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Global Proliferation—Dynamics, Acquisition Strategies, and Responses
Volume 1—Overview

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13. ABSTRACT *(Maximum 200 words)*

The proliferation of nuclear, chemical, and biological weapons, as well as missile delivery systems, is increasingly acknowledged to be one of the most important threats to U.S. security and global stability in the emerging post-Cold War world. The sale of advanced conventional weaponry to conflict-prone regions, frequently accompanied by transfers of technology for their manufacture, has also generated concern. Prepared for the Defense Nuclear Agency (DNA), this report:

a. Assesses the current proliferation situation, including incentives and disincentives for acquisition, current outcomes, and future trends.

b. Highlights different weapons acquisition strategies that countries have pursued and continue to pursue.

c. Describes current policies to contain, cap or rollback, or deal with proliferation.

d. Identifies key policy challenges as well as new initiatives to help strengthen U.S. efforts.

e. Identifies areas in which the Department of Defense (DoD) may be able to make significant contributions to U.S. nonproliferation efforts.

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SUMMARY

The proliferation of nuclear, chemical, and biological weapons, as well as missile delivery systems and advanced conventional weaponry, is one of the main post-Cold War threats to U.S. security. Actions are underway to buttress U.S. policies to check, cap or roll back, or respond to proliferation. High level attention also is now being focused on the defense planning implications of proliferation.

The Department of Defense (DoD) can provide significant "value added" contributions to future U.S. nonproliferation efforts. Two sets of potential DoD activities stand out: (1) program support to specific U.S. counterproliferation initiatives; and (2) responsibility for execution of certain broad counterproliferation missions.

Specific DoD Nonproliferation Support

Building on its core competencies, expertise, and established programs or activities, DoD's technical and intelligence programs can support a wide range of current or future nonproliferation policy initiatives. Augmented DoD responsibilities in some of these areas, moreover, would foster more efficient use of available resources and compensate for shrinking Services' capabilities. In thinking about specific DoD activities, both contributions before proliferation occurs and responses to actual proliferation need to be considered.

Areas in which DoD has a role in carrying out initiatives to check, cap, or rollback proliferation include:

- RDT&E of treaty verification technologies;
- Application of proliferation-related databases to implementation of export controls;
- Accelerated RDT&E of nonproliferation technologies;
- Implementation of security assurances and provision of protective assistance;
- More extensive use of military-to-military contacts to influence countries' proliferation incentives;
- Increased sharing of proliferation intelligence; and
- Contingency planning for active measures to block proliferation.

Possible DoD roles in responding to proliferation include:

- Updating of region-specific intelligence and threat assessments;
- Increased analytic support on regional proliferation developments;
- Preparation for emergency responses to proliferation crises;
- Planning for a broad range of nuclear options and potential deployments;
- Continued RDT&E on enhanced defenses and protective measures;
- Contingency planning for deterrence and preemption against hostile new proliferators; and
- Coordination of technology sharing for reduced proliferation risk.

Organization of the Report

This report comprises six separable volumes (with appendices). Volume One, the Overview, provides a summary of the report. Prepared as stand-alone documents, each subsequent volume addresses a particular counterproliferation area: nuclear, chemical, and biological weapons, missiles, and conventional weapons, respectively. The discussion in each of these volumes provides a detailed analysis of the proliferation situation, the weapons acquisition process, U.S. counterproliferation efforts, and some possible roles for DoD. Supporting information and supplementary materials are included as appendices to each volume. The appendices also provide information on the U.S. government policy process and key organizational participants in that process.

PREFACE

This report was prepared for the Defense Nuclear Agency (DNA) under contract number DNA 001-93-C-0083 under the auspices of the Center for Verification Research, and supervised by Ms. Cathie Montie. The Principal Investigator for this effort was Dr. Lewis A. Dunn.

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Science Applications International Corporation has produced a number of related studies and analytical reports that provided a foundation for this effort. This report evolved from earlier editions that examined possible roles for the Defense Nuclear Agency in a proliferating world. The effort was expanded to cover Department of Defense roles and was published in a coordination draft form in April, 1993. This effort has attempted to incorporate policies derived from the current administration as extracted from the public record. The information cut off date is 1 september, 1993.

CONVERSION TABLE

Conversion factors for U.S. Customary to metric (SI) units of measurement.

MULTIPLY ----------► BY ----------► TO GET TO GET ◄---------- BY ◄---------- DIVIDE		
angstrom	1.000 000 X E -10	meters (m)
atmosphere (normal)	1.013 25 X E +2	kilo pascal (kPa)
bar	1.000 000 X E +2	kilo pascal (kPa)
barn	1.000 000 X E -28	meter^2 (m^2)
British thermal unit (thermochemical)	1.054 350 X E +3	joule (J)
calorie (thermochemical)	4.184 000	joule (J)
cal (thermochemical/cm^2)	4.184 000 X E -2	mega joule/m^2 (MJ/m^2)
curie	3.700 000 X E +1	*giga becquerel (GBq)
degree (angle)	1.745 329 X E -2	radian (rad)
degree Fahrenheit	t_k = (t°f + 459.67)/1.8	degree kelvin (K)
electron volt	1.602 19 X E -19	joule (J)
erg	1.000 000 X E -7	joule (J)
erg/second	1.000 000 X E -7	watt (W)
foot	3.048 000 X E -1	meter (m)
foot-pound-force	1.355 818	joule (J)
gallon (U.S. liquid)	3.785 412 X E -3	meter^3 (m^3)
inch	2.540 000 X E -2	meter (m)
jerk	1.000 000 X E +9	joule (J)
joule/kilogram (J/kg) radiation dose absorbed	1.000 000	Gray (Gy)
kilotons	4.183	terajoules
kip (1000 lbf)	4.448 222 X E +3	newton (N)
kip/inch^2 (ksi)	6.894 757 X E +3	kilo pascal (kPa)
ktap	1.000 000 X E +2	newton-second/m^3 (N-s/m^3)
micron	1.000 000 X E -6	meter (m)
mil	2.540 000 X E -5	meter (m)
mile (international)	1.609 344 X E +3	meter (m)
ounce	2.834 952 X E -2	kilogram (kg)
pound-force (lbs avoirdupois)	4.448 222	newton (N)
pound-force inch	1.129 848 X E -1	newton-meter (N · m)
pound-force/inch	1.751 268 X E +2	newton/meter (N/m)
pound-force/foot^2	4.788 026 X E -2	kilo pascal (kPa)
pound-force/inch^2 (psi)	6.894 757	kilo pascal (kPa)
pound-mass (lbm avoirdupois)	4.535 924 X E -1	kilogram (kg)
pound-mass-foot^2 (moment of inertia)	4.214 011 X E -2	kilogram-meter^2 (kg · m^2)
pound-mass/foot^3	1.601 846 X E +1	kilogram/meter^3 (kg/m^3)
rad (radiation dose absorbed)	1.000 000 X E -2	**Gray (Gy)
roentgen	2.579 760 X E -4	coulomb/kilogram (C/kg)
shake	1.000 000 X E -8	second (s)
slug	1.459 390 X E +1	kilogram (kg)
torr (mm Hg, 0° C)	1.333 22 X E -1	kilo pascal (kPa)

*The becquerel (Bq) is the SI unit of radioactivity; 1 Bq = 1 event/s.
**The Gray (GY) is the SI unit of absorbed radiation.

TABLE OF CONTENTS

TABLES

SECTION 1

OVERVIEW

1.1 SCOPE.

The proliferation of nuclear, chemical, and biological weapons, as well as missile delivery systems, is increasingly acknowledged to be one of the most important threats to U.S. security and global stability in the emerging post-Cold War world. The sale of advanced conventional weaponry to conflict-prone regions, frequently accompanied by transfers of technology for their manufacture, has also generated concern. Prepared for the Defense Nuclear Agency (DNA), this report:

- Assesses the current proliferation situation, including incentives and disincentives for acquisition, current outcomes, and future trends;
- Highlights different weapons acquisition strategies that countries have pursued and continue to pursue;
- Describes current policies to contain, cap or rollback, or deal with proliferation;
- Identifies key policy challenges as well as new initiatives to help strengthen U.S. efforts; and
- Identifies areas in which the Department of Defense (DoD) may be able to make significant contributions to U.S. nonproliferation efforts.

1.2 THE PROLIFERATION SITUATION.

A global process of advanced weapons proliferation, as summarized by Figure 1-1 on the following page, is underway. Its scope varies, however, depending on the particular type of proliferation and on the specific region. Open deployment of ballistic missiles, for example, already characterizes most third world regions as well as the new nations of the former Soviet Union. Unacknowledged but probable or suspected chemical weapons (CW) capabilities also are fairly widespread. Fewer countries have reached or crossed the nuclear threshold; but in key regions countries are trying to join the ranks of the first five nuclear-weapons states. Advanced conventional weaponry, typified by first line aircraft and main battle tanks, is increasingly part of the most volatile regional balances.

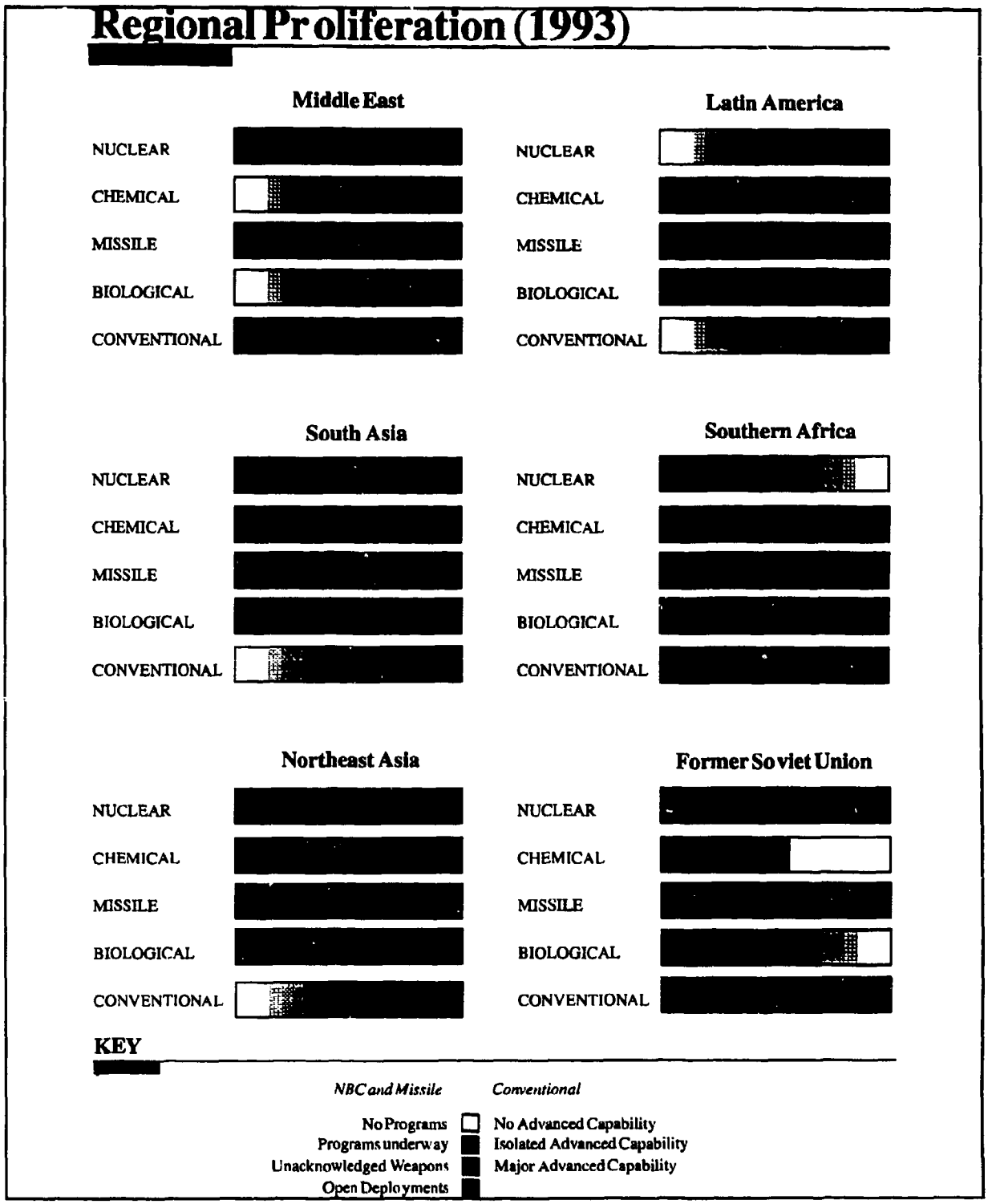

Figure 1-1. A snapshot of regional proliferation for 1993.

1.2.1 Incentives and Disincentives.

Many common incentives and disincentives, as summarized by Table 1-1, one the following page, influence countries' calculations about whether or not to seek NBC weapons, missiles, or advanced conventional weaponry. Military security concerns frequently are a major driver; but pursuit of regional political dominance, domestic considerations, and the forceful personality of key scientists is sometimes critical, too. Fear of hostile reaction by neighbors and outsiders, relative technological weakness, and in some instances, economic costs can be influential disincentives.

Norms against proliferation vary greatly, being strongest against acquisition of nuclear weapons and weakest in the area of conventional weaponry. Successful efforts to strengthen those norms or buttress controls in one proliferation area, moreover, can paradoxically lead countries to redirect their efforts to other areas, e.g., from nuclear to chemical, or chemical to biological weapons.

1.2.2 Proliferation Outcomes.

Today's more specific proliferation outcomes -- defined in terms of broad categories of activity -- also range widely. As summarized by Table 1-2, proliferation extends from many countries' possession of a latent if crude BW capability to several countries' possession of a nuclear-weapons capability. Equally striking, virtually all countries have refused to acknowledge their pursuit or acquisition of nuclear, chemical, and biological weapons capabilities. Of special importance, nuclear proliferation rollback -- the voluntary and credible decision to step back from pursuit of a nuclear option -- has been proven possible, belying the view that once a country sets out to acquire NBC weaponry or missiles, there is no turning back.

1.2.3 Trends and Prospects.

Continuing pursuit of NBC weapons, missiles, and advanced conventional weaponry by third world countries must be assumed. New countries of concern, including some unexpected ones, are all but certain to emerge. Breakout also is conceivable in some regions, whether, for instance, open nuclear deployments and arms racing in South Asia or a refusal by Ukraine, Kazakhstan, or Belarus to honor their commitment to eliminate former Soviet nuclear weapons now on their territories. Conversely, additional instances of proliferation rollback may also occur.

A variety of proliferation-related critical events or surprises are likely to exert an important impact on future trends and prospects across the diverse dimensions of proliferation. Impact of breakup of the former Soviet Union on the availability of advanced weaponry, the success or failure of the Middle East peace process, the outcome of the 1995 Nuclear Non-Proliferation Treaty (NPT) Extension Conference, the United Nations' Security Council's readiness to

Table 1-1. Proliferation incentives and disincentives.

			NUCLEAR	CHEMICAL	BIOLOGICAL	MISSILE	CONVENTIONAL
INCENTIVES	MILITARY	Deterrence of Nuclear Threat	✔	✓	✔	✓	✓
		Deterrence of Conventional Threat	✔	✔	✓	✔	✔
		Deterrence of Chem/Bio Threat	✓	✔	✔	✓	✓
		Warfighting	✔	✔	✓	✔	✔
		Weapon of Last Resort	✔	✓	✔	✓	✓
		Establish Independent Security Posture	✔	✓	✓	✔	✔
	POLITICAL	Improve International Status	✔	✔	✓	✔	✔
		Domestic Prestige	✔	✔	✓	✔	✔
		Regional Influence/Dominance	✔	✔	✔	✔	✔
		Bargaining Lever	✔	✔	✓	✔	✔
		Terrorism	✓	✔	✔	✓	✓
	ECONOMIC	Reduce Conventional Force Spending	✔	✓	✓	✓	N/A
		Acquire Technology	✓	✓	✓	✔	✔
		Expand Production Base	✓	✓	✓	✔	✔
		Sales	✓	✓	✓	✔	✔
DISINCENTIVES	MILITARY	Fear of Provoking Nuclear Attack	✔	✔	✔	✓	✓
		Fear of Disrupting Relations with Allies	✔	✔	✔	✔	✓
		Conventional Force Degradation	✔	✔	✔	✓	N/A
		Risk of Arms Race/Conflict Escalation	✔	✔	✔	✔	✔
	POLITICAL	Damage to International Standing	✔	✔	✔	✓	✓
		Popular Nonproliferation Sentiment	✔	✓	✔	✓	✓
		Decrease Regional Stability	✔	✔	✔	✔	✔
	ECONOMIC	Cost of Weapons/Delivery Systems	✔	✓	✔	✔	✔
		Impediment to Foreign Aid and Investment	✔	✔	✔	✔	✔
		Diversion of Resources from Conventional	✓	✔	✓	✔	N/A
		Other Opportunity Costs	✓	✓	✓	✔	✔
		Lack of Resources/Materials	✔	✓	✓	✔	✔
	CONSTRAINTS	Sanctions	✔	✔	✔	✔	✓
		Safeguards/Inspections	✔	✔	✓	✓	✓
		Export Controls	✔	✓	✓	✔	✔
		International Non-Proliferation Norms	✔	✔	✔	✔	✓

Key:

✓ WEAK

✔ MODERATE

✔ STRONG

Table 1-2. Proliferation outcomes.

NUCLEAR	BIOLOGICAL
Unacknowledged nuclear weapons states	Latent weapons programs
Aspiring proliferators	Offensive RDT&E programs
Potential inheritors	Biological weapons capabilities and/or stockpiles
Nuclear rollback cases	Fully fielded capability
CHEMICAL	
Declared chemical weapons states	
Demonstrated chemical weapons states	
Suspected chemical weapons capabilities	
Suspected chemical weapons development	
MISSILES	**CONVENTIONAL**
Crude regional capability	Across-the-board capabilities
Modernizing capability	Limited advanced capabilities
Longer-range extra-regional capability	Self-sufficient production capability
Intercontinental capability	

enforce close monitoring of Iraq's nuclear, biological, chemical, and missile activities, and the consequences of leadership succession in China are but a few of the most important uncertainties.

Further strengthening of arms control institutions and norms is another important trend, typified by recent tightening of the Missile Technology Control Regime (MTCR), conclusion of a Chemical Weapons Convention (CWC), and the hoped-for full entry into force of the Treaty of Tlatelolco creating a nuclear weapons free zone in Latin America. More broadly, far-reaching agreements by Moscow and Washington to roll back their Cold War nuclear postures and infrastructures already are changing the global security context.

Of modern weaponry, only nuclear weapons have incontestably not been used since 1945. Proliferation could shatter this record of nuclear non-use. Nuclear weapons could well be used in a regional conflict between traditional rivals -- by accident, miscalculation, or intention. Future conflicts may also witness further use of chemical weapons (especially given the erosion of the 1925 Geneva Protocol ban), additional use of missiles for terror attacks on cities, and possibly even threats to use biological weapons. U.S. forward-deployed forces and bases may be targets.

1.3 THE WEAPONS ACQUISITION PROCESS.

The concepts underlying production of a basic, entry-level nuclear, chemical, or biological weapons capability are well-understood. Unlike the situation before August 6, 1945, for example, all countries today know the most important technical fact about nuclear weapons: they work. Similarly, Iraq's use of chemical weapons in the Iran-Iraq war served as a reminder that such weapons are not beyond the technical grasp of many developing countries.

In varying degrees across the dimensions of proliferation, however, more practical obstacles may still slow countries' pursuit of advanced weaponry. Engineering, organizational, and manufacturing difficulties are perhaps most at work in the nuclear field. A crude BW capability is within many countries' reach, but more sophisticated, militarily-usable options -- with less perishable agents, more sophisticated delivery means, and protection at home -- are likely to be more difficult to obtain. Acquisition of a significant CW capability, with advanced agents and protective gear, also may prove beyond the reach of some aspiring proliferators. Despite the broad diffusion of conventional military technology, the most sophisticated systems still cannot be produced by developing countries. Most of them remain largely dependent on purchases, not indigenous production, of advanced conventional weaponry.

1.3.1 Acquisition Strategies.

A diverse set of acquisition strategies, as set out by Table 1-3 on the next page, have been and can be pursued by countries of proliferation concern to acquire a basic nuclear, chemical, biological, or missile capability. No single preferred path exists. Rather, individual countries are likely to pursue a mix of approaches, frequently blending together indigenous efforts, purchases (overt and illicit) from abroad, cooperation with other proliferation problem countries, and outright theft of key components, technology, or materials.

The relative importance of different acquisition strategies varies. Purchase continues to dominate, for example, the proliferation of advanced conventional weapons, though indigenous production capabilities are expanding. Dedicated production, drawing on the purchase or theft of components, has been the main recent route to acquisition of nuclear weapons by third world countries. This is also so with regard to chemical weapons, though diversion from civilian industry may take on greater importance under a CWC. Incremental advances building on an initial CW capability, either diverting resources from civilian activities or on a dedicated basis, provide a proven approach to obtain a crude BW capability.

1.3.2 Advanced Proliferation Capabilities.

Across proliferation, acquisition of more advanced capabilities should be distinguished from possession of a basic, entry-level capability. Thresholds and plateaus also exist. "Higher-

tech" capabilities, for example, include: design and development of staged thermonuclear weapons; the fielding of a survivable, stable second-strike nuclear force; production of

Table 1-3. Proliferation pathways.

NUCLEAR	BIOLOGICAL
• Use dedicated facilities • Diversion of civilian materials or facilities • Direct Purchase • Illegal acquisition of weapons or materials • Inherit production capabilities or weapons	• Super high technology • Low technology • "Add-on and creep out" route • Genetic engineering: a non-route for third world states
CHEMICAL	
• Covert production facility • Overt production facility • Conversion of existing civilian operations • Diversion of civilian materials	
MISSILES	CONVENTIONAL
• Direct purchase • Technology transfer • Clandestine production networks • Modifications • Cooperative ventures	• Direct purchase • Licensing or co-production • Spread of technology knowledge • Diffusion of specific technologies

readily storable microencapsulated BW agents; a CW warfighting capability, with modern nerve agents, advanced means of delivery, sophisticated doctrine, and protective measures; more reliable, longer-range ballistic missiles; and the most advanced conventional weapon capabilities and technologies as well as the target acquisition, organizational, and related capabilities needed for their successful use. Additional examples of this basic distinction between a basic, entry-level capability and an advanced proliferation capability are summarized in Table I-4, on the following page.

1.3.3 Impact of Soviet Breakup.

The breakup of the Soviet Union threatens to have major consequences for proliferation acquisition strategies. Of particular importance, the lack of effective export controls throughout the former Soviet Union could make it considerably easier for countries to

Table 1-4. Proliferation capabilities.

NUCLEAR		BIOLOGICAL	
Basic	**Advanced**	**Basic**	**Advanced**
• Fission • Low Numbers • Aircraft • Questionable safety, security, and survivability • No explicit doctrine	• Boosted or thermo-nuclear warheads • Growing numbers • Missile delivery • Safe, secure, survivable • Explicit doctrine	• Common agents • Low controllability • Small production capability • No stockpiles	• Tailored, predictable, controllable • Large production capability • Stockpiled munitions • Missiles; wide-area capability • Extensive self-protection

CHEMICAL	
Basic	**Advanced**
• World War I vintage agents • Ad hoc delivery means • Weak logistics • Little training	• Super-toxics • Large quantities • Tailored munitions • Extensive training & logistics • Protective gear

MISSILES		CONVENTIONAL	
Basic	**Advanced**	**Basic**	**Advanced**
• Short-range • Low numbers • Low accuracy • Single warheads • Slow retargeting	• Counterforce accuracies • Extra-regional to ICBM ranges • Multiple warheads • Penaids and countermeasures	• Pre-1970s technology • Limited-range aircraft • "Dumb" munitions • Standard materials	• 1970s-80s technology • Long-range aircraft/ aerial refueling • Over-the-horizon target acquisition • "Smart" munitions/ PGMs • Composites/low observables

purchase materials, components, or equipment for nuclear weapons programs. Insider diversion and then outsider sale of nuclear weapons materials -- or even one or more nuclear weapons -- cannot be ruled out. Equally important, Soviet breakup could accelerate missile proliferation by creating a new source of technology as well as by leading to the marketing of now-surplus ballistic missiles and space boosters. Former Soviet engineers and scientists provide, as well, a potential source of nuclear, BW, CW, and missile expertise. This could be especially useful for countries seeking to develop more advanced proliferation capabilities, regardless of the specific proliferation area. Further, Russia's near-desperate need for export earnings, combined with the strong decline in domestic military demand, has led it to embark on a "fire sale" of some of its most modern conventional military equipment.

1.3.4 Acquisition Trends and Prospects.

The global diffusion of technology and growing industrialization throughout the developing world will make it steadily less difficult for many countries to acquire a basic CW, BW, missile, or even nuclear-weapons capability. Nonetheless, important technical thresholds will remain, especially impeding less advanced aspiring proliferators. More potential suppliers of the necessary inputs of materials, components, or equipment for programs to acquire NBC weapons or missiles also can be expected to emerge. This is exemplified by North Korea's sales of improved SCUD missiles, India's sales of chemical weapons precursors, and China's sales of small nuclear reactors. A similar process of technology diffusion and industrialization has already led to the emergence of new suppliers of conventional military equipment.

The impact of further efforts to strengthen proliferation-related export controls is likely to vary, depending on the country and on the proliferation area. Toughened controls would at the least buy time before problem countries can successfully cross the thresholds to more advanced nuclear and missile capabilities; at best, such controls could in certain cases block acquisition of basic capabilities for many years. The impact of CW export controls is likely to be comparable. In turn, agreed controls on exports of top-of-the-line military technology and equipment would, in effect, virtually bar access to such items by third world countries. BW export controls may have the least prospect of continuing success, given the ease of diverting dual-use items from legitimate civilian uses to support a BW program.

1.4 U.S. NONPROLIFERATION POLICIES.

Over the past four decades, the United States has gradually put in place a wide mix of policies, as summarized in Table 1-5, on the next page, to check, cap or rollback, or respond to and deal with different aspects of proliferation -- the spread of nuclear, chemical, and biological weapons, missiles, and advanced conventional weaponry. Timely intelligence, supplier cooperation and export controls, diplomatic initiatives, alliances and security guarantees, security assistance, international nonproliferation treaties and agreements, confidence-building measures, inducements and sanctions, active or passive defensive measures, covert action, and military action have in varying degrees all figured as policy tools. With isolated exceptions, the relative balance in past decades has emphasized traditional nonproliferation measures aimed at preventing acquisition of advanced military capabilities. Only recently has greater attention been paid to the possibility of capping or rolling back some proliferation cases, as well as to the necessity of beginning to think through how to respond to proliferation once it has occurred.

Table 1-5. U.S. nonproliferation policy tools.

TOOLS	NUCLEAR	CHEMICAL WEAPONS	BIOLOGICAL WEAPONS	MISSILES	CONVEN-TIONAL
Collection/ Analysis	• Creation of NPC • Limited information sharing	• Creation of NPC • Limited information sharing	• Creation of NPC • Limited information sharing	•Creation of NPC • Limited information sharing	• Monitoring of arms sales • Creation of NPC
Diplomatic Initiatives	• Talks between India & Pakistan • Mid-East Peace Initiative • July 13 Nonproliferation Initiative • N-S Korea mutual nuclear inspections	• Mid-East Peace Initiative • Australia Group • July 13 Nonproliferation Initiative • CD Negotiations on CWC • 1989 Paris Conference on CW	• Mid-East Peace Initiative • Australia Group • July 13 Nonproliferation Initiative • Ad hoc scientific & technical meetings (BWC members)	• Mid-East Peace Initiative • July 13 Nonproliferation Initiative	• Five Power Talks • UN Conventional Arms Registry
Export Controls	• Nuclear Suppliers Group • NPT controls • Dual-use • National controls	• Australia Group • National controls • EPCI	• Australia Group • National Controls • EPCI	• MTCR • National controls	• National controls • Five Power limits
Treaties/ Agreements	• NPT • IAEA • START • Lisbon Protocol • TTBT, LTBT	• 1925 Geneva Protocol • US-Soviet June 1990 Bilateral Accord • 1993 CWC	• 1925 Geneva Protocol • 1972 BWC	• INF Treaty • START	• CFE limits on FSU • CSCE
Sanctions	• National legislation • Iraq, Pakistan limits	• National legislation	• National legislation	• National legislation	• National "no-sell" decisions
Alliances/ Guarantees	• NATO • US - Japan • US - S. Korea	• NATO	• NATO	• NATO • Support for Israel (Gulf War)	• NATO
Assistance to Threatened Friends	• Conventional weaponry	• Protective gear • Art. XI CWC	• Protective gear • Art. VII BWC • Cooperative defensive research	• Patriot to Israel, S. Arabia (Gulf War) • Arrow (w/Israel)	• Use of matching arms sales
Passive and Active Defenses	• Air defenses • ATBM	• Protective measures • Antidote development • Decontamination equipment	• Protective measures • Therapeutic measures • Decon equipment • BDRP	• ATBM • Restructured SDI	• Use of matching arms sales
Covert Action					
Offensive Military Action	• Threat of preventive action • Threat of retaliation	• No CW retaliatory capability • Conventional response • "Flexible response"	• No BW retaliatory capability • Conventional response • "Flexible response"	• Attempted relocatable targeting • Strikes on fixed sites	• Wide-range of military responses

1.5 MEETING NEW PROLIFERATION CHALLENGES: DOD'S POSSIBLE ROLE.

The design and implementation of U.S. nonproliferation policies has always been an incremental process. New initiatives have repeatedly been taken to strengthen overall nonproliferation efforts, frequently reflecting learning from past mistakes, the activities of problem countries, and changing security imperatives. This also is the case today, especially in the wake of the breakup of the former Soviet Union and the discovery of Iraq's across-the-board pursuit of nuclear, chemical, and biological weapons, missile delivery systems, and advanced conventional capabilities.

A major review of U.S. nonproliferation policies is currently taking place. No longer the forgotten part of arms control, nonproliferation has moved toward the center of the U.S. national security agenda. At the same time, throughout the Defense establishment high level attention is now focused on understanding the defense planning implications of proliferation. In large part, this reflects the recognition, articulated by former Secretary of Defense Cheney that in future regional contingencies:

> We must be prepared to face adversaries who are willing to use weapons of mass destruction. . . [and], if the use of mass destruction is threatened we may need to win even more quickly and decisively than in the Gulf War.[1]

1.5.1 Proliferation Challenges, Initiatives, and DoD's Role.

In thinking about DoD's potential support to augmented U.S. nonproliferation efforts, both contributions before proliferation occurs and responses to actual proliferation need to be considered. Each is discussed in turn.

1.5.2 Possible DoD Contributions to U.S. Efforts to Check, Cap, or Rollback Proliferation.

Table 1-6 lists today's main challenges to U.S. efforts to check, cap, or rollback proliferation. These challenges range from gaps in intelligence assessments through lack of universal membership in key nonproliferation treaties (or questions about the compliance of some members) to the continuing impact of regional political and military insecurities that can drive proliferation. Table 1-6 also summarizes nonproliferation policy initiatives that have recently been taken -- and others that are conceivable -- to help deal with these challenges. Possible DoD roles in carrying out these initiatives are also shown. These roles include:

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[1]Report of the Secretary of Defense to the President and the Congress, February, 1992, p.5.

1.5.2.1 Verification Technologies RDT&E. DoD already is a major player in the area of treaty verification technologies RDT&E. Programs are underway, for example, to develop procedures, technologies, and methodologies in the chemical, nuclear, and conventional areas. Enhanced verification technologies will be essential for future formal nonproliferation agreements, like the just-signed Chemical Weapons Convention (CWC). In addition, the availability of a wide variety of proliferation monitoring and verification technology will play a critical part in supporting future regional confidence-building and arms control efforts. Experience in the design and implementation of verification approaches could also be a valuable resource for regional arms control efforts. In some instances, the possibility to direct deployments of U.S. personnel -- perhaps seconded to international monitoring teams -- might also prove essential for the success of an agreement.

1.5.2.2 Export Control Implementation. Experience in design of verification-related databases also could be brought to bear to assist U.S. government-wide efforts to develop databases for export controls tracking and proliferation assessments. In addition, DoD could take the lead in assessment of identification of enhanced sanctions against either countries or companies in violation of internationally-agreed export control standards. In certain areas, DoD expertise could be essential to the design and pursuit of enhanced export controls, e.g., possible restrictions on sales of munitions usable for BW or on transfers of CW protective gear to non-parties to the CWC.

1.5.2.3 Nonproliferation Technologies RDT&E. Across nuclear, chemical, and biological weapons proliferation, DoD also could take on greater responsibility for accelerated technology development to help meet emerging proliferation challenges. Required nonproliferation technologies include, for example, more effective BW/CW protection technologies; enhanced capabilities for NBC search, detection, and evaluation; and the design of advanced non-nuclear or nuclear munitions for successful attacks on hard structures. The availability of such technologies could lessen proliferation incentives and increase proliferation disincentives in certain cases. The likelihood of successful nuclear diversion, resulting in instant proliferation, would be reduced. In several instances, this RDT&E would build on the work of DoD technical agencies on lethality mechanisms for missile defense kill vehicles, on assessment of hard target munitions, and on advanced non-nuclear munitions.

1.5.2.4 Security Assurances and Protective Assistance. By maintaining a forward defense presence, DoD forces provide an important security umbrella to U.S. allies and friends, thereby containing proliferation incentives. The nonproliferation benefits of forward deployments need to be explicitly articulated in the redesign of U.S. forces in the light of post-Cold War demands and budgetary realities. In turn, other ways to demonstrate U.S. concerns for the security of friends and allies confronting neighbors seeking nuclear weapons warrant intensified exploitation, including perhaps more extensive military-to-military contacts, joint military technology development, and intelligence sharing. DoD planners and technology-developers could also play a major role in ensuring an on-hand U.S. capability to provide protective CW and BW assistance to threatened countries.

Table 1-6. Checking, capping or rolling back proliferation programs.

CHALLENGES	INITIATIVES	PROLIFERATION AREAS	POSSIBLE DOD ROLES
• Intelligence and threat assessment	• Increase collection and analysis priority • Expand information sharing	All All	• Allocate assets; establish priorities • Expand training • Support verification RDT&E • Coordinate with allies
• Export control weaknesses	• Enhance export end-use tracking • Develop all-agency database • ID weaponization indicators • Consider limits on defensive & protective equipment • Regulate people-flows • Establish supplier restraints	N, CW, M, BW N, CW, M, BW N, CW, BW CW, BW N, CW, BW All	• Provide policy & technical support • Support database building • Increase role in information sharing • Plan for sanctions and dealing with counter-sanctions
• Increased incentives and disincentives	• Make proliferators pay a price • Reaffirm security guarantees • Provide protective assistance to lessen risks	All All CW, BW, M	• Identify aid and cooperation levers • Maintain forward presence • Provide nuclear umbrella • Provide tailored military assistance • Assist in technologies RDT&E
• Gaps in nonproliferation treaties, agreements, and approaches	• Clarify ambiguities • Close loopholes • Adjust to post-Cold War world • Pursue new limits	M, BW BW C BW, C	• Policy and technical support • Regional security analyses for CINCs
• Treaty verification weaknesses	• Accelerate RDT&E on detection technologies • New transparency and inspection measures • Support institution-building	N, CW, W M, BW CW, N	• Support verif. technology RDT&E • Support verification detection and analytical methodologies • Technical support for inst-bldg. • Assess value and risks of measures
• Increasing membership and compliance with treaties and agreements	• Membership drive • Reward membership and full compliance • Punish nonmembership and noncompliance • Lessen risks of adherence	CW, BW N, CW, BW N, CW, BW CW, BW	• Link military assistance to membership and compliance • Coordinate emerging assistance • Raise membership in military-to-military talks • Expand protection RDT&E • Plan for BW/CW emergency resp.
• FSU internal security, export controls, and weapons dismantlement	• Keep pressure on prompt weapons dismantlement and disposal • Financial aid and technical/legal support for dismantlement and enhanced controls • Use of science centers	N, CW, M All N, CW, BW, M	• Technical & financial support of safe and secure storage, transportation, dismantlement, disposal • Overseas support for NBC emergency responses • Special opns contingency plans
• Regional political-military insecurities and arms racing	• Bilateral/multilateral security assurances • Encourage regional political dialogue, CBMs, and arms control • Active/passive defenses and protective cooperation • Encourage more transparency	All All CW, BW, M CW, BW	• Support for regional stability • Technical and logistical support for CBMs • Monitoring compliance • RDT&E (and acquisition) on protective measures and assistance
• Active measures to interdict, block, prevent proliferation	• Track/assess program vulnerabilities • Plan overt and covert actions • Train for special operations • Support USG coalition-building	N, CW, BW, M N, CW, BW, M N, CW, BW, M N, CW, BW, M	• Target analysis • Special operations capability • Military contingency planning

1.5.2.5 More Extensive Use of Military-to-Military Contacts. Military-to-military contacts, supplemented by routine high-level contacts between defense officials, are an under utilized nonproliferation tool. Led by DoD, a detailed U.S. government assessment is warranted of how to use such contacts to influence thinking among third world militaries about the utility and risks of NBC and missile proliferation, to shape key countries' views on export controls, to pave the way for multilateral nonproliferation actions, and to provide security reassurances.

1.5.2.6 Sharing Proliferation Intelligence. DoD and its technical agencies could take the initiative in proposing new approaches to sharing proliferation intelligence. This might entail use of existing institutions in new ways, e.g., NATO. Or, proliferation intelligence sharing could become an adjunct of established contacts with defense officials of friendly countries. Specific consideration might also be given to possible "technical or technology fixes" that would facilitate such exchanges. More extensive intelligence sharing could open up new insights into emerging proliferation threats.

1.5.2.7 Active Nonproliferation Measures. DoD contingency planning should begin to assess the costs, risks, and feasibility of active measures to block proliferation, in support. for instance, of a United Nations Security Council request for assistance. For assessment purposes, theoretical possibilities to examine range from covert action through special operations to use of conventional military force.

1.5.3 Possible DoD Contributions to U.S. Responses to Proliferation.

If proliferation actually occurs, the contributions of DoD to the U.S. response would be crucial. Table 1-7 on the next page lists possible DoD roles in the event of proliferation and relates those roles to the challenges that the United States could face and the initiatives that might be taken to meet those challenges.

Possible DoD roles include:

1.5.3.1 Intelligence and Threat Assessment. Proliferation, especially nuclear, chemical, biological, or missiles, would require DoD to update intelligence and threat assessment for the affected region, in order to provide needed guidance for CINCs. New intelligence requirements would be generated, and priorities among them would have to be established. Particular attention would need to be paid to the different ways specific countries viewed possible use of NBC weapons or missiles, any unique characteristics of decision-making in those countries, and what their leaders most valued. A major new DoD undertaking would be the development and maintenance of target sets in hostile new NBC powers.

Table 1-7. Responses to proliferation.

CHALLENGES	INITIATIVES	PROLIFERATION AREA	POSSIBLE DOD ROLES
• Intelligence and threat assessment	• Increased priority to proliferator's defense capabilities and force-building options • Assess regional impact of proliferation	All All	• Generate and rank intelligence requirements • Support to CINCs • Evaluate advanced munitions and technologies • Technical collection • New focus for attaches
• Loss of control over nuclear weapons and weapons accidents (in FSU or by new proliferators)	• Exchanges on basic security principles and information • Selected (FSU) transfer of technology for safety/ security/use control	N N	• Assess effort of exchanges on nuclear weapons physical security and use controls • coordinate and support overseas weapons searches • RDT&E on "transferable" security and use control technologies
• Establish credible (extended deterrence posture for US forces, allies, CONUS	• Requirements analysis and defense planning • Identify and articulate declaratory policies • US security assurances to threatened allies • Multilateral security assurances	N, BW, CW N, BW, CW N, BW, CW N	• Identify response options and force packages • Plan and execute nuclear redeployment • Target assessment • Assess implications for force options
• Disarm hostile new proliferators	• Analysis of options, including covert and special operations	N, BW, CW, M	• Contingency planning for operations • Provide intelligence, targeting, and vulnerability analyses • Logistic support • Advanced munitions R&D
• Protection & defenses against threats of use (for US forces, allies, CONUS)	• Planning for detection of overseas clandestine threats • Enhance active and passive defenses and protection capabilities • Emergency response planning for protective/ medical aid	N, BW, CW, M CW, BW, M CW, BW	• Target identification, attack planning, and allied coordination • Emergency response planning, coordination, and support • Special operations and support for overseas nuclear searches • ATBM RDT&E and acquisition • Protective assistance RDT&E and acquisition
• Aid after use or accidental explosion	• Evaluation of requirements • Plan emergency responses	N, BW, CW N, BW, CW	• Stockpile required capabilities • Execute emergency response plans • Coordinate US planning

1.5.3.2 Analytic Support on Proliferation Issues. DoD has long analyzed global developments that could affect U.S. deterrence and warfighting capabilities, operational planning, technology development, and political-military initiatives. Timely analysis of regional proliferation developments, including the diffusion of conventional military technology, and their consequences for U.S. security interests and U.S. response options would be consistent with DOD's increased emphasis on the defense planning implications of all forms of proliferation.

1.5.3.3 NBC Threat Assessments, Technical Effects Modeling, and Vulnerabilities Analysis. DoD should undertake detailed assessments of the threat (including technical weapons effects) to U.S. forces, weapons systems, and overall operational plans of the use of NBC weapons by hostile third world countries. It also could contribute to assessments of the vulnerabilities of potential third world NBC-armed opponents, including target identification, strike planning, and weapons options. Both types of assessments would draw on DoD's established expertise in threat assessment, scenario development, weapons effects and hardening, detecting underground sites, and environmental modeling.

1.5.3.4 Proliferation-Crisis Emergency Responses. NBC proliferation crises and incidents could call for rapid U.S. responses of many kinds. Mobilization and deployment of BW or CW protective assistance, overseas searches for clandestinely deployed nuclear warheads, and provision of medical assistance after BW or nuclear use or after a BW or nuclear weapons accident are but three examples. Establishing a focal point within DoD for coordinating planning and implementation of emergency responses to future NBC proliferation crises would foster more efficient use of available resources and could compensate for further shrinking of the Services' NBC infrastructure. For strictly medical responses, the capabilities of the Armed Forces Radiobiology Research Institute (AFRRI) is an invaluable resource.

1.5.3.5 Nuclear Options and Deployments. Even as Moscow and Washington take steps to reduce greatly the role of nuclear weapons in their military postures, new proliferation-related nuclear threats are emerging. In some instances, those threats could require that the United States retain a credible non-strategic nuclear capability both to reassure threatened countries and to deter threats to U.S. forces. Current steps to phase out U.S. Army nuclear capabilities, to reduce Air Force capabilities, and to reduce and store Naval capabilities, however, could of course significantly complicate that task. Complete withdrawal of all nuclear weapons from Europe could do so as well. Both sets of considerations need to be reflected in future DoD nuclear force planning. Otherwise, in the coming restructuring of U.S. forces, it may be increasingly difficult to retain nuclear expertise that might be needed for future proliferation contingencies. As an alternative to overseas deployments, the costs and benefits might be assessed of developing a rapid nuclear redeployment capability from CONUS.

1.5.3.6 Loss of Control Over Nuclear Weapons. One possible proliferation emergency is the loss of control over one or more nuclear weapons in the former Soviet Union (FSU) or by a new proliferator. The first responsibility of DoD would be to assess the effect of any information or technology that might have been given to the area in question on the security

of nuclear weapons. DoD would also presumably be required to coordinate and support any overseas search for nuclear weapons that might be missing.

1.5.3.7 Defenses and Protective Measures. RDT&E on enhanced ground-based ATBM capabilities, now being undertaken by DoD and its technical agencies, remains essential to help meet the threat posed by theater ballistic missiles armed with NBC warheads. Development and procurement of more sophisticated BW and CW protective measures and detection equipment also can make a major DoD contribution to dealing with this threat to U.S. forces and allies in future third world contingencies.

1.5.3.8 Disarming Hostile New Proliferators. DoD could be required to engage in contingency planning of an operation to disarm a hostile new proliferator in the areas of nuclear, chemical, or biological weapons or missiles. DoD also needs to pursue RDT&E on advanced munitions for this mission as well as assessing the C3 requirements for prompt strikes in the event of warning of imminent NBC use against U.S. forces. This would also involve intelligence, targeting, and vulnerability analyses. DoD would also have a central role in a disarming operation, if it was actually undertaken.

1.5.3.9 Coordination of Technology Sharing for Reduced Proliferation Risk. DoD is actively involved in current U.S. efforts to ensure the safe and secure dismantlement of former Soviet nuclear warheads. These efforts have already resulted in some technology sharing. Other situations possibly warranting sharing of basic security and control know-how and principles, if not also hardware, are all but certain to arise. Should a decision be taken to offer such assistance as a means to reduce proliferation risk, DoD's institutional experience in ensuring effective physical security and control over nuclear weapons would be a source of valuable insights.

SECTION 2

ORGANIZATION OF THE REPORT

In addition to this Overview, the main report comprises five other separable volumes (with appendices). Prepared as stand-alone documents, each volume addresses a particular proliferation area: nuclear, chemical, and biological weapons, missiles, and conventional weapons, respectively. The discussion in each volume provides a detailed analysis of the proliferation situation, the weapons acquisition process, U.S. nonproliferation efforts, and possible roles for DoD. Supporting information and supplementary materials are included as appendices to each volume. The appendices also provide information on the U.S. government policy process and key organizational participants in that process.

The views expressed in this report are those of the authors and not necessarily those of the Defense Nuclear Agency or any of its supporting agencies, or Science Applications International Corporation (SAIC). In accordance with the instructions of the sponsor, this report has been kept unclassified.

APPENDIX

ABBREVIATIONS, ACRONYMS, AND SYMBOLS

A

AA-2D	Designation for Soviet produced air-to-air missile
ABM	Anti-ballistic missile
AC	Hydrogen cyanide (blood agent)
ACDA	Arms Control and Disarmament Agency
ACEP	Advisory Committee on Export Policy
AEC	Atomic Energy Commission
AECA	Arms Export Control Act
AEW	Airborne Electronic Warfare
AFRRI	Armed Forces Radiobiology Research Institute
AG	Australia Group
AGNI	Name of Indian produced medium-range ballistic missile
AIM-9D	Designation for U.S. produced air-to-air missile
ALCM	Air-launched Cruise Missile
ARMSCOR	South Africa's Armaments Corporation
ASW	Anti-Submarine Warfare
ATBM	Anti-tactical ballistic missile
AT&T	American Telephone & Telegraph

B

BDA	Battle Damage Assessment
BDRP	Biological Defense Research Program
BEAR	NATO designation for TU-142 bomber
BTW	Biological and toxin warfare
BW	Biological warfare; biological weapons
BWC	Biological and Toxin Weapons Convention; Biological Weapons Convention

BWS	Biological weapons state
BXA	Bureau of Export Administration [Department of Commerce]
BZ	Quinuclidinyl benzoate (psychochemical or hallucinogen)

C

C3	Command, control, and communications
CANDU	Canadian deuterium-uranium (reactor)
CB	Chemical and Biological
CBM	Confidence-building measure
CBW	Chemical and biological weapons; chemical and biological warfare
CBU	Cluster bomb unit
CCL	Commodity control list
CD	[Geneva] U.N. Conference on Disarmament
CDC	Centers for Disease Control
CDT	Center for Defense Trade (Department of State)
CEP	Circular error probable
CFE	Conventional Forces Europe
CFR	Code of Federal Regulations
CG	Phosgene (choking agent)
CGIAR	Consultative Group on International Agriculture Research [Institutes]
CHEMEX	Chemical Exchange
CIA	Central Intelligence Agency
CINC	Commander in Chief
CINCs	Commanders in Chief
CK	Cyanogen chloride (blood agent)
CL	Chlorine (choking agent)
CN	Chloroacetophenone (tear gas)
COCOM	Coordinating Committee [for Multilateral Export Controls]
CONUS	Continental United States
CRDEC	[U.S. Army] Chemical Research, Development, and Engineering Center

CRS	Congressional Research Service, Library of Congress
CS	Orthochlorobenzylidene malononitrile (a type of tear gas)
CSCE	Conference on Security and Cooperation in Europe
CSS-2	Designation for Chinese designed intermediate-range ballistic missile
CW	Chemical warfare; chemical weapons
CWC	Chemical Weapons Convention
CX	Dichloroformoxime (also phosgene oxime, a skin irritant)

D

D_20	Deuterium oxide [heavy water]
DARPA	Defense Advanced Research Projects Agency
DISAM	Defense Institute of Security Assistance Management
DEC	Digital Equipment Corporation
DM	Adamsite (a type of tear gas)
DMZ	Demilitarized Zone
DNA	Defense Nuclear Agency; Deoxyribonucleic acid (genetic material)
DOC	Department of Commerce
DOD	Department of Defense
DOE	Department of Energy
DOS	Department of State
DP	Diphosgene (choking agent)
DRSA	Defense Relations and Security Assistance Office (Department of State)
DSAA	Defense Security Assistance Agency (DOD)
DTC	Defense Trade Controls Office (Department of State)
DTP	Defense Trade Policy Office (Department of State)
DTSA	Defense Technology Security Administration
DUSD/I&IPD	Deputy Under Secretary of Defense for Industrial and International Programs
DUSD/TSP	Deputy Under Secretary of Defense for Trade Security Policy

E

EAA	Export Administration Act
EAR	Export Administration Regulations
ECI	Export-controlled information
ECWG	Export Control Working Group
EDAC	Economic Defense Advisory Committee
EFA	European Fighter Aircraft
EMIS	Electromagnetic isotope separation
EPCI	Enhanced Proliferation Control Initiative
ERINT	Extended Range Intercept Technology

F

F-117	Designation for U.S. designed and produced stealth aircraft fighter/bomber
FAA	Foreign Assistance Act (1961)
FAO	Food and Agricultural Organization
FLANKER	NATO designation for SU-29 aircraft
FMS	Foreign Military Sales
[illegible]	Designation of Japanese Advanced Fighter Program
[illegible]CRUM	NATO designation for MIG-29 aircraft
FY	Fiscal Year

G

GA	Chemical nerve agent - tabun
GAO	General Accounting Office
GATT	General Agreement on Tariffs and Trade
GB	Chemical nerve agent - sarin
GD	Chemical nerve agent - soman
GDP	Gross Domestic Product
GPALS	Global Protection Against Limited Strikes

GPS	Global positioning system
GRIPEN	Name of Swedish designed and produced aircraft

H

HAFT (I & II)	Name of Pakistani missiles developed from French rockets
HD	2-chloroethyl sulphide (distilled mustard blister agent)
HD	Chemical nerve agent - mustard
HEU	Highly enriched uranium
HFAC	House [of Representatives] Foreign Affairs Committee
HPT-32	Designation for Indian produced high performance training aircraft

I

ICAO	International Civil Aviation Organization
IAEA	International Atomic Energy Agency
ICBM	Intercontinental ballistic missile
ICSU	International Council of Scientific Unions
IEEPA	International Emergency Economic Powers Act (1977)
IGMDP	[India] Integrated Guided Missile Development Program
IIL	International Industrial List [on dual-use items and technology]
IMF	International Monetary Fund
IMU	Inertial Measuring Unit
INR	[Bureau of] Intelligence and Research
INS CHAKRA	Indian Naval ship "Chakra"
IRBM	Intermediate-range ballistic missile
ISA	[Assistant Secretary of Defense for] International Security Affairs
ISRO	Indian Space Research Organization
ITAR	International Traffic in Arms Regulations
ITC	International Trade Commission
IWG	Interagency Working Group

J

JCS	Joint Chiefs of Staff

K

KFP	Korean Fighter Program
KG	Kilogram
KM	Kilometer

L

L	Lewisite (arsenic-based blister agent)
LANCE	Name of U.S. produced short-range ballistic missile
LAVI	Name of Israeli developmental fighter aircraft
LEU	Low enriched uranium
LIC	Low intensity conflict
LIS	Laser isotope separation
LTV	Name of U.S. Defense Contractor (Link Tempco Vaught)

M

M-9	Designation of Chinese ballistic missile
M-11	Designation of Chinese ballistic missile
MCTL	Military Critical Technologies List
MDE	Major defense equipment
MDW	Mass destruction weapons
MIG-27	Designation for Soviet designed combat aircraft
MIRV	Multiple independently-targeted reentry vehicle
MIT	Massachusetts Institute of Technology
ML	Munitions List (Department of State)
MLF	Multilateral Force
MLRS	Multiple launch rocket system(s)
MOX	Mixed oxide

MTAG	Missile Trade Analysis Group
MTCR	Missile Technology Control Regime
MTEC	Missile Technology Export Control

N

NAS	National Academy of Sciences
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NIH	National Institutes of Health
NIKE	Name of U.S. developed surface-to-air missile
NNWS	Non-Nuclear Weapons State(s)
NO-DONG	Designation for North Korean intermediate-range ballistic missile now under development
NPT	Nuclear Non-Proliferation Treaty (Refers to the 1968 Treaty on the Non-Proliferation of Nuclear Weapons
NRC	Non-recurring cost recoupment; Nuclear Regulatory Commission
NSC	National Security Council
NSF	National Science Foundation
NSG	Nuclear Suppliers Group
NSDD	National Security Decision Directive
NTM	National technical means [of reconnaissance]
NWS	Nuclear Weapons State(s)

O

OFAC	Office of Foreign Assets Control (Department of the Treasury)
OPANAL	Organization for the Prohibition of Nuclear Weapons in Latin America
OPEC	Organization of Petroleum Exporting Countries
OSD	Office of the Secretary of Defense
OTA	[U.S. Congress] Office of Technology Assessment
OTRAG	Acronym for German-owned Zaire-based rocket manufacturer

P

PAL	Permissive action link
PCC	Policy Coordinating Committee
PERSHING	Name of U.S. produced ballistic missiles
PIP	Product Improvement Program
PM	[Assistant Secretary of State for] Political Military Affairs
PNE	Peaceful nuclear explosion
PRITHVI	Name of Indian ballistic missile currently under development
Pu	Plutonium
Pu-239	Fissile isotope of plutonium
Pu-240	Non-fissile isotope of plutonium

Q

Q	2-chloroethylthio (blister agent)

R

RCA	Riot control agents (chemical)
R&D	Research and development
RDT&E	Research, Development, Test, and Evaluation
ROK	Republic of Korea (South Korea)
RV	Reentry vehicle

S

SAIC	Science Applications International Corporation
SAM	Surface-to-air missile
SAPRWG	Security Assistance Program Review Working Group
SCUD	NATO nickname for Soviet designed short-range ballistic missile
SDI	Strategic Defense Initiative [U.S.]
SIPRI	Stockholm International Peace Research Institute
SLBM	Submarine-launched ballistic missile

SLV	Space launch vehicle
SNF	Strategic Nuclear Force
SNM	Special nuclear material
SNT	Sensitive nuclear technology
SONDA IV	Name of Brazilian developed ballistic missile
SRBM	Short-range ballistic missile
SRT	Strategic Relocatable Target
SS-21	Designation for Soviet designed short-range tactical ballistic missile
SS-23	Designation for Soviet designed mobile intermediate-range ballistic missile
SSM	Surface-to-surface missile
START	Strategic Arms Reduction Talks [Treaty]

T

T	2-chloroethylthioethyl (blister agent)
TAC	Technical Advisory Committee (Department of Commerce)
TCR	Transaction Control Regulation (Department of the Treasury)
TDG	Thiodiglycol chemical precursor for mustard gas
TEL	Transporter-Erector-Launcher
TGD	Chemical nerve agent - thickened soman
THAAD	Theater High Altitude Air Defense
THOMSON CSF	Name of French defense contractor
TTG	Technical Task Group (Department of State)
TW	Toxin warfare
TWG	Technical Working Group (Department of Defense)

U

U-235	Fissile isotope of uranium
U-238	Non-fissile isotope of uranium
UAV	Unmanned aerial vehicle
UCNI	Unclassified controlled nuclear information
UK	United Kingdom

UN	United Nations
UNEP	United Nations Environmental Program
URENCO	European multinational corporation involved in uranium enrichment
US	United States
USA	United States Army
USAF	United States Air Force
USAMRIID	U.S. Army Medical Research Institute of Infectious Diseases
USD/P	Under Secretary of Defense for Policy
USG	United States Government
USN	United States Navy
USS	United States Ship [Navy]

V

VR-55	Soman-based nerve agent
VX	Category of chemical nerve agent

W

WHO	World Health Organization
WMD	Weapons of mass destruction
WMEAT	World Military Expenditures and Arms Transfers (ACDA)

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DNA-TR-93-129-V1

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TDANP-TRC August 1, 2001

MEMORANDUM TO DEFENSE TECHNICAL INFORMATION CENTER
ATTN: OCQ/MR LARRY DOWNING

SUBJECT: DOCUMENT CHANGES

The Defense Threat Reduction Agency Security Office reviewed the following documents in accordance with the Deputy Secretary of Defense Memorandum entitled, "Department of Defense Initiatives on Persian Gulf War Veterans' Illnesses" dated 22 March 1995, and determined that the documents were unclassified and cleared for public release:

DNA-TR-93-84, AD-B244408, Acoustic Resonance Spectroscopy in CW Verification Tooele Field Trial (August 1992).
DNA-TR-93-129-V1, AD-B192045, Global Proliferation – Dynamics, Acquisition Strategies and Responses, Volume 1 – Overview.
DNA-TR-93-129-V2, AD-B192046, Global Proliferation – Dynamics, Acquisition Strategies and Responses, Volume 2 – Nuclear Proliferation.
DNA-TR-91-216, AD-B163637, Harmonizing the Chemical Weapons Convention with the United States Constitution.
DNA-TR-92-180, AD-B175230, Evaluation of the Concept of a List for the BWC.
DNA-TR-92-61, AD-B167663, Basic State Party Functions and Skills Under CWC.
DNA-TR-92-66, AD-B167357, Domestic Reporting Requirements for Chemical Industry.
DNA-TR-91-213, AD-B163260, Analysis of the Interactions Between Treaties.
DNA-TR-93-70, AD-B177262, Chemical Weapons Convention Inspections of Private Facilities Application of United States Environmental and Safety Laws.
DNA-TR-92-182, AD-B173450, Commercial Products from Demilitarization Operations.
DNA-TR-91-217-V3, AD-B169350, Chemical Weapons Process Parameters, Volume 3 – Users' Guide.
DNA-TR-92-116-SUP, AD-B175292, Technical Ramifications of Inclusion of Toxins in the Chemical Weapons Convention (CWC), Supplement.
DNA-TR-92-128, AD-B175452, Task 1 Report Target Vapor Identification and Database Development.
DNA-TR-92-196, AD-B174940, Task 2 Report Algorithm Development and Performance Analysis.
DNA-TR-93-68, AD-B178109, CW Detection Instrument R&D Design Evaluation.

Enclosed is a copy of the referenced memorandum. If you have any questions, please call me at 703-325-1034.

Ardith Jarrett

ARDITH JARRETT
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