NBC REPORT

U. S. Army Nuclear and Chemical Agency

Spring / Summer 2005

The Nuclear and Counterproliferation Officers Course: Meeting the Educational Needs of the FA52 Force

Trinity—Beginning of the Atomic Age (Part I)

Joint Urban 2003 Atmospheric Dispersion Study

Understanding Joint Assignment Policies

National Strategy and Implementation of The New Triad—Congruent or Divergent?

Developing a Joint Doctrine for CBRNE Consequence Management

Defense Threat Reduction Agency Liaison Officers—A Vital Link to the Combatant Commanders

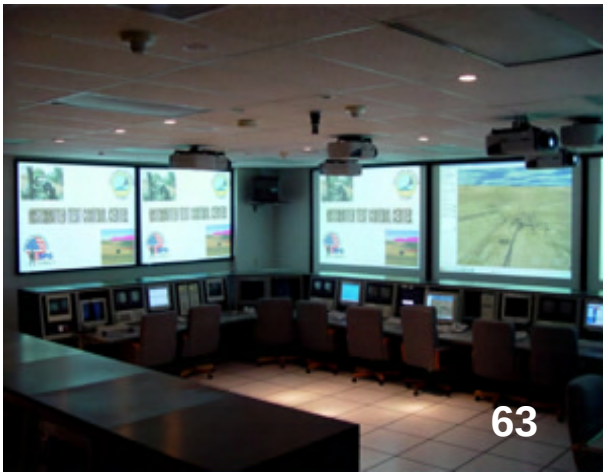
In This Issue

FEATURES

6 **CBRN Defense of US Military Installations and Facilities**
By Mr. Al Mauroni

11 **National Strategy and Implementation of The New Triad—Congruent or Divergent?**
By COL David Fiely

18 **Developing a Joint Doctrine for CBRNE Consequence Management**
By Mr. Rich Burmood and MAJ Kirk Hunter



34 **Joint Urban 2003 Atmospheric Dispersion Study**
By Mr. Donald P. Storwold Jr.

39 **Methodology for NBC Contamination Survivability Paper Study**
By Mr. William G. Davis and Mr. Michael S. Ford

42 **Understanding Joint Assignment Policies**
By MAJ Michael R. Anderson

51 **Catching the Music Between the Notes: The Emerging Role of the US Army in Support of Counterproliferation and the Proliferation Security Initiative**
By MAJ Bret Kinman

58 **WMD CSTs—Focus Needed for Maximized Effectiveness in Homeland Defense**
By MAJ Jim Demyanovich

63 **Virtual Chemical Hazard Environments to Support and Enhance Distributed Live Testing**
By Dr. Jeffery D. Peterson, Dr. James A. Kleimeyer, and Dr. Leonard N. Carter

73 **FA52 Assignment to the National Ground Intelligence Center**
By MAJ Samuel J. Willmon

76 **Defense Threat Reduction Agency Liaison Officers—A Vital Link to the Combatant Commanders**
By LTC Carl Wayne Lowe

83 **The Nuclear and Counterproliferation Officers Course: Meeting the Educational Needs of the FA52 Force**
By LTC Charles A. Pryde and MAJ Kent T. Jones

86 **On Not Confusing Ourselves…. the Challenge of Clarity**
By MAJ Bret Kinman

COLUMNS

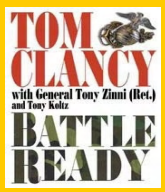
From The Director
4 **USANCA Update**

History
23 **Trinity—Beginning of the Atomic Age (Part I)**
By Mr. Martin W. Moakler, Jr.

46 **Nuclear Weapons and the Sub-Continent: 1974-2004**
By Maj Bill Wieninger

Do You Know...
75 **Aluminum can Actually "Rust" Away in a Matter of Hours?**
By Mr. Robert Pfeffer

Book Review
79 ***Battle Ready***
By Maj Patricio A. Tafoya



NBC Community News
89

NBC REPORT
U.S. Army Nuclear and Chemical Agency

Published by the United States Army Nuclear and Chemical Agency

Director
COL Jesse E. Daniels
Managing Editor
LTC Thomas F. Moore
Editorial Board
Mr. Joseph Nellis, LTC Kathy Gilmartin, and LTC Thomas F. Moore
Design/Layout
CW4 Stephen A. Gomes

Disclaimer: *NBC Report* is published semi-annually by the United States Army Nuclear and Chemical Agency. The views expressed are those of the authors, not the Department of Defense (DoD) or its elements. *NBC Report's* content does not necessarily reflect the US Army's position and does not supersede information in other official Army publications.
Distribution: US Army organizations and activities with NBC-related missions, to include all combat and materiel developers and units with chemical and nuclear surety programs, to each FA52 officer, and to Army attachés. The Secretary of the Army has determined that the publication of this periodical is necessary in the transaction of the public business as required by law of the Department. Use of funds for printing this publication have been approved by HQ, TRADOC, 12 Nov 98, IAW Army Regulation 25-30.
Article Submission: We welcome articles from all DoD personnel involved with NBC matters. Articles are reviewed and must be approved by the *NBC Report* Editorial Board prior to publication. Submit articles in Microsoft Word and include photographs, graphs, tables, etc. as separate files.
Mailing Address: Director, US Army Nuclear and Chemical Agency ATTN: ATNA-OP, Suite 101, Springfield, VA 22150-3164.
Telephone: 703-806-7855, DSN 656-7855, fax 703-806-7900
Electronic Mail: nca@usanca-smtp.army.mil

USANCA Update

COL Jesse E. Daniels
Acting Director
U.S Army Nuclear and Chemical Agency

Greetings to all! It is indeed an honor and a privilege not taken lightly, to greet you through this publication. First, I want to take this opportunity to thank all of our great Soldiers, Sailors, Airmen, and Marines for the sacrifices they are making on behalf of our Nation and towards its Global War on Terrorism. Since 11 September 2001 we have seen our way of life changed in ways unimaginable. However, due in large part to the sacrifices, professionalism, dedication, and sheer will of our young Servicemen and women, we are winning this war and helping to change the lives of many around the world. I am proud to be a Soldier in the world's greatest military ever seen to date.

This *NBC Report* marks the first for me as Acting Director since the retirement of Dr. Davidson in November 2004. The selection process for identifying a new Director is still ongoing, yet the mission and daily operations here at USANCA continue with great vigor. Let me take this opportunity to provide a quick glance at what is going on at USANCA. First, here is a look at a few of my key assignments:

I was assigned to USANCA in August 2003 as the Chemical Division Chief. Prior to coming to USANCA, I was the Director of NBC Operations for Combined Joint Task Force 180, in Afghanistan. I have served two tours as a Corps Chemical Officer; first with III Corps, Fort Hood, Texas, and second with XVIII Airborne Corps, Fort Bragg, NC. I was a Division Chemical Officer for the 2nd Infantry and 82nd Airborne Divisions. My joint duty assignment was with North American Aerospace Defense Command with duty at Tyndal Air force Base, Panama City, FL. I served as the Executive Officer of a Basic and Advance Chemical and Military Police Training Brigade, Fort McClellan, Alabama. Finally, I was the Chemical Staff Officer for the XVIII Airborne Corps Artillery, Fort Bragg, NC.

Update on USANCA Mission Areas

Combating Weapons of Mass Destruction

The use of WMD has been recognized as the single most dangerous threat to our country. As most of you know, United States Strategic Command (USSTRATCOM) was given the mission to synchronize, integrate and coordinate the Department of Defense's (DoD's) combating WMD efforts. Army Strategic Command (ARSTRAT), which is the Army's Space and Missile Defense Command, was given the inter-Service lead, through USSTRATCOM, for WMD-Elimination (WMD-E). USANCA has been providing subject matter expertise to USSTRATCOM and ARSTRAT as these two organizations conduct mission analysis for the combating WMD mission areas of WMD-Interdiction and WMD-E. USANCA's Nuclear Disablement Team experience from Operation IRAQI FREEDOM (OIF), as well as having personnel assigned to USANCA that have experience with OIF WMD-E planning and execution has made USANCA a valuable resource for WMD-E subject matter expertise.

From a combating WMD training perspective, USANCA was involved in the development of the Defense Nuclear Weapons School's Joint Planners Course (JPC) to Combat WMD. This one week course is designed to familiarize DoD and inter-agency planners in the development of combating WMD plans and operations. JPC is now incorporated into the Intermediate Level Education for FA52 officers at the Defense Nuclear Weapons School.

USANCA has provided one FA52 officer with combating WMD subject matter expertise to the Army's Battle Command Training Center, Operations Group Delta, for Corps and above warfighting seminars. This has been a great opportunity to educate Corps and above staffs on the combating WMD mission area, to inform them of the Nuclear and Counterprolif-

eration functional area and to dispel the widespread impression that combating WMD equals passive defense.

Recognizing that the Army lacks a core of combating WMD planning expertise, USANCA has proposed the transformation of its Nuclear Employment Augmentation Team to include the mission of augmenting Army Service Component Commands with planning expertise in the offensive (targeting and WMD-E) tasks of combating WMD.

NATO/Interoperability of Coalition Forces

Land Group 7 (LG/7) on Joint NBC Defense completed its Conference of National Armaments Directors (CNAD)-approved transformation to better address Joint NBC capability gaps, reorganizing its six subordinate bodies (Radiological and Nuclear Defense, Challenge, Sampling and Identification of Biological, Chemical and Radiological Agents, Detection, Identification and Monitoring, Hazard Management, and Physical Protection) to deal efficiently with shortfalls identified and prioritized by a series of NBC Alliance Coordinated Armaments Requirements (ACARs). LG/7developed an overarching ACAR on NBC Defense and will produce additional subordinate ACARs on Detection, Identification and Monitoring; Physical Protection; and Hazard Management. There are seven new LG7 NATO initiatives. First, LG7 has been asked to re-look and establish programs of work (POW) in the Defense against Terrorism initiative (DAT); the group has established their POWs and is moving forward towards being an integral part of NATO efforts. Second, it is developing worst case levels of radioactive air contamination to determine NBC mask filter requirements. Third, it is refining the NBC Commander's Guidance for troops exposed to low-dose rates of radiation after a nuclear weapon denotation. Fourth, it is establishing a Joint Radiological and Nuclear Defense Sub Group associated with supporting the DAT. Fifth, it is pursuing work on Toxic Industrial Chemicals /Toxic Industrial Materials Challenge and Radiological Weapon Effects. Sixth, conducting Sampling and Identification of Biological, Chemical and Radiological (BCR) agents exercises to confirm national capabilities and to validate related procedural and equipment standards. Seventh, LG7 is furthering the development of the NBC deployable analytical laboratory standards and technical background.

FA 52 and Combating WMD

In the upcoming months, it is anticipated that some clarity will be given to the future of DoD combating WMD initiatives. As it applies specifically to FA52 officers, the stand-up and future of the Defense Threat Reduction Agency (DTRA) Combating WMD Directorate should provide the opportunity for additional FA52 officers to serve in both the Military District of Washington and Omaha in support of the USSTRATCOM mission of combating WMD. Fiscal Year 06 approved manpower changes have already increased FA52 assignment opportunities at HQ NORTHCOM. Additionally, HQDA G3 is conducting a broader study of the Army's support of combating WMD, the results of which should have significant impact on FA52 and the larger Army WMD community.

Nuclear Weapons Effects Program

The Nuclear Weapons Effects Database System (NWEDS) is in its third year of modernization by DTRA. The NWEDS upgrade project purpose is to move NWEDS off the SUN Unix computers to a laptop (Windows XP) making NWEDS easier to use and establishing error trapping to avoid abnormal terminations of runs. NWEDS has already been verified and validated by Science Applications International Corp and is presently being beta tested on a laptop for ease of use, efficiencies, and enhancements. The system will be available in unclassified and Secret/RD versions. The Nuclear Capability System (NuCS) is a DTRA program to provide the next generation of nuclear modeling capability, NWEDS and the Integrated Weapons of Mass Destruction Toolkit will both be incorporated into NuCS.

Closing

As you can see, USNACA is extremely busy at any given time. During my tenure as Director I will continue to provide you, the reader, with as much information as possible through this venue. Remember, if there is something out there that you feel is worth sharing with the greater population, do not hesitate to contact us so we can do what is required to get it published.

CBRN Defense of US Military Installations and Facilities

Mr. Al Mauroni
Innovative Emergency Management, Inc.

Following 11 September 2001, the Department of Defense (DoD) leadership took several actions to improve antiterrorism measures, particularly addressing the threat of chemical, biological, radiological, and nuclear (CBRN) hazards. One of these initiatives – the Joint Service Installation Pilot Project (JSIPP) – was to install chemical and biological (CB) defense equipment on nine DoD installations (three Army, three Air Force, two Navy, and one Marine Corps) in fiscal year (FY) 2003, recommend responder equipment for installation procurement, and document potential requirements for improving CBRN defense across all military installations and facilities. The JSIPP final report was to be available at the end of calendar year 2004.

Another initiative was sparked by the Deputy Secretary of Defense (DepSecDef) memorandum "Preparedness of U.S. Military Installations and Facilities Worldwide Against Chemical, Biological, Nuclear, and High-Yield Explosive (CBRNE) Attack," dated 5 September 2002. The DepSecDef memo stated it was DoD policy to protect personnel on military installations and DoD-owned facilities from CBRNE attacks, to respond to those attacks with trained and equipped emergency responders, to ensure installations are able to continue critical operations during an attack and to resume essential operations after an attack. The memo tasked the Chairman, Joint Chiefs of Staff, to develop "DoD-wide concepts of operations" for CBRNE preparedness, and called for "appropriate protection" of personnel on military installations and facilities.

Close to this memorandum's release, DoD had decided to fund the outfitting of 200 installations with CBRN defense equipment over a six-year period, at a cost of approximately $1 billion. The Joint Project Manager Guardian (JPMG), under the Joint Program Executive Office for CB Defense, runs the effort, which is now called the Installation Protection Program. Its funding was offset by Services' antiterrorism funds, and is designated for procurement of current military and/or commercial equipment. The effort was planned to begin on 15 installations in FY 2004, but its start was delayed due to several issues until FY 2005.

The Joint Requirements Office for CBRN Defense (JRO-CBRND) officially stood up in October 2002, with the DepSecDef memo high on its list of priorities. There were several challenges for the JRO – the JSIPP effort was barely underway, the JPMG required guidance on a concept of employment and desired capabilities, and the Assistant to the Secretary of Defense for Homeland Defense (ASD [HD]) had also just opened for business. Traditionally, DoD CBRN defense has addressed military combat operations, not antiterrorism efforts. At the 2001 Joint Staff Antiterrorism/Force Protection (AT/FP) conference, the attendees admitted that CBRN defense efforts were regularly at the bottom of the priority list, and understandably so, given the very low probability of a CBRN incident. The AT/FP and CBRN defense communities lack a clear understanding of each others' concepts and particular language. What was needed was a new concept of employment for how traditional CBRN defense efforts could be applied to AT programs, using appropriate technologies and subject-matter expertise.

The Joint Staff completed a DoD-wide concept for CBRN defense of US military installations and facilities and sent this to the DepSecDef for his approval at the end of April 2004. This document is a joint operating concept of how military forces should operate today, with current organizations, methods, and technologies, as opposed to a detailed directive to the Services, combatant commands, and defense agencies. Once the DepSecDef approves this document, it will be up to the respective agencies to develop more detailed concept of operations (CONOPS) specific to their commander's concepts and guidance. As of April 2005, this document has not been approved, subject to concerns

within the ASD(HD) office.

Defining CBRN Defense

One of the main issues was the development of acceptable definitions. As many of you may understand (especially if you've spent a tour in the Pentagon), words matter. One of the immediate challenges was convincing the AT community that it was okay to use the term "CBRN defense" as opposed to the more commonly-used term "CBRNE." This is still a bone of contention with many people, but it is important to note the following:

- the DepSecDef memo specifically addressed the existing vulnerability to CBRN hazards;
- there is a specific joint doctrine for operations in a CBRN environment, and there are multi-service tactics, techniques and procedures (TTPs) for CBRN defense;
- there is a distinct joint acquisition program for CBRN defense equipment, funded by a DoD budget line;
- while there is a joint doctrine for antiterrorism, there is no similar "joint" explosives doctrine, multi-service TTPs, or joint equipment acquisition process; and
- there is a very mature antiterrorism program in each Service for handling high-yield explosive threats, with very detailed Service and combatant command guidelines.

The newly-developed joint concept explains that CBRN defense capabilities do have to be tightly integrated into the existing DoD AT program, which very adequately addresses the high-yield explosive threat. This future integration should be executed through the Protection Functional Concept being developed by the J-8's Protection Functional Capability Board. This concept also forwards the idea that the term "weapons of mass destruction" is not a useful term; that the overwhelming majority of CBRN terrorist incidents will be small, single releases, which may not necessarily cause mass casualty incidents. To that end, the concept discusses "CBRN hazards" that are different in scope than NBC weapons effects developed under a state-run WMD program. The CBRN threat faced by military installations and facilities is not SCUD missiles or aircraft bombs carrying hundreds of pounds of agent, and the installations need a reasonable and executable approach to a realistic, current threat.

While the initial attempt to protect military installations and facilities may rely on fielded CBRN defense equipment designed for military combat operations, one should not forget the very distinct differences in executing a CBRN defense effort on a military installation.

- The domestic terrorist threat is not as well defined – terrorism threats in the United States rise and diminish throughout the year, and may take the form of any number of military-grade CBRN agents, industrial chemical hazards, or improvised radiological devices
- There are many more unprepared noncombatants that require protection on a military installation or facility than on the battlefield, and these noncombatants are not necessarily healthy young individuals such as in military units
- There are many different types of installations and military facilities, many of which lack the robust infrastructure and/or resources required to address low-probability, high consequence CBRN incidents.

It should be clear that any DoD-wide solution to this challenge must be comprehensive across all existing military installations and facilities, addressing a unique community, but yet flexible and affordable to implement during various periods of heightened threat alerts. Somehow, the desired solution must leverage existing CBRN defense concepts, equipment, and doctrine against the current DoD AT program requirements and its specific concepts and doctrine.

How Sense, Shape, Shield, and Sustain applies to AT

The JRO received approval from the Joint Requirements Oversight Council to use the enabling concept of Sense, Shape, Shield, and Sustain – the "four S" concept – to develop joint CBRN defense capabilities. It is largely intuitive to understand – one must Sense the CBRN hazard (point and standoff detection and reconnaissance), Shape the battlespace through rapid communication of the hazard (battlespace management, battlespace analysis, integrated early warning), Shield the force from the effects of the hazard (protective ensembles, mobile collective protection, medical prophylaxis), and Sustain critical operations (decontamination, medical diagnosis, and medical therapeutics) while the force takes actions to reduce the threat and resume normal operations. One of the keys to this new concept is that these four efforts occur simultaneously

across the battlespace; it is not a linear process.

To develop a CBRN defense capability for antiterrorism, one can use these four same terms, with the specifics changed slightly to accommodate the AT program (see Figure 1). Sense includes point detection and medical surveillance (to detect immediate hazards), and stand-off detection and reconnaissance (for defining the parameters of the hazard). Shape includes hazard/decision support, mass alert capability, and integration with civil information systems. Shield includes (for the general population and VIPs) protective ensembles, personnel decontamination, medical pretreatments, and fixed-site collective protection; and for emergency responders, operational decontamination, mobile collective protection, medical diagnosis and treatments, and installation emergency response capabilities. Sustain includes off-DoD installation support to include support from federal, state and local agencies, thorough decontamination, and logistics support.

One of the key differences in applying the "four S" concept to AT efforts as opposed to military combat operations is that, while a military commander requires a full capability across all four capability areas, an installation commander should only be expected to develop the Sense, Shape, and Shield to the limits of his/her resources and infrastructure. The Sustain capability comes from agencies external to the installation – no one should expect to fully sustain all operations and restore the installation to pre-incident conditions with the limited resources available. The mandate to return to a near-zero risk environment for noncombatants working or living on an installation cannot be met without external assistance. One need only look to the federal efforts to decontaminate the federal buildings and post offices following the 2001 anthrax letter incidents to appreciate the huge cost and time required.

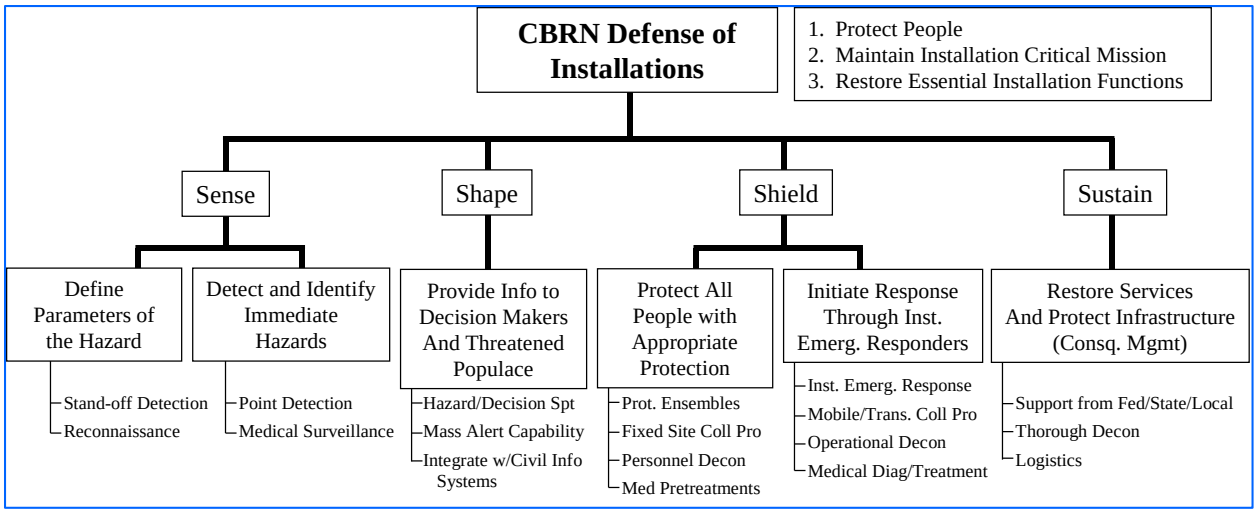


Figure 1. CBRN Defense of Installations.

Defining "Appropriate Protection"

Executing this effort at the many different installations, hosting very different populations, across all DoD military installations and facilities is a monumental task. What is required is a set of general guidelines to inform installation commanders of their options, without compelling them to aspire to some level of protection that is not achievable. There are three important principles to observe: first, no one should be expecting 100 percent protection throughout the base and throughout the year. What is required is a more flexible and reasonable approach, limiting sensors and collective protection to the truly critical locations, utilizing a medical surveillance program, and maintaining a well-prepared emergency operations center (EOC) and emergency response force. Second, not all installations and facilities can or should receive millions of dollars of CBRN defense equipment. Many installations will never be able to afford total monitoring coverage due to size and resources, and many facilities rely on civilian emergency responders. Last, there maybe a perception that some people are more important than others. Any concept for CBRN defense

within an AT program needs to address that there are different requirements to protect essential and non-essential personnel.

The joint concept defines five specific classes of military installations and facilities in an effort to provide installation commanders with options in defining the required level of protection and the priority of capabilities. Class 1 installations/facilities hold more than 15,000 personnel and have an inherent emergency response capability, or are designated as critical by a Service or combatant command because of its mission (as defined by the DoD Critical Infrastructure Program). Class 2 installations/facilities are not "critical" as defined by the Critical Infrastructure Program, have between 2,000 and 15,000 personnel, and an inherent emergency response capability. Class 3 installations/facilities are those installations like Class 2, but do not have an inherent emergency response capability, relying on off-post emergency responders. Class 4 installations/facilities have between 300 and 2,000 personnel and do not have an inherent emergency response capability. Finally, Class 5 installations/facilities are those with less than 300 personnel, to include DoD-owned or leased vessels used to facilitate movement of personnel and equipment for military operations (cargo ships and large-frame aircraft) (see Figure 2).

These classes of installations were developed as a guide (not as a directive) to advise installation commanders on what CBRN defense capabilities and equipment they should consider for their AT program. For instance, all classes of installations and facilities should have a basic protection plan for its personnel, and most installations should have an alert and warning process of some type. Class 3 installations/facilities may have an EOC with hazard prediction software, a number of automated point sensors at certain locations, an installation-wide alert and warning capability, and moderate protection capabilities, but might forego emergency response and medical treatment capabilities. Class 1 and 2 installations/facilities can afford to procure and sustain CB sensor networks tied into a fully-staffed EOC, emergency responder equipment, protection equipment for its critical personnel, some medical treatments, and limited decontamination equipment. Some of the largest installations may even want reconnaissance capabilities. One size does not fit all, nor should we force any mentality of "maximum protection," a condition that can never be adequately met for noncombatants throughout the year.

Currently, AT programs differentiate between personnel deemed essential to the performance of critical military operations and non-essential personnel that may work, live, or be visiting at the installation. The JRO's concept outlines an objective to provide "appropriate protection" to those essential personnel for up to 12 hours of a CBRN incident. This might include protective ensembles and masks or collective protection systems at their critical sites. For all non-essential personnel, the objective is to provide protection or procedures necessary to safely survive an incident. Note that this does not say anything about using any material. Evacuation and shelter-in-place are the desired procedures, vice issuing protective masks to the population. This does not forbid Services, combatant commands, or defense agencies from funding and implementing an "escape-mask" program at specific installations or facilities (such as at the Pentagon) if that is within their budget, but the cost of sustaining that capability will be high.

	Large and/or Critical Inst.	Inst. w/ Emerg. Resp.	Inst. w/o Emerg. Resp.	Small Inst/Facilties	Facilities/Vessels
SENSE-1	**DESIRED**	----------	----------	----------	----------
SENSE-2	**REQUIRED**	**REQUIRED**	**DESIRED**	----------	----------
SHAPE	**REQUIRED**	**REQUIRED**	**REQUIRED**	**REQUIRED**	----------
SHIELD-1	**REQUIRED**	**REQUIRED**	**REQUIRED**	**REQUIRED**	**REQUIRED**
SHIELD-2	**REQUIRED**	**REQUIRED**	----------	----------	----------
SUSTAIN	**PROVIDED BY EXTERNAL FEDERAL, STATE, AND LOCAL AGENCIES (AND HOST NATION AS APPLICABLE)**				

Figure 2. Classes of Installation/Facility and Required Levels of Protection.

Summary

This article summarizes a very complex joint concept of employment for implementing a CBRN defense capability within an installation or facility AT program. The actual document goes into some depth in explaining the overall concept, detailing

the implementation of "appropriate protection." It should be seen as a work in progress, a lump of coal that needs more heat and pressure prior to becoming a fully developed and mature concept.

The results from JSIPP and continued dialogue between the AT and CBRN defense communities are necessary to develop the true "CBRNE" protection to which all installation commanders aspire. Having said that, there are some immediate issues that do need to be addressed.

The first and most important issue is whether it is feasible to define and implement different levels of CBRN defense within the force protection conditions (FPCONs). One of the most controversial discussions in this process was the idea of modifying the existing DoD FPCONs. The cost of constantly operating CBRN defense equipment and testing potential CBRN samples can be astronomical. Certainly there should be the flexibility to significantly reduce CBRN defense efforts at FPCON Alpha, increase some level of monitoring and protection at FPCON Bravo, and turn on all the capabilities at FPCON Charlie.

However, the Services were dead set against any tinkering with the FPCONs, and similarly refused consideration of a separate set of CBRN-CONs. This deadlock must be resolved in the near-term.

Installation commanders already coordinate with the local communities for mutual support on responding to incidents and emergencies. What is required now is to increase this dialogue to discuss what specific capabilities the installation might require from the state and local agencies to respond to an on-DoD installation CBRN incident (as well as vice versa). Key to this discussion should be how the Army installations will coordinate with emergency responders, that is to say, getting the Army emergency responders to use the incident command system (ICS), ensuring a close, coordinated response with the off-post responders. In addition, any installation medical surveillance effort must be linked to the off-post community, as well as throughout the region (and maybe into the DHS BioWatch efforts). DoD should avoid any implications that it will fund off-post state and local communities to develop CBRN response capabilities, considering the requirement that might arise from communities located near 1200 military installations and facilities across the nation, let alone overseas. We need mutual agreements in place and occasional exercises, with DHS supporting improvements of the state/local emergency responders' capabilities.

The successful implementation of CBRN defense measures into the installation preparedness program is a long journey, and this concept merely represents the first hesitant steps down that road. Having set a stake in the ground, it is imperative that the AT community and the CBRN defense community continue a dialogue, first by learning each others peculiar concepts and concerns, and then by constructively working together to develop a new capability under the protection functional concept. To truly meet the expectations of a capability-based force, we need to lose the idea that CBRN defense must take only one form. This joint concept demonstrates that the military can shape the CBRN defense enabling concept to apply to passive defense, consequence management, antiterrorism, and even homeland defense with creative thinking and flexibility from all stakeholders involved.

Al Mauroni is a CBRN defense analyst with Innovative Emergency Management, Inc. He is a former Chemical Officer, with 19 years experience in joint CBRN defense programs and policy. He was a member of the Joint Requirements Office for CBRN Defense between April 2002 and September 2003, during which time he worked on this joint concept. He is the author of four books and several articles on CBRN defense issues.

National Strategy and Implementation of The New Triad - Congruent or Divergent?

COL David Fiely
United States Army War College

At first blush the capabilities of the New Triad outlined in the 2001 Nuclear Posture Review (NPR) seem to resonate with post-11 September 2001 national and military strategic documents. In those documents, senior leaders call for new capabilities and innovative ways to deter and defeat enemies of the United States (US), and the NPR essentially revamped the former nuclear Triad in order to provide these new capabilities.

However, it is not clear that the US can achieve them in the timeframe described (i.e., by 2012). While there is little debate that the traditional nuclear Triad, and, perhaps the nature of deterrence, required major overhaul following the end of the Cold War and the terrorist attacks of 2001, it is also not clear that the major changes described by the NPR will achieve the desired effects against threats in the twenty-first century. The Department of Defense (DoD) implementation plan for the NPR, published in 2003, describes specific tasks, timelines, and responsibilities in order to achieve adequate operational capability for the New Triad. Overall operational numbers of nuclear weapons will be reduced, and advanced conventional weapons fielded in order to supplement or, in certain circumstances, replace nuclear weapons. While this concept sounds reasonable, the debate on how best to achieve success, or whether success is even achievable, is still ongoing. For example, precision-guided, variable-yield, earth-penetrating nuclear weapons are absent in the nuclear stockpile, but the implementation plan only calls for a study of earth penetrating nuclear weapons.

Further improvements to nuclear weapons may be required to address military and political realities such as increased concern for the consequences on non-combatants of offensive strikes, WMD proliferation, and use of hard and deeply buried targets (HDBTs) by potential adversaries. Not surprisingly, however, introduction of new nuclear weapons or improved capabilities for existing ones evokes strong reactions from arms control advocates, anti-nuclear scientists and activists, as well as opponents of current administration policies. Likewise, the capabilities expected by fielding advanced conventional weapons might not be sufficient. Advanced conventional weapon development comes with certain inherent risk when one considers the science and technology challenges – not to mention programmatic ones – in order to achieve operational deployment.

Post 11 September 2001 National and Military Strategic Documents

Following the terrorist attacks on 11 September 2001, publication of national and military strategic documents established ends, ways, and to a certain degree, the means for strategic concepts involving nuclear weapons and the notion of deterrence in the new millennium.

Nuclear Posture Review

On 31 December 2001, DoD submitted a report, as well as presented a series of briefings, to Congress on the NPR. It proposed a New Triad consisting of: offensive nuclear and non-nuclear strike systems; active and passive defenses; and a revitalized defense infrastructure to provide new capabilities to meet emerging threats (Figure 1, page 12). For the first leg, the concept was not to replace intercontinental ballistic missiles (ICBMs), submarine launched ballistic missiles (SLBMs), or long-range bombers, but to supplement their nuclear capabilities with non-nuclear ones, thereby increasing offensive effectiveness and credibility. The second leg appeared to be an acknowledgement that the ability to strike enemies with the spectrum of offensive capabilities was not in itself sufficient to deter them. In this case, the US would need both active (find and defeat) and passive (respond to) defenses. The defenses and improved capability to respond would add to the deterrence equation by discouraging attacks. The third leg of responsive infrastructure is a response to significant de-

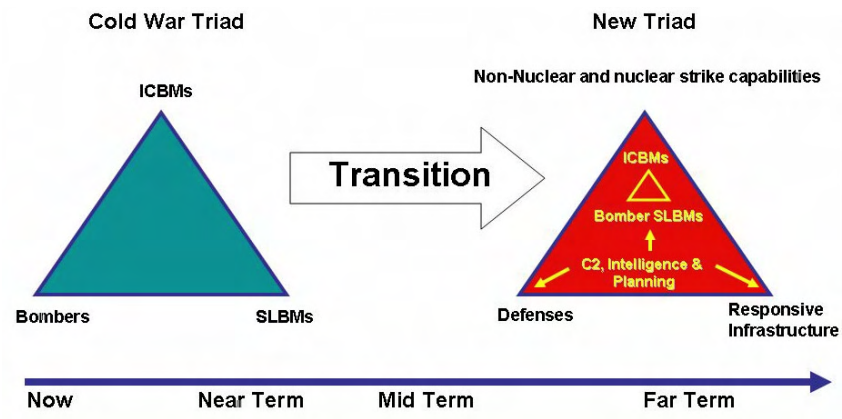


Figure 1. New Triad.[1]

fense military downsizing in the previous decade and the corresponding atrophy of the nuclear infrastructure.[2] The complex infrastructure that designed and fielded exquisite nuclear weapons (from a scientific and engineering point of view) during the Cold War can no longer respond quickly to a request to build and field new nuclear capabilities. A solid infrastructure is required to reduce the size of the nuclear stockpile since weapons dismantlement is a complex, laborious, and expensive process.[3] In summary, the NPR drew upon the Quadrennial Defense Review (QDR), but also presented a way to achieve the ends described in documents that were to follow. It sought to modify a system of deterrence designed for the Cold War, but not to abandon nuclear weapons altogether.

Quadrennial Defense Review

The QDR, published in September 2001, explicitly stated four defense policy goals (the "ends" essentially restated in subsequent documents) to assure, dissuade, deter threats and coercion, and – if deterrence fails – decisively defeat the enemy. First, nuclear weapons have played a part in all four ends in the past, traditionally by first assuring allies without nuclear weapons that they fell under the US nuclear umbrella. Second, our economic and scientific capabilities to rebuild a nuclear arsenal if necessary serve to dissuade others who may hope to rise as a peer competitor. Third, US nuclear capabilities have served as a successful deterrent for nearly sixty years. Finally, should deterrence fail, nuclear weapons serve as an ultimate "trump card" to defeat an enemy determined to use chemical, biological, or nuclear weapons. The question remains whether the current stockpile still supports these ends after 2001. The QDR also emphasized movement to a capabilities-based force able to defeat adversaries relying on deception and asymmetry. It recognized that transformation was critical to strategic success, and that continuing "business as usual" within the DoD was not a viable option. This transformation included denying the enemy sanctuary through improved surveillance and rapid precision strike.[4]

National Security Strategy

The National Security Strategy (NSS), published in September 2002, obliquely mentioned nuclear weapons as an effective Cold War deterrence tool and acknowledged that the US and Russia had reduced nuclear stockpiles. However, there were other areas in the document that resonated within the nuclear community. After restating enduring American values and goals, the NSS pointed out the desire to "prevent our enemies from threatening us, our allies, and our friends, with weapons of mass destruction" and to "transform America's national security institutions to meet the challenges and opportunities of the twenty-first century." If necessary, these requirements could be carried out through preemptive strikes against rogue states and terrorists. This is an important point in that the NSS explicitly points out that the US can no longer count on traditional means (nuclear weapons) to deter an attacker bent on using WMD as an asymmetric means. The President therefore needs a broader range of military options to meet these threats.[5]

Transformation Planning Guidance

The Transformation Planning Guidance, published in April 2003, leveraged the QDR transformation goals (including the requirement to deny enemy "sanctuary") and reemphasized the push from requirements-based systems to capabilities-based for force development, identification processes, and strategic planning. It also recognized risk management as one of the tenets of defense strategy.[6] This concept is germane to the offensive strike leg of the New Triad since the required transformation incurs a certain level of operational and institutional risk. For example,

where nuclear operational numbers are drawn down, the US accepts increased risk for possible reemergence of a nuclear-armed, near-peer, and hostile adversary. The US is also accepting risk in advanced conventional weapon development if one presumes that currently planned expenditures will yield sufficient non-nuclear capabilities as called for in the NPR.

Military Strategy and National Defense Strategy

The National Military Strategy (NMS), published in 2004, offered ways and means by which the Chairman of the Joint Chiefs of Staff would support the NSS ends, as well as those of the National Defense Strategy. The NMS reflected portions of the NPR in that nuclear weapons were noted for continuing to provide an important deterrence role; however, the New Triad provided a strategic deterrence capitalizing on non-nuclear strike capabilities as well. The end result was described as a "diverse portfolio of capabilities" to deter a wide range of adversaries.[7]

Document Summary

A common thread woven through the fabric of current national and military strategic documents is a call for increased capabilities to adapt to a changing world. In this context, the NPR and its implementer clearly call for new capabilities to support decision makers. Another thread calls for transformation, and certainly no one questions the fundamental transformation represented by the New Triad. In short, the way presented by the NPR and its implementer are supportive of the ends established by the NSS, NMS, and QDR, but one might question whether the means to achieve these ends have been identified as clearly. One example may be whether the Services have been sufficiently resourced to field advanced conventional weapons and platforms to replace some capabilities previously provided by nuclear weapons. It is also not clear that there is sufficient risk mitigation in the event these advanced weapons are not forthcoming, or that the idea of modifying or transforming nuclear weapons (vice simply drawing down numbers) has been thoroughly examined in order to provide such mitigation.

Nuclear and Conventional Capability Gap

The US most likely can reduce to 1700-2200 operational nuclear warheads by 2012. However, the intelligence community recognizes that enemies (current or potential) are increasing their capabilities to threaten the US or deny/disrupt our ability to deal with those threats – even with nuclear weapons. For example, Russia, China, North Korea, and Iran continue development and modernization of their respective intermediate and long-range ballistic missile systems. The problems associated with attacking deeply buried and hardened facilities are acute, and the numbers in North Korea alone are staggering (in the thousands if one includes tunnels for long range artillery). Additionally, the depth and distribution of these HDBTs is disconcerting (Figure 2). The Director of the Defense Intelligence Agency stated in testimony to the Senate in February 2004 that: "Use of underground facilities (UGFs) to protect and conceal WMD, ballistic missiles, leadership, and other activities are expanding. Grow-

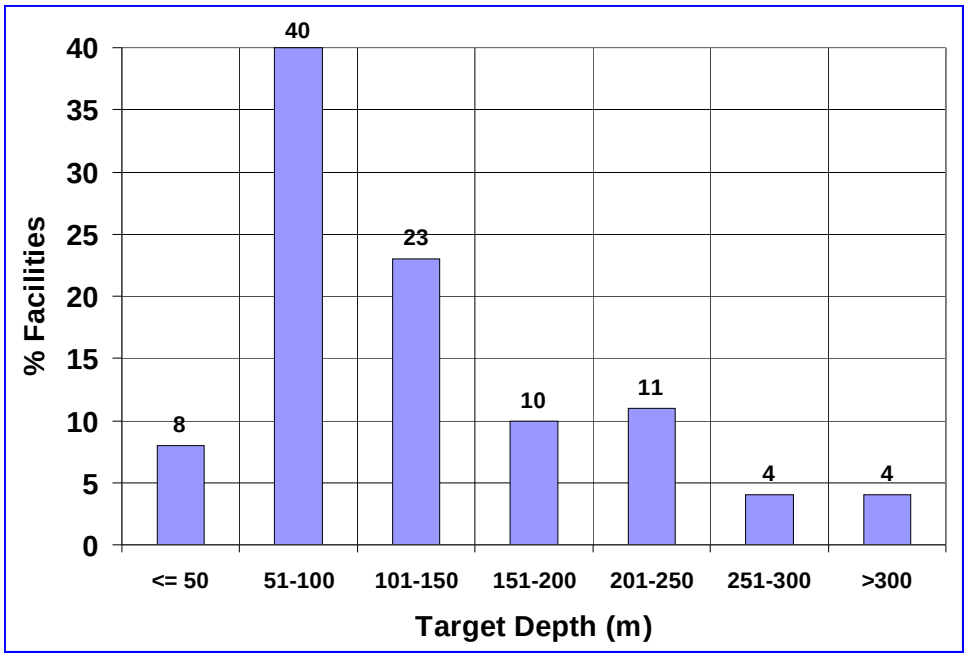


Figure 2. Types and Depth of UGFs.[9]

ing numbers of UGFs are especially notable among nations with WMD programs. In 2003, we have observed more than a dozen new military or regime-related UGFs under construction."[8] Additionally, it is not clear whether advanced conventional weapons can adequately deal with these increased threats in light of reduced numbers of nuclear weapons. More importantly, it is unclear whether the NPR and implementer ensure sufficient research development testing and equipment funding by the Services and combat support agencies to develop, test, and field these advanced conventional weapons. Adequate funding is required to help mitigate the mid-and long-term risk associated with reduced numbers of operational nuclear weapons at the same time the stockpile, its associated infrastructure, and personnel expertise continue to age. In order to assess this issue, one must first understand what constitutes the "gap" of capability shortfalls between nuclear and conventional weapons.

Weapon Lethality

Current penetrating weapons such as the bomb live unit (BLU)-109 and BLU-113 are extremely effective against hardened, shallow bunkers, but have limited capabilities against tunnel facilities unless "skipped" into the entrance or sequenced against the same aim-point (Figure 3). Unfortunately, there are significant limitations to the actual effects or lethality of these weapons against UGFs. Portal attack effectiveness is a function of precise location of the UGF's entrance(s) and duration of enemy capability to clear the debris. Multiple and sequential strikes (aptly called "divine miracles") in the same entry point of the previous weapon are problematic due to the required precision and accuracy. Skipping weapons into portal entrances have yielded spectacular film footage, but flight tactics required to execute such an attack under combat conditions against enemy air defenses are questionable.

Nuclear weapons have a unique capability to deliver damage to deep targets through the multiple effects of coupling the blast effects with the ground – thereby creating shock waves that essentially crush the tunnel facility. However, even nuclear weapons have limitations in relation to target destruction effectiveness at great depths. The weapon must survive the penetration of existing soil or rock conditions in order to achieve coupling sufficient to crush the facility and, of course, the yield of the weapon must be sufficient as well.

Delivery Time

Current families of conventional penetration weapons must overcome a particularly difficult lethality equation in order to be considered a viable strike option. In general, heavy weapons equate to longer delivery times. Theater based cruise missiles and unmanned aerial vehicles can be launched relatively quickly, but lack the destructive explosive power to threaten UGFs. Relatively massive bombs carry larger explosive packages, but must be carried by bombers requiring longer generation times (Figure 4) if launched from the continental US. Similarly, more weight or sheer mass added to a weapon to increase its penetrative capability will reduce the amount of depth, but, if it only carries a several kilogram explosive package its military usefulness may be negligible. Additionally, there is an upper limit to the

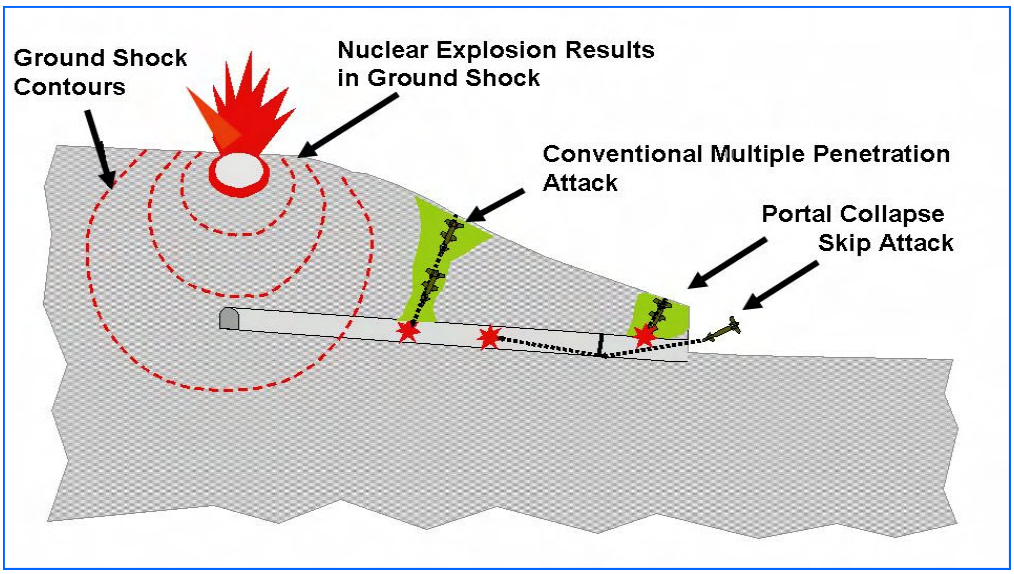


Figure 3. Conventional and Nuclear Damage Mechanisms.[10]

weight carrying capacity for a heavy bomber. Weapons with sufficient weight and explosive capacity to threaten certain categories of HDBTs may only be singly loaded – again limiting bomber effectiveness if sortie rates are of concern.

Finally, some have advocated capitalizing on the relatively simple physics equation of KE = ½ MV^2 (KE = kinetic energy; M = Mass; V = velocity) in order to harness the energy and rapid delivery times offered by SLBM, ICBM, or short range missile delivered conventional or inert warheads – in the same way sabot tank rounds destroy their intended targets. While this concept is viable, its effectiveness is limited against deeply buried targets due to rapid energy dissipation at the earth's surface. This loss of effectiveness is the same for nuclear surface or above ground detonations against HDBTs. Additionally, nuclear weapons are not constrained by "lethality-to-weight" issues, but lengthy generation times for weapons other than alerted SLBMs and ICBMs are problematic for planners if rapid attack timelines are required.

Consequences of Execution

Where nuclear weapons excel in lethality versus weight compared to conventional weapons, they do not measure up favorably for consequences of execution (COE). Precision conventional weapons have demonstrated their potential to mitigate collateral damage in urban environments. Heavier weapons or multiple strikes against deeply buried facilities would certainly be viewed favorably in most high valued target equations unless inadvertent release of stored WMD material was a consideration. In so far as nuclear weapons are concerned, low altitude bursts against above-ground targets are extremely effective in achieving high probabilities for effective military damage with low fallout effects, but the damage in an urban environment (though localized to the target area at lower yields) may be considered too indiscriminant by today's international standards. Deeply buried targets are vulnerable to the current inventory of weapons, but surface or below surface bursts and high yields necessary to achieve desired effects are problematic. The radiological fallout subsequent to a high yield surface or below surface nuclear burst would be significant politically, if not militarily.

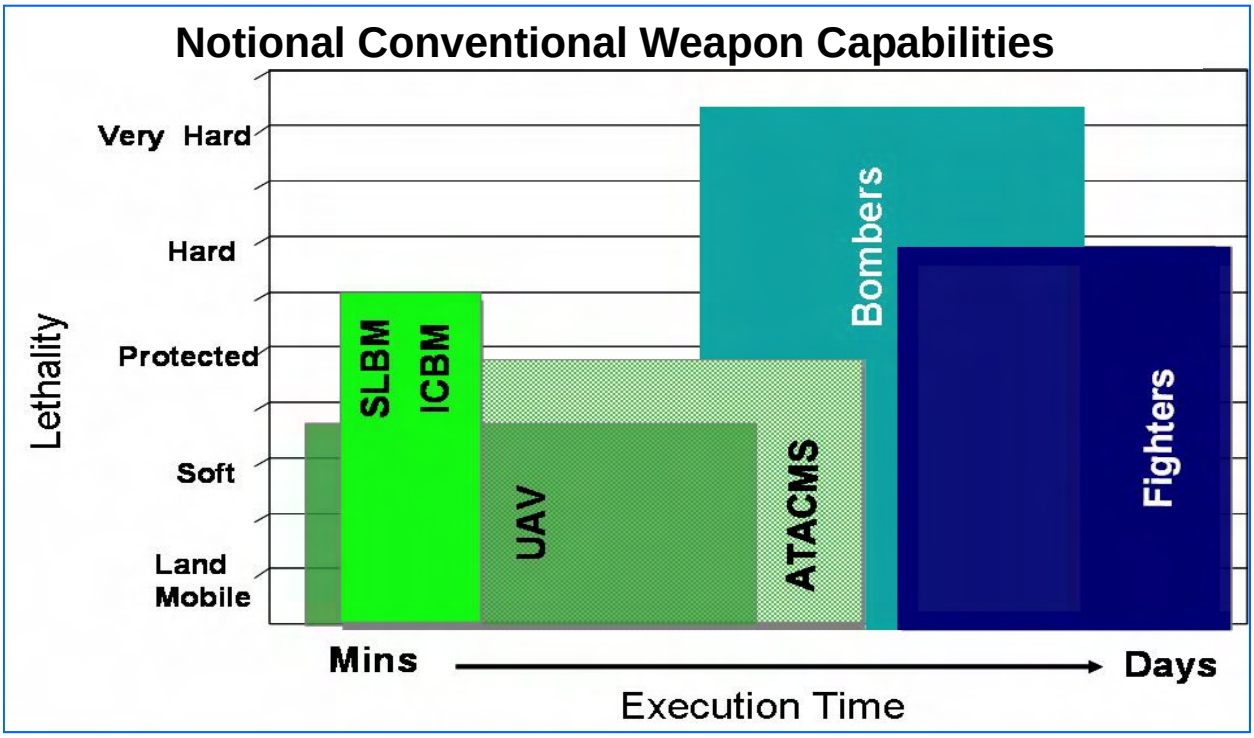


Figure 4. Lethality Versus Timeline.[11]

Future Weapon Development

Current conventional weapons, though impressive in their own right, do not yet bridge the gap in capability when compared to nuclear weapons. However, there have been considerable improvements to existing weapon systems, making them more effective through increased penetration and/or damage mechanisms. Examples include Thermobaric (TB) Hellfire, TB and "agent defeat" BLU-109 variants, as well as penetration variants of cruise missiles.[12] They have demonstrated potential for further development, but do not in themselves represent the type of increased capabilities needed by the New Triad. New weapons with deeper penetrative capability, greater speed, and varied delivery options are required. Several advanced weapon systems could be operational in the 2012 timeframe, but none, beyond a proposed nuclear penetrator, will defeat deeper UGFs.

Conclusions

Is the New Triad congruent or divergent with US national and military strategy? Congruent if one confines the discourse to the ends described by recent strategic documents; divergent if one considers the lack of specific means to achieve the desired end state described in the NPR. There is insufficient evidence that the actions prescribed by the NPR implementer will result in sufficient nuclear and non-nuclear capabilities in the requisite timeframe (2012), particularly relating to the proliferation of HDBTs. Insufficient or slow development for advanced conventional capabilities endangers successful implementation of the New Triad. Is there then an exit strategy if this proves to be true? One would hope that the periodic assessments called for in the implementer would not only offer the opportunity to adjust or abandon the glide slope, but would also provide the political means to execute a new way forward.

Does the US need a precision-guided, low yield, earth penetrating nuclear weapon? In light of the risks associated with advanced conventional weapons to fill the gaps or replace nuclear weapons, the answer is "yes." Since arguments against new weapons are reminiscent of shrill arguments in the past by those who renounce any nuclear weapons, it is difficult to empathize with their position. For example, when the US withdrew from the 1972 Anti-ballistic Missile Treaty at the beginning of the Bush administration, many predicted dire consequences, but none occurred. [13] Unfortunately, even if the United States fielded a new weapon that could credibly deny sanctuary provided by HDBTs, there is still an issue of actionable intelligence. Current categories of nuclear weapons and certain SOF actions can defeat most target categories, but at a political and military cost. If one desires to mitigate risk, one will need to identify, characterize accurately, and assess adequately the damage to any target with extremely high levels of fidelity for any sensitive target such as HDBTs. Any future advanced conventional weapon or precise low-yield nuclear weapon would still have limitations imposed by the mathematical probabilities of damage expectancy and circular error of probability. If precise target location or function is incorrect, even the best weapon systems may be rendered useless upon release.

Improving nuclear weapons through proven and readily available technologies mitigates the high risk associated with advanced conventional weapon research, and will result in a broad and comprehensive set of capabilities available to the President as called for in all current national and military security documents. Failure to achieve the NPR's end state may result in an inability for the US to assure allies, and to dissuade and deter adversaries, and the US may find itself hard pressed, if deterrence fails, to swiftly defeat a determined enemy. A dramatic statement perhaps, but can the country afford the risk?

COL David Fiely is Chief of the National Security Policy Division (DAMO-SSD) on the Army Staff. His previous FA52 assignments include Instructor of Physics at the United States Air Force Academy, Nuclear Research Officer, Defense Special Weapons Agency, Special Weapons Planner, J5, United States Forces Korea, and Deputy Chief, Nuclear Stockpile Division at the Defense Threat Reduction Agency. He has a B.S. from the United States Military Academy at West Point, a M.S. in Physics from the Naval Post Graduate School, and a M.S. in Strategic Studies from the US Army War College.

END NOTES

[1] Though the NPR is a classified document, unclassified portions have been widely disseminated. GlobalSecurity.org, "Nuclear Posture Review [Excerpts] Submitted to Congress on 31 December 2001," 8 January 2002; available from <http://www.globalsecurity.org/ wmd/library/ policy/dod/ npr.htm>; Internet; accessed 13 September 2004.

[2] GAO has published repeated calls for DOE (and now NNSA) to establish accountability and program management procedures for its nuclear weapons programs. General Accounting Office, *Improved Management Needed to Implement Stockpile Stewardship Program Effectively*, (Washington, D.C.: U.S. General Accounting Office, December 2000), 7-14.

[3] Ibid.

[4] Donald H. Rumsfield, *Quadrennial Defense Review* (Washington, D.C.: Office of the Secretary of Defense, 30 September 2001), 14-16.

[5] George W. Bush, *National Security Strategy of the United States of America* (Washington, D.C.: The White House, September 2002), 13-16, 29-31.

[6] Donald H. Rumsfield, *Transformation Planning Guidance* (Washington, D.C.: Office of the Secretary of Defense, April 2003), 8, 11.

[7] Richard B. Myers, *National Military Strategy* (Washington, D.C.: Office of the Chairman of the Joint Chiefs of Staff, 2004), 11.

[8] Lowell E. Jacoby, "Current and Projected National Security Threats to the United States," statement for the record for the Senate Armed Services Committee, 26 February 2004.

[9] Robert Hastie, "Hard Target Defeat Weapons and Weaponeering," briefing slides, Fort Belvoir, Defense Threat Reduction Agency, 22 September 2004.

[10] Donald Linger, "Nuclear and Non-nuclear Options for Hard Target Defeat Incorporating Hypersonics and High Performance Computing," briefing slides, Fort Belvoir, Defense Threat Reduction Agency, 2 July 2004.

[11] Hastie.

[12] Ibid.

[13] "The Nuclear Jitters," National Review, 30 June 2003, 3.

Developing a Joint Doctrine for CBRNE Consequence Management

Mr. Rich Burmood and MAJ Kirk Hunter
Joint Task Force Civil Support

Joint doctrine for conducting chemical, biological, radiological, nuclear, and high yield explosives consequence management (CBRNE CM) is currently in development. This article gives insight to the methodology behind the development process. It also addresses ideas behind the need for the publication, including a short review of current policy, plans and strategy, insight into the CBRNE CM doctrine, and the ongoing collaboration in producing the publication.

Providing assistance to civil authorities in response to CBRNE incidents is an important role for the Department of Defense (DoD). It is not a role that detracts from a warfighting focus, but instead is one of dual use for trained and ready units. Historically, DoD has provided civil support in national times of need for natural disasters such as fires, floods, and hurricanes. DoD plans for assistance as directed by the Secretary of Defense for catastrophic incidents involving CBRNE materials, regardless of their accidental or intentional cause. Joint doctrine currently has a void in providing clear guidance for CBRNE CM. Considering the essential life saving tasks that DoD is able to provide early after an incident has occurred, it is equally important to ensure that sufficient tactics, techniques, and procedures (TTPs) for joint force employment are promulgated.

Joint doctrine consists of fundamental principles that guide the employment of United States (US) military forces in coordinated action toward a common objective. It represents what is taught, believed, and advocated as what is right (i.e., what works best). A doctrine for CBRNE CM standardizes terminology, training, relationships, responsibilities, and processes among all US forces to enable joint force commanders (JFCs) and their staffs to focus efforts on solving the strategic, operational, and tactical problems confronting them. This doctrine focuses on how to think about CBRNE CM operations, not dictate what to think. A purpose in developing the doctrine is to aid thinking, not to replace it. It must be definitive enough to guide operations while versatile enough to accommodate a wide variety of situations, since CBRNE CM operations are probabilistic and unpredictable. Joint forces engaged in CBRNE CM operations will encounter disorder and uncertainty, so the doctrine must foster initiative, creativity, and conditions that allow commanders the freedom to adapt to varying circumstances.

Joint Task Force Civil Support

Joint Task Force Civil Support (JTF-CS) was established under national directive with the mission to plan and integrate DoD support to the designated Lead Federal Agency (LFA) for domestic CBRNE CM operations. When directed by Commander, US Northern Command (CDR USNORTHCOM), JTF-CS will deploy to the vicinity of an incident site, establish command and control (C2) of designated DoD forces and provide timely and effective Defense Support of Civil Authorities (DSCA) to save lives, prevent injury, and provide temporary critical life support. JTF-CS also plays a leading role in CM doctrine development, requirements identification, training and exercise management, and the promotion of domestic CBRNE CM interoperability for DoD CBRNE CM-capable assets in the Active and/or Reserve components of the military.

As USNORTHCOM's operational headquarters for CBRNE CM, JTF-CS is chartered to plan, train and exercise for contingencies with local, state, federal, and other DoD departments and agencies. After a

CBRNE incident has occurred, JTF-CS conducts situational assessments for the supported Combatant Commander in close coordination with state and federal authorities; then it organizes and deploys to establish command and control of designated DoD forces. JTF-CS may deploy to support CBRNE CM operations in USNORTHCOM's area of responsibility (AOR), or within US Pacific Command's domestic portion of their AOR, including Hawaii, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands. As the nation's only standing dedicated CBRNE CM C2 headquarters, JTF-CS has served as an applied laboratory in validating concepts which have favorably impacted this specialized portion of DSCA and identified the need for joint doctrine to guide the TTP in this employment.

An example of these concepts is the command assessment element (CAE), a small team of personnel sent by the Combatant Commander to a CBRNE incident site to conduct a CM assessment and make an evaluation of potential shortfalls in federal and state capabilities. These shortfalls may become requests for DoD assistance. The CAE serves as liaison for the Combatant Commander and prepares an initial commander's assessment. This assessment is used by the Combatant Commander in preparing his commander's estimate requesting forces in anticipation of LFA mission assignments.

Another example is the use of a base support installation (BSI), which is a DoD, Service, or agency installation within the US, its territories, or possessions. The BSI is tasked to serve as a base for DSCA operations and to provide logistics and administrative support to DoD forces during incidents of national significance under the guidelines of the National Response Plan (NRP). Support provided by the designated BSI may include, but is not limited to: general supply, maintenance, transportation, personnel and equipment reception and staging, civil engineering, health and other life support services including billeting, food service, contracting, and communications. Command decisions, such as Force Protection Condition measures and guidance, may have been affected and must be adjusted to be consistent with threat and existing domestic employment conditions for CBRNE CM response forces when operating off DoD-controlled installations in a DSCA environment.

DoD CBRNE Strategy, Policy and Doctrine

The joint doctrine on CBRNE CM is important as it relates to national strategies. In general terms, joint doctrine establishes a link between the "ends" (what must be accomplished) and the "means" (capabilities) by providing the "ways" (how) for joint forces to accomplish military strategic and operational objectives in support of national strategic objectives. DoD's role is clear from the National Security Strategy (NSS) down to current DoD strategies. The NSS calls for "effective consequence management to respond to the effects of WMD use, whether by terrorists or hostile states." [1] The National Strategy for Homeland Security defines emergency preparedness and response as a critical mission area, with the national vision to "strive to create a fully integrated national emergency response system that is adaptable enough to deal with any terrorist attack, no matter how unlikely or catastrophic, as well as all manner of natural disasters." [2]

The National Strategy to Combat Weapons of Mass Destruction names one of its three pillars as WMD consequence management. It calls for the US to be prepared to "respond to the consequences of WMD use on our soil" and to "respond to the effects of WMD use against our forces deployed abroad, and to assist friends and allies." [3] The National Defense Strategy describes the strategic objective of defeating adversaries and protecting the homeland in "providing defense support to civil authorities as directed." [4] Currently in development, the Strategy for Homeland Defense and Civil Support is expected to address CBRNE CM as a key objective. This national level guidance clarifies the need for DoD to provide clear guidance in its implementation of how to contribute to the response of the use of CBRNE materials.

DoD and Joint policy also guide the CBRNE CM requirement. DoD Directive 5100.46, *Foreign Disaster Relief,* has been in effect since 1975 and governs foreign disaster relief. DoD foreign disaster relief tasks typically include "humanitarian services and transportation; the provision of food, clothing, medicines, beds and bedding, temporary shelter and housing; the furnishing of medical materiel, medical and technical personnel; and making repairs to essential services." [5] The Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3214.01, *Military Support to Foreign Con-*

sequence Management Operations, discusses US military forces supporting US Government-led foreign CBRNE CM incidents. It recognizes the Department of State (DOS) as the lead federal agency for host nation support. Key tasks at the Joint Staff level include military planning to support the DOS in preparing for and responding to a foreign CBRNE situation. DoD Directive 3025.1, *Military Support to Civil Authorities*, provides policy regarding assignment and allocation of DoD resources to support civilian authorities during civil emergencies arising during peace, war, or transition to war. DoD Directive 3025.15, *Military Assistance to Civil Authorities*, sets specific criteria for military assistance. The criteria are legality, lethality, risk, cost, appropriateness, and readiness. These criteria provide general guidelines for employment of military forces in determining civil support requests for CBRNE incidents as well as others.

CJCSI 3125.01, *Military Assistance to Domestic Consequence Management Operations in Response to a CBRNE Situation*, provides needed policy guidance to joint operations domestically. Service-specific and multi-Service publications also provide guidance to each military department. Field Manual 3-11.21, *Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Aspects of Consequence Management*, provides a bridge between each Service's guidance and joint doctrine. It is clear that there is a need for joint doctrine to fill a critical gap in defining the roles and responsibilities as well as the tactics, techniques, and procedures for joint forces in supporting civil authorities, either domestically or in a foreign environment.

As previously discussed, CBRNE CM joint doctrine serves to standardize terminology, training, relationships, responsibilities and processes among all US forces. A joint doctrine is also important because CBRNE CM must be treated differently than other types of civil support or foreign humanitarian assistance. The nature of a CBRNE event is that effects will be sudden and catastrophic, often without notice. The victims are usually innocent civilians, the damage occurs to a community, not a battlefield, and the operations must be conducted under complex conditions in a politically charged atmosphere. Based on analysis of previous terrorist actions, there may be multiple incidents that happen nearly simultaneously. The problem of CM extends beyond the effects of WMD use to include large scale industrial or other accidents caused by terrorist elements, so it is also useful to maintain a broader term such as CBRNE. Joint doctrine will help provide a basis for analysis of the mission, its objectives and tasks, and development of the commander's intent and associated planning guidance. The CBRNE CM joint doctrine amplifies general planning guidance in the joint planning publication series. Development of the course of action using decision-making processes is also based on joint doctrinal principles. Joint doctrine will not provide "cookie-cutter" solutions, but rather fundamental guidance on how operations are best conducted to accomplish the mission. These factors combined satisfy the need for a separate joint publication.

The Joint Force and CBRNE

The way in which joint forces are applied in a CBRNE CM situation is also novel. Instead of a typical intelligence preparation of the battlefield outlook, a joint approach to CBRNE CM includes a treatment of how to apply forces to respond to CBRNE effects. In this sense, the CBRNE effects are analogous to the enemy. Analyzing the effects on people and infrastructure determine the right force employment during the crisis action planning in the early aftermath of a CBRNE incident. The JFC responsible for CBRNE CM focuses on responding to the effects of the CBRNE incident. Understanding the effects of CBRNE to the populace and the infrastructure is essential for the JFC to apply the right resources at the right time. Medical effects on the populace may include asphyxiation, burns, and blast injuries, as well as other complications from chemicals and chemical warfare agents, biological toxins and pathogens, and radiation. Infrastructure destruction may include damage to critical sectors that disrupt the production and delivery of essential goods and services (water, public health and emergency services, energy, transportation, postal services), disrupt interconnectedness and operability (information and telecommunications), or degrade public safety and security (government institutions). The infrastructure may be affected not only by the blast caused by high-yield explosives or a nuclear detonation, but also by contamination caused by chemicals or chemical warfare agents, biological toxins and pathogens, or radia-

tion.

Due to the catastrophic nature of a CBRNE incident, a joint force may be required to assist in the response after civilian resources have been depleted. The JFC maintains situational awareness with respect to the incident's cause to better understand the effects and to protect the joint force. Situational awareness is especially important for force protection considerations. Analyzing effects to the populace and infrastructure allows planners to adequately translate the harm caused by the CBRNE incident into the joint force's ability to counteract the harm created by the effects. The counteraction is the essential mission analysis done by joint planners to determine force requirements. Joint planners conduct mission analysis to synchronize DoD's response with the local, state, and federal response.

The CBRNE CM methodology, based on the strategies above, must apply to both foreign and domestic environments. This is important to understand particularly because applicable laws, regulations, and other instructions differ significantly between the foreign and domestic environments. Within the foreign domain, DoD contributes in foreign humanitarian assistance or foreign consequence management. In either case, DoD supports the DOS as the lead federal agency. In foreign humanitarian assistance, DoD typically provides a larger scope of assistance, whereas in foreign CM, DoD usually provides specialized technical assistance in the CBRNE incident response.

Domestically, the NRP, which implements the National Incident Management System (NIMS) framework, governs the response. The NRP outlines a comprehensive approach to managing incidents regardless of their cause. In this sense, the joint force shares a similar approach in focusing on the response rather than the cause of the incident. The NRP signatories designated as primary agencies in their specific functions have designated DoD as a supporting agency for a significant number of tasks. DoD policy is to undertake DSCA when its involvement is appropriate and when a clear end state for DoD's role is defined. Execute Orders (EXORDs) in support of NRP disaster response normally are based on validated requirements that have been funded by the Stafford Act. The EXORD in support of Incidents of National Significance may have to avoid being constrained by these conditions. The assessment prepared by the CAE can help shape the CJCS EXORD for employment. It may be appropriate to provide approval of purpose, desired effect, and scope of action to be taken with sufficient latitude and forces to accomplish critical mission sets such as saving lives, preventing injury, and providing temporary critical life support. The objective might be to provide an 80 percent solution based on the Combatant Commander's assessment/estimate rather than constrain DSCA to only funded mission assignments.

The Assistant Secretary of Defense for Homeland Defense, the Honorable Paul McHale, recently commented on the DoD interaction with civil authorities in execution of NRP tasks. He said "an important tenet of defense support of civil authorities is that DoD is always in support of domestic civil authorities. It is also important to note that the chain of command always runs from the President to the Secretary of Defense to the Combatant Commander concerned. The Department fully supports the Incident Command System of the National Incident Management System. However, at no time does the supported agency exercise any command and control over DoD forces." [6]

CM Doctrine Development

The development process in designing Joint Publication (JP) 3-41, *Doctrine for Chemical, Biological, Radiological, Nuclear, and High Yield Explosive Consequence Management* follows the Chairman of the Joint Chiefs of Staff Instruction 5120.02, *Joint Doctrine Development Process*. USNORTHCOM serves as the lead agent overseeing the publication's life cycle and JTF-CS serves as the primary review authority. The inherent responsibility for JTF-CS by this authority is to serve as the author. In this capacity, preparation of the drafts and resolution of all comments is important to accomplish within the prescribed development times. The joint doctrine sponsor is the Joint Staff J3. The Defense Threat Reduction Agency (DTRA) and the Joint Staff J8, Joint Requirements Office for Chemical, Biological, Radiological, Nuclear Defense (JRO-CBRND), serve as technical review authorities. Both DTRA and the JRO-CBRND provide invaluable technical expertise as well as research and key input to the draft writing through the development of the publication. There has been a strong collaborative effort between these organizations dur-

ing each step of this process. It is expected that JP 3-41 should be final by the summer of 2006.

Summary

Joint doctrine serves a critical need in providing essential guidance for joint force employment. Since joint doctrine provides "fundamental principles that guide the employment of US military forces in coordinated action toward a common objective," [7] it is essential that CBRNE CM operations are included. There is a clear common objective to assist civil authorities in response to CBRNE incidents. National strategies and plans provide guidance that is considered in the development of the doctrine. DoD policy, plans, and strategy provide more specific guidance. This joint doctrine provides greater clarity to assist the JFC in CBRNE CM operations, both domestically and abroad.

Mr. Rich Burmood is a Senior Doctrine and Plans Analyst at Joint Task Force Civil Support. He has a B.S. from Colorado State University, and a M.S. in Operations Research from the University of Southern California.

Major Kirk Hunter is a Joint CBRNE CM Plans Officer at Joint Task Force Civil Support. He has a B.S. from the United States Military Academy at West Point.

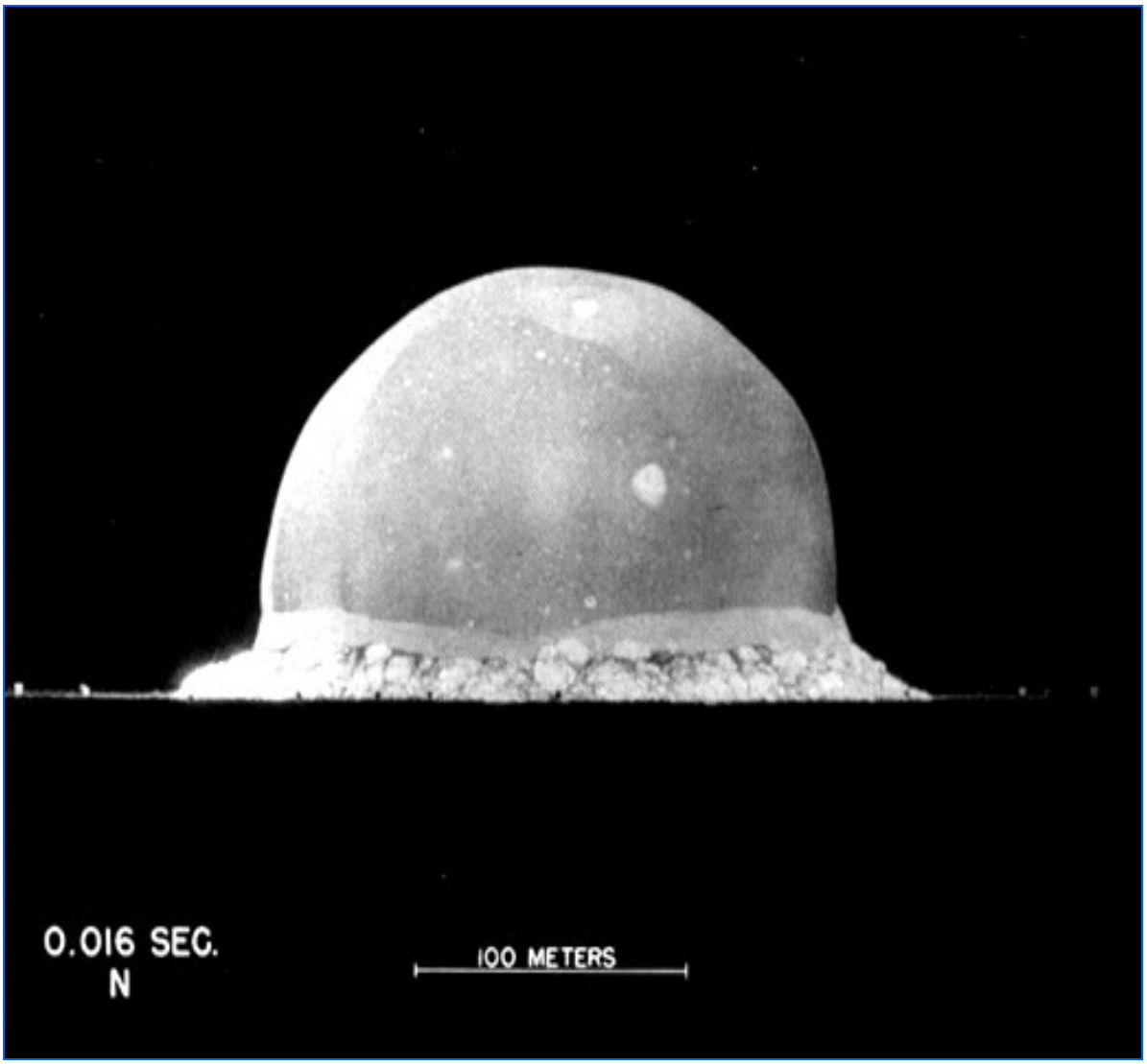
END NOTES

[1] The National Security Strategy of the United States of America, September 2002, 14.
[2] The National Strategy for Homeland Security, July 2002, 42.
[3] National Strategy to Combat Weapons of Mass Destruction, December 2002, 5.
[4] The National Defense Strategy of the United States of America, March 2005, 9.
[5] DODD 5100.46, Foreign Disaster Relief, 4 December 1975, 2.
[6] Statement by Honorable Paul McHale, Assistant Secretary of Defense for Homeland Defense before the 109th Congress Subcommittee on Terrorism, Unconventional Threats and Capabilities, Committee on Armed Services, United States House of Representatives, March 15, 2005.
[7] CJCSI 5120.02, Joint Doctrine Development System, 30 November 2004, A-1.

TRINITY – Beginning of the Atomic Age (Part I)

Mr. Martin W. Moakler, Jr.
United States Army Nuclear and Chemical Agency

For most of the early morning on 16 July 1945, it rained cats and dogs with wind gusts up to thirty miles an hour, blinding lightening and deafening thunder. Night rains in desert areas like Socorro, New Mexico were particularly fierce due to large thermal energies developed during the day forming the tropical air masses that create these storms, but their strength typically collapses at dawn and the weather clears up. About 5:00 a.m. Mountain War Time, the rains stopped and the winds died down as predicted. A serene, peaceful calm fell over the desert between the cities of Socorro and Alamogordo, New Mexico. At 5:29 a.m., the sky lit up with the radiance of a small sun.



Trinity at 0.016 second.

Trinity at 10 seconds.

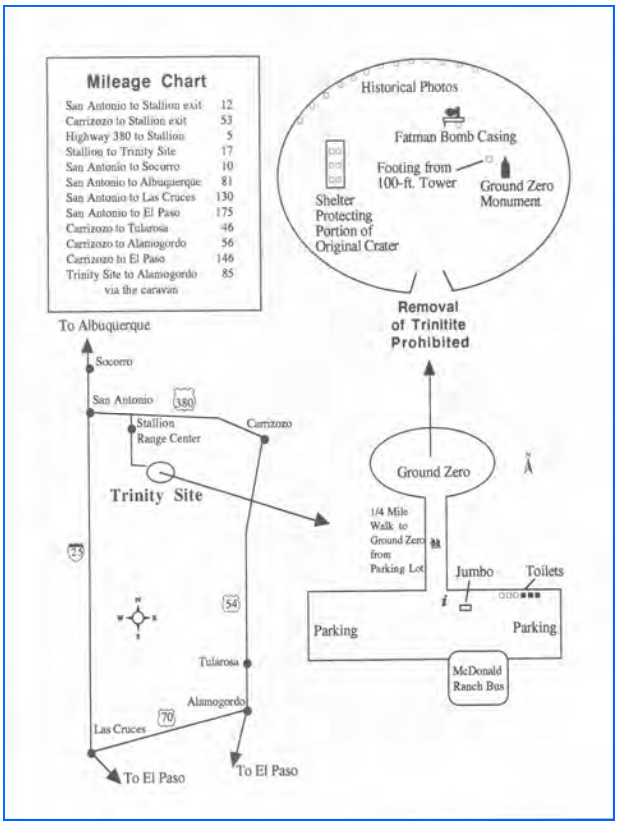
Trinity Colorized.

The brilliance of the white ball grew for two to three seconds and then became clouded with dust whipped up by the explosion from the ground, leaving a black trail of dust particles. Only minutes later the real sun rose, providing a morning of two sunrises. The world had been ushered into the atomic era.

Trinity Site: A National Historic Landmark

Every Functional Area 52 (FA52) officer attends the Nuclear Counterproliferation 52 (NCP52) course (formerly known as the Nuclear Research Operations Officer Course (NROOC)) for qualification initial entry training and conducts a pilgrimage to the Trinity Site, the site of the first nuclear bomb test located on White Sands Missile Range (WSMR) near Socorro, New Mexico (WSMR, 1995). This 51,500-acre area was declared a national historical landmark in 1975. The landmark includes: the Base Camp, where the scientists and support groups lived; Ground Zero, where the

WSMR Shoulder Patch.



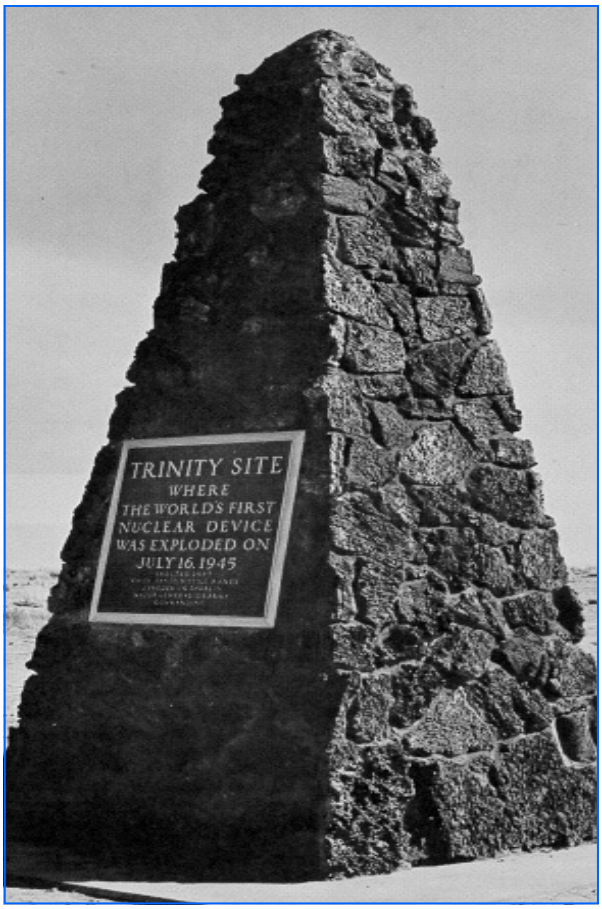
Trinity Site Map (WSMR, 1995).

bomb was detonated; and the McDonald Ranch House, where the plutonium core of the bomb was assembled. From the parking area, you begin the quarter mile walk to Ground Zero with a sense of awe and apprehension.

Ground Zero Monument

As you walk over to the Ground Zero monument, you see the remains of the footing of the one hundred foot tower that once held the first nuclear bomb prior to its detonation. You feel the crunching of the trinitite, which is the remnant silicon slag formed by the intense heat of the nuclear weapon upon the desert sands, under your feet as you move.

You feel a somber sense of reverence as you realize the true power and energy associated with the first nuclear bomb detonation. Army FA52 officers have a strong affinity with the Trinity Site. The technical aspects of the Manhattan Project and Trinity, its first nuclear test, are well known by



Ground Zero Monument.

most FA52 officers. The purpose of this article is not to readdress these technical aspects of the Trinity event. Rather, this article is geared to be a historical mélange of facts, events, and circumstances surrounding the Trinity event and will be

Trinitite Sample.

published in three parts. The themes that will be addressed are: Part One - the Manhattan Engineer District; Part Two - Trinity test preparation and interactions with President Truman; and finally Part Three – first hand recollections of the Trinity Test. This first article focuses on the Manhattan Engineer District (MED).

The Manhattan Engineer District

The MED was established by the US Army Corps of Engineers in September 1942 to build the atomic bomb (Manhattan Project, 2005).

Brigadier General Leslie Groves was placed in command of the MED. Groves was born in Albany, New York, August 17, 1896 (General Leslie Groves, 2004). His father was an Army chaplain so he was an Army brat who moved to follow his father's assignments. He claimed no place as his home. He attended the University of Washington for one year and the Massachusetts Institute of Technology for two years before entering West Point from which he graduated fourth in his class

MED Unit Patch.

BG Leslie Groves.

in 1918. He was commissioned as a Second Lieutenant in the Army Corps of Engineers.

He completed the basic and civil engineering courses at the Engineer School at Camp Humphreys, Virginia (later renamed as Fort Belvoir).

By the summer of 1942, Groves was Deputy to the Chief of Construction for the Army Corps of Engineers and successfully oversaw the construction of the Pentagon, the world's largest office building.

BG Groves was charged to marshal the scientific and manufacturing resources of the US to

Pentagon (Great Buildings, 2005).

build an atomic weapon before any enemy could do so (Manhattan Project, 2005). This was called the Manhattan Project. The Manhattan Project plan was to create two atomic weapons: one fueled by plutonium and the other by enriched uranium. Under BG Grove's command, the MED expanded to three large engineering and production centers at remote US sites: the Clinton Engineer Works at Oak Ridge, Tennessee; the Hanford Engineer Works in eastern Washington State; and Site-Y, a code-named site one hundred miles north of Albuquerque at Los Alamos, New Mexico.

Clinton Engineer Works (Oak Ridge, Tennessee)

The mission of Oak Ridge was to produce enriched uranium for the first atomic bombs (Manhattan Project, 2005). The site was selected because the Clinch River provided ample supplies of water, nearby Knoxville was a good source of labor, and the Tennessee Valley Authority (TVA) could supply the huge amounts of electricity needed. BG Groves ordered acquisition of the 56,200 acre site on 19 September 1942 in a tightly controlled security area spanning three Appalachian valleys. Oak Ridge expanded into four

Site X-10 Roadside Historic Marker.

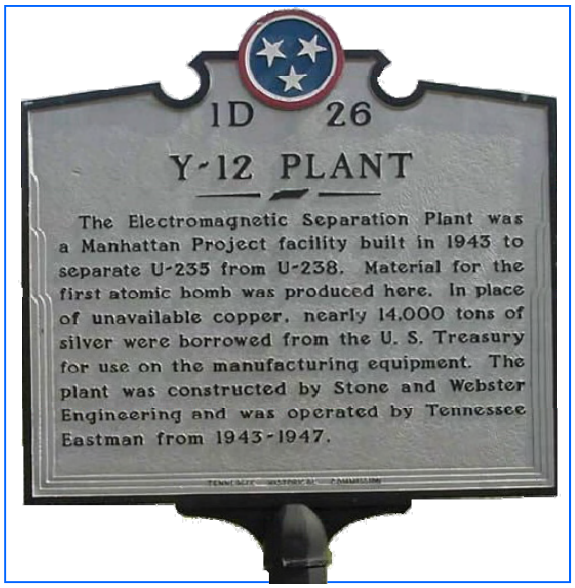
Site X-10: Graphite Reactor.

sites: X-10, Y-12, K-25, and S-50. The Oak Ridge X-10 site was built in 1942 as the Clinton Engineer Works ten miles southwest of the city of Oak Ridge.

Site X-10 was a graphic reactor designed to demonstrate that plutonium could be feasibly extracted from irradiated uranium slugs.

The Oak Ridge Y-12 plant was designed to separate U235 from natural uranium using the electromagnetic separation method using large calutrons.

Because of the war time shortage of copper, 14,700 tons of silver from the US Treasury were



Site Y-12 Roadside Historic Marker.

Site Y-12: Uranium Enrichment by Electromagnetic Separation.

Site K-25: Uranium Enrichment by Gaseous Diffusion.

used in the calutron windings and associated electrical conductors.

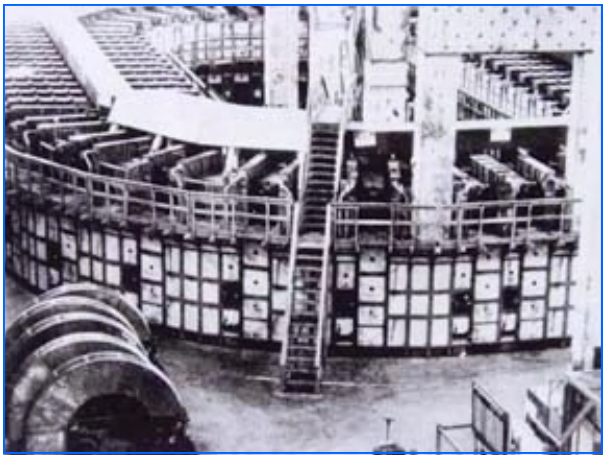
The K-25 Site, approximately thirteen miles west of Oak Ridge, became the world's first gaseous diffusion plant, the method of uranium enrichment championed by the British.

K-25 Plant Run by Union Carbide.

K-25 covered approximately forty-four acres with the K-25 building being the world's largest roofed structure when it was completed in March 1945.

Finally, BG Groves decided to invest in a third technique, thermal diffusion. The thermal diffusion facility, named S-50, consisted of 2,142 columns, each over forty feet tall, and was constructed and operational in ninety days.

As of April 1945, none of the processes worked well. Oppenheimer devised a desperate solution that the three enrichment processes be run seri-



Gaseous Diffusion Cascades.

ally. The thermal diffusion process achieved less than two percent enrichment but this slightly enriched material greatly increased the efficiency of the gaseous diffusion process. When this product, enriched to about 23 percent U-235, was fed

Site S-50: Uranium Enrichment by Thermal Diffusion.

into the calutrons of the electromagnetic separation process, the result was good enough for weapons. By the spring of 1945, Oak Ridge had shipped approximately 132 pounds of enriched uranium to Los Alamos, Site-Y, where the bomb was designed and would be assembled. The Oak Ridge uranium was used in "Little Boy", the bomb dropped on Hiroshima on 6 August 1945.

Hanford Plutonium Chemical Separation Plant.

Hanford Engineer Works (Hanford, WA)

The second of the major Manhattan Engineer District sites was Hanford Engineer Works near Richland, WA along the Columbia River (Manhattan Project, 2005). Hanford's location was chosen for its isolation, readily available hydroelectric power from Grand Coulee and Bonneville Dams, abundant supply of Columbia River water, large amount of land, a deep water table, and soil that could support massive structures. To build the Hanford facility, close to a half-million acres were purchased for the War Department by the spring of 1943. DuPont Corporation was the site's first contractor. Its mission was production of weapons grade plutonium for use in the Trinity

Hanford Plutonium Breeder Reactor.

bomb and the Nagasaki bomb.

Using the process piloted and validated at the X-10 Site at Oak Ridge, Hanford built three water cooled reactors used to breed P-239 and two chemical separation plants to produce the plutonium paste.

The plutonium paste was shipped to Los Alamos, NM for conversion to metallic plutonium and the creation of the atomic weapons components. The first shipment of plutonium left Hanford for Los Alamos on 2 February 1945. The first shipments culminated in the construction of the first nuclear bomb, which was detonated on 16 July 1945, at the Trinity Site near Alamogordo, New Mexico. The Hanford plutonium was used in the "Fat Man" bomb, which was detonated on 9 August 1945 over Nagasaki, Japan.

Los Alamos, New Mexico

The Manhattan Project required a site where scientific and engineering research and development, finishing of raw materials, final assembly, and testing of the atomic bomb could take place (Manhattan Project, 2005). This site was at Los Alamos, New Mexico. In March 1943, BG Leslie Groves, as the MED Commander, selected Dr. J. Robert Oppenheimer to manage the Manhattan Project.

Dr. Oppenheimer and BG Groves.

Oppenheimer recommended the site of the Los Alamos Ranch School, located about thirty-five miles northwest of Santa Fe. It was an ideal, secluded location for the top secret site. Construction of the new laboratory began almost immediately.

Los Alamos Basecamp.

Los Alamos Basic Officer Quarters.

Broad View of the Los Alamos Technical Area.

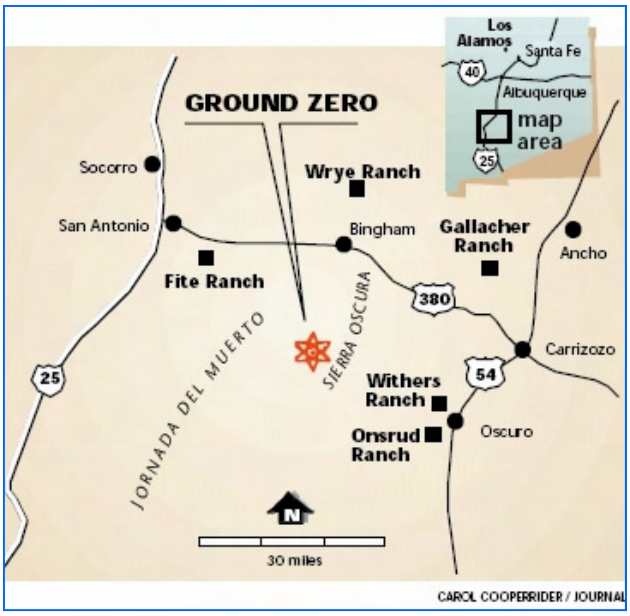
MPs Patrolling the Top Secret Facility.

The team that Oppenheimer assembled in 1943 had the task of turning the theory of nuclear fission into a practical weapon. The theoretical underpinnings were done at Los Alamos. It was at Site Y where theory was applied.

Site Y (Trinity Site near Los Alamos, NM)

Site Y was located on the Alamogordo Bombing and Gunnery Range, about 230 miles south of the Manhattan Project's headquarters at Los Alamos, New Mexico (Manhattan Project, 2005).

This 3,200 square mile range is now known as the White Sands Missile Range (WSMR) and is actively used for non-nuclear weapons testing.



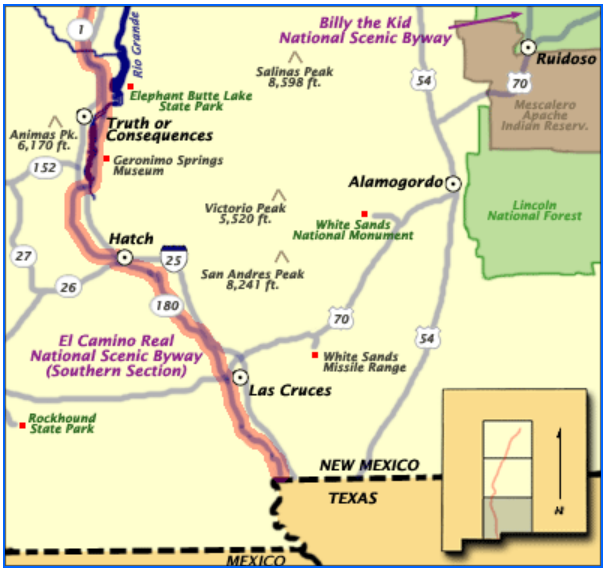
Site Y (Thompson, 1995).

Before World War II, the range was mostly public and private grazing land. During the war, the owning ranchers agreed to vacate the area to establish artillery and bombing practice areas for the War Department.

General George Patton (n.d.).

The selection of this remote location in the Jornada del Muerto Valley for the Trinity test was from an initial list of eight possible test sites. Based on a number of criteria that included availability, distance from Los Alamos, good weather, few or no settlements, and that no Indian land would be used, the choices for the test site were narrowed down to two.

First choice was the military training area in southern California. The second choice was the Jornada del Muerto Valley in New Mexico. When BG Groves discovered that in order to use the California location he would need the permission of its military commander, Major General George Patton, Groves quickly opted for Jornada del Muerto site. Groves did not want anything to do with the flamboyant Patton, who Groves had described as the most disagreeable man that he had ever met (Szasz, 1984). Jornada del Muerto proved to be a good location for the test, since it provided isolation for secrecy and safety, was only 230 miles south of Los Alamos, was already under military control, and had relatively good weather (Manhattan Project, 2005).



El Camino Real Southern New Mexico (National Scenic Byways Online, 2005).

The history of the Jornada del Muerto is in itself quite fascinating, since it was given its name by the Spanish conquerors of New Mexico. The Jornada del Muerto was a short cut on the Camino Real, the King's Highway that linked old Mexico to Santa Fe, New Mexico's capital.

The Camino Real went north from Mexico City till it joined the Rio Grande near present day El Paso, Texas. Then the trail followed the river valley further north to a point where the river curved to the west, and its valley narrowed and became impassable for the supply wagons. To avoid this obstacle, the wagons took the dubious detour north across the Jornada del Muerto through sixty miles of desert, with very little water and numerous hostile Apaches. Hence the name, Jornada del Muerto, which is often translated as "the journey of death" or as "the route of the dead man."

The Costs of the Manhattan Project

How much did the Manhattan Project cost? Ac-

Table 1. Manhattan Project Costs through 31 December 31 1945

Site/Project	Then-year Dollars	Constant 1996 Dollars
OAK RIDGE (Total)	$1,188,352,000	$13,565,662,000
K-25 Gaseous Diffusion Plant	$512,166,000	$5,846,644,000
Y-12 Electromagnetic Plant	$477,631,000	$5,452,409,000
Clinton Engineer Works, HQ and central utilities	$155,951,000	$1,780,263,000
Clinton Laboratories	$26,932,000	$307,443,000
S-50 Thermal Diffusion Plant	$15,672,000	$178,904,000
HANFORD ENGINEER WORKS	$390,124,000	$4,453,470,000
Special Operating Materials	$103,369,000	$1,180,011,000
LOS ALAMOS PROJECT	$74,055,000	$845,377,000
Research and Development	$69,681,000	$795,445,000
Government Overhead	$37,255,000	$425,285,000
Heavy Water Plants	$26,768,000	$305,571,000
GRAND TOTAL	$1,889,604,000	$21,570,821,000

cording to Stephen Schwartz from the Brookings Institute (1998), the cumulative costs of the Manhattan Project through 31 December 1945 by site in then-year dollars and constant 1996 dollars is depicted in the Table 1.

Since there were four bombs produced (Gadget, Little Boy, Fat Man, and Bomb No. 4), the amortized cost for each bomb was approximately $5 billion. How does that expenditure compare with the rest of World War II? The total cost to the US for World War II was approximately $3.3 trillion. This is how much other World War II combat systems expenditures were: $64 billion was spent on tanks, $38 billion was spent on artillery, and $31.5 billion was spent on the production of all bombs, mines, and grenades. You make the value comparisons.

Intermission – The End of Part 1 – The Story Continues

This ends the first part of this article. Parts Two and Three will be continued in the next two issues of *NBC Report*. The next part will cover much more of the Los Alamos Laboratory and the Site Y preparations for the Trinity test. Also in Part Two, interactions with President Truman will be unveiled. Part Three of this article will focus on the Trinity test itself and personal testimonies of people who witnessed that historic moment.

Mr. Martin Moakler is a retired Army FA52 Colonel and is currently working as a physical scientist in the Nuclear Division at USANCA. His previous assignment was as Chief of the Nuclear Division at USANCA. He earned a M.S. in Nuclear Engineering and Computer Science from Rensselaer Polytechnic Institute, a M.S. in Engineering Management form the University of Missouri-Rolla, a M.S. in Education from Old Dominion University, and is a graduate of the US Army War College. His email address is moakler@usanca-smtp.army.mil.

PHOTOGRAPHS:

Unless cited differently, all pictures used in this article came from a webpage titled "Manhattan Project Heritage Preservation Association, Inc" located at: http://www.childrenofthemanhattanproject.org/index.htm. The site has a wealth of primary references letters, pictures, and memorabilia) concerning the Manhattan Project. I highly recommend this site.

REFERENCES:

General Leslie Groves. (2004). Retrieved 4 April 2005 from http://www.atomicarchive.com/Bios/Groves.shtml

General George S. Patton (n.d.). Retrieved 4 April 2005 from http://generalpatton.com/

Great Buildings: The Pentagon. (2005). Retrieved 4 April 2005 from http://www.greatbuildings.com/buildings/The_Pentagon.html

Lamount, L. (1985). *Day of trinity*. New York, NY: Antheneum.

Manhattan Project Heritage Preservation Association, Inc. (MPHPA) (n.d.). Retrieved 4 April 2005 from http://www.childrenofthemanhattanproject.org/index.htm.

Manhattan Project (n.d.). Retrieve 4 April 2005 from http://www.olive-drab.com/od_other_nuclear.php

National Scenic Byways Online. (2005). *El Camino Real – New Mexico.* Retrieve 4 April 2005 from http://www.byways.org/browse/byways/2065/travel.html?map=429

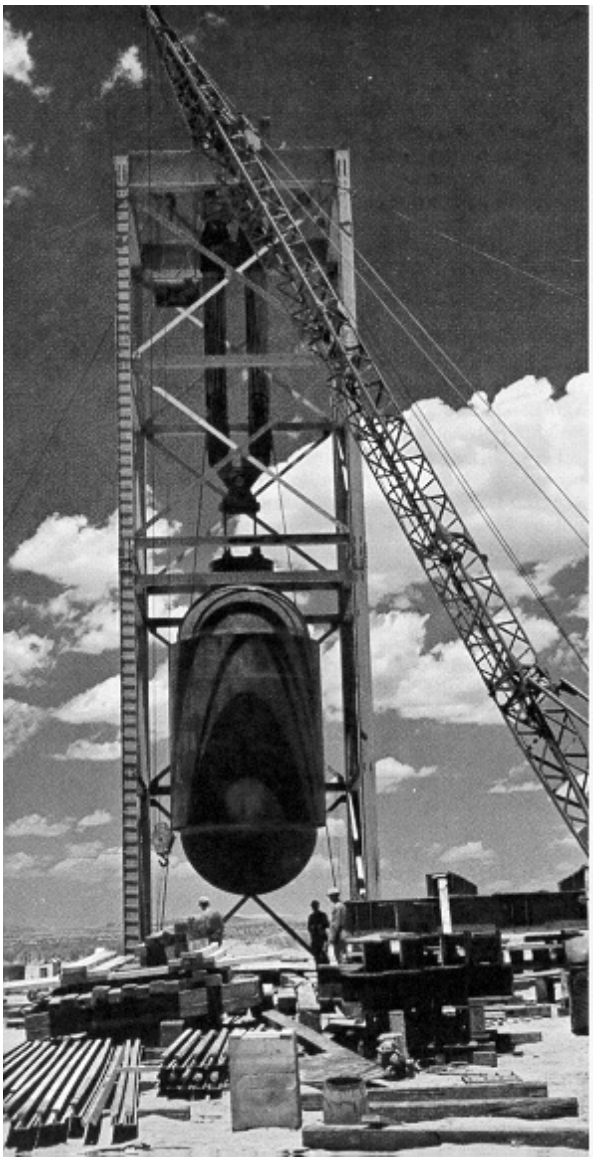
Rhodes, R. (1986). *The Making of the Atomic Bomb*. New York, NY: Simon & Schuster, Inc.

Schwartz, S. I. (1998). *Atomic Audit: The Costs and Consequences of U.S. Nuclear Weapons Since 1940.* Washington DC: Brookings Institution Press.

Szasz, F. (1984). *The Day the Sun Rose Twice. Albuquerque: University of New Mexico Press.*

Thompson, F. (1995). *Locals Witnessed History in a Flash.* Albuquerque Journal Special Reprint, July 1995.

White Sands Missile Range (WSMR) (1995). *Trinity site: 1945- 1995* (1995-674-816-25052). Washington, DC: U.S. Government Printing Office.



A 214 ton container called "Jumbo" was built to contain the plutonium core of the Trinity device.

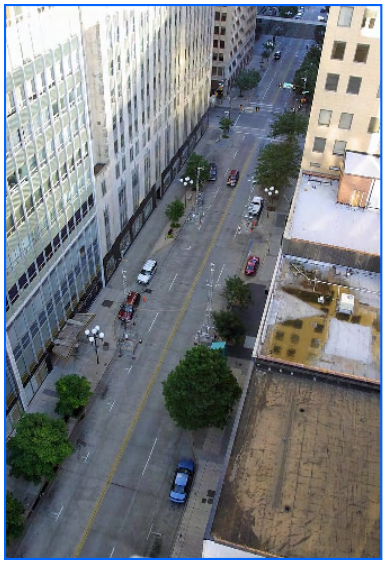
Joint Urban 2003 Atmospheric Dispersion Study

Mr. Donald P. Storwold Jr.
Dugway Proving Ground

For many years, the United States (US) government has been developing, improving and validating atmospheric models to simulate contaminant dispersal in and around cities, into building interiors, and into the surrounding regions. These models allow emergency management, law enforcement, and other personnel to plan for, train for, and respond to potential terrorists attacks and accidents involving toxic industrial chemicals.

The Meteorology Division at Dugway Proving Ground (DPG) West Desert Test Center (WDTC) has assisted with the technical management of the US Department of Defense (DoD) – Defense Threat Reduction Agency (DTRA) Urban Dispersion Modeling Program since the program began in the fall of 1999. One of the challenges faced by the program has been a lack of urban meteorological and dispersion measurements, which are scarce because of the logistical problems and expense of conducting field studies in real cities. Consequently, the US Department of Homeland Security (DHS), the US Department of Energy (DOE), and DTRA have funded wind tunnel and water channel urban flow and dispersion experiments to obtain data needed to develop and test urban models. Additionally, in September 2001 WDTC conducted the Mock Urban Setting Test (MUST), a scaled urban dispersion experiment which used an array of 144 shipping containers as a model city. Since these experiments could not account for all of the effects of real urban areas, however, DTRA and DHS/DOE agreed to collaborate on a full-scale dispersion experiment in a US city – Joint Urban 2003.

Co-located PWIDS & SuperPWIDS.



Aerial View Of Primary Street Canyon.

Instrumented Towers In Street Canyon.

The Joint Urban 2003 atmospheric dispersion study was conducted in Oklahoma City, Oklahoma, in July 2003. Oklahoma City was selected as the experimental site because of its flat terrain, well-defined central city, moderate size, well-characterized climatology, and world-class supporting meteorological instrumentation already in use throughout the surrounding countryside. The city was very cooperative in hosting the study. City representatives provided vital support and assistance in preparing for the effort and during the experiment conduct.

Participation

Over 150 scientists

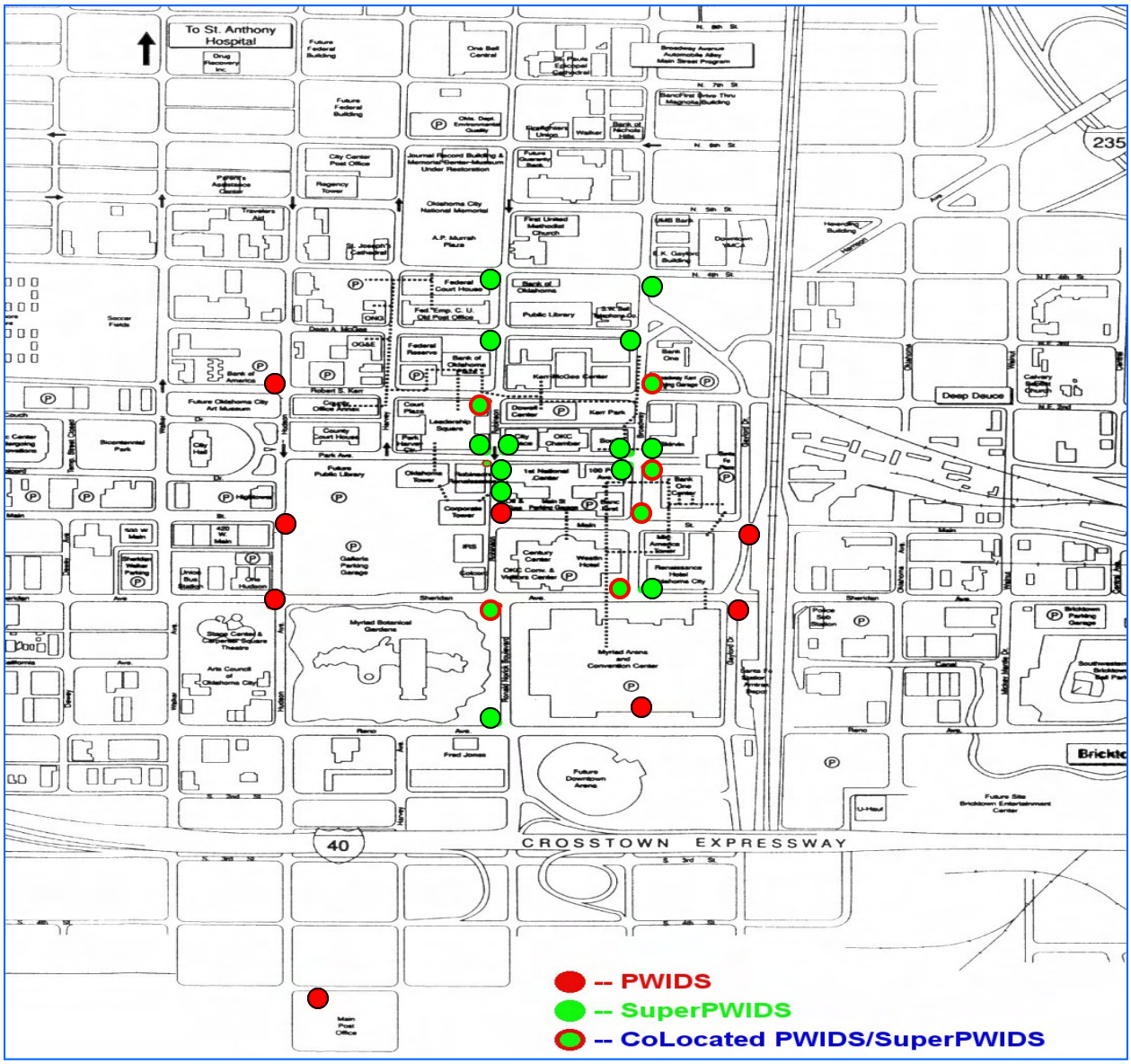


Figure 1. Map Of PWIDS/SuperPWIDS Locations During JU2003.

from DoD research laboratories, the National Oceanic and Atmospheric Administration (NOAA), DOE national laboratories, and a number of universities participated in Joint Urban 2003. Table 1 (page 36) provides a complete list of organizations that participated in Joint Urban 2003 and their contributions (datasets) to the experiment.

Dugway's Meteorology Division was tasked with providing a year-long study of the street canyon winds for the year prior to Joint Urban 2003. During Joint Urban 2003, the Dugway Meteorology Division provided street canyon wind data, street level turbulence measurements, upper-atmospheric measurements, and wind profile information. Dugway fielded fifteen Portable Weather Information Display Systems (PWIDS), twenty SuperPWIDS, a Sound Detection and Ranging (miniSODAR) Doppler acoustic sounder, a Frequency Modulated/Continuous Wave (FM/CW) radar, and a tethersonde system. Figure 1 is a map of PWIDS/SuperPWIDS locations in the central business district (CBD) of Oklahoma City.

In addition to instrumentation, Dugway was also tasked with the creation and multiyear maintenance of the database/website that would permanently archive data collected by all participants during Joint Urban 2003. Database access was

Table 1. JU2003 Participant Datasets

Air Resources Laboratory Field Research Division (ARLFRD)
- Dissemination site sonic
- Dissemination site temp & RH
- Samplers (PIGS)
- Samplers (SuperPIGS)
- SF_6 release data
- SODAR

Argonne National Laboratory (ANL)
- Profiler
- RASS
- Rawinsonde
- SODAR

Arizona State University (ASU)
- Energy budget
- Sonic (3 instruments)
- 5-min mean

Army Research Laboratory (ARL)
- Lidar
- Radiometer (surface)
- Radiometer (profile)
- Rawinsonde
- 10-m sonic (5 instruments)
- 5-m sonic (2 instruments)
- 2.5-m sonic (5 instruments)

Defence Science and Technology Laboratory (DSTL)

Indiana University (IU)
- Energy data
- Flux data
- Sonic (8 instruments)
- Thermocouple data

International Telephone & Telegraph (ITT)
- Samplers
- Sonic (11 instruments)
- 10-min mean sonic

Los Alamos National Laboratory (LANL)
- Sonic (5 instruments)
- 10-min mean sonic

Lawrence Berkley National Laboratory (LBNL)
- Differential pressure sensors
- Samplers

Lawrence Livermore National Laboratory (LLNL)
- Sonic crane (8 instruments)
- Blue box sampler

National Weather Service (NWS)
- Bulletins
- Doppler radar
- Gempak
- Satellite
- Text

NOAA ARL Atmospheric Turbulence and Diffusion Division (ATDD)
- Aircraft data (Twin Otter)
- Flux data (3 sites)
- Pressure data (3 sites)
- Sonic (2 towers with 4 levels each)

University of Oklahoma (OU)
- Mesonet
- Mesonet soil
- Profiler
- RASS
- Sonic tower

U.S. Army Dugway Proving Ground (DPG)
- ETA Model Data
- FM/CW radar (time sync images)
- MEDOC
- MiniSODAR
- PWIDS (climatology) (15 instruments)
- PWIDS (JU2003) (15 instruments)
- RTFDDA
- SuperPWIDS (3-D sonics) (20 instruments)
- sonicTethersonde

Pacific Northwest National Laboratory (PNNL)
- Photos (zipped file)
- Profiler
- Surface met (5 stations)
- SODAR
- RASS
- 2-m temperature (33 instruments)

University of Hamburg (UHam)
- Wind tunnel reports

University of Houston (UH)
- SODAR

University of Utah (UU)
- SODAR
- Sonic
- Sonic
- Tethersonde

Volpe
- Samplers

Washington State University (WSU)
- Samplers

restricted to experiment participants until 31 January 2005, when the database was opened to public access. Database access is accomplished via a web browser at https://ju2003-dpg.dpg.army.mil.

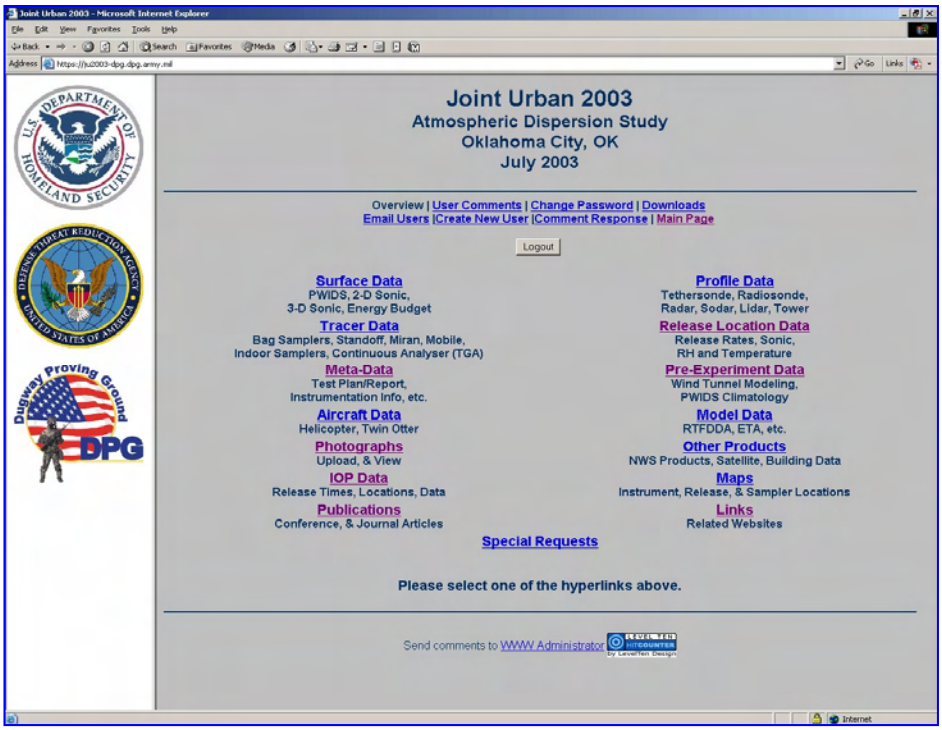


Figure 2. JU2003 Database/Website Screen Snapshot.

Figure 2 shows the home page for the Joint Urban 2003 website and database.

Jim Bowers, Chief of the DPG Meteorology Division, served as a member of both the Joint Urban 2003 Management and Science Teams. Other Meteorology Division members who participated in the experiment in Oklahoma City included Dr. Frank Gallagher, Paul Broderick, Rick Davis, Bill Grayson, and Donny Storwold, the DPG test director. Scott Halvorson and Erik Vernon serve as the Joint Urban 2003 database administrator and webmaster, respectively. Susan Gross provided administrative support.

Experiment Conduct

Ten Intensive Operating Periods (IOP) were conducted during Joint Urban 2003, with each IOP lasting approximately eight hours. During the IOP's, sulfur hexafluoride (SF_6), a safe, inert tracer gas, was released for short periods of time. Hundreds of portable tracer samplers were placed throughout the urban core of Oklahoma City to collect outdoor and indoor air samples for several hours after SF_6 was released in order to track its movement throughout the central business district.

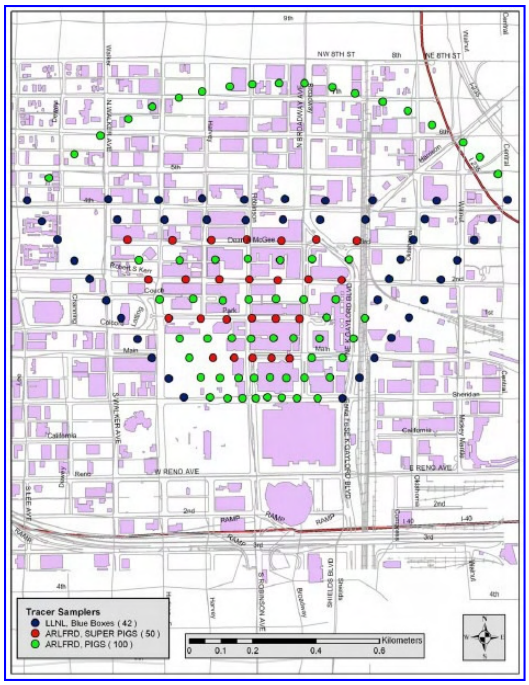


Figure 3. Sampler Locations During JU2003.

At the end of each IOP, the tracer samples were collected and taken to a laboratory for analysis.

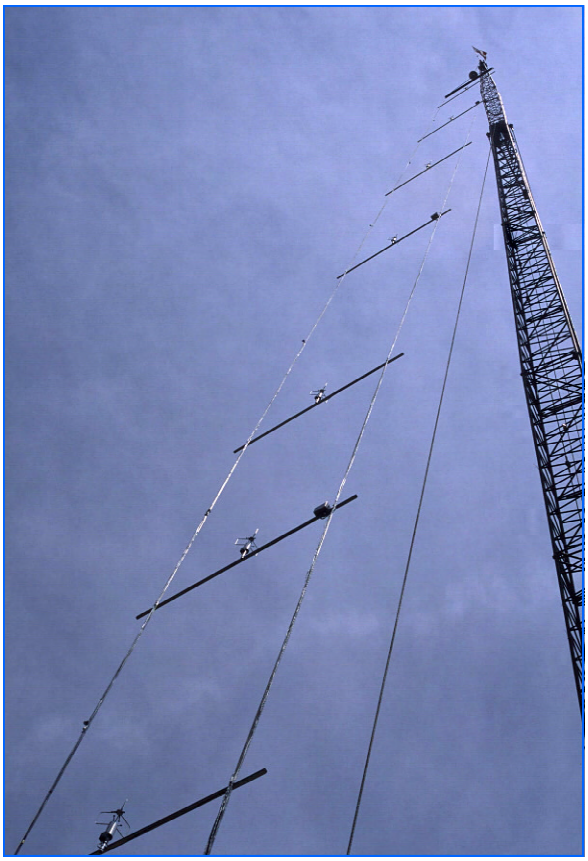
All IOP's consisted of a combination of either a puff or a continuous release of SF_6. The first six IOP's were conducted during the daylight hours while the final four were conducted at night. Figure 3 (page 37) provides a map with some of the locations of the SF_6 samplers.

A question that often arises about gaseous tracer studies is the safety of the tracer materials. Government and private organizations in the US and Europe have safely and successfully used these tracer gases for many years in both indoor and outdoor studies. SF_6 is commonly used as a gaseous insulator in high voltage electrical equipment, in foam insulation, gas-filled athletic shoes, tennis balls, loudspeakers, shock absorbers, sound-insulating windows, in the semiconductor industry and in many other applications.

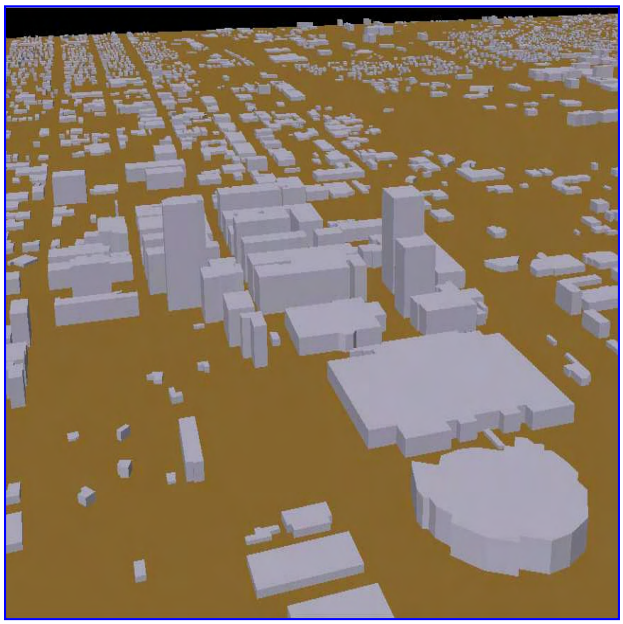
Results

The Joint Urban 2003 study advanced the knowledge about movement of contaminants in and around cities and into and within building interiors. The resulting data are being used to improve, refine and verify computer models that simulate the atmospheric transport of contaminants in urban areas. In addition to generating data to validate models, the results from studies such as Joint Urban 2003 are used to identify and explain the physical processes governing dispersion in urban environments and through the interior of buildings.

Mr. Donald P. Storwold Jr. is a Physical Scientist in the Meteorology Division at Dugway Proving Ground. He has an Associates in Electronic Technology from Salt Lake Community College and a B.S. in Business Information Systems from Utah State University. His email address is donald.storwold@us.army.mil.



Crane supporting samplers & sonic anemometers.



Graphic representation of Oklahoma City central business district (CBD).

Methodology for NBC Contamination Survivability Paper Study

Mr. William G. Davis and Mr. Michael S. Ford
West Desert Test Center, Dugway Proving Ground

The West Desert Test Center (WDTC) is the nation's premier chemical and biological testing location, specializing in the testing and evaluation of equipment and materials that support the defense of our armed forces against nuclear, biological, and chemical (NBC) threats. All activities take place at the US Army's Dugway Proving Ground (DPG), located in the west desert about 80 miles southwest of Salt Lake City and 110 miles southeast of the Bonneville Salt Flats. DPG is operated by the US Army, but as a Joint Services test site it supports all of the armed Services and some non-military government agencies, particularly those in law enforcement and homeland security.

Army Regulation 70-75 *Survivability of Army Personnel and Material*, requires any new fielded item to withstand the rigors of the NBC battlefield, including both agents and decontaminants. Testing with live agent is the best and only definitive way to assure new items will pass this requirement. However, live agent testing is frequently impractical due to the size or cost of an item. Vehicles, or items "bigger than a breadbox," do not fit in a standard chemical hood and must be moved to a chamber. Moreover, following exposure to agent and subsequent decontamination, test items are assigned a "XXX" or "3X" safety level meaning they cannot leave government control and thus cannot be returned to their manufacturer. 3X items that can be re-used on DPG are stored; anything else departs the base for disposal as hazardous waste. Therefore, an NBC Contamination Survivability Assessment (NBCCSA) or "paper study" is often the developer's best option. This article will describe how these paper studies are done.

A paper study is an assessment of the expected ability of the subject system to meet the criteria of AR 70-75. The primary issue is the reaction of the system to agent as well as the effect of decontaminants, which can be very corrosive and damaging. Specifically, we are trying to determine:

1) Decontaminability: can the item be decontaminated to a point where unprotected personnel can work on, inside or within one meter of the item;
2) Hardness: will the system suffer less than 20% degradation in mission essential functions after 30 days and five cycles of NBC contamination and decontamination, and
3) Compatibility: can the item be safely and effectively operated by personnel wearing mission oriented protective posture (MOPP) gear?

Decontaminability criteria are specified in the Quadripartite Standardization Agreement 747 and promulgated in this country by the US Army Nuclear and Chemical Agency (USANCA). For nuclear and biological

NBC Contamination Survivability Criteria.

NBC Contamination Survivability Criteria	
Decontaminability	Can the item be decontaminated to a safe level?
Hardness	Will the item work as intended in an NBC environment?
Compatibility	Can the item be used effectively in MOPP4?

agents, effective decontamination is determined by the reduction in the number of radioactive particles, spores, or colony forming units. Nuclear decon is done with hot, soapy water, and has little or no effect on most non-electronic systems. Biological decon is done using a bleach solution, with small effect on many military systems. Chemical weapon agents (CWAs), though, are much more difficult to remove or render harmless. The objective of chemical decon is arriving at a "negligible risk level" as defined by the Army's survivability program and expressed in milligrams of liquid agent per man, or a vapor dosage in milligram-minutes/cubic meter. Hardness is generally a pass/fail judgment, depending on whether the item survives the test intact, or falls apart, although system degradation may occur, as is the case with optical systems. Compatibility is a measure of whether or not soldiers in MOPP gear can use the system, and is usually assessed on a pass/fail basis.

The task of conducting a paper study usually falls to a member of the Decontamination Group within WDTC's Chemical Test Branch. WDTC has scores of scientists, largely chemists, but representing many other scientific disciplines including mathematics, physics, geophysics, geology, and engineering. Since the Decontamination Group is quite diverse, it allows selection of a member whose specialty best compliments the requirements of the test.

The scientist first contacts the requesting agency to gather information about the item. This will include a description of the item, how it would be used on the battlefield, how it is packaged and transported, and under what circumstances it would most likely be exposed to NBC contamination. User manuals, operating instructions, or any source of information describing how the item is constructed or operated is useful here. Ideally, the scientist will view, handle, and measure the item directly, with a member of the development team on hand to answer questions. He will take photographs of the item with close-ups focused on those areas that are likely to present a problem. Nooks, crannies, seams, hinges, handles, and gaskets can trap agent and subsequently protect it from decontaminants. The low surface tension of chemical agents allows them to seep into areas where water would just run off, making it difficult to remove or detoxify the agent during decontamination. The scientist will observe and document these areas photographically and with notes, to support the later writing of the report.

In addition to the visual inspection, a list of materials is essential. Experience has shown that a complete list of materials is surprisingly difficult to obtain, even from the manufacturer. The list should include the composition of any part or surface which might come into contact with NBC contamination and/or decontaminants. CWAs are soluble in many plastics, resins, coatings, and elastomers, which could directly result in damage or complete destruction of lenses and covers. Elastomers, particularly rubber tires, will absorb and protect CWAs from decontamination efforts, and subsequently release toxic vapors as the agents desorb. The WDTC technical library has assembled an extensive collection of documents and reference materials, including past decontamination test data, that can be used to infer what will happen when the test item is exposed to NBC contaminants. With a materials list in hand, the scientist searches the available data sources to determine how those materials will interact with agents and decontaminants. Materials known to be soluble in the agents, or which are softened, embrittled, or otherwise negatively affected, will be likely to cause problems during decontamination, as the subsurface agent will not be readily removed or detoxified. Materials impervious to penetration or negative effects from the agents will probably be readily decontaminated. The scientist uses the data sources, as well as consultations with colleagues, to come to a conclusion as to whether the item will withstand the contaminants and decontaminants expected on the NBC battlefield.

The results of the analysis are presented as a report to the developer or sponsor, allowing him to respond to acquisition milestone or decision requirements. The reports, however, may also contain recommendations to change procedures, modify the system, or add accessories that are likely to improve performance in an NBC environment. DPG has occasionally been asked for suggestions or recommendations on materials for product improvements, or use in similar systems. Our staff are pleased to make suggestions, but it should be recognized that such recommendations have no official status until a test and evaluation of the new or modified system is

complete.

The cost of a paper study is generally less than $35,000. As with any project, providing a sound statement of the requirement will facilitate meeting all needs and reducing costs. With small items, sending a sample to DPG for inspection can save travel and TDY costs, and with any item, providing a full list of materials will reduce the time required.

Paper studies can save thousands of dollars; but they do not replace testing. Direct test data are always better to eliminate doubts and to answer questions. But when live agent testing is impractical or impossible, paper studies present an acceptable and viable economic alternative.

Mr. Bill Davis is a Decontamination Commodity Leader at the West Desert Test Center (WDTC) located in Dugway Proving Ground (DPG), Utah. He has a B.S. in Mathematics. Prior to his current position he was a Decontamination Group Leader. His email address is bill.davis2@us.army.mil.

Mr. Michael Ford is a Senior Test Director at the WDTC located in DPG, Utah. He has a B.S. in Natural Sciences from St. Mary's College of Maryland. Prior to his work at WDTC he worked at Tooele Army Depot and Edgewood Arsenal as a laboratory manager and chemist. His email address is michael.ford10@us.army.mil

Army Regulation 70-75 Survivability of Army Personnel and Material, requires any new fielded item to withstand the rigors of the NBC battlefield, including both agents and decontaminants.

Understanding Joint Assignment Policies

MAJ Michael R. Anderson
United States Army Human Resources Command

After serving as the Functional Area 52 (FA52) assignment officer at Army Human Resources Command (HRC) for over a year, the one topic that always seems to generate the most questions – and the most confusion – is joint assignment policies. With this article, I hope to clear up some of the confusion and answer many of the most frequently asked questions that I face on a daily basis.

Joint duty assignments (JDA) are positions that are on the joint duty assignment list (JDAL). The JDAL is a master document listing over three thousand Army positions approved as joint billets by the Joint Staff, specifically the J1. JDA billets can be divided into two categories: *joint critical* and *joint*. Joint critical positions require the officer to have the 3L additional skill identifier (ASI), otherwise known as the joint specialty officer (JSO) identifier. I will explain later how an officer obtains the 3L ASI.

If the authorized position is not on the JDAL, then it does not qualify for joint tour duty credit. Many Department of Defense (DoD) organizations have Army authorizations that are not on the JDAL. If you are serving in one of these positions, you will not receive joint tour credit. Table 1 illustrates how FA52 authorizations are divided among the different categories.

Table 1. FA52 Major, Lieutenant Colonel, And Colonel Authorizations As Of 28 Sep 04. Only Approved Authorizations Are Shown. Seven Additional Joint Positions Are In The Process Of Being Converted Into FA52 Authorizations.

Organization	Joint Critical	Joint	Non-Joint
DTRA	2	23	40
DOE	0	2	7
DIA	0	2	0
OSD	0	1	1
JCS	0	1	0
NORTHCOM	0	2	0
STRATCOM	0	9	0
EUCOM	0	3	0
USFK	0	2	0
NATO	0	1	0
AFFRI	0	0	1
CIA	0	0	1
Army (USANCA, USMA, 20th SupCom CBRNE)	0	0	19
Total	2	46	69

Joint Law and Policy

The Goldwater-Nichols Act of 1986 was passed in order to improve the performance and warfighting capabilities of our military in a joint environment and to ensure that the uniformed Services would send high-caliber officers to joint duty assignments. The act and its subsequent amendments have been fully integrated into United States (US) Code Title X. Without getting into too much detail, this legislation (and resulting DoD policy), established the following:

- Promotion goals for officers serving in joint positions
- Mandatory tour lengths (managed down to the day)
- Education and training requirements
- General officer approval on all joint assignments
- JSO nomination process
- Distribution of officers to be assigned to joint positions

following military education level-1 (MEL-1) training

- Annual report to Congress – the Army's report card
- Requirement for general/ flag officers to be JSOs prior to promotion (effective 30 Sep 07)

Assignment /Promotion Management

Title X of US Code establishes promotion goals for officers that have joint experience in order to ensure high quality officers are sent to joint positions, not just to positions on the Headquarters, Department of the Army Staff (Army Staff) and other Service staffs. The law states that,

> *Officers who are serving, or have served, on the Joint Staff are expected, as a group, to be promoted to the next higher grade at a rate not less than the rate for the officers in the same Military Service in the same grade and competitive category who are serving, or who have served, on the headquarters staff of their Military Service.*

Additionally, the law states that JSOs are expected to be promoted using the same promotion goals as officers with Joint Staff experience. Officers who are serving, or have served in JDAs, are expected to be promoted at a rate that is not less than the Army average. DoD policy requires that promotions for officers serving, or having served in the Office of the Secretary of Defense (OSD) meet the same goals as officers on the Joint Staff.

All officers nominated for a JDA must be approved by a general officer. At HRC, the Director, Officer Personnel Management Directorate (OPMD) is briefed on every officer nomination. If an officer is at risk for promotion to the next higher grade, he may not be approved by the Director – unless the officer's skills and experience strongly dictate otherwise. Because of this, assignment officers at HRC screen all JDA nominations very carefully to ensure that the Army is sending a high-caliber officer to the joint command.

Does serving in a JDA, or having served in a JDA give an officer an advantage for promotion? Based on my analysis, the answer is no. Although the promotion board members will see the annotation made for joint service (as well as for Army Staff service), there has been no statistical correlation over the last three years between joint duty and selection for Lieutenant Colonel or Colonel. Although officers who serve in JDA positions have a higher selection rate, the reason for their selection is the overall strength of their file. Promotion board results are never changed in order to meet joint promotion goals. However, since HRC rarely places an officer who is at risk for promotion into a JDA, the Army continues to meet its joint promotion goals every year.

Tour Lengths

Each joint billet has a mandatory tour length. Generally, the tour length is 36 months and this is counted down to the day. An officer must serve a complete tour in order to receive full joint tour credit. The four most common ways in which an officer may leave a joint tour early and still receive full tour credit are:

1. Constructive Credit. This option allows an officer to leave up to 60 days early and is generally used for professional development reasons (school, taking command, etc.). Constructive credit approval depends on the average joint tour length for the Army. If the average is very close to 36 months, then approval may be difficult to obtain.
2. Critical Occupational Specialty Take-out. This option allows an officer (initial JDA only), to leave after 22 months. However, this option is only available to combat arms and engineer officers. Therefore, FA52 officers do not have this option.
3. Multi-Tour Take-out. This option allows an officer to leave after 24 months (to the day), time on station. However, the option only applies to officers in their *second* joint tour. Officers in their first, third, or subsequent joint tour are not eligible.
4. Secretary of Defense (SECDEF) Waiver. Everything is "waiverable." If you have a good enough reason to leave your joint tour and do not fit into any of the other categories, this is an option. SECDEF waivers are typically granted in order to attend Senior Service College or take command. All SECDEF waivers require a general officer letter of release from your current joint command.

Joint Professional Military Education (JPME)

In order to serve in a JDA, an officer must complete Phase I JPME requirements. For Army officers, this can be done by completing resident or non-resident Command and General Staff College. The three month intermediate level course for non-operations career field offi-

cers is considered a resident course and meets all JPME I requirements.

JPME Phase II training is a twelve-week course taught at the Joint and Combined Warfighting School (JCWS) in Norfolk, Virginia. Officers who are on orders to a JDA, or are currently in a JDA, may be enrolled in the course. Unfortunately, the course is only taught three times a year with start dates in the second, third, and fourth quarters of each fiscal year.

Officers can also meet all JPME training by completing Senior Service College, which is MEL-1, at one of the National Defense University (NDU) schools, for example the National War College (NWC) or the Industrial College of the Armed Forces (ICAF).

Joint Skill Identifiers

Officers who receive full joint duty credit for completion of a JDA in an approved JDAL position will earn the 3A ASI. If an officer serves in a billet with a tour length of 12-18 months, he is only awarded cumulative joint duty credit and does not earn the 3A ASI. For example, a one-year United States Forces Korea tour would only earn cumulative credit. Once the officer has 36 months of cumulative joint duty, he is awarded the 3A ASI.

In order to qualify for the 3L (JSO) ASI, an officer must fall under one of four categories listed below and be approved by the Secretary of Defense:

Category A - You complete JPME II en-route to your first joint assignment and then complete your first joint tour. Note; you are considered as part of this category as long as you attend JCWS before actually leaving your joint assignment.
Category B - You complete a critical operational specialty (COS) tour and JPME II.
Category C - You do category A in reverse order. That is, you complete your first joint tour, followed by attendance at JPME II.
Category D - You complete two or more joint tours successfully, but never complete JPME II requirements.

Twice a year, usually in the spring and fall, the Joint Staff submits a list of all officers eligible to receive the 3L ASI to the Secretary of Defense. This used to be a board process, but now it is just a staffing action. Officers in category A almost always are awarded the 3L identifier. Officers in categories C and D require a waiver in order to receive this ASI, and waivers are limited to ten percent of the total awarded.

MEL-1 Distribution

Joint law also dictates the distribution policy for officers who attend an NDU school for Senior Service College and achieve MEL-1 status. Two major constraints of the law are:

1. All JSOs must be assigned to a JDA as their next duty assignment following graduation from one of the NDU schools.
2. More than 50 percent (defined as 50 percent-plus-one), of all non-JSO graduates from each NDU school must be assigned to a JDA as their next duty assignment. One-half of the officers subject to that requirement may be assigned to a JDA as their second assignment, if necessary, for efficient officer management.

The joint policy section of OPMD tracks Army compliance for officer assignments from the MEL-1 producing schools of the NDU. Because of these requirements, OPMD limits the number of JSOs admitted to the NDU. This practice gives OPMD a larger pool of officers to draw from and more latitude in follow-on assignments since they only have to assign 50 percent-plus-one of the non-JSOs into JDA positions, as opposed to 100 percent for JSOs. This also results in more officers earning the 3L ASI, as they will have completed all of the JPME requirements prior to their JDA.

This creates somewhat of a disadvantage for FA52 officers when working the NDU slate. Since we have a relatively large number of JDA positions, many FA52 Lieutenant Colonels already have the 3L JSO ASI and slating them for NDU versus the Army War College becomes difficult due to the rules. FA52 officers have a majority of their assignments in the Washington, D.C. area and, for the most part, would prefer to attend the NDU in Washington, D.C., rather than relocate to the Army War College in Carlisle, Pennsylvania.

Joint Task Force Credit

Officers can now receive cumulative joint duty credit for service on qualifying temporary joint task force (JTF) headquarters staffs. This program has been expanded to include some non-combat operations JTFs. Officers can nominate themselves by answering a simple questionnaire regarding their "qualifying" tour(s). Upon successful completion of the questionnaire, the data is forwarded

to the respective Service representative for verification and endorsement. This initiative authorizes joint credit for individuals assigned to specified JTF headquarters for more than 90 consecutive days (retroactive to August 1992). To view the list of qualifying JTF headquarters and complete a questionnaire, visit the following OSD website: https://www.dmdc.osd.mil/jtf/owa/jtf_main.home.

Future Changes

There are some proposals before Congress to modify current joint policy. These initiatives include awarding JPME II credit for all Senior Service Colleges, not just the NDU schools, and increasing the number of JCWS classes from three to four per year. In addition to increasing the number of courses per year, the overall length of the course may be shortened from twelve weeks to ten. The initiatives could be approved and implemented as early as this current fiscal year.

The Army G3 is also considering changing how the Army funds officers attending JCWS. The Army has a generic professional development training fund; this fund is currently used to pay for officers to attend JCWS in a temporary duty (TDY) en-route status. However, units must pay all of the TDY costs for an officer attending in a TDY and return status. The proposal to the Army G3 would allow all TDY to JCWS to be paid out of the Army's training fund.

Final Comment

Understanding all of the policies and regulations concerning joint duty can be difficult. I am the first to admit that I call the OPMD joint policy section often to verify information. If you ever have any questions concerning joint policy or assignments, please call me at the FA52 assignments desk.

Contact Information

FA 52/47 Assignment Officer

Email: michael.anderson@hoffman.army.mil
Phone: (703) 325-6354 (DSN 221)
FAX: (703) 325-8111 (DSN 221)

Mailing Address:
CDR, Human Resources Command
Functional Area Division
AHRC-OPF-B (ATTN: MAJ ANDERSON)
Hoffman 2 Bldg, Room 7S33
200 Stovall Street
Alexandria, VA 22332-0411

I would like to thank LTC Robert Shirley of OPMD's joint policy section for the assistance he provided in preparing this article.

Major Michael Anderson is the Functional Area 52 Assignment Officer at the United States Army Human Resources Command, Alexandria, Virginia. He has a B.S. in Mechanical Engineering from the University of Arkansas and a M.S. in Mechanical Engineering from the University of Missouri-Rolla. He was previously assigned as a Physics instructor at the United States Military Academy at West Point.

Nuclear Weapons and the Sub-Continent: 1974-2004

Maj Bill Wieninger, USAF
Defense Threat Reduction Agency

It has been widely reported that the CIA has identified South Asia as the most likely nuclear flashpoint in the world today, a place where a war could break out unpredictably, as it did in 1999 and almost again in 2001, and possibly escalate to the use of nuclear weapons. Certainly the history of India and Pakistan is one of frequent crises and not-infrequent wars, largely due to a territorial dispute over Jammu/Kashmir (often referred to as JK or simply as Kashmir). Thus, the introduction of nuclear weapons into the region has been perceived as an unsettling development. However, there is a substantial body of literature which concludes that nuclear weapons actually make conflict and war much less likely, if not impossible, between states possessing them.[1] Thus, the introduction of nuclear weapons into the sub-continent could be interpreted as a positive development which will reduce conflict between these two hostile neighbors. My research, however, finds no support for this argument, indicating that nuclear weapons have not made South Asia more stable.

This article will examine how nuclear weapons have affected the relationship between Pakistan and India since 1974, and is broken down into four sections: a basic history of the Indo-Pakistani dispute, the impact of nuclear weapons on the frequency of crises and war, the impact of nuclear weapons on crisis severity and war, and finally a brief examination of what the future is likely to hold for these two nuclear powers.

The Historical Context

India and Pakistan became independent countries on 15 August 1947 in a cataclysm of communal violence between Hindus and Muslims. As many as 500,000 people were killed and 10 million displaced when a border was drawn through the British Colony of India.[2] As if the communal hatred and the inevitably painful demarcation were not enough, a dispute over the status of the princely state of JK led to the first of four Indo-Pakistani wars. The war began when JK's Hindu ruler, Maharaja Hari Singh, signed a treaty bringing the predominantly Muslim state into India. The brief war was inconclusive and led to the creation of the "Line of Control" (LOC), which remains the de facto border between India and Pakistan to this day. Pakistan refers to the area on its side of the LOC as "Azad" or "Free" Kashmir, an indication of its unwillingness to accept the status quo.

Since that first war, India and Pakistan have fought three others (1965, 1971, 1999), two of which were over Kashmir (1965, 1999), a dispute whose resolution appears nearly impossible. Both states have a large measure of their self-identity caught up in the dispute, making compromise virtually impossible. Pakistan was created to be the homeland for the Muslim people of colonial India, so it insists that Kashmir must be part of Pakistan. India sees itself as a secular state for people of all religions, so it insists that it cannot abandon Kashmir. Historically, India and Pakistan have routinely traded artillery and small arms fire across the LOC in Kashmir for the past 15 years.[3] Tensions increased when the Soviets left Afghanistan in 1989 and many Afghani mujahadeen turned their attention to Kashmir.[4] Although a cease-fire has held since November 2003, talks to resolve the dispute have made no progress beyond agreeing to talk some more. Moreover, the cease-fire could end at any time. India accused Pakistan of violating the cease-fire in January 2005, perhaps to cover infiltration of militants into Indian-held territory.[5]

Exacerbating the hostility over JK, the sub-continent went nuclear in 1974 with India's so-called "Peaceful Nuclear Explosion." [6] Pakistan subsequently increased its efforts to acquire nuclear weapons, so that by sometime in the mid-to-late 1980s Pakistan had matched India's nuclear capability. Several scholars have argued that this new situation may have enhanced stability by creating a South Asian version of the nu-

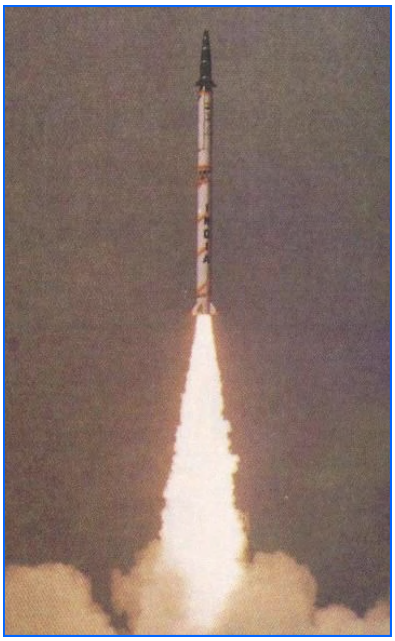


Figure 1. India's Agni Missile is Capable of Targeting all of Pakistan.

clear deterrence that the United States (US) and the Union of Soviet Socialist Republic/Russia have lived with since 1949.[7] However, a careful examination of the history of nuclear weapons in South Asia indicates that nuclear weapons have not had as calming an effect as the nuclear optimists would expect.

Crisis Frequency and Nuclear Weapons

One way to assess the effect of nuclear weapons in South Asia is to compare the frequency of crises before and after the arrival of nuclear weapons. The International Crisis Behavior Project (ICB) identifies 10 crises[8] between India and Pakistan from 1945 and 2004. Five of these occurred prior to India becoming a nuclear power (1947, 1951, 1965, 1965, 1971), none occurred during the period when India alone had a nuclear capability, and five have occurred since Pakistan acquired a nuclear capability (1987, 1990, 1998, 1999, 2001-02).[9] This means that when South Asia was nuclear-free, India and Pakistan averaged 2.08 crises per decade versus 2.78 crises per decade with both states having nuclear capability, and none when India had a nuclear monopoly. Thus, the arrival of nuclear weapons on the subcontinent has not increased stability, and may have even increased instability.

One possible reason for this has to do with what is called the "Stability-Instability Paradox," which basically means that "the greater the stability of the 'strategic' balance of terror [from nuclear weapons], the lower the stability of the overall balance at its lower levels of violence."[10] The paradox indicates that a state unhappy with the status quo can risk small conflicts which may allow it to present a *fait accompli* while counting on nuclear weapons to prevent its opponent from escalating the conflict. This was first posited during the Cold War, but has been used to explain the 1999 Indo-Pakistani Kargil War.[11] Thus, on the issue of crisis frequency, the evidence clearly indicates that nuclear weapons have not increased stability in South Asia. Some may argue that external factors, in particular the shift of Islamic fighters from Afghanistan to Kashmir following the Soviet departure from the former in 1989, are affecting crisis frequency. While this may be true, two facts remain. First, South Asia continues to experience frequent crises despite mutual nuclear weapons capability. Second, the source of conflict between India and Pakistan remains and is unlikely to be resolved soon.

Crises in South Asia and Nuclear Weapons

Although crisis frequency remains unchanged or may be worse in South Asia with both sides' possession of nuclear weapons, perhaps crisis severity has been limited. Unfortunately, the evidence here is mixed at best and unfavorable at worst. As part of my doctoral dissertation at McGill University, I conducted a detailed examination of the five India-Pakistan crises since 1987 to assess the effects of nuclear weapons, and several other variables, on crisis severity. Overall, I found that nuclear weapons may have made the leaders of India and Pakistan somewhat more cautious in several of their crises, but were *not* a direct factor in reducing crisis severity. The most obvious example is the crisis that erupted in 1999 at Kargil which resulted in sufficient casualties to qualify as a war.[12] The fact that the first war between the two countries in nearly 30 years occurred less than one year after both had openly demonstrated their nuclear capability clearly indicates that nuclear weapons have not had a pacifying effect on their relationship. Space limitations preclude a thorough discussion of the Kargil War here, but two aspects of the crisis bear mention. First, India was prepared to do what was necessary to dislodge the invaders, including escalating the conflict to the use of airpower; and, had diplomacy in the US failed, to escalate the conflict beyond Kashmir.[13] Second, nuclear weapons seem to have had the indirect effect of spurring external mediation for the India-Pakistan crises by the US. Indeed, US diplomatic efforts have had a pacifying effect to varying degrees in each of

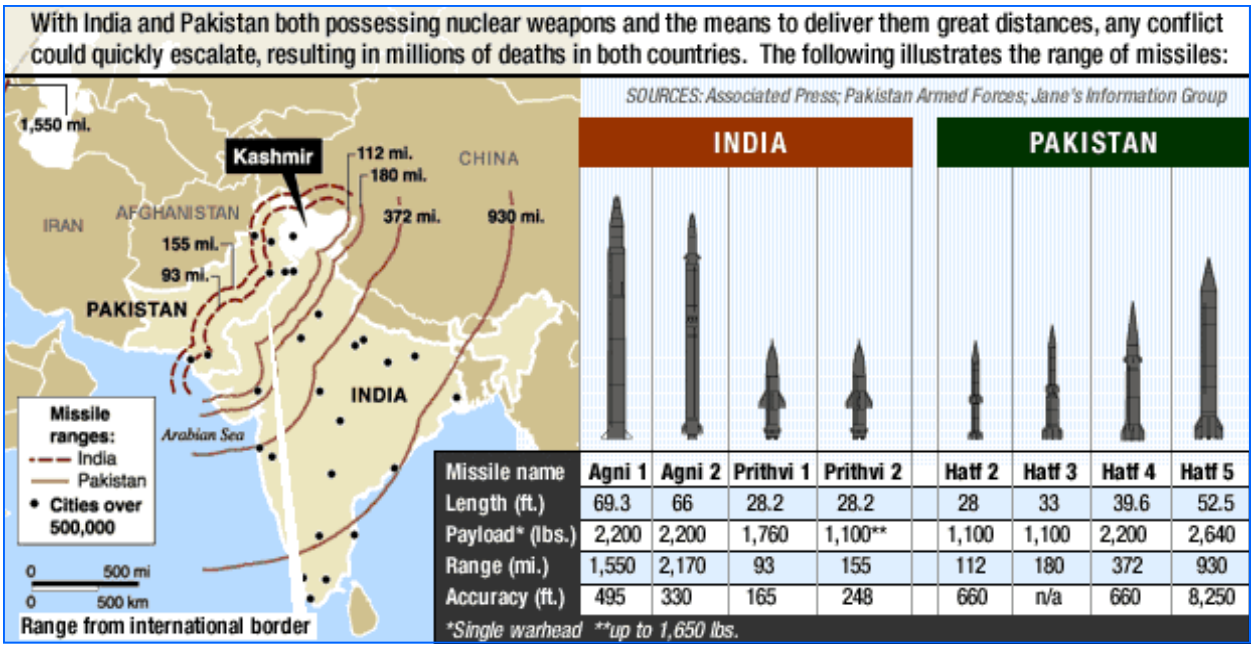


Figure 2. India and Pakistan Continue to Expand Their Nuclear Missile Capability.

the India-Pakistan crises since nuclear weapons appeared on the sub-continent, with the impact perhaps the greatest in Kargil. It may be, as some specialists conclude, that without the US to use as an excuse for concessions, the Indians and the Pakistanis would have found other ways to resolve Kargil without further escalation. However, given Indian indications they would continue escalating the conflict and subsequent strident US diplomatic efforts, including a short-notice meeting on 4 July 1999, it would appear that South Asian experts in the US government concluded otherwise. [14]

Figure 3. Wreckage From an Indian MiG-21 Shot Down by Pakistan.

Two years later, in December 2001, a terrorist attack on the Indian Parliament prompted India to mobilize 500,000 troops along its border with Pakistan, which quickly responded in kind with 300,000 of its own troops. The two nations remained in a dangerous face-off until mid-January 2002 when Pakistan's President Musharraf, in a public speech, promised to crack down on militant groups linked to the terror groups operating in India. The effect of nuclear weapons in this crisis remains unclear, but it would seem that once again India was prepared to escalate the conflict,[15] prompting Musharraf's announcement and indicating that nuclear weapons did not preclude violence. Moreover, it appears that Pakistan lacked confidence that its nuclear arsenal would preclude an Indian attack. A critic

might argue that it was the threat of nuclear war which convinced Musharraf to make the public statement. Although this can not be conclusively disproved, the balance of conventional arms was so strongly in India's favor that it seems likely Musharraf would have been more likely to make the statement if there were no nuclear weapons on the Subcontinent. Overall, an examination of the history of the past 18 years indicates that nuclear weapons have done little, if anything, to pacify relations between India and Pakistan.

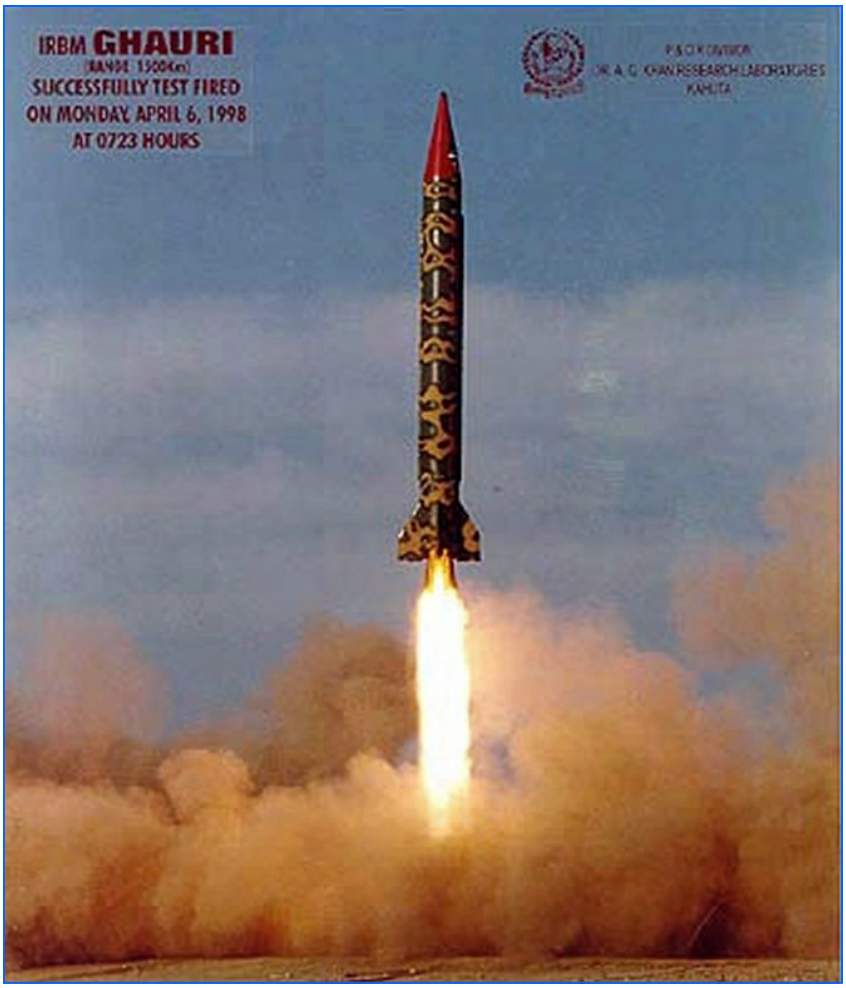


Figure 4. Pakistan's Ghuari or Hatf 5 Missile has a Range of 1350-1500 km and Could Reach Cities Deep Inside India.

A Dangerous Future

Given Pakistan's extremely strong preference to change the status quo in Kashmir and the unlikelihood of a peaceful resolution of the Kashmir dispute, it is likely that there will be more crises in South Asia. This may well include a repeat of the Kargil experience, as "even though there is wide consensus that Pakistan paid a heavy price for initiating the Kargil conflict, a large and significant number of [Pakistani] uniformed and retired military officers, senior political leaders, and analysts simultaneously argue that Kargil can be read as a success in certain respects. There are several variants of this story, all of which together portend disturbing consequences for strategic stability."[16] Moreover, although Kargil remained a limited war, "it is by no means axiomatic that another conflict between the two countries is either unthinkable or would be terminated without escalating across the nuclear threshold." [17]

Ultimately, relying on nuclear weapons to keep the peace, at least in South Asia, is a recipe for disaster. In the Cold War, it may well have been the resolution of the question of Berlin, more than any other factor, which explained the absence of war between the US and the USSR. [18] This examination of five India-Pakistan dyadic nuclear crises suggests that the effect of the conflict over Kashmir closely parallels that of Berlin in the Cold War. The key to peace, and almost certainly the avoidance of nuclear war on the sub-continent, could well rest in finding a mutually satisfactory solution to the problem of Kashmir; it certainly will not come from nuclear arsenals.

Major Bill Wieninger is a United States Air Force (USAF) officer assigned as an instructor at the Defense Nuclear Weapons School, Kirtland Air Force Base, New Mexico. Prior to this position he was assigned as an Assistant Professor of Political Science, USAF Academy and an International Geo-Political Affairs Officer for South/Southeast Asia, 13th Air Force, Republic of the Philippines. He has a B.S. in Political Science from SUNY Brockport College, New York, a M.S. in Political Science from the University of California, Riverside, California, and a Ph.D. in Political Science from McGill University, Montreal, Quebec.

ENDNOTES

1. Kenneth Waltz is best known for this position, staked out clearly in Sagan, Scott D. and Kenneth N. Waltz. "The Spread of Nuclear Weapons: A Debate Renewed," W.W. Norton and Company; New York, 2003.
2. Collins, Larry and Dominique Lapierre, "Freedom at Midnight," Vikas Publishing House PVT LTD, New Delhi, 1976, p. 342.
3. Riedel, Bruce. "American Diplomacy and the 1999 Kargil Summit at Blair House, "Center for the Advanced Study of India, University of Pennsylvania, Philadelphia, 2002, p. 2.
4. See for example Summit Ganguly, "The Crisis in Kashmir: Portents of War, Hopes of Peace, "Cambridge University Press; Cambridge, 1997, p. 16.
5. "Rivals Discuss Cease-Fire Breach, "BBC online 19 Jan 2005,http://news.bbc.co.uk/go/pr/fr/-/hi/world/south_asia/4186547.stm.
6. Indian semantics likely came from a promise to Canada after that country sold India a nuclear power reactor without requiring India to submit to international safeguards. In return, India promised to use the reactor only for "peaceful" purposes.
7. See Devon Haggerty, "The Consequences of Nuclear Proliferation: Lessons from South Asia, "MIT Press; Cambridge Mass, 1998 and Saira Ali Khan, "Nuclear Proliferation Dynamics in Protracted Conflict Regions: A Comparative Study of South Asia and the Middle East," Ashgate Publishing; Burlington, 2002.
8. The ICB defines a crisis as having three characteristics: a threat to one or more basic values, limited time to deal with the threat, and a heightened probability of war (Michael Brecher and Jonathan Wilkenfield, "A Study of Crisis," University of Michigan Press; Ann Arbor, 1997.
9. There is some debate about when exactly Pakistan acquired a nuclear capability, but Pakistan was signaling in the 1987 crisis that it had a nuclear capability, and noted expert on nuclear weapons in South Asia states that Pakistan had the capability in 1987 (George Perkovich, "India's Nuclear Bomb: The Impact on Global Proliferation, "University of California Press; Berkeley, 1999, p. 281), so I count it as a nuclear power from that time.
10. Glenn Snuder, "The Balance of Power and the Balance of Terror," in "Balance of Power," Paul Seabury (ed), Chandler; San Francisco, 1965, p. 198-99.
11. Ashley Tellis, Christine Fair, and Jo Medby, "Limited Conflict Under the Nuclear Umbrella: Indian and Pakistani Lessons from the Kargil Crisis,: Rand Corporation, Santa Monica, 2000.
12. The most widely accepted definition of war in International Relations scholarship establishes 1,000 battle deaths as the minimum definition of a war.
13. See J.N. Dixit, "India and Pakistan in War and Peace," Routledge; New York, 2002 (pp. 55-70).
14. Riedel, p. 4-5.
15. For example, see P.R. Chari, "Nuclear Crisis, Escalation Control, and Deterrence in South Asia," Working Paper, Henry L. Stimson Center; Washington, DC, 2003, p. 21.
16. Tellis et al (2000), p. 35, emphasis in the original
17. Chari (2003), pp. 15-16.
18. Marc Trachtenberg, "A Constructed Peace: The Making of the European Settlement, 1945-63, "Princeton University Press; Princeton, 1999.

PHOTO CREDITS

Figure 1.
http://www.fas.org/nuke/guide/india/missile/agni.jpg
Figure 2.
http://cnnstudentnews.cnn.com/interactive/world/0205/india.pakistan.missiles/popup.ap.india.pak.missile.gif
Figure 3.
http://vayu-sena-aux.tripod.com/pix/mig21m-1539-2.jpg
Figure 4.
http://www.fas.org/nuke/guide/pakistan/missile/Ghauri1.jpg

Catching the Music Between the Notes: The Emerging Role of the United States Army in Support of Counterproliferation and the Proliferation Security Initiative

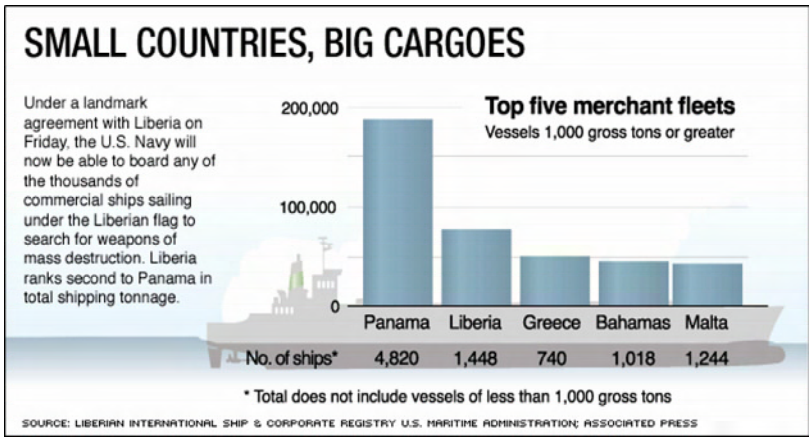
MAJ Bret Kinman
United States Joint Forces Command

This is the conclusion of an article that was first published in the Spring/Summer 2004 NBC Report

Army Roles and Tasks in PSI Operations

The Army's roles in Proliferation Security Initiative (PSI) operations can be portrayed under three broad categories: surveillance, interdiction, and reduction. These roles can be directly related to the area defined in Joint Publication 3-40, *Joint Doctrine for Combating Weapons of Mass Destruction,* as offensive operations. Although the joint doctrine also considers other components, including defensive measures, this paper is focused on a distinctly proactive set of actions.[14] Surveillance obviously covers the gathering of intelligence about WMD programs, infrastructures, and transshipments of WMD materials. Next, interdiction relates to a set of proactive efforts to address WMD activities, such as direct attack of a transport vessel or vehicle or attack of a building or complex. Interdiction is the core mission of the PSI. Finally, reduction encompasses actions to secure WMD materials and infrastructure, verification of the exact materials involved, and final disposition of those materials. Certainly, all three roles overlap and are mutually supporting in execution. The Army would organize the needed forces or, more simply, create a task force to accomplish some or all of these roles and their associated subtasks.

Each of these roles and the associated subtasks will be discussed in greater detail below. For now, it is essential to understand that the Army must be able to provide a set of scalable forces able to accomplish all or some of these tasks in support of PSI operations. WMD activities can occur as follows: at fixed sites where WMD materials are produced, stored, and prepared for shipment; amid transportation networks of vehicles and vessels designed to move the materials; and at additional sites for the assembly or testing of WMD materials. WMD production activities are typically located in urban industrial areas of countries and cities. Additionally, proliferation activities can occur at seaports and airports, as well as roads and highways. As such, this represents a large and diverse operational environment for Army support.



Surveillance

Surveillance is arguably the most important role in PSI operations due to the requirement to provide accurate information for the basis of both decision and action. Surveillance represents a long-term observation of a site, area, vessel, or vehicle to confirm WMD-related activities and the presence of WMD materials. The subtasks involved here are as follows: observation, detection, and confirmation. Developing an accurate picture of what is occurring will not only be the basis for the political decision to act, but will also be the basis for the military planning of additional actions. Clearly, there is already an extensive network of satellites and other intelligence-gathering apparatus. Improvements to operational- and tactical-level intelligence capabilities have also contributed to improved situational awareness. Improvements in information technology have made the product of these assets available to lower levels of end users, particularly field-operating forces.

Observation represents those actions taken to monitor suspected WMD production sites, transport networks, or other related sites. Sea, air, and ground freight delivery networks represent a volume problem for intelligence gathering. The mobility of air, ground, and sea vessels across vast distances further expands the scope of this problem.

The expansion of unmanned aerial vehicle (UAV) technology has allowed commanders and intelligence specialists near-continuous coverage of an area. They are no longer dependent only on satellites, which might have gaps in coverage. Furthermore, UAVs are an ideal platform to identify and detect potential agents in or near a suspected WMD site. Army Special Operations Forces (SOF) may also be able to provide a physical observation of a site that other technical systems are unable to observe. Clearly, the combination of a physical presence near a suspected site coupled with other sensors can provide policymakers and commanders the most comprehensive picture.

Polish President Alexander Kwasniewski, right, applauds President Bush after his speech at the Wawel Castle in Krakow, Poland, 31 May 2003, announcing the Proliferation Security Initiative (AP Photo)

Detection is the definitive identification of WMD materials. The requirement to validate WMD agents will be paramount, especially given the shortfalls over the accuracy of intelligence on Iraq's WMD program. Detection is accomplished through a variety of technical means. Aircraft or UAVs can provide a standoff detection capability. Ground forces can utilize hand-held detectors for initial sampling. Of course, detection is an interim step since field-level identification can provide a false-positive result. The US Army already has procedures and assets within the force structure trained to carry out the detection, capture, and transport of a sample. The existing Technical Escort Unit in the 20th Support Command (CBRNE) is a mix of Chemical Corps and Explosive Ordnance Disposal soldiers trained to accomplish weapons disablement and transport of sensitive and hazardous material.

Confirmation involves verification of both the materials detected and the nature and status of facilities. This task is ultimately needed to provide a reliable basis for action, particularly in the political realm. Confirmation is carried out via certified laboratory process and reconfirmed by a separate laboratory test. Existing Army assets described above can accomplish the transport of any sample to a certified laboratory.

The Army is improving its sensor networks and capabilities, as well as the ability to share that information to the lowest level. The Army is also expanding its Special Forces force structure to better provide a range of capabilities. The ability of both UAVs and SOF to monitor a fixed or mobile site can provide policymakers the needed level of information for further decision and action. Of course, a comprehensive intelligence network can also set the stage for detailed planning of any follow-on military activities. Certainly, the need for observation of mobile targets, expansive industrial areas, or disparate and small manufacturing facilities complicates any intelligence-gathering effort. The ability to detect and confirm WMD activity and material will

be paramount for further decisions.

Interdiction

Interdiction represents one of the most visible aspects of any counterproliferation activity, visible both in terms of its impact on a specific target and its impact on other would-be proliferators. Interdiction consists of the following subtasks: direct action or raid, maritime interdiction, site security, and material exploitation. The Army already possesses assets able to participate in all of these actions should they be necessary, specifically SOF, helicopters (scout, attack, and lift types), and conventional ground units.

Direct action can encompass precision air-to-ground strikes or the physical assault or attack of a building, industrial complex, or vehicle convoy, and is commonly referred to as a raid. Direct action is the largest component within this role. Air Force or Navy fixed-wing aircraft routinely carry out precision air-to-ground strikes. However, Army rotary-wing aircraft can also provide precision strike capability. In addition, helicopters are able to fly closer and slower near a target, providing an additional amount of time for target verification or additional observation if needed.

Army SOF are already trained to execute direct action missions. SOF can conduct small-scale raids or strikes on specific targets with a greater degree of precision and certainty than can be achieved by an air strike. SOF actions in Afghanistan show the broad range of this capability. SOF are increasingly operating with main force Army units, as seen in Iraq. Furthermore, SOF routinely operate with foreign militaries and in a covert manner, which will be useful in PSI operations with the inherent coalition nature and the inevitable media focus that would accompany any direct action. On a larger scale, SOF, which have been operating in an area in the reconnaissance or surveillance role, can provide critical augmentation to conventional units in reconnaissance and direct action skills.

Operations to seize a building, an urban complex, or vehicles or convoy will require varying amounts of Army forces. Additionally, to stop and search a truck or vehicle convoy will also require different-sized forces. In the event they are available, mechanized forces can provide both the manpower and firepower to seize and secure a site or convoy. Conventional maneuver units provide a large amount of manpower, as well as the firepower, needed to overcome any potential armed opposition. Finally, conventional maneuver units are able to provide security and logistic support necessary to sustain a presence at a WMD site.

U.S. Coast Guard team climbs aboard a cargo ship in the Arabian Gulf. (USCG photo)

Maritime interdiction, although most distinctly a Navy operation, can also involve multiple types of Army forces. Army SOF can participate in ship or sea platform boarding as augmentation to existent Navy forces. Moreover, Army helicopters operating from Navy ships can provide an effective reconnaissance platform and, if necessary, the ability to attack specific vehicles or facilities.[15] These operations can be naval-specific operations or in conjunction with ground forces. Army aviation can also provide transportation of personnel or equipment to support PSI actions. In each case, the Army can effectively support a maritime component working on PSI operations.

Site security represents a more manpower-intensive task than any other aspect discussed so far. Nevertheless, site security is important to both contain WMD material from further proliferation and preserve a site for investigation and disposition. Site security requires that large forces be equipped for both combat and possibly crowd control and be able to operate for an extended period in protective gear. This is certainly the case in Iraq where suspected WMD sites were spread around the country. Even in cases in which there are only a few sites, the manpower requirements for 24-hour security can still be high. Site security will be discussed in the next section as well.

Material exploitation represents, in this case, the immedi-

ate action to identify and evaluate WMD material for verification and other information of critical intelligence value. Material exploitation will also be further addressed in the next section. Once interdiction occurs in whatever form, policymakers and commanders will need to verify the presence of WMD and then decide what other action is required from any valuable intelligence gathered. This will certainly include media interaction as well as legal preparations.

Elimination

Elimination represents the longest-term effort and is perhaps the greatest in terms of scale in that it will decisively end a WMD activity in whatever form. Elimination will require extensive resources, including engineer, transport, ordnance disposal, and logistics to secure, disable, and destroy WMD related-activities. Upon completion of direct action or in the event of a diplomatic or similar action allowing the introduction of military forces, security and accountability of a WMD site or vehicle will be paramount. Elimination consists of the following subtasks: site security, material exploitation, remediation, and reconstruction.

Site Security

In this role, security is intended to prevent looting or other types of disturbance and to preserve the site for detailed verification of what the site was producing, transporting, or storing. The possibility of deliberate acts of looting to sabotage accountability can also be expected. Security can be provided by maneuver units or well-coordinated follow-on forces to occupy specific sites of the most interest. In a more benign environment, such as a ship, airplane, or urban factory complex, coordination with local law enforcement will be critical to provide an initial element of crowd control. The need to maintain access control to a site also means limiting access of media until verifiable and confirmed WMD results can be provided.

Material Exploitation

WMD materials will need to be analyzed by “Gold Standard”-rated laboratories, which are limited around the world, being mainly in the US and Europe. These laboratories are necessary for any sort of political or legal proceedings that may follow. The emphasis on homeland security is encouraging industry to develop more accurate and portable detection

and verification devices. The need to evacuate a sample to a qualified laboratory will still exist, yet the ability to have a reliable test result on or near a site would be invaluable. The current set of Army battlefield detection and identification gear is designed primarily for Soviet military chemical and biological weapons and is deliberately designed to be "over safe," meaning that it tends to provide a false-positive reading when suspicious material is detected.

Remediation and Reconstruction

Remediation and reconstruction focuses on ensuring that both WMD material and infrastructure are accounted for and are disposed of properly. WMD-related sites targeted by direct action may require consequence management-type forces to control the effects of materials release or dispersal. Furthermore, WMD sites will require cleanup of any industrial facilities and long-term storage of contaminated materials, such as soil and building rubble. An added requirement may be long-term health monitoring of people directly and indirectly affected by any action. Long-term remediation may require extensive cleanup operations, best handled by contractors with specific expertise. A damaged facility may indeed have a useful, legitimate purpose and can therefore be reconstructed and returned to the host country. The use of Army Reserve engineers with reconstruction experience would be useful in this situation.

Transport methods such as a ship or aircraft will require a detailed check to ensure no contamination from the WMD material. In some cases, the vessel or aircraft may return to its normal operation and legitimate owner. Final disposition of the property will also be necessary. Vessels or aircraft may have been stolen for smuggling use and may need to be returned to the owner or, if applicable, insurance carrier. Otherwise, the property can be sold, and the funds can be used to reduce costs. In any event, remediation and reconstruction should have an initial Army involvement, followed by a rapid handover to a contractor or other designated party.

Assuming security is acceptable, these operations can be turned over to contractors for the extended duration.

Recent Examples

Although the PSI is a relatively new policy program, there have been several examples of Army efforts in similar situations. The conflict in Iraq is the most notable example, in which US Army forces have engaged in the systematic search for WMD materials and evidence of a WMD program inside of Iraq. Although not specifically considered PSI operations, the effort in Iraq is nonetheless indicative of Army forces' potential requirements in support of counterproliferation and the PSI. The WMD search efforts in Iraq represent a pertinent example of how the Army can support counterproliferation activities.

The Army maintains a Chemical Corps providing specialists in NBC operations. In addition, Army units retain the ability to conduct NBC detection, identification, and, if necessary, decontamination. These units, their personnel, and equipment were intended for the Cold War battlefield and possible use of chemical or biological weapons as part of a Soviet offensive. They are not necessarily equipped for PSI operations. However, they do represent a knowledge and skill basis for all three of the proposed Army roles above.

The Army chemical units and SOF are considered high-demand, low-density units. These units maintain high levels of operational tempo yet are small in number relative to the Army. For the WMD search in Iraq, the Army was forced to create a specific task force capable of providing a greater number of soldiers and vehicles to cover large and disparate areas of Iraq. The Army designated the 75th Field Artillery Brigade at Ft. Sill, Oklahoma as the 75th Exploitation Task Force. This 1800-man unit is a Field Artillery brigade consisting of two Multiple Launch Rocket System battalions and an M109A6 Paladin cannon battalion, which normally provides fire support to US Army war-fighting Corps; thus, they were not equipped or organized for the mission they were given.

The unit operated across Iraq during the initial months after the end of major combat operations. The brigade established "site assessment teams" to begin looking at supposed WMD sites across Iraq.[16] The brigade began planning and organizing while at Ft. Sill, as well as coordinated visits to both US Central Command and V Corps headquarters in Qatar. Furthermore, the brigade was augmented by units and personnel from the Defense Threat Reduction Agency (DTRA) and Defense Intelligence Agency.

The augmentation took this form:

> *DTRA provided four Site Assessment Teams and a command and control planning cell. The Defense Intelligence Agency (DIA) brought in three Chemical and Biological Intelligence Support Teams (CBIST) that became the core of the mobile exploitation teams (MET). The 513th Military Intelligence Brigade from Ft. Gordon, GA., added analytical support into what became known as the Intelligence Exploitation Base (IEB).*[17]

The creation of the Iraq Survey Group (ISG) in May 2003 represented a larger-scale, more definitive effort to conduct the search for WMD. However, Army forces, such as the 75th Exploitation Task Force, remained involved in the ISG efforts. As noted above, a variety of Department of Defense and Army units and skill sets were required for the successful creation of a WMD task force. The 75th Field Artillery Brigade is one of the first examples of a unit performing the emerging roles and potential missions Army counterproliferation units may be required to conduct in the future.

Recommendations

The Army is beginning to address the needs of its counterproliferation mission and is beginning to look at how it can support expanded PSI-type operations. The Army's Training and Doctrine Command has begun doctrinal work on the WMD materials exploitation mission set. The first effort will be a training circular on lessons learned and tactics, techniques, and procedures (TTP) the 75th Field Artillery Brigade used in Iraq. Based on experiences in Iraq, a unit needs approximately six months of focused training to become proficient in WMD exploitation missions.[18]

Although an Army doctrinal effort for counterproliferation is needed, such an effort should consider the possibility of support for the PSI. Nevertheless, the Army should begin to look at missions that relate to the specific requirements of WMD activities. This effort will allow

units to plan and train for execution. The roles defined above may provide a starting point for the Army. The recent experiences in Iraq will also provide invaluable insight into the requirements for these types of operations. Certainly, the experiences of US Army SOF will also weigh in how the Army develops this doctrine and the TTP.

Therefore, it is essential for the Army to begin to assign this mission set to units so they might provide additional support and backup to SOF, as well as be able to conduct missions similar to those conducted by the 75th Field Artillery Brigade. The Army can begin to designate units that can add this skill set to their training plans. Clearly, Corps-level field artillery units are a potential starting point, given their large pool of manpower and ability to conduct basic security and, with training, more specialized WMD or NBC-type work. Even so, these units do not possess the skills to conduct small-scale, SOF-type raids. Assignment of units can occur once the necessary doctrinal and TTP work has been accomplished to articulate a clear set of tasks and training requirements. Units can incorporate this into their training plans and validate these skills at the National Training Center or Joint Readiness Training Center.

Conclusions

The PSI represents a new set of proactive measures designed to restrict and stop WMD proliferation. As the PSI expands in scope to address land and air movements of WMD material, it represents a potentially large mission set for US armed forces and the Army in particular. The possible roles, surveillance, interdiction, and elimination, for Army units articulated here can provide a basis for further study. These roles lay out a construct for thinking about a specific mission set yet also allow for expansion as a potential basis for a greater Army counterproliferation doctrine. The Army has already been supporting various aspects of proactive counterproliferation. Many existing units and planning contingencies have required forces to conduct PSI-type operations, such as maritime interdiction, or flexible deterrent options for combatant commanders. Furthermore, the recent experience in Iraq has provided an extensive basis of knowledge for the Army on the broader aspects of proactive counterproliferation and the manpower requirements some tasks may require.

Nevertheless, the Army must begin to look at the emerging requirements that PSI operations might demand of Army assets and forces. Although certain aspects of PSI may entail a long-duration effort such as surveillance, the interdiction aspect may be extremely short; conversely, the elimination role may again require long-term commitment of some portion of Army forces and assets. This paper has attempted to provide a basis for the Army's contribution to proactive counterproliferation and support to the PSI. The Army possesses the forces and skills needed to be a unique contributor to successful PSI operations. However, it must cogently consider how it can best develop the operational and tactical roles and missions that PSI operations might demand.
PSI Web Reference:
http://communitydispatch.com/artman/publish/article_239.shtml

Author's Note: This article was written prior to the mission of Combating WMD becoming formalized within the Department of Defense. Therefore, the author has altered his original text.

Major Bret Kinman is a FA52 officer currently assigned to the United States Joint Forces Command J354 Anti-Terrorism/Force Protection. He was previously assigned as a student at the Naval Postgraduate School, Department of National Security Affairs, the USAREUR G3 Executive Office, and to the USAREUR G3 Force Protection & Anti-Terrorism Division. He has a B.A. in Political Science from North Georgia College and a M.S. in National Security Affairs from the Naval Post Graduate School.

ENDNOTES

14. Joint Publication 3-40, Joint Doctrine for Combating Weapons of Mass Destruction, p. III-3
15. US Army Europe Operational Concept: Over the Horizon, concept considered the use of Army helicopters from Navy ships.
16. LT David Gai, Anatomy of the Hunt for Weapons of Mass Destruction, Fall/Winter 2003, NBC Report, United States Army Nuclear and Chemical Agency, Fort Belvoir, VA p. 11
17. Ibid, p. 11
18. Interview with MAJ Scott Watson, US Army, DIA WMD Exploitation Task Force.

WMD CSTs - Focus Needed for Maximized Effectiveness in Homeland Defense

MAJ Jim Demyanovich
Defense Threat Reduction Agency

The views expressed in this article are the personal views of the author and in no way reflect the official position of the Department of Defense, Defense Threat Reduction Agency, or the United States Army.

In 1998 the Department of Defense (DoD) created National Guard-based military teams for homeland defense that eventually became known as "Weapons of Mass Destruction Civil Support Teams" (WMD CSTs). The WMD CSTs are small military detachments dispersed throughout the United States (US) that they have the equipment and expertise to provide direct military support to domestic WMD-type events at the state level, or when federalized, under DoD control. The initial plan to create only a few, geographically dispersed, "regional" teams has expanded to provide WMD CSTs to all states and territories in the US. WMD CSTs were established to perform specialized tasks needed to properly support WMD event consequence management and hazardous effects mitigation. WMD events may be mass effect; chemical, biological, radiological, nuclear and/or other toxic material release. CSTs have the manning, structure, training, and equipment to provide states a trained military unit with WMD specific capabilities. The major capabilities that CSTs have are technical expertise, a robust communication suite, and portable hazardous material analysis capabilities. They have limited casualty handling and decontamination materials. In general terms, CSTs have less than two dozen well trained, National Guard Soldiers equipped with robust communications and a small set of WMD-centered response equipment with which to accomplish WMD response support missions. Specific WMD CST capabilities are cited in the current WMD CST Tactics, Techniques and Procedures Manual. Figure 1 is a WMD CST capabilities list that depicts the current, competing missions of performing NBC reconnaissance and operating an incident command post WMD center.

First Line of Defense – Civil First Responders

First responders throughout the nation stand now, as they have throughout our history, to mitigate crises in our communities. Local first responders are the fire, police, emergency medical services, and similar organizations that respond to conventional fire, earthquake, and hurricane or accidental/terrorist-initiated WMD-like events. Their role has gained ever increasing importance since 11 September 2001 with the knowledge that maximizing American casualties was then, and is now, a terrorist's primary goal. The first responders and their capabilities continue to serve our communities; WMD CSTs have not supplanted civil first responders. The WMD CSTs aren't equipped or trained to replace local first responder's hazardous materials, fire, rescue, ambulance or other emergency response assets.

Civil First Response Command and Control

Emergency responders have adopted a national set of guidelines for responding to incidents called "The Incident Command System" (ICS). The ICS is a formalized framework that allows first responder units to commonly use specified methods to command, control, communicate, support, and conduct other related operations in incident response. ICS is not a new system, but formal use as a common system only recently began throughout the US. The ICS gives the first responder community standing operating

- The CST provides assessments and presumptive identification to analyze most CBRNE agents and substances. The CST sophisticated detection, analytical, and protective equipment allows for operations to take place in environments that contain many different toxic industrial materials and CBRNE materials. The personal-protective equipment (PPE) used by CSTs provides … extensive protection from hazardous material (HAZMAT). (para 1-7)
- CSTs have a unique ability to assess CBRNE events. This is accomplished through the expertise of personnel and the use of several computer-based modeling programs. In addition, the survey and medical team's high state of training and advanced technology equipment allow for accurate and timely sample collection and identification of CBRNE agents and substances. The CST also provides the ability to act as a CBRNE reconnaissance force that can provide a unique view at the incident site. (Para 1-8)
- The assessment process also supports deliberate and crisis action planning. Assessments include the use of intelligence preparation of the battlespace (IPB), … and needs assessments also occur to determine what capabilities are needed to support the required response actions. Assessments occur prior to, during, and after an incident. Assessment is an ongoing process. … (Para 1-9)
- The CST advises the incident commanders (ICs) and emergency responders. For example, during exercises and training, the CST can advise leaders and first responders on the hazards and countermeasures associated with a response to a CBRNE incident. During such a response, a CST can recommend measures such as the follow-on capabilities (such as types of units, equipment, and supplies) needed to support mitigation measures at an incident site. Postincident, the CST can advise on measures such as the preparation of a transition plan …(that) helps support the disengagement of military units for redeployment to home stations. The CST state and federal technical reach-back capability enables the commander to obtain subject matter expertise on CBRNE matters and provide situational awareness (SA) to appropriate agencies not at the incident site. … (Para 1-10)
- The CST assists leaders and emergency responders by providing a capability to coordinate and conduct liaison, if requested, with other response assets. The CST assists the IC in formulating and communicating appropriate requests for additional support. The CST may also provide recommendations on how to integrate the use of follow-on CBRNE response assets. (Para 1-11)

Figure 1. WMD CST Capabilities.

procedures and command and control structures in responding to incidents.

ICS, while structured in a framework very similar to military unit combat organizations and missions, uses wholly unique language, structure, and response functions. In many ways, it is the ICS that gives first responders a way of planning, organizing, and executing an "attack" to "fight" a fire or other incident - from very small to very large incidents. Since military units do not normally receive ICS training, their knowledge and experience is extremely limited. The military ICS knowledge and experience that exists is primarily DoD installation first response forces.

First responders throughout the nation stand now, as they have throughout our history, to mitigate crises in our communities. Local first responders are the fire, police, emergency medical services, and similar organizations that respond to conventional fire, earthquake, and hurricane or accidental/ terrorist-initiated WMD-like events. Their role has gained ever increasing importance since 11 September 2001 with the knowledge that maximizing American casualties was then, and is now, a terrorist's primary goal.

WMD CST Unique Training

WMD CSTs are trained in ICS as well as military individual and unit operations training. Hence, WMD CSTs become a rare DoD resource since they not only "speak the language" of ICS but they also "speak the language" of the military. They can therefore be the most effective on-site conduit for DoD support of a domestic incident. By virtue of their missions, WMD

CSTs will likely arrive on-scene post-event, although it is possible for them to be present at high visibility, national security events in a pre-planned mode. WMD CST's always depend upon the "call up" for deployment; likely as a backup to the initial call made by first responders at the scene. Since WMD CSTs operate in fixed areas, they train with local first response forces during exercises. Over time, they can become very familiar with the particular needs and capabilities of their regional first response forces.

The most critical aspect of WMD CST support is their value added; significantly supporting event response to best leverage their resources. Perhaps the most valuable capability they provide is communicating local WMD effects and coordinating response force needs with supporting elements of the states and/or Federal Government. Therefore, instead of conducting NBC reconnaissance or acting as recovery forces under HAZMAT conditions, the key function of the WMD CST should be to conduct planning and communicate needs and assessments between the military and civil response forces. In this way, they serve as a "military support command post" or "WMD Center" for the on-scene commander. The Nuclear, Biological and Chemical Center (NBCC) is operated by trained WMD technical specialists as a key command post element. It is a knowledge gathering and assessment center focused on subject matter expertise, information assessment, and situational awareness: it provides decision makers with critical recommendations on WMD event consequence management. This is similar to NBCC found in Army organizations. Figure 2 depicts military

Military, Tactical Command Post Nuclear, Biological and Chemical Center (NBCC) Critical Mission

The critical mission of the NBC Center is to conduct nuclear, biological, and chemical (NBC) battle management. The commander may supplement this mission with his own.

- Plan and coordinate chemical unit operations.
- Conduct NBC vulnerability analysis.
- Receive, process, and disseminate NBC reports.
- Maintain and evaluate contamination information.
- Advise the commander and staff on NBC defense measures, smoke, and flame operations.

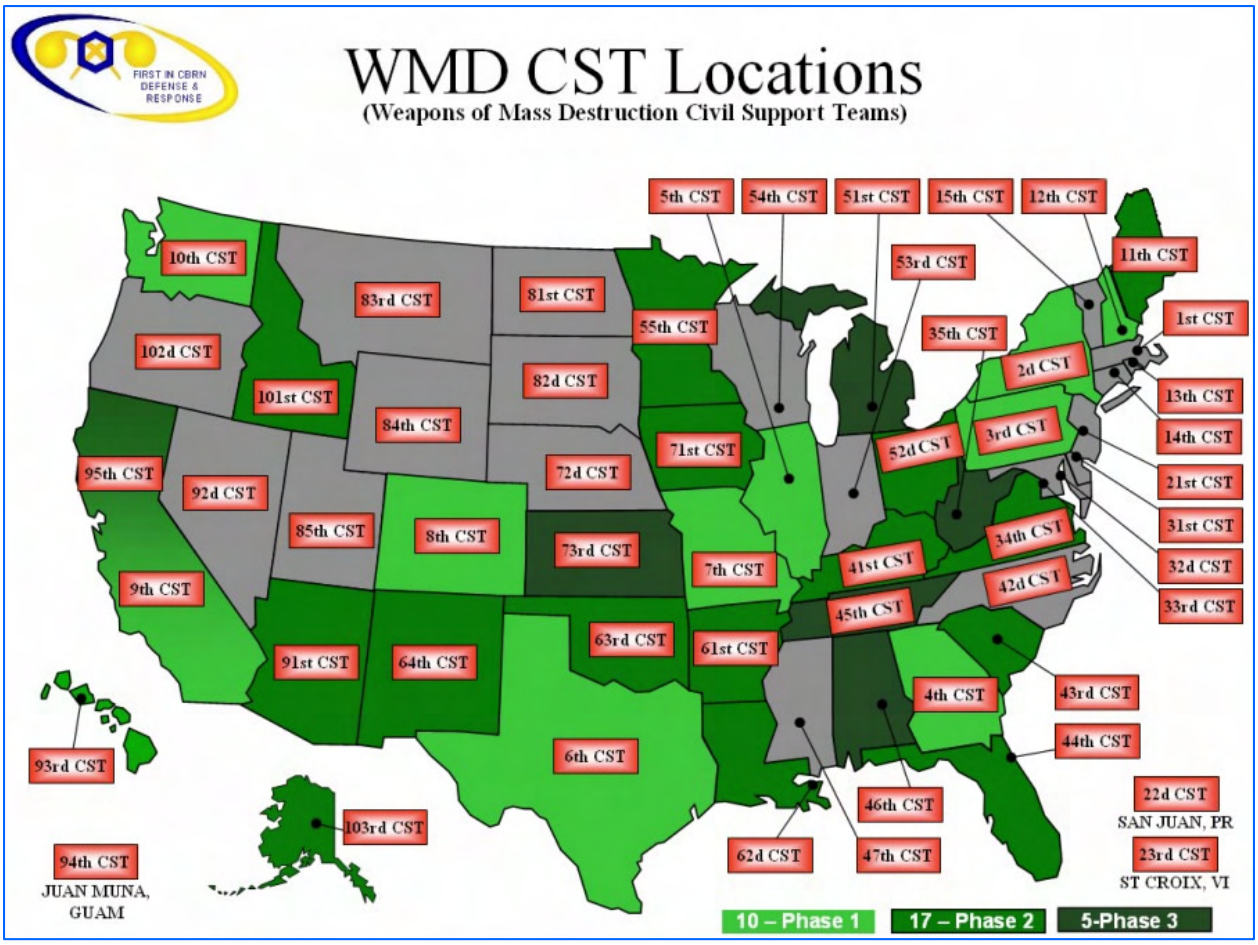
NBCC Command Post

WMD CST Mission

The CST mission is to support civil authorities at a domestic chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) incident site by identifying CBRNE agents/substances, assessing current and projected consequences, advising on response measures, and assisting with appropriate requests for additional support.

WMD CST Unified Command Suite (UCS) Vehicle

Figure 2. Military NBCC and WMD CST Missions.



NBCC and WMD CST Missions.

Civil Support Teams – Critical Value is a Tandem use of Communications and WMD Situational Awareness.

In many ways, the CSTs are equipped to be a WMD response command/evaluation post with technical experts and communications gear. Having served for many years as the NBCC chief in tactical command posts, but none in WMD CSTs, it appears to me that WMD CSTs are best when performing like tactical military NBCCs. NBCCs' dedicated tactical mission is to maintain nuclear, biological, chemical (WMD) situational awareness in a geographic area during tactical operations. Based on their capabilities, the WMD CSTs can perform as state "NBCCs" during WMD events and act as a state or DoD "Forward NBCC" to facilitate state, DoD or other federal support to a WMD incident.

This "Forward NBCC" concept provides enormous value to a WMD on-scene commander, despite the small WMD CST unit size. This value is largely due to the military and civil response familiarity of the WMD CST and their organic communications capabilities. Their "niche" or key role in military support to domestic civil response appears to be their command post functionality – with expertise in both military and civil response methods of operations, plans and procedures – unique within the DoD to facilitate its inter-agency support role in homeland security.

CSTs have some unique, though limited capabilities to perform as small units doing physical WMD "boots in the hot zone" missions. Their command and control links, however, can dramatically leverage their strengths, facilitate federal incident support, and provide the military with the catalyst needed to allow military forces to effectively integrate their abilities into the existing ICS structure established at an incident.

WMD CST reconnaissance or HAZMAT missions may detract from their ability to perform the most critical mission of providing continuous WMD

event information and on-scene assessments. Considering the requirement for continuous, post-WMD event operations, staffing the "Forward NBCC" could easily consume all WMD CST personnel resources.

WMD CST "Niche" for Maximum Effect

WMD CSTs are manned, equipped, and tasked to perform missions akin to the tactical NBCC. Other missions currently envisioned for the CSTs can be conducted by civil first responders, such as HAZMAT teams. In civil response events requiring their deployment, WMD CSTs should focus their capabilities on a primary mission that can best support first responders, and also mitigate some mass effects at a WMD scene by acting as the on-scene NBCC. By design, local first responders will be the first on a scene regardless of the event and provide direct HAZMAT response and assessments. WMD CSTs provide mitigation by leveraging their expertise in WMD and their robust communications capability. These are unique skills and abilities that enhance civil first-responders. WMD CSTs should focus their efforts on becoming NBCC equivalents rather than the additional tasks delineated in Figure 1 (page 59).

The WMD CST capability set is broad but shallow. I believe that WMD CSTs can provide a particularly important role for our nation that allows them to focus their capabilities on a particular mission – WMD-centric communications expertise, facilitated "reach back," and US military operations experience and knowledge of civil first response functions, roles, and missions. These important capabilities are unique within the DoD. The WMD CSTs need to focus their primary skills and capabilities to functionally serve as the DoD's military support channel to civil response command post operations as the "'forward' WMD situation military command post" or "NBCC."

Major Jim Demyanovich is a FA52 officer working in the Chemical/Biological Directorate of the Defense Threat Reduction Agency. He has a B.S. in Mechanical Engineering from Pennsylvania State University and a M.S. in Operations Research from the Naval Postgraduate School.

ENDNOTE

1. Field Manual 3-11.22, *Weapons of Mass Destruction Civil Support Team Tactics, Techniques, and Procedures*, Headquarters, Department of the Army, June 2003.

Virtual Chemical Hazard Environments to Support and Enhance Distributed Live Testing

Dr. Jeffery D. Peterson, Dr. James A. Kleimeyer, and
Dr. Leonard N. Carter,
West Desert Test Center, Dugway Proving Ground

The West Desert Test Center (WDTC) of the Army's Dugway Proving Ground (DPG) in Utah is the Defense Departments major testing site for chemical and biological (CB) sensors. Traditionally, testing of these sensors has been conducted as chamber and field tests. However, the recent development and use of virtual CB environments and analysis tools at WDTC has served to complement and enhance on-site field testing, following and building on the paradigm of simulation-based acquisition programs such as the Army's Future Combat Systems. Known collectively as the Chemical Biological Intelligence, Surveillance and Reconnaissance Suite, entire CB contamination scenarios can be generated through incorporation of simulations, physical test equipment, virtual and real sensors, near real-time meteorological data, and human operators to represent terrain, friendly and enemy entities, command and control messages, CB hazards, and CB sensors. The battlefield hazard environment is modeled using the Nuclear, Chemical, Biological, and Radiological Environment Server, and standoff and point chemical sensors are modeled using the Chemical/Biological Dial-A-Sensor (CB DAS) software tool. The virtual sensors from CB DAS in turn generate a data stream of virtual detection signals to Command, Control, Communications, Computers, and Intelligence systems, which function in conjunction with other tools, primarily OneSAF (Semi-Automated Forces) Test Bed, the Compact Terrain Data Base, the Ocean/Air/Space Environment Server, and the Live Vehicle Interface. Moreover, the off-line Analyzer version of CB DAS aids in post-test data processing by outputting a number of important hazard parameters from referee instrument input, including azimuth, elevation, distance to target, location, and concentration information, which is then compared to test item alarm data for verification purposes. The WDTC has successfully used CB Analyzer for the analysis of field data from tests of standoff chemical agent detectors and nuclear, biological and chemical reconnaissance vehicles.

The fielding of workable CB sensors is an extremely involved process that requires many years of testing and evaluation. Tests usually require the sensor of interest to undergo a wide variety of both real agent and agent simulant testing to develop an accurate measure of sensor performance. Numerous environmental issues and international treaties prohibit the open-air testing of live chemical and biological agents. To accommodate this important part of sensor testing, live agent tests are conducted in special environmentally controlled chambers. As good as these types of tests are, they are unable to provide a complete representation of sensor performance in the presence of CB agents. This is due to the testing constraints inherently associated with chamber tests, such as the limited numbers of infrared (IR) backgrounds that can be challenged by the sensors.

The second measure of sensor performance involves field trials. In such tests, environmentally safe agent simulants are used that closely resemble the spectral signatures of live agents as well as their physical properties and behavior. Similar to chamber tests, field tests cannot fully represent all real-world conditions in which the sensor will be required to perform. Typically, these field tests are conducted under “ideal” conditions (e.g. in calm, dry, warm weather). Therefore, little can be learned about sensor behavior under non-ideal conditions, such as in cold, windy weather.

Once all the tests are complete, the data need to be gathered and analyzed. This can be a very time consuming and cumbersome process due to the large amounts of data generated. Not only do the data need to be analyzed, certain decisions need to be made as to the overall success of the test. Questions regarding the positioning of the referee instrumentation and the sensors, the

alarm reliability, the condition of the agent release, and many others must quickly be answered in order to determine whether testing should continue and what successes, if any, were achieved. These analyses are complex and can occur weeks after the actual data were collected, thereby making accurate testing decisions increasingly difficult.

To minimize these shortfalls in CB sensor testing the WDTC located at DPG worked on developing methodologies that would allow for many of these tests to be simulated in a virtual environment. The Synthetic Environment Integrated Testbed (SEIT) program was started as an initiative by the U.S. Army Developmental Test Command and the Virtual Proving Ground Synthetic Environment Focus Group was tasked with providing this type of analysis. The SEIT program brought together modeling and simulation experts from the various Army Test and Evaluation Command's (ATEC) seven test centers: Electronic Proving Ground (EPG); Dugway Proving Ground (DPG); Redstone Technical Test Center (RTTC); Aberdeen Test Center (ATC); Aviation Technical Test Center; Yuma Proving Ground; and White Sands Missile Range (WSMR). In addition, ATEC wanted to establish the ability to perform these types of tests in a distributed manner (e.g. via network connectivity). This would not only allow test centers to participate from remote locations but evaluators could remotely assess the outcome of the test. The ultimate goal is to merge virtual simulations, actual sensor testing, and distributed testing into a comprehensive technology package. To this end, DPG has been developing tools that have significantly increased the usable information from data collected during sensor field tests. This paper describes the efforts of the SEIT program and the role that DPG plays in distributed sensor testing.

Post-Test Data Analysis

DPG has partnered with various Government organizations and their contractors to develop a system of tools that will aid in post-test data analysis of sensor field tests. The main tool used is called CB Analyzer, which is a software toolkit allowing a user to create threat assessment scenarios for analysis using data from field tests or virtual simulations. The toolkit currently provides support for chemical standoff active and passive sensors. These sensors can be attached to the vehicles in the exercise or placed in stationary locations. The attachment of sensors to vehicles is done via extensible markup language (XML) files. As the vehicles move, the sensor locations are updated appropriately. The parameters for the sensors such as scan pattern, agent detectability and so forth can be customized through another XML file. In order to perform each analysis, measured values of the elapsed time, heading, length, width, height, easting, and northing of the chemical hazard release are collected from the referee IR camera data. For concentration data, time-dependent values measured by the scanning referee instrumentation are used. Each detector has recorded data points for elapsed time, easting, northing, heading, and speed. Using these data, CB Analyzer simultaneously determines the position and concentration-pathlength (CL) of the hazard relative to any number of detectors on the test grid and generates a series of XML files that can be exported into a spreadsheet program for analysis and plotting. The plots created from

Table 1. Data Generated by CB Analyzer.

Ordinate	Abscissa	Description
Max CL	Time	Maximum detected CL values
Azimuth @ Max CL	Time	Absolute or relative azimuth to the hazard at max. CL
Elevation @ Max CL	Time	Elevation angle to the hazard at max. CL
Azimuth Range	Time	Max/min azimuth angles that hit the hazard
Elevation Range	Time	Max/min elevation angles that hit the hazard
Distance	Time	Distance to the nearest point on the hazard surface

the CB Analyzer data are used to validate detector alarm data. The types of data generated by CB Analyzer are shown in Table 1 on the previous page.

Figure 1 shows the types of plots that can be generated by CB Analyzer. Figure 1a shows the maximum/minimum azimuth angles for one of the detectors that hit the hazard as a function of time along with the representative test item alarm data. This plot provides information on where the cloud was located at any given time relative to the detector. The examination of the alarm data within the CB Analyzer data assists in the validation of the alarm data. Similarly, Figure 1b describes the elevation angles that hit the hazard as a function of time. Finally, in addition to position, CB Analyzer can also provide information on the distance to and/or through the hazard relative to the detector.

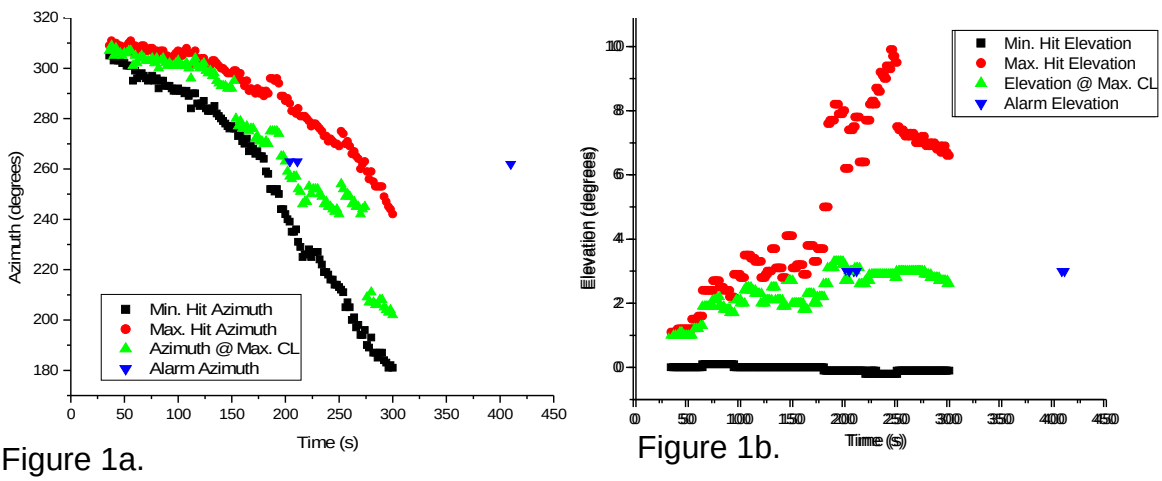


Figure 1a. Figure 1b.

Sample CB Analyzer data plots.

The development of the SEIT program began with a series of two initial operational capabilities (IOC) demonstrations and one distributed test event (DTE) demonstration. These IOC's and the DTE involved various distributed exercises that focused on an evolving and increasing level of capability that could be used in support of distributed events. The events were based on Red/Blue force tactical scenarios that incorporated various synthetic environment threads, such as: command, control, communications, and computers messaging, CB hazard releases, CB sensors, weather effects, radio frequency signal degradation, unmanned ground vehicles (UGV), and live ground and aerial entities. These IOC events utilized numerous hardware and software applications that allowed for test center connectivity and scenario visualization. Both Distributed Interactive Simulation (DIS) and High Level Architecture (HLA) network standards were utilized to send the simulation data packets across the network to the other test centers. A brief summary of the three events is detailed in Table 2 (page 66).

Distributed Test Event 4

The culminating event of the SEIT program was the execution of Distributed Test Event 4 (DTE 4). DTE 4 took place during Test Week 2004, which was a combined conference of the Army Test and Evaluation (T&E) Days and the International Test and Evaluation Association Symposium. Test Week 2004 was held in Huntsville, Alabama from 30 August thru 2 September 2004.

The DTE 4 event included participation from 11 different sites. Table 3 (page 66), lists each of the sites and their locations:

Each of the sites was assigned specific roles to play within the DTE 4 scenario. Each participant site had a staffed Distributed Test Control Center (DTCC) linked together with the other sites through the use of the high-capacity Defense Research and Engineering Network (DREN). Additionally, test centers utilized HLA, DIS, and Test and Training Ena-

Table 2. Summary of SEIT IOC Events.

Event	Synthetic Environment Thread	Participating Test Centers	Accomplishments	Demonstration
IOC 1	• C4 • RSTA • CB hazard	• EPG • RTTC • DPG • YPG	• DIS simulations • HLA federates • Live test entities • Interoperability	• March 2003 • ~50 people
IOC 2	• C4 • RSTA • CB hazard • Mobility • Robotic intelligence • Rotary IR	• EPG • RTTC • DPG • YPG • ATC • ATTC • WSMR	• Distributed environment • All test centers participated • Translocation of GPS positions to common terrain	• August 2003 • ~60 people
DTE 3	• C4 • RSTA • CB hazard • Mobility • Robotic intelligence • Rotary IR • Air drop	• EPG • RTTC • DPG • YPG • ATC • ATTC • WSMR	• FCS mission scenario (Caspian Sea) • TOEL • JANUS provided UE	• December 2003 • ~100 people • 10 papers at SISO

RSTA=Reconnaissance, Surveillance, and Target Acquisition
SISO=Simulation Interoperability Standards Organization
JANUS=Joint Army Navy Uniform Simulation
UE=Unit of Employment
GPS=Global Positioning System
FCS=Future Combat Systems

bling Architecture as the network standards for all models and tools to communicate with each other across the DREN.

DTE 4 Scenario

Many goals and objectives were set forth for DTE 4. The focus was to demonstrate the ability to link test centers and their capabilities in a distributed testing environment. This included the merging of live, virtual, and constructive entity representations into a single mission orientated scenario. The test event was displayed on a digital terrain representation of WSMR. The scenario used for DTE 4 was based on the Unit of Action Maneuver Battle Lab Caspian Sea 2.0 scenario. The Time Ordered Event List consists of over 650 unique events in a 2.5 hour time frame. The scenario calls for the engagement of Red forces (enemy)

Table 3. DTE 4 Participants.

Participant Sites	Location
Aberdeen Test Center (ATC)	Aberdeen, MD
Aviation Technical Test Center (ATTC)	Fort Rucker, AL
Dugway Proving Ground (DPG)	Dugway, UT
Electronic Proving Ground (EPG-FH)	Fort Huachuca, AZ
Electronic Proving Ground (EPG-FL)	Fort Lewis, WA
Redstone Technical Test Center (RTTC)	Huntsville, AL
White Sands Missile Range (WSMR)	White Sands, NM
Yuma Proving Ground (YPG)	Yuma, AZ
Night Vision & Electronic Sensors Directorate (NVESD)	Fort Belvoir, VA
Operational Test Command (OTC)	Fort Hood, TX
Army Evaluation Center (AEC)	Alexandria, VA

Table 4. DTE 4 Scenario Entities

Test Center	Live	Virtual	Constructive
ATC	Vehicle	Vehicle Dynamics Mobility Server	UGV Robotic Intelligence Lethality/Vulnerability
ATTC		Apache Flight Dynamics Model IR scene/Sensor	
DPG	Vehicle	Chemical Agent Hazard Agent Sensors Weather Effects	
EPG	UAV (Shadow 200)	Orion (RF Signal) RPWS w/server	Battle Command Emulator OTB
RTTC	UAV (Helicopter)	IR Scene/Sensor	OTB
WSMR	(4) T72 Tanks (1) T80 Tank UAV (Cessna)		OTB
YPG	Vehicle	Terrain NLOS-C Simulator	

UGV=Unmanned Ground Vehicle
IR=Infrared
UAV=Unmanned Air Vehicle
RF=Radio Frequency
RPWS=Role Player Workstation
OTB=OneSAF Testbed Baseline
NLOS-C=Non Line-of-Sight Cannon

versus Blue forces (friendly). As Blue forces advance on Red forces, spot reports are sent out upon visual confirmation of enemy entities providing enemy type, status, and location. As hostilities increase, exchanges of fire occur. In hopes of deterring the Blue force advance, Red forces release a chemical agent hazard near an airstrip on WSMR synthetic terrain. Six chemical agent sensors (three mobile and three ground) are used to detect and monitor the agent release. Table 4 lists all the test centers that were responsible for controlling various entities engaged in the scenario.

The event was viewable at multiple locations during the T&E Days symposium. RTTC hosted six demonstration sessions during that week for conference attendees. Two of the sessions were reserved for VIP guests and other dignitaries. In addition, ATEC sponsored a DTE 4 booth at the conference where attendees could receive an overview of the event and the role each test center played in the scenario. While each test center had specific roles to play that significantly contributed to the overall scenario, this paper will focus primarily on the DTE 4 efforts at DPG.

DPG DTE 4 Activities

DPG Tools Used During DTE 4

Dugway Proving Ground produced four entities for the DTE 4 exercise. In addition, DPG used numerous software tools and applications to interconnect with the other test sites and to display the DTE event in various formats. Table 5 (page 68), describes each of the tools DPG used in support of DTE 4.

Live Vehicle Entity

DPG was one of three test centers that were tasked with providing a live vehicle for the test event. The vehicle was equipped with wireless network access as well as a mobile Global Positioning System (GPS). The GPS system recorded the vehicle position and speed as it traveled its predetermined route. This information was passed through the wireless network connection to a computer terminal in a communications trailer located at the DPG test range. This information was then transmitted across the DPG Local Area Network (LAN) to the DTCC. A software program called the Live Vehicle Interface (LVI) was used to take this vehicle information and publish it to the visualization software. A unique feature of the LVI software allowed the vehicle GPS position to be translocated to any desired location. Therefore, as the vehicle was traveling in real-time at the DPG test range, its position was being translocated to appear as if it were driving on WSMR terrain. This feature allowed all test centers to place their live vehicles onto the same terrain regardless of the vehicles' actual location.

Weather Effects

DPG utilized its 4-Dimensional Weather system (4DWX) technology to help produce the weather effects that were used during DTE 4. The 4DWX was used to produce a meteorological based file of

Table 5. Tools Used at Dugway During DTE 4.

Tool	Purpose
MÄK Gateway	Allows interoperability and test site connectivity during distributed testing.
MÄK Stealth	3-D visualization application with 3-D entity model support.
MÄK Plan View Display (PVD)	2-D visualization of the battlefield terrain along with icons representing each entity.
MÄK Data Logger	VCR-like application that records and plays back all network traffic.
OneSAF Testbed Baseline (OTB)	2-D representation of the battlefield that allows for scenario generation and battlefield situational development.
Dial-A-Sensor (DAS)	Simulation tool used to represent any general class of chemical and biological particle and vapor sensors.
Nuclear, Chemical, Biological, and Radiological Environment Server (NCBR)	Physics based environment server used for hazard propagation.
Live Vehicle Interface (LVI)	Reads vehicle speed and GPS location and translocates position onto desired terrain.
Role Player Workstation (RPWS)	Displays situational awareness data (Force XXI Battle Command Brigade and Below (FBCB2)) and chemical hazard detection alarms.
Ocean, Atmospheric, and Space Environment Server (OASES)	Simulation for creating a 3-D, time-varying, digital representation of the natural environment.
4-Dimensional Weather System (4DWX)	Globally relocatable mesoscale weather model with high-resolution forecast capability.

WSMR weather conditions that would likely occur during the time of the DTE test. These data were converted to a Gridded Binary file that could be ingested into the weather simulator tool: Ocean, Atmospheric, and Space Environment Server (OASES). OASES contains a tool that allows for 2-D and 3-D graphical representation of the weather data. OASES also interacts with other simulation applications that are responsible for the chemical hazard propagation. In this regard, OASES can influence the way the hazard will propagate across the terrain by setting the environmental conditions that are most likely to affect the cloud behavior (e.g. wind direction and speed, temperature, humidity, etc.).

Chemical Agent Hazard

DPG personnel used the Nuclear, Chemical, Biological, and Radiological Environment Server (NCBR) to generate the chemical agent hazard cloud. As part of the scenario, the Red forces released six 4 kg detonations of the distilled mustard agent HD. Once released, the NCBR incorporated the OASES-based weather condition data and propagated the agent in a westerly direction near the WSMR landing strip. These chemical releases were displayed as detonation markers on the OneSafe Testbed Baseline and as cloud representations on the Plan View Display (PVD) and Stealth displays. The PVD was also used to track the chemical deposition of HD that remained on the ground. This was displayed as a concentration-based dependence on the PVD.

Agent Sensors

The Dial-A-Sensor (DAS) tool was used to emulate the chemical agent sensors. DPG replicated six chemical sensors for the event. Three sensors were chemical point ground sensors and three were passive stand-off chemical agent detectors. DAS has the ability for the user to “dial in” specific sensor performance parameters. For example, the chemical ground sensors were set up to mimic a double wheeled sampling sensor. This configuration takes into account many specific variables such as the transfer

efficiency of the agent from the wheel to the ground and the specific agent detection threshold. Likewise, standoff sensors were virtually attached to live and virtual vehicles. DAS permits user-selectable configurations of scan azimuths and elevations as well as specific scan patterns. Additionally, DAS has the ability to send out tactical messages as either Nuclear, Biological, and Chemical (NBC) reports or as telemetry messages across the Role Player Work Station (RPWS).

Visualizing the Event

During the DTE 4 event, the DTCC was staffed with technical experts in the areas of weather, chemical and biological agents, network, hardware, and software. These personnel helped to ensure that all events proceeded smoothly and that all technical issues and problems could be resolved without affecting the overall event. Additionally, these technical experts were available to answer spectator questions regarding the event and to provide additional background information.

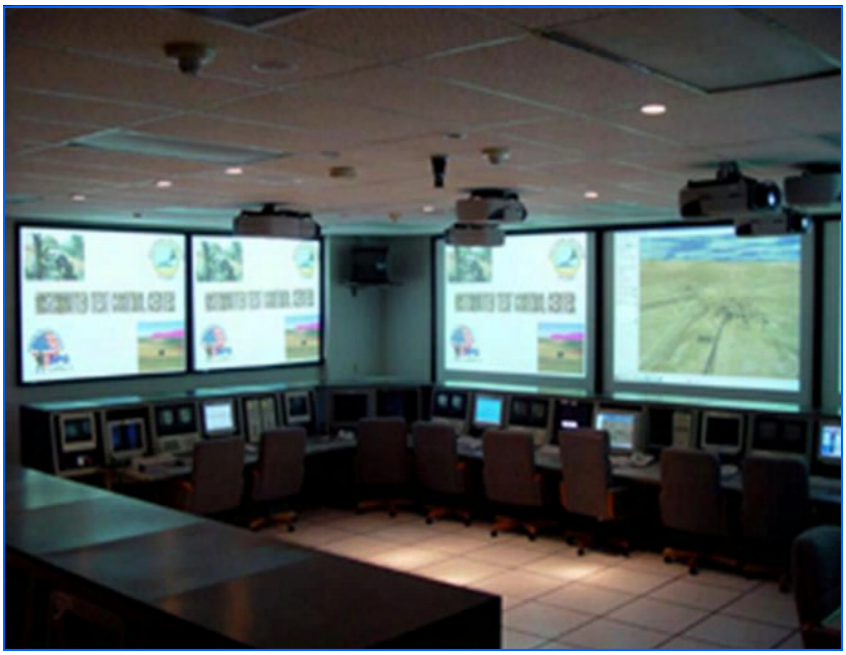


Figure 2. Image of the Dugway Distributed Test Control Center

Figure 2 shows the DTCC located at Dugway Proving Ground. This center is equipped with over 20 workstations and computer servers that provide the computational framework and network connectivity needed to support distributed testing. Each of these workstations is capable of having their outputs displayed on any of the seven overhead projectors that are located in the room. This provides the technicians and spectators an unobstructed view of the displayed events.

Figure 3a shows a screen capture image of the MÄK Stealth visualization tool. The displayed vehicle is the Dugway live vehicle entity whose position has been translocated onto WSMR terrain. The violet colored beam extending from the top of the vehicle is the DAS emulated passive chemical agent detector. The beam is rotating in a 360º scan pattern

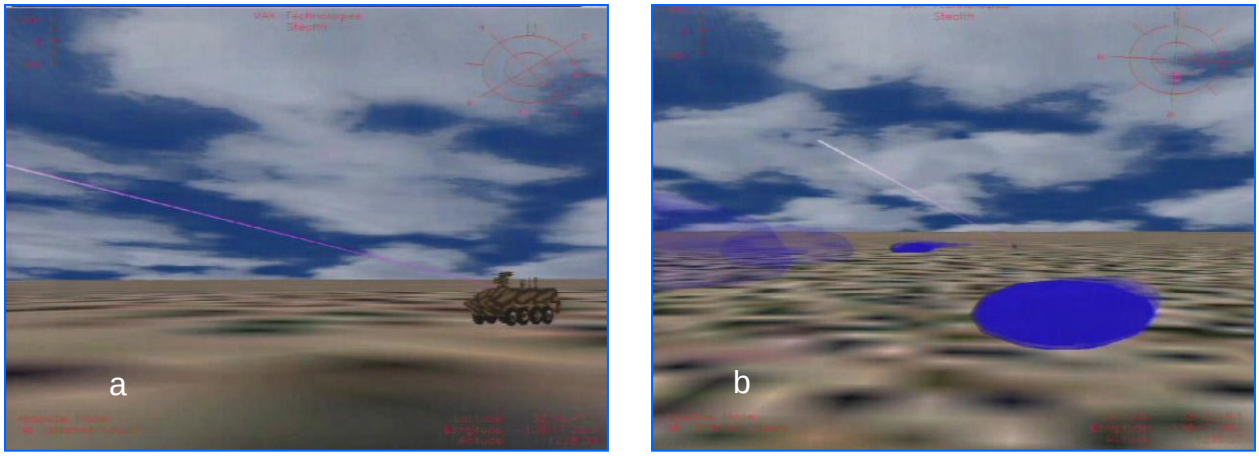


Figure 3a-b. Stealth representations of the Dugway live vehicle with attached sensor and the chemical agent cloud.

as it searches for the chemical cloud. In addition to the DPG vehicle, two other similarly represented vehicles also had attached detector's that were also being published by DPG.

Figure 3b (previous page) shows a Stealth view of the vehicle as it approaches the agent release sites. The Stealth visualization tool adjusts the shading and transparency of the blue agent clouds to provide an agent concentration-based representation of the chemical hazard. The darker blue is indicative of a high concentration region, while the lighter blue shows areas of low concentrations. These shading gradients change as a result of cloud propagation which is governed by the specific agent properties as well as both terrain and weather conditions.

Figure 4 is a screen image of the MÄK PVD tool that was used during DTE 4. Displayed on the right side of the image are the three UGV robotic intelligence vehicles published by ATC. The chemical detonations are clearly shown in the center of the display near the WSMR landing strip. The far right toolbox lists a color-dependent chemical deposition scale that corresponds to the amount of agent that persists on the ground after detonation. As time progresses and the clouds have time to propagate, the colors will change from red (high concentration) to blue (low concentration) indicating a reduction in ground deposition concentration. This information is very beneficial from a real-world situational awareness standpoint in that it provides decision makers the necessary data so they can react accordingly to ensure troop safety and mission success (e.g. initiate personal protection procedures, redistribute troops, etc.).

Figure 5 shows the RPWS software tool. Each of the circle icons represents an individual entity that is participating in the scenario. The red line seen in the upper middle section of the map (see inset as well) represents a sensor alarm from one of the stand-off detectors mounted on the vehicle. Once the sensor detects the agent cloud, a red scan line is displayed on the RPWS indicating the pointing direction of the sensor as well as the entity that detected the hazard. This allows one to track the movement of the cloud in relationship to the vehicles with sensors. As time passes, the scan line will eventually fade away, which allows one to distinguish between recent and old alarms.

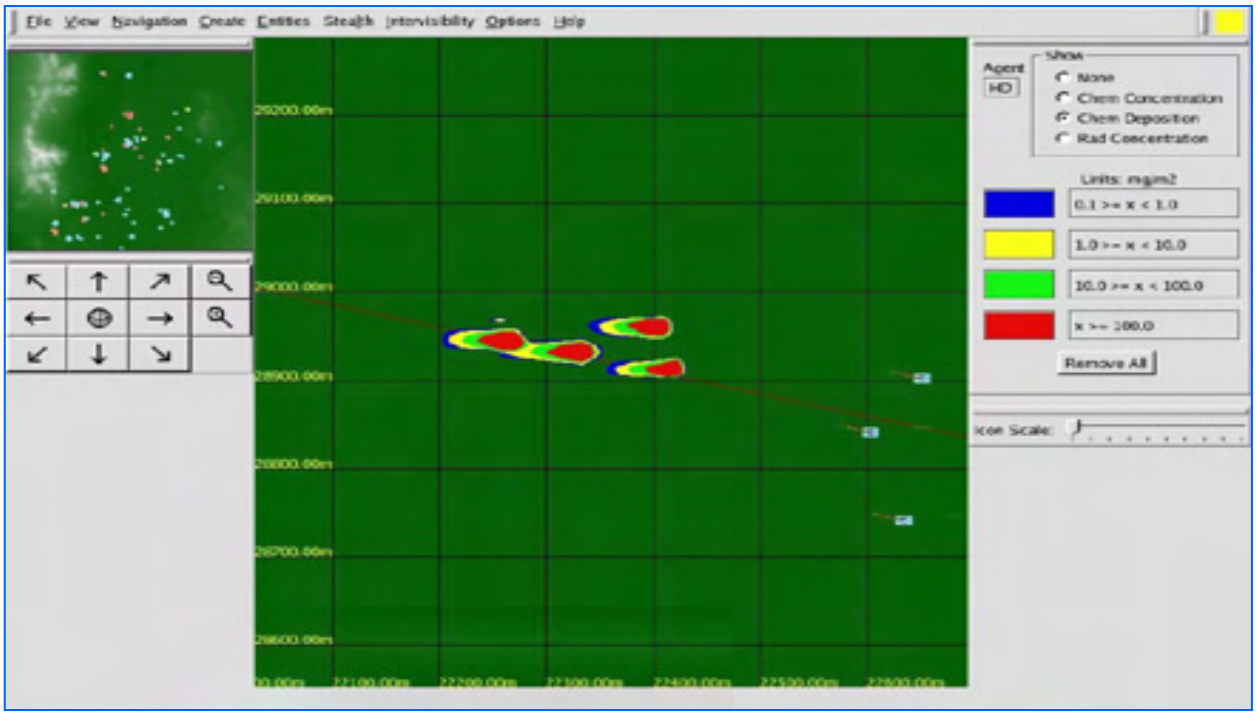


Figure 4. Plan View Display (PVD) of the chemical agent release showing the chemical deposition concentrations.

Future Plans

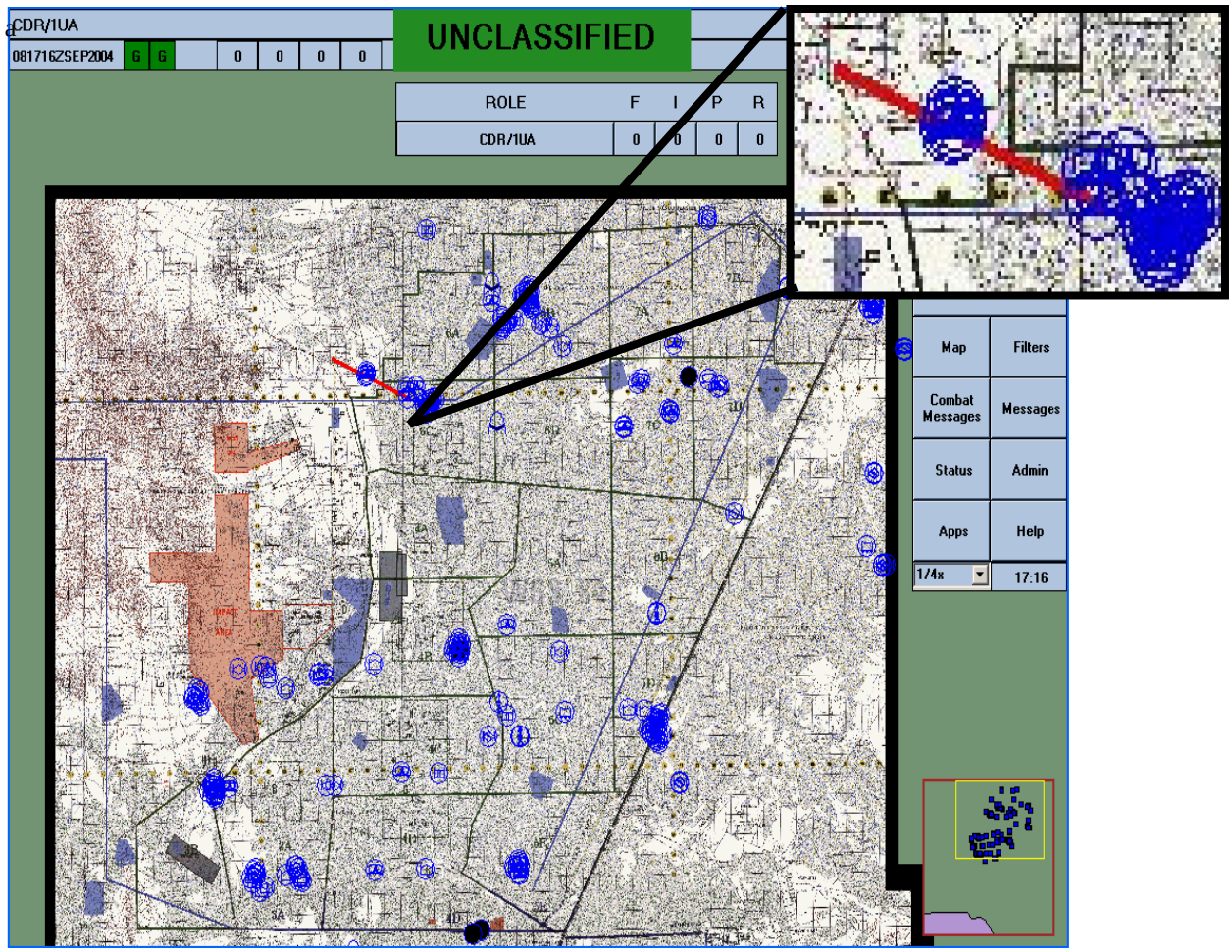


Figure 5. Role Player Work Station (RPWS) Image of the DTE 4 Scenario Showing the Chemical Agent Detection Azimuths.

The successful completion of DTE 4 marks the end of distributed test events built upon mock scenarios. DPG personnel would like to be able to simulate and distribute a live test event, with a technology demonstration planned for this summer. The proposed event will require that all test data be fed in near real-time into the DPG DTCC. This includes data from the detectors under test, the hazard release, the referee instrumentation, and any vehicle position data that may be generated. Once the feeds are collected, the data must undergo significant refinement and processing before they can be distributed out to the other test centers. Present DPG capabilities are such that between one and two weeks are required to prepare test data before they can be analyzed by evaluators. This is due to DPG's use of many different data processing techniques and man-in-the-loop efforts requiring large amounts of execution time. DPG personnel have initiated plans to automate many of the CB Analyzer processes so that the turn-around time can be reduced from weeks to minutes. This is absolutely essential if a live distributed test is to take place in near real time. By distributing a real test event, DPG personnel hope to demonstrate the usefulness of distributive testing in the overall acquisition process. Both testers and evaluators will have immediate access to test conditions, parameters, and results. Based on this data, they will be able to instantaneously make changes to test parameters to ensure accurate, quality data. This, in turn, will save considerable resources and provide virtual test conditions that cannot be replicated in actual field tests.

Dr. Leonard N.Carter is a Program Manager at the West Desert Test Center, located at Dugway Proving Ground, Utah. He has a B.S. in Physics from the University of California at Berkeley, an M.S. in Engineering/Applied Science from the University of California at Davis, and a Ph.D. in Applied Physics from Boston University. He was previously employed at Lockheed Martin Missiles and Space Company, SRI International, Lawrence Livermore National Laboratory, and Naval Surface Warfare Center/Carderock Division. His email address is pete.carter@us.army.mil.

Dr. James A. Kleimeyer is a Physical Scientist at the West Desert Test Center, located at Dugway Proving Ground, Utah. He has a B.S. and Ph.D. in Chemistry from the University of Utah. He was previously employed by Battelle and Jacobs-Sverdrup at WDTC as a Project Scientist. His email address is kleimeyer@dpg.army.mil.

Dr. Jeffery D. Peterson is a Physical Scientist at the West Desert Test Center, located at Dugway Proving Ground, Utah. He has a B.S. in Chemistry from Southern Utah University and a Ph.D. in Physical/Analytical Chemistry from the University of Utah. He was previously employed as a Project Scientist at Battelle. His email address is jeffery.d.perterson1@us.army.mil.

FA52 Assignment to the National Ground Intelligence Center

MAJ Samuel J. Willmon
National Ground Intelligence Center

An assignment to the United States Army Intelligence and Security Command's (INSCOM) National Ground Intelligence Center (NGIC) poses unique challenges and opportunities for the FA52 (Nuclear and Counterproliferation) officer. First, a bit of history.

What is NGIC? NGIC was born in 1995 with the merging of the Foreign Science and Technology Center and the Intelligence and Threat Analysis Center (ITAC). The Foreign Science and Technology Center, formed in 1962, was responsible for the science and technology (S&T) end of things, while the ITAC was an integrated all-source production center created as part of INSCOM in 1977. The end result was the Department of Defense's (DoD's) premier all-source ground intelligence production center that effectively coupled S&T intelligence (S&TI) with general military intelligence functions. One of NGIC's many strengths continues to be its focus on support to the war fighter with heavy emphasis on the science behind intelligence assessments.

Where do we fit in? As a purely Army organization, NGIC answers directly to INSCOM and the Army G2. With our mission focused on supporting the war fighter, NGIC interacts with and supports all of the major commands, all of the Service components, and the DoD in the planning and operational phases. As an all-source intelligence production center, NGIC collaborates with and provides analyses to the entire intelligence community. NGIC also contributes to intelligence products designed for national decision and policy makers. As stated earlier, one of NGIC's greatest strengths rests in the application of S&TI skills in military-oriented assessments used to support the war fighter. FA52 officers have the exact combination of skills uniquely suited for this position: operational military experience coupled with an advanced science degree.

What's the role of the FA52 officer at NGIC? The FA52 officer assigned to NGIC can expect all aspects of his/her military and civilian education to be engaged to the fullest extent. (I've personally experienced periodic nightmares involving the Air Force Institute of Technology's "Nuclear Chemistry" course.) Duties at NGIC span the entire scope of nuclear disciplines: fundamental nuclear principles, the nuclear fuel cycle, radiation effects, health physics, computational modeling, consequence assessment, environmental monitoring, and counterproliferation issues.

FA52 officers have the exact combination of skills uniquely suited for this position: operational military experience coupled with an advanced science degree.

At the basic level, the FA52 assigned to NGIC is an intelligence analyst. This means sifting through daily intelligence reporting ("data mining") and applying technical/tactical knowledge in order to provide an intelligence assessment. At the in-

termediate level, the FA52 officer assigned to NGIC is responsible for establishing and managing contracted efforts external to the organization that promote the production of finished intelligence. The more advanced intelligence work comes from combining technical and tactical skills with a working knowledge of the intelligence reporting in support of Army, national level working groups and committees, and the broader intelligence community. As a major caveat to all of the above, however, and in the spirit of the "Army of One" philosophy, the FA52 assigned to NGIC is truly one-of-one in the Army. This means that there is great flexibility in the issues and focal areas that the FA52 intelligence analyst at NGIC can address.

An assignment to NGIC affords the FA52 officer the opportunity to employ both technical and tactical skills in support of missions that cross the spectrum of national, DoD, Army, and theater-level organizations. NGIC also affords the FA52 officer the opportunity to expand well beyond the traditional developmental training plans. Opportunities exist to receive technical training related to intelligence collection, management, and production as well as training focused on issues related to WMD programs and counter-proliferation efforts.

My assignment to NGIC has been a phenomenal experience (and I'm only half-way through!). I would certainly recommend this assignment to anyone in the FA52 community who wants to apply technical knowledge of nuclear issues to the current and future threats our nation is facing.

Major Samuel Willmon is a FA52 Officer assigned as a Nuclear Weapons Effects Analyst at the NGIC. He earned a B.S. in Engineering Physics from the United States Military Academy at West Point, and a M.S. in Nuclear Engineering from the Air Force Institute of Technology. His email address is frwilsj@ngic.army.mil

One of NGIC's many strengths continues to be its focus on support to the war fighter with heavy emphasis on the science behind intelligence assessments.

Aluminum Can Actually "Rust" Away in a Matter of Hours?

Mr. Robert Pfeffer
Physical Scientist, United States Army Nuclear and Chemical Agency

Since Hans Christian Oersted discovered aluminum in 1825, it has had many military and commercial applications. These include aircraft and ship structures, kitchen pots and pans, and even tin foil and aluminum cans. Such diversity of usage is due to its strength, light weight, and the fact that it can be recycled. Another attractive feature is, unlike iron, aluminum does not just rust completely away. Yes, both metals form oxides when placed in contact with oxygen, but iron oxide continues to replace iron until there is no more metallic iron. Aluminum, on the other hand, forms a very hard, thin coating of aluminum oxide on its surface that actually stops the creation of more aluminum oxide. Aluminum, with this thin oxide layer, is therefore perceived as a low-maintenance, long lived metal.

That's the good news. The bad news is this process is compromised with the application of even a small amount of mercury. When applied to an aluminum surface, mercury infiltrates the metal and disrupts the formation of an aluminum oxide coating that normally protects the metal. The decomposition takes place rapidly! The photograph below shows the decomposition of an aluminum I-beam when a small amount of mercury paste was applied to the surface. This I-beam rusted halfway through in a matter of a few hours.

Mercury-induced decomposition of aluminum has been known for a long time. Its been reported that World War II Allied Commandos went behind enemy lines and smeared Axis aircraft with a mercury paste in an effort to have them destruct in flight. When you consider that an aircraft skin is held together by just a few micron-thick aluminum oxide layer, it is not surprising that such stories persist… and that since 11 September 2001 airport security inspectors confiscate anything that might contain mercury (e.g., thermometers).

NOTE:
Most of the information for this article was taken from an article by Theodore Gray, entitled The *Amazing Rusting Aluminum*, *Popular Science* magazine, October 2004. The photograph below was taken by Jeff Sciortino.

Defense Threat Reduction Agency Liaison Officers - A Vital Link to the Combatant Commanders

LTC Carl Wayne Lowe
Defense Threat Reduction Agency

On the morning of 11 September 2001, Army Major Wayne Lowe, newly arrived Defense Threat Reduction Agency (DTRA) Liaison Officer (LNO) to United States Joint Forces Command (USJFCOM), immediately reported to the USJFCOM Joint Operations Center (JOC) following the first airplane striking the World Trade Center. He sent the Assistant DTRA LNO, Mr. Tom Kiggins, to the Joint Task Force-Civil Support (JTF-CS) JOC. Over the next six weeks they led a team of five additional DTRA personnel providing critical operational, modeling, and planning support to both USJFCOM and JTF-CS during the initial stages of Operation NOBLE EAGLE. DTRA's decision to place LNOs at the Combatant Commands (COCOMs) was paying off.

The Defense Threat Reduction Agency

DTRA safeguards America's interests from weapons of mass destruction (WMD) or chemical, biological, radiological, nuclear, and high explosives (CBRNE), by controlling and reducing the threat to the United States (US) and its allies, and providing quality tools and services for the warfighter.

DTRA uses a comprehensive set of tools to reduce the threat of WMD. Arms control, threat reduction, technology development, combat support, and chemical and biological defense make up DTRA's toolbox. The agency supports the US nuclear deterrent capability; reduces the threat from nuclear, chemical, biological, conventional, and other special weapons; and counters threats posed by WMD. DTRA provides operational and analytical support for nuclear stockpile stewardship duties and technical support for nuclear weapons in Department of Defense (DoD) custody.

History of DTRA LNOs

In 1999, DTRA had an LNO stationed at both United States European Command (USEUCOM) and United States Strategic Command (USSTRATCOM). The Joint Staff Combat Support Agency Review Team (CSART) report for that year recommended that DTRA place LNOs at each COCOM. DTRA began placing the recommended LNO teams during the summer of 2001. The timing was fortuitous in that the LNOs were in place at the COCOMs when the terrorist attacks occurred. In addition to the DTRA personnel that deployed to USJFCOM, DTRA personnel also deployed to United States Central Command (USCENTCOM). Navy Commander Chris Bidwell, DTRA LNO to USCENTCOM, led the DTRA team that supported the USCENTCOM staff as it planned and conducted Operation ENDURING FREEDOM.

These deployments led DTRA to develop and implement a plan for supporting the COCOMs during combat operations. DTRA began an LNO augmentee training program, which identified DTRA personnel for possible deployment and ensured they received the training required to support LNOs in the field. The resources dedicated to this program paid off in the months leading up to Operation IRAQI FREEDOM. The permanent LNO to USCENTCOM, Army Lieutenant Colonel Jeff Weston, deployed forward in theater with one augmentee, Army Major Dale Conwell. An additional augmentee, Army Lieutenant Colonel John McClory, deployed to USCENTCOM at MacDill Air Force Base, Florida to backfill the LNO position. All three of these LNOs

are Functional Area 52 (FA52) officers. This LNO team provided the critical linkage across all elements of USCENTCOM and ensured the commander's requirements for DTRA were met. This included coordinating for the numerous DTRA teams that deployed in support of operations.

It quickly became apparent within DTRA that the LNOs provided a valuable resource and vital linkage to DTRA's customers. DTRA next established LNOs outside the traditional COCOMs. Over the last three years LNO positions have been established at the Pentagon, National Guard Bureau (NGB), United States Forces Korea (USFK), Ft. Bragg, the Federal Bureau of Investigation (FBI), and the Defense Intelligence Agency (DIA). Most organizations have an LNO team consisting of a military officer and a contractor. The contractor support provides continuity as the military members rotate through their tours.

Responsibilities of DTRA LNOs

The Liaison Office at DTRA supports the LNOs in the field. A FA52 officer, Lieutenant Colonel Brenda Harris, leads this office with two contractors supporting her. The office provides daily coordination and reporting between DTRA and the LNOs, as well as any administrative assistance required by the LNOs. This office developed and implements the semi-annual LNO training program, which ensures that the LNOs have the most current status pertaining to DTRA research, development, modeling, and combat support actions. This training also provides DTRA with a pool of trained LNO augmentees available for deployment.

DTRA LNOs

SUPPORTED COMMAND	LNO DESCRIPTION	LOCATION
DTRA Liaison Office	USA FA52 LTC 2 Contractors	Alexandria, VA
USCENTCOM	USA FA52 LTC Contractor	MacDill AFB, FL
USEUCOM, SHAPE & NATO	USAF Lt Col 2 Contractors	Vaihingen, Germany Chievres, Belgium
USJFCOM & USTRANSCOM	USA FA52 LTC Contractor	Naval Support Activity Norfolk, VA
USNORTHCOM & NORAD	USAF Lt Col Contractor	Peterson AFB, CO
USPACOM	USA FA52 LTC Contractor	Camp Smith, HI
USSOCOM & USSOUTHCOM	USN CDR Contractor	MacDill AFB, FL
USSTRATCOM	USAF Lt Col Contractor	Offut AFB, NE
USFK	USA FA52 LTC (Summer 05) Contractor	Seoul, Korea
Ft. Bragg	USA FA52 MAJ	Ft. Bragg, NC
Pentagon	USAF Col Contractor	Arlington, VA
NGB	USA FA52 LTC Contractor	Arlington, VA
FBI	Civilian	Washington, DC
DIA	Civilian	Bolling AFB, Washington, DC

DTRA LNOs act as the communication link between DTRA and the organizations they support. They are DTRA's ambassadors and represent the Director of DTRA to, and within, the warfighting organizations. LNO responsibilities include establishing, conducting, and maintaining liaison in all areas of mutual interest and cooperation. The LNOs serve as the focal point between DTRA and its customers to implement DoD threat reduction initiatives to deter, reduce, and counter the threat of WMD.

DTRA LNOs must have a clear understanding of every DTRA mission area and how it might support or impact the COCOM. In parallel, the LNOs are also required to understand the COCOM mission areas. Gaining situational awareness of each organization allows the LNOs to accomplish their mission of facilitating DTRA's entry into the COCOMs and monitoring on-going programs and projects.

Maintaining this situational awareness – of both DTRA and the COCOM – is the most im-

portant, and the most difficult, aspect of the job. Each COCOM and organization is unique. Two of the LNO teams support multiple COCOMs, which adds another dimension of situational awareness. Overall, the LNOs strive to identify potential linkage between DTRA and the COCOMs, and then work to connect the appropriate action officers (AO) to work the issues.

Most LNOs are also the DTRA representatives on various COCOM teams. These may include joint and contingency planning groups, joint interagency coordination groups, various working groups dealing with CBRNE areas, and crisis action teams. The LNOs are seen as an asset to the staffs and are used as such when CBRNE questions arise. The LNOs utilize DTRA's reachback capability to get subject matter expertise when required.

In addition to working at the AO level, the LNOs must be comfortable interacting with senior leadership. This might include briefing the four-star commander or other flag officers on DTRA capabilities, preparing point papers on CBRNE areas, and participating in senior level meetings as the DTRA representative.

When the DTRA senior leadership is meeting with the COCOM leaders, the LNO is responsible for coordinating all aspects of the visit. This includes working with the protocol office, coordinating calendars and meeting agendas, preparing point papers, participating in meetings prior to and during the visit, and following up on issues and/or agreements. The critical piece to these meetings is ensuring senior leaders from DTRA and the COCOM agree on the agenda and understand all issues to be discussed.

A final aspect of the job is the ability of the LNOs to rapidly communicate with each other. It is often necessary for LNOs to work directly with LNOs and AOs from other COCOMs to quickly resolve issues. Often times, the LNOs pass information between the commands faster than the COCOM staffs.

FA52 Officers as DTRA LNOs

Being a DTRA LNO is a great job for Army FA52 officers. FA52s fill the billets at the DTRA LNO Liaison Office, USCENTCOM, USJFCOM, United States Transportation Command, United States Pacific Command, USFK, NGB, and Fort Bragg. FA52s possess the technical expertise and operational understanding of weapons of mass destruction necessary to integrate DTRA support into the warfighter staffs. This expertise gives the LNO credibility with the staffs. They view the LNO as the conduit for all CBRNE questions and answers. Training at DTRA Headquarters and the Defense Nuclear Weapons School enhances the skill set that FA52s bring to the job.

Summary

The LNOs are DTRA's "Tip of the Spear" in supporting the warfighters. LNOs must be able to work independently with minimal guidance, maintain situational awareness of both DTRA and the supported organization, be comfortable working with both action officers and senior leaders, and be able to represent DTRA in a professional manner. It is a highly rewarding job that FA52 officers are well equipped to perform.

LTC Wayne Lowe is a FA52 officer and the Defense Threat Reduction Agency's Liaison Officer to the United States Joint Forces Command and the United States Transportation Command. He has a B.S. in Engineering Physics from the United States Military Academy at West Point, a M.S. in Nuclear Science and Engineering from Cornell University, and a M.B.A. from the University of New Mexico.

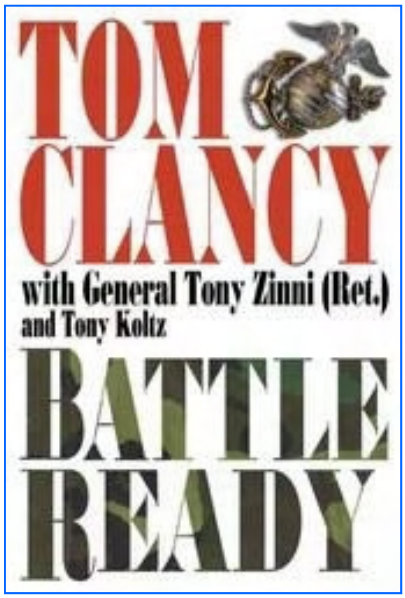
Battle Ready

Maj Patricio A. Tafoya, USMC
The Judge Advocate General's Legal Center and School

A man's memory is bound to be a distortion of his past in accordance with his present interests, and the most faithful autobiography is likely to mirror less what a man was than what he has become. [1]

[E]ighteen of the most prominent peace negotiators, post-conflict supervisors, and writers (the foremost experts and practitioners in conflict resolution came together in Oslo, Norway, in a . . . conference they called "a Mediator's Retreat." I was flattered to be included in this group. [2]

In this, his fourth, "Commanders" biography, Tom Clancy follows the career of General Anthony Zinni, US Marine Corps (Retired), from company grade advisor in Vietnam to Commander-in-Chief of US Central Command [CENTCOM].[3] While Clancy narrates a substantial portion of General Zinni's storied career, the most compelling passages come from General Zinni's own words. Clancy begins the book with General Zinni's actions as CENTCOM commander and his thoughts on America's recent involvement in Iraq, then takes the reader to the beginning of General Zinni's career and the failure that came to represent America's involvement in Vietnam.[4] Ultimately, Clancy and company cleverly relate General Zinni's Vietnam experiences and his lessons over a 40-year career to America's current involvement in Iraq, and bring the reader full-circle in describing the complexity and potential pitfalls in today's operations.[5] Through General Zinni's personal accounts, *Battle Ready* clearly conveys the inherent responsibilities of today's leaders to learn lessons from the past and exercise all the instruments of our national power to maintain America's security and promote positive



change around the globe.[6]

Other than his previous three "Commanders" books, Clancy does not seem specially qualified or knowledgeable in this subject. In fact, other readers believe the absence of a "critical bibliography" weakens Clancy's ability to emphatically defend the reliability of his claims.[7] But it is hard to imagine a more credible or reliable source than Tony Zinni himself, particularly when most of the events he recounts in *Battle Ready* could easily be confirmed or refuted through historical research. Even with the potential for exaggeration, embellishment, or incompleteness, General Zinni's accounts are an interesting read from both a personal and historical perspective.

Battle Ready contains many examples of leadership, initiative, and decisiveness from a career warfighter's perspective. Through the rigors of actual combat engagements in Vietnam, General Zinni is able to share the importance of being proficient, well disciplined, and bold.[8] He shares the importance of understanding, and trusting one's fellow soldiers regardless of their nationality and valuing their abilities and ingenuity.[9] He aptly demonstrates that leadership is not the exercise of a perfect plan or perfectly executed mission, but is often forged through mistakes and spur-of-the-moment decisions that often have costly results.[10]

Military professionals cannot disregard the importance of working in a combined and joint environment. General Zinni's reflections introduce the reader to the combined nature of military operations. He also illustrates various ways in which today's military can approach international operational environments. It is reassuring to know that past generations have

undertaken such operations and have tackled the same or similar issues facing today's military.

Training and ingenuity were among General Zinni's strongest methods of leading.[11] At every opportunity, General Zinni trained himself and his Marines.[12] Whether adopting riot control techniques to curb the tide of racial tension on Okinawa or implementing lessons-learned into his brainchild-the Infantry Training Center, training was clearly a fundamental responsibility of Tony Zinni as a leader.[13] Similarly, his disdain for inflexible plans and templates on conducting both combat and force protection operations, results in leadership through innovation.[14] In fact, the book nearly begs the reader to think "outside the box." General Zinni established and fostered command environments in which creative thinking and innovation were limited only by one's imagination. In practice, the formulation and adoption of new ideas or practices has better-than-expected results and solidifies in Zinni the importance of viewing situations through as many lenses as possible.[15]

General Zinni does not skirt the issue of the role of training in exercising effective leadership. His message that leaders must train when and where possible is unmistakably clear. Military leaders ought to emulate General Zinni's passion and drive to train, regardless of skill or occupational specialty. General Zinni's positive results are reason enough for future leaders to follow suit.

The period coinciding with General Zinni's career was one of great social change and military transformation, and he took full advantage of the opportunities change offered. He was there when the use and abuse of drugs and racial violence threatened unit cohesion.[16] He was active in promoting a Marine Corps that is cognizant of the many racial and socio-economic issues important to individual Marines.[17] He was there as whispers of a revolutionary new form of combat called "maneuver warfare" morphs from an idea to doctrine under former Marine Corps Commandant, General Al Gray.[18] Along with this doctrine comes the development of technologically advanced power-projection systems such as Maritime Pre-Positioning and Tilt Rotor Aircraft.[19] In what appears to be the classic "right place at the right time" situation, General Zinni, though talented, was a direct beneficiary of these and many other major doctrinal and developmental changes within the Marine Corps. Along the way, he worked with and for military officers and government officials who, themselves, had distinguished careers and filled the top levels of the military and civilian establishment.[20] Those contacts undoubtedly had a positive impact on General Zinni's career, and he subtly credits them in *Battle Ready* for their help in molding him into the warrior-peacemaker he would eventually become.[21]

While destiny and luck are uncontrollable, General Zinni demonstrates that one must still make the most of each situation and set of circumstances. Developing a good reputation for professionalism and honesty serves General Zinni far greater than any immediate supervisor. Present and future leaders would do well by emulating his example.

Since a vast amount of General Zinni's military experience came in the form of "Operations Other Than War" [OOTW], General Zinni had the unique experience of acting as mediator, negotiator, and humanitarian as well as warfighter.[22] The recitation of these experiences in *Battle Ready* provides a historical account of OOTW and serves as a forewarning of the nature of future operations.[23] The authors confirm that the nature of military missions today and in the future will unquestionably be confusing, amorphous combinations of combat operations, stability operations, and humanitarian missions.[24] General Zinni owes much of his OOTW experience to uncontrollable events in an ever-changing world, the primary being the collapse of the Soviet Union. As he acknowledges:

> *[T]he fifty-year-old bipolar world structure – for all the risks and dangers it represented-had kept the lid on myriad and terrible demons . . . the superpower competition had mostly played out in the third world peripheries . . . where regimes could be propped up, bought off, or provided with military backing by one or the other superpower . . . [t]hus the world's balance was maintained. . . . But the long-suppressed demons of ethnic and national competition and ancient seething hatreds and blood feuds remained alive. Once the lid was removed and the demons released, nobody was prepared to deal with them.*[25]

The tension of two superpowers is gone, and the door opens to a variety of regional conflicts calling for the gamut of military capabilities.[26] General Zinni clearly accepts, though he does not advocate, that the military will be called upon more frequently to conduct operations that historically would have come under the purview of other governmental departments.[27]

The authors keenly blend Zinni's experiences in OOTW with clear messages that small, regional conflict will continue to demand action from the international community.[28] America should exercise various options rather than laying the bulk of the responsibility on the military.[29] Readers of all disciplines benefit greatly from the book's discussion of the enormous potential pitfalls inherent in OOTW. The coordination required among dozens of governmental and non-governmental organizations is immense.[30] The overriding need to establish a secure environment and ultimately complete the tasks assigned only serves to compound the complexity of these operations.[31] The expectations for senior military leadership to be both warrior and diplomat are clear: senior military leaders are assuming larger roles historically reserved for State Department officials and other civilian organizations.[32] The authors' prophecy of the enormous burdens of our nation's future military is thought-provoking and is a must-read for decision-makers at all levels.

For judge advocates, *Battle Ready* can be extremely relevant. It is easy to recognize that the variety of operations the military is likely to encounter under OOTW present numerous legal issues and challenges. General Zinni refers to lawyers resolving issues in the field,[33] but the book's real value is the detailed discussion of the complexity of issues in these operations. This recitation of facts allows for the judge advocate to begin considering the variety of issues he may encounter and focus his training and preparation accordingly.

General Zinni became a resolute and reputable negotiator and mediator. From the beginning of his career, General Zinni was forced to perceive warfighting from a different cultural perspective.[34] He learned at a young age the importance of understanding various native cultures, beliefs, and practices.[35] This knowledge serves him well as his career progresses and is the root of his belief and practice of engagement and dialogue as an integral part of trying to achieve peace. From Southeast Asia to Russia and from Europe to the Middle East, General Zinni's experiences nearly span the entire globe and his interest and sensitivity to local customs and practices serve as a template for future leaders.[36] From Vietnam to Somalia, General Zinni successfully negotiates settlements and brokers deals with diplomats, military leaders, and national leaders in the hope of achieving peace short of waging war.

After retiring, and armed with valuable experience in high-level talks and negotiations, General Zinni actively engages in peace processes around the world.[38] With a National Security Strategy that promotes global engagement, General Zinni travels from Indonesia to Israel in the hopes of resolving conflict in each of those regions.[39] While these talks are not always successful in achieving peace, Zinni clearly conveys that global engagement and attempts at peaceful resolution are vital to our nation's future.

The reader comes away with an appreciation for the difficulty in brokering peaceful settlements. Moreover, the reader is left with the sense that America, at times, fails to use all methods of achieving peace, stability, and security. General Zinni's belief is that this failure is unacceptable, and American leaders must be global leaders in engagement and peaceful settlements rather than using military might.[40]

Politics and "careerism" threaten both lives and national security, and *Battle Ready* calls on each of us to avoid the pitfalls of power.[41] General Zinni's disdain for Washington and the nature of policy-making in the recent past stem from his disappointment that the very people who lived and learned the harsh lessons of Vietnam are the same people who failed to prevent America's intervention in Iraq.[42] At the very least, any lessons from past conflicts are ignored as, "dereliction, negligence, and irresponsibility; at worst, lying, incompetence, and corruption," are exercised in the decision leading up to the Iraq invasion. General Zinni believes this is a mistake and Americans deserve better.[43]

Battle Ready is replete with lessons learned and visions of the future roles of military leaders. The military professional learns to be prepared to serve

as warrior and diplomat more than in any other time in the recent past. The leader is reminded that the case to go to war must be clear, and perhaps, military action should not be used until other efforts have been tried and have run their course.[44] Ultimately, the reader is urged to hold government officials accountable and to remember that freedom is earned on the shoulders of men and women in uniform. We should never send them to combat unless absolutely necessary.[45]

Major Patricio Tafoya is a United States Marine Corps Officer assigned as a student at The Judge Advocate General's Legal Center and School in Charlottesville, Virginia. He has a B.A. from New Mexico Highlands University and a J.D. from the University of New Mexico School of Law. He was previously assigned as the Deputy Director/Senior Government Counsel, Navy-Marine Corps Appellate Government Division and Officer-in-Charge, Current Legal Operations Section, CJTF-7, Baghdad, Iraq.

ENDNOTES:

[1] Fawn M. Brodie, No Man Knows My History, in The New Penguin Dictionary of Modern Quotations, 69 (Robert Andrews ed., 2003).
[2] Clancy, supra note 1, at 223.
[3] Clancy's "Commanders" books include, Into the Storm, Every Man a Tiger, and Shadow Warriors. Id. at jacket cover.
[4] See Paul Kennedy, The Rise and Fall of the Great Powers 403-08 (Vintage Books Ed., Random House 1989) (1987).
[5] Clancy, supra note 1, at 20-22.
[6] Id. at 434.
[7] See Harold M. Hyman, General Anger: Retired Marine Officer Lays Down a Barrage Over the Iraq War (June 28, 2004), at http://www.chron.com/cs/CDA/sistory.mpl/ae/books/reviews/2645882.
[8] Clancy, supra note 1, at 33-34, 41.
[9] Id. at 46-48, 77-78.
[10] Id. at 48-51.
[11] Id. 129, 139-40, 155-56.
[12] Id.
[13] Id. at 121-26, 139.
[14] Id. 142-43.
[15] Id. at 121-26.
[16] Id. at 116-17, 120.
[17] Id. at 127.
[18] Id. at 144-45, 151.
[19] Id.
[20] Id. at 40, 96, 100, 102-03, 136, 212, 242-43.
[21] Id.
[22] Id. at 227.
[23] Id. at 434-35.
[24] Id.
[25] Id. at 163-64.
[26] Id.
[27] Id. at 22, 434-35.
[28] Id. at 434-35.
[29] Id.
[30] Id. at 19, 213, 218.
[31] Id. at 240.
[32] Id. at 222-23, 244-47.
[33] Id. at 263.
[34] Id. at 56-57.
[35] Id.
[36] Id. at 153-54, 181-86, 197-99, 207, 244-47, 308-09, 316-21.
[37] Id.
[38] Id. at 360-61, 373-406.
[39] Id.
[40] Id. at 428-33.
[41] Id. at 424-27.
[42] Id. at 140, 424-27.
[43] Id. at 426.
[44] Id. at 437-39
[45] Id.; see also Hyman, supra note 9.

The Nuclear and Counterproliferation Officers Course: Meeting the Educational Needs of the FA52 Force

LTC Charles A. Pryde and MAJ Kent T. Jones
Defense Nuclear Weapons School

Since the early 1990's the United States Army Nuclear and Chemical Agency (USANCA) has partnered with the Defense Nuclear Weapons School (DNWS) in Albuquerque, New Mexico, to deliver the Functional Area (FA) 52 initial entry training course, the Nuclear Research and Operations Officer Course (NROOC). Given the recent changes to DA PAM 600-3, the revised FA52 mission statement, as well as changes to the officer education system, it was time to seriously look at what we were teaching and how it was being taught. As a result of this internal DNWS/USANCA review, and a subsequent review by the FA52 Council of Colonels, came a totally new course, designed exclusively by and for today's FA52 community, the Nuclear and Counterproliferation Officer Course (NCP52).

A Noble Past

The original FA52 force was built around an Army that possessed nuclear weapons, participated in underground nuclear weapons tests, and focused much of its energies on those weapons and their use. In the early 1990's this all changed with the removal of Army weapons and the start of a prolonged testing moratorium. The original two week long NROOC course was designed to transition officers from their traditional operational Army jobs into a new specialty where the vast majority would have little or no practical hands-on experience, yet would be expected to hit the ground as experts. With this narrow goal in mind, the NROOC course was developed - heavy on nuclear weapons, weapons effects, and background information about the United States (US) nuclear weapons community.

Instruments of Change

Slowly things started to change. USANCA was visionary as it realized major changes in Army structure, policies, and missions should be embraced rather than fought and quickly positioned FA52s to meet these new challenges. The first major change was the conduct of the Officer Personnel Management System (OPMS)-XXI study, later implemented as OPMS-III. Under OPMS-III, USANCA was able to recruit from a much broader group of officers, so that the new FA52 community was not predominantly former nuclear Field Artillery officers, but was truly representative of the entire Army. This, combined with true academic credentials, made FA52s very attractive to organizations that needed qualified personnel who could perform immediately in a variety of weapons of mass destruction (WMD)-related fields. With the advent of global terrorism and the Global War on Terrorism (GWOT), the Department of Defense began to draw heavily on the FA52 community and assigned officers to increasingly diverse jobs related to a wide variety of WMD and proliferation issues, far beyond our traditional nuclear missions. With each of these changes, incremental changes were made to the NROOC course in an effort to keep it viable and useful to the FA52s who would attend. Finally, with the latest changes to Department of the Army Pamphlet 600-3, *Commissioned Officer Development and Career Management*, which formally changed the title of FA52 to Nuclear and Counterproliferation, coupled with implementation of the new Intermediate Level Education (ILE) system, it was time, not to make minor adjustments, but to radically overhaul how we transitioned officers to meet these new, far more diverse requirements.

Process of Course Development

As with all courses taught at DNWS, inputs for changes or new courses come from a variety of sources: student input, external directive, internal review, and course partners, to name the most common. In the case of the NROOC course, USANCA guidance and student evaluations have always been the primary considerations when

revising course content.

Following last years review of the NROOC course, it was decided that the challenges in keeping the course relevant in its previous format were starting to get complicated. World events were making it ever harder to meet the changing demands in any sort of efficient way. Consequently, the FA52 community needed to take a far more comprehensive look at the NROOC course, to include training on the new counterproliferation functions required of FA52 officers. This action was taken up by the FA52 Council of Colonels, Training subgroup, chaired by COL Randle Scott. The subgroup, using input from the new requirements documents, officers in "the field," and once again student input, made the following decisions.

a. The course would become three weeks long rather then the traditional two weeks in order to fulfill the requirements of Intermediate Level Education, Phase 2. This change also gave course designers the flexibility to integrate a major reoccurring recommendation from students to break up the tours that are presented during the course.

b. The course needed to evolve from an almost singular focus on nuclear weapons to a larger view of CBRNE issues and US combating WMD doctrine and plans, while still exposing officers to those aspects of the US nuclear weapons program that they would not have contact with through other means. Therefore, the course would be renamed the "*Nuclear and Counterproliferation Officers Course (NCP52).*"

c. The first week of the course curriculum would be based upon the new DNWS Joint Planners Course for Combating WMD (JPC-WMD), which would become the basis upon which all follow-on curriculum is built. This separate course had been newly developed by DTRA to assist Combatant Command staffs in the preparation and staffing of WMD-related plans and annexes. As such, it does an excellent job of preparing an officer for a wide range of staff positions involving combating WMD.

d. The FA52 community must continue to understand the weapons effects testing program and remain prepared to assist with nuclear weapons testing if called upon. Therefore the course would retain the traditional effects and test tours, but tour plans would be adjusted. Given a three week schedule, the tours to the Nevada Test Site and White Sands Missile Range could be split up between the second and third weeks.

NCP52 Week One Modules	Hours
Threat Briefing	1.0
Combating WMD Policy	1.0
Doctrine & Guidance for Combating WMD	1.0
JOPES Overview	2.0
CBRN Effects	4.0
Nonproliferation (NP)	2.0
Counterproliferation (CP)	3.0
Elimination Operations	3.0
Consequence Management (CM) and Foreign Consequence Management (FCM)	3.0
Plan Integration	2.0
Course Exercise	12.0

NCP52 Week Two Modules	Hours
WSMR Tour	8.0
Nuclear Weapon Design I&II	2.0
Nuclear Weapon Safety	2.0
Nuclear Weapons Security	1.0
Nuclear Weapons Command & Control	1.0
Medical Effects of Ionizing Radiation	1.0
The US Nuclear Community	1.0
Stockpile Stewardship	1.0
US Nuclear Stockpile	1.0
Foreign Weapon Designs	1.0
Historical Perspective	1.0
Proliferation Issues of the Nuclear Fuel Cycle	1.0
Nuclear Weapons Display Area	4.0
History of Global Terrorism	2.0
TEAMS Site Visit	2.0
US Nuclear Testing Program	4.0

Using these stated goals, DNWS appointed a development team which assembled a recom-

NCP52 Week Three Modules	Hours
Nevada Test Site Tour	8.0
CBRNE Detector Technology	2.0
CFR49 Shipping & Storage	2.0
CM Analysis Exercise	3.0
Acquisition Overview	2.0
NG CST Team Overview	2.0
FA52 Career Overview	3.0
FA52 Job Briefings	16.0

mended list of classes that, when combined, would meet all the course objectives. This list of classes was then circulated among USANCA and the FA52 Training Subgroup and further refined prior to presentation to the entire FA52 Council of Colonels for approval. Once approved, DNWS worked with its training partners and adjunct faculty to refine the list into a schedule and complete the required training materials and tour plans. The end result is that the summer fiscal year 2005 NCP52 course will blend classroom presentations, computer based simulations, exercises, and field tours into a single course designed specifically by existing FA52s for new FA52s.

Teamwork is the Key

Course development can be done in many ways, but the best way is when the needs of the customer can be clearly identified and highlighted in the actual course delivered. Sounds simple, but really what has helped this course is the sound relationship between USANCA, DNWS, and the keen leadership demonstrated by the FA52 Council of Colonels.

The first iteration of the new NCP52 course will occur at DNWS 11-29 July 2005. The course is currently open only to new FA52 officers and fulfills the requirement for ILE (Phase 2) training. Registration is coordinated through the course proponent at USANCA, Mr. Rob Beimler, at (703) 806-7866 or DSN 656-7866.

LTC Charlie Pryde is the Commandant of the Defense Nuclear Weapons School in Albuquerque, New Mexico. Prior to this assignment he was a Mission Commander and Branch Chief at the On-Site Directorate at the Defense Threat Reduction Agency. He has a B.A. in Government from the University of Maryland, a M.A. in National Security Affairs from the Naval Post Graduate School, and is a graduate of the Australian Army Command and Staff College.

Major Kent Jones is Chief of Academics at the DNWS. He has a B.S. in Electrical Engineering from Minnesota State University, a M.S. in Nuclear Engineering from the Air Force Institute of Technology, and is a graduate of the US Army Command and General Staff College.

On Not Confusing Ourselves… the Challenge of Clarity

MAJ Bret Kinman
United States Joint Forces Command

As the United States (US) adjusted its security posture after the end of the Cold War, the nation's former strategic weapons and the people that designed and operated them fell out of center stage in US defense policy. Of course, nuclear weapons and their delivery systems were not being done away with, rather their overall numbers were reduced and the emphasis of US deterrence was shifted to regional activities designed to engage former enemies. Yet even as the weapons were being dismantled and personnel being redirected and retrained for other missions, the presence of these weapons and associated materials was not to depart our consciousness for long. The emergence of radical Islamic terrorists intent on acquiring and utilizing any weapon or method that results in massive casualties causes us to refocus our thinking about these weapons.

Military thinkers and policy makers have begun to redirect military force structure and budget to address the dangerous juncture of nuclear, chemical or biological weapons, and radical terrorism. This relatively new and emerging mission area has had an associated lexicon of terms and concepts develop along with it. The terms WMD or Weapons of Mass Destruction, CBRNE or Chemical, Biological, Radiological, Nuclear, and (high) Explosive have now become a constant part of nearly daily dialogue in the military, and indeed the US in general. While this common reference is easier for many who are casually interested in the topic, these terms, definitions and concepts have reached a confusing level to those who deal with this subject for a living.

Army Nuclear and Counterproliferation Officers or Functional Area 52s (FA52s) are often challenged to define to other elements of DoD, Service and Combatant Command staffs exactly what they do. There is frequent confusion on the outside between the FA52 community and the Chemical Corps. The distinctions are well known among those who are part of it or who deal in this area regularly. Yet on the "outside" FA52s, the multitude of associated terms, definitions and concepts leads one to rapid confusion with our mission and function. Are we WMD officers? CBRNE Officers? Combating WMD officers? Are we planners or operators? How do we define ourselves to those unfamiliar with the FA52 functions, and how do we distinguish ourselves from the Chemical Corps? Undoubtedly the above are all valid questions and ones that I will attempt to address in this article.

Who Are You And What Do You Do?

FA52 officers come from a variety of Army backgrounds as our officer development program "creates" FA52s near our transition from Captain to Major around 10 to 12 years of service. The Army's officer development and education program are unlike the other Services, as is the way we are assigned. Couple this with the small size of the FA52 community within the Army, and you have to ask yourself how many times you, as a FA52 officer, are confused with a Chemical officer? This is by no means intended to disparage the Chemical Corps, yet the confusion remains.

This confusion is cause for concern, especially as we continue to fight the Global War on Terrorism (GWOT) and the growing threat of a nuclear, biological, radiological or chemical weapons attack. The military is placing increasing emphasis on this potentiality-yet this is a new mission area for most. Couple this ongoing and no doubt enduring conflict with the added challenge of "transformation" of the armed forces, and in particular the Army, and there is a

great need for clarity in purpose and task. Much of our problem lies in the complex nature of the world we are operating in today. The dual challenges of the GWOT and "transformation" make clarity difficult.

FA52s who are assigned and operate in jobs and commands that are not an integral part of the "community" must constantly educate those they work with and for, about what FA52 officers are trained for and what the community does as a whole. Often our initial task is to distinguish "us from them", them being the Army's Chemical Corps. While this often leads to greater, not lesser confusion, the distinction is critical. An additional part of this challenge is the broad area that 52s cover. From the force protection aspect of US forces, families and installations to the targeting of competing states nuclear weapons, FA52s have a broad portfolio. Even so, this portfolio is still narrow within the Army and DoD. A frequent challenge I have faced is educating the command I am assigned to on what a 52 officer does, what the background of a 52 officer is (in general terms), and what capabilities the 52 officer can "tap" into to provide accurate information about often technical and complex subjects. Yes, we are often referred to as the "Keepers of Greek Fire", yet we must be more than that to the Army, Combatant Commands and other Services. Of course much of this challenge is in defining what mission sets we typically "cover down" on, and as I previously noted- these missions are themselves changing and new ones are being created and added.

Identifying the Left and Right Limits

WMD, CBRN, combating WMD, counterproliferation, consequence management and that is just a partial list of the missions, tasks and concepts we as 52s must decipher and clarify, not only for ourselves, but others. Certainly, the recent attention given to these areas has helped and there is a growing group of officers dedicated to these mission areas. Nevertheless, there is a limited amount of official doctrine (Joint Publication 3-40, *Joint Doctrine for Combating Weapons of Mass Destruction*) was released in June of 2004 after four years in development) and our recent experience is limited to OPERATION IRAQI FREEDOM (OIF). While OIF provided the Army and DoD more personnel that have experience, the normal dispersion of these individuals over time has diluted the knowledge base. However, we must be careful to not spend our time trying to recreate and perfect our OIF experience; rather we should utilize it as a point of departure for our future efforts. The recent directive to the United States Strategic Command (USSTRATCOM) to lead the combating WMD mission has now finally given this area the one thing it needs most- advocacy. Now that this mission is increasing its profile, and has a greater number of senior leaders involved in it, FA52s should be critical assets in the planning and execution of these operations.

Yet now that we have a mission and an advocate, we must still clarify what it is we do to support that mission. Combating WMD encompasses three broad areas: Nonproliferation, Counterproliferation, and Consequence Management. It has a further set of eight sub mission areas: Safety and Security, Treaties and Agreements, Active Defense, Passive Defense, Interdiction, Elimination, Offensive Operations, and Consequence Management. With all of these overlapping and somewhat redundant categories and tasks, it is no wonder there is confusion about the entire business and those who practice it. However, the complexity of the terms matches the complexity of the task. Combating WMD is a difficult and broad mission area, which requires a diverse set of skills that also happen to be rather discreet within the DoD. The tasks listed above alone are able to consume an enormous amount of staff time (much like engineers calculate "blade time" i.e. how much time they have available given the defensive requirements, number of engineer assets and time before the operation will commence). So the challenge of defining what we are to do is critical. FA52s must be able to articulate their skills and what missions they are primarily responsible for. Often this must occur nearly simultaneously with an education of all the related aspects of WMD. Even under perfect circumstances (unlimited time and no competing demands) this would be difficult to do. Given the pace of operations in the DoD, it is extraordinarily difficult.

Clarity Enables Action

The assignment of the mission of combating WMD to a Combatant Commander provides FA52s a ready made opportunity to better articulate just what it is we do (or are supposed to do). Of course, not every command or organization

with FA52s will have a central or critical role in combating WMD, nevertheless the mission title and model should be the organizing construct for how FA52s communicate their skill set and "value added". While the "WMD Community" has expanded within recent years, it has remained a somewhat closed group. The concepts, ideas and experiences are generally retained within the community and never clearly expressed outside. Further, this community deals with subject areas that have little in common with most of the rest of the DoD, which tends to be focused on major combat operations and concepts.

So Then, Just What Is It We Do?

Here is how I envision the conversation between a FA52 and his new boss, and how a FA52 might clarify who he is and what he can do for the command.

Boss: Welcome to X Command. What is your area of expertise?

FA52: Well sir I am a FA52 or Nuclear and Counterproliferation Officer. It is a relatively new field in the Army. It is also a small field, composed of mid and senior grade officers that are experts in all things WMD. We are not the Chemical Corps, which has a different focus, mainly in providing NBC defense to the tactical formations of the Army. FA52s focus on the combating WMD mission as a whole, although we are often in close coordination with the Chemical Corps.

Boss: OK –what is this combating WMD business?

FA 52: Well sir it is the umbrella term for all things associated with WMD. It has three broad categories: Nonproliferation-mainly dealing with treaties and agreements and nuclear surety, Counterproliferation-which deals with proactive measures to protect US forces from WMD and/or halt their spread from country to country or terrorist, and finally, Consequence Management- which deals with the aftermath of use of a WMD. FA52s are knowledgeable in all of these areas and are also able to "tap into" the correct resources for further expertise if needed.

Boss: OK, well we want to put you into our Plans and Future Operations Division. I need you to get your arms around this combating WMD stuff as we are behind on it and the Commander wants to have a good feel for where we are on this. After you have gotten settled, come back with your division chief and brief me on your plan.

FA 52: OK sir

(And then later)

FA 52: OK sir. Here is where we are. The command will need to charter a combating WMD Working Group (or whatever it is referred to here) I will be the principle action officer-in order to synchronize the staff and coordinate with other commands and our components. I will also put together an orientation briefing on combating WMD to bring the staff up to speed and then go forward to the commander. I will also ensure we have the working group as #1 on our "Way Ahead" slide.

Boss: OK, sounds good.

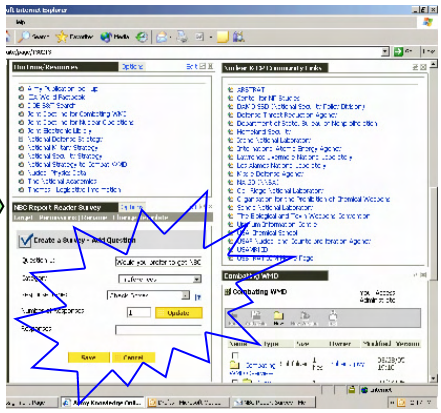
I have obviously over simplified this scenario and given the FA52 major credit for being a good "seller" of 52s and the "boss" credit for being level headed and willing to give the FA52 officer room to set up and operate. Clearly, not all situations would be this clean and simple. But my point remains, we as FA52s must do a better job of articulating what it is we do for a command. Further, we must become clearer as a "community" about what our range of skills is and what our "value added" to a command is. Our "sales" skills are as important as our other technical and operational skills. Otherwise we risk becoming in many ways the very thing we fear – staff "fillers", guys who are plugged in to a staff and given a number of actions to work- none of which has anything to do with FA52 or combating WMD. Of course, a command can always do what they will with their personnel, and certainly some missions may take higher priority; and while the occasional job working for a general officer or other senior leader is not unhelpful, it is an exception rather than common practice.

Major Bret Kinman is a FA52 officer currently assigned to the United States Joint Forces Command J354 Anti-Terrorism/ Force Protection. He was previously assigned as a student at the Naval Postgraduate School, Department of National Security Affairs to the USAREUR G3 Executive Office, and to the USAREUR G3 Force Protection & Anti-Terrorism Division. He has a B.A. in Political Science from North Georgia College and a M.S. in National Security Affairs from the Naval Post Graduate School. His e-mail address is bret.kinman@JFCOM.mil.

NBC Community News

***NBC Report* Survey**

How are we doing? Please complete the on-line survey at the Nuclear and Counterproliferation site located at: https://www.us.army.mil/suite/page/130213. You must have an Army Knowledge Online username and password.



FA52 Courses of Interest

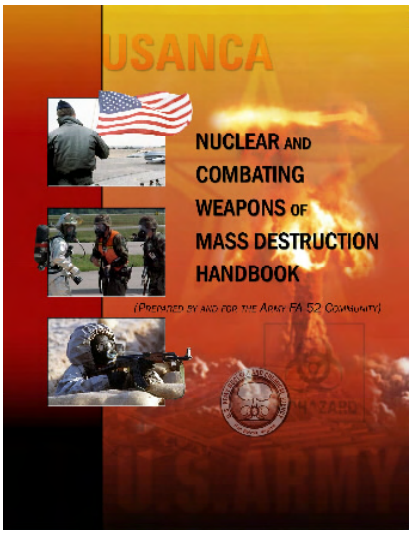
Joint Planners Course for Combating WMD 11-15 Jul 05:
For DoD staff officers with combating WMD responsibilities. POC is LtCol Morales at 703-325-1294.

Nuclear and Counterproliferation Officer Course (NCP52) 11-29 Jul 05:
NCP52 is the Functional Area 52 qualifying course. Initial priority is given to officers TDY enroute to a FA52 assignment or currently serving in a FA52 position. For additional information see the article by LTC Pryde and MAJ Jones in this issue of *NBC Report* (page 83). For availability, call the FA52 Proponent Manager at (703) 806-7866.

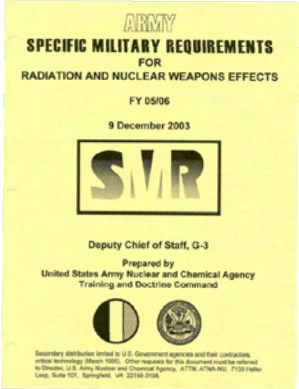
Theater Nuclear Operations Course (TNOC) 1-4 Aug 05:
TNOC is the only course offered by a DoD organization that provides training for staff officers and DoD civilians at Joint, Combatant Command, and Service levels who are required to conduct or support theater nuclear planning. The course teaches students the skills and knowledge necessary for theater nuclear planning, to include the integration of nuclear and conventional fires, weapon system delivery capabilities and limitations, determination of collateral damage effect, determination of force protection and warning measures, and the theater nuclear plan approval and execution process. The course number is DNWS-RO13 (TNOC). Call DNWS at (505) 846-5666 or DSN 246-5666 for quotas and registration information.

HPAC provides the capability to accurately predict the effects of hazardous material releases into the atmosphere and the collateral effects of these releases on civilian and military populations. HPAC employs integrated source terms, high resolution weather and particulate transport algorithms to rapidly model hazard areas and human collateral effects.

Registration, Software Distribution and Training:
(703)-325-1276 Fax: (703) 325-0398 (DSN 221)
https://acecenter.cnttr.dtra.mil
acecenter@cnttr.dtra.mil



If you are a FA52 Officer and have not received your copy of the FA52 Handbook contact USANCA's Nuclear Division at 703-806-7866.



To coincide with the Joint Requirements Office Radiological and Nuclear Broad Capabilities Assessment, USANCA will delay publication of the FY 07/08 SMR. In the interim, the Army will continue to use the FY05/06 SMR unfunded list. For more information on the SMR or to obtain a copy contact USANCA's Nuclear Division at (703) 806-7860 or DSN 656-7860.

FA52 Council of Colonels

The Functional Area 52 (FA52) Council of Colonels will convene at the Defense Nuclear Weapons School at Kirtland AFB, NM, on 26-27 July 2005 to discuss current and future issues relevant to FA52. The theme of this meeting will be "The Role of FA52 in Implementing DoD Combating WMD Initiatives." The FA52 Council of Colonels is comprised of all FA52 Colonels, FA52 Senior Service College students, and the senior FA52 officers in organizations that do not have a FA52 Colonel assigned. The FA52 Council of Colonels is an advisory body to the FA52 Proponent across the entire spectrum of DOTMLPF. In addition to attending the Council of Colonels, the majority of the members will remain in Albuquerque on 28-29 July to present briefings and interface with the ongoing NCP52 class that will be at DNWS from 11-29 July.

Do you have information to share with the "NBC Community?"

Get it posted here. Send your input to nca@usanca-smtp.army.mil

Note: The editor retains the right to edit and choose which submissions are printed.

NUCLEAR AND COUNTERPROLIFERATION OFFICER
FA52

U.S. ARMY NUCLEAR AND CHEMICAL AGENCY

Fort Belvoir, Virginia