

# Preventing WMD Terrorism: Ten Perspectives



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THE INTER-UNIVERSITY CENTER FOR TERRORISM STUDIES

# Preventing WMD Terrorism: Ten Perspectives

August 2017

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## **Introduction**

### **Preventing WMD Terrorism: Past Lessons and Future Outlook**

**Professor Yonah Alexander**

Director, Inter-University Center for Terrorism Studies

The resort to force as a *modus operandi* tool in the struggle for power within and among nations is as old as human history. Despite the ancient warning that “all who take the sword will perish by the sword” (Matthew, XXVI, 52), both strong and weak actors have deployed a wide range of arms, from primitive to high tech as well as weapons of mass disruption and destruction.

Suffice to mention several historical observations of this evolutionary record of violence nationally, regionally, and globally. As Homer famously asserted more than three thousand years ago, “The blade itself incites to violence” (The Odyssey, XVI). Indeed, this tactic of force has continued to be available to adversaries over subsequent centuries and well into modern times, along with the utilization of other arms, including guns, explosives, and others of more powerful capabilities.

Therefore, it is not surprising that in the 19<sup>th</sup> century military philosopher Antoine Henri Jomini keenly stated that “the means of destruction are approaching perfection with frightful rapidity.”<sup>1</sup> Also, General Matthew B. Ridgway (USA), in a speech delivered in Cleveland on November 10, 1953, alarmingly observed that “There is still one absolute weapon... That weapon is man himself.”<sup>2</sup>

To be sure, preventing the proliferation of biological, chemical, radiological, and nuclear weapons has been a major priority for many nation states in the post-World War II era. Additionally, in the aftermath of 9/11, there has been a growing awareness globally of the potential dangers posed by terrorist groups who may resort to WMD. For example, the explosion of a nuclear bomb, the use of fissionable material as a radioactive poison, the seizure and sabotage of nuclear facilities, or the explosion of a “dirty bomb” is seen by many experts as plausible and by others as inevitable in the foreseeable future.

More specifically, three factors suggest the probable development of more disruptive and destructive forms of terrorism. First, bringing terrorism under substantial control through national and international legislation as well as through increased security and enforcement measures might, in fact, hasten the advent of more daring and costly types of terrorism. As a result of such an anticipated trend, vulnerable targets created by technological advances of contemporary society are likely to become more attractive to terrorists.

A second factor for the probable shift to more elevated forms of violence is the propaganda and psychological warfare value of such operations to terrorist groups. Since the strategy of terrorism does not ensure instant victories over adversaries, an extension of the duration and impact of attacks is indispensable. The media serves as a suitable tool for this purpose. Thus, should effective governmental and intergovernmental attempts to impose media blackouts deny terrorists their publicity

objectives, they are likely to change tactics, increase their audacity, and escalate their symbolic-oriented acts through high technology weapons, if available.

A third distinct consideration which might encourage escalated terrorism is the fact that since ideological and political violence is usually a means to an end, it progresses in proportion to the aims envisioned. If the goals are higher, then the level of terrorism must necessarily be higher. It is possible, therefore, that certain conditions could provide terrorists with an incentive to intensify their attacks dramatically. Relevant examples could include ethnic differences, which might allow dehumanization of intended victims; religious fanaticism which might in the view of the terrorists be sanctioned by God; brutalizing effects of a lengthy struggle; and perceptions that “the cause” is lost and hence recourse to the “ultimate weapon” is justified.

If these precipitating factors motivate desperate terrorist groups with technological and financial assets, they might attempt to improve their strategic leverage by resorting to major disruptive forms of violence. No rational government would likely risk an incident with mass destruction potential even if it were skeptical about the credibility of the threat. The danger here is that if one sub-national body succeeds in achieving its goals, then the temptation for other terrorist groups to escalate their operations may become irresistible.

### *Super-Terrorism Threats: An Overview*

Some brief reminders on the nature, characteristics, and potential dangers of terrorists’ utilization of WMD are as follows. First is the challenge of biological threats.<sup>3</sup> These challenges range from Mother Nature (e.g. the “Black Plague” in the 14<sup>th</sup> century, the 1918 influenza pandemic, and the recent Ebola and Zika outbreaks) to man-made operations (e.g. Anthrax attacks following 9/11).

Biological agents are micro-organisms too small to be seen with the naked eye and can include bacteria, viruses, and fungi. Some of the most serious viral agents are those that produce, for example, smallpox and yellow fever. Bacterial agents can induce the plague and Anthrax.

Biological weapons are difficult to control as they require a biological delivery system or “vector” that can make distribution difficult and dangerous. Furthermore, it seems likely that if terrorists were to use a biological weapon, they would probably choose a bacteriological rather than a viral or rickettsial agent due to available countermeasures as well as the difficulty of cultivating viruses.

In addition, toxins, the poisonous byproducts of micro-organisms, plants, and animals, fall somewhere between biological and chemical agents as they are non-living substances. Toxins are relatively easy to manufacture and extremely virulent. Botulinum toxins, for example, can be more toxic than some nerve agents on an equal-weight basis.

Second are the chemical challenges.<sup>4</sup> Chemical threats consist of agents that are generally considered superior to biological agents and toxins. They are stable, controllable, and easy to manufacture and disperse. These agents do not share the

hazards of biological weapons by being neither infectious nor contagious. Also, chemical weapons can be studied and manufactured in secret and produced in large quantities.

Biological and chemical weapons have many advantages for terrorists. These benefits include their low cost, the speed of their production, and the ease at which they can be developed by individuals with limited education. For instance, formulas for some nerve agents are available and published. Weapon development requires only a minimum amount of tools and space, and equipment can be improvised or purchased without arousing suspicion. Also, these weapons are easier to disguise and transport than conventional arms. All of these factors combine to reveal how terrorists might find these weapons particularly desirable for future operation and the need for both thorough analysis and strong preventative measures to avert such threats.

And third is the nuclear terrorism challenge, which is growing because of a confluence of factors.<sup>5</sup> The elements include the increased lethality and sophistication of conventional forms of terrorism; the apparent evidence of state support, even sponsorship of terrorist groups; the storing and deployment of nuclear weapons in areas of intense terrorist activity; an increasing number of potential targets in civil nuclear programs, especially where weapon-usable forms of uranium and plutonium are used as fuels; and potential black and gray markets in nuclear equipment and materials.

While biological and chemical weapons may be technologically more feasible, in the long term nuclear terrorism is still plausible and perhaps inevitable. For example, radioactive material for commercial purposes will increasingly be shipped by land, sea, and air. The possibility of hijacking shipments of such material and using it to build radiological or even nuclear weapons is no longer just the subject of movie thrillers but remains a real prospect for terrorists.

In sum, during the past two decades the nature and effect of terrorists' pursuit of WMD was demonstrated initially by al-Qa'ida.<sup>6</sup> As early as 1988, Osama bin Laden stated that acquiring WMD is a "religious duty." Ample evidence was discovered that al-Qa'ida's training camps in Afghanistan focused attention on utilizing biological, chemical, radiological, and "dirty bomb" capabilities if available.

More recently, Daesh (also known as the Islamic State, ISIS or ISIL) was responsible for sulfur mustard attacks in Syria and is reportedly intending to pursue other WMD capabilities. Just imagine what might happen in the aftermath of the anticipated capture of Raqqa, the self-declared capital of Daesh in Syria, as well as the loss of other territories of the "Islamic Caliphate" elsewhere. In such a case, the surviving leadership and their die-hard members will most likely resort to some sort of WMD attacks in their battle for regional and global dominance.<sup>7</sup>

In this connection, it is important to underscore more broadly that terrorist WMD threats will continue to remain high because of two key factors. First is the escalating terrorists' intent as well as their efforts to acquire, develop, and utilize such capabilities. Second is state support of terrorism by Iran and Syria.<sup>8</sup> Both countries, designated by the U.S. and other nations as state-sponsors of terrorism in 1984 and 1979, respectively, continue to provide a wide-range of assistance to groups such as Hizballah, Hamas, and other various actors in the Middle East and elsewhere. Although conventional support is fully documented in published open sources, there are

persisting concerns by intelligence sources that some sort of WMD cooperation exists between these states and their non-state proxies. In this regard, an alarming “clue” for a planned attack on Israel’s nuclear facility as provided on August 13, 2017 by Hassan Nasrallah, Secretary General of Hizballah. In a televised address he boasted “One example of the respect and recognition Israel gives the ‘resistance’ is the closure of the ammonia tank in Haifa...We hope that they will look into moving the nuclear reactor in Dimona as it is more dangerous and needs extra care.”<sup>9</sup>

In the face of the foregoing future potential dangers, the international community has developed numerous structures as well as counter and non-proliferation programs aiming to reduce or eliminate terrorist WMD challenges. These multilateral efforts include the Nuclear Security Summits, the G-7 Global Partnership, the Global Initiative to Combat Terrorism, the Global Threat Reduction, the Biological Weapons Convention, and the Organization for the Prohibition of Chemical Weapons. Although these partnerships have made considerable progress in their undertakings, the grim reality is that the terrorist WMD challenges, such as illicit trafficking of these materials, still persist.<sup>10</sup>

Also, it is noteworthy that there are considerable other multilateral efforts to counter terrorism, including WMD threats, through numerous regional and global bodies. Among the participating institutions are the United Nations and specialized agencies (e.g. International Atomic Energy Agency); the North Atlantic Treaty Organization, the European Union, Organization for Security and Co-operation in Europe, Interpol, the Organization of American States, the Association of Southeast Asian Nations, and the African Union.

Finally, in light of the looming crisis over North Korea’s nuclear threats and Iran’s latest warning that it will increase spending on its ballistic missile program and foreign operations of the Revolutionary Guard Corps,<sup>11</sup> it is hoped that our report will stimulate further study on preventing the scourge of WMD challenges to future generations.

### *Academic Context*

The emergence in the post-World War II era of the “Age of Terrorism,” coupled with the concerning escalation into a potential “Age of Super Terrorism” with all its frightening implications, has generated diversified published and unpublished literature by governmental, inter-governmental, and non-governmental bodies. The purpose of this section is merely to outline selected academic programs relevant to WMD terrorism issues that were undertaken by the Inter-University Center for Terrorism Studies (IUCTS), the Inter-University Center for Legal Studies (IUCLS), and the International Center for Terrorism Studies (ICTS), and their earlier institutional structures during the past half-a-century. These activities consisted of seminars and publications seeking to provide insights into historical lessons learned, future potential threats, and offer recommendations for WMD terrorism strategies by public and private entities.

Several related WMD academic projects are noteworthy. One project was developed by the “Task Force on the Prevention of Nuclear Terrorism,” co-sponsored by the Institute for Studies in International Terrorism (ISIT) at the State University of New York and the Nuclear Control Institute (NCI) in Washington D.C. That effort resulted in the publication of two books: *Nuclear Terrorism: Defining the Threat* (Pergamon-Brassey’s,



1986) and *Preventing Nuclear Terrorism* (Lexington Books, 1987). Both volumes were co-edited by Paul Leventhal and Yonah Alexander.

A second academic effort in this field was the 1988 formation of an international multidisciplinary project on “Preventing Super-Terrorism,” administered by Professor Yonah Alexander and Professor Yuval Ne’eman (the Wolfson Distinguished Chair in Theoretical Physics at Tel Aviv University). The purpose of this project, chaired by Professor Edward Teller of Lawrence Livermore Research Laboratory and Stanford University, was to both develop coherent counter-proliferation policies and increase governmental and public understanding of the risks of and responses to super-terrorism without providing sensitive information that could prove useful to potential perpetrators of terrorist acts involving weapons of mass destruction. An international task force of experts representing various disciplines and nationalities was responsible for formulating a critical analysis of the dimensions of the challenge and for developing a strategy to cope with it.

A third academic activity was the 2012 undertaking of a research project on a “WMD-Free Zone in the Middle East” (WMDFZME). This ongoing effort is administered by the IUCTS in cooperation with the International Center for Terrorism Studies (ICTS) at the Potomac Institute for Policy Studies (PIPS) in Arlington, Virginia, and the Inter-University Center for Legal Studies (IUCLS) at the International Law Institute (ILI) in Washington, D.C. The objective of this project is to organize a series of seminars and to conduct research with experts from both the public and the private sectors seeking to offer recommendations for ultimately achieving a Middle East free of WMD.

A fourth initiative was the 2014 establishment of the bipartisan Blue Ribbon Study Panel on Biodefense co-chaired by Senator Joseph Lieberman (Former United States Senator and Attorney General of the State of Connecticut; the Democratic Vice-Presidential candidate in 2000; and currently Senior Counsel at Kasowitz, Benson, Torres, & Friedman LLP) and Governor Thomas Ridge (First Assistant to the President for Homeland Security, first Secretary of the U.S. Department of Homeland Security, former Governor of Pennsylvania, and currently Chairman of Ridge Global). Other panel members include former Secretary of Health and Human Services Donna Shalala, former Senator Majority Leader Tom Daschle, former Representative Jim Greenwood, and the Honorable Kenneth Wainstein. The Panel’s institutional sponsorship consisted of the Hudson Institute and the IUCTS and subsequently the Potomac Institute for Policy Studies.

The Panel assesses the spectrum of biodefense efforts from preparation to recovery and is developing recommendations for the U.S. government to improve and optimize these efforts. It has already published two reports “A National Blueprint for Biodefense: Leadership and Major Reform Needed to Optimize Efforts” (October 2015)<sup>12</sup> and “Biodefense Indicators: One Year Later, Events Outpacing Federal Efforts to Defend the Nation” (December 2016).<sup>13</sup>

More recently, in July 2017, the Hudson Institute’s Center for Political-Military Analysis and the Inter-University Center for Terrorism Studies/Potomac Institute for Policy Studies began to collaborate on a new project on “Sustaining Bipartisan U.S. Leadership Against Nuclear Terrorism.” The purpose of this project, supported with a two year grant from the MacArthur Foundation, is to focus on expanding bipartisan

political consensus on U.S. policies to prevent terrorists from acquiring nuclear material. The mission's methodology combines technical and foreign policy expertise, invites new voices to the work, and integrates early career interns and experts.

To be sure, other studies in the broader WMD field resulted from extensive academic projects over several decades. These contributions appeared in publications such as *Terrorism: An International Journal* (Taylor and Francis, 1988-1991); *Terrorism: An International Resource File, 1970-1990* (University Microfilm International, 1988-1991); *Technology Against Terrorism: Structuring Security* (Office of Technology Assessment, U.S. Congress, 1992); and *Super-Terrorism: Biological, Chemical, Nuclear* (Transnational Publishers, 2002), co-edited by Yonah Alexander and Milton Hoenig.

Additionally, a special report titled "The Age of Super and Cyber Terrorism: Selected Papers" was published in summer 1999 by PIPS in conjunction with a research project on "Counter Terrorism Strategies in the 21<sup>st</sup> Century: National, Regional, and Global Agenda" undertaken by the IUCTS and the IUCLS. Other notable relevant reports published by the IUCTS in co-sponsorship with PIPS and the ILI include the report on "Reassessing the WMD Challenges: The Next Phase?" (May 2014) and "Biological Terrorism: Past Lessons and Future Outlook" (June 2017).<sup>14</sup>

The current report "Preventing WMD Terrorism: Ten Perspectives" draws from two major academic sources. Presentations by Dr. Rita Colwell, Kyle Olson, and Dr. Richard Weitz were made at a seminar on "Preventing WMD Terrorism: Past Lessons and Future Outlook" held March 23, 2017 at the Potomac Institute for Policy Studies and slightly edited for this publication. The contributions from David Albright Ambassador Bonnie D. Jenkins, Dr. Anthony Fainberg, the Hon. Charles A. Duelfer, Michael Eisenstadt, Dr. Milton Hoenig, and the Hon. Guy Roberts were made at earlier events organized by the IUCTS with its affiliated institutions and published previously in our reports and journals. Specific details are provided for each individual contributor.

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Finally, the views expressed in this report do not necessarily reflect those of the institutions associated with our academic work.

August 15, 2017

### Endnotes

<sup>1</sup> Baron Antoine-Henri Jomini. *The Art of War*, translated by Capt. G.H. Mendell and Lt. W.P. Craighill. Philadelphia: J.B Lippincott & Co., 1862, p. 48.

<sup>2</sup> Cited in *Dictionary of Military and Naval Quotations*. Annapolis, MD: U.S. Naval Institute, 1966, p. 358.

<sup>3</sup> Selected references and cases can be found at <https://emergency.cdc.gov/agent/agentlist.asp>, [https://www.cdc.gov/phlp/docs/forensic\\_epidemiology/Additional%20Materials/Articles/Torok%20et%20al.pdf](https://www.cdc.gov/phlp/docs/forensic_epidemiology/Additional%20Materials/Articles/Torok%20et%20al.pdf), <http://www.npr.org/2011/02/15/93170200/timeline-how-the-anthrax-terror-unfolded>, <https://www.theguardian.com/uk-news/2015/feb/21/top-secret-ebola-biological-weapon-terror-warning-al-qaida-isis>, and <http://www.cnn.com/2016/05/04/africa/kenya-foiled-terror-attack/>.

<sup>4</sup> Selected sources include <http://time.com/3742241/tokyo-subway-attack-1995/>, <http://www.cnn.com/2003/WORLD/europe/01/24/spain.terror.arrests/>, <https://www.theguardian.com/world/2005/nov/08/australia.bernardoriordan>, and <https://www.armscontrol.org/factsheets/Timeline-of-Syrian-Chemical-Weapons-Activity>.

<sup>5</sup> Selected reports and articles include <https://www.nytimes.com/2017/04/20/opinion/the-world-must-secure-pakistans-nuclear-weapons.html>, <http://nation.foxnews.com/2017/06/27/nikki-haley-worries-iran-will-give-nuclear-weapons-terrorists>, <https://www.forbes.com/sites/anderscorr/2017/07/06/u-s-nuclear-options-against-north-koreas-nuclear-missiles/#737812e522bb>, <http://www.telegraph.co.uk/news/2016/03/25/brussels-attacks-nuclear-terrorism-is-real-threat-says-un-watchd/>, and <https://www.nytimes.com/2016/03/30/science/nuclear-fuels-are-vulnerable-despite-a-push.html>.

<sup>6</sup> See, for example, several publications by Yonah Alexander and Michael S. Swetnam released on al-Qa'ida: *Usama bin Laden's al-Qaida: Profile of a Terrorist Network* (2001); *Al-Qa'ida Ten Years After 9/11 and Beyond* (2012); and *Al-Qa'ida's Mystique Exposed: Usama bin Laden's Private Communications* (2016).

<sup>7</sup> See, for instance, *The Islamic State: Combating the Caliphate Without Border* by Yonah Alexander and Dean Alexander (Lexington Books, 2015); "Can we prevent ISIS's Domsday Revenge?" in the Times of Israel by Yonah Alexander and Milton Hoenig (December 21, 2016) <http://www.timesofisrael.com/can-we-prevent-isis-domsday-revenge/>; and report on "Reassessing the WMD Challenges: The Next Phase?" (May 2014) <https://www.terrorisemelectronicjournal.org/seminar-reports/reassessing-the-wmd-challenges/>.

<sup>8</sup> For example, see <http://www.un.org/press/en/2006/sc8792.doc.htm>, <http://www.cnn.com/2017/07/19/politics/state-country-terror-report/index.html>, and <http://www.nti.org/learn/countries/syria/>.

<sup>9</sup> Okbi, Yasser. "Hezbollah Leader: Perhaps Israel Should Move Nuclear Research Center." *Jerusalem Post*, 14 August 2017. <http://www.jpost.com/Arab-Israeli-Conflict/Hezbollah-leader-Perhaps-Israel-should-move-nuclear-research-facility-502356>

<sup>10</sup> For some details on multilateral structures and efforts, see the U.S. Department of State publication (Bureau of Counterterrorism) “Country Reports on Terrorism 2016” (released July 2017) <https://www.state.gov/documents/organization/272488.pdf>.

<sup>11</sup> “Iranian bill mirrors new U.S. sanctions.” The Washington Post, 14 August 2017, p. A10.

<sup>12</sup> The 2015 report on A National Blueprint for Biodefense: Leadership and Major Reform Needed to Optimize Efforts" (October 2015) can be viewed at <https://www.iucts.org/publications/reports/blue-ribbon-report-on-biodefense/>

<sup>13</sup> The 2016 report on “Biodefense Indicators: One Year Later, Events Outpacing Federal Efforts to Defend the Nation” can be viewed at <https://www.iucts.org/publications/reports/blue-ribbon-report-biodefense-indicators/>

<sup>14</sup> These reports can be viewed at <https://www.iucts.org/publications/reports/>.

**Professor Rita Colwell**

Distinguished University Professor at the University of Maryland, College Park and the Johns Hopkins University Bloomberg School of Public Health, and Senior Fellow at Potomac Institute for Policy Studies\*

This presentation is very direct and concerns a molecular biology story that began shortly after 9/11, while I served as Director of the National Science Foundation. What is less vividly remembered of that period in time is the anthrax event that followed the destruction of the towers of the World Trade Center and the plane crash into the Pentagon. Late in the fall of 2001, a reporter died in Florida. The details of his death were eventually published in the newspapers but there was a delay before it was determined that he died from an anthrax infection. Much misinformation was disseminated, including the conjecture that the reporter contracted anthrax from water he drank while hiking on his trip to Florida. As a nation, we were naïve, having had little information about anthrax in the public domain. Subsequently, additional cases of anthrax appeared following the reporter's demise. Most of these new cases were in Washington, DC, and were Post Office workers at the postal station serving the federal government. Unbeknownst to the perpetrator, powder in envelopes stamped by postal machines seeps through pores of envelopes. Several postal workers died of inhalation anthrax, others became ill, and remain disabled from the anthrax infection even today. These events occurred essentially on the heels of the New York and Washington incidents, involved closing buildings and subjecting workers to preventative medical treatment, and was terrifying for the nation.

The immediate assumption was that al-Qa'ida or a foreign national was the perpetrator. Today I can speak about this terrorist event as the report has been declassified and it is important to speak out. The story needs to be told because this act of bioterrorism was disastrous. Norman Kahn, present at today's March 23, 2017 workshop, was at the CIA at the time and led that agency's anthrax team. Norm and I worked together to form an interagency committee, of which I served as chairman, the "National Interagency Genome Sciences Coordinating Committee". We did not have a formal appointment and the committee easily could have had official authorization, but that would have required formalities. We comprised an informal interagency research group, meeting every Friday afternoon in a Sensitive Compartmented Information Facility (SCIF). CIA, Department of Justice, FBI, Department of Homeland Security, National Science Foundation, National Institutes of Health, and approximately a dozen other agencies had representatives at this informal gathering. There were about 20 of us who met every Friday afternoon, as a "research group" for three years, and continued to meet every month for another three years.

It took that long to track down the source of the anthrax and the task was accomplished using molecular biology as a tool. It was the launch of bioforensics. Every strain of *Bacillus anthracis* that could be traced to the specific anthrax strain that had been isolated from the Florida victim was collected and analyzed.

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\* Presentation at an event on "Preventing WMD Terrorism: Past Lessons and Future Outlook" held on March 23, 2017, at the Potomac Institute for Policy Studies and printed previously in a report "Biological Terrorism: Past Lessons and Future Outlook" (June 2017) <https://www.iucts.org/publications/reports/> .

Sequencing of all isolates obtained was done and the DNA sequences were matched. It was then possible to show that the flask containing *B. anthracis* at Fort Detrick was a source. That culture was a test strain for vaccine being developed against anthrax at Fort Detrick. The flask contained a composite of cultures grown in different laboratories and composited as a test for the vaccine. Since the composite was a mixture of cultures, mutations had occurred independently during growth and harvest. It was possible, then, to show that those mutations were present in the criminal case samples, e.g., those anthrax cultures sent as powders in envelopes to Senators Daschle and Leahy and to the media. The six years that it took to track down the source represented an arduous, tedious but ultimately successful process.

In that year following 9/11, the country suffered through the horrors of destruction and death in New York City, not knowing when there might again be another anthrax event. The death of the reporter in Florida was followed by mailing of envelopes with anthrax powder to members of Congress. And then the death of a woman in an entirely different location, tracked to a post office box, where letters with anthrax powder had been dropped.

An important point to keep in mind is that to cause that kind of social upheaval as this anthrax perpetrator succeeded in accomplishing did not require an elaborate laboratory facility, and neither enormous sums of money, nor cadres of personnel. All that is required is a warped minded individual with the technical knowledge of a clever undergraduate or graduate student able to grow *Bacillus anthracis* and introduce it in a relatively simple way to cause the most harm. The threat of the unknown explodes the overall effect in the public mind and the country can then be forced to a standstill. For example, before 9/11 there was an event that took place at the B'nai B'rith in Washington, D.C. Petri dishes were left at the entrance with a note, "Beware of anthrax." It turned out to be a hoax but that scenario closed down Washington, D.C. for a day, demonstrating the social upheaval a biological event can cause.

Since 2008, my team and many others have been working to develop the capacity to identify pathogens rapidly, accurately, and actionably, to ensure that rapid detection and identification can be achieved within minutes or hours so that action can be taken and lives saved. Using methods that have been developed over the past decade, any sample of water, soil, or clinical specimen, such as urine and blood, or food or water can be extracted to obtain their nucleic acid content. The extracted DNA and RNA can now be sequenced relatively inexpensively and accomplished within hours, not days or weeks. The raw sequences obtained from a sequencing machine are matched against libraries that have been constructed, with matching done at very high speed using probabilistic Bayesian/statistics approaches. Microorganisms (bacteria, viruses, fungi, and parasites) can now be identified to species and strains and then genes that code for antibiotic resistance, virulence, and metabolic properties are characterized. The entire set of analyses can now be accomplished within minutes after the sequencing is done. Thus, in the years since the anthrax event, science has moved rapidly to provide technical capacity to address bioterrorism events as occurred in late fall of 2001.

One example of success is a study we have done with a team at the National Institute for Cholera and Enteric Diseases. A number of samples were collected, including healthy volunteers and hospital patients diagnosed as having cholera, including samples from patients whose disease agent could not be identified using standard culturing methods.



The gut flora of these volunteers was determined and NIH human microbiome data served as reference.

Summation of the gut flora of all patients, based on DNA sequencing, allowed identification of the pathogens causing the disease. It was discovered that more than one pathogen was present in patient specimens. Thus, we discovered that enteric infections are caused by a mixture of pathogens and not a single pathogen, with three or four, up to ten pathogens are involved in infections previously concluded to be cholera. This stunning finding was confirmed by our colleagues in India who used standard bacteriological culture methods that took weeks to accomplish. Our findings were obtained in minutes.

Another very interesting finding was that the Western gut flora differs significantly from the Indian gut flora, creating a new bioforensics tool. A parallel finding was that the Indian and Western gut flora differ in the incidence of antibiotic resistance genes, very likely a result that antibiotics are freely available without prescription in India.

This experience is a very simple and brief example of the power of molecular biology as a forensic tool. We now have the tools to mount a powerful defense against bioterrorism, but we must consider how to build this capacity to protect our country against future bioterrorism attacks.

**Kyle Olson**

President, The Olson Group, Ltd. He is a consultant to the public and private sectors on arms control issues such as chemical terrorism challenges\*

Chemical, biological, and nuclear weapons. Of the three “classic” weapons of mass destruction, it is hardest to make the case that CW constitutes an existential threat. Whether we are talking about primitive agents, such as industrial chemicals like chlorine or phosgene, or more sophisticated and far deadlier nerve agents, they are more narrow gauge weapons. These are weapons, the impact of which remains defined by the classic admonition, “It’s not the poison, it’s the dose that kills you.” Truly significant quantities are required to achieve mass fatalities.

On the other hand, that limitation, along with their particularly terrifying effects on unprotected victims, evidently loosens the restraints of those who would use chemical weapons. Over the last 25 years or so, the total number of people killed with nuclear weapons is zero. The death toll due to the use of biological weapons (including the 2001 anthrax attacks) is somewhere south of 10. The total number of people killed by chemical weapon attacks or the deliberate release of other toxic chemicals is over 20,000.

These dead include Kurd, Japanese, Indian, Korean and, again and most recently, Syrians. While some of these attacks may have had strong tactical components, chemical agents were primarily employed for their psychological impacts on survivors. Chemical weapons, it would seem, are not an existential threat. They are a societal threat.

I wish to note that the manufacture and possession of chemical weapons was banned in 1990, with the Chemical Weapons Convention. But just as with the bans on the proliferation of nuclear weapons and on biological weapons, a convention is no better than the paper it is written on and the people that stand behind it, and the CWC is in many respects stronger than most. But a number of countries, including North Korea and Syria, are (or were) not signatories of that convention. The CWC has an organization based in Hague, which enforces that convention and has had some successes. Unlike the biological weapons convention, the CWC has a verification regime in place which has been active and rather successful. It has also had some failures, of course. The wars that we fought in the Middle East in the 1990s were – at least in part – about the Iraqi chemical weapons program. And we are all acutely aware of the continued existence of a Syrian chemical weapons program, despite both the CWC and the Obama Administration’s somewhat infamous “red line” agreement.

When we consider bans on weapons of mass destruction and discuss them in terms of terrorist use, we are talking about them not in terms of state versus state but in terms of sub-national or supra-national terrorist organizations. The very fact is that the international community has tried to ban these weapons gives them some enhanced credibility and some enhanced cache from the point of view of a non-government actor. For an organization or a group or an individual whose objectives are to disrupt society

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\* Presentation at an event on “Preventing WMD Terrorism: Past Lessons and Future Outlook” held on March 23, 2017, at the Potomac Institute for Policy Studies.



by creating panic or fear, using a Banned Weapon of Mass Destruction makes a lot of sense. It is a logical step along a path on which they want to go.

Consider the excitement and horrified fascination in the weeks that followed the VX assassination of North Korean Kim Jong-nam in Malaysia. Seemingly little gets as much attention as a nerve agent attack. Although, certainly, the bizarre nature of the attack where the female attackers apparently transferred a nerve agent by physical contact, yet the fact that no one else died is an excellent example of the design limitations of these weapons. The details and the chutzpa of the attack are still a little shocking. I think most weapons experts would have doubted such an attack, with such limited casualties among the attackers, at least, was possible.

Still, the consequences, the approbation, the intense global interest in the use of a banned weapon, makes CW desirable to a terrorist group. It is not surprising that al-Qa'ida under Usama Bin Laden actively pursued chemical weapons even as they also pursued biological weapons and radiological weapons.

A further complicating factor is that access to chemical weapons is low technology. Chemical weapons were first deployed in 1915 during the First World War, with great effect. They used chlorine, which was then and continues to be one of the most commonly mass produced chemicals. Chlorine was used in Iraq against our troops, with our limited utility. We have seen it used against civilian populations in the Middle East with considerably more utility. Let me note again that chlorine is a common industrial chemical. Highly toxic, globally available, and manufactured in the millions and millions of pounds annually.

Again, consider the impacts. The impact of using a banned weapon. The attention that receives in the media. The panic that creates in a population with little or no defense against chemical weapons. This is potent motivation to acquire and use.

The nerve agents such as sarin, VX and novichok also demand our attention.\* The Aum Shinrikyo religious cult, members of which were able to manufacture their own relatively crude sarin, subsequently used in a coordinated attack on the Tokyo subway system. This event's repercussions still flow through American defense and industrial policy and drive much of the planning that goes forward in preparing our responses to CW terrorism.

But please, take a moment to consider Bhopal, India. In 1984, an industrial chemical, methyl isocyanate (MIC), escaped from a manufacturing facility in the middle of the night, killing at least 10,000 and injuring another 40,000 residents of the surrounding towns. Most analysts who have looked at it objectively have conclude that it was not an industrial accident, but was an act of industrial sabotage by a disgruntled employee. In any event, water was introduced to a chemical storage tank, triggering a reaction that released an invisible, lethal cloud.

Shortly thereafter, the United States Government took a number of preventive steps. One of these was to create an organization called the Chemical Safety Board, jointly

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\* The April 4, 2017 Syrian use of sarin against civilians in Khan Sheikhoun had not occurred at the time of this presentation.

housed within the Environmental Protection Agency and the Occupational Safety and Health Administration (EPA and OSHA). The Chemical Safety Board's essential mission was to try to get ahead of potential Bhopals in this country, whether accidental or deliberate in nature. Part of that Federal action was driven by the fact that MIC – the same chemical released in India – was also manufactured and stored in large quantity in both New Jersey and West Virginia and routinely travelled on the rails for use in factories around the nation.

Hazmat transport continues to be an issue here in the United States. Everything from Bakken crude to pesticides are transported in bulk. Some experts suggest that potential targets and potential weapons are on the roll across the country. And freight rail manifests are not state secrets. While the lists of chemicals that are being shipped are confidential, they are not protected under elevated levels of security; most are clearly identified by placards on the tank cars, themselves. If you know what a company uses or factory uses, you can pretty well guess what's coming in, and when.

For my parting comment, then, I will just note that in the White House's budget blueprint one of the organizations slated for the chopping block is the Chemical Safety Board.

**Dr. Richard Weitz**

Senior Fellow and Director of the Center for Political-Military Analysis, Hudson Institute\*

What I am going to talk about is sustaining U.S. capacity, attention, and interest in the nuclear terrorism field.

There are similar concerns I think we are seeing in both bio and nuclear fields in terms of the sustainment question. We have been very fortunate in that, since the end of the Cold War, we had strong bipartisan, bicameral, presidential, and congressional leadership in the area of limiting terrorist access to nuclear materials, making nuclear energy more secure, limiting the spread and proliferation of scientific knowledge and technologies that could be used by terrorists, either as a radiological weapon or more seriously as a nuclear explosive device.

President Obama particularly made this a very important component of his agenda. As you know, we had the nuclear security summits where he would directly engage with the highest foreign leadership. And the summits contributed a lot, but of course they have now ended with the previous administration. The new Trump Administration is still defining what it wants to do in this domain. I do not see any interest in nuclear security summits but I do see much interest in pushing and focusing on this field in general.

The last nuclear security summit basically set out a series of action programs, agendas that they wanted to work on in the future but through different institutions, including the International Atomic Energy Agency, Interpol, and others. And now the challenge for us is to implement and activate those concepts into concrete policy plans at the international level. At the domestic level, we need to make sure that we sustain strong U.S. leadership at both presidential and congressional level.

And then we also have the same challenge as in bio of building the next generation. Since a lot of us got into the field when young – I am a child of the Cold War, so I did Russian, Soviet/American arms control, so nuclear security was a natural fit – but the upcoming generation, we want to make sure to train people who are knowledgeable in this domain as well as in biological, chemical, and other problems we have to deal with; but those are the two we are going to focus on today.

The criticality of the U.S. leadership I think is evident in the fact that, without strong U.S. leadership, I worry that other countries are also going to backslide. One of the advantages of the nuclear security summits and the high attention the Bush and Obama Administrations gave to this issue was that other leaders would make sure when they came to Washington that they would have some deliverables in this domain: we are returning this highly-enriched uranium, we are closing this reactor, we shared this data with IAEA.

And in order to keep that going, we need to make sure that the presidential leadership here makes that a demand. I believe that it is the intent, from what I

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\* Presentation at an event on “Preventing WMD Terrorism: Past Lessons and Future Outlook” held on March 23, 2017, at the Potomac Institute for Policy Studies.

understand, but of course it is still early. And at the congressional level, of course, we need to make sure that, as we reorganize the budget, particularly in the Department of Energy and so on, that nuclear security is understood as a distinct component from perhaps some of the more controversial questions related to arms control and nuclear proliferation, since they are somewhat different funding streams. It is not related to MOX, for example. So we have to make sure that budget is protected.

In terms of the future projects, one of the agenda items that I think could be particularly useful to focus on in the next few years under a strong Trump Administration leadership supported by congressional champions would be: what to do with some of the institutions we have had on this domain. There is the Global Initiative to Combat Nuclear Terrorism, there is the Global Partnership Against the Spread of Weapons of Mass Destruction, and so on. Some of these can take on biological activities, but their focus has so far been nuclear – the Proliferation Security Initiative, for example, is another one. We need to define what is the agenda, how we are going to pursue that.

And related to this is the question of what is going to be the new relationship between the United States, Russia, and China. Clearly those relationships are in flux in all sorts of ways. In the past we have carved out nuclear terrorism, counter-nuclear terrorism, nuclear security, and we shielded that for the most part from the problems we have had in other dimensions of the relationship. We want to think about how we can continue to do that. Clearly it would be helpful to have, for example, China pick up more of the funding in the International Atomic Energy Agency, particularly nuclear security work. We want to make sure that the Russian decision not to participate in the last Nuclear Security Summit was, just related to a disagreement with the U.S. over what institution needs to take the lead in this, and not a more serious tension.

We need to also, as has become very clear in the last few months, figure out a good balance between making sure that the information about what the U.S. government is doing in terms of nuclear security, and presumably biological security is accessible to the American public – and that the American public understands what the U.S. is doing and why, while also making sure that the leakage from the intelligence community does not give information we do not want the terrorists to have. So we have got to work out that balance between freedom of access and security of some information.

There are other topics, again I am just highlighting: minimizing HEU, thinking about the emergency response plans. I presume they are going to review the bio and the nuclear ones and others in context, we will need to review and keep those up to date. I hope that would be part of the Trump Administration's policy review. Regarding trafficking – illicit trafficking – there is a series of programs, some probably about nuclear, some about others. We want to make sure that those are continuously updated, with realigned priorities. The threats are always changing and our response needs to as well.

In ending, I want to highlight that, in both the question of biological security and nuclear security, we want to continue to emphasize that these are tools for defending the United States, they are part of our national security portfolio. So if we contribute to eliminating a nuclear stockpile somewhere, if we contribute to making a biological lab in some other country more secure, that helps our security. I am going to keep on emphasizing that as we restructure our budget and policies in the coming years.

**David Albright**

A physicist and Founder & President, Institute for Science and International Security. He is a former inspector of the Iraqi nuclear program and a faculty member at Princeton University and George Mason University\*

I met Yonah Alexander in the 1980s on a preventing nuclear terrorism project that was done in collaboration with Paul Leventhal at the Nuclear Control Institute. And in fact this threat has changed in many ways but we are still confronted with the basic question of how a terrorist would use or misuse nuclear materials or radiological sources. I add that that today terrorists could also launch cyber attacks against nuclear facilities. Nonetheless, it remains very hard to conceptualize what they want to do. We do not know much about what they have done or how they think about nuclear terrorism.

I think 9/11 was certainly a tough shock on this question. Some of the changes, or the reality that kind of took over U.S. thinking was that Afghanistan was an area that was safe for terrorists to work on nuclear weapons. It was also an area close to Pakistan where there were many scientists and engineers in the nuclear establishment who were willing to work with these terrorists. They had been radicalized, and they were willing to provide information and other types of assistance that was aiding the al-Qa'ida effort to get nuclear weapons. Fortunately that effort had not gone very far by the time the United States invaded Afghanistan. Certainly, it was not going to go very fast given the immense challenges in putting together a nuclear explosive device. But no one had thought this type of effort was even possible in such a backwards place as Afghanistan. So, a central lesson of 9/11 was that you had to deny terrorists territory where they can work safely on WMDs.

And coming forward to today, you have to ask the question, have we done that with Daesh or ISIL? What have they been doing over the last several years to further their terrorist goals to acquire certain types of nuclear explosive capabilities or radiological dispersal devices? In fact, let me just ask a question. Can you tell me that they do not have radioactive sources that are, in the International Atomic Energy Agency's terms, Category 1 materials? If they do have them, why have they not used them? I have no idea what the answer to the second question. We have the assumption that if they have the capability to harm us they will. But in fact we do not know very much about what they are planning, and what they intend to do. And I think that poses hope and also great risk for us.

There was also after 9/11 a recognition that nuclear explosives are not as hard to build as often believed. In the work Yonah Alexander and Paul Leventhal did in the mid-80s, they brought in the very renowned U.S. nuclear weapons experts Carson Mark and Ted Taylor, and they made convincing arguments based on their experience building some of the most robust U.S. nuclear weapons that terrorists could build an implosion style nuclear explosive. They would not have to spend their efforts just on gun type devices but they could also build the more sophisticated implosion ones, which require less nuclear explosive materials, separated plutonium or highly enriched uranium.

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\* Presentation at an event on "The Fifteenth Anniversary of 9/11: Past Lessons and Future Outlook" held on October 14, 2016 at the Potomac Institute for Policy Studies.

I think a lesson after 9/11 is that it is really hard for terrorists to build implosion weapons but doable. It is hard because they do not have the laboratory research conditions necessary to master the use of high explosives in an implosion system, which requires a great deal of spherical symmetry and also requires a great deal of diagnostic equipment so you actually know what is going on during the testing of high explosives, e.g. did your experiment fail or not? And so it is a tough problem for terrorists. But from what I have read of George Tenet's memoirs, al-Qa'ida was exploring some of this. They were trying to learn how to master high explosives used in nuclear weapons. That work may have continued since then. And we do not know really much about the people or teams that may be working on these problems. But I think the bottom line is that you have to worry that terrorist groups at some point will be able to build an implosion system and at that point you may see a greater effort to get the actual nuclear explosive material needed to fuel the explosive device.

We have been fortunate that there have not been large thefts of plutonium or highly enriched uranium. Another lesson of 9/11 is that these nuclear explosive materials have to be better protected. You have to consolidate the locations that store them. You have to try to eliminate them. Highly enriched uranium can be easily eliminated through diluting it back down to low enriched uranium or natural uranium. Plutonium is tougher but it certainly can be protected better. And so there has been time to develop quite a number of successful efforts to consolidate, minimize, and better protect fissile material, but more needs to be done.

The downside is that there is a lot of fissile material out there – 4,000 tons of plutonium and highly enriched uranium in the world. You need just kilograms of it to make a bomb. And so you have an on-going challenge of how to further improve the controls over this material. I think that is going to be a priority for this country for quite a while, because in the end it does not take that much to make a bomb, particularly if you know how to make implosion-type nuclear explosive devices. On the civil nuclear side, if you look at civil plutonium use – it is used quite a bit in France, and Japan wants to do pursue plutonium separation and use in its power reactors. The separated plutonium, which is the more dangerous form from a nuclear weapons point of view, is moved around by truck and plane. So, it is in transport, and truck transport of fissile material in particular poses difficult challenges to protect adequately against terrorist attack or theft.

Now on threats to nuclear facilities, I will make this brief. The recent episodes in Belgium where there was fear of nuclear facilities being attacked by Daesh terrorists. I do not know the extent of what Daesh planned or really the extent of what Belgium could have done to prevent such attacks, but it raises another aspect to this problem. If you want to cause a huge nuclear accident or problem, you can go for nuclear facilities. And you have to worry not only about the actual physical seizing of facilities, but also cyber attacks. I think preventing these scenarios is very difficult.

As one aspect of my work in the 1990s, I was involved in trying to understand the Rocky Flats nuclear weapons production site and the off-site releases of plutonium that had happened there. Part of what we learned involved some of the physical protection procedures and practices of the plant. In one training session to test the adequacy of the site's physical protection, National Guard troops entered the site using helicopters and tried to seize the plutonium stored in a major vault. In this session, as in other



ones, the troops were usually caught or stopped as they were leaving the building with the plutonium. But what if, from a terrorist point of view, seizing the plutonium was the goal, not escaping with it? There were tons of plutonium and highly enriched uranium stored in the vaults at Rocky Flats. If terrorists were able to seize a facility with lots of fissile material in it, without planning to get off site with it, they could cause one massive criticality accident. So, you not only have to have robust physical protection but you also have to think about how to extend the protection in new ways that are not typically well protected against.

Now let me end with Daesh. What have they learned? Do they have radioactive sources? I assume they have not worked a lot on nuclear weapons in Syria and Iraq but we do not follow this as closely as we used to. I assume that it is an important question for the intelligence community. But I do think that one of the problems we are going to face, and Daesh demonstrates, is that it is very hard to deny these terrorists physical space. In terms of the long term threat of nuclear terrorism, they need bases and they need places safe to work on WMD, gathering experts and equipment. I think a lesson of Daesh has to sober one that is not necessarily going to be easy to deny them this safe territory.

**Ambassador Bonnie D. Jenkins**

U.S. Department of State's Coordinator for Threat Reduction Programs in the Bureau of International Security and Nonproliferation\*

My work in the government really focuses on ways in which we can keep weapons of mass destruction materials and weapons (WMD) out of the hands of non-state actors with an intent to do harm. So my perspective in terms of international cooperation in combating terrorism is that it is very important indeed to have international cooperation. The only way we can really reduce the threat of terrorism is to work together on a global scale, to work bilaterally, multilaterally with partners, and the work that I do really does foster that effort and ways in which we can develop programs to actually make sure that we do not have opportunities for non-state actors to use chemical, biological, nuclear, or radiological weapons.

The U.S. has developed a number of tools and initiatives to address this issue whether they are through working with international organizations, whether it is working through specific initiatives, or working on the ground bilaterally with countries. There are a number of ways which we have been focusing on addressing a very complex threat that follow individuals as they move around the world. Individuals with a threat to do harm may seek access to pathogens, precursors, or to nuclear materials.

There are a number of areas that I work on at the State Department focused on reducing WMD terrorism. I have worked since 2009 on the Nuclear Security Summit. I am the Department of State lead on the preparations for the Summit. It is an effort that was started in 2009 by President Obama in his first Prague speech where he announced that nuclear terrorism is one of the greatest threats the world faces. And he announced we would have a security summit to bring together leaders around the world to focus on this important issue, recognizing that in order to prevent nuclear terrorism you want to prevent the access to nuclear material. So as you probably know, there have been a number of nuclear security summits since that speech. There was one in 2010 here in Washington, followed by the 2012 summit in Seoul, and 2014 in The Hague, and there will be a final summit under the current format in 2016 in the United States, the place and time to yet be determined.

Through these nuclear security summits we have worked with 54 leaders, to include four international organizations, providing commitments, communiqués, and other efforts to ensure that states who are working with us are doing what they can to secure nuclear materials. We have done this through a number of national commitments. There have been a number of what we call "gift baskets," which are actually commitments by a group of countries on particular areas of nuclear security. So through this process of nuclear security summits, we have been providing ways in which we can consolidate nuclear material, get rid of excess nuclear material, and really focus on ways in which we can coordinate and work together internationally and with international organizations and initiatives like the International Atomic Energy Agency (IAEA), the

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\* Presentation at an event on "International Cooperation in Combating Terrorism: Review of 2014 and Outlook for 2015" held on March 30, 2015 at the National Press Club.

The opinions expressed herein are the author's alone and do not necessarily reflect the views of the U.S. Department of State or the United States government.



Global Partnership Against the Spread of Weapons and Materials of Mass Destruction (Global Partnership) and others to prevent nuclear terrorism in the future.

One of the other aspects about international cooperation is the recognition that we need to work with not only governments but with entities outside the government as well. Through the nuclear security summit there has been a process of working very closely with non-governmental organizations and industry, which are very important parts of ensuring that we do secure nuclear material. So when we talk about international cooperation, we are talking not just about governments; we are talking about all of the entities that exist around the globe that can help ensure that we prevent nuclear terrorism.

Another entity that exists to which I am the U.S. representative is something called the Global Partnership. This is an initiative that was started in 2002 in Kananaskis under the then G8 chairmanship of Canada, and the main focus of this initiative is to help ensure, through programs and activities, that we do not let WMD get in the hands of non-state actors. It was originally to be a ten-year commitment amongst the G8 members with the United States putting in \$10 billion matched by \$10 billion of the other members. We now have twenty-eight members of the Global Partnership, so it has grown a lot since 2002. It was extended in 2011 to go beyond ten years. For the first ten years of the Global Partnership's main focus was destroying Russian nuclear submarines and Russian chemical weapons. We spent over \$22 billion in the first ten few years in the Global Partnership. Now the Global Partnership is looking at all areas of chemical, biological, nuclear, radiological weapons to prevent them from getting into the hands of non-state actors with intent to do harm.

Some of the activities that the global partnership has been engaged include: the physical protection of nuclear materials, securing the transport of nuclear materials, radioactive security, prevention of illicit nuclear trafficking, material management, verification and compliance, and work on export controls. In the area of biosecurity, there is work on securing and accounting for biological pathogens, preventing deliberate biological attacks, strengthening disease surveillance and detection, reinforcing biological non-proliferation instruments like the biological weapons convention, and ensuring the safe, secure and responsible conduct in the biological sciences. In chemical destruction, the global partnership members have completed the projects remaining for Kisser projects, assisted in destruction and activities in Syria and Libya, and are prepared to assist in the destruction of newly-declared stockpiles.

In addition, I should mention that last year the Global Partnership has been having meetings focusing on CBRN security assistance in Ukraine. Ukraine is one of the members of the Global Partnership. It has been a member since 2003. And as a result of recent activities in Ukraine, we have been meeting and working with Ukraine in trying to address some of their CBRN threats that they may be facing right now.

I should also mention one other area that is getting a lot of attention called the Global Health Security Agenda. For those of you who do not know what this is, it is an effort that was started last year in the United States, with a launch in Washington, D.C., February 2014, to focus on reducing infectious disease threats, like Ebola, whether accidental or intentional. The focus of the Global Health Security Agenda (GHSA), which is led by the White House, now has forty-four countries that are working on this effort.

It is a security effort. It is also a human and animal health effort, and it is a law enforcement effort. In the United States you have quite a number of departments who have traditionally not been working on threat-reduction programs who are now involved because we are looking at infectious disease and how to fight infectious disease from a prevent, detect, and respond lens. There is a strong bio-security aspect to the GHSA.

Those are just some of the programs that fall within my portfolio and that promote international cooperation to combat terrorism.

**Dr. Anthony Fainberg**

A physicist and former FAA Director of Office of Policy and Planning for Aviation Security\*

Let me refer to two articles, one in *The Washington Post* by David Albright in November 2013; David Albright as some of you may know is a technical expert who has been using satellite and other information, fighting the non-proliferation issue for decades, and is by no means a pushover. Another article I would refer you to is by James Acton of the Carnegie Institute, who is looking at this Iranian nuclear agreement, or accord, or interim settlement or whatever. I came to the same conclusions they have: it is not a bad thing to not only freeze the Iranian program but to roll it back.

The assessment of Albright is that if the Iranians wanted to break out and made a decision to do that today and produce enough highly enriched uranium to make a weapon, they could probably do that within a month or two. This at least prevents them from getting any closer, and the only purpose I see of the interim agreement is not just a pause in the psychology; the purpose is so that we do not get rolled the way some people think we did in North Korea. We negotiated with North Korea at the same time they were building their ability to produce nuclear material.

This interim accord allows the negotiations to take place without them (the Iranians) being able to push closer, in principle. It is also more than enrichment; it is more than even rolling back 100 kilos of 20 percent <sup>235</sup>U, which is almost enough to make a nuclear weapon for an early nuclear state. It is not an inconsiderable concession for the Iranians to have said “Half of these 100 kilograms we will dilute back to 5 percent, and the other half we will turn into oxide.” It is pretty easy to get from the oxide back to the gas, but it also takes a while and that is why it is 3 to 4 weeks longer rather than allowing them to get closer. So it is very much in the interest of the West and the rest of the world to have this pause. It not only prevents them from getting closer to sufficient nuclear material for a bomb during the 6-month pause, but it actually puts them a month further from it than they are now.

There are a few other issues I would like to discuss from a technical point of view. Just to give you an idea of numbers, when uranium is enriched to 3-5 percent, you have already used about half of the energy (or you can also read that as time) you need to get up to the 90 percent weapons level. Once you are at 20 percent, you are roughly at 90 percent of the energy required. It is very quick to go from the 20 percent up. So again, if this is their main stockpile – and I think we have other reasons to believe their main stockpile of 20 percent is not much larger – it is a great advantage to down blend it so they would have to start again.

On the issue of what are the real intentions of the Iranians now as well as their decision-processes and decision-makers. My reading from a position far away from everything is that eight years ago, when there were elections Khamenei in some way or other intervened in the process, or his people or his revolutionary guard allies at the

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\* Presentation at an event on “Tehran's Bomb Challenge: Crossroads, Roadblocks, and Roadmaps to Rapprochement?” held on December 5, 2013 at the Potomac Institute for Policy Studies and previously printed in a report on “Tehran's Bomb Challenge: Crossroads, Roadblocks, and Roadmaps to Rapprochement?” (March 2014).

time intervened in the process. Somehow Ahmadinejad made the runoff and then ran against Rafsanjani who was quite unpopular at the time and thus won. Ahmadinejad did unexpectedly very well to make the runoff, as I remember, and then easily won. Was that an intrusion of Khamenei? I do not know.

In 2009, you had this second election of Ahmadinejad that to many people looked fraudulent (and I do not know if it was or not. There are arguments of both sides). However, what is indisputable is there were a lot of people in Iran who thought it was fraudulent. There was a very nice analysis of that election by Professor Ali Ansari of the University of Saint Andrew's in Scotland making a very good case that it was extremely unlikely that the results were as quoted. The fundamental reason was because when he looked at the different parts of Iran and what the reported results were, and it turned out to be almost uniform across the country. For one example, in the district where Mousavi came from – and by the way he is still under house arrest as far as I know – in his home district, he did not do much better than he did in the rest of the country. It was almost certainly a fraudulent election, in my view, viewed from the long distance.

This time, something is different. And what I think is different are the sanctions and the parlous state of the economy in Iran and a public that was in many ways more suppressed since 2009, feeling perhaps a greater discontent with what was going on than before. Again, I do not know the numbers, but I believe with the sanctions did reduce oil revenues by almost a factor of two. The sanctions at least made it harder to make up the incompetence and inefficiencies in the government. So when Rouhani was allowed to run in the first place, that indicated to me that Khamenei had decided that his old buddy from the old days, Rouhani, was going to be okay and would respond more to the desires of the Iranian people.

Now, whether or not this is all a conspiracy of collusion between Rouhani and Khamenei to pull the blinders over the eyes of the west, I do not know, but I think all we can do at this point is to give the Iranian government a chance to show that it is not. I am not sure I give it as much as 50 percent, I am not sure I give it as well as 10 or 5 percent. But there may actually be a chance that something has changed because of the sanctions and because of the great discontent of the people. Maybe Khamenei has decided that he does not want to be known as the person who let the Islamic Republic collapse and the one who destroyed the economy of his country and the status of his country for a long time. Perhaps he has made it a strategic decision – we do not know. And even if he has, however, he is not a lone actor. The power structure in Iran is like the internet, I am sure of that. There are many, many nodes and ghost nodes, virtual nodes. Khamenei may have made this decision. The revolutionary guards may have some people in there at a high level, who do not like this decision, and a question is whether they would be able to mobilize support to derail it. I do not know.

My bottom line is because of the technical aspect, at least we have frozen, stopped, rolled things back for 3 to 5 weeks, whatever it is, and therefore it is probably worth trying to see if Khamenei and Rouhani can be brought to a reasonable agreement. Then one has to go into more details to decide whether the future “final” agreement is a reasonable one.

In my view and David Albright's view too, and he has done some great work on this, the Iranians were doing explosives testing in the area called Parchin, some 30 kilometers southwest of Tehran, for a long time. This testing looked extremely like the kind of explosives testing you would perform with conventional explosives to see if you could compress material for a nuclear implosion device in the accurate and well-timed way that you would need to achieve nuclear detonation. This kind of work really does not have any other applications. It looked very suspicious, and in the last few weeks people have been cleaning up that site. They have been taking the topsoil off and doing all other kinds of interesting things. They knew that eventually someone from IAA would come and take some samples.

There are some questions there and also about a whole bunch of past lies and deceptions from the Iranian regime, from the past administration more than the current one. There were violations of the agreement with the IAEA regarding the announcement of the facilities at Natanz and Fordow where the enrichment is being done, particularly Fordow. The Iranian government at the time said "Oh, we had a perfect right to sign on to additional protocol and then back out of it." This protocol provides additional safeguards that the IAEA has tried to impose upon its member states over the last couple of decades, and to which Iran had agreed, then violated.

We have to ask in some final agreement that those questions be probed a little bit. I do not know if we can achieve a decent final agreement, and I do not know if it is necessary to rub their noses in their past lies. Perhaps. That is a political and diplomatic question that other people have to answer. Maybe if one understands the extent of their previous military program, or perhaps current military program, it is worth dropping the matter (while keeping it in mind of course) if one can impose enough safeguards. The fact that Iran may come out of this with some enrichment capability at the 3 to 5 percent level is somewhat disturbing to me. I am somewhat concerned about it as it could allow them to eventually break out in the future. However, the game with the safeguards regime under the Nuclear Non Proliferation Treaty is to try to arrange your safeguards, your monitoring and your understanding of what is going on in any country, such that if they decide to break out, they will have to make a major announcement and there will be enough time for the world to react, perhaps in a very forceful way, before they're able to screw in the last screw of the first nuclear weapon.

Additionally, a parenthetical point: getting one bomb is not enough, because you do not really know if it will work. The North Koreans' first bomb did not really work very well. It was worse than a fizzle; the numbers I have seen were 0.3 to 0.5 kilotons. If the Iranians get one bomb, they would have no idea whether it will work at all. They would have to get 2 or 3, the way the Koreans have 6 or 7. And, by the way, the Korean example is something I view in a slightly different way. The way we treated the Koreans in 2002-2007 was to insult them a lot and make all kinds of threats, then say, "Well, if you're not going to make a strategic decision to give into our demands, we're just not going to talk to you." And Kim Jong-Il said, "Thank you, Jesus!" And he took the plutonium that was in his reactor there, kicked everybody out, and made several weapons.

It is not a good idea to speak loudly and carry a small stick, which is what the U.S. did. Teddy Roosevelt had it better using the right version of the aphorism, which he got from the Wolof peoples. There were people around here who apparently thought it was perfectly okay to try to play the schoolyard bully. The result is that the Koreans now

have a nuclear deterrent and we're now in a much worse strategic position than before. If we can intervene in Iran in some way – and Iran I know is a very different state than North Korea, in a very different situation – but if we can intervene and negotiate with them in some way to keep their hands off enough highly enriched uranium to make a bomb, we will be far better than we were in North Korea when we let the guy take his 6 to 10 weapons worth of plutonium and play around with them. So I think we ought to consider that option. What is the alternative? If you really think it is better not to talk and just to threaten these guys, you had better be prepared down the road for what you have to do. It may be easier in Iran for many respects than in North Korea, but it is not going to be pleasant for anyone.

One final thing, if one puts one's optimistic hat on and engage in some hope for the future – and it probably will not take six months if there is a final agreement, it will probably take more, 12 or 18 – maybe that could lead to a situation where one might explore the possibility of a Middle East Weapons of Mass Destruction Free zone. It is possible. And it is something that even the Iranians and the current Israeli government have been playing around with over the last few years, with the international community talking about a meeting in Helsinki that didn't work out and where each side was annoyed at the other's behavior. (I think in this case, Israel was really right.)

Another point: since Syria has removed its chemical weapons of mass destruction from its own control, maybe that would give the international community an impetus to try to push forward in that direction. I am not all that optimistic, but I think that the results of that could be so positive that we might want to keep that in mind.



**Hon. Charles A. Duelfer**

Former Special Advisor to the Director of Central Intelligence for Iraq, WMD; leader of the Iraq Survey Group on WMD; and acting Chairman of the UN Special Commission on Iraq (UNSCOM); currently, Chairman of the Board, OMNIS, Inc.\*

What strikes me about the situation in Syria (I am going to set aside Iran for the moment) is how far things have come so quickly. Let me just tick through a timeline.

On August 21, 2013, there was a massive use of chemical weapons in Syria, which provoked an international response; the UN, which had a team in Damascus to investigate other allegations of earlier CW use, was immediately redirected to investigate the new massive attack.

As that team was conducting its work, on September 9, Sergey Lavrov, (who I would note spent five years as Russian Ambassador to the UN during the 1990s at the height of the Iraqi WMD issue – so he knows about the UN inspection mechanisms that were applied to Iraq – and he certainly knows how those lessons may be applied to Syria) said publicly that “we are calling on the Syrian authorities. Not only to agree on putting chemical weapons storages under international control, but also for its further destruction and for them to join the OPCW – the chemical weapons convention.”

The next day, on September 10, less than two weeks after this massive use of CW, President Barack Obama made an address to the nation where he was said that he was going to ask Congress for the authority to conduct a military strike against Syria in reaction to the CW attack for which United States intelligence clearly assigned the responsibility to Damascus. He said the goals were twofold: to deter and degrade the Syrian chemical weapons capability.

The next day, September 11, US Secretary of State John Kerry agreed to meet with Lavrov in Geneva to discuss the option of addressing Syrian CW via a UN mechanism.

So, it’s just 20 days after that massive use. On September 12, a day later, Bashar al-Assad agreed to the Russian proposal. At the same time, Bashar al-Assad told the Russian TV at the time that they would accede to the CWC, and this was not because of American pressure.

On September 14, Lavrov and Kerry agreed in Geneva to a framework for the elimination of chemical weapons in Syria, and this laid out the path ahead which would use both the existing mechanism of the OPCW and the Security Council.

Lavrov and Kerry returned to their respective capitals, on September 14. Syria acceded to the CWC. Coincidentally at about the same time, Ake Sellstrom, the chief UN inspector who investigated the August 21 use of chemical weapons, issued his report.

On September 27, a month after that use, the UN Security Council passed Resolution 2118 which laid out the process and set the goals and schedule for getting rid of the

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Syrian CW program – its munitions, its production capacity, and its agent. At the same time and carefully choreographed with that, the Executive Committee of the OPCW, the executive arm that implements the CWC, passed a decision laying out the groundwork, and rules that would apply to the Syrian disarmament.

On October 1, three days later, the first inspection team entered Damascus to begin its work.

On October 11, the Norwegians and the Nobel Committee decided to award the OPCW the Peace Prize for that year.

On October 16, the UN named a coordinator for the joint work of OPCW and the implementing organization set up under the Security Council and named a coordinator, Sigrid Kaag, who is a Dutch national, knows the UN system, and speaks Arabic.

On October 27, the Syrians submitted their declaration to the OPCW detailing their infrastructure and munitions and so forth. This declaration was judged to be in the ballpark by the experts at OPCW.

On October 30, the UN submitted its first status report to the Security Council. That report said basically that the initial team had accomplished its assigned mission – it established an inventory of CW sites, did a baseline survey of the facilities which Syria declared, visiting all of them except for two (which may or may not have been important but they were outside of the secure zone). But they reported that they had accounted for and destroyed (in the terms of the UN, “functionally destroyed”) the Syrian capability to produce CW munitions.

I detail all of this because that’s progress at lightning speed for the international community. When you look at weapons destruction and arms control over the past several decades, how is it that between August 21 and October, basically just two months, an entire country’s CW capacity has been taken off of the table?

It is an astonishing thing that something happened that quickly. Decades ago when I was involved in arms control during the Cold War, I had a sense that arms control came in two and possibly three types. There were those agreements that set useless limits, there were those that limited useless things, and then potentially there were agreements that limited useful things and set useful limits; but it was hard for me to find a lot of cases where that applied.

And looking at the Syrian CW case, why is it all of a sudden they agreed to do this? Why now? And now, chemical weapons have been almost taken off of the map. They remain in countries that are not a part of the CWC. Only leaving Egypt, North Korea, South Sudan, and Angola. There are 190 other countries that have acceded to the treaty. There are two that have signed but have not ratified, Israel and Burma. But we are now at a point where chemical weapons are kind of taken off of the map – at least on the part of state actors. The residual problem is non-state actors, and that may be a big problem.

For discussion, let me just put a couple of questions out. I have my own answers, but they are open questions worth thinking about.



All of this is taking place in the context of a much broader problem. In fact, probably the only good thing that you can point to in respect to Syria and the whole region is that we now appear to be very close to getting rid of Syrian chemical weapons. That says nothing about the rest of the mess in the area. People argue about this: Does this progress on CW convey legitimacy to the Bashar al-Assad regime, and is that not a negative? How does this ripple on in its affect with Iran? Is it a good example? Is it a bad example? I do not know. It is an interesting debate in all those points. I would point to the role of Russia. Why is it that Russia did this? It is very interesting, and Lavrov as I described, he knows this stuff, he is very smart, he is, I should not say this but he is one of the smartest people up at the UN in my experience. I do not think anybody other than Lavrov could have done this because he knew but the mechanisms from the Iraq experience, but he also knew Bashar al-Assad. He would not have proposed this if he did not know that Bashar al-Assad was going to come through on this deal. So thinking about it, Russia all of a sudden is playing a very interesting and unique role. They understand the UN inspections and, critically they understand the Bashar regime.

Let me just mention one other thing to keep an eye on. As I mentioned, there was a UN report on the CW use that took place on August 21st. It was interesting if you look at the annexes of that report. They have photographs and analysis of the munitions used. My guess is that those munitions will not match up with the munitions Syria has declared in its inventory. So what I am suggesting here is that chemical munitions may not necessarily be fully under the control of state governments. I think there may be leakage over to non-state actors. I think is an area for one of your studies. As more information about the inspections comes out, I would keep an eye on this question of the munitions used on August 21 and those declared by the Syrian government to the OPCW.

One other thing, drawing on my Iraq experience, is that Iraq had and used a lot of chemical weapons during the war with Iran. Iran was conducting military offensives using tactics we came to call “human wave attacks,” and chemical munitions really saved the Saddam regime at that point. So, going to my point of concerning whether these are useful or useless systems which we have taken off the map, I think there is an argument that Syria is giving up a potentially useful, albeit horrible, capability. Chemical munitions were very useful militarily to the Iraqi army during the Iran-Iraq war in the 1980s. So, I find that in itself, this is interesting. It is not like we are taking a weapon off the table which is without utility. There may be alternative better ways of performing a military function, and maybe that’s the case now; but it’s an interesting point.

Finally, let me acknowledge that it sounds like I have already declared victory on this narrow Syrian CW problem, but we are not there yet. The chemical agents – some agent is in final form but most of the chemicals in Syria are the agent precursors – still must be either neutralized or removed from Syria. I think, however, that there is a path forward on that. Of course, there is a risk some rebel groups may see this process as not in their interest and may try to upset it one way or another. But I think that the dialogue which is going on between the United States, Russia, and some other European countries suggests that there is a pretty good path forward. Certainly by the standards which President Obama laid out in his speech to the nation which was to “deter and

degrade the Syrian CW capacity,” the process which we are going on now is going to achieve a greater degree of success on that score than the military strike would have.

**Michael Eisenstadt**

Senior Fellow and Director, Military and Security Studies Program, The Washington Institute for Near East Policy\*

What I think I will do is just toss out some thoughts about first of all Syrian motivation for agreeing to dismantle its chemical weapons (CW) program and the implications for Iran. In particular, what lessons did Iran draw from this episode and what are the likely implications in nuclear negotiations with Iran?

Immediately after Syria signaled that it would act in conformity with the framework agreement between the United States and Russia, Secretary of State John Kerry said that the credible threat of American force was the key factor in accounting for the Syria decision. I think it is hard to avoid the conclusion that it probably played a very important role. What is odd is that at the time that Syria accepted the Russian plan, it seemed clear to at least many people in Washington and elsewhere in the United States was that the U.S. was already not going to strike by then. So there seemed to have been a disconnect between the Syria decisions and the actual political reality in Washington. How does one account for that? I would say that it was due in part to a delay in comprehension on what was going on in Washington; maybe it was a failure to understand how the U.S. system works, that maybe Syrian President Bashar al-Assad thought that U.S. President Barack Obama would act anyhow whether or not the public or the Congress was opposed to it. And Assad probably was under a lot of pressure from the Russians who were trying to convince him that this was actually a pretty good deal for him. And based on what Assad has said in interviews since then he has probably concluded CW were more of a liability than an asset at this point. He found that limited use of CW produces limited benefits, while massive use invites foreign military intervention.

It had also become clear that conventional arms are the true weapons of mass destruction in Syria. In addition, agreeing to the Russian plan ensured that the U.S. had a compelling interest in the survival of the Assad regime for at least as long as the CW disarmament process continued. So I think from Assad's point of view, the agreement gave him a new lease on life. Agreeing to disarm provided him an insurance policy against an American strike and at least a lease on life for the duration of this process. Also, I think it is quite possible that the Russians promised to replace Syria's military losses if they signed onto the agreement. I think it is possible that the Russians said, "Look, you are going to win this fight conventionally, and we will replenish your conventional weapons to make sure that you prevail." A bit of speculation on my part, but I think we have seen enough in the media to believe that this may have happened.

Although I would also say that a shortage of weapons is not Assad's biggest problem. A lot of his army has melted away; he can only rely on three or four divisions. So the regime has equipment from about eight other divisions which are sitting unused. Some of it has been looted, and it has been taken by the opposition, and some might not be operational, due to lack of maintenance. But what they really need, is reliable,

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competent manpower. In the interim, however, that has been provided by Hizballah and Iran. But maybe the promise of additional arms played a role as well.

Finally, while we cannot rule out cheating by Assad, we should not assume he will inevitably cheat on this agreement. It provides him with a lot of benefits—as it has enabled him to continue starving out large numbers of Syrians and continuing with the conventional fight. So I will just say again that things might change. He might find reason to renege later on disarmament if he can get away with it, but do not assume he will cheat. Much will depend on the kind of expectations the U.S. creates with regard to the price of renegeing.

In terms of the implications of these developments in Syria for Iran and the lessons that Iran drew from them, there was concern at the time of the American stand-down that this would harm America's ability to achieve an agreement with Iran with regard to nuclear weapons. In fact, even the president said to the Iranians, "Don't draw the wrong conclusions," indicating that what the U.S. did in Syria does not necessarily apply to Iran, and that all options are still on the table. My feeling is that for a long time now, Iran has been skeptical of the likelihood of an American strike, and what happened in Syria only deepened this skepticism. This was a preexisting problem, however, the result of 30 years of American policy towards Iran, where the main American approach to dealing with Iranian terrorism has been American restraint. The U.S. has never retaliated militarily for Iranian terrorism – and perhaps that was appropriate, but this has led Tehran to believe that it can get away with certain things without dealing with the prospect of military retaliation. The U.S. had a credibility problem to begin with, and I think the recent Syrian episode compounded it.

Iran is less worried about a U.S. military strike than what they call American soft warfare – what they see as American efforts to undermine the ideological underpinnings of the regime and Iranian culture with American culture. For in the end, if you cannot raise a new generation of Iranians who buy into the ideology of the regime, the regime will ultimately collapse and the revolution will ultimately fail. That is what they are really fearful of. I think no administration has really, whether the current one or previous ones, recognized this fact or shown a willingness to act on it because it would require a very different policy approach to Iran that we are not really prepared for – intellectually or organizationally. Moreover, some people have raised the possibility that since we demonstrated in Syria that we are willing to cut deals with regimes that many previously thought we were trying to get rid of, maybe Tehran will conclude that we are ready to cut a deal with the Islamic republic. I would argue that will likely draw another lesson Syria as Libya redux. In other words that just as we made a tactical decision to temporarily make peace with Libyan leader Moammar Gaddafi in order to disarm him, only to eventually work for his overthrow when this became possible, likewise we will divest Syria of its chemical weapons, and then work to overthrow the regime when that becomes possible.

Let me make my final points here with regard to Iranian redlines in the ongoing nuclear negotiations. We do not know the details of what Iran presented to the P5+1 in their meetings a couple of weeks ago, but I think you can draw some inferences from what they have been saying publicly about what their red lines are. They have talked, reportedly, about the recognition of Iran's inalienable right to enrich. They have said no more suspending enrichment. They said that actually building a bomb is a red line for

them – that they do not have the intention to build one and that there is a nuclear fatwa that would prevent them from doing so, and that in order to reassure the P5+1 on this point, they are willing to agree to greater transparency to build confidence. Fatwas, however, can be issued and rescinded or modified according to circumstances, so I do not take that as an assurance at face value. But that is what they have been trying to convince the world; that this is a red line for them.

Finally, not acknowledging a possible military dimension to their program is a red line for them. They are saying that allegations that Iran had a nuclear weapons research and development effort are a bunch of lies in order to justify sanctions on Iran. For this reason, it would be very, very hard for them to admit to having done military research and development related to their nuclear program in the past. It is always hard for countries that had clandestine WMD programs to come clean, but this to them is so tightly woven into their narrative of grievance, that I think it will be very hard for them to do so.

What does this mean in practical terms? I think that Iran will insist on some type of centrifuge program, and they might accept limits on the number of centrifuges and the percentage of enrichment they can do, but not the quality of centrifuges. In this way, they can swap quality for quantity with regard to their centrifuge program, because right now there are centrifuges in use that are 100 times more efficient than the ones that Iran has and the U.S. and the Europeans are developing centrifuges that are 300-500 times as efficient. So, you have to think that if they are allowed to keep 1,000 or 3,000 centrifuges, 20 or 30 years down the road they could potentially have a very potent enrichment capability with 1,000 or 3,000 of these much more efficient centrifuges. Likewise, with regard to the additional protocols I mentioned before, Rouhani has talked about greater transparency, but consistent with international law and current universally applicable regulations. So Iran might sign an additional protocol, but an additional protocol alone is not enough, and any kind of monitoring regime has to be much more intrusive than permitted by the additional protocol. One principle of Iranian arms control policy is pushing back against what they perceive as discriminatory provisions. And any kind of additional protocols plus from their point of view would be discriminatory; Iran would be the only country in the world subjected to that kind of monitoring. Therefore, they are unlikely to accept the kind of monitoring that would be necessary to be sure they are not trying to secretly build a bomb.

So in short, I think it will be very hard to get a deal, but who would have thought we would have gotten a deal on Syria? But let us see how that goes. It is too soon to call that a policy success.

**Dr. Milton Hoenig**

Nuclear physicist and coauthor with Professor Yonah Alexander of *The New Iranian Leadership: Ahmadinejad, Terrorism, Nuclear Ambition, and the Middle East* (Praeger Security International) and *Super Terrorism: Biological, Chemical, and Nuclear* (Transnational Publishers)\*

I will start by noting that Weapons of Mass Destruction depend on both materials and delivery systems.

The Chemical Weapons Convention concentrates heavily on isolating materials and destroying them – as we see now with the 1,000 tons of chemical precursors declared in Syria. Materials are the key. No chemical, biological, or nuclear materials means no WMDs to deliver.

Nevertheless, in the nuclear arms reduction treaties between the United States and Russia, the focus is on reducing delivery systems. That leaves the nuclear materials to be reckoned with. The fissile materials – uranium-235 and plutonium – cannot be easily destroyed, but they can be diluted, isolated, and guarded.

Under the strictures of the Nuclear Non-Proliferation Treaty, in states agreeing not to pursue nuclear weapons, a great deal of effort is spent by the International Atomic Energy Agency to verify that nuclear materials and facilities are used only for peaceful purposes, mainly to fuel research reactors and power plants.

The security of highly enriched uranium and plutonium left over in Russia from the Cold War has long been a concern. In 2010 and 2012, at the behest of the United States, Nuclear Security Summits were held to consider this matter and others related to securing the global accumulation of nuclear materials usable for nuclear weapons. A third Summit is scheduled for The Hague in 2014.

Over the past 2 decades, in the just completed Megatons to Megawatts program, 500 tons of leftover Russian highly enriched uranium have been diluted with natural uranium and blended down to low-enriched material sold to the United States, where it has been the source of half the fuel for our nuclear power plants.

Weapon-usable nuclear materials carry a persistent threat, as developing technologies make their manufacture and misuse ever easier.

The United States is trying to promote a policy that countries building their first nuclear power reactors will agree to not accompany them with local uranium enrichment plants or fuel reprocessing plants. The United States does this through so-called “123” agreements that place restrictions on the subsequent use of U.S. origin fuel and technology.

For example, the United Arab Emirates (UAE), which has contracted for South Korea to build 4 nuclear reactors, now has a 123 agreement with the United States in which

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the UAE agrees to abide by the “golden rule” – no accompanying enrichment or reprocessing plants in the UAE. Fuel is to be bought from foreign suppliers.

South Korea, itself, in a standoff with the United States, wants a revised 123 agreement to allow uranium enrichment and fuel reprocessing, not only indigenously, but as a sweetener to accompany its sale of power reactors to other countries. This would further the spread of fuel enrichment and reprocessing throughout the world rather than encourage the ultimate nonproliferation goal of just a handful of multinational fuel cycle centers.

South Korea claims that the dry reprocessing technology it wants to use—so-called pyroprocessing – which was developed at the Argonne National Laboratory in Chicago – is proliferation resistant because the recovered plutonium is accompanied by other fission products – transuranics and lanthanides – that would provide a radiation shield against seizure by terrorists. But this shielding will not deter a dedicated proliferator who can simply use the long-proven PUREX process to separate out the plutonium in a vat of acid.

Enrichment and reprocessing technologies are potentially dangerous things. Look at Iran.

At the Natanz centrifuge enrichment plant, Iran enriches the gaseous molecule of uranium and fluorine called uranium hexafluoride. Iran is producing 240 kilograms of 3.5 percent enriched uranium hexafluoride per month in 9,000 operating centrifuges. This is appropriate for power reactor fuel, but is not being used for that purpose. Instead, as of August 2013, the International Atomic Energy Agency (IAEA) reports, a stockpile of over 6,000 kilograms has accumulated – enough for 4 to 5 nuclear weapons, if further enriched to 90 percent weapon grade. That would take a few months for a single weapon.

Iran also has been enriching uranium to 20 percent – both at Natanz and at the small enrichment plant at Fordow, built in the side of a mountain. Iran says that this uranium is to fuel its small research reactor in Tehran. But it has been careful to keep the supply on hand at about 180 kilograms, below the red line drawn last year by Israeli Prime Minister Netanyahu at 240 kilograms of 20 percent enriched uranium hexafluoride, the amount Iran would need for a weapon, if further enriched to weapon grade--something requiring just a couple of weeks’ time.

Iran is building the IR-40 heavy-water reactor at Arak, touted as being for medical isotope production. But it could also produce 2 bombs worth of plutonium a year that could be separated in a quickly constructed small reprocessing plant, making the reactor a prime target for an Israeli military strike before fuel loading starts.

Also, Iran could have concealed secret centrifuge plants. The point is that a clandestinely operating centrifuge plant has no identifying signatures. It could house tens of thousands of spinning centrifuge machines in an average size facility. The plant does not have any unusual requirements for electric power. And it does not emit any identifying chemical gases or vapors to the environment.

Even more dangerous is using laser isotope separation. Iran has admitted to experimenting with this for enriching uranium, but it won't supply details to the IAEA. Laser isotope separation – L-I-S for short – is the next big proliferation worry. In the United States, GE-Hitachi has been licensed by the Nuclear Regulatory Commission to build a commercial laser enrichment plant in North Carolina using the successful Australian SILEX process. Uranium enrichment in a clandestine LIS facility would be fast and difficult to detect.

In the negotiations now going on between Iran and the five permanent members of the UN Security Council plus Germany, the elephant in the room is Iran's nuclear-related activities with "possible military dimensions," PMD's for short. These past activities have been cited by the IAEA and beg further explanation.

For example, the IAEA has evidence of experiments on the symmetric placement of detonators on a hemisphere of high explosive—an arrangement that would be appropriate only for creating the converging shock wave in an implosion nuclear weapon. Also, there is evidence of work on the design of a compact warhead to fit into the nose cone of a Shahab-3 ballistic missile. In the documents obtained by the IAEA, Iran never mentions the word, "nuclear," but the nuclear weapon context is unavoidable.

In addition, the IAEA would like to investigate explosives tests in a chamber at the Parchin military site to which it has been denied access while the site has been thoroughly cleaned and stripped of its possibly contaminated top soil.

Also, in Vienna, experts from the IAEA and Iran met again to try working out a structured approach to answering the IAEA's questions. A joint statement described the talks as "very productive." Getting answers to the PMD questions will be important for achieving successful negotiations at a higher level.

Another matter that is likely to come up in a negotiated agreement is the need for enhanced safeguards on the surviving elements of Iran's enrichment program. These would go beyond the Additional Protocol to its Comprehensive Safeguards Agreement with the IAEA. Iran adhered to the Additional Protocol between 2004 and 2006, allowing inspections of suspect nuclear sites. Enhanced safeguards would allow more frequent inspections, remote camera monitoring, and more extensive environmental monitoring, among things to increase transparency.

Enhanced verification is strategic to a Middle East Weapons of Mass Destruction Free Zone, should that ever come about. Despite the vast divide between Israel and its Middle East neighbors, it is time to start building confidence. The meeting in Helsinki sought by Jaakko Laajava, the Finnish Under-Secretary of State, would be a good place to start this difficult task, no matter what the magnitude of the differences. Diplomatic efforts that led to the Nuclear Nonproliferation Treaty (NPT), the Chemical Weapons Convention (CWC), the Biological Weapons Convention (BWC), and the Comprehensive Test Ban Treaty (CTBT) show that progress can be made without first settling larger political conflicts and disputes.



**Hon. Guy B. Roberts**

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*NATO and Preventing the Proliferation of WMDs*

Since the end of the Cold War, NATO has increasingly recognized the grave threat posed by WMD proliferation and the catastrophic potential of such weapons. At the Washington Summit in April of 1999 the Alliance adopted a then new Strategic Concept which declared that "...proliferation... can pose a direct military threat to the Allies' populations, territory, and forces." Further, the Concept committed the Alliance to the fight against WMD proliferation by stating that "The principal non-proliferation goal of the Alliance and its members is to prevent proliferation from occurring or, should it occur, to reverse it through diplomatic means."

The fight against WMD terrorism took on an increased urgency for the Alliance after the terrorist attacks on New York and Washington DC on 11 September 2001. In response, NATO invoked Article 5 of the Washington Treaty – the collective defense clause – where this attack was considered an attack on all members of the Alliance. This event highlighted the need to develop capabilities to stop terrorist attacks, particularly those with a WMD dimension.

Consequently, at the Prague Summit in November 2002, Allies endorsed the implementation of a number of nuclear, biological and chemical (NBC) defense capabilities. These included a deployable NBC analytical laboratory, the creation of a rapidly deployable (less than 48 hours) NBC Joint Assessment Team; establishing a disease surveillance system, develop a NATO biological and chemical defense stockpile; and create a virtual center of excellence for NBC weapons defense. Following this, at the Istanbul Summit in June 2004 Allies adopted a package of anti-terrorist measures including one to detect, protect and defeat the use of chemical, biological, radiological and nuclear (CBRN) weapons.

These Summit initiatives were subsequently reaffirmed in the Comprehensive Political Guidance of 2006, where Allies again expressed their concern that terrorism and the spread of Weapons of Mass Destruction (WMD) are likely to be the principal threats to the Alliance over the next 10-15 years with the most critical threat being a scenario where terrorists armed with WMD attack the population center of one or more Alliance member. Clearly, the Alliance has sought since the Washington Summit to prevent proliferation through an active political agenda of arms control, disarmament and non-proliferation; to developing and harmonizing the defense capabilities mentioned above among others; and, when necessary, employing these capabilities consistent with political decisions in support of the Alliance's non-proliferation objectives.

This paper will briefly discuss some of the key activities and initiatives NATO is engaged in, as outlined already, and is expecting to do in the future in support of the Alliance's non-proliferation goals.

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To provide the policy framework by which NATO will conduct its non-proliferation and CBRN defense activities at the Strasbourg/Kehl Summit in 2009, Heads of State and Government endorsed a key political statement on NATO's anti-WMD policy: The Alliance's Comprehensive Strategic-Level Policy for Preventing the Proliferation of Weapons of Mass Destruction (WMD) and Defending Against Chemical, Biological, Radiological and Nuclear (CBRN) Threats. As set forth in the new policy, the main goal is to secure populations, territory and forces of the Alliance from CBRN and WMD threats and maintain a robust deterrence posture to ensure its members are not coerced at any time by those potentially posing WMD threats. To achieve this goal the policy is broken down into three separate but related categories or pillars of the policy. (1) Prevention the proliferation of WMD, (2) protection against WMD attack or CBRN event and (3) recovery from a WMD attack, should one occur. Additionally, it refers to strategic enablers which will aid NATO to effectively undertake these three pillars of proliferation denial. These include the role of intelligence and information sharing, public diplomacy including, but not limited to, the Alliance's outreach to partners, and international and regional organizations. The Comprehensive Policy is the key document mandating NATO pursue a number of key initiatives in preventing WMD proliferation. While resource constrained, based on the guidance provided in the Comprehensive Policy, NATO has now embarked on a number of initiatives to counter the growing threat of WMD proliferation and terrorism.

#### *NATO initiatives in the matter of countering WMD proliferation and WMD terrorism*

At the Washington Summit the Allies agreed, in recognition of the importance to have a central location to coordinate anti-WMD proliferation activities, to create in May 2000 a Weapons of Mass Destruction (WMD) Non-Proliferation Centre. The Centre's main purposes are to seek ways to strengthen dialogue and common understanding among member countries on issues related to the threat of weapons of mass destruction; to strengthen consultations on non-proliferation, arms control and disarmament issues; to assess risks; and to support defense efforts that serve to improve the Alliance's preparedness to respond to the risks of WMD and their means of delivery. Furthermore, a wide-ranging set of seminars and workshops organized by the WMD Non-Proliferation Centre provide an opportunity for experts from the Alliance, partners and other international organizations to review ongoing work and address current issues.

For example, on 23 and 24 March 2010 NATO held a Chemical, Biological, Radiological, and Nuclear (CBRN) Defense Workshop and Exhibition at NATO Headquarters with the stated purpose of sharing knowledge and skills in preventing, protecting and recovering from the use of Weapons of Mass Destruction (WMD). This workshop and exhibition on anti-proliferation technologies was one of NATO's largest partner events with over 220 participants from more than 45 countries, and four international organizations: the European Union, the European Defense Agency, the World Health Organization and the Organization for the Prohibition of Chemical Weapons. Subsequently, NATO has held similar such workshops over the last several years.

With regard to NATO capabilities in meeting this challenge, in 2003 NATO created the Multinational CBRN Defense Battalion (now called the Joint Combined CBRN Task

Force) and Joint Assessment Team, which since 2007 are part of the Combined Joint CBRN Defense Task Force. The Task Force is a component of the quick reaction NATO Response Force (NRF). These high readiness forces serve to protect against, and respond to, any incidents involving CBRN materials, and significantly adds to the specialized capabilities that the Alliance has to offer Allies and partners. It also has been deployed to and is available to support high visibility events following requests from nations such as during 2004 Olympic and Paralympic Games in Athens and NATO's Istanbul and Riga Summits.

NATO is also finalizing a near real time Deployment Health Surveillance System (DHSC) – code named ASTER – which will be, when fully operational, centrally located and hosted by Germany. The DHSC, now a branch of the Center of Excellence for Military Medicine, will enhance protection of NATO's deployed forces against the threats of both infectious diseases and biological warfare attacks. It will enhance Alliance efforts to prevent and respond to any outbreaks of disease, whether naturally or deliberately caused, and novel biological warfare agents. This capability has been operationally tested and will be deployed to add a further element of monitoring, reach back, and recovery in the event of a biological attack on NATO's forces. The idea of the system is to rapidly collect, identify, analyze and disseminate information related to any biological outbreak, with the goal of responding rapidly to prevent and contain the spread of disease, thus limiting the initial loss of personnel and resources. It will also accelerate diagnoses of outbreaks of disease in order to develop vaccines and other methods to contain and limit the consequences of a disease outbreak to operational readiness.

To develop these initiatives, NATO has also created a number of "Centers of Excellence (COEs) and training centers for Partnership for Peace nations the concept of which was reaffirmed at the Strasbourg/Kehl Summit in 2009. Overall responsibility for COE coordination and employment within NATO lies with Allied Command Transformation, a NATO military organization designed to help implement the transformation of military forces to meet emerging threats and challenges to Alliance security. A "COE" is a nationally or multi-nationally sponsored entity, which offers recognized expertise and experience to the benefit of the NATO Alliance, especially in support of transformation. These include the Defense Against Terrorism (DAT) COE in Turkey and, the Joint CBRN COE in the Czech Republic.

DAT COE in Turkey was established in Ankara on 28 June 2005 and received NATO (NAC) accreditation on the 14th of August 2006. The mission of the DAT COE is to provide subject matter expertise, conduct DAT training and education, assist NATO in concept and doctrine development and to contribute to NATO standardization to improve capabilities and interoperability with regard to stopping terrorist groups. The DAT COE has served as a useful conduit for engaging in an exchange of views with NATO partner countries on all aspects of addressing the terrorist problem including WMD terrorism.

Another key COE is the Joint CBRN Defense Centre of Excellence in Vyskov, the Czech Republic, activated in July 2007. The Centre offers recognized expertise and experience for the Alliance on NBCR technologies and response actions in case of attack with an NBCR weapon, and it also supports NATO's transformation process. It provides opportunities to improve interoperability and capabilities by enhancing multinational

education, training and exercises; assisting in concept, doctrine, procedures and standards development; and testing and validating concepts through experimentation.

As part of the continuing education process of senior diplomatic and political leaders, NATO organizes on an annual basis a “close hold” seminar for NATO ambassadors and the Secretary General to discuss the ramifications of a crisis with a WMD dimension. This seminar has proven extremely useful in understanding what NATO’s capabilities are, what is currently lacking, and the many and varied responses and reactions to such an event if it should occur. Each seminar touches different aspects of WMD proliferation and WMD terrorism threats and NATO mechanisms for dealing with them. Potential topics have included possible terrorists’ acquisition of nuclear material of sufficient quantity to produce a nuclear yield that has been lost or stolen in a non-NATO country, in proximity to NATO deployed forces.

NATO is actively working to improve civil preparedness and consequence-management capabilities in both Allied countries and Partner countries in response to potential attacks on the civilian population using CBRN agents. To combat this threat allies have established an inventory of national civil and military capabilities that could be made available to assist stricken countries, following a CBRN terrorist attack. This inventory is maintained by the Euro-Atlantic Disaster Response Coordination Centre (EADRCC). The EADRCC was originally created in 1998 to coordinate responses to natural and man-made disasters and, since 2001, has been given the additional coordinating role of responding to potential terrorist acts involving CBRN agents. The center has a standing mandate to respond to a national request for assistance in the event of a terrorist attack using such agents. It also organizes major international field exercises to practice responses to simulated disaster situations and consequence management.

In addition, NATO is also conducting a number of related outreach activities with its growing network of partners worldwide. To combat a WMD proliferation and WMD terrorism NATO actively cooperates with its network of partners worldwide. NATO’s partnership network has been an area of great success for the Alliance. Through the Euro-Atlantic Partnership Council (EAPC), the Mediterranean Dialogue (MD), the Istanbul Cooperation Initiative (ICI),\* and with other partners such as Sweden, Australia, New Zealand, Japan, South Korea and Singapore, NATO has deepened cooperation and information sharing on WMD threats and strengthened non-proliferation initiatives, such as the 2003 Proliferation Security Initiative (PSI), an initiative where like-minded states share intelligence and information on proliferated activities and conduct joint interdiction operations.

Another critical platform for exchanging views and information, sponsored by NATO, is the annual NATO Conference on WMD Arms Control, Disarmament, and Non-Proliferation, held under the auspices of the Senior Politico-Military Group on Proliferation. For example, more than 50 countries participated in the 2017 event, which took place in a NATO partner country – Finland – for the first time in May 2017. These

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\* The EAPC includes the 28 NATO countries plus 22 partner countries. Mediterranean Dialogue countries include Egypt, Israel, Mauritania, Morocco, Tunisia, Jordan and Algeria. Istanbul Cooperation Initiative countries include Bahrain, Kuwait, Qatar, and the United Arab Emirates.

conferences consistently attract over 100 participants from over 50 different countries, representing a diverse array of experience and specialized knowledge.

With an increasingly dangerous security environment characterized by the repeated use of chemical weapons in Syria, nuclear and ballistic missile testing by North Korea, and the attempt to restrict Iran's nuclear weapons program through the Joint Plan of Action, these conferences have proved to be an important forum for detailed and open debate among leaders and senior experts on how to jointly address related issues of proliferation. Delegates have the opportunity to listen to and discuss presentations covering an array of topics including non-proliferation regimes, proliferation threats and challenges, NATO's contributions to arms control, disarmament, and non-proliferation, and WMD Terrorism issues.

NATO has also developed a WMD Maritime Interdiction Operations course that takes place on an annual basis at the NATO Maritime Interdiction Operations Centre in Souda Bay, Greece. The aim of the course is to provide students information on the political, legal, operational and tactical dimensions of WMD Maritime Interdiction Operations. The course is open to NATO and partner nations and will include both theoretical and practical issues as well as demonstrations on the latest technologies and techniques and tactics for interdicting suspect cargo. Eventually it is anticipated the course could be open to PSI partners as well. Since NATO is not officially a member of PSI or other non-proliferation initiatives it has been limited in its ability to actively participate in these initiatives even though all its member nation are either in or fully endorse such initiatives. Consequently, NATO supports or complements such initiatives as PSI and the Global Initiative to Combat Nuclear Terrorism (GICNT) by making available training and educational programs and support for exercises.

Likewise, the Alliance also emphasizes the importance of the implementation of and compliance with the legal and normative basis for preventing the proliferation of WMD. These include, but are not limited to, the Nuclear Non-Proliferation Treaty (NPT), the Chemical Weapons Convention (CWC), and the Biological and Toxin Weapons Convention (BWC), as well as relevant United Nations Security Council Resolutions such as UNSCR 1540 which, passed in 2004, legally requires nations to implement laws and enforcement mechanisms to prevent their territories to be used as a safe haven for terrorist and proliferation activities.

### *Concluding Thoughts*

As this brief overview demonstrates and explains, NATO has since the end of the Cold War built a number of robust capabilities to protect, prevent and recover from WMD proliferation and potential attacks. Its Comprehensive Policy is a political mandate to do more but, despite efforts to raise the profile of the Alliance in this area and to develop more initiatives, the Alliance remains hamstrung with unfunded initiatives and scarce resources. Nevertheless, we will continue to encourage Allies and our partners and others to fully implement and comply with non-proliferation legal norms, support global international non-proliferation initiatives such as PSI and GICNT, reach out to other international partners and organizations, and continue to develop the necessary capabilities to impede and stop the trafficking of WMD and related materials.

More clearly needs to be done. In recognition of that fact but given the “zero real growth environment” we currently must live in, the Alliance could, for example, create a non-proliferation trust fund where like-minded Allies could contribute to support the goals of UNSCR 1540, PSI and other non-proliferation activities. Some projects that could be funded by a trust fund include the creation of a regional non-proliferation operations fusion center and the deployment of mobile training teams for UNSCR 1540 compliance assistance.

As a multifaceted threat, we have recognized that WMD proliferation and terrorism cannot be addressed by NATO alone. The Alliance has acknowledged this aspect and is working to counter it by reaching out to its partners, both governmental and non-governmental around the globe. By working with different actors, both nations and organizations alike, NATO is more than willing to join with nations, international and regional international organizations, non-governmental organizations and private industry to partner with and help build a network of networks that will eventually create an impenetrable web of proliferation denial for those who would seek and use weapons of mass destruction.



# Academic Centers

## Inter-University Center for Terrorism Studies (IUCTS)

Established in 1994, the activities of IUCTS are guided by an International Research Council that offers recommendations for study on different aspects of terrorism, both conventional and unconventional. IUCTS is cooperating academically with universities and think tanks in over 40 countries, as well as with governmental, intergovernmental, and nongovernmental bodies.

## International Center for Terrorism Studies (ICTS)

Established in 1998 by the Potomac Institute for Policy Studies, in Arlington, VA, ICTS administers IUCTS activities and sponsors an internship program in terrorism studies.

## Inter-University Center for Legal Studies (IUCLS)

Established in 1999 and located at the International Law Institute in Washington, D.C., IUCLS conducts seminars and research on legal aspects of terrorism and administers training for law students.

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