, the conference attendees were given the opportunity to select one of two topics from concurrent sessions:

- *Realizing Rainbows* by Ms. Virginia McGuire, Adjunct Faculty for the USDA Graduate School. Ms. McGuire discussed the necessity of planning your career and setting achievable goals.



*Mr. James Amps*

- *Surfing into the Millennium* by Ms. Linda Haynes-Jackson, President of LHM and Associates. Ms. Haynes-Jackson focused on technological implications of moving to the year 2000 and beyond.

The closing presentation, *The Federal Sector, A View for the Future* with Mr. Michael Burr, President of Corporate and Government Consulting, Inc., closed the conference with an employment forecast for the federal government. Mr. Burr, author, teacher, and former federal manager with the U.S. Office of Personnel Management pointed out organizational, managerial, and staffing trends and some career skills that employees will need to be competitive in the future work place.

This was the third year for CBDCOM's **Professional Development Conference**. The conference concept is a product of several administrative employees in the Engineering Directorate of the Command's Edgewood RDE



Photo by Conrad Johnson

David A. Hodge, left, Chief of the CBDCOM Internal Review and Audit Compliance Office, receives an autograph from **Michael Olesker, Baltimore Sun columnist and television personality**, following Olesker's luncheon speech.

Center, who had attended similar conferences in the Baltimore area. A committee from the ERDEC, which was formed around these key employees, worked for seven months with the Graduate School, USDA, to find speakers who could meet the needs of the CBDCOM workforce. The committee was co-chaired by Ms. Barbara Knapp and Ms. Christine Hignutt. Other members on the committee were Ms. Patricia Belcher, Ms. Donna Brown, Ms. Frances Chubb, Ms. Roberta Clay, Ms. Emily Fowler, Ms. Barbara Frank, Ms. Karl Gerhart, Ms. Kay Gilbert, Ms. Mary Hagy, Ms. Phyllis Ostrom, and Ms. Karen Vado.

Each year a different theme is selected to provide the attendees a day for personal, professional and organizational growth. The conferences always include speakers of regional or national acclaim with credentials to convey appropriate, powerful, and memorable messages. In 1995, the conference focused on strategies for success in the workplace and at home. In 1996, the theme was *A Year of Change* and the day-long conference centered on the changes in the workplace. The conferences are a popular annual event for all employees in CBDCOM. It continues to be a day when all levels of the Command come together to absorb new ideas, network, and learn refreshing approaches to life's opportunities.

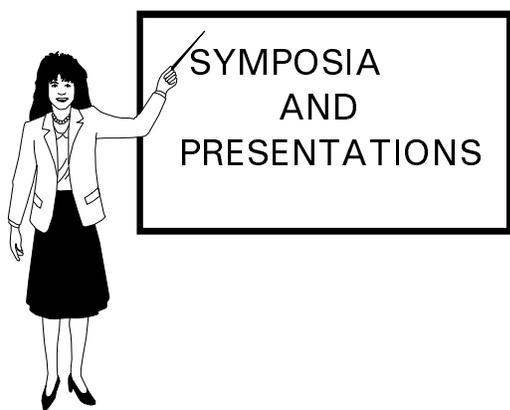
Knapp said the conference is held in the fall to "energize the workforce for the coming fiscal year." She said the conference agenda results largely from employee comments from the previous year's forum and from command input. Developments in government, such as budget cuts and right-sizing, and community events drive the committee's choice of speakers and the final agenda.

POC: Ms. Barbara J. Knapp, Co-Chairman, Professional Development Conference Committee, Commercial (410) 671.5713, DSN 584-5713, or email [bjknapp@apega.army.mil](mailto:bjknapp@apega.army.mil)

# IMPORTANT

<i>Upcoming Conferences</i>		
<i>Date and Place</i>	<i>Title</i>	<i>POC</i>
<i>1-2 April 1998</i> <i>Johns Hopkins Applied Physics Laboratory Laurel, Maryland</i>	<i>Advanced Planning Briefing for Industry</i>	<i>Mr. Ronald P. Hinkle</i> <i>(410) 671-2032</i> <i>email: <a href="mailto:rphinkle@apega.army.mil">rphinkle@apega.army.mil</a></i>
<i>27-29 April 1998</i> <i>Edgewood RDE Center</i>	<i>Smoke/Obscurants Symposium XX</i>	<i>Ms. Dorothy Berg</i> <i>(410) 671-4883</i> <i>email: <a href="mailto:dxberg@apega.army.mil">dxberg@apega.army.mil</a></i>
<i>10-15 May 1998</i> <i>Stockholm, Sweden</i>	<i>6<sup>th</sup> International Symposium on Protection Against Chemical and Biological Warfare Agents</i>	<i>Ms. Brenda Eckstein</i> <i>(410) 671-2879</i> <i>email: <a href="mailto:bceckste@apega.army.mil">bceckste@apega.army.mil</a></i>
<i>2-6 June 1998</i> <i>Paris, France</i>	<i>EUROSATORY</i>	<i>Mr. William Fox</i> <i>(410) 671-2266</i> <i>email: <a href="mailto:wafox@apega.army.mil">wafox@apega.army.mil</a></i>
<i>15-18 June 1998</i> <i>Norfolk Convention Center Norfolk, Virginia</i>	<i>21<sup>st</sup> Army Science Conference</i>	<i>Ms. Katherine Kominos</i> <i>(703) 697-3558</i>





Edgewood Enterprise employees participate in many workshops, symposiums, and conferences; and many are recognized by outside organizations for their exemplary performance. It is our pleasure to share this information.

In September . . .

- Dr. Sherif Kafafi, formerly of the Kennedy Krieger Institute at the Johns Hopkins University and now with the National Institutes of Science and Technology, visited the Edgewood RDE Center and presented a talk on computational chemistry of organophosphorus compounds. With support from the Army Research Office, Dr. Kafafi has developed a new computational scheme that reduces computational time without sacrificing accuracy in calculating properties such as heat of formation and ionization potential. After his oral presentation, how he could focus his research to the Edgewood RDE Center and the Army's chemical defense program were discussed.

- Mr. Richard Roux, Director of our Arms Control and Treaty Assistance Directorate, and Dr. Sarver, Team member attended the **American Chemical Society's 214<sup>th</sup> National Meeting**. Dr. Sarver organized and chaired the session on the Defense Special Weapons Agency/Office of the Secretary of Defense R&D Program for the Chemical Weapons Convention Treaty Verification. The Defense Special Weapons Agency also conducted a progress review of the Joint U.S./Finnish Analytical Method used by the Organization for the Prohibition of Chemical Weapons inspection teams. Mr. Roux also attended

the American Chemical Society Business Management Division meeting; he obtained some partnering leads within the U.S. chemical industry. Dr. George Famini, of our International Programs Office, gave an invited presentation at the meeting in Las Vegas. The presentation, titled "Using Theoretical Description in Quantitative Structure Activity Relationship," described the correlation and prediction of additional data sets using a methodology jointly developed at the Edgewood Center and LaSierra University over the past 8 years.

- Again this year, the Pueblo Chemical Depot manned an exhibit at the 17-day Colorado State Fair. Volunteers were from the depot, county, state and federal agencies, and contract personnel supporting depot activities. The exhibit had chemical demilitarization, ACWA, CSEPP, all hazards, environmental, community outreach, and Team Pueblo information. Besides fact sheets and brochures, other handouts were available with Team Pueblo, public affairs and community outreach information. An estimated 10,000 visitors of all ages visited the exhibit, and about 130 addressees were added to the depots master mailing list.

- Quality engineers from Guild Associates, Inc. and our Sorbent Decontamination Systems Team attended a course on **Statistical Process Control (SPC) for Short Production Runs** at George Washington University. The course was taught by Dr. Eden Chan, an expert in SPC and Quality Assurance, and in applying statistical methodology. The course was attended to facilitate monitoring of the current Sorbent Decontamination System contract by the Team and application of Statistical Process Charts to the Sorbent Decontamination System processes by Guild Associates, Inc.

- Mr. Charles Tornga and Mr. Thomas Gervasoni, members of our Arms Control and Treaty Assistance Directorate, attended the **AMC Treaty Meeting** in Yuma, Arizona. Mr. Tornga presented a briefing on "Chemical Weapons Convention Inspection Resource Planning and Cost Reporting."

- Mr. Augustus LaComb participated in SWA/FEMA's "**NBC Hazard Assessment Conference.**" A exhibit of our Domestic Preparedness Program was also there. Over 200 individuals viewed the exhibit.

- We participated in the **Technology 2007 Seminar and Exhibit** in Boston, MA. Three U.S. Army laboratories: the Armament Research Development and Engineering Center, the Army Research Laboratory, and the Edgewood RDE Center, set up a booth together to market the U.S. Army's newest technologies and patents which are available for transfer to the commercial market. Contacts were made with several companies that are interested in possibly doing business with the Center.

- Mr. Roy Thompson attended the annual **Technical Advisory Committee** meeting at the National Biotechnology Information Facility, New Mexico State University, to review the Edgewood RDE Center's first year achievements in generating relational, biotechnology databases, developing bioinformatic procedures to extract functional information from pure sequence data and developing learning modules for conveying this technology to the academic and commercial sectors. There is an intense demand building for being able to interpret the actual function of a given gene sequence and relate that to gene sequences found in other taxonomic domains. Mr. Thompson also attended the **DARPA Tech '97 Systems and Technology Symposium** at which the DARPA vision of the future and the technological challenges facing the DoD R&D community in the 21st Century were presented.

- Dr. Valdes attended the **Army-wide Senior Technologists Meeting** hosted by the U.S. Army Corps of Engineers. A draft tech base policy was reviewed and briefed. The purpose of the briefing was to present a consensus view-point of the Army's Senior Technologists as to the importance of a strong 6.1 and 6.2 tech base. Results of initial Army After Next wargaming were discussed, as well as a proposal by SARDA to involve Senior Technologists in planning and evaluating Strategic Research Objectives. Planning for the Army

Science Conference was also initiated and Dr. Valdes was selected to chair a panel of SES and Senior Technologists personnel organizing the conference.

In October . . .

- We participated in the **AUSA Annual National Meeting** in Washington, DC. The Army Materiel Command had a corporate exhibit at this event that included our role in Domestic Preparedness for one section of the display.

- We had an exhibit at the **TTCP Meeting** at the Army Research Laboratory, APG, MD.

- On invitation from the course producer, MAJ Steve Moore participated in the 18 Oct 97 session of USAMRIID's **Medical Management of Biological Casualties Course** to discuss the M31 BIDS program. The course was attended at the Gaithersberg site by medical professionals, uniformed and civilian, from all the services; by other U.S. civilian agencies; and by military members from other countries (i.e. United Kingdom and Australia). The course was broadcast live to 300 other sites via satellite and attended by 8000 people. The invite was a result of an earlier support effort to provide raw video tape footage of the BIDS for this same course.

- Ms. Emma Forrest will attend the **Non-Proliferation and Arms Control Technology Working Group Meeting** in Langley, VA.

- Mr. Stephen English attended the ADPA/NSIA "**Enhancing Aircraft Survivability Conference**" in Monterey, CA.

- CBDCOM hosted an **Industrial Base Workshop--Post Cold War**, in Aberdeen, MD We participated in the workshop for industrial base planners in the chemical-biological sector. The purpose of the workshop was to give newer planners an understanding of the principles of the Industrial Base program and to get seasoned planners to consider new solutions to problems. Drs. Starns and Barnett, TASC Inc., gave most of the presentations, which included past and current



operating environment, models for problem solving, and leveraging the commercial base. Mr. Jim Collis, NAVAIR, covered Diminishing Manufacturing Sources and Materials Shortages (DMSMS), microcircuit obsolescence, and virtual supply chains. HQ DA, HQ AMC, DLA, TACOM-ACALA, and the Chemical School at Ft. McClellan also participated in the very worthwhile workshop.

- Mr. James Byrnes, Joint Service Material Group, attended the AFCEA-sponsored **Intelligence Symposium** at the Defense Intelligence Agency. The topic of the session was “Technological Responses to Changing Intelligence Priorities.” Included in the sessions were presentations on the application of advanced technologies towards CB detection, and various projects of the National Reconnaissance Office. Speakers included Mr. Busbee, Dr. Shuler, and Dr. Donlon (Manager of Counterproliferation for DARPA).

- At the invitation of Morris Krauss, Drs. William White and J.B. Wright, a NRC Postdoctoral Fellow, visited the **Center for Advanced Research in Biotechnology (CARB) and the National Institute of Standards and Technology (NIST)** in Gaithersburg, MD. Discussions with Drs. Krauss, Kafaffi, Wladkowski and others focused on quantum chemical approaches for determining the mechanisms of enzymatic catalysis - particularly the replacement of large segments of the protein with effective fragment potentials. Their expertise with ribonuclease, an enzyme that catalyses the hydrolysis of phosphate esters, should be valuable in studies on the inhibition of acetylcholinesterase by various organophosphorus compounds. Future collaborations involving computational chemistry of macromolecules are likely.

In November . . .

- We had an exhibit at the **Jane’s Conference on Countering Chemical and Biological Weapons: Government Programs, Industry Opportunities**, in Washington, DC. We highlighted the systems and technologies at

Edgewood that support the Domestic Preparedness Program.

- Dr. George Famini, of our International Programs Office was one of 4 plenary speakers at the **6th International Symposium on Current Trends in Computational Chemistry**, in Vicksburg, MS. The conference, sponsored by the U.S. Army High Performance Computing Research Center and the DOD High Performance Computing Initiative, has brought together approximately 200 of the top researchers in computational chemistry in each of the past 5 meetings. Dr. Famini’s presentation focused on the use of computational chemistry in developing and applying linear free energy relationships to the prediction of physical, chemical and toxicological properties.

- Dr. William Sarver of our Treaty Verification Team attended the **5th Chemical Congress of North America**. Dr. Sarver chaired a session and present a paper.

- The **1997 Department of the Army ILS Symposium** was held at the University of Alabama Huntsville campus in Huntsville, AL. Highlights of the symposium focused on the need for PEOs and MSCs to have a means of identifying true ownership costs in order to implement and measure the impact of several Life Cycle and Operating and Support Cost reduction initiatives which are being developed and implemented within the Army (Value Engineering, Modernization Through Spares, Reliability, Maintainability, Supportability, etc.). This is particularly true if PEOs/PMs/MSCs are to execute total life cycle management responsibilities as outlined by Mr. Decker, SARD, in a 29 Apr 97 memorandum. It was emphasized that fielding supportable systems at minimum life cycle costs has always been a goal of ILS and the total life cycle cost mission given to PEOs/PMs afforded ILS personnel a good opportunity to execute their responsibilities. It was recognized by attendees that the Army has gone far in dismantling its ILS functions and our capability to ensure that systems are fielded at the lowest life cycle cost has been significantly diminished.



Representing CBDCOM were Ms. Jean Salvatore, Alternate ILS POC, Mr. Guy Matricianni who received the ILS Management Team award for the XM94 Biological Standoff Detector Team and Mr. Graham, and ILS Point of Contact, who also participated in the DA ILS Executive Committee Meeting.

- Mr. Novak received sponsor approval of his report entitled “Micro Spot Tests and Other Candidate Screening Tests for On-Site CWC Verification Inspections.” He also received sponsor approval to present the results of his FY97 Microtest Screening Kit efforts at the Edgewood RDE Center’s **Scientific Conference and the 6th International On-site Analysis Conference** in Jan 98.

Two papers were presented last week at the **SPIE International Symposium on Optical Science, Engineering, and Instrumentation** regarding significant results in laser standoff chemical detection. “Detection and reconnaissance of pollutant clouds by CO2 lidar (MIRELA),” by Philippe Adam and Steve Gotoff, detailed laboratory measurements of backscatter coefficients, verified with field data, that show unique spectral structure which differs from absorption spectra. “Spectral albedo cross-correlation and its effect on topographical airborne DIAL measurements,” by Avi Ben-David, Rich Vanderbeek, Steve Gotoff, and Fran D’Amico, described the practical effects of flight geometry, signal averaging, and time-lag correlation coefficients on airborne CO2 dial lidar measurements as shown in simulations and field measurements.



## Journal and Magazine Articles

A refereed book chapter entitled “Neutralization and Biodegradation of Sulfur Mustard” by S.P. Harvey, W.T. Beaudry, L.L. Szafraniec, J.P. Early, and R.L. Irvine, was published in a series entitled **Bioremediation: Principles and Practice Vol II. Biodegradation Technology Development**, S.K. Sikdar and R.L. Irvine, authors. The chapter details a comparison of the results of biodegradation of the caustic and water-hydrolyzed HD in sequencing batch reactors. Studies were conducted in support of the Alternative Technologies Program, funded by the Program Manager for Chemical Demilitarization.

A book entitled **Advances in Animal Alternatives for Safety and Efficacy Testing** edited by Harry Salem (Edgewood RDE Center) and Sidney Katz (Rutgers University) was published by Taylor and Francis. The Edgewood RDE Center employees who contributed refereed chapters to this book were Bronk, et al and Salem, et al. Many of the chapters in the book were solicited from the scientists who participated in the last Alternatives to Animal Testing Symposium held at the Edgewood RDE Center.

“Validation of the Cytosensor for In Vitro Cytotoxicity Studies” by C.J. Cao, R.J. Mioduszewski, D.E. Menking, J.J. Valdes (Edgewood RDE Center), and V.I. Cortes, M.E. Eldefrawi, and A.T. Eldefrawi (University of Maryland School of Medicine) was published in *Toxicology in Vitro*, Vol 11, pp 285-93. This paper describes the in vitro cytotoxicity testing of human liver cells using the Cytosensor Microphysiometer

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and showed excellent correlation between IC50 values for 24-hour exposure and the published human lethal blood concentration.

“Epoxidation By Dimethyldioxirane: Kinetics for cis-Alkenes” by Professor Alfons L. Baumstark, Georgia State University, and Dr. Harold D. Banks (Edgewood RDE Center), was accepted for publication in the international journal *Heterocyclic Communications*. The manuscript describes the amazingly close agreement of the experimental and calculated results for this important oxidation system that is replacing m-chloroperbenzoic acid as the reagent of choice for stereoselective, controlled oxidation of alkenes. It is noteworthy that the calculations were performed at the semi-empirical level (AM1), allowing one to obtain reliable results in a small fraction of the time required for the more rigorous ab initio treatments. Computational chemistry continues to emerge as an important tool for the experimental chemist in the design and implementation of research directed toward synthetic targets.

“Toxicity of Sea Nettle Toxin to Human Liver Cells, and the Protective Effects of Phosphorylating and Alkylating Agents” by C.J. Cao, R. Mioduszewski, D.E. Menking, and J.J. Valdes (Edgewood RDE Center); and A.T. Eldefrawi, J.W. Burnett, and M.E. Eldefrawi (University of Maryland School of Medicine) was accepted for publication in *Toxicon*. The protective effects of VX may be due to phosphorylation of proteins involved in ion channel formation, and suggests a general mechanism by which nerve agents affect cellular physiology which is independent of their anti-cholinesterase properties.

The manuscript titled, “Analytical Chemistry Associated with the Destruction of Chemical Weapons” edited by Monica Heyl (Edgewood RDE Center) and Dr. Raymond McGuire of Lawrence Livermore National Laboratory (**NATO ASI Series 1. Disarmament Technologies-Vol 13**) was recently published. The manuscript is a collection of papers presented at the NATO Advanced Research Workshop held in Brno, Czech Republic in May 1996.

“Hydrolysis of Russian-VX by Organophosphorus Hydrolase” by V.K. Rastogi, J. DeFrank, T-C Cheng, and J. Wild has been accepted for publication in *Biophysical & Biochemical Research Communication*. The results summarized in this publication provide the first evidence for enzymatic detoxification of the Russian V-type chemical nerve agent. Current efforts are geared towards cloning and over-expression of the enzyme for development of comprehensive enzyme-based decontamination technology.

The first meeting of the APG Journal Club in computational chemistry was held this month at the Army Research Laboratory. This is a group which consists principally of computational chemists from the Edgewood RDE Center and the Army Research Laboratory and is an outgrowth of a similar Edgewood effort that had been dormant for several years. The club’s participants will meet monthly to discuss high performance computing issues related to the DoD Major Shared Resource Center located at the Army Research Laboratory, to learn of new developments in computational chemistry, and to increase their knowledge of current research by reviewing articles published in open literature. Although the group is focused on chemistry, anyone with an interest in computational research is encouraged to participate.



# U.S. ARMY CHEMICAL AND BIOLOGICAL DEFENSE COMMAND FY97 PATENT REPORT

## *Patent Applications Filed*

1. Oxidative Detoxification of Phosphonothiolates and Phosphonothioic Acids, Inventors: YU-CHU YANG and LAWRENCE PROCELL (Docket: 369-97)
  2. Scavenging & Filtering of Airborne Particles Using Bubbles, Inventor: JAMES A. GENOVESE (Docket: 393-94)
  3. Method for Creating a One-Way Visible Screening Smoke, Inventor: JANON F. EMBURY (Docket: 395-94)
  4. Super Toxic Analytical Glove Box System, Inventors: CHARLES E. HENRY, MONICA J. HEYL, and DENNIS J. REUTTER (Docket: 410-95)
  5. Biological-Chemical Composition and Method for Determining Chemical Cross Talk or Isotopic Scrambling Induced by Analytical Procedures, Inventor: RONNY C. ROBBINS (Docket: 412-95)
  6. Panoramic Infrared Imaging Spectroradiometer with Reverse Phase Modulation Beam Boadcasting, Inventor: ARTHUR H. CARRIERI (Docket: 416-95)
  7. Advanced Chemical & Biological Protective Mask, Inventors: COREY M. GROVE, STEPHEN E. CHASE, and WILLIAM M. FRITCH (PROVISIONAL)
  8. Method and Kit for Rapid Detection of Toxins, Inventors: SHEILA J. WOOD and ROBERT J. SYDISKIS (Docket: 426-95)
  9. Microspot Test Methods and Field Test Kit for On-site Inspections for Chemical Agents, Inventors: THADDEUS, J. NOVAK, HERBERT S. AARON, and TRACEY D. BIGGS (Docket: 428-96)
  10. Detection of Botulinum Toxin, Inventors: JAMES J. VALDES, PETER A. EMANUEL, MOHYEE E. ELDEFRAWI, and JAMES P. BURANS (Docket: 431-96)
  11. Low Concentration Aerosol Generator, Inventors: JEROLD R. BOTTIGER and PAUL J. DELUCA, (Docket: 435-96)
  12. Novel Detector for Nucleic Acid Typing and Methods of Using the Same, Inventors: HOMER R. YEH and CHARLES H. WICK (Docket: 436-96)
  13. Hand-Held Temperature Programmable Modular Gas Chromatograph, Inventors: WALEED M. MASWADEH and A. PETER SNYDER (Docket: 437-96)
  14. Enzymatic Detoxification of Organophosphorus Compounds, Inventors: TU-CHEN CHENG and JOSEPH J. DEFRANK (Docket: 443-96)
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15. Rapidly Deployable, Man-Portable, Inflatable, Chemical, Biological, Radiological & Explosive Containment System, Inventors: WILLIAM J. DRUMGOOLE, WILLEM F. VANBASTEN, and JAMES A. GENOVESE (Docket: 444-96)
16. Rapid Identification of Bacteria by Mass Spectrometry, Inventors: T. KRISHNAMURTHY and PHILIP L. ROSS (Docket: 445-96)
17. Improved Sampling Arm Coupler, Inventors: STEPHEN J. COLCLOUGH and LOUIE J. LIPP (Docket: 447-96)
18. Ion Interface for Mass Spectrometry, Inventors: WALEED M. MASWADEH and A. PETER SNYDER (Docket: 448-96)
19. Intermittent Automatic Windshield Wiper Controller, Inventor: RONNY C. ROBBINS (Docket: 451-96)
20. System and Method for Detection, Identification and Monitoring of Submicron-Sized Particles, Inventors: CHARLES H. WICK and DAVID M. ANDERSON (DAM 462-97)
21. Acid-Catalyzed Oxidation of S-(2-Diisopropylamino) Ethyl Methylphosphonothioate Ion With Hydrogen Peroxide, Inventors: YU-CHU YANG and GEORGE WAGNER (Docket: 463-97)
22. Biological Warfare Mask, Inventors: RICHARD W. HUTCHINSON, and VAN ROGER JONES (Docket: 464-96)

#### *Patents Issued*

1. Patent Number 5,560,511, Hermetically Sealable Reusable Container, Inventor: MCNERNEY, JOHN L.
  2. Patent Number 5,568,186, Focal Plane Filtered Multispectral Multidetector Imager, Inventor: ALTHOUSE, MARK L.
  3. Patent Number 5,569,580, Method For Testing the Toxicity of Chemicals Using Hyperactivated Spermatozoa, Inventor: YOUNG, RONALD J.
  4. Patent Number 5,606,111, Apparatus and Method for Measurement of Offgassing Rate, Inventors: PILIE, ROLAND J.; McMAHON, THOMAS M.; and MOSKAL, MICHAEL D.
  5. Patent Number 5,627,054, Competitor Primer Asymmetric Polymerase Chain Reaction, Inventor: GILLESPIE, DAVID
  6. Patent Number 5,631,469, Neural Network Computing System for Pattern Recognition of Thermoluminescence Signature Spectra and Chemical Defense, Inventors: CARRIERI, ARTHUR H. and LIM, PASCAL E.
  7. Patent Number 5,649,466, Method of Rapidly Deploying Volume-Displacement Devices for Restraining Movement of Objects, Inventor: GENOVESE, JAMES A.
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8. Patent Number 5,654,144, Detection of Yersinia Using the Polymerase Chain Reaction, Inventors: MANN, BARBARA J. and WOOD, SHEILA J.

9. Patent Number 5,659,391, Earth Monitoring Satellite System with Combined Infrared Interferometry and Photopolarimetry for Chemical and Biological Sensing, Inventor: CARRIERI, ARTHUR H.

10. Patent Number 5,659,147, Method of Assembly of Compacted Fibers and Explosive Charge for Effective Dissemination, Inventors: ROUSE, WILLIAM G.; FIALA, JOHN P.; CAUDILL, LISA A.; and KILGORE, CONNIE S.

11. Patent Number 5,660,173, Frustum Layered Canister, Inventor: NEWTON, RICHARD A.

12. Patent Number 5,665,272, Multifuel Combustion Engine and Use In Generating Obscurant Smoke, Inventors: ADAMS, WILLIAM A.; FRITZ, JANICE A.; and HURMAN, TERRY L.

13. PATENT Number 5,671,869, Fiber Chaff Disseminator, Inventors: ALTHOUSE, MARK L.G. and WILCOCK, KEVIN J.



***Reasons to patent CBDCOM***

***inventions:***

- Provides a basis for industry to further develop CBDCOM technology having commercial potential, thereby developing new commercial products and services.

- Brings royalties and other income to the center and individual inventors through patent licensing and provides a basis for CRDAs to explore development of commercial products. For example, last year alone, NIH patents generated over \$40 million in royalty payments including payments to employees of \$150,000 per year.

- Provides a measure of technical innovation. Number of invention disclosures or patent applications generated per dollar investment in CBDCOM R&D is a technology metric monitored by Headquarters, U.S. Army Materiel Command.

- Brings recognition to CBDCOM and inventors, creating a record of technical accomplishment and prestige. Protects both investment and product of valuable R&D. Patents provide only protection of Government intellectual property, therefore, reporting of inventions through disclosure to the legal office is mandatory, not discretionary, for all employees under AR 27-60.

- Provides defensive protection to the Government against patent infringement litigation. The Government has defended, and is defending, itself in costly litigation against patent infringement for patent claims which would not have been issued had the Government properly patented its own inventions.

POC: Ms. Vicki A. Upchurch, Office of Legal Counsel, Commercial (410) 671-1291, DSN 584-1291



## 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.*

ERDEC-CR-210	M256 Chemical Agent Detector Kit Toxin Product Improvements, Final Comprehensive Report, January 1997, UNCLASSIFIED - limited.	M. Lamensdorf G.G. Olsen G.G. Olsen, II
ERDEC-CR-226	Equivalence of Potential Theory and Ideal Adsorbed Solution (IAS) Theory Treatments of the Dubinin-Radushkevich Equation, June 1997, UNCLASSIFIED - public release.	D.T. Croft D. Reed
ERDEC-CR-227	Adsorbent Evaluation and Adsorption Equilibrium Data for R-123, R-134a, and Toluene on Selected Activated Carbons, Silica Gels, and Polymeric Resins, July 1997, UNCLASSIFIED - public release.	D.T. Croft S.M. Maurer D. Reed
ERDEC-CR-228	Infrared Interferometer Without Moving Parts, July 1997, UNCLASSIFIED - limited.	W.K. Wong J.L. Robichaud M. DeSha
ERDEC-CR-229E	Immobilization and Testing of Proteins on Microsensors, July 1997, UNCLASSIFIED - public release.	J.P. Chambers D.E. Menking R.G. Thompson J.J. Valdes
ERDEC-CR-230	Thickener for Use with Flame Field Expedients, August 1997, UNCLASSIFIED - limited.	W.A. Mallow R.J. Malecki
ERDEC-CR-231	Measurement of Adsorption Equilibria for 2,2-Dichloro-1,1,1-Trifluoroethane on Activated Carbon, July 1997, UNCLASSIFIED - public release.	A.B. Brady T.M. Wilson D.K. Friday D. Reed

ERDEC-CR-233	Evaluation of the Vesicating Properties of Neutralized Chemical Agent Identification Set (CAIS) Components, June 1997, UNCLASSIFIED - public release.	C.T. Olsen T.L. Hayes A.W. Singer R.G. Menton R.C. Kiser T.L. Miller M.C. Matthews D.M. Moore C.M. Shannon J.B. Johnson E.J. Olajos H. Salem
ERDEC-CR-234	Evaluation of the Vesicating Properties of Neutralized Sulfur Mustard, June 1997, UNCLASSIFIED - public release.	C.T. Olson T.L. Hayes A.W. Singer R.G. Menton R.C. Kiser M.C. Matthews D.M. Moore C.M. Shannon J.B. Johnson T.A. Peace E.J. Olajos H. Salem
ERDEC-CR-235	Polymer Standards for Testing Fourier Transform Infrared Spectrometers, September 1997, UNCLASSIFIED - public release.	P.R. Griffiths G.T. Merklin B.T. Bowie R.T. Combs
ERDEC-CR-236	Analysis and Design of the Adsorbent Sample Temperature Control in the Volumetric Isotherm System, September 1997, UNCLASSIFIED - public release.	D.T. Croft S.M. Maurer D.F. Fowler D. Reed
ERDEC-CR-237	Development of a Multi-Channel Integration Routine in LABVIEW, September 1997, UNCLASSIFIED - public release.	T.M. Wilson D. Reed
ERDEC-CR-238	Temperature Measurements to Characterize Dispersion Within Pressure Swing Adsorption (PSA) Beds, September 1997, UNCLASSIFIED - public release.	L.C. Buettner R.S. Brown D.K. Friday D. Reed



ERDEC-CR-239E	Head-Only Inhalation Toxicity Study (LC50) of Chemical Agent Identification Sets (CAIS): Red Process Wastestream in Rats, July 1997, UNCLASSIFIED - public release.	E.W. Morgan R.A. Renne B. McVetty R. Johnson R.L. Phelps F-S. Yin J.T. Pierce J.Blessing P.W. Mellick E.J. Olajos H.Salem
ERDEC-CR-240	Smoke/Obscurant Characterization Procedures, October 1997, UNCLASSIFIED - limited.	M.R. Perry A. Richardson W. Rouse
ERDEC-CR-241	Transport, Diffusion, and Radiance Version 3.2, November 1997, UNCLASSIFIED - limited.	R.O. Pennsyle W. Rouse
ERDEC-SP-048	Proceedings of the 1996 ERDEC Scientific Conference on Chemical and Biological Defense Research, 19-22 November 1997, October 1997, UNCLASSIFIED - public release.	D.A. Berg
ERDEC-SP-051	Process Description for the Manufacture of Genetically Engineered Anti-Botulinum Toxin B Monoclonal Antibodies, June 1997, UNCLASSIFIED - limited.	G. Olsen II M. Myers L. Wohnlich S. Kracke K. Phan J. Wilson
ERDEC-SP-052E	Department of Transportation Dermal Toxicity Evaluation of Product Solutions Resulting from the Chemical Neutralization of HD, GB, and VX via Monoethanolamine (MEA), August 1997 UNCLASSIFIED-public release.	E.J. Olajos H. Salem J.K. Giesecking
ERDEC-SP-053E	Edgewood RDE Center Support to the Alternative Technology Program, September 1997, UNCLASSIFIED - public release.	J.J. Novad J.N. Coale
ERDEC-SP-054E	Evaluation of the Vesicating Properties of Neutralized Chemical Agent Identification Sets, August 1997, UNCLASSIFIED - public release.	E.J. Olajos H. Salem J.K. Giesecking



ERDEC-TR-317C	Evaluation of a Post-Treatment Filter, Part 4: Predicted Stack Gas Filtration, August 1997, UNCLASSIFIED - public release.	J. Mahle D. Croft
ERCED-TR-317D	Evaluation of a Post-Treatment Filter, Part 3: Experimental Study of Multicomponent Adsorption Breakthrough, August 1997, UNCLASSIFIED - public release.	L.C. Buettner C. LeDuc J.J. Mahle
ERDEC-TR-381	Feasibility of Detecting Chemical Agents Using A Chemical Imaging Interferometer from Low and High Altitude Platforms, July 1997, UNCLASSIFIED - public release.	W.R. Loerop
ERDEC-TR-406E	Toxicological Evaluation of Eight VX Demilitarized Samples: Alternative Technology Program, July 1997, UNCLASSIFIED - public release.	J.H. Manthei D.H. Heitkamp R.A. Way
ERDEC-TR-408	Micro Spot Tests and Other Candidate Screening Tests for On-Site Chemical Weapons Convention Verification Inspections, May 1997, UNCLASSIFIED - limited.	T.J. Novak T.D. Biggs E.L. Vickers B.S. Ince N. Turner R.C. Matteson S.M. Rowlyk
ERDEC-TR-409E	GC/MS Characterization and Stability of the Equimolar VX/Water Reaction Product, May 1997, UNCLASSIFIED - public release.	D.K. Rohrbaugh
ERDEC-TR-410E	Chemical Weapons Convention Verification Technology Research and Development, Ion Trap MS/MS Detection of Scheduled Chemicals, May 1997, UNCLASSIFIED - limited.	D.K. Rohrbaugh K.B. Sumpter T.E. Rosso
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C.H. Wick  
H.R. Carlon  
R.L. Edmonds  
J. Blew



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