Conference Abstracts

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18th International Chemical Weapons Demilitarisation Conference CWD 2015

3-5 June 2015
London, England

The 18th International Chemical Weapons Demilitarisation Conference

Welcome to CWD 2015

On behalf of the organisers, we would like to welcome you all and thank you for your attendance and participation at the 18th International Chemical Weapons Demilitarisation Conference (CWD 2015) in London, England.

In addition to providing technical updates this international event provides a great opportunity for exchange of knowledge and experiences. It also provides an excellent opportunity for building up new and existing relationships and strengthening collaborations.

With your support, this series of CWD conferences has continued albeit in a more reduced way. Hopefully, this will not detract from the previous conferences where they have provided a wider depth and breadth to the work undertaken. The speakers will still discuss the nature of the challenges posed and how governments are adapting to overcome them. The vast knowledge and experience of the speakers and delegates should prompt some useful debate and expose a variety of views.

We hope you will take the opportunity not only to network and meet with many high-profile personnel, but also to hear presentations from prominent speakers from various countries. The exchange of information will be invaluable as we strive to improve our knowledge and expertise in this area.

The organisers would like to thank all those entities that have pledged support to the conferences past and present. We would also like to thank the speakers and session chairs for their participation and for giving us the benefit of their expertise.

We look forward to your enthusiastic participation in the 18th conference of the series that will take place in the UK.

Finally, a very sincere thank you to all the attendees for joining us at CWD 2015. We hope you have a productive and informative conference and a very enjoyable stay in London.

Acknowledgements

An international event of this kind could not have been accomplished without the engagement and support of many organizations and individuals. Special acknowledgements are due to the following organizations:

Organisation for the Prohibition of Chemical Weapons (OPCW)
Ministry of Defence (UK) and in particular the Arms Control and Counter Proliferation Policy
Department of Defense, Department of State, US Army Chemical Materials Agency and the Office of the Deputy Assistant Secretary of the Army (Elimination of Chemical Weapons)
Abandoned Chemical Weapons (ACW) Office, Japan
The Foreign and Commonwealth Office (UK)
Defence Science and Technology Laboratory (Dstl)

The organisers would also like to express gratitude to the following for their generous financial contributions:

Bechtel Corporation
Kobe Steel
URS Corporation

Abstracts

Progress With Respect To The Destruction Of Chemical Weapons

Mr. Philippe Denier, OPCW

Japan's ACW Destruction Project in China

Mr. Kenichi Takahashi Abandoned Chemical Weapons Office, Cabinet Office, Government of Japan

The Japanese Government is making utmost effort to destroy chemical weapons abandoned by the former Japanese military forces in China in accordance with the Chemical Weapons Convention.

Most abandoned chemical weapons (ACWs) are highly corroded or deformed as they have remained under soil or water for a long time. Therefore, it requires extra caution and care throughout the entire process of excavation, recovery and destruction. Also, since it is a joint project carried out in Chinese soil, there exist various differences in, for example, legal framework, business custom, operational procedures and government administrative process, all of which require significant amount of management challenge. All of these factors make the ACW project one of the most complicated and challenging project, which is unlike any other chemical weapon destruction projects in the world.

Despite all the difficulties, the ACW project in China has made significant progress in recent years. After going through several years of consultations and various preparation work, destruction operation using two destruction facilities, namely Controlled Detonation Chamber and Static Detonation Furnace had finally launched in Haerbaling in December last year. Full-fledged destruction operation is now ready to take place in Haerbaling, where 300 to 400 thousand ACWs are estimated to be buried. Also in December last year, mobile destruction facility in Wuhan began its operation and destruction campaign is expected to end in May. In Shijiazhuang, the other deployment site of mobile destruction facility, destruction operation has been carried out since 2012.

Given that our highest priority is to keep Chinese citizens away from the danger of ACWs, Japan attaches great importance not only to the destruction of ACWs as required by the CWC, but also to excavation and recovery operations. To date, more than 52,300 ACWs have been recovered at various locations in China.

The presentation will provide overview of the ACW project as well as current status and future prospect

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Mr Kenichi Takahashi is the Director-General for the Abandoned Chemical Weapons Office, Minister's Secretariat, the Cabinet Office, Government of Japan.

Apr 1983 Administration Division, Bureau of Equipment, Japan Defense Agency
Apr 1984 Defense Policy Division, Bureau of Defense Policy
Apr 1985 General Affairs Division, Secretariat of the Minister of State for Defense
Apr 1986 General Affairs Division, Maritime Technology and Safety Bureau, Ministry of Transport
Apr 1988 Education Division, Bureau of Education & Training, Japan Defense Agency
Jul 1990 First Personnel Division, Bureau of Personnel
Apr 1992 Financial Affairs Division, Bureau of Finance
Jul 1994 General Affairs Division, Secretariat of the Minister of State for Defense
Jul 1996 First Defense Intelligence Division, Bureau of Defense Policy
May 1997 Financial Affairs Division, Bureau of Finance
Jul 1999 Director, Facilities Department, Hiroshima Defense Facilities Administration Bureau
Jul 2001 Director, Legal Division, Minister's Secretariat
Aug 2002 Director, Second Personnel Division, Bureau of Personnel & Education
Jul 2004 Director, Planning & Programming Division, Bureau of Defense Policy
Aug 2005 Director, Facilities Planning Division, Defense Facilities Administration Agency
Aug 2006 Counselor, Cabinet Secretariat (National Security Affairs And Crisis Management)
Aug 2009 Deputy Director-General, Minister's Secretariat, Ministry of Defense
Sep 2011 Deputy Director-General, Secretariat International Peace Cooperation Headquarters, Cabinet Office
Jul 2013 Director-General, Abandoned Chemical Weapons Office, Cabinet Office (Current Position)

2015 - The Transition to Operations: An ACWA Progress Report

Mr. Conrad F. Whyne, US Army Element, Assembled Chemical Weapons Alternatives

After many years of technology demonstration, engineering design and plant construction, the Assembled Chemical Weapons Alternatives Program, known as ACWA, is now transitioning to an operational mode as it begins destroying the remaining 10 percent of the original U.S. chemical weapons stockpile.

The Explosive Destruction System at the Pueblo Chemical Agent-Destruction Pilot Plant in Colorado started destruction operations with overpacked mustard munitions unsuited for automated processing by the main plant, which is approaching operational status later this year.

Construction of the Blue Grass Chemical Agent-Destruction Pilot Plant in Kentucky will be completed this summer, and plant systemization there continues to accelerate. Site preparation is well underway for the Blue Grass Static Detonation Chamber, which is scheduled to begin destroying all of the mustard-filled munitions in the Blue Grass stockpile in 2017.

The establishment late last year of an ACWA field office at Anniston Army Depot in Alabama allows the program to leverage more than 60 years of hands-on chemical demilitarization experience in support of both ACWA's Pueblo and Blue Grass facilities.

This presentation will also describe ACWA's new top-level management structure designed to focus experienced executive attention on plant start-up and destruction operations while preserving nearly two decades of highly technical institutional memory in the oversight of systems engineering and risk management.

Mr. Whyne will also discuss contingency planning to optimize operational efficiency should either site experience technical difficulties with their on-site secondary treatment systems which could negatively impact the pace of chemical weapons destruction.

Mr Conrad F. Whyne serves as the program executive officer, the civilian equivalent of a major general, for the U.S. Department of Defense's Assembled Chemical Weapons Alternatives (ACWA) program, a position to which he was assigned on Feb. 26, 2012. Previously, he served for more than four years as director of the U.S. Army Chemical Materials Agency (CMA) where, among other duties, he oversaw the safe and successful destruction of 90 percent of the U.S. chemical weapons stockpile. As ACWA program executive officer, Mr. Whyne oversees all aspects of the safe elimination of the remaining 10 percent of the U.S. chemical weapons stockpile stored at U.S. Army installations in Colorado and Kentucky. A native of Pennsylvania, Mr. Whyne holds a bachelor's degree in biology from the Pennsylvania State University, University Park, and a master's degree in biomedical engineering from Rutgers, The State University, Piscataway, N.J.

Destruction of Japanese Abandoned Chemical Weapons Discovered in China: Progress and Challenges

Mr. Cheng Tang, Ministry of National Defence, People's Republic of China

Japanese Abandoned Chemical Weapons (JACW) have been discovered at more than 90 locations in 17 provinces across China. In accordance with the provisions of the CWC, Japan is obliged to destroy JACW, with the provision of appropriate cooperation from China.

Since 1995, on-site Sino-Japan bilateral JACW investigations have been conducted at more than 170 sites – this has resulted in the recovery of nearly 50,000 items of JACW.

Haerbaling is the largest JACW burial site that has been discovered to date on Chinese territory, where an estimated 330,000 items of JACW are believed to have been buried, according to bilateral experts.

To speed up the destruction process, consolidation of JACW from several storage sites to the Mobile Destruction Facilities (MDF) at Shijiazhuan, and Wuhan were conducted by China in 2014. Progress has also been made on the destruction front. One week test destruction began at Haerbaling on 30 November 2014, while similar operations were initiated by the MDF at Wuhan on 23 December 2014.

JACW MDF at Shijiazhuan is still ongoing, but was been temporarily suspended due to the monitored Dioxin levels exceeding the national environmental limit.

The destruction of JACW discovered in China was unfortunately not completed within the time frame specified by the CWC. An agreement on a revised JACW destruction program with new destruction deadlines has been bilaterally agreed upon, and confirmed by the OPCW Executive Council.

Many challenges still lie ahead before the ultimate completion of the JACW destruction, in line with the Executive Council's decision.

Mr Cheng Tang is Dthe Deputy Chief of the Office for CWC Implementation and Disposal of Japanese Abandoned Chemical Weapons (JACW) at the Ministry of National Defence of China. His responsibilities are to oversee relevant facilities under the supervision of the Ministry of National Defence, fully implement the provisions of the CWC, as well as to provide support to Japan for the destruction of JACW discovered in China. Mr. Tang is also a member of the Scientific Advisory Board of the OPCW. From December 2013 to February 2014, he was seconded to the Technical Secretariat of the OPCW– with a role in the Operation Planning Group concerning the movement and destruction of Syrian chemical weapons.

Prior to his current position, he served as a senior chemical demilitarization officer for seven years within the Verification Division of the OPCW Technical Secretariat. His responsibilities included CW related inspection planning and Chemical Weapons Storage Facilities. From early 1991 until the conclusion of the CWC negotiations in September 1992, Mr. Tang was an expert as part of the Chinese delegation to the Conference of Disarmament in Geneva, where he participated in the end game negotiations of the CWC

Chemical Demilitarization in Syria: An Overview

Mr. Dominique Anelli OPCW

The main objectives of the Syrian chemical demilitarisation programme are to eradicate the chemical weapons production capability and destroy the stockpile of chemical weapons in Syria. This is being achieved by the destruction of chemical weapons production facilities as well as the removal and destruction of approximately 1,330 tonnes of chemicals and related materials from the Syrian Arab Republic, in accordance with the OPCW Executive Council decisions.

The Syrian Arab Republic declared twenty-seven chemical weapons production facilities. These include both mobile chemical weapon production units and specialised structures which were located above and below ground. The Syrian Arab Republic also declared several locations across its territory, where chemical weapons were stored (chemicals stored in bulk form and unfilled munitions).

All chemical weapons classed as bulk chemical (category 1 and 2 chemical weapons), with the exception of Isopropanol, were removed from the Syrian territory and transferred to disposal sites outside of the country

Removal and destruction of Syrian chemical weapons has been a great achievement for the OPCW. This was accomplished by dedication and commitment of Technical Secretariat staff with direct support of the CWC States Parties. This operation was an excellent example of "Working Together for A World Free of Chemical Weapons".

Mr Dominique Anelli has worked as a Military officer, specialising in the Nuclear, Radiological, Biological and Chemical fields. He has been involved in the field of disarmament and chemical defence since 1992. Mr Anelli has four years' worth of experiences in Iraq, where he was based twice in 1992, as well as 1996, and 1998 as Chief Inspector. He acted as an Adviser in protection for Singaporean forces during 1997 and 1998 and has also been responsible for Human factors studies in Djibouti and Guyana. Dominique has also worked in an international environment from 1996 to 2003 as Secretary of the NATO Working group on Decontamination and as French Representative to the NATO Challenge Sub-group. His previous post as Military Advisor to the French permanent Representation to the OPCW provided him with his current skills in diplomacy. Mr Anelli has been working at the Technical Secretariat of the OPCW since February 2007.

Destruction of Syrian Chemical Agents and the Field Deployable Hydrolysis System

Raymond DiBerado, Edgewood Chemical & Biological Center
Robert Malone, Lloyd Pusey, Joint Program Executive Office for Chemical Biological Defense

The comprehensive panel briefing will cover several topics associated with the destruction of the Syrian Chemical Agent and pre-cursor materials stockpile to include:

- Technology Selection;
- FDHS Design, Fabrication, and System Attributes;
- Constructing and Operating the FDHS on the Cape Ray; and
- Returning Cape Ray to Service

The technology selection briefing will cover the initial problem set, the time line and limitations for destruction, the methodology for evaluating technologies and the formulation of a complete solution set.

The FDHS design, fabrication, and system attributes briefing will describe the full design life cycle of the FDHS from concept to the two systems now operational ready on the Cape Ray. The briefing will cover the changing destruction paradigm over 2013 and how the FDHS modular design was adapted to suit the operational environment and end state.

The briefing on constructing the FDHS on the Cape Ray will provide the process used to select the vessel, the Cape Ray's attributes for performing the mission, the experience of constructing the FDHS on the Cape Ray, and challenges associated with constructing and operating on a vessel. Finally, the briefing will cover the overall destruction plan for the compounds on the Cape Ray.

The Returning Cape Ray to Service briefing will describe the application of decades of decontamination and closure methods from the former production facilities, stockpile destruction facilities and non-stockpile equipment to the Cape Ray FDHS. Through the application of a comprehensive program for contamination mapping, deconstruction and demobilization, decontamination, analytical sampling and unventilated monitoring the Cape Ray will be returned to the Maritime Administration for unrestricted use.

Mr Raymond DiBerardo has 30 years of experience in project management and demilitarization of chemical warfare materiel (CWM). His experience includes the evaluation of new technologies (fixed and transportable) for the treatment and disposal of CWM. Currently he is serving as the Project Manager for the Explosive Destruction System (EDS) for field operations in Hawaii, Utah and Alabama. Mr DiBerardo is considered a technical expert in the area of equipment development, testing and fielding of treatment technologies for CWM. He has established a proven track record in the deployment of these technologies to include documentation development, mobilization, setup, equipment systemization, training, testing and demobilization. He served as the Project manager for the design, fabrication and testing of the Field Deployable Hydrolysis System (FDHS) and served aboard the MV Cape Ray during FDHS equipment installation and CW destruction of the Syrian CWM

The Changing Operational Landscape, Working with the International Community and Construction of the FDHS on the Cape Ray

Robert Malone, Joint Program Executive Office for Chemical Biological Defense
Lloyd Pusey, Raymond DiBerardo

The briefing will cover the changing destruction paradigm over 2013 and how the FDHS modular design was adapted to suit the operational environment and end state. The briefing will go on to describe the construction of the FDHS on the Cape Ray to include the process used to select the vessel, the Cape Ray's attributes for performing the mission, the experience of constructing the FDHS on the Cape Ray, support requirements for operations and challenges associated with constructing and operating on a vessel

Mr Robert Malone is a subject matter expert in chemical agent operations, secondary waste processing, treatment technology selection, facility closure planning / implementation, field sampling and site remediation. His career includes leadership roles as both a government civilian for the U.S. Army and as a contractor for Science Applications International Corporation. Rob currently serves as a Senior Project Manager for the Joint Project Manager for Elimination. His work has led to the technology selection, fabrication and delivery of the Field Deployable Hydrolysis System a first-of-a-kind deployable chemical agent destruction system developed under a rapid acquisition process to satisfy the first Joint Emergent Operational Needs Statement (JEONS) issued. Mr. Malone has worked the project planning for both land-based and ship board FDHS operations. He served aboard the Cape Ray throughout the construction, operation and demobilization phased of the Syrian chemical weapons destruction mission.

Rob previously served as the Associate Site Project Manager for the Tooele Chemical Agent Disposal Facility (TOCDF), responsible for both technical and contractual management. TOCDF, in Tooele Utah has destroyed the largest and most diverse stockpile of chemical agent munitions in the world. Rob chaired the Integrated Risk and Schedule Management IPT for the Deseret Chemical Depot utilizing his knowledge of acquisition lifecycle management, demilitarization, chemical operations, and closure to lead the integrated team of government and contractor personnel through a first-of-a-kind process that quantifies risks to project schedule execution, calculates milestone confidence and identifies solutions for risk avoidance or mitigation to the Project Managers. Prior to TOCDF, Rob was the Closure and Remediation Department Manager and the Johnston Atoll Chemical Agent Disposal System (JACADS) Project Manager for SAIC. JACADS was the first full-scale chemical agent demilitarization plant in the U.S.

Mr. Malone holds a Bachelor in Science in Natural Resources Management from the University of Maryland at College Park and a Master of Science in Environmental Science and Policy from The Johns Hopkins University. He maintains an active membership as a PMI® Project Management Professional and is a National Registry of Environmental Professionals Registered Environmental Manager

Operating the FDHS on the Cape Ray and Returning the Cape Ray to Service

Lloyd Pusey, Joint Program Executive Office for Chemical Biological Defense.
Robert Malone, Raymond DiBerardo

The briefing will cover the overall destruction operation for the compounds on the Cape Ray to include pre-operational testing, training, container movement, DF operational experiences, and HD operational experiences.

The briefing will describe the application of decades of decontamination and closure methods from the former production facilities, stockpile destruction facilities and non-stockpile equipment to the Cape Ray FDHS. Through the application of a comprehensive program for contamination mapping, deconstruction and demobilization, decontamination, analytical sampling and unventilated monitoring the Cape Ray was returned to the Maritime Administration for unrestricted future use.

Mr. Pusey serves as the director of product development for the Joint Project Manager Elimination (Provisional) within the Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD). In this role, Mr. Pusey is also the product manager for the field deployable hydrolysis system (FDHS). The FDHS is a transportable variant of the destruction processes that were used to successfully destroy much of the bulk chemical warfare within the U.S. unitary stockpile under the Chemical Stockpile Elimination Project. Throughout 2013-2014, Mr. Pusey was engaged in the mission to destroy the Syrian stockpile of chemical weapons and binary precursors at Edgewood, Maryland, at Portsmouth, Virginia, and aboard the MV Cape Ray. In his 17 years with the chemical elimination project, Mr. Pusey has been engaged in strategic planning, performance management and conduct of operations that have safely destroyed 87% (28,000 US tons) of the stockpile of U.S. unitary chemical weapons. Four times awarded medals for civilian service, Mr. Pusey is a driven innovator whose mission is to serve as an inspiration to pursue life's full potential. His goals include establishment of a Chemical & Biological Center of Excellence within Aberdeen Proving Ground and nurturing his ten year old son as he matures into an engaged and motivated young man.

Explosive Destruction System Update

David Deegan, Paul Arrondelle, Tetronics International

Tetronics DC plasma arc systems can be used on a wide range of solid, liquid or gaseous waste streams to destroy or transform hazardous components. To date Tetronics has supplied over 20 commercial facilities for the treatment of hazardous waste including plasma equipment located within Germany's GEKA facility. Other materials treated include polychlorinated biphenyls (PCBs), persistent bio-accumulative and toxic (PBT) pollutants, and air pollution control residues (APCr) that contain dioxins and furans.

This presentation discusses the results of a theoretical study into the use of Tetronics plasma arc technology for the destruction of chemical weapons (CW) and their precursors. The Project's brief was to design a transportable plasma chamber and ancillary support services using a containerised modular platform so that it can installed and run as a rapidly field deployable working facility, at the site of CW stockpiles. Once the destruction operation had been completed the system would be removed from site, leaving minimal environmental impact. In the study, 3 unitary agents and 8 precursor chemicals were thermodynamically modelled on the basis of being converted to relatively benign components at varying feed rates. Based on the requirements of the models a design for the system was devised and then each major section of the integrated system was subjected to a optioning and sensitivity analysis to determine which technology variant was best suited to give an outcome most aligned with the project brief. It was found that the plasma arc had no difficulty in destroying the target feed chemicals but that the predicted by-products, for a limited number of cases, were potentially hazardous for more conventional reasons. The initial study recommended, in the absence of empirically derived performance data, that a secondary combustion chamber would be desirable to act as a process safeguard, and that cleaning the gaseous effluent stream would also present challenges due to the associated impacts on transportability. It was shown that these difficulties could be managed within the overall design brief by varying feed rate, specific energy input and controls with high enough confidence to move forward to construct a pilot plant demonstration.

David Deegan is the Chief Technical Officer for Tetronics. David oversees all technical aspects of client project delivery, operational permitting and ongoing support. David is also responsible for technology research and development as well as patent portfolio management. With a commercial and regulatory focus, particularly in the areas of resource recovery, David was sponsored by Tetronics to obtain his PhD in plasma waste processing in 2003. David is a Chartered Environmental Engineer and a Fellow of the Institute of Materials, Minerals and Mining.

Static Detonation Chamber M28 Propellant Processing

Timothy K. Garrett, Anniston Chemical Agent Disposal Facility

The Anniston Chemical Agent Disposal Facility (ANCDF) installed a Static Detonation Chamber (SDC) to process overpacked munitions and other munitions that could not be readily processed using the baseline equipment. After completing the SDC's primary mission and some additional testing, ANCDF transferred the SDC to the Program Executive Office, Assembled Chemical Weapons Alternatives (PEO-ACWA) for future use.

In March 2015, the Anniston SDC conducted a treatability study for the processing of M28 rocket propellant utilized in the M55 rocket. The study objective was to ascertain how the SDC and the Off-Gas Treatment (OGT) unit would operate and respond while processing this propellant. Emissions data was collected and analyzed which included volatile organic compounds, semivolatile organic compounds, dioxins/furans, acid gases, particulate matter, metal compounds, and energetics. This data along with processing data was used to evaluate processing efficiency and the equipment's performance in terms of throughput and reliability. This effort required collaboration with ACWA headquarters, Blue Grass Chemical Agent-Destruction Pilot Plant (BGCAPP), the Alabama Department of Environmental Management (ADEM), the U.S. Army Joint Munitions Command (JMC) and the U.S. Army Research, Development and Engineering Command (RDECOM).

To support the testing, BGCAPP provided (23) M67 Rocket motors containing the M28 Propellant grain to RDECOM-Armament Research, Development and Engineering Center (ARDEC) at the Picatinny Aresenal in New Jersey. RDECOM-ARDEC sampled and analyzed the rocket motors for nitroglycerin migration and for sensitivity. Subsequently, RDECOM-ARDEC cut the propellant grain into 4 pieces, each weighing less than 6.6 lbs. and packed them in accordance with the Special Packing Instructions (SPI) developed by the JMC. The propellant was then shipped to Anniston, AL, to support testing. The presentation will discuss testing parameters, emissions data, and operational lessons learned

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Timothy K. Garrett, an Alabama native, is the Anniston Site Project Manager for the Program Executive Office for Assembled Chemical Weapons Alternatives (PEO ACWA). He provides oversight of Static Detonation Chamber operations to ensure the contractor meets and maintains Army, State, Federal safety and security standards and environmental laws, regulations, and permit conditions. He also provides contractor performance evaluations to Headquarters as required. Mr. Garrett is also charged with effectively implementing ACWA's strategic goals. Another critical role involves providing chemical agent munitions and agent destruction managerial and technical support to the chemical munitions storage sites in Colorado and Kentucky.

Mr. Garrett previously served as the Site Project Manager for the Anniston Chemical Agent Destruction Facility (ANCDF) at Anniston Army Depot. The facility was designed and constructed to safely and efficiently destroy 2,254 tons of chemical agents (GB, VX, and Mustard) in munitions stored on the Depot.

The ANCDF was operational from August 2003 until September 2011. The team of government and contractor employees at the ANCDF that Mr. Garrett managed and mentored for 13 years safely demilitarized all 661,529 munitions as well as 2,254 tons of nerve agent and mustard agent. The GB nerve agent campaign concluded in March 2006. The VX nerve agent campaign concluded in December 2008. The Mustard agent campaign was completed in September 2011, marking the end of disposal operations.

Mr. Garrett's Federal career began in 1987 as a Chemical Engineer in the Environmental Management Division, Anniston Army Depot. He subsequently became Chief of the Environmental Engineering Branch and then Chief of the Environmental Control and Engineering Division. Mr. Garrett is a member of the U.S. Army Acquisition Corps.

Mr. Garrett, a licensed Professional Engineer who grew up in Cullman, AL, graduated from Cullman High School in 1979. He has a Bachelor of Science Degree (1983) in Chemical Engineering from The University of Alabama and a Master of Science Degree (1994) in Environmental Engineering, also from The University of Alabama.

EDT Implementing a New Destruction Technology and Working with Project Stakeholders

Mr. Jefferey Brubaker, Program Executive Office Assembled Chemical Weapons Alternatives

The Assembled Chemical Weapons Alternatives (ACWA) program is responsible for safely disposing of the unitary stocks of chemical weapons stored at the Pueblo Chemical Depot near Pueblo, Colorado, and at the Blue Grass Army Depot near Lexington, Kentucky. To augment the capabilities of the main demilitarization plants, the ACWA program has chosen to use explosive destruction technologies to destroy problematic munitions and contaminated energetic components. This presentation will describe the decision making process for the selection of these explosive destruction technologies and review how these technologies will be used to address the unique challenges faced by both the Pueblo Chemical Agent-Destruction Pilot Plant and the Blue Grass Chemical-Agent Destruction Pilot Plant.

Jeffrey L. "Jeff" Brubaker is the Site Project Manager for the Blue Grass Chemical Agent-Disposal Pilot Plant (BGCAPP), one of the two chemical weapons destruction facilities of the Department of Defence's Assembled Chemical Weapons Alternatives Program. In this position, Mr. Brubaker is responsible for overseeing the project to construct, systemize, operate and close the plant, which will destroy the chemical weapons stockpile at the Blue Grass Army Depot. In addition to managing plant activities, Mr. Brubaker's duties include coordinating with Blue Grass Army Depot and Chemical Activity leadership.

Prior to taking the helm at BGCAPP, Mr. Brubaker was the Site Project Manager for the Newport Chemical Agent Disposal Facility, where he led the government team during the final phases of facility construction, systemization, pilot testing and full-rate agent destruction, which was successfully completed in August 2008.

His career within the Chemical Demilitarization Program began in 1988, with service on several projects at sites utilizing incineration technology prior to joining the Army's Alternative Technology and Approaches Program in 1997. He served as an Associate Project Manager for 6 years and was responsible for oversight of neutralization design development and coordination of preliminary site construction efforts with the Army Corps of Engineers.

Additionally, Mr. Brubaker previously served as a project engineer responsible for oversight at the Army's Chemical Agent Munitions Disposal System at Deseret Chemical Depot in Tooele, Utah. In this role, he was responsible for planning, observation and evaluation of test programs for new and unique processes and equipment used to demilitarize chemical agents and munitions. He managed these programs in support of the Army's first full-scale chemical agent disposal facility at Johnston Atoll, and also supported systemization efforts on Johnston Atoll related to bulk-item and projectile processing systems.

Mr. Brubaker graduated from the University of Delaware with a degree in mechanical engineering. He has been a member of the Army Acquisition Corps since 1997 and is Level 3 certified in two acquisition career fields: Program Management and Systems, Planning, Research, Development and Engineering.

Mr. Brubaker's awards include the Meritorious Civilian Service Award and Superior Civilian Service Award as well as numerous exceptional performance awards.

Blue Grass Lessons Learned: Implementing Explosive Destruction Technology at BGCAPP

Allison Respess, Steve Bragg, Bechtel Parsons Blue Grass

In Anniston, Alabama, the Static Detonation Chamber, SDC 1200 CM (transportable unit) was used for the processing of chemical weapons (CW). Over 2700 CW were processed with a limited number of 155MM CW projectiles. During the processing of these larger projectiles, the system, specifically the Off-Gas Treatment System (OTS), exhibited limitation during these runs and further 155MM projectiles processing was stopped.

Based on the lessons learned from Tooele associated with processing mustard, Blue Grass conducted a Feasibility Study to consider the use of explosive detonation technology. The Feasibility Study evaluated four different technologies.

Once a determination was made to move forward, a performance specification was developed that provided information on types of munitions and required length of processing. This specification allowed the bidding organizations to propose innovative approaches to processing the projectiles as long as design and footprint constraints were met. This included numerous restrictions due to a significant conventional weapons footprint adjacent to the disposal facility location. The specification also provided the requirements for the facility per the required codes and regulations. It was left to the bidders to develop their approaches on building and equipment configurations.

Through a competitive process, the SDC 1200 C (non-mobile unit) was selected for BGCAPP. This unit included SDC 2000 OTS, which is larger than the Anniston unit by a factor of almost two.

Through design maturity, numerous lessons learned were incorporated in the BGCAPP design. BGCAPP has incorporated over 100 lessons learned from the Anniston processing. The project has embedded Engineering during the design (30, 60, 90 and 100 percent design reviews) and testing phases. The design reviews have been collaborative and successful in the implementation of the lessons learned.

A pre-engineered metal building has been designed. This allows a more economical approach while still providing a cascaded ventilation system for containment purposes. The more robust and higher capacity OTS will increase capacity and throughput of the SDC. This should allow a relatively short duration operation cycle that will destroy all mustard munitions before the main plant goes into operation for nerve agents.

The project has been set up for 24/7 operations with rotating operations, maintenance and lab staff and is fully supported without impact to or dependent on the BGCAPP main plant. It is currently planned for the facility to be decontaminated and then restored to an operational condition. There is not a future mission planned at this time.

Allison Respess is the Assistant Project Manager responsible for the Explosive Destruction Technology (EDT) facility at Blue Grass Chemical Agent-Destruction Pilot Plant (BGCAPP) in Richmond, Ky. Respess has over 20 years of experience working alongside the Department of Energy; focus areas include environmental remediation, operations and maintenance, deactivation and decommissioning, as well as infrastructure and facility management. She has been exclusively working in chemical demilitarization for the past 3 years at BGCAPP

Static Detonation Chamber Camp Sibert Round Processing

Timothy K. Garrett, Anniston Chemical Agent Disposal Facility

The Anniston Chemical Agent Disposal Facility (ANCDF) procured and installed a Static Detonation Chamber (SDC) to process overpacked chemical munitions and other chemical munitions that could not be readily processed using the baseline demilitarization equipment. After completing the SDC's primary mission, the Anniston Field Office initiated a Throughput, Reliability, Availability and Maintainability (TRAM) study in order to determine the SDC's long term viability for processing munitions containing chemical agent as well as conventional weapons.

After the TRAM study was completed in March 2013, the Anniston Field Office began a Follow-on Test and Evaluation (FOT&E) to collect data in support of the U.S. Army's Joint Project Manager Elimination and the Recovered Materiel Directorate for the Destruction of Recovered Munitions. The SDC was operated using a variety of combinations of testing equipment, conventional munitions and surrogates. In June of 2014, as part of a Test and Feasibility Study, Anniston agreed to destroy eighteen (18) recovered munitions from the former Camp Sibert, located approximately 40 miles from Anniston. The Camp Sibert munitions consisted of recovered items of three different types: C707 4.2-in, M2A1, FS Smoke and CNB filled cartridges; C708, 4.2-in, M2A1 White Phosphorous (WP) Smoke filled cartridges; and 1340-ZD, Liven Projectile with various fills of FS, FM, bleach and water. Processing of the recovered Camp Sibert rounds allowed the SDC to prove its effectiveness in processing munitions in various overpacked configurations and further demonstrated its ability to safely process a wide variety of munitions. This presentation will discuss the transportation and destruction of the Camp Sibert Munitions to include SDC system parameters and performance.

Timothy K. Garrett, an Alabama native, is the Anniston Site Project Manager for the Program Executive Office for Assembled Chemical Weapons Alternatives (PEO ACWA). He provides oversight of Static Detonation Chamber operations to ensure the contractor meets and maintains Army, State, Federal safety and security standards and environmental laws, regulations, and permit conditions. He also provides contractor performance evaluations to Headquarters as required. Mr. Garrett is also charged with effectively implementing ACWA's strategic goals. Another critical role involves providing chemical agent munitions and agent destruction managerial and technical support to the chemical munitions storage sites in Colorado and Kentucky.

Mr. Garrett previously served as the Site Project Manager for the Anniston Chemical Agent Destruction Facility (ANCDF) at Anniston Army Depot. The facility was designed and constructed to safely and efficiently destroy 2,254 tons of chemical agents (GB, VX, and Mustard) in munitions stored on the Depot.

The ANCDF was operational from August 2003 until September 2011. The team of government and contractor employees at the ANCDF that Mr. Garrett managed and mentored for 13 years safely demilitarized all 661,529 munitions as well as 2,254 tons of nerve agent and mustard agent. The GB nerve agent campaign concluded in March 2006. The VX nerve agent campaign concluded in December 2008. The Mustard agent campaign was completed in September 2011, marking the end of disposal operations.

Mr. Garrett's Federal career began in 1987 as a Chemical Engineer in the Environmental Management Division, Anniston Army Depot. He subsequently became Chief of the Environmental Engineering Branch and then Chief of the Environmental Control and Engineering Division. Mr. Garrett is a member of the U.S. Army Acquisition Corps.

Mr. Garrett, a licensed Professional Engineer who grew up in Cullman, AL, graduated from Cullman High School in 1979. He has a Bachelor of Science Degree (1983) in Chemical Engineering from The University of Alabama and a Master of Science Degree (1994) in Environmental Engineering, also from The University of Alabama.

Updated operation and maintenance activities of DAVINCH system

Mr. Osamu Shimoda, Mr Hiroki Watanabe, Mr Ayumu Kuriyama, Kobe Steel, Ltd.

DAVINCH systems which Kobe Steel, Ltd. (hereinafter referred to as KOBELCO) have been operated at a number of global sites with exceptional safety performance for over 15 years since the first disposal of Old Chemical Weapons at Lake Kussharo.

KOBELCO executed all of the necessary operation and maintenance functions such as detection, identification, recovery, transportation, destruction by detonation and waste disposal at Kanda Weapons Destruction Facility. During this project DAVINCH system safely and efficiently destroyed red bombs (DA/DC) and yellow bombs (Lewisite/Mustard) including munitions with a large “heel” component. At the completion of the project the DAVINCH system was decontaminated and dismantled.

KOBELCO has been destroying Abandoned Chemical Weapons (ACWs) using DAVINCH systems with the mobile type configuration in two places of China. After the operation at first site Nanjing was completed, the DAVINCH system was decontaminated, dismantled and transferred to Wuhan where it is presently in operation. The operation of DAVINCH system at Haerbaling was also started.

In Belgium, DA/DC and phosgene munitions and a variety of conventional ammunitions have been destroyed by DAVINCH system since 2008. The inner chamber of the detonation chamber was replaced as a part of preventive maintenance

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Mr Osamu Shimoda
2007 Completed master’s course at KOCHI University of Technology (mechanical)
2007 Joined KOBE STEEL.
2007-2013 Plant engineering Department, Iron unit division
Past works
- Engineering work of Pelletizing Plant in Bahrain
- Commissioning work of Pelletizing Plant in Bahrain, Iran and Oman
- Equipment design of Pelletizing Plant
2014- CWD project department, Nuclear and CWD division
Past works
- Engineering work of CWD plant
- Operation work at Wuhan

Updated design of DAVINCH detonation chamber and its new application

Mr Koichi Hayashi, Kobe Steel, Ltd.
Mr Takao Shirakura, Transnuclear Tokyo Inc.

Several phases and types of DAVINCH systems have been designed, fabricated and operated to destroy the chemical agents, explosives, and hazardous items for more than ten years. Modifications and improvements have been underway by analysing the data and the lesson learned of the actual operations. Kobe has also collected the test data on the structural integrity, the destruction performance, and the operation procedures and subjected the data to rigorous analysis.

The structural design of DAVINCH detonation chamber is in compliant with ASME code Section VIII division 3 and Code Case 2564 on the impulsive loaded pressure vessels. The analysis model has been improved based on the amount of the actual operation data, providing Kobe with a sufficient sized data base to make design modification without the need to perform actual fabrication and test. As a result, the current DAVINCH chamber, with an updated design, has more design margin than the previous model. Analysing the actual operational data on the inner chamber, which is the sacrificial chamber protecting against fragment damage, demonstrates an improvement of the expected life of the chamber and provides additional basic data of the analysis model.

The updated design scheme of DAVINCH detonation chamber allows for new applications such as the destruction of conventional ammunition. Kobe is also evaluating demilitarization of missiles with high explosive warheads, the disposal of fuses and propellants. Kobe engineers are also studying a design for a novel small chamber suitable for problems unique to the urban area.

Mr. Koichi Hayashi graduated from Tokyo University (Mechanical engineering) and joined Kobe Steel, Ltd.in 1977
He has engaged in the Chemical weapon Destruction (CWD) project from 2007.
He specially engaged in the DAVINCH CWD project as the General Project Manager at Tooele UTAH USA from 2009 to 2012. He was responsible for overall activities such as marketing, development, design, manufacturing, construction, risk analysis, permitting, and systemization of this project, and played role to design DAVINCH chamber in accordance with ASME pressure vessel code and executed DDESB test and obtained the permit both for DDESB and environment of this project.
He engaged in marketing, design, manufacturing, and systemization of the nuclear equipment such as spent fuel casks and heat exchangers from 2000 to 2007. He had also the experience of the development, design, manufacturing, and quality assurance of the high pressure vessel, heat exchanger and nuclear equipment according to ASME code and other high pressure vessel code at Takasago chemical equipment plant where DAVINCH pressure vessels have been built from 1977 to 1999.

Extensive application for destruction of various hazardous items by DAVINCH lite system with high mobility

Atsushi Sugiyama, Masahiko Sugimoto, Kobe Steel, Ltd

A Destruction system designed to be installed at a fixed site may take a considerable amount of time, possibly several months to move from one site to another site. On the other hand, high mobility systems are generally limited of throughput or target of destruction.

Kobe engineers applied their long-term experience in engineering and operation of DAVINCH system to reduce the size and weight of both the chamber and the off-gas treatment modules.
Kobe's goal was to increase the mobility, decrease the site installation time, and increase the destruction capability of DAVINCH lite system.

DAVINCH lite system can be used to destroy various munitions with chemical agents such as DA, DC, HD and nerve agents. Moreover, the chamber is capable of handling explosive quantities necessary to destroy large munitions (for example, chemical munitions up to 155mm) as well as most conventional ammunition. Munitions such as white phosphorous and other smoke producing munitions are also being evaluated by Kobe at this time.

In this presentation, these advantages of DAVINCH lite system will be presented based on the Kobe testing, investigating destruction capability and efficiency using simulated munitions and surrogates.

Atsushi Sugiyama
i2013 Completed master's course at Tokyo Institute of Technology (Chemistry)
2013 Joined KOBE STEEL.
2013~ Nuclear and CWD Engineering division
Past works
- *Test operation of Davinch Lite*
- *Destruction experiment of several type of munitions*
- *Decontamination test at Kanda CWD plant*

Cementation as a method for neutralisation and encapsulation of CW agents

Mr. Stuart Notman, Mr Norman Govan, Miss Pat Watts, Defence Science & Technology Laboratories

Encapsulation of waste materials in cement is a well-developed process used to solidify and stabilise hazardous waste prior to disposal in landfill, including intermediate level radioactive waste. Ordinary Portland cement is a ubiquitous construction material that undergoes hardening by hydration. As the cement hardens the reaction conditions in the cement paste closely mirror those found in highly aggressive CBW agent decontaminants – offering an expedient destruction medium.

This presentation describes the results of laboratory-scale experiments undertaken to demonstrate the feasibility of using Portland cement to neutralise and encapsulate practical quantities of CW agents, without generating excessive volume of waste material. Initial experiments used CW agent hydrolysis products to assess the quantities that could be introduced into cement pastes without significantly inhibiting the setting properties. Subsequent experiments assessed the destruction capacity of cement pastes towards a range of CW agents and CW agent precursors; HD, GB, VX and DF. The presentation will also discuss the results of leaching experiments that were carried out on the solidified cement pastes to assess the degree of CW agent immobilisation.

Stuart Notman is a Senior Scientist in the Detection Department at Dstl Porton Down. He graduated with a degree in Chemistry from the University of Bristol and obtained his Doctorate (2003) in Organic Chemistry with Dr Paul Wyatt at the University of Bristol. He started at Dstl Porton Down in 2003 as an NMR spectroscopist, developing NMR techniques to identify and monitor reactions of chemical warfare agents (CWAs). Following a secondment to the Ministry of Defence (2006-2010) he returned to Dstl in the Hazard Management team focusing on physical and chemical methods of CWA decontamination.

Resumption of United States Chemical Weapons Destruction at the U.S Army Pueblo Chemical Depot Using Explosive Destruction Technology (EDT)

Mr. Bruce Heunefeld, Scott Susman, Program Executive Office, Assembled Chemical Weapons Alternatives

The United States has successfully restarted its chemical weapons destruction process since completing nearly 90% destruction of its existing stockpile in 2012.

Several significant program steps involved in the safe and successful start of destruction operations at the U.S. Army Pueblo Chemical Depot located outside of Pueblo, Colorado, will be discussed.

The start of operations associated with the Pueblo Chemical Agent-Destruction Pilot Plant or PCAPP, is being accomplished using the Army's Explosive Destruction System or EDS. The EDS was selected to supplement the main destruction facility for the disposal of problematic munitions that cannot be readily processed through the plant's highly automated systems.

The final selection of the EDS, as opposed to other available EDT systems, was based upon important technical, cost, risk, environmental and public acceptance criteria including: determining the estimated quantity of chemical munitions to be processed by the system; applicability of the technology to the stockpile at the Pueblo Chemical Depot; throughput of the system in relation to the estimated number of munitions to be processed; maturity of the system as demonstrated by testing and prior application; contractor or government operation of the system; and public and regulatory acceptance of the technology.

All of these factors were considered in a series of trade off analyses that led to the selection of the PCAPP EDS as the best solution for destroying existing overpacked munitions and reject munitions from the main demilitarization facility.

Bruce Huenefeld is the Site Project Manager (SPM) for the Pueblo Chemical Agent-Destruction Pilot Plant Explosive Destruction System (PCAPP EDS) in Colorado. As such he is responsible for management of the design, construction, systemization, and operation of a system that will augment the pilot plant and be used to destroy problematic chemical munitions, including those that have leaked in the past and are now over packed, as well as "rejects," whose deteriorated physical condition does not easily allow for automated processing.

His position complements that of the PCAPP SPM (a position in which he served from June 2011 to January 2015) which is responsible for leading the pilot plant's 27-person field office and overseeing execution of the systems contract by the Bechtel Pueblo Team. In his current position, Huenefeld continues to report directly to the Program Executive Office, Assembled Chemical Weapons Alternatives headquartered at Aberdeen Proving Ground in Maryland.

Prior to his current position, Huenefeld worked for more than 26 years at the Rocky Mountain Arsenal, or RMA, near Commerce City, Colo. There, his duties as supervisory engineer involved acquisition planning for the long-term operation and maintenance of RMA remediation facilities, oversight of hazardous waste treatment projects and contract management associated with environmental cleanup activities. Notable among these assignments were the Miscellaneous Structures Demolition Project, during which 10 M139 sarin-filled bomblets were discovered and later safely destroyed in a U.S. Army's explosive destruction system, which is the same system to be used to destroy problematic munitions stored at the U.S. Army Pueblo Chemical Depot. He also directed the technical and non-technical staff responsible for the design, construction, trial burn and operation of the Basin F Liquid Incinerator Project, which resulted in the successful destruction of almost 11 million gallons of stored contaminated liquid waste.

While much of his career has been dedicated to improvements at the Arsenal, Huenefeld began his federal service at the U.S. Army Aberdeen Proving Ground, Md. At Aberdeen, he worked on several projects in conjunction with the Chemical Agent Munitions Disposal System under the purview of the U.S. Army Toxic and Hazardous Materials Agency. The projects included those associated with destruction of the M55 Rocket, development of incineration systems (including those to destroy nerve agents), and assessments for redesign, installation and operation of portions of pollution abatement systems.

Born in Bartlesville, Okla., Huenefeld spent his junior high through high school and junior college years in Riverton, Wyo., where he earned an associate's degree in chemistry from Central Wyoming College. He later attended the University of Wyoming, in Laramie, receiving a bachelor's degree in chemical engineering in 1979. Most recently, he completed his Level III certification in the program management discipline and became a member of the Army Acquisition Corps in 2013. He is now pursuing an additional Level III certification through the Acquisition Corps in the engineering discipline.

Further Investigation of the Performance of the XSD MINICAMS®

Dr Gary Sides, Battelle Memorial Institute
Claire Longo, Peublo Chemical Agent Disposal Pilot Plant
Carrie A. Kauffman, Battelle Eastern Science & Technology Center
Walter Waybright, Peublo Chemical Agent Disposal Pilot Plant

At the Pueblo Chemical Agent-Disposal Pilot Plant (PCAPP), the MINICAMS equipped with a halogen specific detector (XSD) is used to monitor for agent mustard [bis(2-chloroethyl) sulfide] at its 15-min short-term exposure limit (STEL) and at its immediately dangerous to life and health (IDLH) concentration. At the CWD2014 conference, Battelle described a modification to the XSD MINICAMS method for mustard, which was changing a single parameter to account for the non-linearity of the XSD. This change resulted in a significant improvement in the performance of the MINICAMS, as evidenced by the results of precision-and-accuracy (P&A) studies that easily passed required statistical criteria, lower reported limits of quantification (LOQs), and greatly improved agreement between reported and target concentrations over the required concentration range. This simple change then enabled the PCAPP monitoring team to easily complete method certification and validation requirements for the XSD MINICAMS.

During the past year, we have continued to investigate the technology on which the XSD is based and the performance of the XSD MINCAMS. This work has included further reviews of the theoretical basis for the detector and reviewing challenge results generated at several different sites (using agent mustard and three other chlorinated chemicals). These data also include challenge results for another detector based on the same technology as the XSD. In addition, a large body of additional challenge data has been generated at PCAPP during the past year, including the determination of the exponent value as a function of time for three MINCAMS units operated 24/7 for nine months. This presentation will include a review of the technology on which the XSD is based, a review of challenge data from several different sites, and the results of recent statistical evaluations of PCAPP challenge data.

Gary D. Sides, Senior Research Leader, has more than 30 years of experience in the development and manufacture of automated, near-real-time (NRT) monitoring systems for chemical agents and related instrumentation. Dr. Sides' accomplishments include the development and manufacture of small quantities of the ACAMS (1978-1987), the NRT monitoring system for GB, VX, and HD that was used at the five US baseline demilitarization (JACADS, ANCDF, PBCDF, TOCDF, and UMCDF). He also founded CMS Research Corporation in 1986, now a division of OICO, and developed and manufactured the MINICAMS and numerous monitoring accessory products from 1986-1998, including the integration of the halogen specific detector (XSD) into the MINICAMS. Since 1999, Dr. Sides has remained active in the development of air monitoring instrumentation, and he has served as the Chief Scientist for Battelle's Demilitarization Business Unit since 2009. He has an M.S. and a Ph.D. in physical chemistry

Lessons learned and best practices from design and starting operations of two chemical agent laboratories

Mr. Jeffery Kiley, Program Executive Office, Assembled Chemical Weapons Alternatives

The Program Executive Office, Assembled Chemical Weapons Alternative is preparing to operate pilot test facilities for assembled chemical weapons destruction systems at Pueblo Chemical Depot, Colorado, and Blue Grass Army Depot, Kentucky.

During plant operations, the laboratory will support all worker protection air monitoring efforts and analysis of the process liquids the plant will generate, such as the hydrolysate byproduct of the destruction process. The laboratory will verify that the chemical agent has been destroyed in accordance with standards set by local environmental permits. Battelle Memorial Institute operates the laboratory as part of our team of contractors led by the prime systems contractor, Becthel National Inc.

Instead of building the laboratory in a conventional manner, the laboratories were designed as modular sections that are built, assembled, tested and then dissembled and sent to the site for assembly. Once on site, the components are reconnected, anchored, weatherproofed and assembled into the lab complex. Also, each laboratory was designed with a separate carbon filtration system to preclude any release of chemical agent to the environment. The laboratories chose different designs for their carbon filtration systems. One laboratory chose the classic design of one system for the entire laboratory. The other laboratory chose a design that had an individual filtration system for each laboratory hood.

In order for the laboratories to become operational, a process was used by the systems contractor to certify lab readiness. The systems contractor conducts an assessment of readiness to validate that the facility, people and process collectively meet the requirements to begin operations. The systems contractor then declares readiness to operate to the government. The government provided oversight of the process and conducts an independent validation to support the systems contractor's declaration of readiness. This process is very similar to that which will be used to certify plant operational readiness.

The readiness evaluations encompass all area of lab operations to ensure the lab has established safe, secure and consistent processes for storing, accessing and using agent standards. The laboratories must test and operate the heating, ventilation and air conditioning, and carbon filtration systems to ensure they are working properly. Also, laboratory personnel must be fully trained on use of respirators, protective clothing and safety equipment, and the laboratory contingency procedures must be in place and exercised to ensure worker safety.

Both laboratories have successfully started operations and are working on method development to support operations.

Mr. Kiley works for the Program Executive Office for Assembled Chemical Weapons Alternatives. Mr. Kiley is the team leader in the Risk Management Directorate for Environmental, Monitoring and Occupational Health. Mr. Kiley previously worked for the US Army Chemical Materials Agency's Risk Management Directorate as Chief of the Quality Assurance Office. Mr. Kiley is a graduate of Western Maryland College with a Bachelor of Arts degree in chemistry.

Medical Requirements and Reliability of Workers Engaged in DPE Operations

Dr Samuel S. Jang, Program Executive Office, Assembled Chemical Weapons Alternatives

Demilitarization Protective Ensemble (DPE) has been developed to protect workers operating in Immediately Dangerous to Life and Health (IDLH) chemical agent concentration environments. This personal protective equipment encloses the worker in an airtight environment to protect against any vapor and liquid chemical agent hazards. The DPE protects the worker, but this air tight environment creates a microenvironment preventing dissipation of endogenous heat produced to the external environment. Heat stress injuries represent the number one occupational hazard for workers conducting demilitarization operations. Heat injuries are a spectrum of illnesses ranging from heat cramps, heat exhaustion, and heat stroke. A normal physiologic response to heat production from both endogenous and exogenous sources involves shunting blood flow from the core to the periphery. The inability to correctly respond to endogenous heat production in DPE will lead to heat exhaustion and ultimately heat stroke. A comprehensive heat injury prevention program has been established to eliminate heat related medical complications in workers. A three-phase medical intervention for preventing heat injuries has been established at Assembled Chemical Weapons Alternatives sites. Workers engaged in DPE operations undergo an extensive medical screening and surveillance examination to determine fitness and medical clearance for operating in DPE. The components of this evaluation comprise of obtaining a comprehensive health history, physical examination, laboratory, and radiological examinations. Select workers are deemed qualified to conduct operations in DPE. These selected workers must undergo supervised, directly observed operational training in a non-agent environment prior to conducting operations at a live, full-scale demilitarization facility. Every DPE entry requires a real-time medical clearance exam of the DPE entrant. This exam is comprised of a medical questionnaire evaluating concurrent worker fitness to completing the established operational objectives. It is focused on recent health status, vitals, and laboratory testing to evaluate individual risk to completing the mission. The maximal aerobic capacity is defined by the worker's age and heart rate. The maximal heart rate represents a quantitative value to inject pause or stop work interventions to prevent further physiologic compromise and potential heat injury in the worker. DPE workers are asked to provide heart rates and verbalize any heat related symptoms at specific intervals during operations. DPE workers are also monitored via closed caption television to monitor any physical signs of heat injury. These subjective and objective data elements are captured to establish a baseline of physiologic markers for each DPE worker. All DPE workers are provided medical screening and vitals measurements at the conclusion of every operation to determine physiologic changes resulting from DPE operations.

Dr. Samuel S. Jang, DO, MPH is the Chief Medical Officer for the Program Executive Office, Assembled Chemical Weapons Alternatives (PEO ACWA). He is responsible for clinical oversight and operations of all contracted occupational health clinics supporting the PEO, ACWA mission. Dr. Jang's expertise spans a broad spectrum of issues to include health system strategic planning and operations, veterans and military health care issues, public health emergency response, NBC surety medicine, environmental surveillance, and health services research methodologies. His current research activities focus on occupational medical surveillance, deployment health, occupational medicine program evaluations, bioterrorism and public health preparedness, and residency training programs. He is board-certified in Occupational and Environmental Medicine and board qualified in Preventive Medicine and Public Health. Dr. Jang held appointment as adjunct assistant professor at Uniformed Services University of the Health Sciences in the Preventive Medicine and Biometrics Department.

Toxicity and medical countermeasure studies on the organophosphorus nerve agents VM and VX

Dr Christopher Timperley, Helen Rice, Defence Science & Technology Laboratories

To support the effort to eliminate the Syrian Arab Republic chemical weapons stockpile safely, there was a requirement to provide scientific advice based on experimentally-derived information on both toxicity and medical countermeasures (MedCM) in the event of exposure to VM, VX, or VM-VX mixtures. Complementary in vitro and in vivo studies were undertaken to inform that advice. The percutaneous penetration rate of VM was measured through guinea-pig and pig skin, both alone and in combination with VX. This is the first time that the penetration characteristics of VM-VX mixtures have been studied in this in vitro system. The penetration rate of neat VM was not significantly different from that of neat VX, through either guinea-pig or pig skin in vitro. The presence of VX did not affect the penetration rate of VM in mixtures of various proportions. This study characterised the toxicity of VM in guinea-pigs, alone and in combination with VX; this is one of the few reports of toxicity determinations of mixed solutions of any organophosphorus nerve agents and the first to our knowledge on mixtures of V-agents. A lethal dose of VM was approximately twice that of VX in guinea-pigs poisoned via the percutaneous route. There was no interaction in mixed agent solutions which altered the in vivo toxicity of the agents. Percutaneous poisoning by VM responded to treatment with standard MedCM, although complete protection was not achieved.

Dr. Christopher M. Timperley is a Dstl Fellow for chemistry. He has 20 years of experience of chemical defence research and has published widely on this topic: he has authored over 70 peer-reviewed publications and he co-authored/edited the book Best Synthetic Methods: Organophosphorus (V) Chemistry, which was published by Elsevier this year. He was elected the Vice-Chair of the OPCW Scientific Advisory Board (SAB) in 2013, the year the OPCW won the Nobel Peace Prize for 'its extensive efforts to eliminate chemical weapons'. He currently serves on the SAB as one of 25 international experts, enabling the OPCW Director-General to provide advice in science and technology to OPCW policy-making bodies and Member States.

Using Heart Cut Methods to Reduce False Positives for Automated Air Monitoring Systems

Dr Gary Sides, Battelle Memorial Institute
Carrie A. Kauffman, Battelle Eastern Science & Technology Center

Automated air monitoring systems have been used at chemical agent disposal sites for more than 20 years to monitor for airborne concentrations of chemical agents with the goal of protecting workers, the general public, and the environment. Although these systems have performed well, false alarms (i.e., false positives) have occurred on a frequent basis. Each false alarm has the potential to result in the disruption of agent operations, to increase risk due to the need to don personal protective equipment (PPE), to reduce worker confidence in the accuracy of reported agent concentrations, and to reduce the confidence of regulatory agencies in the validity of air monitoring data generated at disposal sites.

The causes of false positives are varied, and there are several simple techniques for reducing the frequency of false positives. However, some matrices that must be monitored are so complex that these techniques are not effective.

One approach that has proven effective for complex matrices is the use of a gas-chromatographic (GC) technique known as heart-cut chromatography, which is commonly used in laboratory analyses and industrial process monitoring. This technique involves first separating the agent of interest from other chemicals on one GC column and then separating the agent from any remaining chemicals on a second column just before the agent enters the GC detector.

The heart-cut technique for chemical-agent air monitoring systems was first implemented by modifying the ACAMS, the monitoring system used at the US baseline (incinerator) agent disposal sites. This technique has also been implemented for the MINICAMS® at several locations by interfacing the monitoring system to an external accessory, the Selective Sampler, which uses a heart-cut approach to "clean up" the air sample prior to introduction to the MINICAMS sample inlet.

This presentation will include a brief review of typical causes of false positives, as well as descriptions of the "splitter" (heart cut) ACAMS, the Selective Sampler for the MINICAMS, and a new air monitoring system (the AirAlertTM), which includes optional internal heart-cut capability.

Gary D. Sides, Senior Research Leader, has more than 30 years of experience in the development and manufacture of automated, near-real-time (NRT) monitoring systems for chemical agents and related instrumentation. Dr. Sides' accomplishments include the development and manufacture of small quantities of the ACAMS (1978-1987), the NRT monitoring system for GB, VX, and HD that was used at the five US baseline demilitarization (JACADS, ANCDF, PBCDF, TOCDF, and UMCDF). He also founded CMS Research Corporation in 1986, now a division of OICO, and developed and manufactured the MINICAMS and numerous monitoring accessory products from 1986-1998, including the integration of the halogen specific detector (XSD) into the MINICAMS. Since 1999, Dr. Sides has remained active in the development of air monitoring instrumentation, and he has served as the Chief Scientist for Battelle's Demilitarization Business Unit since 2009. He has an M.S. and a Ph.D. in physical chemistry

Health Services Transformation and Innovations Supporting the Current Chemical Agent Demilitarization Facility

Dr Samuel S. Jang, Program Executive Office, Assembled Chemical Weapons Alternatives

The United States Army's full-disposal facility, Johnston Atoll Chemical Agent Disposal System (JACADS), began destruction of chemical agent stockpile in 1990. A health care facility was built to provide comprehensive health services to the workforce and management personnel. Real-world operational experiences to establishing required medical support were non-existent prior to JACADS. Health service requirements were based on experiences at military and related civilian chemical industries. Medical staffs were hired to provide emergency medical services and occupational health services based on projected health services needs. Health service delivery was soon transformed through operational experiences gained in baseline demilitarization facilities. Medical staff and health services quality assurance programs were developed to manage risk associated with rendering health care to the workforce. Health services provided required evaluations by advisory committees to determine appropriateness and quality of health services rendered. All health care providers required verified licensure, certification, and training to provide quality medical services at the sites. The Toxic Chemical Training Course was developed for health care providers supporting demilitarization operations. Health care providers were provided an avenue to improve, enhance, and standardize their knowledge based on chemical agent's health effects and occupational health service required by regulation and best practice guidelines. A comprehensive heat stress prevention program was established to eliminate and minimize heat injuries among chemical agent workers using personal protective equipment. Health care delivery has been enhanced with improvements in air monitoring techniques and procedures. Environmental data was incorporated with clinical data to fully characterize a worker potentially exposed to chemical agent. A comprehensive exposure and health outcome profile was developed to improve precision and accuracy of worker's chemical agent exposure and health effect. Support agreements with a designated laboratory provided confirmatory testing for an actual chemical agent exposure event. Evaluation and treatment protocols for the chemical agent workers were optimized. Current health services innovations are the employee centered medical home, telemedicine, and electronic occupational health record. These newer health care initiatives at Assembled Chemical Weapon Alternatives demilitarization sites are transforming health programs from being reactive to proactive in its mandate for "protection of the workforce."

Dr. Samuel S. Jang, DO, MPH is the Chief Medical Officer for the Program Executive Office, Assembled Chemical Weapons Alternatives (PEO ACWA). He is responsible for clinical oversight and operations of all contracted occupational health clinics supporting the PEO, ACWA mission. Dr. Jang's expertise spans a broad spectrum of issues to include health system strategic planning and operations, veterans and military health care issues, public health emergency response, NBC surety medicine, environmental surveillance, and health services research methodologies. His current research activities focus on occupational medical surveillance, deployment health, occupational medicine program evaluations, bioterrorism and public health preparedness, and residency training programs. He is board-certified in Occupational and Environmental Medicine and board qualified in Preventive Medicine and Public Health. Dr. Jang held appointment as adjunct assistant professor at Uniformed Services University of the Health Sciences in the Preventive Medicine and Biometrics Department.

Old Chemical Weapons under the CWC – Shortcomings and perspectives

Dr. Thomas Stock, Dynasafe Germany GmbH

18 years after Entry into Force of the Chemical Weapons Convention this arms control and disarmament treaty, to which 190 States have made a commitment by ratification, is a true success story. Despite delays in the CW destruction programs of the 2 major possessor states, the destruction of existing stockpiles has been demonstrated as technical feasible and environmental safe.
The regime for coping with old chemical weapons (OCW) is implemented and has been demonstrated as being efficient and with some kind of flexibility. Technical solutions are in place and major OCW possessors are running destruction programs. However, there seems also to be evidence that the CWC regime which calls for destruction of declared OCW is not always realistically reflecting the required capability of a potential concerned States Party with OCW if it comes to the destruction obligations for OCW.
The presentation will discuss possible options for small scale OCW destruction undertakings against the CWC requirements – here in particular under the aspect of assistance and co-operation under the treaty. Hereby, technical solutions will be presented. Technology access as well available destruction capability for an individual State Party with OCW should not decide about declaration or non-declaration of OCW..

Dr Thomas Stock has PhD in chemistry. Trained as analytical chemist with background in chemical toxicology. Since 1985 working in the field of chemical disarmament and arms control. Between 1988 and 1996 Project Leader and Program Manager of the CBW Research Programme at SIPRI (Stockholm International Peace Research Institute). Work focussed on: chemical weapons, old and abandoned chemical weapons, destruction technologies, environmental aspects, waste disposal technologies, and verification techniques and technologies.
After 1996 with private industry in different positions, such as Project Leader and Sales Manager. Since 2002 with DYNASAFE, Swedish born company, as Sales Manager and Project Manager and now Managing Director of Dynasafe Germany. Performing several CW related projects.
Expertise in: chemical warfare agents, old and abandoned chemical weapons, destruction of explosives, thermal off-gas treatment and other waste treatment processes, analytical chemistry, toxicology, arms control and disarmament, chemical disarmament and project management.

Hotzone Solutions Group: Possible Support to the OPCW Training Programmes

Dr Yaugen Ryzhykau, Olivier Mattmann, Hotzone Solutions Group

It is stated in the Organiszation for the Prohibition of Chemical Weapons (OPCW) Medium-Term Plan (MTP) for the period from 2015 to 2019 (EC-77/S/1 dated 23 April 2014) that in support of the Organisation's mission and vision — i.e. to secure a world free of chemical weapons (CW) — the MTP focuses on four strategic enablers. They support the Organisation's seven core objectives, which remain unchanged and must be implemented in an efficient and effective manner. In order to meet the challenges arising for the Organisation, the MTP addresses strategic enablers results-based management (RBM), knowledge management, resilience, and engagement.
"The full and effective implementation of the Organisation's core objectives may become more difficult to achieve in a dynamic environment. However, by focusing more on results instead of inputs, improving knowledge management, augmenting the Organisation's adaptive capacity, and pursuing more systematic and sustainable engagement with external stakeholders…" (paragraph 28, EC-77/S/1).

Without prejudice to the indispensable role of Governments' institutions and stakeholders, best practice and experience, private specialized companies might be also engaged in OPCW support missions, as it commonly practices in many United Nations organisations.

Hotzone Solutions Group (HZS) is an expanding international training and consulting company founded by a group of former OPCW staff members. The company staff members are military and civilian NBC Defence Officers, CW and munitions specialists, highly qualified analytical chemists and health and safety specialists; including former OPCW Inspection Team Leaders and weapons inspectors of the United Nations Special Commission (UNSCOM) and the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC).

HZS provides specialised CBRN-related consulting services, as well as CBRN comprehensive, realistic and practical live agent training to military defence, law enforcement, emergency response and security units. Live agent training is conducted at specialised facilities in several European countries. Theoretical training is carried out at the International CBRN Institute (ICI) in Belgium.
The support to the Technical Secretariat by HZS Group, especially its reactivity, adaptability, and flexibility, will no doubt be an asset in assisting the TS in meeting its forthcoming challenges and mitigating certain aspects of the uncertainties underlined in the four plausible scenarios described in the above mentioned MTP.
The presentation addresses the question of possible support to OPCW's training and educational programmes by HZS. Although a challenging task, HZS is ready to meet it since it can count on the unique experience and knowledge of HZS staff members and on the proven quality of its training courses

Yaugen Ryzhykau has signed consultancy agreement with Hotzone Solutions's since June 2012. His professional background includes 18 years with the OPCW and UNOPS, where he acted as Senior Chemical demilitarization Officer of the Verification Division. During his work with the OPCW he developed extensive experience in disarmament of all CW possessors, management of the verification and its evaluation of the quality/ effectiveness; organisation of joint projects, scientific research and specialised professional training; technical advices and expertise in the area of CW destruction technologies and monitoring instruments/systems; liaison with delegations and national authorities; technical advice and expertise in the field of NBC defense equipment and systems. Yaugen Ryzhykau also served in army for 23 years, including 15 years as a senior military officer in the NBC R&D Institute of USSR MOD, including relationship with the civil protection/emergency responses, police regarding any-terrorist measures, riot control and hazardous material incidents. He has Ph.D in Technical Science (Physical Chemistry) and academic degree of Doctor/SSF on systems for evaluation and testing of arms and military equipment by Supreme Certifying Commission, Council of Ministers of the former USSR

The Start of Agent Operations in Colorado: A Case Study in Strategic Communications

Mr. Miguel Monteverde, Program Executive Office, Assembled Chemical Weapons Alternatives

Charged with the safe and environmentally sound destruction of the remaining 10 percent of the US chemical weapons stockpile, the Assembled Chemical Weapons Alternatives program reached a critical phase as the Colorado site team completed construction and is completing systemization processes at the Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP), located at the U.S. Army Pueblo Chemical Depot (PCD).

The Explosive Destruction System (EDS) was selected to augment the PCAPP by destroying a number of problematic munitions unsuited for processing by the plant's automated equipment. The start of PCAPP EDS operations, programmed ahead of main plant operations, marks the resumption of United States chemical weapons demilitarization since 2012 when the U.S. Army Chemical Materials Agency completed destruction of 90 percent of the stockpile and represents the first chemical weapons destruction in the State of Colorado.

With transparent and open communication a cornerstone of the ACWA program, it was imperative that agency partners and the local community be involved in the start of EDS operations. Maintaining national and international confidence in ACWA's ability to achieve its mission and reinforcing the United States' unwavering commitment to safely destroying 100 percent of its chemical weapons stockpile are strategic communications imperatives of the ACWA program.

This start of PCAPP EDS agent destruction operations was a milestone warranting strategic outreach to internal and external stakeholders based on specific communication and outreach objectives. Two highly visible elements of our strategic outreach effort were the Start of Operations Event that occurred in Pueblo, Colorado, on September 4, 2014, and the public exhibition of an EDS unit at Pueblo's Weisbrod Aircraft Museum on September 6, 2014. Both events demonstrated the core values of the ACWA program, its commitment to public involvement and transparency, and its outreach to the local community, the agencies of the Departments of Defense and Army and the wider global community through electronic and social media..

Miguel Monteverde is a public affairs specialist in the Public Affairs Office of the Program Executive Office, Assembled Chemical Weapons Alternatives, known as "ACWA," the US Department of Defense agency responsible for destroying the remaining 10 percent of the U.S. chemical weapons stockpile. With more than 15 years of communications and public outreach experience in support of the US chemical demilitarization effort, Monteverde has been associated with the ACWA program since 2004, both as a support contractor and as a government public affairs specialist. In his present position, Monteverde assists in facilitating the information exchange between ACWA management and members of the US Congress and their staffs, serves as a media spokesman for the program and provides guidance and oversight to the public outreach programs in Colorado and Kentucky where ACWA demilitarization facilities are located. A retired career Army officer, Monteverde holds a bachelor of arts degree in English from the Virginia Military Institute and a master of arts degree in public communication from the University of Kansas. He is a graduate of the US Defense Information School and the US Army War College

Process and Results of the Program Executive Office, Assembled Chemical Weapons Alternatives National Environmental Policy Act 5-Year Re-evaluation

Jeffrey Kiley, Program Executive Office, Assembled Chemical Weapons Alternatives

The destruction of the U.S. stockpile of chemical weapons that contain lethal unitary chemical agents is required by U.S. public law and international treaty. The Department of Defense is currently in the process of preparing to operate pilot test facilities for assembled chemical weapons destruction systems at Pueblo Chemical Depot, Colorado, and Blue Grass Army Depot, Kentucky.

Destruction of the two chemical stockpiles represents a major governmental action pursuant to the National Environmental Policy Act (NEPA) (Public Law 91-190) and implementing regulations (40 Code of Federal Regulations [CFR] Part 1500 in general and 32 CFR Part 651 for Army-specific actions).

In accordance with Army policy established under 32 CFR 651.5, NEPA documentation must be periodically reviewed for adequacy and completeness in light of changes in project conditions. Since the publication of the Programmatic Environmental Impact Statement and the site-specific Environment Impact Statements, both projects have undergone changes, including modifications of facility designs and evaluation of potential offsite treatment of chemical agent neutralization products and other secondary waste. Additionally, assessments of options to accelerate destruction of the chemical stockpiles at both locations have also been conducted at least once.

A detailed review was conducted for both sites in regards to an assessment of programmatic changes, design changes in the plant with potential for environmental impacts, and changes in environmental resources/impacts.

It was determined in accordance with 32 CFR Part 651 (Army Regulation 200-2), Environmental Effects of Army Actions, the NEPA Policy Act of 1969 and Council on Environmental Quality Regulations in the CFR, that the current information and analyses confirm the conclusions found in both facilities' Final Environmental Impact Statements and the environmental assessments done for the installation and operation of an Explosive Destruction Technology facility at each of the sites.

Based on the results of this re-evaluation, a Record of Environmental Consideration (REC) was prepared to document the review. A REC was appropriate as there are no substantial changes in the proposed action that are relevant to environmental concerns, and there are no significant new circumstances or information relevant to environmental concerns that have a bearing on the proposed action or its impact.

Mr. Kiley works for the Program Executive Office for Assembled Chemical Weapons Alternatives. Mr. Kiley is the team leader in the Risk Management Directorate for Environmental, Monitoring and Occupational Health. Mr. Kiley previously worked for the US Army Chemical Materials Agency's Risk Management Directorate as Chief of the Quality Assurance Office. Mr. Kiley is a graduate of Western Maryland College with a Bachelor of Arts degree in chemistry.

Sponsors

Kobe Steel

KOBELCO
KOBE STEEL GROUP

Kobe Steel Group is the only company which develops, designs, manufactures and operates detonation systems for Chemical Weapons Destruction. The system is named Davinch.

There are two systems under operation in Japan and in Belgium. Over 5,500 chemical warfare items have been safely destroyed with Davinch. A new mobile Davinch system is scheduled to start in 2010 at Nanjing, China and another Davinch is scheduled to operate in early 2011 at Tooele, USA. These activities are based on Kobe's technical legacy of development of armor materials for defense, fabrication of ultra-high and huge pressure vessels, and a wide spectrum of engineering experience in plant processes and operations including the nuclear industries.

- **Poelkapelle Project in Belgium:** The site is located in the middle of Flanders field, a major site of early chemical weapons warfare from World War I. Kobe Steel supplies supervisors and major maintenance of DAVINCH. Over 2,700 munitions have been detonated, including hazardous munitions of 21cm Clark shells, Livens, and shells filled with Phosgene, Chloropicrin etc.
- **Mobile detonation project in China:** Government of Japan awarded the service contract for mobile detonation systems for abandoned chemical weapons from the Old Japanese Imperial Army at several sites in China. Davinch will be used for munitions destruction
- **Tooele Project, Utah: URS** placed an order to VERSAR/Kobe Steel, to destroy 155mm and 4.2" Mustard leaker stockpiles with overpack(s) in Davinch.
- **Lake Kussyaro Project:** Kobe Steel destroyed (for the first time in Japan) 26 items consisting of 50kg yellow bombs recovered from the lake.
- **Port Kanda Project:** Port Kanda is located in a heavily industrialized area. During dredging of the port, chemical weapons were found. Kobe Steel supplies services to survey, recover, transport and destroy chemical weapons from the sea. Davinch Explosive Destruction Technology is used to destroy all of the munitions from Kanda Bay. Over 2,800 items of 50kg yellow bombs with mixture of Mustard +Lewisite and 15kg red bombs with Diphenyl-chloroarsine or Diphenyl-cyanoarsine have been destroyed. The facility is constructed on a steel deck over the sea and is located only two kilometers away from Kitakyusyu Airport and 700m away from a Toyota Motors' plant.
- **Samukawa Project:** Kobe Steel destroyed chemical agent in over 800 beer bottles recovered from the highway construction site near Yokohama. The destruction site was in a municipal area and near a heavy traffic load. An additional 8,000 cubic meters of soil was decontaminated by rotary kiln.

Testing of DAVINCH Chambers for China

DAVINCH at Poelkapelle

Technologies for Chemical Weapon Destruction: With complete project experience and capabilities in CWD projects, Kobe Steel Group offers broad capabilities for safely treating and destroying chemical weapons. Major technologies and products include:

- **Chemical neutralization processes**
- **Controlled Detonation Process (DAVINCH)**
- **Air Pollution Control Systems**
- **Robotic Handling of Hazardous Materials**
- **Plasma process for non-combustible waste**
- **Incineration processes**
- **Special Waste Form Evaluation**
- **Transportation chamber**
- **High efficiency magnetometer system fo detection and identification of old metallic munitions (Immobilization, Overpacks)**
- **DESTINY Life Cycle Managemen**

Bechtel

Systems & Infrastructure, Inc.

General Info

Bechtel led the team that in 2005 completed the destruction of a chemical weapons stockpile—the first at a continental U.S. military site—at the Aberdeen Proving Ground in Maryland.

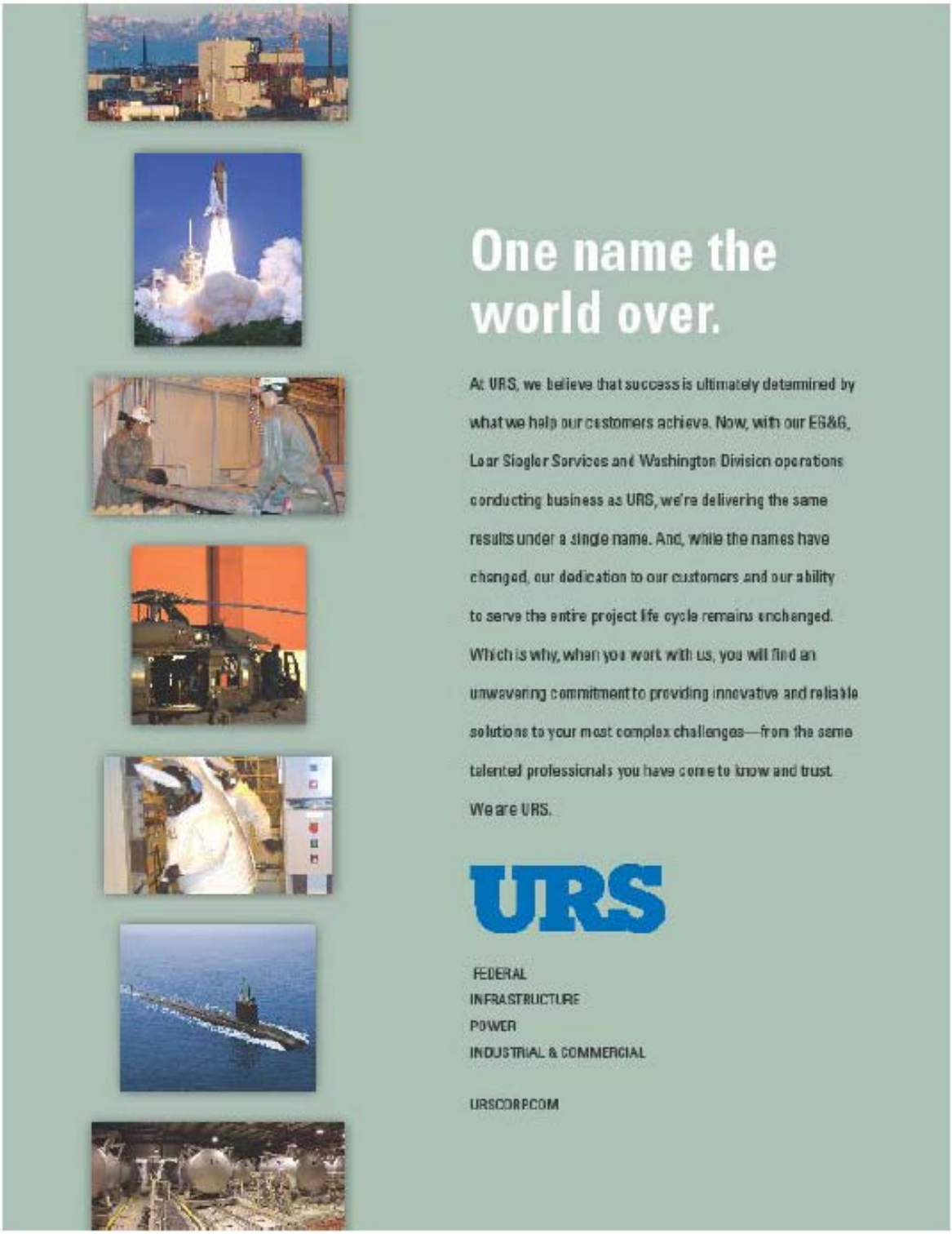
Halfway around the world in Russia, we played a key role in the planning of the country's first-of-its-kind chemical weapons destruction facility near Shchuch'ye, 1,000 miles southeast of Moscow.

Today, we work at the U.S. Army depots in Pueblo, Colorado, and Richmond, Kentucky, with the same mission—to help safely and efficiently eliminate unused and obsolete chemical weapons—performing scope from plant design and construction to systemization, operation, and environmental facility closure.

For the past 113 years, our people have met the world's most complex engineering and technical challenges with the experience, know-how, and innovation to get the job done. Wherever—or whatever—your challenge, Bechtel will deliver.

Project Photos

- Pueblo Chemical Agent-Destruction Pilot Plant
- Blue Grass Chemical Agent-Destruction Pilot Plant
- Aberdeen Chemical Destruction Facility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At URS, we believe that success is ultimately determined by what we help our customers achieve. Now, with our EG&G, Lear Siegler Services and Washington Division operations conducting business as URS, we're delivering the same results under a single name. And, while the names have changed, our dedication to our customers and our ability to serve the entire project life cycle remains unchanged. Which is why, when you work with us, you will find an unwavering commitment to providing innovative and reliable solutions to your most complex challenges—from the same talented professionals you have come to know and trust. We are URS.
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Organisers

Dstl

The Defence Science and Technology Laboratory (Dstl) leads the defence science and technology sector's response to the Ministry of Defence's (MOD) current operations and future defence strategy. Dstl maximises the impact of science and technology (S&T) for defence and security requirements, working with industry and academia to deliver battle-winning technologies. It identifies real S&T advances and works to pull ideas rapidly in to service. In addition Dstl works with other government departments, exploiting its expertise and knowledge to improve the safety and security of UK citizens.

More than 3,700 of the nation's most talented and creative scientists, technologists and engineers work for Dstl at its three main sites: Porton Down, near Salisbury, Portsdown West, near Portsmouth, and Fort Halstead, near Sevenoaks.

The 7000 acre Porton Down Range is the UK's strategic field test and evaluation facility designed to support research and equipment acquisition programmes particularly for Chemical, Biological, Radiological, and Explosive aspects.

Dstl maintains the only licensed chemical munitions disposal capability in the UK and it also houses a Designated Laboratory with the ability to carry out analysis for chemical relevance to the Convention, which is a key feature of the verification regime. Special teams are available to provide support on contaminated land legacy, which is an important environmental and political issue for MoD.

Dstl has a long history of international collaboration and regularly trains overseas operators in munitions disposal as well as offering advice to other nations on best practice. These services help to prepare people to work safely in toxic and hazardous environments. Specialists from Dstl have also been involved in the Chemical Weapons Convention for many years, providing technical advice to the UK negotiators.

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