UNIDIR

UNITED NATIONS INSTITUTE FOR DISARMAMENT RESEARCH

COMING TO TERMS WITH SECURITY:

COMING TO TERMS WITH SECURITY:

A Lexicon for Arms Control, Disarmament and Confidence-Building

Steve Tulliu and Thomas Schmalberger

Confidence-Building:
measures that
build trust and
confidence in
regions of tension

Arms Control:
measures that place political or
legal constraints
on the range and/or scope of
military technologies and
capabilities

Disarmament:
measures that seek to reduce
the level of military
capabilities or to ban
altogether certain categories
of weapons

UNITED NATIONS

A LEXICON FOR ARMS CONTROL, DISARMAMENT AND CONFIDENCE-BUILDING

UNIDIR/2003/22

Coming to Terms with Security:

A Lexicon for Arms Control, Disarmament and Confidence-Building

Steve TULLIU
and
Thomas SCHMALBERGER

UNIDIR
United Nations Institute for Disarmament Research
Geneva, Switzerland

NOTE

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

*
* *

The views expressed in this paper are those of the authors and do not necessarily reflect the views of the United Nations Secretariat.

UNIDIR/2003/22

UNITED NATIONS PUBLICATION
Sales No. GV.E/A.03.0.21
ISBN 92-9045-152-1

CONTENTS

PREFACE

At the height of the Cold War, arms control was a bitterly disputed topic, but few questioned its importance. Today more than a decade after the end of the Cold War, arms control remains bitterly disputed, but the disputes have largely vanished from the front page and many question whether it really matters how they are resolved.

The most obvious reason for this change is that few today, East or West, North or South, fear an outbreak of nuclear war or even a catastrophic non-nuclear war like those of the early twentieth century. To a considerable extent this absence of fear is well founded.

The major States of Europe and North America have developed relations, understandings, and institutions that effectively preclude the use of war as an instrument of national policy. Not all problems have been solved, either within or between States, but the danger of large-scale violence has been pushed out to the margins. Moreover, the broad framework of this peace has been underpinned by a network of arms control agreements negotiated during and at the end of the Cold War that assure basic security throughout the region often described as reaching from Vancouver to Vladivostok.

Unfortunately, one cannot make so optimistic an assessment of much of the rest of the world. Developing nations do not today command the kinds of resources available to the former Cold Warriors, so the danger of a world war arising from disputes outside of Europe is vanishingly small. This does not, however, mean that the human suffering now or in the decades to come resulting from quarrels in developing regions is negligible. And, unlike Europe, institutions to deal with inter-State or internal violence remain inadequate, whether at the national, regional, or global level. Meanwhile, those institutions that are beginning to develop lack the arms control underpinnings that the Cold War, for all its evils, effectively bequeathed to Europe.

There remain, moreover, certain dangers in or from the North. The agreements at the end of the Cold War were “arms control,” not

"disarmament." They thus left an enormous nuclear "overhang," especially in the United States and Russia, and these nuclear stockpiles remain dangerous, both to their possessors and to others. Chemical and biological weapons are widely banned but not yet eradicated, and very large conventional military power remains in the hands of a number of countries, especially the United States.

Under these circumstances, disparaging the importance of arms control is worse than regrettable; it is dangerous. Weapons of mass destruction are far from being eliminated; rather they are spreading. And the use or threat of war as an instrument of policy remains a reality in much of the world, the words of the United Nations Charter notwithstanding.

There are two tracks along which policymakers can proceed as they attempt to build global structures that will make people everywhere as secure as most Europeans are today. One is through the resolution of political disputes such as the Middle East problem. This track has primacy, and for good reasons.

But there is a second track, through arms control and—eventually—disarmament agreements, and this track has not been adequately utilized. In the long run, it must be, for political agreements will not be indefinitely stable if the parties remain armed camps. Moreover, in the short run, as the East-West experience of the sixties and seventies demonstrated, arms control negotiation can be a means of building confidence and mutual respect, even while political differences remain acute.

Arms control should not be viewed as something pertinent only to countries of the north, nor should specific agreements among the Great Powers be dismissed presumptively as inapplicable to other parts of the world. Indeed, some of the first confidence-building measures and arms control agreements adopted during the Cold War were pioneered outside Europe, particularly in the Middle East. In this sense arms control is applicable wherever there is military conflict. Even adversarial countries that lack common political, economic, and social interests share, at a minimum, a common need to ensure their security, usually through military preparedness. In such situations, negotiating arms control and confidence-building agreements provides an important opportunity for promoting interaction, perhaps the only opportunity, while at the same time seeking to reduce pressures to acquire more and costly arms.

As with all international agreements, "the devil is in the details" and therefore it is important for practitioners and students of diplomacy alike to master the arcane details associated with arms control. A good agreement can go a long way toward improving relations by providing a pillar of predictability and transparency. A poorly negotiated agreement that provokes recrimination about lack of compliance can quickly turn a confidence-building measure into a confidence-eroding activity.

Arms control has its own unique vocabulary. And its esoteric lexicon is difficult to comprehend without a basic understanding of the historical context in which arms control agreements have been negotiated. Mastering this arcane subject is even more difficult when dealing in several languages. The situation begs for a comprehensive resource to improve understanding of arms control.

The United Nations Institute for Disarmament Research (UNIDIR), with the support of the United States Department of State, seeks to address this need. They have conceived and developed this handbook as a means of facilitating a dialogue on arms control, particularly among the States of the Middle East. The handbook provides clear and precise definitions of arms control terms and places these terms in a historical context. These tools are useful. A common vocabulary and a shared understanding of achievements at the global level and in other regions can only facilitate the exploratory discussions that have been taking place for some time and the official negotiation and agreements that must eventually be realized.

Ambassador Jim Leonard
Retired

ACKNOWLEDGMENTS

Coming to Terms with Security: A Lexicon for Arms Control, Disarmament and Confidence-Building is aimed at informing people on the body of arms control and disarmament terms that has developed over recent decades. There is so much information that exists in the literature that a newcomer to the field can be overwhelmed and not know where to begin. We intend this compilation to be a reference manual for the young and experienced scholar alike.

The lexicon will also be published in different languages—each bound together with the English version—so that the language and culture of arms control and disarmament becomes accessible to a much larger readership.

There have been several people who have contributed to the lexicon. First and foremost, our thanks go to Michael Yaffe of the US State Department who not only helped in the conception of the idea, he also secured funding for the project and then helped shepherd the lexicon through the whole process, in and out of UNIDIR, including giving us inspiration for the title. The generous funding by the Government of the United States of America for the lexicon is most gratefully acknowledged.

Thanks also to Ambassador James Leonard who encouraged us throughout the project development and execution and who wrote the Preface.

Our immense gratitude goes to the authors, Steve Tulliu and Thomas Schmalberger. Thomas, assisted by Natalie Mouyal, began the book, working on its structure and content for several months in 1998. Steve took over in 1999, and assisted by Nina Baier, developed the structure, adding to the numbers of terms, definitions and context over a period of two years. Following that process, Steve also carried out the job of sending out the text for reading by experts and then editing the contents in the light of their comments. Proof-reading was carried out by the excellent proof-reading department here in the Palais des Nations and Anita Blétry undertook the layout, the arduous tasks of checking all the cross references (assisted by Eva Ratihandayani) and carrying the whole product through to completion.

Thanks also go to everyone in UNIDIR who helped on the project especially to Lara Bernini and Kerstin Vignard who originally worked on developing the concept before the research phase. Just about every staff member was involved at some point and in some way. Particular thanks go to Isabelle Roger for her thorough administration of the project and to Jackie Seck for the project management and support.

Grateful thanks go to our official reviewers group, which consisted of Gen. (Ret.) Ahmed Fakhr, Richard Guthrie and Emily Landau. They put in many hours of careful reading and gave us detailed comments and criticisms. Thanks also go to a host of unofficial readers, many of whom choose to remain unamed but I must include Trevor Findlay, Milton Leitonberg, Jim Leonard, Julian Perry Robinson and Jean-Pascal Zanders for their expert eyes that were carefully cast over some of the chapters. Their comments helped enormously. However, none of our readers are responsible for the final product. Any errors belong to UNIDIR and UNIDIR alone.

Naturally, we have had to make difficult editorial decisions. Terms have been excluded and included and definitions and placing are not always orthodox. Some may disagree with our definitions and some may feel that we have left a key term out or put it in the wrong place. We encourage correspondence from the lexicon's users so that we can take comments into account for future editions.

We hope that this lexicon can become a useful companion to researchers and practitioners and if, through them, it can contribute in anyway to the cause of security and disarmament, our wishes will be fulfilled.

Patricia Lewis
Director

Christophe Carle
Deputy Director

UNIDIR
Geneva 2001

PART I

Introduction

CHAPTER 1

OVERVIEW

This lexicon is intended as a handbook for officials involved in arms control and disarmament activities as well as students, scholars, and journalists who are concerned with such matters. Its aim is to introduce the reader to the major themes and concepts in the field. Emphasis is placed on presenting specific arms control and disarmament instruments and on explaining relevant terminology. An effort is made—within the confines of the scope of the book and of available space—to situate these into appropriate context so that the reader may gain a better understanding of the issues involved. Envisaged as a handbook, the lexicon seeks as much as possible to steer clear of the political controversies which inevitably surround many of the topics discussed and to address these from a factual point of view.

The lexicon is divided into five parts comprising ten chapters. The first part introduces the reader to the concepts of arms control and disarmament and the main surrounding questions. The second part provides a *tour d'horizon* of the historical and technological background and major arms control and disarmament agreements related to four categories of weapons—conventional, biological, chemical, and nuclear—and their delivery systems. The third part explores the concept and agreements of trust and confidence-building which can play a major role in military relations between States. The fourth part introduces the reader to the basic aspects of arms control and disarmament negotiations as well as to the institutional forums established to support these. Finally the fifth part examines the implementation of arms control and disarmament agreements which increasingly involves mechanisms of verification and compliance.

The lexicon is designed first and foremost with the notion of flexibility of use in mind. As a result, it is organized such that it may be used either as a reference book or as a glossary. As a reference guide, it may be read from

cover to cover, or alternatively, an individual chapter at a time. To the greatest extent possible, the chapters have been written so that the reader may find most of the information on the topic of interest in the corresponding chapter. As a glossary, individual entries discussing relevant terms and agreements may be found within each chapter. For quick reference, the terms and agreements discussed within a chapter appear in bold typeface generally the first time they are mentioned in the text as well as the first time they are mentioned in each of the glossary entries. An index at the end of the book quickly directs the reader to where the entries on all the terms and instruments included are located.

In closing, the reader is cautioned of an obvious yet important point. The material covered in the book is by no means exhaustive. As such, the lexicon neither addresses every aspect of arms control and disarmament, nor treats exhaustively those aspects which it does address. For that a lot more than what can be offered in any one book would be required.

CHAPTER 2

THE BIG PICTURE ON "SECURITY BY OTHER MEANS"

Traditionally States have entrusted their security to national military means. These provide States with the tools with which to resist attack and even discourage it by lowering the benefits expected to accrue from aggression. However, they also can give rise to dangerous **arms races** that have the potential to lead to war, and make war more destructive should it occur.

The unrestricted deployment of national military means can trigger destabilizing arms races which in turn can be a major cause of war. *Arms races are action-reaction phenomena whereby countries locked in political conflict steadily augment their military capabilities in response to a perceived growth in each other's military preparations*. They exacerbate tensions among States and can contribute to the outbreak of armed conflict by heightening pressures for pre-emptive attack, and by raising the danger of accidental war. Because identical military capabilities can be used for defensive or offensive purposes alike, growing national armaments as characteristic of arms races, are generally taken as evidence of aggressive intent. As tensions mount and the perceived likelihood of war increases, States are more likely to decide in favour of pre-emptive attack, especially if prevailing circumstances such as existing military technologies or a temporary position of superiority are thought to reward offensive action. Such pressures are particular manifest in times of crisis when decisions about military action are aggravated by great uncertainty and severe time constraints. Likewise heightened tensions and the anticipation of war can increase the potential for misperception and hence for accidental war due to political or military miscalculation, or technical accident.

In addition to contributing to armed conflict, arms races can create conditions which threaten to raise drastically the scale of violence associated with war. As adversaries race one another to deploy ever more

potent military means, the potential destructiveness of war increases commensurately. When the military instruments deployed include weapons capable of mass destruction, the potential destructiveness in the event of war becomes tremendous.

To alleviate the problems associated with the uncontrolled deployment of national military means, States have evolved measures that restrict the unilateral accumulation of arms and limit the scope of their use. These measures, which share the same objectives as the deployment of national military means, can rightly be construed as the pursuit of national security by other means.

2.1 History and Principles of Attempts to Regulate the Accumulation and Use of Military Force

The history of modern efforts to regulate the deployment and use of military arms is characterized by a steady growth in the range and scope of arms regulation instruments over time. Since the First World War arms regulation measures have assumed a growing number of forms, applied to a growing number of areas, and become increasingly elaborate and stringent.

Contemporary efforts to restrict armaments began at the turn of the 20th century with attempts to establish international norms for the conduct of States. The Hague Conferences of 1899 and 1907 sought to constrain national military expenditure and to regulate the conduct of war by delineating the rights and obligations of belligerents and non-belligerents in combat.

In the wake of the First World War, attempts to restrict national armaments turned to arms reductions. At the end of the war, arms reduction measures were imposed on all the defeated countries, while the goal of reducing armaments was inscribed in the Charter of the newly established League of Nations. During the 1930s, negotiations on arms reductions across all weapon categories were carried out at the World Disarmament Conference. The Conference's collapse in 1937, however, brought these to an end.

After the Second World War, arms regulation efforts focused on the control of nuclear weapons. Globally this was addressed by the Non-Proliferation Treaty (NPT) signed by participants to the Conference of the Committee on Disarmament in 1968. Under the Treaty, so-called non-nuclear-weapon States (NNWS) committed not to acquire nuclear weapons, while so-called nuclear-weapons States (NWS) committed not to aid NNWS to acquire such weapons. Furthermore, both NNWS and NWS pledged to negotiate in good faith measures for complete nuclear disarmament. Bilaterally the control of nuclear weapons was the object of several treaties negotiated between the Soviet Union and the United States. Foremost among these, the Anti-Ballistic Missiles (ABM) Treaty and the Strategic Arms Limitation Treaties (SALT) I and II, sought to quell the nuclear rivalry of the two countries by limiting their deployment of strategic nuclear weapons and missile defences.

The end of the Cold War has brought a fleury of arms regulation activities aimed at cementing the relaxation of international tensions. Globally nuclear controls have been strengthened by the conclusion of the Comprehensive Nuclear Test Ban Treaty (CTBT) which prohibits the field-testing of all nuclear explosive devices. In addition, the Chemical Weapons Convention (CWC) which bans the development, possession and use of chemical weapons, has eliminated an entire class of weapons. Regionally conventional weapons in Europe have been brought under control through the Conventional Armed Forces in Europe (CFE) Treaty and its complements. These restrict the deployment of conventional arms in the area from the Atlantic to the Urals. Bilaterally the Soviet Union and the United States have started to dismantle their accumulated nuclear arsenals. Under the Intermediate-range Nuclear Forces (INF) Treaty, the two countries have eliminated all their land-based intermediate-range nuclear weapons, while under the Strategic Arms Reduction Treaties (START) I and II they have agreed to reduce drastically their strategic nuclear weapons under strict verification

2.2 Approaches on How to Limit Arms and Activities

Conceptually measures designed to limit arms and military activities divide into two categories: **arms control** and **disarmament**. *Arms control measures place political or legal constraints on the deployment and/or disposition of national military means*. Their aim is to reduce the risk of

inadvertent war by improving the capacity of adversaries to formulate more accurate assessments of each other's intentions, and by restricting their range of available military options. In practice, arms control measures may take numerous forms. For example, they may place quantitative or qualitative restrictions on the fielding of military equipment. They may entail non-proliferation agreements and export controls which regulate or prohibit the development or transfer of particular weapons and their components. They may comprise confidence- and security-building provisions which constrain military activities, increase mutual knowledge about the disposition of national military forces, and enhance the capacity of parties to communicate with one another. Or they may take the form of rules of war which restrict or prohibit certain methods of warfare, or even regulate the conditions under which arms may be used. Arms control measures may be implemented on an unilateral basis though most commonly they are applied on the basis of mutual agreement. They may cover any type of armaments and/or military activities. Although arms control measures do not necessarily seek to lower national military capabilities, they do aim to reshape these in accordance with their purpose.

Disarmament measures seek to reduce the level of national military capabilities or to ban altogether certain categories of weapons already deployed. The disarmament approach to arms limitations is premised on the assumption that armaments in and of themselves are the main source of tension and war. Disarmament, hence, aims to preclude or at least reduce the likelihood of military conflict by depriving parties, in full or in part, of their military capabilities. Measures consistent with disarmament include any provisions that eliminate national military capabilities either partially or completely, either at the macro or micro level. Disarmament measures may be imposed following armed conflict as a means of sanctioning a country, they may be undertaken unilaterally as a means of signalling benevolent intentions, or they may be mutually agreed upon as a result of negotiations as a means of creating more stable military balances (in the case of partial disarmament), or of eliminating military balances altogether (in the case of complete disarmament).

2.3 What Kinds of Arms to Limit?

Both arms control and disarmament measures may be applied with respect to any type of weapons and/or military activities. States attempting

to negotiate such measures, however, must first agree on just what kind of arms and/or activities to limit. Since countries tend to have different preferences as to what precisely ought to be subject to limitations—usually preferring to limit those arms and activities in which others have an advantage—this decision is hardly trivial or straightforward. Prior to the Second World War arms limitations were primarily related to the rules of war and reductions in aggregate military capabilities. Since then, however, arms limitations have been addressed mostly in terms of weapon categories. This shift was due mainly to the advent of nuclear weapons which brought to the fore the distinction between so-called **weapons of mass destruction (WMD)** defined by the United Nations as *"atomic explosive weapons, radioactive material weapons, lethal chemical or biological weapons, and any weapons developed in the future which have characteristics comparable in destructive effect to those of the atomic bomb or other weapons mentioned above,"* and so-called conventional weapons. Weapons of mass destruction severely complicate calculations of aggregate military capabilities, while their great potential destructiveness, it is often argued, makes their control more pressing.

2.4 Timing: Arms Limitations Before Peace or After?

Whether associated with arms control or disarmament, the adoption of arms limitation measures requires a practical decision as to the timing of their implementation. Here three different arguments can be distinguished. According to one view, because arms limitations are expected to attenuate military rivalries, they should be implemented as a means of opening the way to formal political settlement. An opposing view holds that since the success of arms limitations depends on a minimum level of mutual cooperation, they can be implemented only after formal political settlement has been reached, as a means of confirming and reinforcing the latter. A middle position sees a tangled relationship between arms limitations and formal political settlement, and argues that efforts in both areas should be carried out concomitantly, with advances in one area fostering advances in the other and vice-versa.

2.5 Implementing Arms Limitation Agreements: Verification and Compliance Mechanisms

Typically arms limitation measures take the form of mutually agreed upon accords resulting from multilateral or bilateral negotiations. These accords, once entered into force, need to be implemented. The implementation of arms limitation agreements refers to the compliance of the parties with their obligations under the accord. Prior to the Second World War, the implementation of arms limitation agreements was premised mostly on the basis of trust. Since the Second World War, however, implementation has become increasingly subject to verification which monitors and assesses the parties' compliance with the accord. Verification may be carried out unilaterally through so-called national technical means, and/or cooperatively through cooperative measures.

As a complement to verification requirements, many arms limitation agreements provide for conflict resolution mechanisms. Typically these specify procedures for mediating disputes arising from the verification of parties' compliance, and take the form of some sort of deliberative forum such as for instance a consultative commission. Consultative commissions allow parties to express and explore concerns about the implementation or the need for amendment of accord provisions, and to seek to address these jointly on the basis of common understanding. In some cases, consultative commissions are supplemented or substituted by procedures for referring disputes for mediation to an a priori designated international body such as the United Nations Security Council.

2.6 Controversy About the Objective of Trying to Limit Arms and Warfare

Despite their prevalence, measures regulating arms and military activities are often subject to critique. Criticism of attempts to limit national armaments typically revolves around six main points. First, the arguments in favour of arms limitation are based on a set of assumptions about the relation between armaments and war which may not be true. Second, because successful arms limitations imply a minimum mutual interest in the avoidance of war, such measures are altogether inappropriate in cases where this is absent. Third, because successful arms limitations imply at

least tacit mutual cooperation which is more likely to occur when relations between countries are good, it is likely that such measures are going to be more effective in times of decreasing tensions when they are less needed, and less effective in times of rising tensions when they are most needed. Fourth, arms limitations may fuel rather than cool down arms races as countries strive to acquire "bargaining chips" to be traded at the negotiation table, or they may merely redirect arms races as countries steer their military preparations towards non-regulated areas. Fifth, if arms limitations are intended to attenuate military rivalries, their rationale loses impetus in a context in which either there are no military rivals or it is unclear who the military rivals are. Finally, arms limitations may well be afflicted by a vicious paradox, namely, that in making war potentially less destructive, they might also make it potentially more likely.

2.7 Conclusion: Arms Limitations Becoming a Normal State-to-State Activity

Arms limitations place deliberate constraints on the range and scope of national military policies. Their application has grown significantly over time, and has now become well established. After the First World War disarmament efforts played a major role in attempts to preserve international peace. Since the Second World War arms control and increasingly disarmament measures have been used widely as tools of conflict management and prevention at the global, regional, and bilateral levels. Increasingly arms limitation efforts of growing range and scope are becoming a normal State-to-State activity and a prevalent feature of international relations.

PART II

Arms Control and Disarmament Agreements

CHAPTER 3

CONVENTIONAL WEAPONS

3.1 BACKGROUND

Conventional weapons are difficult to characterize precisely. In principle, weapons that are not considered to have a character of mass destruction are collectively referred to as conventional. The distinction between arms with a character of mass destruction and those without emerged with the appearance of nuclear weapons at the close of the Second World War. The evident qualitative difference of the latter made it imperative to differentiate them from more traditional kinds of weapons already in existence. Over the years, chemical and biological weapons have also been allotted to the category of weapons of mass destruction (WMD). This has further refined the distinction between conventional and unconventional weapons.

Although distinguishable primarily by what they are not, in practice, conventional weapons are understood to comprise those devices capable of killing, incapacitating or injuring a military target mainly through, though not exclusively, **high-explosives**, **fuel-air explosives**, **kinetic energy**, or **incendiaries**. High-explosives are chemical charges that detonate at very high speed to produce a powerful shattering effect. Most conventional weapons in effect rely on high-explosives to achieve their ends. Fuel-air explosives ignite a combustible aerosol to create an extremely powerful blast effect upon detonation. They are tremendously destructive, especially within confined spaces, much more so than high-explosives. Kinetic energy weapons propel their projectiles to extremely high rates of acceleration. Upon impact these generate massive force, which is projected onto the target. Incendiary devices burn a hot flame that releases high heat radiation. Essentially, they inflict damage through fire.

Conventional weapons are the most common type of armament. Historically, they have also been the preponderant means of conflict and that is likely to remain true for the foreseeable future. The use of conventional weapons as instruments of war is termed **conventional warfare**. Historically, conventional weapons have been used to attack a variety of targets ranging from military personnel and equipment to infrastructure. Compared with weapons of mass destruction, they are significantly less destructive in the sense that their effects, which vary in accordance with the types of weapons used, their accuracy and, most significantly, their scale of employment, are inherently much more limited. Nevertheless, conventional weapons are exceedingly accessible, even though their acquisition and maintenance in large amounts can be rather costly.

3.2 Arms Limitation History: Approaches and Instruments

3.2.1 Global Attempts

Arms control efforts have long sought to limit the accumulation and use of conventional weapons. Previous to the First World War, these focused largely on the formalization of the so-called laws and customs of war. The Hague Conventions of 1899 and 1907 laid out the rules governing the conduct of belligerent and neutral countries and of combatants. After the First World War, the victorious powers imposed strict disarmament measures on the vanquished. The Treaty of Versailles of 1919 restricted the size of the German army and prohibited it from possessing certain kinds of armaments. Similar measures were included in the peace treaties signed with Austria, Bulgaria, Hungary, and Turkey. During the 1920s, negotiations on the reduction of national armaments and transparency in the transfer of arms were held at the League of Nations. Most notably, at the World Disarmament Conference (1932-1937), participants attempted to reach agreement on a broad treaty on disarmament to include all members of the League plus the United States and the Soviet Union. Germany's withdrawal from the Conference as well as from the League in 1933 ensured the ultimate failure of both.

Following the Second World War, restrictions on the manner in which war is conducted, were substantially strengthened. In 1949, the Geneva Conventions, which stipulated the rights of prisoners of war, were

reinforced and extended to include civilians. The Scope of the Conventions was further enlarged with the addition of two Protocols on the protection of victims of international and domestic conflict in 1977. In 1981, the **Inhumane Weapons Convention**, which bans the use of certain types of conventional weapons including mines and booby-traps, was opened for signature. Despite the subsequent strengthening of the Convention's mine provisions, however, many parties remained dissatisfied and instead continued to argue for a complete ban on anti-personnel mines. The latter was achieved with the signing of the **Ottawa Convention** in December 1997, which prohibits the use, production, stockpiling, and transfer of anti-personnel **landmines**.

The unrestricted transfer of weapons had already emerged as an international concern at the time of the League of Nations. The Geneva Convention on Arms Trade and the League's Armaments Yearbook inaugurated in the 1920s, attempted to regulate and catalogue the transfer of arms by introducing requirements for national licensing of arms exports and the release of public statistics on the import and export of weapons. After the Second World War, Western countries tried to restrict the transfer of technologies that could serve in the development of sophisticated weapons to their Communist rivals. The Coordinating Committee for Multilateral Export Controls (COCOM) established in 1950, began as an association of 17 Western countries aimed at coordinating national restrictions on the export of advanced material and know-how to Communist countries. However, as the Cold War began to wane, COCOM's role started to shift towards aiding the former Communist countries to design and implement technology control measures compatible with those of the West. In 1994, COCOM dissolved and a new organization called the **Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-use Goods and Technologies**, comprising former COCOM members plus the former Warsaw Pact Countries, took its place. Building on the experience with COCOM, the Wassenaar Arrangement coordinates members' policies regarding restrictions on the transfer of military and related technology. In the same vein, the **Missile Technology Control Regime (MTCR)**, which was formed in 1987, restricts the transfer of missiles and technology related to missiles capable of delivering weapons of mass destruction payloads. The regime places particular focus on missiles capable of carrying a payload of at least 500 kilograms to a distance of at least 300 kilometres, so-called "Category I" or "MTCR-class" missiles. On 25 November 2002, members of the MTCR

signed an International Code of Conduct against Ballistic Missile Proliferation (ICOC). The Code is a politically binding arrangement to promote the prevention and curbing of the proliferation of ballistic missiles capable of delivering weapons of mass destruction, to develop relevant norms, and to promote confidence regarding missile and space launch vehicle activities. It aims to become universalised through an ad hoc process separate from the MTCR and open to all States.

3.2.2 Regional Attempts

Efforts to control conventional armaments have also been registered at the regional level. In Europe, these were shaped primarily by the unfolding of the Cold War. The Mutual and Balanced Force Reduction and Associated Measures in Central Europe (MBFR) discussions between North Atlantic Treaty Organization (NATO) and Warsaw Pact countries kicked off in 1973. Aimed at curtailing the level of conventional forces on the continent, the talks quickly led to stalemate due to differences between the two sides over what to reduce, troops only or equipment too, and over how to reduce, proportionally or to proportional ceilings. Although the talks nominally continued for a period of 15 years, they were terminated in February 1989 without agreement in favour of new discussions made possible by the collapse of the Soviet Union.

In March 1989, negotiations for the purpose of establishing a military equilibrium at a lower level of armaments opened within the framework of the Conference on Security and Cooperation in Europe (CSCE). On 17 November 1990 they resulted in the signing of the **Conventional Forces in Europe (CFE) Treaty** and, on 6 July 1992, of its complement the **Concluding Act of the Negotiation on Personnel Strength of Conventional Forces (CFE-1A)**. Together, the two treaties establish ceilings for the amount of military equipment and personnel parties are permitted to deploy in the area from the **Atlantic to the Urals (ATTU)**. Subsequent to the dissolution of the Warsaw Pact and of the Soviet Union, a series of treaties counting the **Tashkent Document**, the **Oslo Document**, the **Flank Document** the **"Basic Elements" Document**, and the **Adapted CFE Treaty**, were negotiated to take account of the changing nature of the European strategic landscape.

In Latin America, efforts to control conventional weapons have focused principally on the restriction of the transfer of arms within and to

the area. The Ayacucho Declaration issued by seven Latin American countries in 1974, commits parties to dedicate themselves to restrict the amount of weapons imported by each. This declaration, however, is non-binding and efforts to change this have been unsuccessful. Similarly, in 1985, the Contadora Group of Countries put forth a proposal for an agreement meant to curb the militarization of Central America. The agreement was to establish limits on arms acquisitions by Central American countries, and provide for advanced notification of military exercises held close to international borders. A lack of support by States in the region, however, doomed the proposal.

In the Middle East, conventional arms control efforts began with international attempts to restrict the supply of weapons to the region. In 1948, the United Nations imposed an embargo on arms transfers to Israel and neighbouring Arab countries then engaged in conflict. This embargo, however, was short-lived, and was lifted in 1949 after the signing of an Armistice Agreement between Israel and Egypt, Jordan, Lebanon, and Syria. This agreement included a series of confidence- and security-building measures, and was supervised by the United Nations Truce Supervision Organization. In June 1950, building on the experience with the 1948 embargo, the United States, Britain and France, at the time the major suppliers of arms to the region, established the Near Eastern Arms Coordinating Committee (NEACC). The Committee served as a consultative forum regulating the transfer of weapons by the three countries to the Middle East and issued a Tripartite Declaration on arms transfers. Israel and the Arab League accepted the terms of the declaration in 1950. The NEACC initiative broke down in 1955 with the emergence of the Soviet Union as an alternative source of weapons.

The 1980s and early 1990s witnessed a series of further initiatives aimed at stemming the flow of conventional weapons to the region. During the Iran-Iraq War, the United States sought to gain international support to stop the transfer of arms to Iran, and the Soviet Union, at least initially, suspended its weapon transfers to Iraq. Despite some limited impact, ultimately both these supply control attempts failed, as both Iran and Iraq were able to secure arms from other sources. In May 1991 the United States called for export controls on the transfer of conventional arms, weapons of mass destruction, missiles, and related exports to the region. This led to the establishment of a consultative group, known as the Arms Control in the Middle East (ACME) group, consisting of the five permanent members of the

United Nations Security Council: China, France, Russia, the United Kingdom, and the United States. The group reached agreement on common guidelines for conventional arms transfers, and began developing pre-notification and consultation procedures for those transfers that affect regional stability in the Middle East. Political differences over arms transfers to other regions, however, led to the breakdown of the group in 1992.

Conventional arms control measures also operate with respect to some other regions. The **Antarctic Treaty** concluded in 1959 forbids the emplacement of any military material or the carrying out of any military activities on the continent. The Treaty has its roots in American concerns in the 1950s about possible Soviet military interest in the area and the risk this carried of drawing the Antarctic into the realm of Cold War rivalry. Negotiations on the Treaty began in June 1958 at the invitation of the United States, and finished approximately a year and a half later. In West Africa, a **Small Arms Moratorium** on the importation, exportation, and manufacturing of light weapons in the region entered into force on 1 November 1998. A political rather than legal agreement, the Moratorium is aimed at stopping the growing flows of small arms in the region. The Moratorium is designed to operate for renewable periods of three years.

3.3 Arms Limitation Instruments

3.3.1 Global Instruments

Inhumane Weapons Convention (*Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects*)

Multilateral agreement prohibiting the use of certain conventional weapons, opened for signature on 10 April 1981 and entered into force on 2 December 1983. The Inhumane Weapons Convention comprises three Protocols. Protocol I prohibits the use of any weapon designed to injure by fragments which in the human body are undetectable by x-rays. Protocol II prohibits the indiscriminate use of **landmines**, **booby-traps** and other similar devices, as well as their use against civilians or civilian populations. Mines may only be placed in the vicinity of enemy objectives and civilians must be adequately protected from their effects. Booby-traps may not be disguised as harmless objects. States parties are required to record the location of

emplaced landmines and booby-traps, to protect United Nations forces by disclosing the location of minefields and booby-traps in the area, and, following the cessation of hostilities, to cooperate in their removal. Protocol III bans the use of incendiary weapons against civilian populations or objects, and their delivery by air against military objectives located within civilian concentrations. The Convention does not provide for any verification provisions. At the first Review Conference of the Inhumane Weapons Convention held in 1995 and 1996, Protocol II of the Convention was amended and Protocol IV was added. The amended Protocol II broadens the restrictions applicable to the use of landmines, and of **anti-personnel mines** in particular. The latter may only be used if equipped with a self-deactivation or self-destruction mechanism, or if several stringent criteria designed to protect civilians are met. The added Protocol IV prohibits the use of laser weapons specifically designed to cause permanent blindness to the naked eye. In December 2001, at the Second Review Conference of the States parties to the Convention, the scope of the Inhumane Weapons Convention was extended to include internal conflicts. Furthermore, the parties agreed to establish a Group of Governmental Experts to address the control of **explosive remnants of war (ERW)** and anti-vehicle mines.

Ottawa Convention/Ottawa Treaty (*Convention On the Prohibition Of The Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and On Their Destruction*)

Multilateral treaty banning the use, production, acquisition, stockpiling, and transfer of **anti-personnel landmines** as well as the assistance or encouragement of others to engage in such activities. Parties to the Convention are to clear existing minefields within ten years following the entry into force of the Treaty, and to destroy all their anti-personnel mines. Minefields are those areas under the jurisdiction or control of a party in which mines are known or suspected to exist. Such areas must be marked, monitored, and protected until all landmines are removed and destroyed. Parties are also urged to assist one another in fulfilling their obligations under the Convention. Implementation of the Convention is verified through annual declarations submitted by the parties to the Secretary-General of the United Nations detailing the fulfilment of their obligations under the Convention and through provisions for clarification requests and fact-finding missions. The *Landmine Monitor*, an annual report

compiled by an international collection of civil society groups and individuals, also contributes to verifying that parties are complying with their obligations. The Convention entered into force on 1 March 1999, it is of unlimited duration and withdrawal requires six months prior notification. For a party involved in armed conflict, withdrawal takes effect only after the end of the conflict.

Missile Technology Control Regime (MTCR): see page 123.

Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies

Supply control agreement that commits parties to regulate the transfer of conventional arms and dual-use goods and technologies. Under the Agreement, the parties are to prevent the transfer of unauthorized items, exchange relevant information on a voluntary basis, and inform each other of approved or denied transfers. The decision to transfer or not a particular item rests with each individual party. The exact conventional arms covered are specified in Appendix 3 to the Agreement while the dual-use items are listed in Appendix 5. The latter are divided into a List of Dual-Use Goods and Technologies and a Munitions List. The List of Dual-Use Goods and Technologies is further partitioned into a sensitive items and a very sensitive items part. The Agreement counts 33 parties and has been effective since September 1996.

3.3.2 Regional Instruments

Adapted CFE Treaty (*Agreement on Adaptation of the Treaty on Conventional Armed Forces in Europe*)

Multilateral accord between the parties to the **Conventional Forces in Europe (CFE) Treaty** amending the CFE Treaty in order to take account of changes in military conditions in Europe engendered by the dissolution of the Warsaw Pact and the expansion of the North Atlantic Treaty Organization (NATO). The Adapted CFE Treaty modifies the CFE Treaty on the basis of the **"Basic Elements" Document** agreed to in July 1997, and opens up the latter to accession by States not previously members of NATO or the Warsaw Pact. The Treaty also provides for enhanced transparency as States parties are required to disclose even more information about their forces, and as the quota for mandatory on-site inspections is increased. The Adapted CFE Treaty

was signed on 19 November 1999 at an Organization for Security and Cooperation in Europe (OSCE) summit held in Istanbul, Turkey.

AGREEMENT ON SUB-REGIONAL ARMS CONTROL

Agreement between the Republic of Bosnia and Herzegovina, the Republic of Croatia and the Federal Republic of Yugoslavia (FRY) concluded on 14 June 1996, as mandated under the General Framework Agreement for Peace in Bosnia and Herzegovina. Modelled on the **Conventional Forces in Europe (CFE) Treaty**, the Sub-regional Arms Control Agreement establishes numerical restrictions on the possession of military armaments by the parties in five weapon categories—battle tanks, armoured combat vehicles, heavy artillery, aircraft and helicopters, as well as on the deployment of military personnel. The restrictions on the possession of armaments are established on the basis of a 5:2:2 ratio for Yugoslavia, Bosnia and Herzegovina and Croatia, and of a 2:1 ratio for the Muslim-Croat Bosnians and the Serb Bosnians within Bosnia and Herzegovina itself. The modalities for effecting reductions in each of the restricted weapon categories are specified in the Agreement, and all reductions had to be completed by November 1997. Implementation of the Agreement is subject to verification provisions with no right of refusal comprising on-site monitoring, annual exchanges of information on the possession of personnel and armaments, and intrusive on-site inspections. A Sub-Regional Consultative Committee is charged with adjudicating disputes which might arise during the implementation of the Agreement. The Agreement is of unlimited duration, and, following an initial period of 42 months, may be abrogated by any party pending advance notification of 150 days. See also General Framework Agreement for Peace in Bosnia and Herzegovina.

ANTARCTIC TREATY

Multilateral treaty prohibiting the militarization of Antarctica. The Antarctic Treaty was signed on 1 December 1959, and entered into force on 23 June 1961. The Treaty may be modified or amended pending the unanimous agreement of the contracting parties. Currently the Antarctic Treaty has 42 parties, with the United States serving as the depositary government. It prohibits the stationing or testing of any kind of weapons including nuclear weapons in the Antarctic. In addition, no military bases or facilities may be established, and all actions of a military nature, as well as all nuclear explosions and

the disposal of radioactive waste material in Antarctica, are banned. Verification of compliance with the Antarctic Treaty is assured through inspections. All areas in Antarctica, including stations, installations and equipment, ship and aircraft debarkation and embarkation points are subject to unlimited on-site and aerial inspections. Contracting parties are also to notify each other of stations to be established, of expeditions to be undertaken to and within Antarctica, and of any military personnel or equipment that may be placed in Antarctica. Disputes that cannot be settled through talks, mediation or arbitration, can be referred to the International Court of Justice.

"BASIC ELEMENTS DOCUMENT"

Multilateral accord between the parties to the **Conventional Forces in Europe (CFE) Treaty** modifying the CFE Treaty adopted on 23 July 1997. The Document is part of a larger CFE adjustment process necessitated by the dissolution of the Warsaw Pact and the Soviet Union and the expansion of the North Atlantic Treaty Organization (NATO) . It calls for the replacement of the CFE Treaty's bloc-to-bloc (i.e., Warsaw Pact countries and NATO countries) structure of aggregate ceilings and sub-ceilings on ground-based **treaty-limited equipment (TLE)** with national and territorial ceilings. The national ceilings delimit the amount of TLE a party may possess nationally, and are calculated to include those forces stationed on another party's territory. Territorial ceilings comprise the total number of forces stationed on a party's territory including the party's national limit and forces stationed on its territory by another party. The national and territorial sub-ceilings designate the maximum quantity of TLE each party may hold in each TLE sub-category at the national and territorial levels. The "Basic Elements" Document forms the basis for the **Adapted CFE Treaty** which was concluded in November 1999.

CFE-1A AGREEMENT (*Concluding Act of the Negotiation on Personnel Strength of Conventional Armed Forces in Europe*)

Political agreement between the signatories of the **Conventional Armed Forces in Europe (CFE) Treaty**, limiting the number of troops deployable by each party within the Agreement-covered area. The CFE-1A Agreement was signed on 10 July 1992, and entered into force simultaneously with the CFE Treaty. The Agreement establishes an aggregate ceiling on the number of military personnel to be deployed by each signatory. This ceiling is determined for each party on the basis

of a "sufficiency" principle according to which each country maintains only as many troops as necessary to ensure an effective defence. The ceilings were to be reached within 40 months following the entry into force of the CFE Treaty. In addition, signatories are required to give advance notification for military reserve call-ups exceeding 35,000 full-time military personnel. The Agreement covers an area stretching from the **Atlantic Ocean to the Ural Mountains (ATTU)**. It is of unlimited duration, and may be supplemented, modified, or suspended.

Conventional Armed Forces in Europe (CFE) Treaty

Multilateral treaty between the members of the North Atlantic Treaty Organization (NATO) and of the Warsaw Pact, reducing the level of conventional military forces deployable by the States parties within the Treaty-covered area. The Treaty was signed at Paris on 19 November 1990, and formally entered into force on 9 November 1992, following ratification by the final State party (the Treaty actually entered into force provisionally on 17 July 1992). The CFE is of unlimited duration and withdrawal requires a minimum of 150 days prior notification.

The CFE Treaty restricts the level of so-called **treaty-limited equipment (TLE)—armoured combat vehicles**, **attack helicopters**, **battle tanks**, **combat aircraft**, and large calibre **artillery—**which the States parties may deploy within the Treaty-covered area. Under the Treaty, the States parties were divided into two blocs, the Warsaw Pact countries and the NATO countries, each of which had to observe equal aggregate ceilings on TLE holdings set at 30,000 armoured combat vehicles, 20,000 artillery pieces, 2,000 attack helicopters, 20,000 battle tanks, and 6,800 combat aircraft. Each bloc was free to determine the precise distribution of TLE holdings amongst its members. However, the Treaty also established limits on the amount of TLE that any one State party could have. In addition, the Treaty-covered area was divided into concentric zones running from central Europe outwards, and restrictions were placed on the amount of TLE deployable within any one such zone. Implementation of TLE limits occurred in three phases over a period of 40 months.

The CFE Treaty contains comprehensive verification provisions administered through national and multinational technical means that include confidence- and security-building measures (CSBMs) and inspections. Information pertaining to national conventional

armaments was to be exchanged annually, and notifications were to be given for any change in the structure or size of national conventional military forces. On-site and aerial inspections were to be used to confirm compliance with the numerical TLE limitations contained in the Treaty, and to monitor the process of TLE reduction to these limits. Baseline inspections, conducted during the first one hundred and twenty days following the entry into force of the CFE, were to verify the accuracy of the exchanged data. For three years afterwards, on-site inspections were to be carried out so as to monitor the reductions of TLE. During this period, States parties were to accept a quota of declared sites inspections based on the percentage of objects of verifications (OOVs) present on their territory. Challenge inspections to undeclared sites could also be conducted, pending the State approval of the State to be inspected. One hundred and twenty days following the end of the three-year TLE limits implementation period, on-site inspections were to be carried out to verify the reductions of TLE to mandated limits. Thereafter, a permanent inspection process was to monitor the continued compliance with the provisions of the Treaty. A Joint Consultative Group (JCG) was established in Vienna to promote the objectives and implementation of the CFE, and review conferences verifying the workings of the Treaty were to be scheduled every five years.

The dissolution of the Warsaw Pact and of the Soviet Union, as well as the expansion of NATO subsequent to the signing of the CFE Treaty has meant that the Treaty has had to be adjusted to take account of these new circumstances. For this purpose a number of accords have been concluded, including the **Tashkent Document**, the **Oslo Document**, the **CFE-1A Agreement**, the **Flank Document**, the **"Basic Elements" Document**, and the **Adapted CFE Treaty**.

FLANK DOCUMENT

Multilateral agreement between the parties to the **Conventional Armed Forces in Europe (CFE) Treaty** modifying Article V of the CFE Treaty. The Flank Document entered into force on 15 May 1996. It establishes specific limitations on the amount of **treaty-limited equipment (TLE)** which may be deployed within Europe's northern and southern flanks. To alleviate Russia's difficulties in absorbing its forces formerly stationed in Central and Eastern Europe, the Flank Document reduces the size of the flank zone as originally established

by the CFE Treaty, thereby reducing the area within which Russian forces have to be cut.

JOINT CONSULTATIVE GROUP (JCG): see page 205.

OSLO DOCUMENT (*Final Document of the Extraordinary Conference of the States Parties to the CFE Treaty*)

Multilateral treaty between the parties to the **Conventional Armed Forces in Europe (CFE) Treaty** modifying the CFE Treaty signed on 5 June 1992. The Document adjusts the language of the CFE Treaty so as to include the Soviet successor States, and modifies its **treaty-limited equipment (TLE)** allocation provisions according to the **Tashkent Document**. The adoption of the Oslo Document permitted the CFE Treaty to enter into force provisionally on 17 July 1992.

TASHKENT DOCUMENT (*Joint Declaration and Agreement on the Principles and Procedures for Implementing the CFE Treaty*)

Multilateral agreement between the parties to the **Conventional Armed Forces in Europe (CFE) Treaty** modifying the CFE Treaty signed on 15 May 1992. The Document designates the Soviet successor States that become parties to the CFE Treaty, and redistributes the **treaty-limited equipment (TLE)** entitlements provided for in the CFE Treaty amongst these successor States. At Tashkent, Estonia, Latvia, and Lithuania disassociated themselves from the CFE Treaty but agreed to keep their territory open for on-site inspections as long as Russian troops remained stationed there.

WEST AFRICAN SMALL ARMS MORATORIUM
(*Moratorium on the Importation, Exportation and Manufacture of Light Weapons in ECOWAS Member States*)

Political agreement concluded by the member States of the Economic Community of the West African States (ECOWAS) on 13 October 1998. Under the agreement the signatories commit to a moratorium on the importation, exportation, and manufacture of small arms for a renewable period of three years. The Moratorium entered into force on 1 November 1998.

3.3.3 Arms Limitation Instruments Terms

ANTI-PERSONNEL MINE

Weapon system defined by Protocol II of the **Inhumane Weapons Convention** as an explosive device primarily designed to be detonated by the presence, proximity, or contact of a person and which will incapacitate, injure, or kill one or more persons. The **Ottawa Treaty** adopts a more inclusive definition by removing "primarily" which then addresses all **landmines**.

ARMOURED COMBAT VEHICLE (ACV)

Self-propelled vehicle with an armoured protection and cross-country capability. ACVs include **armoured personnel carriers**, **armoured infantry fighting vehicles**, and **heavy armament combat vehicles**. ACVs are part of the five weapon categories regulated under the **Conventional Armed Forces in Europe (CFE) Treaty**.

ARMOURED INFANTRY FIGHTING VEHICLE (AIFV)

Armoured vehicle designed and equipped primarily to transport an infantry squad, and normally provides the capability for the troops to deliver fire from inside the vehicle under armoured protection. AIFVs are armed with an integral or organic cannon of at least 20-millimetres calibre and sometimes an anti-tank missile launcher.

ARMOURED PERSONNEL CARRIER (APC)

Armoured vehicle designed and equipped to transport a combat infantry squad and which, as a rule, is armed with an integral or organic weapon of less than 20-millimetres calibre.

ARMOURED PERSONNEL CARRIER LOOK-ALIKE

Armoured vehicle based on the same chassis as, and externally similar to, an **armoured personnel carrier** which does not have a cannon or gun of 20-millimetres calibre or greater, and which has been constructed or modified in such a way as not to permit the transportation of a combat infantry squad.

ARTILLERY

Large calibre systems capable of engaging ground targets by delivering primarily indirect (i.e., over-the-horizon) fire. Such artillery systems provide the essential indirect fire support to combined arms

formations. Large calibre artillery systems include guns, howitzers, artillery pieces combining the characteristics of guns and howitzers, mortars and multiple launch rocket systems with a calibre of at least 100 millimetres. Artillery systems are part of the five categories of weapons regulated under the **Conventional Armed Forces in Europe (CFE) Treaty**.

ATTACK HELICOPTER

Helicopter designed to carry anti-armour, air-to-ground, or air-to-air munitions, and equipped with an integrated fire control and aiming system for delivering these. Attack helicopters may either be specially designed or multi-purpose. They are part of the five weapon categories restricted by the **Conventional Armed Forces (CFE) Treaty**.

ATTU (*Atlantic to the Urals*)

Area of application of the **Conventional Armed Forces in Europe (CFE) Treaty**. This encompasses the entire land territory of the States parties in Europe from the Atlantic Ocean to the Urals Mountains, including all the European island territories: the Danish Faroe Islands, the Norwegian Svalbard including Bear Island, the Portuguese islands of the Azores and Madeira, the Spanish Canary Islands, and the Russian Franz Josef Land and Novaya Zemlya. In the case of the former Soviet Union, the area of application includes all territory west of the Ural River and the Caspian Sea. In the case of Turkey the area of application includes the territory north and west of a line extending from the point of intersection of the Turkish border with the 39th parallel to Muadiye, Patnos, Karayazi, Tekman, Kemaliye, Feke, Ceyhan, Dogankent, Gözne, and thence to the sea.

BASELINE INSPECTIONS: see page 208.

BATTLE TANK

Tracked or wheeled vehicle, which weighs at least 16.5 metric tons, and is equipped with a 360-degree traverse gun of at least 75-milimetre calibre. Battle tanks are one of the five weapon categories restricted by the **Conventional Armed Forces (CFE) Treaty**.

BOOBY-TRAP

Manually emplaced explosive or other kind of device triggered by contact, remote control, or automatically after a lapse of time, designed to kill, injure, or damage a person.

CERTIFICATION

Process by which the **recategorization** of multiple-purpose **attack helicopters** or the **reclassification** of combat-capable trainer aircraft is completed under the **Conventional Armed Forces in Europe (CFE) Treaty**. Certification is carried out by the State party which is converting the aircraft. Under the CFE Treaty certification must be communicated to other States parties who have the right to inspect the certified aircraft.

CERTIFICATION INSPECTIONS: see page 208.

CIVILIAN OBJECTS

All objects that are not **military objectives**.

COMBAT AIRCRAFT

Fixed-wing or variable-geometry wing aircraft armed and equipped to engage targets with guided missiles, rockets, bombs, guns, cannons, or other weapons of destruction, as well as any model or version of such an aircraft which performs military functions such as reconnaissance or electronic warfare. Combat aircraft does not include primary trainer aircraft. Combat aircraft is one of the five weapon categories regulated by the **Conventional Armed Forces in Europe (CFE) Treaty**.

COMBAT HELICOPTER

Helicopter armed and equipped to engage targets in the air or on the ground, or to perform other military functions. Combat helicopters comprise **attack helicopters** and **combat support helicopters** but do not include unarmed transport helicopters. Combat helicopters are one of the five weapon categories regulated by the **Conventional Armed Forces in Europe (CFE) Treaty**.

COMBAT SUPPORT HELICOPTER

Helicopter which does not qualify as an **attack helicopter**, but which may be equipped with a variety of self-defence and area suppression weapons, such as guns, cannons, and unguided rockets, bombs, or

cluster bombs, or which may be equipped to perform other military functions.

CONVERSION

Transformation of **battle tanks** and **armoured combat vehicles (ACVs)** into vehicles used for peaceful purposes under the **Conventional Armed Forces in Europe (CFE) Treaty**. These may consist of general-purpose prime movers, bulldozers, fire-fighting vehicles, cranes, power unit vehicles, mineral fine crushing vehicles, quarry vehicles, rescue vehicles, casualty evacuation vehicles, transportation vehicles, oil rig vehicles, oil and chemical spill cleaning vehicles, tracked ice-breaking prime movers, and environmental vehicles. Under the CFE Treaty each State party is allowed to convert either 150 or 5.7 per cent (whichever is greater) of its existing battle tanks, but no more than 750 battle tanks. Similarly each State party is allowed to convert the greatest of either 150 or 15 per cent of its existing ACVs, but no more than 3,000 ACVs.

CONVERSION INSPECTIONS: see page 210.

DESIGNATED PERMANENT STORAGE SITE

Clearly bounded area which contains **treaty-limited equipment (TLE)** counted by the **Adapted CFE Treaty** as part of national ceilings but not subject to Treaty limitations in terms of active units.

DESTRUCTION

Method of reducing possession of **treaty-limited equipment (TLE)**. Under the **Conventional Armed Forces in Europe (CFE) Treaty** destruction may be effected by severing, explosive demolition, deformation, or smashing.

EXPLOSIVE REMNANTS OF WAR (ERW)

Unexploded ordnance other than **landmines** left over from use in armed conflict. ERW includes abandoned stockpiles of munitions.

GROUND-INSTRUCTIONAL PURPOSES

Method of reducing existing numbers of **combat aircraft** and **attack helicopters** under the **Conventional Armed Forces in Europe (CFE) Treaty**. Each State party to the CFE Treaty may reduce no more than 5

per cent of its maximum level of holdings for combat aircraft and attack helicopters solely for ground-training purposes.

GROUND TARGETS

Method of reducing **battle tanks**, **armoured combat vehicles (ACVs)** and self-propelled pieces of **artillery**, under the **Conventional Armed Forces in Europe (CFE) Treaty**. States parties to the CFE Treaty may reduce by use as ground targets up to 2.5 per cent of their battle tanks and ACVs, as well as up to 50 self-propelled pieces of artillery.

HEAVY ARMAMENT COMBAT VEHICLE (HACV)

Combat vehicle armed with an integral or organic direct fire gun of at least 75 millimetres calibre, weighing at least 6.0 metric tons unladen weight, which does not fall within the definitions of an **armoured personnel carrier**, an **armoured infantry fighting vehicle**, or a **battle tank**.

LANDMINE

Explosive device emplaced below, on the surface, or just above the ground, designed to detonate on contact or in the proximity of a target for the purpose of killing, destroying, injuring, or incapacitating it. Broadly speaking, landmines divide into two categories: **anti-personnel mines** and anti-vehicle mines. Anti-personnel mines are designed to kill or injure persons, while anti-vehicle mines are designed to destroy or damage tanks and other sorts of armoured vehicles.

METHODS OF REDUCTION

Eight procedures provided for in the **Conventional Armed Forces in Europe (CFE) Treaty** to reduce the existing numbers of **treaty-limited equipment (TLE)** to their respective limits as specified in the Treaty. These include **destruction**, **conversion** to non-military purposes, placement on **static display**, use for **ground instructional purposes**, **recategorization**, use as **ground targets**, **reclassification**, and **modification**.

MILITARY OBJECTIVES

Any object which by its nature, location, purpose, or use makes an effective contribution to military action and whose total or partial

destruction, capture, or neutralization, in the circumstances ruling at the time, offers a definitive military advantage.

MODIFICATION

Method of reducing possession of **treaty-limited equipment (TLE)**. Under the **Conventional Armed Forces in Europe (CFE) Treaty** only certain multi-purpose lightly armoured vehicles may be modified into an **armoured personnel carrier look-alike**. Unless modified these vehicles are considered as **armoured personnel carriers** and fall under the limits spelled out in the Treaty.

OBJECTS OF VERIFICATION (OOVS): see page 219.

RECATEGORIZATION

Method of reducing possession of **treaty-limited equipment (TLE)** under the **Conventional Armed Forces in Europe (CFE) Treaty**. Recategorization applies only to multi-purpose **attack helicopters**, and requires that the helicopters be rendered incapable of further employment of guided weapons through the removal of specific components. Recategorization is completed when the conversion of multi-purpose attack helicopters is certified. See also **certification**.

RECLASSIFICATION

Method of reducing possession of **treaty-limited equipment (TLE)** under the **Conventional Armed Forces in Europe (CFE) Treaty**. Reclassification applies only to specific models of combat-capable trainer aircraft which are transformed into unarmed trainer aircraft. Reclassification is completed when the disarmament of the aircraft is certified. See also **certification**.

REDUCTION INSPECTIONS: see page 222.

REDUCTION LIABILITY

Amount of equipment in each category of **treaty-limited equipment (TLE)** which a party has to discard in order to comply with the provisions of the **Conventional Armed Forces in Europe (CFE) Treaty**.

REDUCTION SITE

Designated location where the reduction of conventional armaments and equipment specified in the **Conventional Armed Forces in Europe (CFE) Treaty** takes place.

STATIC DISPLAY

Method by which parties to the **Conventional Armed Forces in Europe (CFE) Treaty** may reduce their possessions of existing **treaty-limited equipment (TLE)**. The CFE Treaty allows parties to use a limited number of TLEs (the greater of eight items or one per cent) as displays, provided specific reduction procedures are applied. Further, each party may retain in working order two items of each type of TLE for display in museums.

TREATY-LIMITED EQUIPMENT (TLE)

Five categories of conventional weapons regulated under the **Conventional Armed Forces in Europe (CFE) Treaty**, comprising **battle tanks**, **armoured combat vehicles (ACVs)**, **artillery**, **attack helicopters**, and **combat aircraft**. The destruction of TLE as mandated by the CFE Treaty may be undertaken in five different ways. Severing may be used for all TLE. Explosive demolition may be used for all TLE, except for combat aircraft. Deformation may be used for all TLE, except for ACVs and artillery systems not including self-propelled multiple-rocket launchers or mortars. Smashing may be used for battle tanks, ACVs, and self-propelled guns, howitzers, artillery pieces combining the characteristics of guns and howitzers, or mortars. Target drones usage applies to a maximum of 200 combat aircraft per State party.

3.4 CONVENTIONAL WEAPONS TERMS

AMMUNITION

Projectile fired or set off by some sort of delivery mechanism.

ANTI-HANDLING DEVICE

Device intended to protect a **landmine** which is part of, linked to, attached to, or placed under the mine and which activates when an attempt is made to tamper with the mine.

CONVENTIONAL FORCES

Military forces equipped with **conventional weapons**.

CONVENTIONAL WARFARE

The use of **conventional weapons** in war.

CONVENTIONAL WEAPONS

Weapons that are not weapons of mass destruction (WMD). Typically understood to include devices designed to kill, injure, or cause damage usually, though not exclusively, by means of the effects of **high explosives**, **kinetic energy** or **incendiaries**, and their delivery systems.

FUEL-AIR EXPLOSIVES

Combination of a combustible aerosol and a detonator, which produces a very powerful blast effect. Fuel-air explosives generate higher explosive force than equivalent **high explosives**.

HIGH EXPLOSIVES

Chemical charges which detonate at very high speeds and produce powerful shattering effects. Examples of high explosives include trinitrotoluene (TNT), nitroglycerine, amatol, RDX and PENT. Most conventional weapons employ high explosives to achieve their effects.

INCENDIARY

Device that uses combustible metals or a mixture of carbonaceous fluids and thickeners to generate extremely high temperatures upon detonation in order to ignite and/or burn the surrounding media.

KINETIC ENERGY WEAPON

Weapon system that exploits the force generated upon impact by a very fast-moving projectile to destroy a target rather than by means of an explosion.

LIGHT WEAPONS

Term generally used to denote weapons of a weight and size such that they are either man- or crew-portable. It is often used in conjunction with and sometimes as a synonym for **small arms**.

SMALL ARMS

Term generally understood to refer to small calibre weapons including revolvers and self-loading pistols, rifles and carbines, sub-machine guns, assault rifles, and light machine guns. Small arms are a category of **light weapons**.

CHAPTER 4

BIOLOGICAL WEAPONS

4.1 BACKGROUND

Biological weapons make deliberate use of **pathogenic** materials to inflict death or harm in humans or animals. Together with chemical and nuclear weapons, modern biological weapons are commonly classified as weapons of mass destruction (WMD).

The use of disease as an instrument of war has long been known to man. The modern origins of biological weapons, however, may be traced to the time of the First World War, and the alleged attempt by the German army to use pathogens for the purpose of sabotage. After the war, biological weapon research and development projects were set up in all the major countries. In France, the Commission de bactériologie was created in 1921 to draw up biological warfare policy. In the mid-1930s the French began developing anti-personnel and anti-animal agents at the Le Bouchet Laboratory. Research activities at Le Bouchet continued until the facility was captured by the Germans in 1940. In the United Kingdom, the Committee of Imperial Defence set up a Biological Warfare Sub-Committee in 1936 to prepare measures against possible biological attack. The establishment of a special biological weapons unit at Porton Down in 1940, marked the beginning of the British biological weapons programme. Research at Proton Down focused on anti-corp and anti-animal weapons using botulinum toxin and anthrax agents. By 1941 some 5 million anthrax-filled cattle cakes had been produced, and in 1942 several anthrax bombs were tested at Gruinard Island in Scotland. In May 1942 the British joined efforts with Canada and a few months later the United States. This collaboration lasted throughout the war and after. The United States began taking interest in biological weapons in 1941when a special commission was established to assess the threat of biological warfare. In1943 a research

station was set up and by 1944 a field-test facility was in operation. Also in 1943, the cloud chamber project got underway. This eventually demonstrated the feasibility of infection through inhalation and established the possibility of disseminating pathogens in aerosol form. By the end of the war, the United States had examined a wide number of agents, pioneered large-scale freeze-drying stabilization techniques, and tested at least one cluster bomb design for the dispersion of biological agents. In the Soviet Union, a biological weapons programme is thought to have begun around 1927. Prior to the Second World War, a variety of pathogens had already been researched and, by the beginning of the war, the Soviets were reportedly able to manufacture agents causing tularaemia, typhus, and Q fever. In Japan, an offensive biological weapons programme was established around the mid-1930s. The main Japanese research facilities were located at Beiyinhe and Pingfan in Manchuria. Over the course of the Second World War, the Japanese tested biological agents on prisoners of war and worked on several bomb designs for the large-scale dissemination of bacteria as well as on an aeroplane spray-tank device. In addition, the Japanese are thought to have used biological agents against the Soviets in Mongolia in 1939, against Chinese troops in 1942, and against Chinese civilians from 1940-1944. In Germany, a modest biological weapons programme was launched in 1943 with the establishment of a research station at Posen. The facility operated until 1945 when it was captured by the Soviets. Research carried out included the study of anti-personnel and anti-crop agents, and of spray-tank dispersion.

By the end of Second World War, although no country had achieved a significant breakthrough, the feasibility of biological weapons had at least been firmly established. In the wake of the war, research and development of biological weapons continued, most notably in the United States and the Soviet Union. In 1950 the United States decided to establish a peacetime biological agent production facility near Pine Bluff, Arkansas. Within a year anti-crop agents were already being manufactured there. Also beginning in 1950, a series of large-scale field experiments involving the spreading of harmless bacteria over selected urban and rural areas were conducted to test the effectiveness of agent aerial dissemination methods. The American biological weapons programme officially came to an end on 25 November 1969 when President Richard Nixon announced that henceforth the United States renounced all forms of biological warfare and ordered the closing of all facilities engaged in the production of biological agents as well as the destruction of all biological weapons stockpiles. A statement issued by

Nixon on 14 February 1970, extended the same treatment to toxin weapons. Thereafter, biological warfare research in the United States is said to have focused exclusively on the development of defensive countermeasures.

Public accounts of the Soviet biological weapons programme indicate that during the Cold War the Soviet Union maintained an extensive research and production effort. The end of the Second World War left the Soviets in possession of much of Germany's advanced agent manufacturing techniques and Japan's weapon development research. Thereafter, the Soviets proceeded to investigate new types of agents and improved techniques for their production and dispersion. Significant quantities of biological weapons also seem to have been manufactured. During the 1970s, the Soviet biological weapons programme reportedly sought to capitalize on advances in the field of genetic engineering by creating more virulent strains of pathogens. On 2 April 1979 an outbreak of pulmonary anthrax erupted around a military installation in Sverdlovsk. In a statement issued on 29 January 1992, then Russian President Boris Yeltsin acknowledged that the outbreak had been caused by an accidental release of anthrax spores. At the same time he ordered the cessation of all Russian biological weapons activities and the destruction of all existing biological weapon stockpiles.

Since the Second World War, besides the Soviet Union and the United States, other countries also are believed to have attempted to develop biological weapons. The most striking example in this respect, is Iraq. It has now been established that between 1985 and 1991 Iraq carried out an intensive biological weapons development programme. The programme covered a comprehensive range of anti-personnel and anti-plant agents, and a wide range of delivery systems including ballistic missiles. By the time of the Gulf War in 1991, Iraq had produced significant quantities of biological agents, an important part of which had been already filled into munitions and deployed. After the Gulf War, the United Nations Security Council mandated the destruction of all Iraqi weapons of mass destruction including biological weapons.

Biological weapons consist of **biological agents** and the munitions, equipment, or means employed in their delivery. Biological weapon agents cause harm through their pathogenic effects on living organisms. Future ones could also possibly damage equipment by causing corrosion and

degradation of plastic and rubber components. Most biological weapon agents are living organisms that can reproduce and multiply following dispersion. This quality allows them to actually multiply their effect over time. Furthermore, some agents can cause contagion, which means that they can spread disease from one contaminated organism to another. Agents causing contagious disease have the potential to trigger an epidemic, especially if local sanitation conditions are poor. From a warfare point of view, these agents are evidently more valuable, because they have the potential to inflict the greatest amount of damage. Other inherent features which influence the suitability of biological agents for warfare purposes include: infectivity, virulence, toxicity, incubation period, lethality, and stability.

Biological agents suitable for use in weapons are typically classified into five categories: **bacteria**, **viruses**, **rickettsiae**, **fungi**, and **toxins**. Bacteria are unicellular micro-organisms consisting of nuclear material, cytoplasm, and cell membrane. They are generally readily grown on artificial solid or liquid culture media, and replicate by straight division. Some bacteria are pathogenic, and although most of these can be countered with **antibiotics**, strains can be selected that are resistant to known treatment. Bacterial agents usable in biological weapons include *bacillus anthracis*, *brucella suis*, *yersinia pestis*, *vibrio choleare*, *pasteurella tularensis*, and *salmonella typhi*. Viruses are micro-organisms consisting of a nucleic acid molecule coated in protein. They are significantly smaller in size than bacteria, and can only be grown within living cells. Viruses are abundant in nature. They are able to mutate on their own, or may be genetically altered to increase their effectiveness. Viral disease are generally untreatable. Viral agents utilizable in biological weapons include *Venezuelan enquine encephalitis*, *Ebola*, *Hantaan*, *Rift Valley fever*, and *yellow fever*. Rickettsiae are micro-organisms similar in structure to bacteria, but that must be grown within living cells like viruses. Similarly to bacteria, rickettsiae are treatable with antibiotics. Rickettsial agents amenable to use in biological weapons include *coxiella brunetti*, *bartonella quintana*, *rickettsia prowasecki*, and *rickettsia rickettsii*. Fungi are spore-producing micro-organisms that feed on organic matter. They are generally not harmful to man or animals, but can be damaging to plants. Fungal diseases are generally treatable with anti-microbial agents. Fungal agents that may be suitable for use in biological weapons include *colletotrichum kanawae*, *helminthosporiumoryzae*, *microcyclus ulei*, and *puccinia graminis*. Toxins are poisonous substances produced or derived from animals, plants, or micro-organisms. Unlike the other kinds of

biological agents, toxins are not living organisms and hence are unable to reproduce. Some toxins may be produced artificially. Toxin poisoning may be amenable to pharmacological treatment. Toxins utilizable in biological weapons include *alfatoxins*, *botulinum toxins*, *ricin*, *staphylococcus aureus toxins*, and *saxitoxin*.

Although the exact production process is agent-specific, the manufacture of biological agents generally entails selecting the micro-organisms to be used either from a natural source or from culture collections maintained for medical or research purposes; culturing the micro-organisms by seeding the appropriate growth media (in the case of toxins, extracting the culture from an appropriate plant or animal source) until the desired quantities are obtained; concentrating the culture to increase its potency and make it suitable for warfare purposes; and stabilizing the culture to protect it from degradation either during storage or usage. If biological agents are to be produced as a dry powder, the liquid culture obtained as described is dried out and then milled into microscopic particles. Generally the procedures for the production of specific biological agents are well documented in open literature, and the equipment needed to produce them is dual-use. This in turn implies that any country wishing to produce some sort of biological agent can likely do so with limited effort and specialized infrastructure.

Biological agents may be dispersed by a variety of explosive, spraying, or dispenser munitions. Explosive munitions rely on the force generated by the detonation of a high-explosives charge to disperse the agent over the target. They are not terribly effective, however, as the physical effects produced by the blast of the high-explosives is likely to inactivate most if not all of the agent instantly. Moreover, explosive munitions are unable to control the **particle size** of the agent, which is typically crucial for effective dissemination. All explosive munitions involve some sort of bomb. Spraying munitions disseminate the biological agent as an invisible aerosol cloud of microscopic particles. Typical spraying munitions involve some sort of nozzle device or spray tank. They offer excellent control over particle size, and avoid the stress and attending inconveniences generated by explosive devices. Dispenser munitions employ special aerosol generators affixed to aircraft or ground vehicles to deliver pre-sized dried powders. Processing the agents into this form is usually difficult, however, once this is achieved, dispenser dissemination is relatively simple and effective.

The effects of biological weapons are influenced by many factors including the type and quality of agents used, effective dissemination, environmental conditions, and the susceptibility of the target. Different types of agents induce different results. For example, whereas some agents are lethal, others are merely incapacitating, and while some are contagious and capable of triggering an epidemic, others are not. Additionally, some agents are more amenable to treatment than others. The quality of the agents used, also makes a difference. For instance, agents need to be stabilized in order to be protected from natural decay while in storage, and environmental conditions in application. All other things being equal, a stabler agent has a greater likelihood of successfully penetrating its target. Successful dissemination plays a key role in the effectiveness of biological weapons. As discussed, biological agents are most effective when disseminated as aerosols. Typically, with aerosol dissemination, about 40-60 per cent of the agent is expected to survive the initial dispersion process, whereas with explosives dissemination, only about 1-5 per cent of the agent is likely to survive. In the case of anti-personnel agents, aerosols are generally intended to contaminate the target via the respiratory system. To achieve this, the microscopic droplets forming the aerosol need to have a particle size of approximately 0.5-10 microns in diameter, for otherwise they will not be able to effectively penetrate the lungs. In the case of anti-plant agents, aerosol dispersion is once again preferred because of its better area-coverage possibilities. Because most biological agents are fragile living organisms, they are very sensitive to environmental conditions. Exposure to sunlight, air pollutants, the wrong or a rapidly changing level of humidity, and even oxygen can render them inactive. Although most agents can be effectively stabilized against exposure, the effects of environmental conditions remain nevertheless difficult to predict and control. Finally, the level of protection available to the target will also have a bearing on the effects of biological weapons. Early warning, protective equipment and prophylactic and therapeutic treatment can under limited circumstances contain the effects of biological agents. More broadly, the ability of contagious agents to spread an epidemic often depends on the general level of sanitation characterizing the target.

The use of biological weapons presents advantages and disadvantages alike. On the one hand, biological weapons are more economical to build and, due to their high potential virulence, to use than nuclear, chemical, or conventional weapons; they can offer considerable tactical flexibility in that a very wide range of agents that can be combined in numerous ways is

available; they can attack large targets over protracted periods of time due to their ability to multiply and even cause epidemics, as well as their capacity to contaminate areas for very long; they can consume significant enemy resources by inflicting high casualties rates and soliciting the mobilization of massive resources in response; they can have a devastating psychological impact on the target by conjuring up the fear of undetected contamination and impending death; and they are suitable for covert or terrorist operations since they can be dispersed discretely and their effects take time to develop. On the other hand, biological weapons are highly unreliable due to their extremely uncertain effects; their effects are never immediate due to their inevitable period of incubation which can take from hours to days after contamination; their use carries the risk of contaminating even the attacker; they greatly complicate all other military operations by imposing onerous regimes of precautionary measures; and their use is prohibited by international convention and might therefore attract international sanction.

Carefully taking into account their capabilities and limitations, biological weapons could be used against both military and civilian targets. Militarily biological weapons can be useful in attacking large, relatively static targets to the rear of the battlefield such as troop assembly areas and reserves pools, artillery emplacements and missile bases, command and control posts, logistical installations, fortifications, and air- or naval-bases. Against civilians, biological weapons could be used to instigate epidemics on a mass scale, to contaminate water and food supplies, or to carry out terrorist acts.

Biological weapons could be attractive to States or sub-State actors seeking to acquire a weapons of mass destruction capability. Compared with nuclear and chemical weapons, biological weapons are considerably easier and cheaper to build. As discussed, any country or sub-national group determined to produce some sort of biological agent can probably do so with minimal investment, and although the dissemination of biological agents can be complicated, some means are easily accessible. For example, prior to the Gulf War of 1991, Iraq had made significant progress in developing a comprehensive biological weapons capability in a very short period of time, while the Japanese cult Aum Shinrikyo, known for its chemical attack on the Tokyo subway system in June 1994, had also managed to produce anthrax, although it failed to develop a workable dissemination method. Despite this attractiveness, however, biological

weapons are generally perceived as untried, unreliable and not very useful, and hence as militarily inferior to nuclear or chemical weapons. Moreover, their use is prohibited by international convention since 1925, as is their development or possession since 1972.

4.2 Arms Limitation History: Approaches and Instruments

4.2.1 Global Attempts

Global efforts to restrict the use of biological weapons began after the First World War. The **Geneva Protocol for the Prohibition of the Use in War of Asphyxiating**, **Poisonous or Other Gases**, **and of Bacteriological Methods of Warfare** concluded in 1925, prohibited the use of chemical and biological weapons alike. During the 1930s, attempts were made to ban the production and stockpiling of biological weapons at the World Disarmament Conference. The eventual collapse of the Conference in 1937 brought these to naught, however.

After the Second World War efforts to control biological and chemical weapons remained tied to one another. In 1962 the elimination of biological and chemical weapons was placed on the agenda of the newly-established Eighteen-Nation Disarmament Committee (ENDC). Stalemate in the ENDC led in 1968 to a proposal by the British to separate discussions on the two issues. In 1969, the British submitted a draft convention on the production, possession, transfer, and use of biological weapons as well as of biological weapons research and delivery systems. This, however, was rejected by the Soviet Union who opposed the separation of biological and chemical weapons talks. Thereafter, discussions remained deadlocked until the spring of 1971 when the Soviets suddenly reversed their position and accepted the splitting of negotiations. As a result, in August 1971, the Soviet Union and the United States tabled identical drafts for a convention on biological weapons and, on 10 April 1972, the **Biological and Toxin Weapons Convention (BTWC)** prohibiting the development, production, stockpiling, or acquisition of biological agents or toxins for non-peaceful purposes as well as of related delivery means, was signed.

Among other provisions, the BTWC called for the holding of a **Review Conference** by the States parties to assess the functioning of the Convention (subsequent Conferences have been held on the basis of consensus). At the

Second Review Conference held in September 1986, the parties agreed to a series of transparency measures to increase confidence in the functioning of the Convention. These comprised the declaration of all high-security containment facilities, the declaration of unusual outbreaks of disease, the encouragement of the publication of research results, and the encouragement of scientific contacts. At the Third Review Conference held in September 1991, in addition to adopting further transparency measures, the parties decided to establish the **Ad Hoc Group of Governmental Experts on Verification (VEREX)** to identify ways of verifying compliance with the Convention. Following a consensus report submitted by VEREX at a Special Conference convened in 1994, the **Ad Hoc Group (AHG)** was established to elaborate these further. In 1996, at the Fourth Review Conference, the AHG was charged with negotiating a legally binding Protocol on verification to be added to the BWTC. Efforts toward this end, however, have not come to a successful conclusion.

In addition to the BTWC, some States have sought to curb the risk of biological weapons proliferation by placing export controls on the transfer of potential biological agents and their delivery systems. The **Australia Group** established in 1985, is an informal association of States that aims to harmonize national export controls on materials usable in the production of biological and chemical weapons. The Group maintains control lists that itemize materials and equipment including 93 pathogens and toxins that affect humans, animals or plants, and a small set of production equipment. Group countries review exports of such items to ensure that they will not be used in a biological weapons programme. Similarly, the Missile Technology Control Regime (MTCR) which was established in 1987, restricts the transfer of missiles capable of carrying biological and other weapons of mass destruction payloads over a distance of 300 kilometres, and of their components.

4.2.2 Regional Attempts

De facto regional controls on the deployment of biological weapons operate as part of several weapon-free zone treaties. The Antarctic Treaty bans the deployment of any military equipment or facilities on the Antarctic continent, while the Moon, Outer Space, and Seabed Treaties ban the deployment of weapons of mass destruction on the moon, in space, and on the ocean seabed. In addition, the **Mendoza Agreement**, concluded by Argentina, Brazil and Chile in 1991, prohibits the parties from developing,

producing, acquiring, transferring, or using biological and chemical weapons.

4.2.3 Trilateral Attempts

On 11 September 1992 the Governments of the Russian Federation, the Unite Kingdom, and the United States issued a **Joint Statement on Biological Weapons**. The statement aimed to assuage concerns about Russian compliance with the provisions of the BTWC, in the wake of Russia's admission that the Soviet Union had carried out a biological weapons programme in contravention of the BTWC between 1972 and 1992. In the statement, the three countries confirmed their commitment to full compliance with the terms of the BTWC, and Russia affirmed its status as the legal successor to the Convention. Moreover, to remove any lingering ambiguities, Russia gave assurances about the termination of its offensive biological weapons programme and agreed to provide information and accept visits to non-military sites and, thereafter, to military research and development facilities. However, at the time of this writing, Russia has yet to permit access to its military laboratories.

4.3 Arms Limitation Instruments

4.3.1 Global Instruments

Australia Group: see page 61.

Biological and Toxin Weapons Convention (BTWC) (*Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction*)

Multilateral treaty opened for signature in London, Moscow and Washington, D.C. on 10 April 1972. The Convention entered into force on 26 March 1975, after 22 governments, including the three depositary governments, deposited their instruments of ratification. It is of unlimited duration, and withdrawal requires three months prior notification.

The BTWC prohibits parties to develop, produce, stockpile or otherwise acquire or retain microbial or other **biological agents**, or **toxins** whatever their origin or method of production, of types and in

quantities that have no justification for prophylactic, protective or other peaceful purposes; weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict. All prohibited substances are required to be destroyed or diverted to peaceful purposes within nine months following the entry into force of the Convention.

Verification of compliance with BTWC obligations is carried out for the most part through national technical means. The parties are to consult and cooperate to resolve any problems arising from the implementation of the Convention. If a party is suspected of acting in breach of the Convention, a complaint against it may be submitted to the United Nations Security Council.

The BTWC provided that five years after its entry into force a **Review Conference** be convened to review its operation; subsequent Review Conferences have been held every five years on the basis of agreement between the parties. At the Second Review Conference held on 1986, the parties agreed to a series of transparency measures in order to bolster confidence in the workings of the Convention. These comprised the declaration of all high-security containment facilities, the declaration of unusual outbreaks of disease, encouragement of the publication of research results, and encouragement of scientific contacts. In 1994, a Special Conference established the **Ad Hoc Group (AHG)**, which was subsequently mandated to draft a Protocol specifying verification measures to be added to the Convention. After lengthy deliberations, efforts toward this end have not come to a successful conclusion.

ENMOD Convention (*Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques*)

Multilateral agreement opened for signature on 18 May 1977, and entered into force on 5 October 1978. The Secretary-General of the United Nations serves as the depositary. The Convention is of unlimited duration.

The ENMOD Convention prohibits widespread, long-lasting or severe changes to the environment by deliberate human manipulation of natural processes, and forbids any changes in the dynamics, composition or structure of the earth, including the atmosphere and outer space, as means of destroying, damaging or injuring any State party. The term “widespread” is defined as encompassing an area of

several hundred square kilometres. The term "long-lasting" is defined as a period of months or a season. The term "severe" is defined as involving serious or significant disruption or harm to human life, nature and economic resources. This would include the deliberate causing of phenomena such as earthquakes, seismic sea waves, an upset in the ecological balance of a region, changes in weather patterns, changes in climate patterns, and changes in ocean currents. Exceptions are allowed for any changes that fall below the threshold established by the Convention or that are made for non-hostile purposes.

The Convention does not contain any specific verification provisions although the Consultative Committee of Experts can engage in fact-finding missions upon request by a State party.

GENEVA PROTOCOL: see page 63.

MISSILE TECHNOLOGY CONTROL REGIME (MTCR): see page 123.

UNITED NATIONS SPECIAL COMMISSION ON IRAQ (UNSCOM): see page 201.

4.3.2 Regional Instruments

ANTARCTIC TREATY: see page 23.

MENDOZA AGREEMENT: see page 64.

MOON TREATY: see page 83.

OUTER SPACE TREATY: see page 84.

SEABED TREATY: see page 84.

4.3.3 Trilateral Instruments

JOINT STATEMENT ON BIOLOGICAL WEAPONS BY THE GOVERNMENTS OF THE UNITED KINGDOM, THE UNITED STATES AND THE RUSSIAN FEDERATION

Joint declaration issued by the Russian Federation, the United Kingdom, and the United States following a meeting in Moscow on 10-

11 September 1992. The declaration aims to address concerns with regard to compliance with the 1972 **Biological and Toxin Weapons Convention (BTWC)**. Under the declaration, the three States confirm their commitment to full compliance with the BTWC, and Russia affirms its legal succession to the obligations of the Convention. In addition, Russia undertakes to terminate the offensive biological weapons programme conducted by the Soviet Union between 1971 and 1992 in contravention of the BTWC, and to provide information and allow visits to non-military research facilities. Subsequently it was also to permit visits to military facilities. Finally, the three parties agree to establish working groups to investigate potential measures to monitor compliance with the BTWC.

4.3.4 Arms Limitation Instruments Terms

AD HOC GROUP (AHG)

Body created by the parties to the **Biological and Toxin Weapons Convention (BTWC)** at the Special Conference held in September 1994. In 1996 the AHG was mandated to draft a Protocol providing for monitoring and verification measures to be added to the BTWC. The Protocol was expected to include such measures as mandatory declarations of facilities and activities, and voluntary and challenge on-site inspections. Implementation of these provisions was to be administered by a specially established organization. Negotiations on the Protocol, however, have not come to a successful end.

AD HOC GROUP OF GOVERNMENTAL EXPERTS ON VERIFICATION (VEREX)

Group of government and scientific experts established on an ad hoc basis by the Third **Review Conference** in September 1991 to identify and examine possible verification measures from a scientific and technical standpoint. In September 1994, after four working sessions, VEREX produced a consensus report that was forwarded to States parties at a Special Conference. The Special Conference endorsed the report and mandated the convening of the **Ad Hoc Group (AHG)** to draft a legally binding Protocol on verification to strengthen the Convention.

REVIEW CONFERENCE

Conference held every five years by the States parties to the **Biological and Toxin Weapons Convention (BTWC)**. The initial Conference was explicitly provided for by the Convention; subsequent ones have been held on the basis of agreement between the parties. The Review Conference examines the operation of the BTWC and allows parties to address matters of concern. At the Second Review Conference convened in 1986 the parties agreed to a set of voluntary transparency measures to enhance trust in the functioning of the Convention. At the Third Review Conference held in 1991, the parties formally established the **Ad Hoc Group of Governmental Experts on Verification (VEREX)** to examine the feasibility of procedures and techniques for the verification of compliance with the provisions of the Convention. See also **Ad Hoc Group of Governmental Experts on Verification (VEREX)** and **Ad Hoc Group (AHG)**.

4.4 BIOLOGICAL WEAPONS TERMS

ANTIBIOTICS

Substances usually obtained from micro-organisms that inhibits the growth of or destroys other virulent micro-organisms. Antibiotics boost the natural immune system and can also be used as a defence against **biological agents**. However, antibiotics may not always be effective in this role. Many biological agents can be designed to be resistant to particular antibiotics.

BACTERIA

Single-cell micro-organisms consisting of nuclear material, cytoplasm and cell membrane, some of which can cause disease. They are generally readily grown on artificial solid or liquid culture media, and replicate by simple division. Although many pathogenic bacteria are susceptible to **antibiotics**, strains can be selected that are resistant to particular treatments. Bacteria suitable for use as **biological agents** include *bacillus anthracis*, *brucella suis*, *yersinia pestis*, *vibrio choleare*, *pasteurella tularensis*, and *salmonella typhi*.

BIOLOGICAL AGENT

Infective material that causes death or incapacitation through its pathogenic effects. Biological agents are usually classified into

bacteria, **viruses**, **rickettsiae**, **fungi**, and **toxins**. They can be used against man, animals, or plants. Typically they penetrate the human body through the respiratory or digestive system.

BIOLOGICAL WARFARE

Use of **biological weapons** for hostile purposes.

BIOLOGICAL WEAPON (BW)

Device or **vector** that delivers **biological agents** to target. In the early years of the 20th century, biological weapons were known as bacteriological weapons.

CONTAINMENT

Safety regime implemented to ensure the safe handling or maintenance of hazardous biological materials. It is of two types of: primary and secondary. Primary containment refers to the protection of the personnel and of the immediate laboratory environment from exposure to hazardous biological materials. Secondary containment refers to the protection of the environment outside the laboratory from exposure to such materials.

FERMENTATION

Process of inducing the growth or reproduction of micro-organisms such as **biological agents** in a controlled environment. This process is vital to the cultivation of biological agent cultures.

FUNGI

Group of micro-organisms that live off organic matter. Although usually not harmful to humans and animals, fungi can be damaging to plants. Fungi suitable for use as **biological agents** include *colletotrichum kanawae*, *helminthosporiumoryzae*, *microcyclus ulei*, and *puccinia graminis*.

PARTICLE SIZE

Size of a dispersed **biological agent** or chemical agent particle. It affects the capacity of the agent to effectively penetrate the respiratory system of an individual. For instance, large particles quickly settle out of the air and cannot be inhaled into the lung while very small particles are unstable and ineffective.

PATHOGEN

Disease-causing micro-organism or toxin. All **biological agents** are pathogenic.

RICKETTSIA

Intracellular micro-organisms similar in structure and form to **bacteria**, but that must be grown within living cells like **viruses**. Rickettsia have pathogenic effects on man; exposure may lead to temporary incapacitation. Rickettsiae for use as **biological agents** include *coxiella brunetti*, *bartonella quintana*, *rickettsia prowasecki*, and *rickettsia rickettsii*.

STABILIZATION

Processing of a **biological agent** for storage or loading into munitions. It protects the agent against degradation during storage or usage. Stabilization may be achieved through a variety of techniques including direct freeze drying, direct spray drying, and deep freezing.

TOXINS

Non-living poisonous by-products of plants, animals, micro-organisms, or artificial chemical synthesis. Unlike other **biological agents** toxins cannot reproduce, and therefore cannot produce transmissible diseases; they only affect those organisms exposed. Exposure to toxins by humans may cause temporary incapacitation ranging from a few hours to several days, or death. Because toxins are not living organisms, they are more stable and therefore easier to handle than other biological agents. Toxins usable as biological agents include *alfatoxins*, *botulinum toxins*, *ricin*, *staphylococcus aureus toxins*, and *saxitoxin*.

VECTOR

Arthropod used to deliver a **biological agent** to its target.

VIRUS

Infective micro-organism consisting of a nucleic acid molecule coated in protein. Viruses reproduce within living cells, and can mutate naturally or be genetically altered to increase their effectiveness. Viral warfare agents are usually fatal to man, and unlike bacterial agents, are not susceptible to treatment. Viruses usable as **biological agents** include *Venezuelan enquine encephalitis*, *Ebola*, *Hantaan*, *Rift Valley fever*, and *yellow fever*.

CHAPTER 5

CHEMICAL WEAPONS

5.1 BACKGROUND

Chemical weapons make deliberate use of the toxic properties of chemical substances to inflict death or harm. Together with biological and nuclear weapons, chemical weapons are generally considered to be weapons of mass destruction (WMD).

The modern use of chemical substances as an instrument of war occurred early on in the First World War. On 15 April 1915, two French divisions defending the Belgian town of Ypres were doused with chlorine by the German army. The attack proved to be a mitigated success. The panicked French troops gave way, but the Germans, surprised by the extent of their break-through, failed to exploit their temporary advantage. The German use of chlorine at Ypres marked the beginning of gas warfare. Thereafter, both the Germans and the Allies made regular use of gas as part of their major military operations, with each striving to outdo the other in offensive and defensive innovations. As the war progressed, new and more virulent substances such as phosgene and mustard made their way to the battlefield, initially introduced by the Germans, subsequently take up by the Allies.

By the end of the war it had become common wisdom that gas was an inextricable part of modern combat. Yet the employment of chemical weapons during the war had by no means shown itself to be decisive. After all, gas, had neither helped the Germans avoid defeat, nor secured victory for the Allies. Moreover, its unreliable effects and the logistical and tactical complications it introduced made it a cumbersome and clumsy weapon, to say the least.

After the war, the development of chemical weapons continued to attract respectable attention. Research programmes aimed at the construction of protective measures and the synthesis of new, more potent, agents were carried out by all the major powers. Most notably, in 1936, a German chemist working on the development of new pesticides stumbled onto an extremely toxic substance that attacked the nervous system, which he named tabun (GA). Two years later, he discovered an even more toxic substance, which he called sarin (GB). A new type of chemical weapons was thus born.

In the inter-war period, chemical weapons were used on several occasions. The Italian army made use of gas in Abyssinia, while the Japanese employed it in their invasion of China. Although presumably considered on several occasions, with the exception of the Japanese in China, chemical weapons played no part in the Second World War.

After the Second World War, research on chemical weapons focused on the new toxic substances, tabun and sarin, captured from Germans. Both the United States and the Soviet Union set up large-scale production facilities, and set upon perfecting a multitude of delivery systems. In the late 1950s, British researchers developed a new type of nerve compounds known as V-agents. These were more stable and considerably more toxic than sarin. The Americans dubbed their version of the compounds VX. The Soviets too, developed a strain similar in structure to VX.

Chemical weapons consist of **toxic chemicals** (and their **precursors**), and the devices used to deliver these to target. Toxic chemicals induce death, injury or temporary incapacitation. Precursors are part of the production of toxic chemical. Although numerous substances fit the description of toxic chemicals, in practice, only relatively few have been selected for weapon development. To be suitable for use as a weapon of war, a chemical substance must be sufficiently toxic to induce the desired effects when applied in small quantities as well as be reasonably easy to produce in large quantities, and be stable enough to preserve its toxicity during storage and survive the process of dissemination.

Toxic chemicals used in the production of chemical weapons may be classified according to several criteria such as for instance their volatility or

military use. Most commonly, however, they are grouped according to their effects into: **blood agents**, **blister agents**, **choking agents**, **nerve agents**, **incapacitating agents**, **harassing agents**, and **toxins**. Blood agents inhibit the exchange of oxygen that normally takes place between red blood cells and body tissue. They are very fast acting, and exposure is generally fatal. Blister agents induce severe burns and blisters on the skin, eyes, and lungs. Exposure to blister agents causes immediate injury and pain, and may induce death through asphyxiation. Choking agents attack the eyes and respiratory tract. They are particularly damaging to the lungs, which they cause to fill up with fluid and swell such that the blood stream can no longer be supplied with oxygen. This causes gradual asphyxiation, and eventual death. Nerve agents are the most potent toxic chemicals. They are generally colourless, odourless and tasteless, and are easily absorbable through the respiratory system, eyes, skin, and the digestive tract without causing irritation and thereby alerting the target to their presence. They are highly toxic and generally fatal even after very brief exposure. They induce their effects by interfering with the transmission of nerve impulses in the nervous system. Incapacitating agents do not kill or injure, but rather render their target incapable of carrying out routine actions. They cause only temporary physical or physiological effects which generally wear out after a short period of time. Similarly to incapacitating agents, harassing agents induce only temporary physiological effects such as the disruption of vision or respiration, which typically do not cause serious injury. Compared with incapacitating agents, harassing agents are faster acting, although, their effects are also shorter lasting. Toxins are poisons produced by living organisms or their synthetic equivalents. They are highly poisonous and exposure can be fatal.

Most toxic chemicals can be produced in a variety of ways. The production agenda may be more or less onerous depending on the type of agent. The production of blood and choking agents is relatively simple, and does not require special facilities or equipment beyond what is afforded by a modest chemical industrial base. Many such agents are already produced as part of commercial industrial activities throughout the world, and are readily available for purchase on the market. The production of blister agents is slightly more involved because of an initially greater risk of accident, yet still not terribly challenging. Blister agents have been manufactured since the First World War, and the processes for their production are well documented and understood. Unlike blood, blister and choking agents, nerve agents are much more complicated to synthesize.

They involve complex production processes and require specialized equipment that is highly resistant to corrosion. Toxins are generally extracted from the living organisms that produce them. The extraction process can be elaborate but still easier than the production of nerve agents. Toxins may also be produced synthetically, however, this is difficultly achieved on a large scale.

Once produced, toxic chemicals are either stored into bulk containers or loaded into munitions. Storage containers need to be leakproof and withstand corrosion. Munitions need to be designed to deliver the agent to target safely, and disseminate it in an effective manner. Broadly speaking, there are three main types of chemical weapons munitions: explosive munitions, thermal munitions, and spraying munitions. Explosive munitions employ high-explosives to distribute the chemical substance over the target. They are not particularly efficient since most of the substance is likely to be incinerated by the initial explosion, and since they are unable to control for **particle size**. They are, however, easy and inexpensive to produce, since they are adapted from common conventional munitions. Thermal munitions rely on pyrotechnics to aerosolize and disseminate the toxic substance. They are more effective than explosive munitions in that they are better able to control for particle size, however, most toxic substances are quite sensitive to heat and tend to degrade quickly if overexposed. Spraying munitions employ aerodynamic stress to disperse a toxic chemical in aerosol form. They have the advantage of offering very good control over particle size, and are particularly well suited for area-coverage dissemination. However, unless employed at low altitudes, the fine aerosol droplets produced may simply evaporate or be carried away by the wind before they have the chance to reach their target.

The effects of chemical weapons depend on several factors including effective dissemination, meteorological conditions, and the level of defence available to the target. Proper dissemination is crucial for chemical weapons. Unless the toxic substances are efficiently distributed over the target, their direct impact will likely be negligible. Generally, toxic substances will be distributed as aerosols or liquids. For off-target attacks where the substance is expected to travel some distance before reaching the target, aerosols comprising particles less than 10 microns in diameter will be employed. In this form, aerosols are capable of drifting downwind and of attacking the respiratory system. In using aerosols, it is important that

the right particle size be obtained. If the particle size is too great, the droplets will settle out of the air before they reach their target, or will be blocked by the natural defences of the respiratory tract. If it is too small, the particles will be dispersed too quickly and the target will be exposed to dosages too weak to produce the desired effect. For on-target attacks where the substance is dropped directly on the target, liquids composed of particles of at least 70 microns in diameter will be employed. Liquids in this form are useful when the desired effect is percutaneous. Here again obtaining the right particle size is key if the attack is to be effective. Particles that are too small will drift away and miss the target. Those that are too big, will not penetrate the skin. Meteorological conditions will also have a significant impact on the effect of chemical weapons. Unfavourable weather conditions can frustrate a chemical weapons attack. Bad wind, may blow the substance off-target or may disperse it before it can take effect, while rain may render it ineffective. Off-target and area-interdiction attacks are particularly susceptible to meteorological conditions and changes therein. Finally, the level of protection available to the target will also be determinant in deciding the impact of chemical weapons. In the absence of protection, chemical weapons can have devastating effects. However, timely detection and adequate personal and collective protection equipment can to a large extent vitiate these. The most common chemical weapon defence is the gas mask. Collective defences such as specially protected areas and vehicles are also available, as are to some extent prophylactic and therapeutic treatments against exposure.

Chemical weapons may be used against military as well as civilian targets. Their use has advantages and disadvantages alike. In terms of advantages, chemical weapons are cheaper to use than conventional ones, they can be used against dispersed or fortified targets, they can be used against point targets whose exact location is unknown, they can be used for area-interdiction, they attack personnel but leave equipment and infrastructure intact for further use, and they are suited for surprise or terrorist operations. In terms of disadvantages, chemical weapons require complicated operational capabilities, they have unpredictable effects, their effects may not be confined to the intended target area, they do not destroy equipment and hence leave enemy forces intact in case of failure, they impose negative externalities in that their use complicates the conduct of all other military operations, and their use violates international law and hence may attract international sanction.

Militarily chemical weapons are most likely to be used in tactical situations. Chemical weapons can be very effective in supporting conventional military activities. In offensive operations, surprise attacks of short duration but high intensity with non-persistent substances can be used to weaken enemy defences along and to the rear of areas slated for penetration, while persistent agents can be used to secure the flanks against counter-attack or to hinder the withdrawal of enemy forces. In defensive operations, non-persistent agents can be used to disrupt enemy staging areas, command posts and fire-support emplacements, while persistent agents can be used to channel enemy forces into defence traps. Chemical weapons may also be used in naval battles, or to attack air bases. Whichever the case, the use of chemical weapons severely complicates and slows down all military operations and, all else being equal, this may be to the advantage of the party preferring a lower pace of battle. In addition, because chemical weapons have the potential to inflict high casualty rates, their use may very well be to the advantage of a numerically inferior party, if this inferiority cannot be overcome by other means.

Against civilian targets, chemical weapons are probably best suited for terrorist attacks. The release of toxic substances within enclosed areas against unprotected civilians, can have great effect. A hint of this was provided by the sarin attack perpetrated by the Aum Shinrikyo cult in the Tokyo subway in June 1994. Although botched, the attack still killed seven people and injured about 500. Strategic strikes against civilian areas can also be envisaged, but to a much lesser degree. Unless complete surprise is achieved, such strikes are unlikely to prove terribly effective beyond the minor disruption of normal daily activities.

As weapons of mass destruction, chemical weapons can be attractive to State and non-State actors seeking a WMD capability. Compared to nuclear weapons, they are significantly easier and cheaper to develop, produce, and maintain. However, their unreliable effects and their other drawbacks outlined above, make them inferior to nuclear weapons from the military point of view. Chemical weapons have been produced by a number of States, and many others have the ability to do so. Since 1993, however, chemical weapons have been banned by international law.

5.2 Arms Limitation History: Approaches and Instruments

5.2.1 Global Attempts

International restrictions on modern chemical weapons have progressed from the loose control of their use to their complete prohibition. The potential threat posed by the use of chemical weapons was appreciated as early as the 19th century. The Brussels Convention of 1847 prohibited the employment of poison or poisoned weapons, while the Hague Conventions of 1899 prohibited the use of asphyxiating or deleterious gases. The ubiquitous use of gas during the First World War, provided great impetus to chemical weapon control efforts in the inter-war years. The Treaty of Versailles which concluded the war with Germany, contained provisions that prohibited Germany from manufacturing or importing chemical weapons. Similar provisions were included in the other peace treaties. In 1922, at the Washington Naval Conference, an agreement was signed which declared the prohibition of the use of poisonous or other gases and all analogous liquids, materials, and devices. The failure of France to ratify the agreement due to a dispute over its provisions on submarines, however, nullified the accord. In 1925 the United States proposed that the League of Nations ban trade in chemical weapons. The negotiations resulting from this proposal led in 1925 to the conclusion of the **Geneva Protocol for the Prohibition of the Use in War of Asphyxiating**, **Poisonous or Other Gases**, **and of Bacteriological Methods of Warfare**. The Protocol, as it's name suggests, banned the use of chemical and biological weapons.

Having remained idle during the Second World War, after the conflict chemical weapons attracted little attention form the international community. Debates at the United Nations in the 1940s over how to define weapons of mass destruction, resulted in the inclusion of chemical weapons in the category. It was not until the mid-1960s, however, that chemical weapons began to resurface on the international agenda as a result of the use of defoliants by United States in the Vietnam War. In 1962 the prohibition of chemical and biological weapons was taken up at the Eighteen-Nation Committee on Disarmament (ENDC). Deadlock followed quickly. In 1968 the British suggested that chemical and biological weapons negotiations be separated. An agreement on the prohibition of biological weapons was reached in 1971, but talks on chemical weapons remained stalled. In the 1980s the use of chemical weapons by Iraq against Iran, rekindled discussions. In 1984 an agreement was reached on the structure

of a preliminary treaty. Subsequent bilateral talks between the Soviet Union and the United States advanced the matter further. In 1993 the **Chemical Weapons Convention (CWC)** prohibiting the acquisition, development and stockpiling, transfer and use of chemical weapons, was signed. It entered into force on 29 April 1997, 180 days after the 65th instrument of ratification was deposited.

In 1985, alarmed by the growing proliferation of chemical weapons in the Middle East and South-East Asia, a number of supplier States came together to form the **Australia Group**. This informal association harmonizes national export controls to prevent the transfer of chemical weapons precursors, biological toxins and pathogens, and chemical and biological production equipment to chemical and biological weapons programmes. In support of this effort, the Group maintains control lists which itemize these materials and equipment affecting humans, livestock animals, and/or food plants, and a small set of chemical and biological production equipment and technology. The Missile Technology Control Regime (MTCR) established in 1987 seeks to control the spread of unmanned delivery systems capable of carrying chemical and other weapons of mass destruction payloads.

5.2.2 Regional Attempts

De facto regional controls on chemical weapons emerged as part of treaties prohibiting the deployment of weapons of mass destruction in the Antarctic, outer space, and ocean seabed. Additionally, under the Mendoza Agreement of 1991, the Governments of Argentina, Brazil, and Chile undertook to refrain from the development, production, acquisition, transfer, or use of biological and chemical weapons. The Agreement marked the first attempt to ban chemical weapons at least regionally, although, in view of the CWC, its provisions have now become superfluous.

5.2.3 Bilateral Attempts

Bilateral controls on chemical weapons were agreed to by the Soviet Union and the United States at the end of the Cold War. The **Memorandum of Understanding (MOU)** concluded in 1989 on the basis of an American proposal, committed the two countries to exchange data on chemical weapon possessions and to have these verified by on-site

inspections. The **Bilateral Destruction Agreement** signed in 1990, further obliged the two not to produce chemical weapons, to reduce their stocks to equally low levels, to develop inspection procedures, and to cooperate in the safe disposal of chemical weapons. Both the MOU and the Bilateral Destruction Agreement have now been superceded by the CWC.

A bilateral accord with respect to chemical weapons, is also in force between India and Pakistan. The **India-Pakistan Agreement on Chemical Weapons** concluded in 1992 commits the two countries not to develop, produce, acquire or use chemical weapons, and to join the CWC. Subsequent to joining the CWC, India disclosed a chemical weapons capability.

5.3 Arms Limitation Instruments

5.3.1 Global Instruments

Australia Group

Informal association established in 1985 that restricts the transfer of chemical weapon **precursors** and **toxic chemicals**, of biological warfare agents and organisms, and of equipment used in the production thereof. Group members administer a common list of items subject to national export controls, coordinate approaches to export licensing procedures, consult and exchange information on matters relating to export requests which could potentially aid in the proliferation of chemical and biological weapons, and brief non-group members on the activities and purposes of the Group. Australia Group members meet each year in Paris with Australia as the chair.

Chemical Weapons Convention (CWC) (*Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction*)

Multilateral treaty banning the development, production, acquisition, stockpiling, retention, transfer, and use of **chemical weapons**, opened for signature in Paris on 13 January 1993, following the conclusion of negotiations in the Conference on Disarmament (CD). The Convention entered into force on 29 April 1997, 180 days after the deposit of the 65th instrument of ratification. The Secretary-General of the United

Nations serves as depositary. The CWC is of unlimited duration, and States parties may withdraw following prior notification of 90 days.

The CWC obliges States parties not to develop, produce, acquire, stockpile, transfer, use, or prepare to use chemical weapons. The Convention also requires the destruction of all chemical weapons and **chemical weapon production facilities** owned or controlled by a State party, as well as the destruction of chemical weapons abandoned by a State party on the territory of another State party. The destruction of all chemical weapons and chemical weapon facilities is to be accomplished within ten years following the CWC's entry into force (i.e. by April 2007). States parties may retain a small amount of chemical warfare substances to be used for research purposes and can maintain chemical weapon defence programmes.

The CWC contains a comprehensive verification regime comprising initial, routine, and challenge on-site inspections. Initial inspections verify the validity of the initial data declaration detailing the chemical weapon possession and facilities, and plans for the destruction thereof that States parties are required to submit under the Convention. Routine inspections verify facilities storing chemical weapons slated for destruction. Challenge inspections are conducted at the request of any State party that suspects that the Convention is being violated. All States parties are required to accept challenge inspections on very short notice. The CWC's verification regime is administered by the Organization for the Prohibition of Chemical Weapons (OPCW) established under the Convention. The OPCW gathers the initial data declarations submitted by States parties, conducts the inspections, serves as a forum for consultation and cooperation among the States parties, and has the ability to settle disputes between these regarding the application and interpretation of the CWC. The information gathered from all inspections is forwarded to the OPCW Executive Council which is empowered to determine whether a violation has occurred.

Chemicals subject to CWC verification provisions are divided into three schedules according to the degree of danger they pose. Schedule 1 chemicals, with the exception of a small quantity not exceeding one metric ton, which may be produced annually for protective, research, medical or pharmaceutical purposes, must be destroyed. Schedule 2 chemicals may not be transferred to non-CWC parties after the Convention has been in force for three years. Schedule 2 producers,

consumers and processors, above established thresholds, are subject to declarations and to on-site inspections. Schedule 3 chemicals must be declared if annual production exceeds 30 metric tons and facilities producing more than 200 tons are subject to on-site inspections. Schedule 3 chemicals can be transferred to non-CWC States parties without restrictions. See also Organization for the Prohibition of Chemical Weapons (OPCW).

GENEVA PROTOCOL (*Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare*)

Multilateral treaty banning the use of biological and **chemical weapons**, signed on 17 June 1925 and entered into force on 8 February 1928. The French Government serves as its depositary. The Protocol prohibits the use in war of asphyxiating, poisonous or other gases, and of all analogous liquids, materials or devices, as well as of bacteriological methods of warfare. However, the it does not prohibit the development or possession of **toxic chemicals** and weapons, or their use in non-war situations. Upon joining the Protocol, many States expressed reservations whereby they retained the right to retaliate with chemical weapons against any chemical attack upon themselves, and against non-members of the Protocol. Subsequently, however, many of these reservations were withdrawn. The Geneva Protocol has no international verification mechanisms, although a number of resolutions passed by the United Nations General Assembly (UNGA) have empowered the United Nations Secretary-General to investigate reports of non-compliance.

MISSILE TECHNOLOGY CONTROL REGIME (MTCR): see page 123.

ORGANIZATION FOR THE PROHIBITION OF CHEMICAL WEAPONS (OPCW): see page 199.

5.3.2 Regional Instruments

ANTARCTIC TREATY: see page 23.

MENDOZA AGREEMENT (*Mendoza Agreement on the Prohibition of Chemical and Biological Weapons*)

Multilateral agreement between Argentina, Brazil, and Chile signed on 5 September 1991. It banns the production, acquisition, possession, transfer, and use of biological and **chemical weapons**. The parties also commit to establish on a national basis appropriate inspections mechanisms necessary for the implementation of the accord.

MOON TREATY: see page 83.

OUTER SPACE TREATY: see page 84.

SEABED TREATY: see page 84.

5.3.3 Bilateral Instruments

BILATERAL DESTRUCTION AGREEMENT (*Agreement Between the USA and the USSR on the Destruction and Non-Production of Chemical Weapons and on Measures to Facilitate the Multilateral Convention on Banning Chemical Weapons*)

Bilateral agreement between the Soviet Union and the United States on the reduction and disposal of **chemical weapons**, signed at Washington, D.C. on 1 June 1990. The Agreement directs both parties to cooperate in the safe and efficient destruction of chemical weapons, not to produce chemical weapons, to reduce chemical weapons inventories to equally low levels, to develop appropriate inspection procedures, and to encourage all other chemical weapons-capable States to negotiate a chemical weapons convention. It is of unlimited duration, and each party may withdraw pending advanced official notification of 180 days.

INDIA-PAKISTAN AGREEMENT ON CHEMICAL WEAPONS
(*Joint Declaration by Pakistan and India on the Complete Prohibition of Chemical Weapons*)

Bilateral agreement between India and Pakistan concluded in New Delhi on 19 August 1992. It obliges the two parties not to develop, produce or acquire, use, or assist, encourage or induce anyone in the development, acquisition, stockpiling or use of chemical weapons. It

also commits both States parties to become parties to the **Chemical Weapons Convention (CWC)**.

MEMORANDUM OF UNDERSTANDING (MOU) (*United States-Russian Memorandum of Understanding on Chemical Weapons*)

Bilateral agreement between the Soviet Union and the United States with respect to the exchange of data on national **chemical weapons** capabilities by the two countries and the verification thereof, concluded in September 1989 at Jackson Hole, Wyoming. The Agreement specified two phases. In the first phase, the Soviet Union and the United States exchanged general data on their chemical weapons capabilities and conducted visits to each other's relevant military and civil installations as chosen by the host country. In the second phase, they exchanged detailed data on their chemical warfare capabilities and conducted five on-site inspections each (including a mock challenge inspection) at installations selected from a list of facilities declared in the data exchange. The experience gained from the data exchanges and on-site visits effected under the MOU played an useful role in the negotiations of the **Chemical Weapons Convention (CWC)**.

WEAPONS DESTRUCTION AND NON-PROLIFERATION AGREEMENT: see page 101.

5.3.4 Arms Limitation Instruments Terms

ABANDONED CHEMICAL WEAPON

Under the **Chemical Weapons Convention (CWC)**: **Chemical weapons**, including old chemical weapons, abandoned by a State after 1 January 1925 on the territory of another State without the consent of the latter.

CHEMICAL WEAPONS PRODUCTION FACILITY

Under the **Chemical Weapons Convention (CWC)**:(a) Means any equipment, as well as any building housing such equipment, that was designed, constructed or used at any time since 1 January 1946: (i) As part of the stage in the production of chemicals ("final technological

stage") where the material flows would contain, when the equipment is in operation: (1) Any chemical listed in Schedule 1 in the Annex on Chemicals; or (2) Any other chemical that has no use, above 1 tonne per year on the territory of a State Party or in any other place under the jurisdiction or control of a State Party, for purposes not prohibited under this Convention, but can be used for **chemical weapons** purposes; or (ii) For filling chemical weapons, including, inter alia, the filling of chemicals listed in Schedule 1 into munitions, devices or bulk storage containers; the filling of chemicals into containers that form part of assembled binary munitions and devices or into chemical submunitions that form part of assembled unitary munitions and devices, and the loading of the containers and chemical submunitions into the respective munitions and devices.

Destruction of Chemical Weapons

Process whereby **toxic chemicals** and their **precursors** are irreversibly converted to a form unsuitable for production of, or use as, **chemical weapons**, and which irreversibly renders munitions and other devices related to **chemical warfare** unusable.

Old Chemical Weapon

Under the **Chemical Weapons Convention (CWC)**: (a) **Chemical weapons** which were produced before 1925; or (b) Chemical weapons produced in the period between 1925 and 1946 that have deteriorated to such extent that they can no longer be used as chemical weapons.

Schedules of Chemicals

Lists specifying **toxic chemicals** to be subject to the verification provisions of the **Chemical Weapons Convention (CWC)**. Schedule 1 chemicals include those chemicals, which have been developed, produced, stockpiled, or used as **chemical weapons** or as chemicals that are **precursors** for the production of chemical weapons. These chemicals have little industrial value. Schedule 2 chemicals are divided into two lists. One list includes toxic chemicals that can be used to manufacture chemical weapons, but that are not used exclusively for this purpose. The other list contains chemicals that are potential

precursors of chemical weapons. Schedule 3 chemicals are chemicals that can be used to produce chemical weapons or their precursors, but are produced in large quantities for other purposes as well.

5.4 Chemical Weapons Terms

Binary Chemical Weapon

Store separately two non-toxic chemicals that are synthesized either just before or while the projectile is on its way to target, to form a **toxic chemical**.

Blister Agents *(Vesicants)*

General tissue irritants. Usually oily liquids that burn and blister the skin within hours of exposure. Contact with the eyes causes rapid injury and leads to inflammation and possible loss of sight. Injury to the respiratory tract is similar to that caused by **choking agents**. Commonly known blister agents include distilled mustard (HD), nitrogen mustard (HN), Lewisites (L), and phosgene oxime (CX).

Blood Agents

Inhibit the uptake of oxygen from the blood, thereby causing asphyxiation and death. Typically blood agents enter the body through the respiratory tract or the skin. They are very fast-acting. However, because they tend to be highly unstable, they are generally not regarded as suitable for use in large-scale military operations. Commonly blood agents include hydrogen cyanide (AC), and cyanogen chloride (CK).

Chemical Warfare

The use of **chemical weapons** for hostile purposes.

Chemical Weapon

Under the **Chemical Weapons Convention (CWC)**: (a) **Toxic chemicals** and their **precursors**, except where intended for purposes

not prohibited under this Convention, as long as the types and quantities are consistent with such purposes; (*b*) Munitions and devices, specifically designed to cause death or harm through the toxic properties of those toxic chemicals specified in subparagraph (*a*), which could be released as a result of the employment of such munitions and devices; (*c*) Any equipment designed for use directly in connection with the employment of munitions and devices specified in subparagraph (*b*). Under the CWC, all three elements mentioned in the three subparagraphs (*a*), (*b*) and (*c*), must be present in order to constitute a chemical weapon.

CHOKING AGENTS *(Asphyxiants)*

Typically gases or highly volatile liquids which, when inhaled irritate and severely damage the bronchial tubes and the lungs. The latter are caused to gradually fill up with fluids from the bloodstream. This inhibits the supply of oxygen to the body, and eventually causes death by asphyxiation. Common choking agents include chlorine (CL), chloropicrin (PS), and phosgene (CG).

HARASSING AGENTS

Sensory irritants that cause a temporary flow of tears, irritation of the skin and respiratory tract, and occasionally nausea and vomiting. They are mostly used for riot control but have also been used in warfare. The most common harassing agents are the tear gases CN and CS.

INCAPACITATING AGENTS

Cause temporary effects or induce temporary mental or physical disability. The best known irritant agent is 3-quinuclidinyl benzilate (BZ), an anticholinergic agent that can affect humans for up to several days. Incapacitating agents are not generally considered to be militarily effective.

MULTI-COMPONENT CHEMICAL WEAPONS

Store more than two non-toxic chemicals separate until shortly before they are used. When mixed, the chemicals form a **toxic chemical**. See also **binary chemical weapons**.

NERVE AGENTS

Usually colourless, odourless, and tasteless liquids, they disrupt the normal functioning of the nervous system and muscles. Nerve agents are among the most lethal chemical weapon agents. They divide into G-agents and V-agents, and include several hundred different organophosphorus compounds that are stable, highly toxic, and have rapid effects when inhaled or absorbed through the skin. The main nerve agents are sarin (GB), soman (GD), tabun (GA), and VX.

PARTICLE SIZE: see page 51.

PRECURSOR

Under the **Chemical Weapons Convention (CWC)**: Any chemical reactant, which takes part in any stage in the production by whatever method of a **toxic chemical**. Precursors that can be used to synthesize warfare and commercial substances alike, are known as dual-use chemicals.

RIOT CONTROL AGENT

Any chemical that produces rapid but temporary sensory irritations or disabling effects in humans. **Harassing agents** are most often used as riot control agents. The **Chemical Weapons Convention (CWC)** allows the use of riot control agents for domestic policing purposes.

TOXIN: see page 52.

TOXIC CHEMICAL

Under the **Chemical Weapons Convention (CWC)**: Any chemical which through its chemical action on life processes can cause death, temporary incapacitation or permanent harm to humans or animals. This includes all such chemicals, regardless of their origin or of their method of production, and regardless of whether they are produced in facilities, in munitions or elsewhere.

CHAPTER 6

NUCLEAR WEAPONS

6.1 BACKGROUND

Nuclear weapons are explosive devices that are based on nuclear reactions. Together with chemical and biological weapons, nuclear weapons are considered to be weapons of mass destruction (WMD).

The first nuclear weapons were developed by the United States during the Second World War. In 1939, concerns about possible work by the Germans in the area, led the United States to establish an Advisory Committee to assess the possibility of obtaining a self-sustaining fission reaction in uranium. Encouraged by rapid progress in the field, in 1942, the Americans launched an atomic weapons development programme code-named the "Manhattan Project". After three years of intensive work, on 16 July 1945, the United States detonated the world's first **atomic bomb** at the Trinity test site. Based on plutonium fuel, the device surpassed all expectations, producing a burst of over 20 kilotons equivalent TNT. On 6 August 1945 a sole American B-29 bomber dropped an untested uranium atomic bomb on the Japanese city of Hiroshima. The resulting explosion instantly destroyed over two thirds of the city. Three days later, a second bomb was dropped on the city of Nagasaki with similar effects.

In 1949 the Soviet Union exploded its first atomic device. A copy of the American plutonium bomb detonated at the Trinity site, the Soviet weapon produced a yield of 22 kilotons. A nuclear arms race ensued between the Soviet Union and the United States. Alarmed by the speed with which the Soviets had built their atomic bomb and by the discovery of Soviet espionage within the ranks of their nuclear weapons programme, in 1950, the Americans decided to go ahead with the development of hydrogen weapons. Based on a combination of nuclear fission and fusion,

hydrogen or **thermonuclear weapons**, promised to increase dramatically the destructive power of nuclear bombs by raising their yields from kiloton to as much as megaton ranges. In 1952 the United States detonated the world's first hydrogen bomb. The force of the explosion measured over ten megatons. In response, in 1953, the Soviet Union tested a fusion-boosted device which produced a yield of approximately 400 kilotons. Two years later a thermonuclear device with a yield of approximately one and a half megatons followed.

Other than the United States and the Soviet Union, a number of other countries have also developed nuclear weapons. In 1940 the United Kingdom set up the MAUD Committee to study the feasibility of weapons based on atomic reactions, and in 1941 it established an active weapons development programme. However, it was not until 1952 that a nuclear fission device based on plutonium was actually tested. A device incorporating nuclear fusion was set off a few years later, in 1957. In France, post-war nuclear research and development began in 1945 under the Commissariat de l'Énergie Atomique (CEA). A nuclear weapon development programme was initiated in 1954, and in 1960 a first test of a plutonium nuclear fission explosive was carried out. In 1968, France exploded a thermonuclear device. Chinese efforts to develop nuclear weapons began in 1953 with the assistance of the Soviet Union. By 1959, however, a political rift between the two caused the Soviets to withdraw their support. Despite the loss of Soviet aid, in 1964, China successfully tested a uranium-based nuclear weapon, and in 1967 it detonated a thermonuclear device. In 1974 India conducted a so-called peaceful nuclear explosion of a 12 kiloton plutonium device. This effectively demonstrated India's capacity to build nuclear weapons, although the country refrained from further testing for over two decades. In May 1998 India carried out a series of tests of various nuclear explosive devices. These were immediately answered by Pakistan which within a few weeks conducted its own nuclear explosion tests. Although neither officially confirmed nor denied, Israel is widely believed to possess nuclear weapons. After the Gulf War of 1991, the work carried out by the International Atomic Energy Agency (IAEA) and the United Nations Special Commission (UNSCOM) revealed that since the early 1980s, Iraq had been involved in substantive efforts to acquire a nuclear weapons capability and had been close to producing a working design.

Nuclear weapons consist of **nuclear explosives** and the means for their delivery. Nuclear explosives are based on self-sustained **nuclear reactions** which transform the nuclear structure of atoms and in the process release great bursts of energy. An atom is the smallest part of a chemical element and its nucleus is made up of protons and neutrons collectively referred to as nucleons. Nuclear reactions modify the structure of nucleons, usually through the absorption or release of neutrons. Two types of nuclear reactions used in the construction of nuclear weapons: **fission** reactions and **fusion** reactions. Fission reactions splinter the nucleus of heavy atoms following the capture of a neutron and in doing so give off further neutrons. If a fissioning atom succeeds in inducing fission in another proximate atom and so on, then a self-sustained **chain reaction** leading to a massive release of energy will result. This will happen at a **critical mass** or **density**. Nuclear explosives exploit the massive energy discharged by a chain reaction by deliberately inducing such a condition. Fission reactions are part of all nuclear weapons including atomic and thermonuclear ones.

Nuclear fusion reactions combine the nuclei of two lighter **isotopes** in order to form a heavier new one. The forced combination of the two isotopes produces a tremendous amount of energy, much greater than that obtainable from fission reactions alone. To achieve fusion, a small initial fission reaction is necessary in order to create the extreme temperatures required to drive the isotopes together. A fusion explosive, hence, contains a fission **primary**. If a fusion device is surrounded with a jacket of **fertile material**, the neutrons released by the fusion will cause this to fission thereby creating a fission-fusion-fission process. Thermonuclear weapons are typically based on such a process.

Whether based on fission only, or fission and fusion, the assembly of nuclear weapons requires usable **fissile material** and intricate engineering. Fissile material comprises any atoms capable of fission when bombarded with neutrons. To be usable in the construction of nuclear weapons, fissile material needs to be sufficiently enriched so as to be able to support a sustained chain reaction. Typically the fissile materials used in nuclear explosives are **uranium**-235 and **plutonium**-239. Uranium-235 is an isotope found in naturally occurring uranium in concentrations of 0.71 per cent. Weapon-grade enriched uranium generally contains concentrations of uranium-235 in excess of 90 per cent, although weapon-usable high-enriched uranium (HEU) is commonly defined as uranium enriched to 20 per cent or more. To obtain concentrations of uranium-235 for weapons

use, a process of **enrichment** is required. Unlike uranium, plutonium does not exist in nature in any significant amounts, and has to be artificially generated. Plutonium-239 isotopes are produced by exposing uranium-238 atoms to neutron radiation. Both plutonium-239 and uranium-235 are difficult and expensive to fabricate and require elaborate production facilities. Other types of fissile materials that could be used in the building of nuclear weapons include uranium-233, americium, neptunium, and all other plutonium isotopes.

The development of nuclear weapons poses significant engineering challenges. For instance, to obtain a fission reaction, the explosive's fissile material must first be rendered supercritical. Thereafter, maintaining the fission reaction is greatly complicated by the fact that the tremendous amount of energy released by the initial explosion threatens to destroy the fissile material before the chain reaction can occur. The best way to ensure the efficacy, reliability, and safety of nuclear weapons is through **testing**. Although nuclear weapons using fission and possibly even crude ones using fission and fusion could be developed on the basis of theoretical understanding alone, testing is indispensable in the manufacture of sophisticated systems, in developing new weapons, and in adapting existing explosives to new delivery means. Nuclear weapon tests examine the performance of individual weapon components or of the overall system. Field tests of nuclear explosives can be conducted above or below ground, under water, or in outer space. Experiments in which the fissile material is kept below critical density are called **subcritical**. To date, seven countries are known to have tested nuclear explosives: China, France, the Soviet Union, the United Kingdom and the United States, as well as India and Pakistan. Sophisticated computer programs can be used to produce **computer models** of nuclear explosives. Increasingly favoured by the established nuclear-weapon countries, computer modelling relies on detailed data gathered from extensive field tests.

Nuclear explosives can be delivered by a wide range of systems such as aerial bombs, ballistic and cruise missiles, artillery shells, naval mines and torpedoes, and landmines. Long-range ballistic missiles armed with nuclear warheads are commonly called **strategic nuclear weapons (SNWs)**. Their mission is generally to strike valuable targets deep inside enemy territory and bring the war to an end quickly. Typically SNWs have intercontinental ranges. Nuclear weapons meant to be used in close proximity on the battlefield are generally referred to as **tactical nuclear weapons (TNWs)**.

TNWs have shorter ranges than SNWs, but more importantly, their tasks differ from those of SNWs in that they are intended for use on the front lines and to the rear thereof for the purpose of winning local engagements. SNWs constitute by far the main component of the established nuclear-weapon countries' nuclear arsenal. However, they are difficult and expensive to manufacture and maintain, and since the end of the Cold War, their numbers have decreased dramatically.

Nuclear weapon explosions cause damage through a combination of effects comprising a powerful blast wave, thermal radiation, and initial and residual radiation. The absolute and relative strength of each effect depends on several factors including the explosive **yield** and design of the device, the height of burst, and to a limited extent, meteorological conditions. Theoretically the blast effect of a nuclear explosion is proportionate to its yield. In practice, however, because blast waves interact with surrounding matter (including air) their effect will be mediated by the amount of matter encountered which, in turn, will be partly determined by the height of the explosion. The degree of thermal radiation released by a nuclear explosion is nearly proportional to its yield. Relative to the size of blast output, however, the effect of thermal radiation increases much more rapidly as a function of yield. The absolute strength of the initial radiation produced by a nuclear burst also varies proportionately to the yield of the burst. However, because ionizing radiation decays fairly quickly, its magnitude relative to that of blast and thermal radiation releases will decline rapidly as the yield of the explosion increases. Residual radiation takes the form of so-called fallout, the severity of which is influenced by the height of the explosion, the location, and its yield.

Nuclear weapons have devastating effects, and may be employed against both military and civilian targets. Against military targets, they can be used at the tactical level to wipe out entire military formations and infrastructures, or at the strategic level to attack enemy nuclear weapons and vital command and control posts deep inside enemy territory. Against civilian targets, nuclear weapons can be used to level entire cities within moments and leave behind virtually no survivors. More generally, informed studies have suggested that nuclear weapons, if employed on a mass scale, have the potential to inflict serious damage on the earth's ozone layer and to trigger drastic global climatic changes commonly referred to as "nuclear winter". No effective defence exists against the effects of nuclear weapons, and no target can withstand a determined nuclear attack.

Because of their tremendous destructive power, nuclear weapons are considered as distinct from other kinds of weapons and their advent has led to the emergence of special nuclear military doctrines. A nuclear military doctrine describes the conditions under which and the modalities of how nuclear weapons are to be used. To date, various nuclear doctrines have been formulated and adjusted to meet changing political, military, and technological circumstances. Common to all of these doctrines, however, is the concept of **nuclear deterrence**. Premised on the broader notion of deterrence as the use of the threat of force to dissuade undesirable actions, nuclear deterrence threatens the use of nuclear weapons to discourage military and especially nuclear attack. Conceptually strategies of nuclear deterrence may be divided into two broad categories: those that seek to dissuade aggression by threatening to inflict crippling punishment in return, and those that seek to dissuade aggression by promising to deny the adversary the capacity to successfully carry out the attack. Nuclear deterrence policies based on the threat of retaliatory punishment are called **countervalue** strategies. Historical examples of countervalue strategies include the **massive retaliation** and **mutual assured destruction (MAD)** policies embraced by the United States in the 1950s and 1960s respectively, and the **minimum deterrence** policy currently espoused by China, France, and the United Kingdom. Nuclear deterrence policies premised on the denial of successful attack are termed **counterforce** strategies. The policy of **flexible response** adopted by the United States in the late 1960s as well as Soviet nuclear doctrine throughout the Cold War, are examples of deterrence policies based on denial. In the context of a stand-off between two nuclear-armed States, both countervalue and counterforce strategies are thought to require a so-called **second-strike capability** so as to discourage surprise attack.

Nuclear weapons can be attractive to those that seek an assured mass destruction capability. Because they are significantly more destructive and predictable in their effects than either chemical or biological weapons, nuclear weapons tend to be regarded as more reliable and possibly more credible than the former. To a certain extent, nuclear weapons may also have been imputed an element of prestige. This may well derive from the fact that their possession requires a substantial amount of technological prowess and that historically they have been associated exclusively with the great Powers. Currently there are five official nuclear-weapon States: China, France, the Russian Federation, the United Kingdom, and the United States. After the break-up of the Soviet Union, several former Soviet Republics

were left with stockpiles of nuclear weapons on their territories. Since then, they have all voluntarily renounced their ownership. In 1998 India and Pakistan demonstrated their ability to build nuclear weapons by carrying out respectively a series of nuclear explosion tests.

6.2 Arms Limitation History: Approaches and Instruments

6.2.1 Global Attempts

Nuclear weapons are subject to a number of global control instruments. The most prominent of these are the **Non-Proliferation Treaty (NPT)** and the **Comprehensive Nuclear Test Ban Treaty (CTBT)**. The NPT was signed in 1968 at the Conference of the Committee on Disarmament (CCD). It is concerned primarily with the prevention of nuclear war as a result of the spread of nuclear weapons. The Treaty distinguishes between **nuclear-weapon States (NWS)** and **non-nuclear-weapon States (NNWS)**, and requires the former not to transfer nuclear weapons or to assist others in their development, and the latter not to develop or acquire nuclear weapons. It also calls on all parties to negotiate in good faith measures for nuclear disarmament. The NPT was initially signed for a duration of 25 years, however, in 1995, it was extended indefinitely. Implementation of the provisions of the NPT is verified by the International Atomic Energy Agency (IAEA) which operates a system of safeguards to ensure that nuclear activities in NNWS are not diverted towards military ends.

The CTBT was negotiated in 1996 by the Conference on Disarmament (CD), and following a veto in the CD was signed in the United Nations General Assembly. Its aim is to inhibit the development of new kinds of nuclear weapons by the NWS and of nuclear weapons by the NNWS. Towards this end, the CTBT prohibits all field testing of nuclear explosives and contains a comprehensive monitoring regime to verify the implementation of its obligations. The Treaty is currently in the process of ratification by the States parties. It has a stringent entry into force provision requiring 44 named States parties to ratify it before it can enter into force.

Nuclear weapons are also subject to international export controls. These are administered by three bodies: the **Zangger Committee**, the **Nuclear Suppliers Group (NSG)**, and the **Missile Technology Control Regime (MTCR)**. The Zangger Committee oversees a trigger list of specific

nuclear items whose exports require the application of safeguards under the NPT. The NSG has developed common guidelines for controlling exports of nuclear trigger list items, as well as nuclear-related dual-use items, to ensure that such exports do not contribute to nuclear proliferation. The MTCR regulates the transfer of missile systems and related technologies. The Regime bans the export of equipment and technology that can be used in the production of missiles capable of carrying nuclear, biological, or chemical payloads, and which raise the danger of weapons of mass destruction proliferation.

6.2.2 Regional Attempts

Regional controls on nuclear weapons have taken the form of **nuclear-weapon-free zones (NWFZs)**. NWFZs seek to prevent the emergence of new NWS or the deployment of nuclear weapons in previously non-nuclearized areas. By banning the production, hosting, and stationing of nuclear weapons within a designated geographical region, NWFZs provide parties with the assurance that nuclear weapons are not spreading to their neighbours, or that nuclear weapon deployments are not expanding into new parts of the globe. This, in turn, allays pressures for further nuclear proliferation. The **Antarctic Treaty** of 1959 which prohibits the deployment of nuclear and other weapons in the Antarctic was the first de facto NWFZ to be established. Since then, such zones have been created in Latin America, the South Pacific, Africa, South-East Asia, outer space and the ocean seabed, and have been proposed *interalia* for the Middle East, Central Asia, Central and Eastern Europe, Northern Europe, South Asia, and the Korean Peninsula.

6.2.3 Bilateral Attempts

During the Cold War, nuclear weapons were part of several bilateral arms control agreements. Most important amongst these are the ones negotiated between the Soviet Union and the United States. The **Strategic Arms Limitation Treaties (SALT) I** and **II** concluded in 1972 and 1979, imposed limits on the number of strategic nuclear delivery systems each party could deploy in an effort to stabilize the nuclear balance between the two countries. They were the first arms limitation agreements concluded by the Soviet Union and the United States. Two other important nuclear weapons agreements negotiated by the Americans and the Soviets during the Cold War, are the **Anti-Ballistic Missile (ABM) Treaty** and the

Intermediate-range Nuclear Forces (INF) Treaty. The ABM Treaty, which was a complement of SALT I, restricted the deployment of ballistic missiles defences by each party. It was meant to help remove incentives for the further build-up of nuclear arsenals. The INF Treaty of 1987, eliminated all the ground-based intermediate and short-range nuclear ballistic missiles of the two countries, thus beginning a process of bilateral nuclear arms reduction by the Soviet Union and the United States. This process continues to date.

At the end of the Cold War, the Soviet Union, and subsequently Russia, and the United States signed two further major nuclear disarmament treaties. The **Strategic Arms Reduction Treaties (START) I** and **II** of 1991 and 1993 significantly reduce the number of strategic nuclear weapon warheads possessed by each country. Although START II has yet to enter officially into force, its provisions are nevertheless being implemented. Negotiations by the two parties on an eventual START III agreement which would further lower the number of strategic nuclear warheads held by each country as well as add other control measures, is expected to begin sometimes in the future, the principle of such negotiations having already been agreed to by the Presidents of the United States and of the Russian Federation at a summit meeting in Helsinki in March 1997.

6.3 Arms Limitation Instruments

6.3.1 Global Instruments

Comprehensive Nuclear Test Ban Treaty (CTBT)

Multilateral agreement opened for signature on 24 September 1996 following many years of negotiations in the Conference on Disarmament (CD). Although the CD failed to reach a consensus on the approval of the treaty text, the CTBT was nonetheless forwarded to the United Nations General Assembly (UNGA) where it received overwhelming support. To enter into force, the CTBT must be ratified by 44 specific States. The Treaty is of unlimited duration, and States retain the right to withdraw their participation pending six months prior notification.

Under the CTBT each party undertakes not to carry out **nuclear weapon** test explosions or any other nuclear explosion, and to refrain from causing, encouraging, or in any way participating in the carrying out of any nuclear weapon test explosion or any other nuclear explosion. The provisions of the CTBT apply equally to all States parties regardless of their nuclear status.

The CTBT also provides for a comprehensive verification regime including the establishment of an International Monitoring System (IMS), on-site inspections, and confidence- and security-building measures (CSBMs). The IMS system is to comprise worldwide facilities for seismological monitoring, radionuclide monitoring, hydro-acoustic monitoring, and infra-sound monitoring. These facilities are to transmit data to an International Data Centre (IDC), for analysis. On-site inspections may be requested if a party has concerns regarding Treaty compliance. The executive organ of the CTBT, the Executive Council, is to decide whether or not an inspection should be carried out and, after examining the inspection report, whether non-compliance has occurred. In case of non-compliance sanctions may be applied, and, if necessary, the matter may be brought before the United Nations. CSBMs provided for by the CTBT include consultation and clarification procedures, and a dispute settlement mechanism. The CTBT also establishes a Comprehensive Nuclear Test Ban Treaty Organization (CTBTO) seated in Vienna, to implement the Treaty's provisions and to administer compliance with these provisions. See also Comprehensive Nuclear Test Ban Treaty Organization (CTBTO), and International Monitoring System (IMS).

CONVENTION ON THE PHYSICAL PROTECTION OF NUCLEAR MATERIAL

Multilateral convention opened for signature on 3 March 1980, and entered into force on 8 February 1987. It currently counts 56 States parties and the European Atomic Energy Community (EURATOM). It is of unlimited duration, and the International Atomic Energy Agency (IAEA) serves as its depositary. The Convention requires parties to protect at agreed levels nuclear materials used for peaceful purposes while in international transport. Nuclear materials used for peaceful purposes are defined as **plutonium**, **uranium**-235, uranium-233, and irradiated fuel. States parties are prohibited from exporting, importing, or allowing the transit through their territory of nuclear materials unless they have received assurances that these will be protected as required

by the Convention. States parties are to also inform other States parties in the event of theft, robbery, or embezzlement of nuclear materials.

ENMOD CONVENTION: see page 47.

INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA): see page 198.

MISSILE TECHNOLOGY CONTROL REGIME (MTCR): see page 123.

NON-PROLIFERATION TREATY (NPT) (*Treaty on the Non-Proliferation of Nuclear Weapons*)

Multilateral treaty opened for signature on 1 July 1968 in London, Moscow, and Washington, D.C.. It entered into force on 5 March 1970 for an initial duration of 25 years. Review Conferences are slated to be held every five years. At the 1995 Review and Extension Conference, the Treaty was extended indefinitely. The NPT possesses almost universal membership. Withdrawal from the Treaty requires three months prior notification.

The NPT distinguishes between **nuclear-weapon States (NWS)** and **non-nuclear-weapons States (NNWS)**. NWS are defined as those that have exploded a nuclear device prior to 1 January 1967, and comprise China, France, the Soviet Union (now the Russian Federation), the United Kingdom, and the United States. Adjusting this definition so as to allow other States, that have declared their nuclear weapons capabilities but are not yet party to the NPT, to join the Treaty would require an amendment of the Treaty. NNWS are those parties that have renounced the acquisition of nuclear weapons.

The NPT contains four main provisions inscribed in its first six articles. First, NWS are prohibited from transferring or from assisting others in acquiring **nuclear weapons** and related technologies, or control over these, and NNWS are prohibited from receiving or developing nuclear weapons. Second, nuclear safeguards are established to ensure that fissionable material produced or used in nuclear facilities of NNWS is employed solely for peaceful purposes. These safeguards are to be administered by the International Atomic Energy Agency (IAEA). Third, the NPT recognizes the right of all parties to research, produce, and use nuclear energy for peaceful purposes. It permits NWS to assist NNWS in the peaceful exploitation of nuclear technologies. Finally, the NPT calls for all parties to negotiate in good faith measures related to

nuclear disarmament, and a treaty on general and complete disarmament under strict and effective international control. See also International Atomic Energy Agency (IAEA).

NUCLEAR SUPPLIERS GROUP (NSG) *(London Group)*

Export control regime that regulates the transfer of nuclear and related products by parties. The NSG operates a set of Guidelines that spell out the conditions for the export of equipment, materials and technologies that: (Part 1) are exclusively for nuclear use, and (Part 2) are dual-use in that may contribute to the proliferation of nuclear weapons. The transfer of Part 1 items requires the application of International Atomic Energy Agency (IAEA) safeguards. The transfer of Part 2 items is to be avoided in cases in which a risk of proliferation exists. The Group was established in 1974. It currently counts 39 members.

PARTIAL TEST BAN TREATY (PTBT) (*Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water*)

Multilateral treaty signed at Moscow on 5 August 1963 by the United Kingdom, the Soviet Union and the United States, and entered into force on 10 October 1963. Currently the PTBT has 135 States parties. Despite not signing the PTBT China and France have agreed to respect its provisions, since 1980. The PTBT is of unlimited duration. Withdrawal from the Treaty requires three months prior notification. The PTBT is also sometimes referred to as the Limited Test Ban Treaty (LTBT).

The PTBT obliges parties not to conduct any **nuclear explosions** in the atmosphere, under water, and in outer space. Underground nuclear explosions are not banned except when radioactive debris is released outside of the territorial limits of the State conducting the explosion. They are, however, now banned by the **Comprehensive Test Ban Treaty (CTBT)**. Verification of PTBT obligations is carried out through national technical means (NTMs). In 1991 two thirds of PTBT States parties convened an Amendment Conference to the PTBT. Aimed at transforming the PTBT into a comprehensive nuclear test ban by prohibiting all nuclear explosions regardless of the environment in which they are conducted, and by establishing comprehensive verification measures to ensure compliance, the Conference failed due to opposition by the United Kingdom and the United States, two of the

three depositories. However, the conclusion of the CTBT in 1996 has achieved most of the goals of the Amendment Conference.

ZANGGER COMMITTEE (ZAC) (*NPT Exporters Committee*)
Export control group that establishes guidelines for the supply of nuclear materials and of equipment used in the production or processing of nuclear materials by members to **non-nuclear-weapon States (NNWS)**. While not legally binding, these guidelines serve as a means of coordinating the national policies of members with respect to the transfer of nuclear-related supplies. The Committee thus operates a so-called Trigger List that specifies the items whose export must automatically be accompanied by International Atomic Energy Agency (IAEA) safeguards. The list may be updated as warranted and serves as a point of reference in the annual confidential exchange of information by members.

6.3.2 Regional Instruments

AGENCY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (OPANAL): see page 202.

ANTARCTIC TREATY: see page 23.

EUROPEAN ATOMIC ENERGY COMMUNITY (EURATOM): see page 202.

MOON TREATY: (*Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*)
Multilateral treaty signed on 5 December 1979, and entered into force on 11 July 1984. The Treaty currently counts nine parties and five additional signatories that have yet to ratify the Treaty. The Moon Treaty is of unlimited duration, and withdrawal requires one year prior notification. The Secretary-General of the United Nations serves as the depositary. The Moon Treaty affirms the use of the moon for peaceful purposes only, and prohibits the use or threat of use of force or other hostile acts on or from the moon. It also prohibits States parties from placing weapons of mass destruction (WMD) on the moon or around the moon's orbit. The verification provisions of the Treaty allow States parties to inspect all space vehicles, equipment, stations, and installations on the moon. In case of a dispute the parties are obliged

to hold prompt consultations with a view to resolving their differences by peaceful means.

OUTER SPACE TREATY (*Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies*)

Multilateral accord that prohibits the deployment of objects carrying nuclear or other kind of weapons of mass destruction (WMD) in orbit, on celestial bodies, or in outer space. Further, the moon and other celestial bodies are to be used exclusively for peaceful purposes, and the establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies, is forbidden. The Treaty entered into force on 10 October 1967. It is of unlimited duration and withdrawal requires one year prior notification.

SEABED TREATY (*Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Seabed and the Ocean Floor and in the Subsoil Thereof*)

Multilateral treaty signed on 11 February 1971, and entered into force on 18 May 1972 following ratification by the three depositary governments, the Soviet Union, the United Kingdom and the United States, as well as 20 other States. Negotiations for the Seabed Treaty were concluded in the Conference of the Committee on Disarmament (CCD) although they had begun in the Eighteen Nation Disarmament Committee (ENDC) in 1968. The Seabed Treaty prevents States parties from placing any type of weapons of mass destruction (WMD) or related installations on the seabed and ocean floor beyond a 12 mile (or 19.2 kilometre) coastal zone. Verification of Treaty obligations is carried out through national technical means (NTMs). Treaty Review Conferences are held every five years. At the 1989 Review Conference the parties declared not to have placed any **nuclear weapons** or other WMD on the seabed outside the Treaty's area of application (i.e. within a party's 12 mile coastal zone), and that they had no intention to do so in the future. This declaration effectively rendered the Seabed Treaty applicable from coast to coast.

TREATY OF BANGKOK (*Treaty on the South-East Asia Nuclear-Weapon-Free Zone*)

Multilateral treaty establishing a **nuclear-weapon-free zone (NWFZ)** in South-East Asia developed out of a working group established by the Association of South-East Asian Nations (ASEAN) as part of its 1971 Declaration on the Zone of Peace, Freedom and Neutrality. It was signed at Bangkok on 15 December 1995, and entered into force in March 1997 when Cambodia deposited the seventh instrument of ratification. It is of unlimited duration and withdrawal requires 12 months prior notification. A Review Conference is to be held ten years following its entry into force, and any time thereafter pending consensus among the States parties.

The Treaty of Bangkok prohibits States parties from developing, manufacturing, testing, acquiring, possessing, or controlling **nuclear weapons**, and from allowing the use of their territories by other States for any one of these purposes. States parties are also required to conclude individual agreements with the International Atomic Energy Agency (IAEA) concerning the application of full-scope safeguards. A Protocol to the Treaty open for accession to the **nuclear-weapon States (NWS)** obliges signatories to respect the terms of the Treaty. To date, no NWS has signed the Protocol. The Treaty's area of application includes the territory and airspace of the ten members of the Association of South-East Asian Nations (ASEAN) as well as their internal, territorial, and archipelagic waters, and exclusive economic zones. Verification of compliance is to be carried out by IAEA**,** the report, exchange and clarification of information, and possibly fact-finding missions. To help with the implementation of the Treaty, the Commission for the South-East Asia Nuclear Weapon Free Zone has been established. Disputes regarding implementation may be referred to the International Court of Justice, and non-compliance may ultimately be referred to the United Nations.

TREATY OF PELINDABA (*African Nuclear-Weapon-Free Zone Treaty*)

Multilateral treaty establishing a **nuclear-weapon-free zone (NWFZ)** in Africa opened for signature on 11 April 1996 in Cairo. It is to enter into force following the deposit of the 28th instrument of ratification. The Secretary-General of the Organization of African Unity (OAU) serves as its depositary. The Treaty is of unlimited duration, and

withdrawal requires 12 months prior notification. It prohibits the manufacture, stockpiling, acquisition, possession, control, or stationing of **nuclear weapons** on the territory of States parties. It also expressly bans the research and development of nuclear weapons as well as the conduct of **peaceful nuclear explosions**, while the dumping of radioactive waste is limited to the guidelines established in the Bamako Convention. Any attack against nuclear installations in the Treaty's area of application by States parties is also prohibited, and States parties operating nuclear facilities are required to maintain the highest standards of physical protection of nuclear material, facilities and equipment. The Treaty allows each party to decide for itself whether it allows the transit of nuclear weapons on its territory. Its area of application includes all territories comprising the continent of Africa, island States members of OAU, and all islands considered by OAU in its resolutions to be a part of Africa.

Verification of compliance is provided by the International Atomic Energy Agency (IAEA) which administers safeguard measures to all the parties. The African Commission on Nuclear Energy (AFCONE), to be established when the Treaty enters into force, with its headquarters in South Africa, will also share in the tasks of verification. Inspections triggered by the complaints procedure can be conducted by IAEA at the request of AFCONE. Three protocols are attached to the Treaty of Pelindaba to ensure the respect of the NWFZ by non-States parties. Protocol I calls upon the declared **nuclear-weapon States (NWS)** not to use or threaten to use nuclear weapons against any Treaty member or territory of a party to Protocol III that is situated within the zone. Protocol II calls upon the declared NWS to not test or encourage the testing of nuclear explosives anywhere within the Treaty's area of application. Protocol III concerns States with dependent territories in the zone and requires them to observe specific denuclearization provisions of the Treaty and to ensure IAEA safeguards with respect to these territories. All three Protocols have been signed by the relevant NWS.

TREATY OF RAROTONGA (*The South Pacific Nuclear Free Zone Treaty*)
Multilateral treaty establishing a **nuclear-weapon-free zone (NWFZ)** in the South Pacific signed by the members of the South Pacific Forum on 6 August 1985. It entered into force on 11 December 1986, after

ratification by the eighth State of the South Pacific Forum. The South Pacific Forum comprises 16 members (Australia, Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tuvalu, Tonga, and Vanuatu) of which so far 12 have ratified the Treaty. Withdrawal from the Treaty requires 12 months prior notification, and can only occur if one of the provisions of the treaty has been violated by a State party.

The Treaty of Rarotonga prohibits the manufacturing, acquisition, stationing or control of **nuclear weapons** on the territory of States parties, as well as the conduct of **nuclear explosions**. It allows individual States parties to determine the regulations concerning the transit of nuclear weapons in their airspace and coastal waters. States parties are also prohibited from dumping radioactive waste into the seas within the Treaty's area of application. The Treaty's area of application includes all territories of the members of the South Pacific Forum that have ratified the Treaty including their 12 mile territorial sea limit. Also, as a condition for nuclear exports, the exporting State party must ensure that the recipient State accepts the safeguards administered by the International Atomic Energy Agency (IAEA).

Verification of compliance is to be carried out by IAEA. States parties must accept IAEA's safeguard measures. Discussion of compliance and other treaty-related matters can take place in the South Pacific Forum. With the authorization of two thirds of the States parties, the South Pacific Forum can also conduct on-site inspections. Three protocols regarding non-regional States are attached to the Treaty of Rarotonga. Protocol I calls on all countries possessing territories in the South Pacific to apply the Treaty's provisions prohibiting nuclear weapons to those territories. Protocol II calls on the declared **nuclear-weapon States (NWS)** not to use or threaten to use nuclear weapons against the parties to the Treaty or the territories of other countries covered by Protocol I. Protocol III forbids NWS from conducting nuclear explosion tests anywhere within the Treaty's area of application. France has signed and ratified all three Protocols, China, Russia and the United Kingdom have signed and ratified Protocols II and III, while the United States has signed all three Protocols.

TREATY OF TLATELOLCO (*Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean*)

Multilateral treaty establishing a **nuclear-weapon-free zone (NWFZ)** in Latin America. It was signed on 14 February 1967 in Tlatelolco, Mexico with the stipulation that it enter into force after national ratification and when four conditions have been met: (1) all States in the region must adhere to the Treaty; (2) Protocol I and (3) Protocol II must be signed and ratified by the States concerned; (4) all parties to the Treaty must conclude agreements with the International Atomic Energy Agency (IAEA) to place their nuclear facilities under IAEA safeguards. However, to bring the Treaty into force for each individual State, these conditions can be waived at the time of ratification or later, and most States have, in fact, done so. The Treaty became operative in April 1968, and is of unlimited duration. States parties can withdraw from the Treaty following three months prior notification. The Treaty of Tlatelolco was the first treaty to establish a NWFZ in a populated area.

The Treaty prohibits parties from testing, using, manufacturing, producing, or acquiring **nuclear weapons** or participating in such activities aimed at any of these ends. Parties are also prohibited from storing, deploying, or possessing nuclear weapons. All nuclear materials and facilities are to be used exclusively for peaceful purposes. However, research towards the development of nuclear weapons is not expressly prohibited and States parties are allowed to conduct **peaceful nuclear explosions** according to a set of specific guidelines. Most countries have interpreted these guidelines as prohibiting the development of all **nuclear explosives** that release nuclear energy in an uncontrolled manner and that can be used for military purposes. Verification of compliance with the provisions of the Treaty is ensured through negotiated agreements between the States parties and IAEA which applies safeguards to all nuclear activities taking place within the territory of each signatory. The Agency for the Prohibition of Nuclear Weapons in Latin America (OPANAL) holds regular meetings regarding the purpose of the Treaty and also oversees compliance.

The Treaty's area of application includes the territory, territorial seas, airspace and any other space over which a signatory exercises sovereignty in accordance with its own legislation. Within this area the transit of nuclear weapons is not expressly prohibited and the declared **nuclear-weapon States (NWS)** have taken various positions on this

issue. High seas freedoms of transit and navigation are not affected, and no Tlatelolco State has ever challenged another's right to authorize transit through its territorial waters. To ensure that the NWFZ is also respected by States that do not belong to the region but exert their sovereign rights over territories in the region, Protocol I of the Treaty requires that these States apply the provisions laid out in the Treaty to their territories in the region. Protocol II calls upon all declared NWS to respect the denuclearization of the region and not to use or threaten to use nuclear weapons against the contracting parties. This Protocol has been ratified by all relevant States, albeit with statements regarding the non-application of the Treaty's provisions to international waters. See also Agency for the Prohibition of Nuclear Weapons in Latin America (OPANAL).

6.3.3 Bilateral Instruments

Agreed Framework between the United States of America and the Democratic People's Republic of Korea

Agreement concluded between North Korea and the United States on 21 October 1994 aimed at stemming nuclear proliferation on the Korean peninsula by ensuring that North Korea remains a party to the **Non-Proliferation Treaty (NPT)**. On 12 March 1993 North Korea announced its intention to withdraw from the NPT. To preclude this, the United States brokered an accord whereby North Korea agreed to freeze and eventually dismantle its graphite-moderated nuclear reactors under the supervision of the International Atomic Energy Agency (IAEA) as well as to send its spent reactor fuel for disposal outside the country in exchange for two light-water reactors to be built by 2003 and, pending completion of the first reactor, an annual supply of 500,000 tons of heavy fuel to be provided by an international consortium called the Korean Peninsula Energy Development Organization (KEDO). In October 2002, the United States accused North Korea of maintaining a uranium-enrichment programme in contravention of the Agreed Framework, and suspended oil transfers to the country. In response, North Korea, announced its intention to resume operation of its nuclear reactors, and asked the IAEA to cease monitoring these facilities. On 10 January 2003, North Korea announced its immediate withdrawal from the **Non-Proliferation Treaty (NPT)**.

Agreement between France and the Union of Soviet Socialist Republics on the Prevention of the Accidental or Unauthorized Use of Nuclear Weapons

Agreement effected by an exchange of letters between the Foreign Ministers of France and the Soviet Union on 16 July 1976. It calls on each party to maintain and possibly improve its organizational and technical safeguards to prevent the accidental or unauthorized use of **nuclear weapons** under its control. In addition, the parties commit to notify each other immediately of any accidental or otherwise unexplained or unauthorized explosion of one of their nuclear weapons whose effects could be construed as likely to be harmful to the other.

Agreement between the Government of the United States of America and the Government of the Russian Federation Concerning Cooperation Regarding Plutonium Production Reactors

Agreement concluded by the United States and the Russian Federation on 23 September 1997, whereby the two parties agree to cease operation of their reactors used for the production of weapon-grade **plutonium**. Under the Agreement, Russia agrees to convert by the year 2000 its three remaining plutonium production reactors so that they stop all production of weapon-grade plutonium; and both Russia and the United States commit not to restart any of their previously shut-down plutonium production reactors, not to use in **nuclear weapons** the plutonium already produced by their reactors prior to their conversion, and to incorporate in the fuel to be used by the converted reactors uranium extracted from dismantled nuclear weapons so as to diminish their stockpiles of weapon-grade plutonium. A Joint Implementation and Compliance Committee is to oversee the implementation of the agreement and to mediate any disputes which might arise.

Agreement between the United Kingdom and the Union of Soviet Socialist Republics on the Prevention of the Accidental or Unauthorized Use of Nuclear Weapons

Agreement between the Soviet Union and the United Kingdom signed and entered into force on 10 October 1977. It requires each party to maintain and, if it deems necessary, to improve its organizational and

technical safeguards to prevent the accidental or unauthorized use of **nuclear weapons** under its control. In addition, the parties undertake to notify each other immediately of any accidental or otherwise unexplained or unauthorized incident which could lead to the explosion of one of their nuclear weapons or could otherwise create the risk of outbreak of nuclear war.

AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND THE RUSSIAN FEDERATION CONCERNING THE DISPOSITION OF HIGHLY ENRICHED URANIUM RESULTING FROM THE DISMANTLEMENT OF NUCLEAR WEAPONS IN RUSSIA

Agreement concluded by the United States and the Russian Federation on 18 February 1993, whereby the two parties agree to cooperate in the conversion of high-enriched uranium (HEU) resulting from the dismantlement of Russian **nuclear weapons** into low-enriched uranium (LEU) for use as fuel in commercial **nuclear reactors**. Under the Agreement, the United States commits to purchase over the next 20 years 500 metric tons of HEU extracted from dismantled Russian nuclear weapons at a rate of no less than ten metric tons per year in the first five years and no less than 30 metric tons per year each year thereafter. The purchased material is to be delivered to the United States in the form of commercial reactor-usable LEU, with the conversion process to take place in Russia. The proceeds generated by the sale of HEU may be used by Russia to improve the safety of nuclear reactors in the former Soviet Union and/or to support the construction and operation of its nuclear fuel conversion facilities. In addition, the two parties undertake to establish appropriate measures to ensure the non-proliferation, physical security, proper accounting and control, and environmental protection requirements with respect to the HEU and LEU material treated by the accord. The first LEU transfers from Russia to the United States under the Agreement occurred in 1998.

AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND THE UNION OF SOVIET SOCIALIST REPUBLICS ON THE ESTABLISHMENT OF NUCLEAR RISK REDUCTION CENTERS

Agreement between the Soviet Union and the United States signed and entered into force on 15 September 1987. Each party is required to establish in its capital a Nuclear Risk Reduction Center aimed at avoiding an accidental nuclear war. The Centers are to exchange

notifications of ballistic missile launches and other relevant information.

AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND THE UNION OF SOVIET SOCIALIST REPUBLICS ON NOTIFICATIONS OF LAUNCHES OF INTERCONTINENTAL BALLISTIC MISSILES AND SUBMARINE-LAUNCHED BALLISTIC MISSILES

Agreement between the Soviet Union and the United States signed and entered into force on 31 May 1988. It directs each party to notify through its Nuclear Risk Reduction Centers, no less than 24 hours in advance of the planned date, the launch area and the area of impact for any test launch of a strategic ballistic missile.

AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND THE UNION OF SOVIET SOCIALIST REPUBLICS ON THE RECIPROCAL ADVANCE NOTIFICATION OF MAJOR STRATEGIC EXERCISES

Agreement between the Soviet Union and the United States signed on 23 September 1989, and entered into force on 1 January 1990. It requires each party is to notify the other no less than 14 days in advance about the beginning of a major strategic forces exercise which includes the participation of heavy bomber aircraft. Notification is to be transmitted through the Nuclear Risk Reduction Centers of each country.

AGREEMENT ON MEASURES TO REDUCE THE RISK OF OUTBREAK OF NUCLEAR WAR

Agreement between the Soviet Union and the United States signed and entered into force on 30 September 1971. It obliges each party to take the necessary measures to improve its organizational and technical safeguards against the unauthorized or accidental use of **nuclear weapons**. In addition, both parties are to make arrangements for immediate notification should the risk of a nuclear war arise from the unauthorized or accidental use of nuclear weapons. Finally, both parties are to notify each other in advance of any planned missile test launch beyond the territory of the launching party and in the direction of the other party.

AGREEMENT ON THE PREVENTION OF NUCLEAR WAR

Agreement between the Soviet Union and the United States signed and entered into force on 22 June 1973. It obliges the parties to act in such a manner as to prevent the exacerbation of their relations, as to avoid military confrontations, and as to exclude the outbreak of nuclear war between them and between either of the parties and other countries. Each party commits to refrain from the threat or use of force against the other, against the allies of the other, or against other countries in situations which may endanger international peace and security. If a situation involving the risk of nuclear war is to occur, the parties are to consult immediately with one another and to make every effort to avert this risk.

ANTI-BALLISTIC MISSILE (ABM) TREATY

Treaty signed by the Soviet Union and the United States in 1972, which prohibits deployment of a defence of national territory against strategic ballistic missile attack. As modified by a Protocol signed in 1974, the Treaty permits the Soviet Union and the United States one deployment area each for ABM defences to protect either the national capital or an intercontinental ballistic missile (ICBM) deployment area. The Soviet Union chose, and Russia now maintains, an ABM defence of Moscow. The United States deployed the Safeguard ABM system to defend the ICBM complex at Grand Forks, North Dakota. It, however, has been inactive since 1976. To promote the objectives and implementation of the Treaty, the parties established the Standing Consultative Commission (SCC), which meets at least twice a year. The terms of the Treaty specify that a review of the Treaty shall be conducted every five years. In 1997, the United States, the Russian Federation, Belarus, Kazakhstan, and the Ukraine completed and signed several agreements dealing with succession to the Treaty and demarcation issues related to the distinction between ABM systems which are limited by the Treaty, and theatre ballistic missile defence systems, which are not limited by the Treaty, per se. On 13 December 2001 the United States gave official notice to the Russian Federation of its intention to withdraw from the Treaty. The Treaty terminated as of June 2002. See also Standing Consultative Commission (SCC).

BRAZILIAN-ARGENTINE AGENCY FOR ACCOUNTING AND CONTROL OF NUCLEAR MATERIAL (ABACC): see page 203.

HOTLINE AGREEMENT (*Memorandum of Understanding Between the United States of America and the Union of Soviet Socialist Republics Regarding the Establishment of a Direct Communications Link*)

Agreement between the Soviet Union and the United States signed and entered into force on 20 June 1963. It provides for the establishment of a direct communications link between Washington, D.C. and Moscow, to ensure the ability to exchange messages during eventual crises. This teletype link was to be assured through a telegraph circuit running through Washington, D.C., London, Copenhagen, Stockholm, Helsinki, and Moscow, and a back-up radiotelegraph circuit running through Washington, D.C., Tangiers, and Moscow. The Hotline Agreement was the first arms control agreement concluded between the Soviet Union and the United States.

INTERMEDIATE-RANGE NUCLEAR FORCES (INF) TREATY
(*Treaty between the United States of America and the Union of Soviet Socialist Republics on the Elimination of Their Intermediate-range and Shorter-range Missiles*)

Treaty between the Soviet Union and the United States signed at Washington, D.C., on 8 December 1987, and entered into force on 1 June 1988. It requires the destruction of all Soviet and American ground-launched ballistic missiles and cruise missiles with ranges between 500 and 1,000 kilometres and those with ranges between 1,000 and 5,500 kilometres within 3 years of its entry into force. It also bans the flight testing, and therefore modernization and production of such missiles.

Verification of compliance with treaty provisions is assured through a comprehensive regime of cooperative measures and on-site inspections. Because INF on-site inspection obligations extended beyond the territories of the Soviet Union and the United States, the Western Basing Agreement and the Eastern Basing Agreement were signed on 11 December 1987. The Western Basing Agreement, between the United States, Belgium, the Federal Republic of Germany, Italy, the Netherlands and the United Kingdom, permitted

inspections by the Soviet Union of American missile sites located on the territory of these countries. The Eastern Basing Agreement allowed the United States to inspect Soviet missile sites located on the territories of the Soviet Union, Czechoslovakia, and the German Democratic Republic. Originally a bilateral agreement between the Soviet Union and the United States, the INF Treaty became a multilateral treaty following the break-up of the Soviet Union. Twelve States were designated as successors to the Treaty, six of which had inspectable INF facilities on their territory. Of these successor States, Belarus, Kazakhstan, Russia, and the Ukraine are considered as active participants in the process of implementation inspection. The Special Verification Commission (SVC) provides a forum for discussion of implementation and compliance-related issues. See also intermediate-range ballistic missiles (IRMs), shorter-range ballistic missiles (SRBMs), and Special Verification Commission (SVC).

JOINT DECLARATION ON THE DENUCLEARIZATION OF THE KOREAN PENINSULA (*Agreement between North and South Korea to establish a denuclearized Korean Peninsula*)

Agreement between North and South Korea on the denuclearisation of the Korean peninsula signed on 20 January 1992 at Pyongyang. The two parties agree not to test, manufacture, produce, receive, possess, store, deploy or use **nuclear weapons**. They also commit not to possess nuclear reprocessing and uranium enrichment facilities and to use nuclear energy solely for peaceful purposes. Implementation of the declaration is to be verified through the conduct of mutually agreed inspections and, while not explicitly stated, the application by each country of nuclear facility safeguards administered by the International Atomic Energy Agency (IAEA). Although the declaration entered into force on 19 February 1992, at the time of this writing, it remained unimplemented. Further, on 10 January 2003, North Korea announced its immediate withdrawal from the **Non-Proliferation Treaty** (**NPT**) and hence from its IAEA obligations.

PEACEFUL NUCLEAR EXPLOSIONS TREATY (PNET) (*Treaty on Underground Nuclear Explosions for Peaceful Purposes*)

Treaty between the Soviet Union and the United States signed at Washington and Moscow on 28 May 1976. It regulates **nuclear**

explosions conducted for peaceful purposes by both parties by limiting yield to 150 kilotons per nuclear explosion. For a series of explosions, the yield is set at 1,500 kilotons, provided that each explosion can be measured. The PNET ensures that the yield established for nuclear weapons explosions by the **Threshold Test Ban Treaty (TTBT)** is not exceeded under the guise of a peaceful explosion.

Ratification of the PNET and the TTBT did not take place until 11 December 1990, although both the Soviet Union and the United States observed the provisions of the treaties in the interim. This delay stemmed from differences regarding verification procedures which the United States deemed insufficient. Because, apart from national technical means (NTMs), the PNET originally contained no verification provisions, in1990 two Protocols establishing verification measures were added to the Treaty. Under the two Protocols, hydro-dynamic yield measurement procedures, seismic yield measurement procedures and on-site inspections, were formally identified as methods of verifications. The Protocols also established the Joint Consultative Commission (JCC) as a forum in which issues relating to compliance with the PNET could be discussed. The JCC is also charged with coordinating the on-site inspections in the two countries. The PNET was to remain in force for a period of five years following which it could be extended for additional five-year periods, although it could not be terminated so long as the TTBT remained in force. Both the PNET and the TTBT have now been superceded by the **Comprehensive Nuclear Test Ban Treaty (CTBT)**. See also Joint Consultative Commission (JCC).

SALT INTERIM AGREEMENT (or **SALT I Agreement**) (*Interim Agreement between the United States of America and the Union of Soviet Socialist Republics on Certain Measures with respect to the Limitation of Strategic Offensive Arms*)

Agreement between the Soviet Union and the United States limiting the number of strategic ballistic nuclear missiles deployable by each country signed at Moscow on 26 May 1972, and entered into force on 3 October 1972. It placed a five-year freeze on the aggregate number of fixed launchers for land-based intercontinental ballistic missiles (ICBMs), i.e., each party could not increase the number of such launchers beyond those already operational or under construction.

The number of launchers for submarine-launched ballistic missiles (SLBMs) was permitted to be increased to an agreed number. Verification of compliance is ensured through national technical means (NTMs), while issues relating to the implementation of the Agreement are dealt with in the Standing Consultative Commission (SCC) established under the Agreement. See also Standing Consultative Commission (SCC).

STRATEGIC ARMS LIMITATION TALKS (SALT I)

Negotiations between the Soviet Union and the United States on limiting the number of **strategic nuclear weapons** held by each country. Discussions began in November 1969 and ended on 26 May 1972 with the signing of an agreement comprising two components: the **Anti-Ballistic Missiles (ABM) Treaty** and the **Interim Agreement on Certain Measures with respect to the Limitation of Strategic Offensive Arms**. Both components were ratified on 3 October 1972. SALT I marked the first successful attempt to restrict the growth of American and Soviet nuclear arsenals during the Cold War.

STRATEGIC ARMS LIMITATION TREATY (SALT II) (*Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Strategic Offensive Arms*)

Agreement between the Soviet Union and the United States limiting the number of strategic ballistic nuclear missiles possessed by each country. Discussions on SALT II began in 1977, shortly before the **SALT Interim Agreement** was due to expire. The resulting agreement was signed at Vienna on 18 June 1979, and was to remain in force until 31 December 1985. Although never actually ratified, both parties have observed the terms of the Treaty.

The Vladivostok Agreement of 1974 established the basic framework for SALT II, including the principle of equal aggregate ceilings on strategic nuclear delivery vehicles. Under SALT II, equal aggregate limits on the number of strategic nuclear delivery vehicles including intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), air-to-surface ballistic missiles (ASBMs) and heavy bombers, were placed at 2,400 for each party. This ceiling was to be reduced to 2,250 systems beginning in 1981. Of these, the total

number of ballistic missiles equipped with multiple independently targetable re-entry vehicles (MIRVs) and strategic bombers was limited to 1,320, while the aggregate limit of ICBMs with MIRVs was set at 820. A freeze on MIRVs on existing ICBMs as well as limits of 10, 14 and 10 MIRVs for new ICBMs, SLBMs and ASBMs respectively, was also introduced.

Compliance with SALT II is verified through national technical means (NTMs) and disputes regarding the implementation are discussed in the Standing Consultative Commission (SCC) established under the **SALT Interim Agreement**. See also Standing Consultative Commission (SCC).

Strategic Arms Reduction Treaty (START I) (*Treaty on the Reduction and Limitation of Strategic Offensive Arms*)

Agreement between the Soviet Union and the United States signed at Moscow on 31 July 1991 following nine years of negotiations, and entered into force on 5 December 1994. It is to remain in force for a period of 15 years following which it can be extended for successive five-year periods. START I is the first treaty to actually reduce the size of strategic nuclear arsenals. Under START I, both the Soviet Union and the United States are obliged to cut the number of their strategic nuclear warheads to no more than 6,000 each which can be deployed on no more than 1,600 strategic missiles and heavy bombers. This reduction in nuclear warheads and delivery systems is scheduled to be completed in three phases over a seven-year period following the Treaty's entry into force (that is, by December 2001). Although existing equipment may be modernized and/or replaced, the production, flight testing, and deployment of new or modified intercontinental ballistic missiles (ICBMs) and submarine launched ballistic missiles (SLBMs) with more than ten warheads, are banned. Several techniques can be used to reduce the number of warheads on deployed ballistic missiles. One technique is to dismantle ICBM and SLBM launchers. Another permissible technique is to "download" or remove some warheads from multiple independently targetable re-entry vehicle (MIRVs) launchers. However, MIRVed missiles may not be downloaded by more than four warheads each, and the number of warheads reduced through downloading cannot exceed 1,250.

The dissolution of the Soviet Union in December 1991 created several complications for the adoption and implementation of START I. Although Russia declared itself the legal successor of the Soviet Union (and hence the legal party to Treaty), Belarus, Kazakhstan, and Ukraine all had strategic weapons on their territory, thus affecting the implementation of the Treaty. In order to take account of this situation, the Lisbon Protocol which recognized Belarus, Kazakhstan, Russia and the Ukraine as successor States in relation to START I was signed on 23 May 1992. Under the Protocol, Belarus, Kazakhstan and the Ukraine also pledged to eliminate all nuclear weapons on their territory and to join the **Non-Proliferation Treaty (NPT)** as **non-nuclear-weapon States (NNWS)**. This pledge became a Russian condition for the ratification of START I. Although initially a bilateral treaty between the Soviet Union and the United States, the Lisbon Protocol transformed START I into a multilateral treaty ratified as a bilateral treaty between Russia and the United States.

STRATEGIC ARMS REDUCTION TREATY (START II) (*United States-Russian Treaty on the Further Reduction and Limitation of Strategic Offensive Arms*)

Agreement between Russia and the United States establishing further reductions in the number of strategic nuclear missiles and missile warheads possessed by the two countries signed at Moscow on 3 January 1993. It is to remain in force throughout the duration of START I. Together with its extension Protocol, it was ratified by Russia on 14 April 2000, contingent on ratification by the United States.

START II aims to further reduce the strategic nuclear arsenal held by Russia and the United States. Under START II, both countries are to reduce their strategic nuclear warhead holdings to 3,000-3,500 each (down from 6,000 warheads each as provided for by **START I**), of which no more than 1,700 to 1,750 may be deployed as submarine-launched ballistic missiles (SLBMs). In addition, all intercontinental ballistic missiles (ICBMs) with multiple independently targetable re-entry vehicles (MIRVs) are to be eliminated, as are all Russian SS-18 heavy ICBMs.

Under START II, the reduction of nuclear warheads is scheduled to proceed in two phases. In the first phase, Russia and the United States are to reduce their total number of deployed nuclear warheads to 4,250-3,800 each, of which no more than 1,200 can be deployed on

MIRVed ICBMs, no more than 2,160 can be deployed on SLBMs, and no more than 650 can be deployed on heavy bombers. This phase is to be completed within seven years after START I has entered into force (that is, by 2001). In the second phase, each country is to reduce its nuclear warhead stocks to 3,000-3,500, as well as to eliminate all MIRVed ICBMs. Initially this phase was be completed by the year 2003, however, a Protocol signed by the two parties in New York on 26 September 1997, extended the deadline for completion to the end of 2007. The reduction of nuclear warheads to the agreed limits can be achieved through several methods, including "downloading", conversion, and/or elimination. Downloading can be used to remove up to four warheads per MIRVed missile. Up to one hundred strategic bombers can be converted to carry conventional weapons but these have to be based separately from bombers carrying nuclear weapons.

STRATEGIC OFFENSIVE REDUCTIONS TREATY

Strategic nuclear warheads reduction agreement signed by the Russian Federation and the United States on 24 May 2002 at Moscow, Russia. Under the terms of the Treaty the two countries undertake to reduce their number of strategic nuclear warheads to 1,700-2,200 each by 31 December 2012. Each party retains the right to determine the exact make-up of its strategic nuclear forces at its discretion within the aggregate limit of warheads established by the Treaty. A Bilateral Implementation Commission which is to meet at least twice a year is established for the purpose of facilitating the implementation of the Treaty. The Treaty contains no explicit verification provisions. The Treaty is to enter into force pending the exchange of ratification instruments by the parties, and to remain in force until 31 December 2012. Thereafter it may be extended by agreement or it may also be subsumed by an earlier or subsequent agreement. Withdrawal from the Treaty requires three months written notification.

THRESHOLD TEST BAN TREATY (TTBT) (*Treaty on the Limitation of Underground Nuclear Weapon Tests*)

Treaty between the Soviet Union and the United States signed on 3 July 1974, at Moscow. It limits the yield of an underground **nuclear explosion** to 150 kilotons. Similar limits on peaceful nuclear explosions are set by the **Peaceful Nuclear Explosion Treaty (PNET)**.

Ratification of the TTBT only took place on 11 December 1990, although both the Soviet Union and the United States observed the provisions of the Treaty in the interim. The delay in ratification stemmed from differences regarding the verification provisions contained in the Treaty which relied on the use of national technical means (NTMs), and which the United States deemed insufficient. In 1990 a Protocol to the TTBT introduced more elaborate verification measures including hydrodynamic yield measurement procedures, seismic yield measurement procedures and on-site inspections, and created the Bilateral Consultative Commission (BCC) to coordinate the proceedings of the on-site inspections and to resolve differences over compliance with the TTBT. The TTBT was to remain in force for five years following which it could be extended for additional five-year periods. The TTBT has now been superceded by the **Comprehensive Nuclear Test Ban Treaty (CTBT)**. See also Bilateral Consultative Commission (BCC).

Weapons Destruction and Non-Proliferation Agreement (*Agreement Between the United States of America and Russia Concerning the Safe and Secure Transportation, Storage and Destruction of Weapons and the Prevention of Weapons Proliferation*)

Agreement between Russia and the United States signed at Washington, D.C. on 17 June 1992, and entered into force on the same date. It commits the two parties to cooperate in the destruction of nuclear, chemical and other weapons, to ensure the safe and secure transportation and storage of weapons slated for destruction, and to adopt verifiable measures against the proliferation of such weapons. It is for a duration of seven years, and may be amended or extended by the formal consent of the two parties. Withdrawal requires 90 days prior notification.

6.3.4 Unilateral Instruments

Safe Secure Dismantlement (SSD) Initiatives

Programme initiated by the United States in 1993 under the Nunn-Lugar Act aimed at assisting Belarus, Kazakhstan, Russia, and Ukraine in the safe and secure transportation, storage and dismantlement, as well as non-proliferation of nuclear and other weapons of mass

destruction (WMD). Under the programme, the United States undertakes to provide the four former Soviet Republics with technical and material aid including emergency response equipment, special **fissile material** transportation and storage containers and facilities, transportation security-enhancing devices such as armoured blankets, chemical weapons destruction expertise, and export control know-how. The aid is to be delivered on an individual basis under special bilateral so-called "Umbrella Agreements" negotiated with each country.

Soviet President's Announcement Regarding Unilateral Reductions of Nuclear Weapons

Declaration issued by the President of the Soviet Union on 5 October 1991, describing a series of unilateral measures to be taken in reducing its **nuclear weapons** arsenal in response to a similar initiative announced by the President of the United States a week earlier. As part of the Announcement, the Soviet Union undertook to destroy all tactical nuclear artillery munitions and missile warheads; to remove all tactical nuclear weapons from surface ships, submarines and ground-based naval aircraft, and to destroy part of these; to de-alert all strategic bombers; to stop development of new strategic bombers, short-range cruise missiles and a small mobile intercontinental ballistic missile (ICBM); to abandon plans for the construction of new railway car-based ICBM launchers; to place in storage all ICBMs deployed on railway cars and to de-alert 503 ICBMs, including 134 ICBMs equipped with multiple warheads; to remove three additional nuclear missile submarines from service; to effect cuts in its strategic nuclear warheads by 1,000 more than required by the **Strategic Arms Reduction Treaty (START)**; to introduce a one-year moratorium on all nuclear **testing**; and to reduce its armed forces by about 700,000 personnel. The Announcement also called on the United States to begin negotiations on further reductions of **strategic nuclear weapons** by approximately one half, as well as indicated that the Soviet Union was ready to reach agreement on a cut-off treaty. See also **United States President's Announcement Regarding Unilateral Reductions of Nuclear Weapons**.

UNITED STATES PRESIDENT'S ANNOUNCEMENT REGARDING UNILATERAL REDUCTIONS OF NUCLEAR WEAPONS

Declaration issued by the President of the United States on 27 September 1991, outlining a number of unilateral measures to be taken in reducing American **nuclear weapons**. Announced reductions included: complete elimination of all ground-based short-range nuclear weapons; withdrawal of all tactical nuclear weapons from ships and submarines and of nuclear depth charges for land-based naval aircraft, and their partial dismantlement; the immediate de-alerting of American strategic bombers and intercontinental ballistic missiles (ICBMs) slated for deactivation under the **Strategic Arms Reduction Treaty (START I)**; termination of the development of a mobile ICBM; cancellation of the replacement of existing nuclear short-range cruise missiles; and the streamlining of command and control procedures under a unified Strategic Command. The Announcement also called on the Soviet Union to reciprocate these measures, to commence negotiations with a view to eliminating all multiple warhead ICBMs, and to cooperate on the development of non-nuclear ballistic missile defences as well as on the improvement of command and control, security, transportation, and dismantlement of nuclear weapons. See also **Soviet President's Announcement Regarding Unilateral Reductions of Nuclear Weapons**.

6.3.5 Arms Limitation Instruments Terms

EXPORT CONTROLS: see page 124.

FULL-SCOPE SAFEGUARDS (FSS): see page 213.

INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA) SAFEGUARDS: see page 215.

NON-NUCLEAR-WEAPON STATE (NNWS)

Under the **Non-Proliferation Treaty (NPT)**, all States parties that had not manufactured and detonated a **nuclear explosive** by 1 January 1967.

NUCLEAR-WEAPON-FREE ZONE (NWFZ)

Geographic area within which the deployment of **nuclear weapons** is formally prohibited. NWFZs are non-proliferation instruments

designed to preclude the spread of nuclear weapons within specified regions on the initiative of the States in the region in question (as far as inhabited areas are concerned). NWFZs have been established with respect to the Antarctic, the ocean seabed, the outer space, the Moon, Africa, Latin America, South-East Asia, and the South Pacific. See also **Antarctic Treaty**, **Seabed Treaty**, **Outer Space**, **Moon Treaty**, **Treaty of Pelindaba**, **Treaty of Tlatelolco**, **Treaty of Bangkok**, **Treaty of Rarotonga**.

NUCLEAR-WEAPON STATE (NWS)
Under the **Non-Proliferation Treaty (NPT)**, a State that has manufactured and detonated a **nuclear explosive** prior to 1 January 1967. The five NWS are China, France, the Russian Federation, the United Kingdom, and the United States.

STRENGTHENED SAFEGUARD SYSTEM (SSS): see page 225.

6.4 NUCLEAR WEAPONS TERMS

ATOMIC BOMB
Explosive device that releases energy by means of nuclear **fission**. It combines a **primary** containing an **ignition mechanism** and sufficient amounts of **fissile material** to create a self-sustaining **chain reaction**. Thermonuclear weapons use atomic explosives as primaries. Atomic bombs are sometimes referred to as fission or first-generation weapons.

BOOSTED FISSION WEAPON
A more powerful kind of **atomic bomb**. They add a few grams of deuterium or tritium into the core of the atomic explosive to increase its **yield**. After detonation, the imploding **fission** device causes the deuterium/tritium to undergo **fusion**. This increases the amount of energy released in the final phase of the explosion.

CHAIN REACTION
Self-sustaining **fission** reaction in which the neutrons released by one fission or division of a large atomic nucleus cause at least one other fission. In a **nuclear explosive** an extremely rapid chain reaction causes the explosive release of energy. In a **nuclear reactor** the pace

of the chain reaction is controlled to produce heat for power (power reactor) or neutrons for the production of fissile material (production reactor) or for research purposes (research reactor).

COMPUTER MODELS

Electronic simulations initially used to facilitate the design of nuclear warheads and to model their explosive behaviour. They can be used to simulate the explosive behaviour of a nuclear warhead design to help ensure that the replacement or modification of some of its components does not adversely affect the safety or reliability of the warhead. The development of computer models is based on data acquired from previously conducted **nuclear explosions**. Computer models are used to help designers understand among other things, the implosion dynamics generated by the **ignition mechanism**, the ignition and burn of boost gases, and the initiation of **fusion** in **thermonuclear weapons**.

COUNTERFORCE

Nuclear doctrine that provides for the use of **nuclear weapons** to destroy or significantly impair an adversary's nuclear forces and related facilities (rather than population or industrial centres). It aims to achieve **nuclear deterrence** by promising to deny an adversary the ability to successfully carry out a nuclear attack. Operationally it requires a **second-strike capability** combining enough accurate delivery systems and accurate intelligence, to precisely target the adversary's nuclear assets.

COUNTERVALUE

Nuclear doctrine that provides for the retaliatory use of nuclear weapons to destroy or severely incapacitate an adversary's population and industrial centres. It aims to achieve **nuclear deterrence** by promising to punish any nuclear (or possibly other kinds of) attack with a devastating response. Within the context of two nuclear armed States, it requires a **second-strike capability**.

CRITICAL MASS (OR CRITICAL DENSITY)

Minimum quantity of **fissile material** needed to support a self-sustaining **chain reaction**. The exact mass varies according to many factors such as the fissionable **isotope** used, its concentration and chemical form, the geometrical arrangement of the material, and its

density. When fissile materials are compressed by high-explosives, the density increases and the critical mass needed for a **nuclear explosion** is reduced; the material has thus reached critical density. The Standing Advisory Group on Safeguards Implementation of the Director-General of the International Atomic Energy Agency (IAEA) has defined **significant quantities** to be 25 kilograms of high-enriched **uranium**-235, 8 kilograms of uranium-233, or 8 kilograms of **plutonium**-239. However, to form a critical mass less than 50 per cent of these quantities may be needed if a suitable **tamper** is available.

DECOUPLING

Technique whereby the seismic signals generated by a **nuclear explosion** are not coupled to their surroundings and thereby are weaker. Decoupling can be achieved by conducting the test in an underground cavity that is surrounded by crystalline rocks or salt.

ELECTROMAGNETIC PULSE (EMP)

Effect of **nuclear explosions** that destroys or impairs the performance of electronic equipment and computer memories by the sudden creation of powerful but short-lived electrical and magnetic fields.

ENHANCED RADIATION WEAPONS

Thermonuclear weapons designed to limit the blast and thermal effects of a **nuclear explosion** while enhancing radiation emissions (i.e., neutrons, X-rays, and gamma rays) that are particularly damaging to the human body. Compared with other kinds of **nuclear weapons**, they are better suited for attacking personnel while reducing the damage caused to equipment and infrastructure. Enhanced radiation weapons are based on **fusion** reactions. Their greater emission of radiation is due to the omission of a neutron-reflecting **tamper** from the design of the **nuclear explosive**. Enhanced radiation weapons are sometimes referred to as neutron bombs, or third-generation nuclear weapons.

ENRICHMENT

Means through which the relative concentration of a particular **isotope** of an element is artificially increased. It can be understood as a process of "purification" whereby the undesirable isotopes of an element are progressively isolated and removed until the relative proportion of the desired isotope reaches the level wanted. Enrichment is scaled in levels

according to the relative abundance of the desired isotope. It can be achieved by several methods, the two most common ones being gaseous diffusion and centrifuge separation. Both techniques use a compound of natural **uranium** in gaseous form to separate the heavier uranium-238 from the lighter uranium-235. Other methods include the jet nozzle technique and electromagnetic separation, as well as laser and chemical separation techniques.

Fertile Material

Isotope that can readily transform into **fissile material** through the absorption of a neutron.

First-Strike Capability

Ability to eliminate an adversary's retaliatory capabilities through a massive attack on its nuclear assets. See also **second-strike capability**.

Fissile Material

Material capable of readily undergoing **fission** when bombarded by neutrons. **Uranium**-235 and **plutonium**-239 are fissile materials typically used in the production of **nuclear explosives**. Other fissile materials potentially usable include uranium-233, americium, neptunium, and other plutonium isotopes.

Fission

Reaction whereby the nucleus of a heavy **isotope** is split into fragments following bombardment by neutrons, thereby releasing further neutrons and producing energy, heat, and radiation. If in a fission reaction more neutrons are released than consumed, a self-sustained **chain reaction** can be supported in a **critical mass**. See also **nuclear reaction**.

Fissionable Material

Material capable of undergoing **fission** when bombarded by neutrons or photons of the appropriate energy. **Uranium**-238, for instance, is fissionable, but not fissile.

Fission-Fusion-Fission Weapons

Thermonuclear weapons whose explosion unfolds over three stages. In stage one, a **fission** reaction is initiated which, in turn, sets off a **fusion** reaction in stage two. In stage three, the fusion reaction ignites

a further fission reaction. Fission-fusion-fission weapons are the most powerful type of **nuclear weapons**.

Flexible Response

Nuclear doctrine that provides for the use of **nuclear weapons** at the tactical and/or strategic levels in response to an armed attack. Flexible response is also known as graduated deterrence or ladder of escalation because of its potential for gradually escalating the use of nuclear weapons from various employments at the tactical level to various employments at the strategic level.

Fusion

Process by which two lighter **isotopes** are combined into heavier one, resulting in the release of neutrons and large amounts of energy. The elements most commonly used for fusion are hydrogen, deuterium, tritium, and lithium. To initiate fusion, the isotopes must have very high energies so as to overcome the electrical repulsion of the nuclei. This can be created by exposing the isotopes to extremely high temperatures of millions of degrees, which can be obtained by detonating a **fission** device. Other techniques for creating the conditions for fusion in reactors (such as the use of lasers) are also in development. A fusion reaction is often called a thermonuclear reaction because it takes place at high temperatures; it is the basis for **thermonuclear weapons**. See also **inertial confinement fusion** and **nuclear reaction**.

High-Energy-Density Experiments

Small-scale experiments which simulate the conditions found in a thermonuclear explosion. These experiments are used to provide more accurate information about the behaviour of matter at high-energy density. They are particularly relevant in examining a warhead's secondary stage, although they can also be used to study **primary** hydrodynamics. Test diagnostics include an X-ray burst or a pressure pulse. Test results are compared with theoretical predictions and used to improve **computer models**.

Hydrodynamic Experiments

Experiments used to measure the ability of a nuclear warhead's high-explosives to compress the **fissile material** core. Only the **primary** of the warhead is used and the fissile material is usually replaced with an

inert material such as depleted **uranium,** lead, or tantalum. Hydrodynamic tests are arranged and conducted in such a manner that a **nuclear explosion** cannot result. Experimental diagnostics include flash radiography as well as electrical and optical diagnostics. Results are compared with theoretical predictions and used to improve **computer models**.

HYDRONUCLEAR TESTS

Tests used to study the initiation of a **chain reaction**. A hydronuclear test generates only a very small usually non-explosive nuclear **yield** because some of the **fissile material** of the **warhead** is either removed or replaced with non-fissile isotopes, or the device otherwise modified.

IGNITION MECHANISM

Device that uses conventional high-explosives to bring a subcritical mass of **fissile material** to **critical density**, and thereby trigger a **fission** reaction.

INERTIAL CONFINEMENT FUSION (ICF)

Technique whereby nuclear **fusion** reactions are initiated by lasers or energetic beams of particles, and energy releases, while extremely rapid, are contained within a suitable vessel.

INSENSITIVE HIGH-EXPLOSIVES (IHE)

Category of chemical high-explosives used in the **ignition mechanism** of **nuclear weapons** which ensure that these are not accidentally detonated. They are insensitive to a number of contingencies such as being dropped or exposed to other similar shock. Insensitive high-explosives ensure that the **fissile material** of a nuclear **warhead** is not accidentally rendered critical.

IRRADIATION

Process whereby anything is exposed to any form of radiation.

ISOTOPES

Atoms of the same element whose nuclei have the same number of protons but different numbers of neutrons. Most elements comprise a mixture of isotopes. Unstable isotopes are **radioactive**.

Massive Retaliation

Countervalue nuclear doctrine that provides for the massive use of **nuclear weapons** at the strategic level in response to any kind of attack.

Minimum Deterrence

Countervalue nuclear doctrine that provides for the possession of a minimum **second-strike capability** sufficient to inflict unacceptable damage on the opponent in retaliation to a nuclear attack. Because minimum deterrence emphasizes the possession of minimal nuclear forces, it is sometimes argued that a policy of minimum deterrence could be interpreted to signal restraint.

Mutual Assured Destruction (MAD)

Countervalue nuclear doctrine that provides for **massive retaliation** in response to any nuclear or possibly other kind of attack. Within the context of a nuclear stand-off, MAD requires a **second-strike capability**.

Nuclear Deterrence

Threat of use of **nuclear weapons** to dissuade armed (usually nuclear) attack. Nuclear deterrence is the objective of both **countervalue** and **counterforce** doctrines. The concept emerged in the United States in the late 1940s as a response to the perceived threat posed by Soviet conventional forces initially, and conventional and nuclear forces subsequently.

Nuclear Explosion

Uncontrolled release of energy produced by a **fission** reaction, a **fusion** reaction, or both. It produces a combination of initial and residual effects comprising a blast wave, thermal radiation, initial radiation, **electromagnetic pulse**, and residual radiation. The effects of a nuclear explosion differ according to the **yield** and design of the device, the altitude at which the device is detonated, the environment in which it is detonated, and, to a limited extent, prevailing meteorological conditions.

Nuclear Explosive

Device that releases energy through nuclear **fission** or fission and **fusion** reactions.

NUCLEAR FUEL

Material that may be used for the operation of a **nuclear reactor**, including **fissile** and **fertile materials**. Commonly used nuclear fuels include natural **uranium** and low-enriched uranium. High-enriched uranium and **plutonium** are used in some reactors.

NUCLEAR FUEL CYCLE

Set of chemical and physical operations needed to prepare nuclear materials for use in **nuclear reactors** and to dispose of or recycle these after its removal from the reactor. Existing fuel cycles begin with **uranium** as a natural resource and create **plutonium** as a by-product. Some future fuel cycles may rely on thorium and produce the fissionable isotope uranium-233. Two elements in the fuel cycle are particularly relevant for the development of **nuclear weapons**. First, the **enrichment** of uranium as required by some reactors can be used to produce weapon-grade enriched uranium. Second, the **reprocessing** of spent nuclear fuel separates plutonium from uranium. The separated plutonium could then be used for the production of nuclear weapons instead of being stored as nuclear waste or recycled as nuclear fuel.

NUCLEAR FUEL FABRICATION

Processes by which **nuclear fuel** is fabricated into a rod, tube, plate, or other mechanical shape or form which is called a fuel element. Only fuel elements can be inserted into **nuclear reactors**.

NUCLEAR REACTION

Reaction that changes the nuclear structure of an atom. An atom comprises a nucleus composed of protons and neutrons (except for hydrogen atoms which contain no neutrons), surrounded by a number of revolving electrons. Nuclear reactions can transform the relative number of protons and neutrons contained in the nucleus, through the absorption or release of nuclear particles.

NUCLEAR REACTOR

Device configured to sustain a controlled **chain reaction** when fuelled with **fissile materials**. There are two types of nuclear reactors: heavy-water and light-water reactors. Heavy-water reactors use heavy water consisting of the hydrogen isotope deuterium, or use carbon, as a moderator to slow the neutrons, raising the likelihood of the fissioning

of **uranium**-235. Such reactors are used in the production of **plutonium**-239. The moderator slows down the neutrons emitted by fissioning uranium-235, plutonium or other nuclei, thereby allowing fertile uranium-238 isotopes to capture these and turn into **plutonium**-239. Light-water reactors use regular water to moderate the fission process. Such reactors cannot operate with natural uranium, and use only enriched uranium. Light-water reactors are the most common type of reactors used for the production of electrical power and research. See also **enrichment**.

NUCLEAR TEST EXPLOSIONS

Test explosions of **nuclear explosives** conducted for military purposes. Such explosions have been used to develop new nuclear warheads and to adapt existing ones to new delivery systems, to assure the reliability of existing nuclear weapon stockpiles, to improve the safety mechanisms of existing nuclear weapons in order to prevent their accidental detonation, or to research the effects of nuclear explosions. To date, seven countries are known to have conducted nuclear test explosions: China, France, India, Pakistan, the Soviet Union, the United Kingdom, and the United States.

NUCLEAR WARFARE

The use of **nuclear weapons** as instruments of war.

NUCLEAR WEAPON

A weapon consisting of a **nuclear explosive** and a delivery system.

NUCLEAR WEAPON TESTS

Testing of any **nuclear weapon** or any of its components that involves a **nuclear explosion**.

PEACEFUL NUCLEAR EXPLOSIONS (PNES)

Nuclear explosions conducted for non-military purposes. Until the late 1970s, proponents maintained that peaceful nuclear explosions could be conducted for large civil engineering operations such as excavation, underground storage and oil and gas extraction. However, because of unsatisfactory results, uncertain benefits, and growing concern about released **radiation**, peaceful nuclear explosions are no longer considered to be industrially useful. Since peaceful nuclear explosions are indistinguishable from nuclear explosions conducted for

military purposes, such explosions hold the potential to cover experiments conducted for weapon development purposes and so are banned under the **Comprehensive Nuclear Test Ban Treaty (CTBT)**. See also **Threshold Test Ban Treaty (TTBT)** and **Peaceful Nuclear Explosions Treaty (PNET)**.

PLUTONIUM

Radioactive element with atomic number 94, comprising a range of 13 **isotopes** including plutonium-239 and plutonium-240. Plutonium-239 is an isotope used almost exclusively in the construction of nuclear weapons, that is produced when a uranium-238 isotope captures an extra neutron following **irradiation**. Plutonium-240 is an isotope whose presence complicates the construction of nuclear explosives because of its high neutron emission, its decay by spontaneous fission, its higher critical mass, and its high heat output. According to the level of plutonium-240 present, different grades of plutonium may be distinguished. For instance, the United States categorizes plutonium into three different categories: weapon-grade plutonium containing less than 7 per cent plutonium-240; fuel-grade plutonium containing 7-8 per cent plutonium-240; and reactor-grade plutonium containing over 18 per cent plutonium-240. All grades of plutonium could possibly be used to manufacture nuclear explosives.

PRIMARY

First part of a **fission** or **fusion nuclear weapon**. Two types of primary designs are used in **nuclear explosives**: the gun-type design, and the implosion-type design. The gun-type design uses a conventional high-explosives charge to propel two separate subcritical masses of uranium-235 into each other thereby creating a **critical density**. The implosion-type design uses a conventional explosion to compress a subcritical mass of uranium-235 or plutonium-239 into a critical density.

RADIOACTIVITY

Process by which the nucleus of an unstable atom releases energy and mass emits alpha particles, beta particles, and gamma radiation. Alpha particles are fast-moving helium nuclei, which are unlikely to penetrate the human body, but, which, if absorbed in the lungs or bone marrow, can pose a serious threat to health. Beta particles are high energy electrons which have only one thousandth of the mass of alpha

particles, but a much greater velocity. Beta particles can penetrate moderately into the body tissue and can represent a greater health danger than alpha particles. Gamma radiation consists of high energy electromagnetic radiation. These rays can be very harmful to the human body.

RADIOLOGICAL WEAPON

Weapon that spreads radioactive material without a nuclear explosion. Radiological weapons are sometimes referred to as "dirty bombs".

REPROCESSING

Treatment of spent **nuclear fuel** to separate **plutonium** and **uranium** from unwanted radioactive waste by-products and from each other. While the purpose of reprocessing is to recover plutonium and/or uranium for the further use for operation of a **nuclear reactor**, the separated plutonium could also be used for the development of **nuclear weapons**.

SECOND-STRIKE CAPABILITY

Capacity for nuclear retaliation of sufficient strength to inflict unacceptable damage on an attacker following the absorption of a nuclear first-strike. It implies the possession of a nuclear force and related infrastructure large enough and diverse enough to be able to survive an initial nuclear attack by the adversary. Such a capability is usually a minimum prerequisite for credible nuclear deterrence involving two or more nuclear armed countries.

SIGNIFICANT QUANTITY (SQ)

Amount of nuclear material sufficient to make a **nuclear explosive**. It is defined by the International Atomic Energy Agency (IAEA) as 25 kilograms of high-enriched **uranium**-235, 8 kilograms of uranium-233, or 8 kilograms of **plutonium**-239.

STRATEGIC NUCLEAR WEAPONS (SNWS)

Nuclear weapons designed to attack valuable enemy targets at very long, usually intercontinental, ranges. Typically they are designated to target enemy strategic nuclear forces and related infrastructure, as well as population and industrial centres. Strategic nuclear weapons are generally delivered by long-range ballistic missiles. See also

intercontinental ballistic missile (ICBM), and submarine-launched ballistic missile (SLBM).

SUBCRITICAL TESTS

Nuclear experiments that stop short of triggering a self-sustaining **chain reaction**. They are used to provide data on the properties of ageing nuclear material in order to assess the performance and safety of stockpiled nuclear weapons.

TACTICAL NUCLEAR WEAPONS (TNWS)

Nuclear weapons designed to attack battlefield enemy targets at short ranges. Typically they are used to target frontline enemy conventional forces and related infrastructure. For this reason, tactical nuclear weapons are sometimes referred to as battlefield weapons. TNWs are delivered by short-range ballistic and cruise missiles, fighter/bomber aircraft and/or long-range artillery. See also short-range ballistic missile, shorter-range ballistic missile, and intermediate-range ballistic missile.

TAMPER

Reflector which prevents the escape of neutrons that are released during a **fission** reaction.

THERMONUCLEAR WEAPONS

Explosive devices that release energy by means of a **fusion** reaction. A **fission** device is used as a **primary** to generate the heat necessary to trigger the fusion process. Thermonuclear bombs are sometimes referred to as hydrogen bombs, fission-fusion weapons, or second-generation **nuclear weapons**.

URANIUM

Radioactive element with the atomic number 92 and, as found in natural ores, an average atomic mass of 238. Natural uranium contains three isotopes: uranium-238 (99.28 per cent), uranium-235 (0.71 per cent), and uranium-234 (0.006 per cent). Uranium-238 is both a **fissionable** and a **fertile** isotope, that is, it can easily absorb neutrons and transform into **fissile material** and when struck by high energy neutrons, it fissions. Uranium-235 is a fissile **isotope** which, following a process of **enrichment,** can be used in the production of **nuclear explosives**, and as fuel in **nuclear reactors**. Depending on the level of enrichment, two grades of uranium are distinguishable : low-enriched

uranium (LEU) containing 0.71-20 per cent uranium-235; high-enriched uranium (HEU) containing 20-90 per cent uranium-235 (the term medium-enriched uranium (MEU) is sometimes to describe uranium-235 concentrations of between 20-50 per cent). LEU can be used to sustain a chain reaction when employed as fuel in light-water reactors. HEU, and more usually, weapon-grade uranium, are used in the production of nuclear explosives. Uranium-233, another fissionable uranium isotope, does not exist naturally but is bred in fertile thorium-232. It is theoretically an excellent material for **nuclear weapons**, but has rarely been used in the construction of such weapons. Uranium-233 can also be used as reactor fuel. See also **enrichment**, **fertile material** and **isotopes**.

WEAPON-GRADE MATERIAL

Fissile material suitable for use in **nuclear explosives**. Most **nuclear weapons** employ 90 per cent pure **plutonium**-239, or greater than 90 per cent enriched **uranium-**235. See also **chain reaction**, **critical mass**, **enrichment**, **fissile material**, **fission**, **plutonium**, and **uranium**.

YIELD

Total energy released in a **nuclear explosion**. It is usually expressed in equivalent tons of trinitrotoluene (TNT), that is, the equivalent amount of TNT required to produce a corresponding amount of energy. A yield of 1 kiloton thus, represents the equivalent of the energy released by an explosion of 1,000 tons of TNT, while a yield of 1 megaton represents the equivalent of energy released by an explosion of 1,000,000 tons of TNT. TNT is a common conventional explosive. One kiloton is equal to 4.17×10^{12} joules.

CHAPTER 7

DELIVERY SYSTEMS: BOMBERS AND MISSILES

7.1 BACKGROUND

Delivery systems propel or transport munitions to their targets. They are an integral part of most weapon systems, and include a wide variety of devices of different degrees of sophistication. For example, both an ordinary canon and an advanced missile are delivery systems in that essentially they both serve the same purpose of delivering some sort of munition to its target. Delivery systems can be air-, land-, or sea-based, and some are dual-capable, meaning that they can be used to carry either conventional or weapons of mass destruction (WMD) payloads. This chapter focuses on two types of delivery systems: **bombers** and **missiles**. Since their advent, these have dramatically transformed the conduct of warfare and have become a major feature of military thought. Moreover, from an arms control perspective, bombers and missiles are particularly important because they are by far the main instruments charged with delivering weapons of mass destruction, and their control is considered to be intimately tied to issues of non-proliferation.

Bombers are any kind of aircraft designed primarily to attack enemy ground targets from the air. Crude attempts at aerial bombardment began in the middle of the nineteenth century, although, it was not until the First World War that the modern bomber emerged. During the war, the Germans were the first to employ military aircraft to strike enemy positions. Their was quickly followed by the Allies, which by the end of the war were targeting German industrial and front-line positions on an unprecedented scale. The inter-war years, saw advancements in both bomber design and doctrine. Most notably, the advent of strategic air war theory as elaborated by the Italian General Giulio Douhet, raised the bomber to the status of strategic, war-winning weapon. During the Second World War, aerial

bombardment played a prominent role. At the beginning of the war, the Germans used it to great effect against Poland, France, and Russia. In 1940 they opened the Battle of Britain, a massive air campaign aimed at wiping out British resistance. Similarly in 1941 the Japanese used carrier-based aircraft to attack the American naval base at Pearl Harbour, in an attempt to knock the United States out and ensure that it would not join the war. By the end of the war, however, it was once again the Allies which had gained the upper hand and which were carrying out crippling bombing raids against German and Japanese military and industrial targets. In August 1945 these raids culminated in the dropping of two nuclear bombs on Hiroshima and Nagasaki, which brought about the surrender of Japan. After the war, long-range bombers were tasked with the delivery of nuclear weapons in strategic missions. From the 1960s onward, however, this role was increasingly assigned to missiles. Currently most modern hybrid fighter-bomber aircraft in service with many countries around the world, are capable of accommodating nuclear weapon payloads.

Missiles are unmanned, disposable, rocket-powered or air-breathing vehicles, which are guided to rather than aimed at a target. Missiles can have various ranges extending from a few hundred metres to several thousand kilometres, and can carry various types of conventional and weapons of mass destruction ordnance. They can be air-, land- or sea-based, and can be fired from either static or mobile launchers. Missiles are divided into two categories: **ballistic missiles** and **cruise missiles**. Ballistic missiles follow a ballistic (i.e. parabolic) flight path. The first ballistic missiles, the so-called V-2s, were introduced by the Germans in the Second World War. The V-2 had a range of slightly over 300 kilometres and carried a 1-ton conventional high-explosives warhead. During the Battle of Britain, approximately 4,000 V-2s were fired from specially prepared sites. However, because of their gross inaccuracy and limited destructive power, they produced only modest results. Since the Second World War, the development of ballistic missiles has been geared mainly towards the delivery of nuclear explosives. In the 1950s, spurred by the advent of sufficiently light nuclear charges, both the Soviet Union and the United States introduced **intercontinental ballistic missiles (ICBMs)**, capable of delivering a nuclear warhead to a distance of several thousand kilometres. In the 1960s and 1970s, a wide range of advances in ballistic missile propulsion, launching, guidance, and other component systems were introduced. Most notable amongst these was the **multiple independently targetable re-entry vehicle (MIRV)** system which allowed an ICBM to carry

several individually targetable warheads and thereby to engage multiple targets simultaneously. In the 1980s, further refinements in ballistic missile technology were registered, especially in the area of guidance systems, where the introduction of re-entry vehicles capable of actively manoeuvring to target, improved the accuracy of ballistic missiles even further. Currently concerns over the proliferation of ballistic missiles capable of transporting weapons of mass destruction payloads over short and intermediate ranges has triggered interest in the development of missile defences, particularly in the United States.

Ballistic missiles comprise a **launcher**, **propulsion system**, **payload**, and **guidance system**. The launcher is the platform that holds and fires the missile. Ballistic missiles may be fired from land-based launchers such as a **silo**, or from sea-based launchers such as specially designed submarines. Launchers may also be static as in the case of fixed silos, or mobile as in the case of specially designed trucks or railway cars. The propulsion system describes the part that powers the ballistic missile to target. Depending on the range of the missile, the propulsion system may involve multiple stages. An ICBM, for instance, may have up to four separate propulsion stages. The payload of a ballistic missile refers to the total number of warheads and **penetration aids** that the missile carries. The **warhead** is the part of the missile that contains the explosive charge, which can be either conventional, nuclear, biological, or chemical. In strategic ballistic missiles the warheads are housed in so-called **re-entry vehicles**, several of which can be mounted on a single missile as is the case with MIRVed missiles. The guidance system steers the ballistic missile to its target. Typically ballistic missiles contain in-flight guidance systems only. These systems direct the missile along a pre-determined flight path, and make the necessary adjustments as needed.

Cruise missiles are small unmanned guided vehicles that use propulsion and aerodynamic lift in order to overcome gravity and drag. Similar to ballistic missiles, cruise missiles also have their origins in the Second World War. During the Battle of Britain some 10,000 V-1s cruise missiles were launched by the Germans both from fixed ground sites along the Channel coast and from specially adapted bombers. Essentially a small unmanned aircraft powered by a pulse jet engine, the V-1 had an operational range of approximately 250 kilometres and carried an 850 kilogram conventional high-explosives warhead. The V-1 was steered to target automatically by a gyroscope which regulated the missile's flight

course, and an internal clock which directed the missile downwards after the lapse of a predetermined amount of time. Although this crude assembly supplied only rudimentary guidance making the missile highly inaccurate and mostly ineffective, the V-1 experience during the Battle of Britain convincingly demonstrated the ability of cruise missiles to thread through tightly defended aerospace and strike targets at considerable ranges. After the Second World War, cruise missiles were developed by both the Soviet Union and the United States. Throughout the 1950s and the 1960s both the Soviets and the Americans deployed a variety of air-, land-, and sea-launched nuclear and conventionally armed cruise missiles designed for a variety of purposes. The sinking of an Israeli destroyer by a Soviet-made anti-ship missile in 1967during the Arab-Israeli War, marked the first post-Second World War successful use of cruise missiles in combat. Such use would be repeated in the Indo-Pakistani War (1971), the Iran-Iraq War (1983-1988), the Falklands War (1987), and particularly in the Gulf War (1991). In the 1970s, prompted by military, political, economic and technological considerations, the United States and the Soviet Union began work on a new generation of cruise missiles. Fielded in the 1980s, these new missiles featured radical improvements in all system components including fuels, engines, airframe construction materials, and design. Most importantly, however, they were fitted with advanced guidance systems which incorporated newly available sophisticated digital area correlation and satellite navigation systems capable of directing them to target with a tremendous amount of accuracy. These guidance systems rendered the new generation of cruise missiles vastly superior to their predecessors, and transformed cruise missiles into an extremely accurate and effective means of delivering all sorts of payloads over various ranges.

Similar to ballistic missiles, cruise missiles comprise a propulsion system, payload, and guidance system. Cruise missiles can be launched from a number of air-, land-, and sea-based platforms. These platforms can be static, as in the case of fixed ground sites, but often they tend to be mobile, as in the case of specially adapted bombers, submarines, and surface sea vessels. Mobile platforms allow greater targeting flexibility and effectively extend the range of the missiles by carrying them part if not most of the way to their intended target before being fired. Cruise missiles are propelled either by specialized air-breathing engines such as a pulsejet, a ramjet, a turbojet or a turbofan engine, or by rocket motors. Like an aeroplane, cruise missiles follow a flight trajectory parallel to the ground. This trajectory can be pre-programmed, so that the missile avoids known

enemy defences or takes advantage of favourable terrain conditions to avoid detection by radar. Cruise missiles can accommodate conventional, nuclear, biological and chemical warheads, and some of them are dual-use. Since cruise missiles have flight characteristics similar to those of aeroplanes, their warheads are based on designs for conventional munitions. Typically cruise missiles are equipped with two types of guidance systems: an in-flight guidance system which regulates the missile's flight path and altitude, and a terminal guidance system which helps the missile home in on a preselected target in the final stage of its flight. The combination of in-flight and terminal guidance can make cruise missiles extremely accurate, giving them a very low **circular error probable**.

Anti-ballistic missiles (ABMs) are designed to destroy or disable ballistic missiles or their re-entry vehicles during flight. ABMs are active as opposed to passive missile defences in that they seek to prevent incoming missiles from reaching their target, rather than merely to improve the survivability of the target. Interest in anti-ballistic missiles was sparked by the advent of the V-2 in the Second World War, and intensified with the proliferation of ICBMs in the 1950s. In the United States, studies on the feasibility of anti-ballistic missile systems began as early as 1944, and continued throughout the 1950s. In the early 1960s the Americans carried out the first successful test-interception of an ICBM, while the Soviets embarked on their own ballistic missile defence development programme. However, although essentially defensively-oriented, ABMs threatened to upset the fragile nuclear deterrence relationship between the Soviet Union and the United States by complicating the capacity for retaliatory second strikes. In recognition of this, in 1972 the Soviet Union and the United States concluded the Anti-Ballistic Missile (ABM) Treaty, which limited the ABM deployments of each country to a single facility and a maximum of 100 interceptors. After the ABM Treaty, missile defence systems development received little attention until 1983, when the United States announced a new and extensive ABM research and development programme known as the **Strategic Defense Initiative (SDI)**. Initially aimed at protecting the United States against a massive ballistic missile attack, in 1991 SDI was replaced with the **Global Protection Against Limited Strikes**, a scaled down and refocused ABM research and development programme. Currently the United States is in the process of assessing the feasibility of various anti-missile systems with a view to deciding whether they should be deployed over the next decade.

7.2 Arms Limitation History: Approaches and Instruments

7.2.1 Global Instruments

Bombers and missiles have been the object of several global arms control initiatives. After the Second World War, with international arms control negotiations stalemated, restrictions on the transfer of bombers and missiles and of components thereof, came to be seen by many States as the most effective means of stemming the proliferation of nuclear and other weapons of mass destruction. As a result, in 1950, a group of Western States established the Coordinating Committee for Multilateral Export Control (COCOM) as an informal association to regulate *inter alia* the transfer of sensitive technologies with military applications, primarily to communist countries. In 1995 COCOM was replaced by the **Wassenaar Arrangement** which features a modified list of items subject to transfer restrictions and an expanded membership which includes the former European communist countries. In 1987, due to growing concern over the spread of missiles, the States comprising the Group of 7 announced the formation of a **Missile Technology Control Regime (MTCR)** for the purpose of limiting the proliferation of missiles and of technologies usable in the construction of missiles capable of delivering weapons of mass destruction payloads to ranges greater than 300 kilometres.

7.2.2 Bilateral Instruments

During the Cold War, restrictions on the deployment of missiles formed the basis of nuclear arms control efforts by the Soviet Union and the United States. The Strategic Arms Limitation Treaties (SALT) I and II concluded by the two countries in the 1970s, limited the number of strategic ballistic missile each party could deploy, while the ABM Treaty agreed to at the same time as SALT I, restricted the number of missile defence installations and interceptors of each party. In the 1980s, restrictions on missiles crossed into the realm of disarmament as the Soviet Union and the United States agreed to eliminate all their ground-based short- and medium-range ballistic missiles under the Intermediate-range Nuclear Forces Treaty (INF). At the end of the Cold War, the Strategic Arms Reduction Treaties (START) I and II negotiated in 1991 and 1993 respectively, mandated deep reductions in the strategic ballistic missiles and warheads of each country, and in their deployments of bombers and corresponding armaments.

7.3 Arms Limitation Instruments

7.3.1 Global Instruments

International Code of Conduct against Ballistic Missile Proliferation (ICOC)

Agreement initially developed by the members of the Missile Technology Control Regime (MTCR), with a view to becoming universalised through an ad hoc process separate from the MTCR and open to all States. The ICOC is a politically binding arrangement to promote the prevention and curbing of the proliferation of ballistic missiles capable of delivering weapons of mass destruction, to develop relevant norms, and to promote confidence regarding missile and space launch vehicle activities. A first meeting of the subscribing States was held in The Hague on 25 November 2002. The ICOC is also known as the Hague Code of Conduct. The ICOC subscribing States agree not to assist ballistic missile programmes in States which might be developing or acquiring weapons of mass destruction. They also resolve to implement transparency and confidence-building measures (CBM) including pre-launch notifications of ballistic missiles and space launch vehicles, and the submission of annual declarations regarding their national ballistic missile and space launch vehicle policies. Such declarations include information on ballistic missile systems and launch sites, as well as the number and generic class of ballistic missiles and space launch vehicles launched each year. Subscribing States are to meet annually, they make all decisions by a consensus of the subscribing States present, and one of them serves as a point of contact, notably for collecting and disseminating CBM submissions.

Missile Technology Control Regime (MTCR)

Informal political arrangement formed in 1987 to control the proliferation of rocket and unmanned air vehicle systems and components thereof capable of delivering weapons of mass destruction (WMD). The MTCR is not a treaty, but a regime, establishing a set of export control Guidelines which each participating country implements according to its own national legislation. The Guidelines state that the regime "is not designed to impede national space programs or international cooperation in such programs as long as such programs could not contribute to delivery systems for weapons of mass destruction". MTCR Guidelines address delivery systems for all

types of WMD, and are applicable to such rocket and unmanned air vehicle systems as **ballistic missiles**, space launch vehicles, sounding rockets, unmanned air vehicles, **cruise missiles**, drones, and remotely piloted vehicles. Items subject to the Guidelines are divided into two categories and are enumerated in the MTCR's Equipment and Technology Annex. Category I items include complete rocket and unmanned air vehicle systems capable of delivering a payload of at least 500 kilograms (the assumed weight of a first-generation nuclear warhead)to a range of at least 300 kilometres, and their major subsystems and related technology. Category II items include all missiles with a range of at least 300 kilometres, whatever their payload, since biological and chemical warheads may be lighter than nuclear ones. The Equipment and Technology Annex is modified periodically in order to improve its clarity and reflect evolving technologies.

Wassenaar Arrangement on Export Control for Conventional Arms and Dual-Use Goods and Technologies: see page 22.

7.3.2 Bilateral Instruments

Anti-Ballistic Missile (ABM) Treaty: see page 93.

Intermediate-range Nuclear Forces (INF) Treaty: see page 94.

SALT Interim Agreement (or **SALT I Agreement**): see page 96.

Strategic Arms Limitation Treaty (SALT II): see page 97.

Strategic Arms Reduction Treaty (START I): see page 98.

Strategic Arms Reduction Treaty (START II): see page 99.

7.3.3 Arms Limitation Instruments Terms

Export Controls

Measures designed to regulate the international transfer of certain weapon systems and of their components. Export controls are a form of arms control aimed at the non-proliferation of sensitive

technologies. They may be imposed on unilaterally or collectively. Multilateral export controls consist of political agreements that seek to coordinate the national transfer policies of the participants. For instance, the **Missile Technology Control Regime (MTCR)** and the **Wassenaar Arrangement** aim to co-ordinate the national policies of member States with respect to the transfer of missiles capable of carrying weapons of mass destruction (WMD) or their components, and other weapon systems and sensitive technologies. The Zangger Committee (ZC) and Nuclear Suppliers Group (NSG) play a similar role with respect to the transfer of materials and technologies usable in the development of nuclear weapons.

7.4 Delivery Systems Terms

Anti-Ballistic Missile (ABM)

System designed to intercept and destroy a **ballistic missile** or its **re-entry vehicle(s)** during flight. ABMs comprise tracking sensors, **launchers** and interceptors. Depending on their intercepting range, ABMs may be classified into three categories: those designed to destroy attacking missiles early in their flight (boost-phase interception); those designed to destroy missiles at relatively long ranges outside the atmosphere (exoatmospheric interception); and those designed to destroy missile re-entry vehicles at relatively short ranges after they have re-entered the atmosphere (endoatmospheric interception). The deployment of ABMs by Russia and the United States is restricted by the ABM Treaty. ABMs are sometimes also referred to as ballistic missile defences (BMDs). See also **Global Protection Against Limited Strikes (GPALS)**, **Strategic Defense Initiative (SDI)** and **Theatre Missile Defence (TMD)**.

Ballistic Missile

Missile whose flight path follows a ballistic (i.e. parabolic) trajectory governed mainly by gravity and aerodynamic drag once thrust is cut. A ballistic missile comprises a rocket-powered **propulsion system**, **payload**, and **guidance system**. The propulsion system propels the missile on a predetermined vector to a predetermined altitude, at which point thrust is cut and the missile or its **re-entry vehicle(s)** slides to target, pulled by gravity. Mid-course correction systems available on some ballistic missile re-entry vehicle(s) allow these to effect minor

modifications to their flight path. Ballistic missiles may be armed with conventional, nuclear, biological, or chemical **warhead(s)**. Typically they are used to carry weapons of mass destruction (WMD) payloads. See also **intercontinental ballistic missiles (ICBMs)**, **submarine-launched ballistic missiles (SLBMs)**, **intermediate-range ballistic missiles (IRBMs)**, **medium-range ballistic missiles (MRBMs)**, **shorter-range ballistic missiles (SRBMs)**, **short-range missiles (SRMs)**.

Bomber

Type of aircraft designed primarily to bombard enemy ground targets from the air. Bombers are typically classified according to the amount of **payload** they can carry and to their range into strategic bombers and tactical bombers. Strategic bombers tend to carry heavier payloads and have greater reach. For this reason strategic bombers are sometimes also referred to as heavy or long-range bombers. Tactical bombers tend to carry lighter payloads, and have shorter ranges. Tactical bombers are sometimes also referred to as light or medium bombers, or as medium- or short-range bombers. Many modern bombers are dual-capable, that is, they can be used to carry conventional as well as weapons of mass destruction (WMD) payloads.

Circular Error Probable (CEP)

Radius of circle within which 50 per cent of all **missiles** fired at a target are expected to hit. The centre of the circle is defined by the target. CEP measures the degree of accuracy of a class of missiles. A smaller CEP indicates a more accurate class of missiles, while a larger CEP indicates a less accurate one. Missile accuracy is important in assessing the expected effectiveness of a missile.

Cruise Missile

Missile that uses aerodynamic lift to offset gravity, and propulsion to counteract drag. Unlike **ballistic missiles**, cruise missiles travel parallel to the ground (usually at a constant height) like an aircraft. Some cruise missiles can fly at an altitude of about 30 metres (over flat areas) and at a speed of up to 800 kilometres per hour to a range of over 3,000 kilometres. The most advanced cruise missiles are equipped with both in-flight and terminal **guidance systems**, which enable them to follow flexible, obstacle-dodging flight paths, and which give them great targeting accuracy. Cruise missiles can be air-, ground-, or sea-

launched, and can carry either a conventional (unitary or cluster) or a nuclear **warhead**. Conceivably they could also be armed with biological or chemical payloads.

DELIVERY SYSTEM

Means of propulsion or transport employed to carry munitions to their target. Many delivery systems are so-called dual-capable in that they may transport both conventional weapons and weapons of mass destruction (WMD) payloads.

GLOBAL PROTECTION AGAINST LIMITED STRIKES (GPALS)

Missile defence system research and development programme initiated by the United States in 1991 as a scaled-down and refocused version of the **Strategic Defense Initiative (SDI)**. GPALS was intended to provide protection against limited nuclear and non-nuclear **ballistic missile** strikes against the territory and/or troops of the United States, its allies, and other friendly nations. GPALS comprised three main components: ground-based national missile defences (NMDs); theatre-missile defences (TMDs); and a space-based global missile defence.

GUIDANCE SYSTEM

Electronic system that directs a **missile** to its target. Guidance systems are of two types: in-flight systems, and terminal systems. In-flight systems regulate a missile's flight trajectory and altitude. Usually they rely on autonomous inertial guidance which uses a gyroscope, an accelerometer, and a processing unit to position the missile on a predetermined flight path and make adjustments as necessary. In long-range **cruise missiles**, inertial guidance is supplemented by other types of guidance such as a radar-based terrain-following navigation system, or a satellite navigation-based system. Terminal guidance systems assist a missile to find its target in the final stages of flight. Terminal guidance can employ an optical sensor-based digital scene matching system, which allows the missile to home in on its specified target. Terminal guidance is mainly deployed on advanced cruise missiles.

INTERCONTINENTAL BALLISTIC MISSILE (ICBM)

Ballistic missile that has a range of over 5,500 kilometres. ICBMs are nuclear-armed, although they may also carry conventional or other

weapons of mass destruction (WMD) ordnance. They can incorporate **multiple independently targetable re-entry vehicles (MIRVs)**, and can be deployed in and fired from either land-based static **silos** or mobile **launchers**. ICBMs are sometimes referred to as strategic missiles.

INTERMEDIATE-RANGE BALLISTIC MISSILE (IRBM)

Ballistic missile that has a range of between 1,000 and 5,500 kilometres. IRBMs are ground-based and can be deployed on and fired from fixed as well as mobile launchers. They can be armed with nuclear, conventional, biological, or chemical **warheads**. The 1987 Intermediate-range Nuclear Force (INF)Treaty eliminates land-based IRBMs from the arsenals of the Soviet Union and the United States. IRBMs are sometimes also referred to as tactical or theatre missiles.

LAUNCHER

Device that holds and launches a rocket or a **missile**. Launchers may be either land-based as in the case of **silos**, air-based as in the case of aircraft, or sea-based as in the case of submarines. Launchers may also be either static or mobile. For instance, silos are fixed and immobile, whereas missiles-carrying platforms such as specially adapted trucks or train cars, are mobile. Mobile launchers offer tactical flexibility in that their ability to readily shift their location makes them difficult to detect and destroy. Fixed launchers, in contrast, tend to offer higher targeting accuracy and are able to accommodate missile systems carrying greater **payloads**.

MEDIUM-RANGE BALLISTIC MISSILE (MRBM): see **Intermediate-range Ballistic Missile (IRBM)**

MISSILE

Unmanned, disposable, rocket-powered vehicle which is guided to, rather than aimed at, its target. A wide variety of missile systems exists, with ranges spanning from a few hundred metres to several thousand kilometres. A missile consists of a **propulsion system**, **guidance system** and **payload**. For operational purposes, a missile needs to be affixed to a **launcher**. Missiles may carry conventional, nuclear, biological, or chemical **payloads**.

MISSILE INTERCEPTOR

Vehicle that intercepts and disables attacking **ballistic missiles** or their **re-entry vehicles** and/or **cruise missiles** during flight.

MULTIPLE INDEPENDENTLY TARGETABLE RE-ENTRY VEHICLES (MIRVS)

Two or more **re-entry vehicles** carried by a single **ballistic missile**, deliverable to different targets. A MIRVed missile carries a **payload** of several single **warheads** affixed to a post-boost vehicle (PBV) or "bus". During the middle stage of the missile's flight, the rocket-powered PBV separates from the rest of the missile and releases each warhead at predetermined points along a preplanned flight path. Gravitational pull and aerodynamic drag then guide the warheads to their targets. Because each warhead may be ejected on a different vector (determined by the point of release), multiple targets may be engaged simultaneously. MIRVs were developed in the 1960s and marked an important step in the qualitative arms race between the Soviet Union and the United States. Because MIRVs enabled existing ballistic missiles to attack more enemy targets in a shorter period of time, the advent of MIRVed missiles greatly enhanced the first-strike capabilities of ballistic missiles. This, in turn, triggered a quantitative arms race between the Soviet Union and the United States with each seeking to improve its second-strike capacity. As part of the Strategic Arms Reduction Treaty (START) II signed in 1993, the two countries agreed to de-MIRV their **intercontinental ballistic missiles (ICBMs)** so that only a single-warhead per missile may be deployed.

PAYLOAD

The total mass of munitions including **warhead(s)**, arming, fusing and safety features, and **penetration aids** carried by a bomber or missile.

PENETRATION AIDS

Devices carried by **bombers** and **missiles** that assist these to successfully infiltrate enemy defences. Typical penetration aids include chaff, decoys and electronic jammers, which confuse or obstruct enemy radar systems.

PROPULSION SYSTEM

Portion of a **missile** that propels it to target. Modern **ballistic missiles** have propulsion systems that involve up to four stages. The number of stages is proportional to the range of the missile (i.e. the greater the

range, the greater the number of stages). Propulsion systems may be powered by liquid- or solid-fuel. Liquid-fuel propulsion systems tend to produce greater specific impulse and their thrust can be controlled to make flight path adjustments. Liquid fuel, however, needs to be stored separately and loaded into the missile before firing. Solid-fuel propulsion systems tend to be more compact, more rugged, and to deliver greater acceleration. Solid fuel is stored within the missile, which can thus be fired at shorter notice. Performance differences between liquid and solid-fuel propulsion systems, make systems based on liquid-fuel more suitable for powering long-range ballistic missiles (especially the post-boost vehicle), and systems based on solid-fuel more suitable for powering intermediate and short-range ballistic missiles, or the initial stages of long-range ballistic missiles.

RE-ENTRY VEHICLE (RV)

Container housing the **warhead(s)** and penetration aids carried by a **ballistic missile**. Re-entry vehicles are designed to safely re-enter the earth's atmosphere following separation from boosters. They are cone-shaped, and constructed out of highly resistant, heat-absorbing materials. A ballistic missile may accommodate several re-entry vehicles as in the case of ballistic missiles equipped with **multiple independently targetable re-entry vehicles (MIRVs)**. Typically re-entry vehicles are guided to target by gravity and aerodynamic drag. However, certain re-entry vehicles are fitted with a flight correction system which allows them to partially adjust their trajectory and "manoeuver" to target. Such re-entry vehicles are called manoeuvrable re-entry vehicles (MARVs), and possess highly accurate targeting capabilities.

SHORTER-RANGE BALLISTIC MISSILE (SRBM)

Ballistic missile that has a range of between 500 and 1,000 kilometres. SRBMs are land-based and can be deployed on and fired from static as well as mobile **launchers**. They may carry nuclear, conventional, or other weapons of mass destruction (WMD) **payloads**. The 1987 Intermediate-range Nuclear Forces (INF) Treaty eliminates land-based, nuclear-armed SRBMs from the arsenals of the Soviet Union and the United States. SRBMs are sometimes also referred to as theatre missiles.

SHORT-RANGE MISSILE (SRM)

Ballistic missile that has a range of less than 500 kilometres. SRMs are land-based and can be deployed on and fired from static as well as mobile **launchers**. They may carry nuclear, conventional, or other weapon of mass destruction (WMD) **payloads**. SRMs are sometimes also referred to as tactical or battlefield missiles.

SILO

Underground facility that houses and launches **ballistic missiles**. Modern silos are tube-like shaped, stand vertically, and are hardened to provide protection for their missiles from enemy fire. The destruction of hardened silos and their missiles requires a high precision nuclear attack. The launching of missiles from silos is usually controlled by stand-away control centres, although individual silos are also outfitted to effect a launch. In principle, silos can be reusable in that after having fired a missile, they can be reloaded and used to fire again. Typically silos are used to house **intercontinental ballistic missiles (ICBMs)**.

STRATEGIC DEFENCE INITIATIVE (SDI)

Defence research and development programme announced by the United States in 1983, aimed at developing an effective **anti-ballistic missile defence (ABM)** system capable of protecting the United States against a massive nuclear strike by the Soviet Union. Initially SDI research and development focused on space and ground-based interception systems designed to destroy or disable enemy **ballistic missiles** and **warheads** during their flight stages using a variety of techniques including directed energy weapons, and **missile interceptors**. In 1991, with the end of the Cold War, SDI was officially replaced by the less ambitious **Global Protection Against Limited Strikes (GPALS)** programme, and its research efforts were re-oriented mainly towards conventional missile interceptor systems.

SUBMARINE-LAUNCHED BALLISTIC MISSILE (SLBM)

Ballistic missile that has a range of more than 5,500 kilometres and is deployed on and fired from submarines. Similarly to **intercontinental ballistic missiles (ICBMs)**, SLBMs are usually nuclear-armed, but may also carry conventional or other weapons of mass destruction (WMD) ordnance, and be equipped with **multiple independently targetable re-entry vehicles (MIRVs)**. Unlike ICBMs, however, SLBMs are sea-

based, have a shorter range, carry a smaller **payload** and are somewhat less accurate. Because they are deployed on difficult to locate submarines, SLBMs are well protected from enemy targeting. This makes them a very suitable second-strike capability weapon.

TELEMETRY

Remote automatic measurement and transmission of data. It is typically carried out via radio waves. Telemetry is used to assess the performance of **missiles** during tests.

THEATRE MISSILE DEFENCE (TMD)

Defence system designed to intercept and disable theatre **ballistic missiles** and their **re-entry vehicles** while in flight. TMDs combine advanced sensors capable of providing real-time launch detection and of accurately determining re-entry vehicle trajectory and point of impact, and sophisticated, ground and ship-based **missile interceptors**. The impetus for TMD development has been brought about by the growing proliferation of ballistic missiles. This impetus is especially strong in the United States which is currently in the process of assessing a Theater High-Altitude Area Defense (THAAD) system. The ABM Demarcation Agreement concluded in 1997 between Belarus, Kazakhstan, Russia, Ukraine, and the United States distinguishes between permissible theatre ballistic missile defences and prohibited strategic ballistic missile defences. The Agreement defines theatre missiles as missiles having a maximum speed of less than 5 kilometres per second and a range of less than 3,500 kilometres.

THROW-WEIGHT

Warhead-carrying capacity of a **ballistic missile**.

WARHEAD

The part of a **missile**, projectile, rocket, torpedo, or other munition that contains either nuclear explosives, chemical high-explosives, chemical or biological agents, or other material intended to cause damage.

PART III

Building Trust and Confidence

CHAPTER 8

CONFIDENCE- AND SECURITY-BUILDING MEASURES

8.1 BACKGROUND

Confidence- and security-building measures (CSBMs) are military provisions adopted by States to dispel mistrust that might otherwise lead to armed conflict. In their contemporary form, CSBMs emerged primarily as part of the Helsinki Final Act agreed to by the Soviet Union and Western countries in 1975. CSBMs are perceived by some as potent preludes and accompaniments to other forms of arms control in cases of seemingly intractable conflict.

CSBMs aim to influence the perceptions of adversaries regarding each others' intentions. They are premised on the belief that armed conflict can result out of misperception about national military policies engendered by the indistinguishability of offensive and defensive military preparations. This indistinguishability can create mutual suspicions of aggressive designs, and precipitate military conflict if States succumb to pressures for pre-emptive war. To dispel such mistrust CSBMs seek to remove the inherent ambiguity surrounding national military policies by rendering these more transparent and by modifying these such that their potential for military aggression is demonstrably curtailed.

According to their provisions, CSBMs are generally divided into three categories: **information and communication** measures, **observation and inspection** measures, and **military constraints**. Information and communication measures seek to foster better mutual understanding of national military capabilities and activities, and to facilitate regular and crisis communication between adversaries. Typical information CSBMs include the **exchange of military information** on national forces and armaments, advance **notification** of important military activities, and **military contacts**.

Typical communication measures comprise so-called **risk reduction centres** responsible for transmitting and receiving relevant information, and so-called **hotline** arrangements which permit parties to communicate rapidly in times of crisis.

Observation and inspection measures aim to generate trust between adversaries by allowing them to follow each other's routine and non-routine military activities. They thus help parties establish that purportedly harmless military preparations are not a prelude to aggression. Typical observation and inspection CSBMs entitle parties to send observers to each other's major military exercises, and to visit selected facilities and sites to check that prohibited events are not taking place or that banned equipment is not being stored there.

Military constraints limit national military activities and deployments. Their aim is to limit the opportunities for offensive and especially surprise military action which might otherwise be available to States. Typical constraints measures include restrictions on the number and scope of major military exercises, limitations on troop movements, **de-alerting**, as well as the creation of **demilitarized zones**, **weapon-free zones**, **thin-out zones** and separation agreements. Military constraints may also be undertaken on an unilateral basis. A **no-first-use** pledge or a policy of **non-offensive defence** for instance, may be construed as constraints because they effectively restrict the ability of States to carry out offensive military operations, even though they oblige only one party.

CSBMs are a form of arms control. Arms control places political or legal limits on the scope and range of national military policies. CSBMs are clearly aimed at this purpose. Unlike other forms of arms control, however, CSBMs seek to influence perceptions rather than capabilities, and as such are essentially concerned (even in the case of constraints) with the circulation of information between adversaries rather than with the distribution of military capabilities. Because of this, it is commonly argued that CSBMs do not intrude onto sensitive military interests, and that they may therefore be more susceptible to agreement than other types of arms control, especially in cases where severe conflict makes the latter unlikely. Whether or not this is actually the case, cannot in fact be determined *a priori*, out of context. This caveat notwithstanding, the proposition that CSBMs can be a prologue to further arms control, is an established tenet of arms control though.

8.2 History of CSBMs: Approaches and Instruments

8.2.1 Global Attempts

The main CSBM instrument currently operating at the global level, pertains to the transfer of conventional weapons. On 9 December 1991, amidst general concern over the international trade in weapons and ammunition, the United Nations General Assembly established by resolution 46/36L a **Register of Conventional Arms**. The Register requires participating States to submit on a voluntary basis yearly statistical data and possibly background information on national imports, exports, domestic procurement, and total holdings of seven specific weapon categories. This data is made public in a report produced by the Secretary-General of the United Nations. An international register with regards to nuclear weapons and materials based on similar principles has been proposed but has not been agreed to.

Other CSBMs functioning at the global level, relate to the operation of the Biological and Toxin Weapons Convention (BTWC). Agreed to at the Second Review Conference of the State Parties of 1986, these voluntary measures instruct the parties to declare all high-security containment facilities, declare unusual outbreaks of disease, encourage the publication of research results, and encourage scientific contacts.

8.2.2 Regional Attempts

Contemporary CSBMs emerged in Europe with the **Helsinki Final Act** of the **Conference on Security and Cooperation in Europe (CSCE)** as a means of reducing the risk of surprise attack. The Act's so-called Basket I required the parties to give advance notice of military exercises involving more than 25,000 troops, and to exchange military observers on a voluntary basis. In 1986 the **Stockholm Document** revised the Helsinki provisions to provide for greater transparency. The threshold for mandatory notification was lowered, the invitation of observers to large military exercises was made obligatory, the exchange of **annual calendars** and constraints on the conduct of activities were introduced, and the right to conduct verification visits with no right of refusal was established. During the 1990s the Stockholm measures were progressively strengthened by four successive

Vienna Documents negotiated at the Organization for Security and Cooperation in Europe (OSCE).

Other than the CSCE/OSCE provisions, European CSBMs can be found under the **Open Skies Treaty** which allows parties to carry out aerial inspections of each other's territories, the Conventional Forces in Europe (CFE) Treaty, the Euro-Atlantic Partnership Council (EAPC), Partnership for Peace (PfP), and the **Founding Act on Mutual Relations, Cooperation and Security between NATO and the Russian Federation**.

In East Asia and the Western Hemisphere, CSBMs have been formulated under the aegis of the Association of South-East Asian Nations (ASEAN) and the Organization of American States (OAS). In both instances these measures have been fairly recent—dating only from the mid-1990s, and modest—consisting mainly of limited information and communication exchanges. In Asia, the ASEAN Regional Forum (ARF) was established in 1994 as an arena for discussion and consultation on regional security issues. At its second meeting held in Brunei in August 1995, the ARF decided to establish an Inter-sessional Support Group on Confidence-Building Measures (ISG-CBM) to study and propose ways to foster better understanding and security cooperation in the region. CSBMs recommended by the ISG and subsequently endorsed by the ARF include a series of voluntary exchanges of information on security perceptions and policy, and military contacts.

In the Western Hemisphere, a special conference on CSBMs was proposed by Chile in 1992 at the Conference on Disarmament (CD) in Geneva. The proposal drew immediate support from other OAS members, and in 1994 an experts' meeting on the subject was convened in Buenos Aires, Argentina, under the auspices of the OAS. A follow-on conference, held in Chile in 1995, produced the **Santiago Declaration** which called on OAS members gradually to accept agreements regarding the pre-notification of military exercises, to participate in the Register of Conventional Arms, to exchange information regarding national defence policies, and to allow foreign observers to partake in national military exercises. In 1998, under the **Declaration of San Salvador**, these proposals were expanded to include provisions such as political contacts, border cooperation, the exchange of information on the organization, size and composition of national armed forces, the development of common accounting procedures for military expenditure, and the institutionalization

of discussions on CSBMs through annual experts meetings. Also in 1998, following a Resolution on Conventional Arms Transparency and Confidence-Building in the Americas adopted by the OAS General Assembly a year earlier, the OAS Committee on Hemispheric Security established a formal working group to draft a convention providing the legal framework for the advance notification of acquisitions of the weapon systems covered by the Register of Conventional Arms.

In the Middle East, regional CSBMs have been devised within the framework of the **Arms Control and Regional Security (ACRS)** talks. ACRS is one of the five working groups established as part of the multilateral negotiations track that supplements bilateral discussions between Israel and its neighbours in the Middle East peace process launched in Madrid in 1991. It is aimed at devising suitable CSBMs and other arms limitation measures that could be applied in the Middle East as a means of strengthening regional security and cooperation. ACRS participants include Israel, its Arab neighbours (including the Palestinian Authority) and other Arab States, as well as several non-regional parties such as the United States, Russia, Canada and certain European countries, which as co-sponsors of the process, act to facilitate proceedings. The ACRS talks opened officially in Moscow in January 1992, together with the rest of the Arab-Israeli multilateral discussions. Between 1992 and 1995, ACRS progressed and achieved several notable accomplishments. The working group conducted six plenary sessions and 31 experts meetings in Egypt, Jordan, Tunisia, Qatar, and 12 extra-regional States. During this period, ACRS had transformed from educational and informational sessions for familiarizing regional parties with the benefits and modalities of arms control to developing tangible CSBMs. The building momentum of activities and ambitious work plan resulted in the ACRS agenda being split into two inter-sessional groupings: one dedicated to operational matters, the other to conceptual ones. In the operational grouping, the parties reached agreements on pre-notification of certain military activities; avoiding incidents at sea; maritime search and rescue co-ordination; holding joint military meetings; founding a communications network and planning for a permanent network hub in Cairo; and establishing a regional security centre in Amman and related facilities in Tunis and Doha. Participation in each of these activities was to be voluntary. In the conceptual grouping, ACRS held discussions and negotiations on a variety of important issues such as delineating the region for arms control purposes; laying the basis for beginning arms control negotiations; the long-term security objectives of

the parties; a statement of basic principles and objectives for guiding the working group; arms control verification techniques and the prevention of the proliferation of weapons of mass destruction (WMD). ACRS ceased full activities in the autumn of 1995 after the parties failed to reach consensus on the future agenda of work, particularly with regard to addressing the establishment of a nuclear weapons/WMD-free-zone in the region and pursuing concrete arms control agreements.

8.2.3 Bilateral Attempts

During the Cold War CSBMs emerged as a means of preventing and managing crises between the Soviet Union and the United States. After the Cuban missile crisis of 1962, the **Hotline Agreement** established a permanent direct link between the Kremlin and the White House for the exchange of high level communications in the event of an emergency. This was actually the first arms control agreement concluded between the Soviet Union and the United States. In 1971 the **Agreement to Reduce Risks of Nuclear War** was signed. It provided for the pre-notification of missile launches beyond national borders and for prompt warning in case of accident or unauthorized launch. Nuclear Risk Reduction Centres charged with transmitting notifications of strategic ballistic missile launches and other information, were set up in Moscow and Washington in 1987. Two years later, the **Agreement on Dangerous Military Activities (DMA)** and the **Notification of Major Strategic Exercises Agreement** introduced restrictions on the conduct of certain military activities and required the two countries to notify one another 14 days prior to carrying out any major strategic exercise involving heavy bombers.

Within the context of the Arab-Israeli conflict, bilateral CSBMs were introduced as part of the disengagement of Arab and Israeli forces following the October War (1973). After the war, Israel and its immediate neighbours, Egypt and Syria, implemented a number of military constraints including the creation of **buffer zones**, demilitarized zones**,** and thin-out zones; restrictions on the operation of national air forces; the operation of early warning surveillance by the United States; and the emplacement of international personnel as observers in areas of conflict. These were codified in a series of agreements: the **Separation of Forces Agreement between Israel and Syria** (1974); the **Separation of Forces Agreement between Israel and Egypt** (1974); the **Interim Accords between Israel**

and Egypt (1975); the **Camp David Accords** (1978); and the **Israel-Egypt Peace Agreement** (1979). In 1994 Israel and Jordan signed the **Israel-Jordan Peace Agreement**. Under the terms of the Agreement, the two countries committed not to threaten each other with use of military force and to develop suitable CSBMs.

In Southern Asia, CSBMs have been used to alleviate simmering military tensions between India and Pakistan, and between China and India. Between India and Pakistan CSBMs were initially instituted in 1946 when the Joint Defence Council (JDC) established an informal communications hotline linking the offices of the Indian Prime Minister and of the Pakistani Governor-General. In 1972, under the **Simla Accord**, the two countries pledged to refrain from the use of military force in Kashmir, and under the 1998 **Agreement on the Prohibition of Attack Against Nuclear Facilities** they committed not to attack each other's nuclear installations. In the 1990s high-level talks between the Indian and Pakistani Foreign Ministers resulted in the conclusion of a series of agreements on the **Prevention of Airspace Violations**, the **Advance Notification of Military Exercises, Manoeuvres and Troop Movements**, and the establishment of a Joint Working Group to discuss outstanding issues.

Between China and India CSBMs were introduced at the end of the Sino-Indian War of1962, with creation of a so-called Line of Actual Control (LAC) and of a 20 kilometre demilitarized zone along the western part of the Himalayan border between the two countries. In 1988, in the wake of renewed diplomatic fervour in the border dispute, a Joint Working Group was formed to promote discussion and settlement of the border issues. CSBMs subsequently negotiated by the Group include biannual meetings of military officers and the establishment of communication links at key points along the border and between military headquarters, prior notification of troop movements along the border, the exchange of high-level defence officials, and the prevention of airspace violations. Building on the experience of the Working Group, in 1993, China and India signed the **Maintenance of Peace and Tranquillity Agreement** which stipulated that both countries would limit their military forces and their exercises along the LAC, would consult on possible restrictions of air exercises in the areas near to the LAC, and would negotiate appropriate verification and supervision arrangements. In 1996 the **Agreement on Confidence-Building Measures** reaffirmed and expanded the commitment to limit military deployments along the LAC, outlined specific restrictions on large-scale air and land

military exercises, enunciated a series of conflict-avoidance measures, and broadened existing communications provisions.

In the Korean peninsula, the tentative development of CSBMs between North and South Korea began after the end of the Cold War. The **Agreement on Reconciliation, Nonaggression, and Exchange and Cooperation** reached in 1991 provides for the establishment of a joint reconciliation commission as well as of a joint military commission charged with the elaboration of CSBMs including the limitation and advance notification of military exercises, the exchange of military information and personnel, and the installation of a hotline between national military commands. In 1992, under the **North-South Joint Declaration on the Denuclearization of the Korean Peninsula**, both countries undertook not to test, produce, acquire, or possess nuclear weapons or related facilities. These tentative advances notwithstanding, in 1993, North Korea precipitated a crisis by threatening to withdraw from the Non-Proliferation Treaty (NPT), a clear indication that the country would not abide by its commitments regarding the non-development of nuclear weapons. This crisis was eventually resolved by the Agreed Framework Agreement Between North Korea and the United States of October 1994, whereby North Korea agreed to freeze and place its nuclear programme under the international supervision of the International Atomic Energy Agency (IAEA) and to take steps to implement the Joint Declaration, in exchange for two internationally-built light-water power reactors and annual supplies of heavy fuel oil.

8.2.4 Unilateral Attempts

Unilateral CSBMs enable States to signal their benign intentions without the constraint of having to reach agreement with others. The oldest form of unilateral CSBM is the adoption of a status of **neutrality**. Neutrality, implies a pledge by a State to abstain from any actions that might engage or threaten to engage its armed forces in an offensive way. Historically a status of neutrality has been embraced at various times by different States with varying degrees of success. Arguably the most prominent example of a neutral State is Switzerland. Swiss neutrality has been generally recognized since the Peace of Westphalia (1648), and was successfully maintained throughout the two World Wars and the Cold War. Another example of successful neutrality is the example of post-Second World War Austria. At

the insistence of the Soviet Union, in exchange for the restoration of its sovereignty under the Austrian State Treaty (1955), Austria proclaimed a status of permanent neutrality, which it inscribed in its constitution. This status effectively shielded Austria from the Cold War, and continues to remain in effect to date.

Other unilateral CSBMs sometimes used by States to signal their peaceful intentions, are commitments to observe limited self-imposed restraints. A recent example of this is the **United States President's Announcement Regarding the Unilateral Reduction of Nuclear Weapons** issued in 1991. It declared that the United States undertook unilaterally to implement a series of de-alerting measures with respect to part of its nuclear weapons arsenal and to discontinue certain nuclear weapon modernization programmes. These measures were reciprocated eight days later by the Soviet Union which announced the adoption of similar unilateral provisions under the **Soviet President's Announcement Regarding Unilateral Reductions of Nuclear Weapons**.

8.3 CSBMs Instruments

8.3.1 Global Instruments

United Nations Register of Conventional Arms

Agreement aimed at increasing transparency in the international transfer and national production and procurement of major conventional arms. The Register requires States to submit annual data on the number of items imported and exported in seven equipment categories: battle tanks, armoured combat vehicles, large calibre artillery systems, combat aircraft, attack helicopters, warships, and missile systems. The data are to be submitted on a voluntary basis to the United Nations, and to be made publicly available. No verification provisions are provided for, though reported exports and reported imports data are expected to correspond to each other. The Register was created by a resolution passed by the United Nations General Assembly on 9 December 1991. It is administered by the United Nations Department for Disarmament Affairs.

8.3.2 Regional Instruments

AGREEMENT ON CONFIDENCE- AND SECURITY-BUILDING MEASURES IN BOSNIA AND HERZEGOVINA

Agreement between the Republic of Bosnia and Herzegovina, the Republic of Croatia and the Federal Republic of Yugoslavia concluded on 26 January 1996, as directed by the **General Framework Agreement for Peace in Bosnia and Herzegovina**. Modelled on the **Vienna Documents**, the Agreement imposes restrictions on the geographic deployment of troops and heavy weapons, and on the conduct of military exercises; establishes requirements for the **exchange of military information** and the **notification** of planned military activities and of changes in military structure and equipment; and provides for the invitation of observers to notifiable military activities, the inspection of military forces and the monitoring of weapons manufacturing capabilities. A Joint Consultative Commission oversees the implementation of the Agreement.

ARMS CONTROL AND REGIONAL SECURITY (ACRS)

Talks aimed at the elaboration of regional arms control and **confidence- and security-building measures (CSBMs)** in the Middle East. ACRS is one of the five multilateral working groups which complement the bilateral discussions between Israel and its neighbours launched in Madrid in 1991. It comprises delegations from 13 Arab States, Israel, the Palestinian Authority, and several other States and entities including certain European States, the Russian Federation, and the United States which act as facilitators to the process. Deliberations within ACRS are structured into two groupings dealing with so-called operational and conceptual security issues, respectively. As of 1995, discussions in the operational grouping had yielded agreement on a series of voluntary CSBMs comprising: **notification** of certain military activities, avoidance of incidents at sea, maritime search and rescue coordination, **military contacts**, the set-up of a communication network centred in Cairo that could lead to the establishment of a **hotline** between the parties, and the creation of a regional security centre located in Amman with sub-centres located in Tunis and Doha. Discussions in the conceptual grouping had addressed issues such as defining the region for arms control purposes, exploring the parties' guiding principles and objectives for arms control and regional security, and verification techniques. In 1995, deliberations within

ACRS were suspended due to disputes between Egypt and Israel over the issue of nuclear weapons and the establishment of a weapons-of-mass-destruction-free zone in the region. Following the resumption of bilateral negotiations between Syria and Israel and between Israel and the Palestinian Authority over a final settlement, however, a commitment to renew the ACRS talks was made at a meeting of the Steering Committee of the Multilateral Negotiations of the Middle East Peace Process held in Moscow on 1 February 2000.

ASEAN Regional Forum (ARF): see page 176.

Conference on Security and Cooperation in Europe (CSCE): see **Organization for Security and Cooperation In Europe (OSCE)**.

Conventional Armed Forces in Europe (CFE) Treaty: see page 25.

Council for Security Cooperation in the Asia Pacific (CSCAP): see page 176.

Declaration of San Salvador

Statement issued by the Organization of American States (OAS) following the Conference on Confidence- and Security-Building Measures held in February 1998, in San Salvador, El Salvador. The Declaration contains proposals for a series of information and communication **confidence- and security-building measures (CSBMs)** meant to complement the provisions laid out in the **Santiago Declaration**. It calls on OAS member States to encourage contact between elected political representatives, to expand the range of **military contacts** provided for at Santiago to include exchanges between military teaching institutions, to promote the **exchange of information** on the size, structure and composition of national armed forces, to evolve common methodologies for the reporting of military expenditure which allow for the carrying out of comparisons, to improve and broaden their participation in the **United Nations Register of Conventional Arms**, and to continue discussion and consultation on regional arms control.

Declaration of Santiago

Statement issued following the Organization of American States (OAS) Vice-Ministerial Conference held in Santiago, Chile, in 1995. It calls on

OAS member States gradually to adopt arrangements concerning the advance **notification** and invitation of foreign observers to military exercises, to engage in the **exchange of information** on military matters, and to take part fully in the **United Nations Register of Conventional Arms**. The Declaration marked the first major CSBM initiative in the Western Hemisphere. See also **Declaration of San Salvador**.

Forum for Security Cooperation (FSC): see page 177.

Founding Act on Mutual Relations, Cooperation and Security between NATO and the Russian Federation

Agreement between the members of the North Atlantic Treaty Organization (NATO) and the Russian Federation signed on 27 May 1997 at Paris. Under the Act, NATO members and Russia undertake to respect the norms of international conduct as laid out by the Charter of the United Nations and the Organization for Security and Cooperation in Europe (OSCE); to establish a NATO-Russia Permanent Joint Council as a venue for consultation on security-related issues such as the prevention and peaceful settlement of conflicts, the non-proliferation of weapons of mass destruction (WMD) and the conversion of defence industries, and for joint decision-making and joint action whenever possible; and to establish **military contacts** via the creation of military liaison missions on both sides. In addition, the Act reiterates the assertion of NATO members that no nuclear weapons or new substantial combat forces would be deployed on the territories of new members in the foreseeable future, and that the structure and doctrine of NATO nuclear forces would not be affected by the enlargement of the Alliance.

General Framework Agreement For Peace in Bosnia and Herzegovina *(Dayton Accords)*

Agreements between the Republic of Bosnia and Herzegovina, the Republic of Croatia and the Federal Republic of Yugoslavia concluded on 21 November 1995, bringing the civil war in Bosnia and Herzegovina to an end. As part of the Agreement, the parties recognize and agree to respect each other's equal sovereignty, and undertake to implement a series of military measures to support the existing cease-fire including the withdrawal of forces behind a four kilometre **buffer zone**, the cantonment of these forces and of their heavy weapons (or

otherwise their demobilization), and the establishment of a multinational Implementation Force (IFOR) and of a Joint Military Commission to respectively monitor and ensure compliance, and assist with the implementation of the accord. Under Annex-1B of the Agreement the parties also commit to negotiate within six months an arms reduction agreement, and within a period of 45 days a confidence- and security-building agreement. The confidence-building agreement is to be negotiated under the auspices of the Organization for Security and Cooperation in Europe (OSCE), and to include measures such as restrictions on military deployments and exercises, **notification** of planned military activities, and **exchanges of information** on the possession of major weapon systems.

HELSINKI FINAL ACT

Document adopted in 1975 as a result of negotiations between the Soviet Union and Western countries at the Conference on Security and Cooperation (CSCE). As part of Basket I (the military issues basket), the Act introduced a series of **confidence-building measures (CBMs)** aimed at reducing the risk of surprise military attack in Central Europe. Specifically the Act provided for mandatory **notification** 21 days in advance of military manoeuvres involving 25,000 or more troops, voluntary pre-notification of other major military exercises, and voluntary hosting of observers to major military exercises. These measures were subsequently strengthened by the **Stockholm Document** of 1986, and a series of the **Vienna Documents** agreed to during the 1990s.

INTER-SESSIONAL SUPPORT GROUP ON CONFIDENCE-BUILDING MEASURES (ISG-CBM): see page 177.

NORTH ATLANTIC COOPERATION COUNCIL (NACC): see page 178.

PARTNERSHIP FOR PEACE (PFP): see page 179.

STOCKHOLM DOCUMENT

Agreement adopted in 1986 by the **Conference on Security and Cooperation in Europe (CSCE)**, which strengthened and expanded the confidence- and security-building provisions laid out in the **Helsinki Final Act**. Specifically the Document lowered the threshold for manoeuvres subject to mandatory pre-**notification** to include those

involving 13,000 or more troops, 3,000 amphibious or airborne paratroopers, or 300 battle tanks; made exchanges of information on **notifiable military activities** and the invitation of observers to military activities involving more than 17,000 troops or 5,000 amphibious or airborne paratroopers obligatory; and instituted the exchange of **annual calendars** of military activities and of verification visits with no right of refusal. The Stockholm Document was succeeded in the 1990s by the **Vienna Documents**.

Treaty on Open Skies

Agreement signed by 27 parties at Helsinki on 24 March 1992 and entered into force on 1 January 2002. Under the Treaty, parties are entitled to conduct aerial inspections of each other's national territory. Each party is allotted an active quota that indicates the number of overflights that it may conduct, and a passive quota that specifies the number of overflights that it is obliged to receive. The active quota cannot exceed the passive quota, which is a function of the party's geographical size. Active quotas may be transferred in whole or in part pending the consent of the party to be overflown. Overflights must be preceded by a 72-hour notice and all aircraft and sensors employed must be certified by pre-flight inspection to ensure that they comply with the allowances of the Treaty. The aircraft used may belong either to the party conducting the overflight or to the party that is overflown. The aircraft may be equipped with particular types of sensors only, all of which must be commercially available to all the parties. All information collected during the overflights must be made available to any party pending reimbursement of the costs of reproduction. Implementation of the Treaty is overseen by the Open Skies Consultative Committee (OSCC) seated in Vienna. The Treaty is of unlimited duration and withdrawal requires six months advance notification. Any withdrawal necessitates that a special conference be convened to consider its implications.

Vienna Documents

Set of four successive **confidence- and security-building measures (CSBMs)** agreements concluded respectively in 1990, 1992, 1994, and 1999. The initial 1990 Vienna Document strengthened and expanded the scope of the CSBMs established by the **Stockholm Document**. New or modified provisions included the annual **exchange of information** on military forces, major weapon

deployments and military budgets, **military contacts**, verification through on-site inspections, and the establishment of a Conflict Prevention Centre charged with clarifying unusual military activities and assessing the implementation of agreed upon CSBMs. In 1992 an amended Vienna Document prohibited the holding of more than one military activity involving more than 40,000 troops or 900 battle tanks per every two years, or the holding of more than six military activities involving more than 13,000 troops or 300 battle tanks (but less than 40,000 troops or 900 battle tanks) per year. Moreover, of these six military activities, no more than three could involve over 25,000 troops or 400 battle tanks, and not more than three involving over 13,000 troops or 300 tanks could be undertaken simultaneously. In 1994 a new Vienna Document lowered the threshold for military activities subject to mandatory notification and observation; established evaluation visits, verification by multinational inspection teams and voluntary aerial inspections; and provided for expanded military contacts including voluntary joint training, visits to airbases and demonstrations of major weapon systems. Finally, the Vienna Document adopted in 1999 contained still broader obligations with respect to annual exchanges of information and of annual calendars; prior notification of military activities; observation provisions; constraining provisions; verification measures; and military contacts.

8.3.3 Bilateral Instruments

Agreement between France and the Union of Soviet Socialist Republics on the Prevention of the Accidental or Unauthorized Use of Nuclear Weapons: see page 90.

Agreement between India and China on Confidence-Building Measures in the Military Field Along the Line of Actual Control in the India-China Border Areas

Agreement concluded by India and China on 29 November 1996, elaborating a series of **confidence- and security-building measures (CSBMs)** to be implemented by the two countries in the interest of maintaining peace and tranquillity along the Line of Actual Control (LAC) along their Himalayan borders, and of contributing towards a final settlement of the boundary issue. The Agreement contains provisions with regard to mutual non-aggression, constraints on

military deployments and exercises, **exchanges** of military data, prior **notification**, **military contacts**, and information and communication measures. Under the Agreement, the two countries pledge to avoid conducting military exercises involving one division or more in close proximity to the LAC, not to fly combat aircraft within ten kilometres of the LAC, and to provide advance notification of exercises close to the LAC involving one brigade or more; resolve to refrain from opening fire, using hazardous chemicals or carrying out blast operations within two kilometres of the LAC, and to notify each other five days in advance if any such activities are to take place; commit to maintain and expand military contacts and communications along the LAC, and initiate medium- and high-level meetings between border authorities; and recognize each other's right to obtain timely and adequate clarifications from one another in the event of doubtful situations arising with respect to the implementation of the Agreement and more generally, the situation along the LAC. The Agreement is subject to termination by either side, pending six months advance notification.

AGREEMENT BETWEEN PAKISTAN AND INDIA ON ADVANCE NOTICE OF MILITARY EXERCISES, MANOEUVRES AND TROOP MOVEMENTS

Agreement concluded by India and Pakistan on 6 April 1991, whereby the two countries agree to restrict and give one another prior **notification** of significant military activities. Resulting from talks between the Foreign Ministers of the two countries in the summer of 1990, the Agreement aims at reducing the risk of inadvertent military confrontation by restricting, providing advance warning, and clarifying the nature of military activities which might otherwise be considered as provocative. Under the terms of the Agreement, the two sides are to refrain from carrying out land military exercises at or above the divisional level within five kilometres from each other's borders, and to notify each other of divisional level exercises carried out in the area between the Manawar, Tawi and Ravi rivers, of exercises at the corps level held within a distance of 75 kilometres of each other's borders, and of all exercises conducted at or above the corps level. The parties are also to transmit a schedule of planned military exercises 15 to 90 days in advance detailing their type, level, location, duration, and size. The concentration of additional troops at or above the division level for internal security or civil relief purposes within 150 kilometres of each other's borders is also to be subject to two days prior notification. The parties are likewise to be entitled to obtain adequate clarification

about any exercises, movements, or manoeuvres subject to notification. Similar provisions are also contained with respect to naval and air force exercises.

AGREEMENT BETWEEN THE UNITED KINGDOM AND THE UNION OF SOVIET SOCIALIST REPUBLICS ON THE PREVENTION OF THE ACCIDENTAL OR UNAUTHORIZED USE OF NUCLEAR WEAPONS: see page 90.

AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND THE UNION OF SOVIET SOCIALIST REPUBLICS ON THE ESTABLISHMENT OF NUCLEAR RISK REDUCTION CENTERS: see page 91.

AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND THE UNION OF SOVIET SOCIALIST REPUBLICS ON NOTIFICATIONS OF LAUNCHES OF INTERCONTINENTAL BALLISTIC MISSILES AND SUBMARINE-LAUNCHED BALLISTIC MISSILES: see page 92.

AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND THE UNION OF SOVIET SOCIALIST REPUBLICS ON RECIPROCAL ADVANCE NOTIFICATION OF MAJOR STRATEGIC EXERCISES: see page 92.

AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND THE UNION OF SOVIET SOCIALIST REPUBLICS ON THE PREVENTION OF DANGEROUS MILITARY ACTIVITIES (DMA)

Accord between the Soviet Union and the United States signed at Moscow on 12 June 1989, and entered into force on 1 January 1990. It requires each party to avoid intentional military incursions into the other's territory, to avoid the use of laser so as to cause harm or damage to the personnel or equipment of the other party, and to avoid hampering or interfering with the other's command and control networks in such a way as to cause harm or damage to its personnel or equipment. In addition, each party is to exercise caution while operating near the other's territory. To ensure verification of compliance with the agreement a Joint Military Commission was established.

AGREEMENT ON THE MAINTENANCE OF PEACE AND TRANQUILLITY ALONG THE LINE OF ACTUAL CONTROL IN THE INDIA-CHINA BORDER AREA

Agreement between China and India concluded on 7 September 1993, aimed at establishing principles for the avoidance of inadvertent conflict along the Line of Actual Control (LAC) on their Himalayan

borders, which was established after the 1962 Sino-Indian War. As part of the Agreement, the two parties commit not to violate the LAC and to undertake joint investigations of alleged violations whenever necessary, to keep their military forces along the LAC to a minimum level and to negotiate reductions in these forces to ceilings compatible with the principle of mutual and equal security, and to negotiate **confidence- and security-building measure (CSBM)** arrangements with respect to the constraint of certain military activities in mutually agreed zones and the prior **notification** of major military exercises as well as to establish effective mechanisms for their verification.

Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War: see page 92.

Agreement on the Prevention of Aerospace Violations

Agreement between India and Pakistan concluded on 6 April 1991, whereby each country undertakes to adopt adequate measures to ensure that violations of each other's airspace do not take place. The Agreement was reached as a result of a round of talks between the Foreign Ministers of the two countries launched in the summer of 1990. Its aim is to lower the risk of inadvertent war through the implementation of constraints on certain military activities. Under the terms of the Agreement, the combat and unarmed military aircraft of each country are prohibited from flying respectively within ten kilometres and 1,000 metres of the airspace of the other, unless permitted to do so. In case of flights by unarmed aircraft within 1,000 metres of the other's airspace, prior **notification**, including the type and flying plan of the aircraft involved, is to be given. Any special air exercise scheduled to take place close to the other's airspace is also to be subject to prior notification.

Agreement on the Prevention of Incidents on or Over the High Seas

Agreement between the Soviet Union and the United States over the prevention of incidents at sea, signed and entered into force on 25 May 1972. It requires the parties to refrain from conducting threatening manoeuvres, simulated attacks, or disruptive behaviour in international sea areas, and to respect the International Regulation for Preventing Collisions at Sea. A Protocol agreed to on 22 May 1973, also extends the applicable provisions of the agreement to non-military ships.

AGREEMENT ON THE PREVENTION OF NUCLEAR WAR: see page 93.

AGREEMENT ON THE PROHIBITION OF ATTACK AGAINST NUCLEAR FACILITIES

Agreement between India and Pakistan concluded on 31 December 1988, whereby each party pledges not to attack the nuclear installations of the other. The Agreement codified an informal understanding between the two countries not to attack each other's nuclear installations reached three years earlier. Its aim is to allay mutual fears of and thereby ease pressures for pre-emptive strikes by each side against the other's nuclear complexes, especially in time of crisis. Under the terms of the Agreement, the parties were to exchange complete lists of their nuclear installations by the end of December 1991. Together with the **Simla Accord**, the Agreement on the Prohibition of Attack Against Nuclear Facilities form the pillars of the bilateral Indo-Pakistani **confidence- and security-building measures (CSBMs)** effort.

CAMP DAVID ACCORDS

Two agreements signed by Egypt and Israel on 17 September 1978. One agreement dealt with establishing a framework for the conclusion of a peace treaty between Egypt and Israel, while the other addressed the conduct of negotiations for the establishment of Palestinian autonomy in the West Bank and Gaza. In terms of **confidence- and security-building measures** (**CSBMs**), the Accords provided for the establishment of two thin-out zones, one limiting the deployment of Egyptian forces within an area of approximately 50 kilometres east of the Gulf of Suez and the Suez Canal to no more than one division, the other limiting the deployment of Israeli forces within an area of three kilometres east of the international border of the Gulf of Aqaba to no more than four infantry battalions. In addition, a buffer zone within an area west of the international border of the Gulf of Aqaba of about 20 to 40 kilometres in width, was to be monitored by lightly armed United Nations forces. The Camp David Accords laid the foundation for the **Treaty of Peace between Israel and Egypt** which was signed a few months later.

HOTLINE AGREEMENT: see page 94.

INDIA-CHINA JOINT WORKING GROUP ON THE BOUNDARY QUESTION: see page 179.

India-Pakistan Joint Working Group: see page 180.

Separation of Forces Agreement between Egypt and Israel

Agreement on the disengagement of Egyptian and Israeli armed forces in the Sinai as part of the cease fire accords which ended the October War of 1973. Signed by Egypt and Israel on 18 January 1974, the Agreement established a 30 kilometre demilitarized **buffer zone** east of the Suez Canal which separated the Egyptian and Israeli forces, as well as adjacent **thin-out zones** restricting the deployments of Egyptian and Israeli weapons and troops in those areas to a maximum of 7,000 personnel, 30 battle tanks, and anti-tank guns and missiles, mortars and six batteries of howitzers with a range not exceeding 12 kilometres. Egyptian and Israeli air forces were allowed to operate freely up to the demilitarized zone of separation, which was monitored by the United Nations Emergency Force (UNEF) assisted by aerial reconnaissance provided by the United States. The Agreement is sometimes also referred to as the Sinai Disengagement Agreement or the Sinai I Agreement. See also **Separation of Forces Agreement between Israel and Syria**, **Sinai Interim Agreement**, **Camp David Accords**, and **Treaty of Peace between Israel and Egypt**.

Separation of Forces Agreement between Israel and Syria

Agreement on the disengagement of Israeli and Syrian armed forces in the Golan as part of the cease fire accords which ended the October War of 1973. Signed by Israel and Syria on 31 May 1974, the Agreement established a **buffer zone** which separated the Israeli and Syrian forces, two equal adjacent **thin-out zones** which limited the deployments of Israeli and Syrian weapons and troops in those areas, and a **demilitarized zone** within part of the Israeli-controlled territory. Israeli and Syrian air forces were permitted to operate freely up to the zone of separation, and the United Nations Disengagement Observer Force (UNDOF) was charged with monitoring the observance of the accord. See also **Separation of Forces between Egypt and Israel Agreement**.

Simla Accord

Accord between India and Pakistan signed on 2 July 1972 after their military clash over East Pakistan one year earlier which resulted in the creation of Bangladesh. Under the Agreement both parties pledged to respect the established cease fire lines and to resolve their differences

over Kashmir through negotiations and by peaceful means. The Simla Accord forms the basis of all bilateral discussions between India and Pakistan over the Kashmiri issue.

SINAI INTERIM AGREEMENT *(Sinai II Agreement)*

Agreement concluded as part of the disengagement process of Arab and Israeli forces following the October War of 1973. Signed by Egypt and Israel on 4 September 1975, the Agreement sought to resolve the outstanding dispute over the control of the strategically important Giddi and Mitla passes in the Sinai. Under the terms of the Agreement, Israeli forces relinquished control of the two passes in exchange for the establishment around the passes of a tightly monitored 25 kilometre wide **demilitarized buffer zone** flanked by adjacent **thin-out zones** on each side. The buffer zone was supervised by 4,000 United Nations Emergency Force (UNEF) troops supported by aerial reconnaissance and a system of early warning remote ground sensors provided and operated by the United States, as well as an Egyptian and an Israeli signal collection station deployed near the Giddi Pass. The stationing of Egyptian and Israeli forces in the thin-out zones was limited to 8,000 troops, 75 battle tanks and 72 pieces of artillery with a range not exceeding 12 kilometres, respectively. Each side was entitled to conduct up to seven aerial monitoring flights per week along its respective thin-out zone. A Joint Commission and Liaison System including representatives from both sides was established to oversee the implementation of the Agreement.

SOUTH-NORTH BASIC AGREEMENT (*Agreement on Reconciliation, Nonaggression and Exchange and Cooperation Between the South and the North*)

Agreement between North and South Korea concluded on 13 December 1991, with a view to building confidence and improving relations between the two countries. Under the Agreement, the two parties pledged to respect each other's sovereignty; to resolve disputes peacefully and avoid accidental armed clashes; to establish a joint military commission to negotiate **confidence- and security-building measures (CSBMs)** including arms reductions, **constraints** on and **notification** of military exercises, **exchanges** of personnel and of information, the elimination of weapons of mass destruction (WMD), verification mechanisms, and the installation of a **hotline** between

national military authorities; as well as to increase economic, cultural, and humanitarian ties.

Treaty of Peace between Israel and Egypt

Agreement completing the disengagement process of Egyptian and Israeli forces in the Sinai following the October War of 1973, signed by Egypt and Israel on 26 March 1979. The Agreement provided a final settlement to the conflict in the Sinai, and proclaimed the termination of the state of war between the two countries. Under the Accord, all Israeli military forces and civilians were to be withdrawn from the Sinai peninsula in phases over a period of three years, and a demilitarized **buffer zone** and three **thin-out zones**, two on the Egyptian side and one on the Israeli side, were to be established. The demilitarized buffer zone was to be supervised by means of low-level aerial reconnaissance overflights and on-site inspections carried out by the United States, and by four Israeli signal collection stations. The thin-out zones limited the number of troops and type of equipment each party could deploy along the buffer zone. On the Egyptian side, the stationing of Egyptian forces in the two thin-out zones was restricted to a lightly armed border unit of up to four battalions and civil police units, and one mechanized infantry division of up to 22,000 personnel, 230 tanks and 480 armoured personnel carriers (APC), respectively. On the Israeli side, the deployment of Israeli forces in the thin-out zone was limited to four infantry battalions comprising up to 4,000 personnel and 180 APCs (with no tanks, heavy artillery or anti-aircraft batteries), and to unarmed aircraft only. To coordinate and supervise the implementation of the Accord, a Joint Commission comprising representatives from both sides, was created.

Treaty of Peace between Israel and Jordan

Agreement concluded by Israel and Jordan on 26 October 1994, establishing peace between the two countries. Under the Treaty, Israel and Jordan recognize each others' legitimate political rights including sovereignty, territorial integrity and political independence; undertake not to employ force or the threat of force against one another; pledge to create a mechanism of liaison, consultation and verification regarding the implementation of the Treaty; and commit themselves to the establishment of a Conference on Security and Cooperation in the Middle East. The parties also agree to cooperate on water management related issues, to normalize economic relations, and to refrain from

engaging in behaviour incompatible with the pursuit of good neighbourly relations.

8.3.4 Unilateral Instruments

Soviet President's Announcement Regarding Unilateral Reductions of Nuclear Weapons: see page 102.

United States President's Announcement Regarding Unilateral Reductions of Nuclear Weapons: see page 103.

8.4 CSBMs Terms

Annual Calendar

Schedule of significant military activities a State plans to conduct in the course of a year. Annual calendars are usually exchanged as a result of explicit agreement which defines exactly what activities are considered to be militarily significant, as well as other procedural matters. The provision of yearly advance notice of major military movements or exercises helps alleviate fears of surprise attack by signalling that the military activities conducted are part of normal military preparations and not preludes to aggression.

Buffer Zone

Designated portion of land separating hostile forces. Typically a buffer zone tends to be **de-militarized**. A buffer zone may also be referred to as a **zone of separation**.

Civil Confidence-Building Measures (CCBMs)

Measures specifically designed to build trust and confidence among civil communities. For example, between two ethnic communities (one in the majority, the other in the minority) within a country or between neighbouring villages in regions of scarce resources. CCBMs include the availability of local and national governmental documents in all the minority languages; local political structures including minority representation; discussions over the symbols that represent societies (i.e. flags and statues); transparency in the decision-making at

the local and national levels; equal rights within the constitution for all; and so on.

CONFIDENCE-BUILDING MEASURES (CBMS)

Conceptually similar to **confidence- and security-building measures (CSBMs)**, but generally understood to be broader and more encompassing than the latter in that they may not necessarily be related only to security issues. CBMs were introduced by the **Helsinki Final Act** of the Conference on Security and Cooperation in Europe (CSCE).

CONFIDENCE- AND SECURITY-BUILDING MEASURES (CSBMS)

Measures undertaken by States with a view to clarifying national military policies in order to overcome problems of misconception that might otherwise lead to political or military tensions. CSBMs seek to introduce transparency and thereby predictability in military relations between States by clarifying national military intentions, reducing uncertainties about national military activities, and/or constraining national opportunities for surprise attack or the coercive use of military force. Depending on their provisions, CSBMs may be divided into three broad categories: (1) **information and communication** measures; (2) **observation and inspection** measures; and (3) **military constraints** measures. CSBMs may be implemented unilaterally, though usually they are mutually agreed upon by means of political accord. The term originated with the 1983 of the Conference on Security and Cooperation in Europe (CSCE). CSBMs are a form of arms control.

DE-ALERTING

Measure(s) which deliberately reduces the state of readiness of military forces or of certain weapon systems. Recently de-alerting has been advocated with respect to nuclear weapons as a means of lowering the risk of surprise or accidental launches. Nuclear weapon de-alerting could be implemented through a variety of techniques such as the physical separation of launchers and warheads, the removal of missiles from launching facilities, and the obstruction of launching facilities. In 1991, under the **United States President's Announcement Regarding Unilateral Reductions of Nuclear Weapons**, the United States de-alerted all its nuclear-armed strategic bombers and all intercontinental ballistic missiles scheduled for deactivation under the

Strategic Arms Reduction Treaty (START). A few days later, the Soviet Union reciprocated with similar measures under the **Soviet President's Announcement Regarding Unilateral Reductions of Nuclear Weapons**.

DEMILITARIZATION

Formal agreement between parties not to station troops or military installations within a specified zone or territory. See also **demilitarized zone** and **buffer zone**.

DEMILITARIZED ZONE (DMZ)

Geographical area within which the deployment of military forces and of military installations of any type is formally prohibited. Demilitarized zones are generally used to separate hostile forces in the wake of armed conflict. A current example of a DMZ is the 248-kilometre-long area separating North and South Korean forces around the 38th parallel, established as part of the ceasefire to the Korean War.

EXCHANGE OF MILITARY INFORMATION

Measure intended to reduce uncertainty about the actual or planned military capabilities and/or activities of States. Typically the exchange of military information entails the regular submission of reports detailing the size, organization, deployment and equipment of national military forces, as well as of an **annual calendar** of their activities.

FEAR-REDUCTION MEASURES (FMRS)

Measures designed to reduce fear of attack in communities in the midst of violent conflict. They are based on the notion that an unarmed community, such a rural village, can help prevent attack through the ability to identify potential aggressors. For example, the use of video cameras linked up in real time to an Internet web site; the use of identification sprays for attackers and their vehicles and so on, could all contribute to the awareness that an aggressor would be easily identified and called to account following an attack. Independent non-governmental observers could also participate in monitoring vulnerable communities and getting information out to an international audience and court. Such witnesses could deter attack and reduce inter-communal violence.

HOTLINE

Measure establishing a permanent communication link between heads of States that is used in emergency situations when other consultative mechanisms appear to be either insufficient or unavailable. The first Hotline Agreement was signed by the Soviet Union and the United States in 1963. It established two permanently operated direct, text communication channels between the Kremlin and the White House. Since then, the Agreement has been modified several times to take advantage of technological innovations in communication systems. In 1966 and 1967 hotlines were also established between France and the Soviet Union and the Soviet Union and the United Kingdom respectively, and in 1989 a hotline was installed between the then Federal Republic of Germany and the Soviet Union. In 1971, India and Pakistan set up a hotline between their heads of military operations. A hotline between the prime ministers of the two countries, which had been instituted in the 1980s but had fallen into disuse, was reinstated in the summer of 1997. Hotlines are sometimes also referred to as direct communications links (DCLs).

INFORMATION AND COMMUNICATION

Category of **confidence- and security-building measures (CSBMs)** designed to promote better mutual appreciation of national military forces, installations and activities through the exchange of relevant data, and to facilitate regular and crisis communications. Typical information and communication measures include **exchanges of information**, **notifications of military activities**, **hotline** agreements, and **risk reduction centres**.

LIMITED FORCES ZONE: see **Thin-out Zone**

MILITARY CONSTRAINTS

Category of **confidence- and security-building measures (CSBMs)** that restrict the activities, deployment and/or structure of national military forces. Typical military constraints include limits on the type and scale of military activities that may be carried out, **separation zones**, **de-militarized zones**, **weapon-free zones**, **thin-out zones**, and policies of **non-offensive defence (NOD)**.

MILITARY CONTACTS

Measures aimed at bringing members of national military establishments together. They may involve regular or occasional invitations to visit military bases, exchanges of military personnel for training and teaching purposes, demonstrations of new weapon systems, or invitations to assist at military manoeuvres. Military contacts have been instituted as part of the **Vienna Documents**, and have been agreed to by parties to the ASEAN Regional Forum (ARF), and the **Arms Control and Regional Security (ACRS)** talks in the Middle East.

NEUTRALITY

Status that obliges a State to abstain from any actions that might engage or threaten to engage its armed forces in offensive military action. In times of war neutral States are expected to observe the principles of impartiality and abstention. They are expected neither to assist in any way nor to hinder in any way any of the belligerents. A status of neutrality can be declared on a unilateral basis, or can be negotiated as part of a multilateral treaty whereby the rights and obligations of the neutral State and the other parties involved are strictly stipulated.

NO-FIRST USE

Pledge by a State not to use a particular type of weapon except in retaliation. The Geneva Protocol of 1925 is for many States effectively a no-first use agreement with respect to biological and chemical weapons. No-first use pledges with respect to nuclear weapons were issued by the Soviet Union and China in the 1960s.

NO-FLY ZONE

Geographic area over which the flight of military aircraft is temporarily formally prohibited. No-fly zones are typically incorporated into agreements which separate the forces of former belligerents.

NON-AGGRESSION PACT

Formal agreement between two or more States not to engage in hostile military operations against one another.

NON-OFFENSIVE DEFENCE (NOD)

Military doctrine that aims to maximize defensive military options while minimizing offensive ones. NOD seeks to provide national forces that are strong enough to ensure adequate defence but that are

incapable of sustaining offensive operations beyond national frontiers. These would then presumably be non-threatening to others. Different models of NOD exist, and these can be implemented on both multilateral or unilateral bases. To date, no country has adopted a policy of NOD.

NOTIFIABLE MILITARY ACTIVITIES

Specific military activities subject to mandatory **notification** under the provisions of an agreement. Typical notifiable military activities include military exercises, movements and manoeuvres, the redeployment and increase of military forces, and the introduction of new weapon systems.

NOTIFICATION OF MILITARY ACTIVITIES

Measure that entails notice of a strictly specified minimum amount of time in advance of **notifiable military activities**. Notifications seek to make militarily significant activities predictable in order to reduce fear of a surprise attack.

OBSERVATION AND INSPECTION

Category of **confidence- and security-building measures (CSBMs)** designed to allow States to track each others' military activities. Essentially observation and inspection measures try to reassure States that each other's routine military activities do not mask aggressive intentions. Typical observation and inspection measures include the **observation of military activities** and other various verification provisions.

OBSERVATION OF MILITARY ACTIVITIES

Measure often used in conjunction with **notification of military activities** provisions. Typically they entail the monitoring of major military exercises or of other significant military activities for instance as provided for in the **Vienna Documents**, and/or of patterns of national force deployment as provided for under the **Open Skies Treaty**.

RISK REDUCTION

Measures that help clarify and resolve suspicious or hazardous incidents relating to military activities. Typical risk reduction measures

include the establishment of **risk reduction centres (RRCs)** and other crisis communication instruments such as a **hotline**.

Risk Reduction Centres (RRCs)

Establishments charged with the transmission, receipt, and processing of **notifications** and other information relating to the prevention of war. RRCs have been established under the **Vienna Documents** to assist in the **exchange of information**, to facilitate consultation and co-operation with regard to unusual military activities and to organize annual implementation assessment meetings, as well as part of the **Agreement on the Establishment of Nuclear Risk Reduction Centers between the Soviet Union and the United States** to handle the exchange of communications required under various nuclear weapons-related treaties to which the two countries are parties. Regional RRCs have also been agreed to by the participants taking part in the **Arms Control and Regional Security (ACRS)** talks in the Middle East.

Separation of Forces

Formal agreement which stipulates the conditions for the disengagement of belligerent forces. Typically separation agreements comprise a series of **confidence- and security-building measures (CSBMs)** such as provisions for the establishment of **buffer zones**, **demilitarized zones**, **thin-out zones**, or **weapon-free zones**. Separation agreements have been negotiated between Israel and Syria, and Egypt and Israel as part of the disengagement process of Arab and Israeli forces following the October War of 1973. See also the **Separation of Forces Agreement between Egypt and Israel, Separation of Forces Agreement between Israel and Syria** and the **Sinai Interim Agreement**.

Thin-Out Zone

Designated geographic area within which the deployment of military forces and installations is formally restricted. It aims to lower the risk of surprise attack by limiting the number of forces which can be stationed within an area. Thin-out zones have been negotiated as part of the **separation of forces** agreements concluded between Israel and Syria, and Egypt and Israel as part of the process of the disengagement of Arab and Israeli forces which followed the October War (1973). See also **separation of forces agreement**, the **Separation of Forces**

Agreement between Israel and Syria, **Separation of Forces Agreement between Egypt and Israel** and the **Sinai Interim Agreement**.

UNILATERAL MEASURES

Measures adopted by States on an individual basis; they do not depend on mutual agreement or reciprocation. Since unilateral measures are nationally defined, they do not involve any legally binding international obligations. Typically unilateral measures comprise some sort of demonstration(s) of self-restraint such as the adoption of a policy of **neutrality**; reductions of military expenditures, forces, or force readiness; reductions in the number or types of deployed major weapon systems or the elimination of an entire category of weapons; cessation, moratoria, or freezes on the development, production, or acquisition of certain kinds of weapons; and declared restrictions on the use of certain weapons in warfare, including commitments to **no-first use**.

WEAPON-FREE ZONE

Geographic area within which the deployment of specific types of weapon systems and/or of military installations is formally prohibited. Weapon-free zones aim to lower the risk of military confrontation by banning the deployment of weapons generally regarded as suitable for offensive military operations within certain sensitive areas. Weapon-free zones are classified as **confidence- and security-building measures (CSBMs)** when introduced as **military constraints** aimed at reducing the fear of surprise attack. However, when introduced as non-proliferation or disarmament measures, as for instance in the case of weapon-of-mass-destruction-free zones, they are no longer considered to be CSBMs. Weapon-free zones as CSBMs have been part of the disengagement of forces agreements concluded between Israel and Syria and Egypt and Israel following the October War of 1973, and of the Dayton Peace Accords which put an end to the conflict in Bosnia and Herzegovina.

ZONE OF SEPARATION: see **Buffer Zone**

PART IV

Treaty Basics

CHAPTER 9

NEGOTIATING ARMS CONTROL AND DISARMAMENT AGREEMENTS

9.1 BACKGROUND

Like all agreements, arms control and disarmament accords are compacts that confer on parties specific rights and obligations. The exact nature of these is typically settled through negotiations that, depending on circumstance, may take a number of forms. In general, arms control and disarmament discussions tend to be complex, lengthy affairs. This tends to be especially the case when more than two parties are involved. In such situations, negotiations are often imbedded within purposefully designed institutions meant to imbue them with a sense of stability and to help diminish the individual participation costs that might otherwise prove prohibitive.

Negotiations describe the deliberations carried out between two or more parties with a view to reaching agreement over the exact nature of the rights and obligations that might be inscribed in a formal accord. It is important to note that negotiations, even when completed rapidly, are not one-time events but are rather processes that unfold over time. As the term deliberations suggests, negotiations involve the exchange of communication, that is, the reciprocal transmission of information in one form or another. From the standpoint of the individual party, the aim of communication is invariably to sway the opinion of others.

Figuratively speaking, negotiation processes may be approached in either an inductive or a deductive manner. Under the inductive approach, parties trade concessions on individual points until consensus is reached on enough matters to sum up to an agreement. The nature of the overarching agreement is thus determined by the aggregation of the separate points

decided. Under the deductive approach, the starting point of negotiations is not discussion of individual points but rather the search for a consensus on the broad aims and principles that are to govern the agreement. Once this is attained, attention is shifted to individual points. The latter are expected to be settled in accordance with the broad goals of the consensus regarding the nature of agreement that has already been established.

The division of negotiation processes into inductive and deductive approaches is evidently notional and, in any case, the two approaches are by no means mutually exclusive. In practice, at least in the area of arms control and disarmament, negotiations tend to involve elements of both (the analogy of solving tangled functions through a process of iteration may be useful here) the predominance of which is determined by prevailing circumstances.

As already mentioned, in practice, arms control and disarmament negotiations may assume any number of organizational forms. Broad distinctions made between negotiations such as formal and informal, official and unofficial, and so on, are commonplace. In current diplomatic parlance, negotiations, particularly when formal and official, that is, when carried out by dignitaries acting explicitly and overtly on behalf of the party they represent and invested with the authority to make binding commitments, are sometimes referred to as **track I** discussions. From this, it follows that all arms control and disarmament agreements are by definition the result of track I negotiations.

In addition to track I discussions, informal talks may be carried out by representatives that are not acting explicitly on behalf of a party and that in any case lack the authority to make binding commitments. As a rule, such talks are concerned principally with preparing the ground for track I discussions or for higher stages thereof. In prevailing diplomatic language, such talks are sometimes referred to as **track II** activities. An example of track II activities is provided by the work carried out by the **Council for Security Cooperation in the Asia-Pacific (CSCAP)**.

In practice, track I and track II activities may be mingled, the result being dubbed **two-track** negotiations. Two-track negotiations are rooted in the belief that track I and track II discussions are complementary, the latter being considered particularly useful in aiding the former progress in cases where parties are mired in seemingly intractable conflict. The more flexible

and perhaps less acrimonious venue offered by track II talks is though to facilitate the search for common ground, which may then reverberate within track I discussions to the benefit of the latter. The Arms Control and Regional Security (ACRS) talks launched in 1992 as part of the Middle East peace process and the related multitude of informal activities surrounding it are a good example of a two-track approach to negotiations. Following the launching of ACRS, several extra regional and a host of non-governmental organizations sponsored over 40 track II projects that brought together scores of regional officials, military officers and experts for off-the-record talks on various issues related to regional security. Some of these informal projects produced publications on specific issues related to regional security and ACRS. Track II projects also encompassed training programmes in arms limitation and multilateral diplomacy that were organized to help prepare the parties for ongoing global arms control and disarmament negotiations and resumed regional security talks.

The outcomes of arms control and disarmament negotiations depend in a complex manner on a multitude of factors, both of a general and of a specific nature. Although commonly not considered to be decisive, a suitable institutional forum within which the negotiations are able to take place may exert some influence on their course. As previously mentioned, at times, parties establish an explicit institutional framework in order to support the negotiating process. Such a framework is particularly helpful when negotiations are being carried out between multiple parties. Negotiations among multiple parties, which tend to become more complex and require a greater organizational effort the greater the number of parties involved, run the risk of falling prey to problems of coordination and even of legitimacy. This risk, however, can be mitigated by embedding the discussions within an appropriate institutional forum that is able to overcome problems of coordination and lessen the transaction costs of the participants, which might otherwise confound attempts to reach agreement.

Since the end of the Second World War, arms control and disarmament negotiations carried out between multiple parties have tended to be institutionalized in specially designed frameworks. Examples of forums hosting on-going arms control and disarmament and related discussions include the **Conference on Disarmament (CD)**, the **Organization for Security and Cooperation in Europe (OSCE)**, and the **United Nations Disarmament Commission (UNDC)**. In contrast,

negotiations carried out solely between two parties have tended to take place under procedural mechanisms decided on an ad hoc basis.

Successful arms control and disarmament negotiations typically result in the conclusion of a **treaty** or of some sort of formal accord. A treaty is an agreement between legal entities that upon **entry into force** becomes legally binding. The conditions whereupon a treaty enters into force are stipulated within the treaty itself. Sometimes, a treaty may enter into force simply upon signature. More often, however, entry into force requires **ratification** of the treaty by the parties or a majority thereof. Formally, ratification represents the final confirmation by a State (ratification has meaning only within the context of inter-State relations) of its acceptance to be bound by the provisions of the treaty. It is usually performed by the highest legislative office of a country according to national procedures. Generally, ratification is expected to be performed within a reasonable length of time after the treaty has been signed, although, in most cases, the timeframe within which ratification is to be carried out is not explicitly stated. Failure to comply with the prescribed ratification requirements, nullifies a treaty. Following a treaty's entry into force, all **contracting parties** are legally bound to observe its provisions in full. Some treaties enable their provisions to be extended to parties that may wish to **adhere** at a later date. In such cases, the joining parties too become fully bound by the provisions of the treaty once all adhesion requirements have been met.

Besides treaties, successful arms control and disarmament negotiations may also result in the conclusion of a formal political agreement. Political agreements are similar to treaties, except that, unlike treaties, they do not have a basis in international law and are therefore not legally binding. Despite their lack of a legal basis, political agreements do nevertheless have a political foundation, which makes them politically binding, and respect of their provisions is expected just as much as in the case of treaties. Under particular circumstances, political agreements may become de facto legally binding, although, such occurrences are extremely rare and the matter itself remains relatively contentious within the field of international law.

9.2 NEGOTIATION FORUMS

9.2.1 Global Institutions

CONFERENCE ON DISARMAMENT (CD)

Multilateral negotiating forum on arms control and disarmament issues. The CD is mandated to negotiate arms control and disarmament measures in any major area of interest to the international community. In practice, the CD adopts a specific work programme focusing on a limited number of issues selected at the beginning of each annual session. Items in the CD work programme are taken up in formal and informal plenary meetings of the Conference. However, the CD may also establish subsidiary bodies in the form of ad hoc committees, working groups, technical groups, or groups of governmental experts. These bodies can be given either negotiating or non-negotiating mandates. Decision in the CD are carried out on the basis of consensus. To date, two major multilateral arms limitation treaties have been concluded under the auspices of the CD: the Chemical Weapons Convention (CWC) in 1992, and the Comprehensive Test Ban Treaty (CTBT) in 1996.

The CD traces its origins to the late 1950s. In 1959, the demonstrated failure of the **United Nations General Assembly (UNGA)** to address disarmament issues effectively, led to the establishment of the Ten Nation Committee on Disarmament (TNCD), outside the United Nations system. Comprising five members from the North Atlantic Treaty Organization (NATO) and five members from the Warsaw Pact, the TNCD was mandated to elaborate measures leading towards general and complete disarmament. Deep divisions between East and West on the issues of nuclear and conventional weapons, however, quickly led to an unbreakable stalemate, halting the work of the Committee within its first three months of operation. In 1961, looking to break what seemed like a permanent deadlock, the UNGA expanded the membership of the TNDC to 18 countries by adding representations from eight non-aligned States. The work agenda of the newly-created Eighteen Nation Disarmament Committee (ENDC) featured a shift in focus away from disarmament in favour of arms control measures aimed at limiting the development and deployment of nuclear weapons, although general and complete disarmament remained as the final stated goal of the body. The ENDC operated until

1969, and two treaties were completed under its aegis: the Partial Test Ban Treaty (PTBT) in 1963, and the Non-Proliferation Treaty (NPT) in 1968. Seeking broader representation in arms control negotiations, in 1969, the UNGA voted to expand the membership of the ENDC to 26 countries, and renamed the new body the Conference of the Committee on Disarmament (CCD). During the 1970s the CCD oversaw the successful conclusion of the Seabed Treaty in 1971, the Biological and Toxin Weapons Convention (BTWC) in1972, and the Environmental Modification (ENMOD) Convention in 1977. In 1975 the membership of the CDD was increased to 31 States. Three years later, in 1978, the Committee on Disarmament (CD) succeeded the CDD. Established with a view to strengthening the participation of non-aligned countries in multilateral arms control and disarmament negotiations, the CD replaced the permanent American-Soviet co-chairmanship of its predecessors with a chairmanship rotating on a monthly basis among all members. In addition, membership in the CD was expanded to 40 States, including all nuclear-weapon States (NWS). In 1984 the Committee was renamed the Conference on Disarmament, although its structure was kept intact. In 1996 and again in 1999, CD membership underwent two further expansions, reaching a total of 66 member countries. Although the CD is not a United Nations body, its meetings are held at the United Nations office in Geneva, and its secretariat is entrusted to the United Nations Department for Disarmament Affairs.

First Committee (*Disarmament and International Security Committee*)
One of six main committees of the **United Nations General Assembly (UNGA)**. It deals with all issues relating to disarmament and international security of interest to the UNGA, and makes recommendations in the form of draft resolutions to be taken up by the UNGA while in plenary session. It is composed of all members of the UNGA and meets annually at the United Nations Headquarters in New York.

Special Sessions on Disarmament (SSOD)
Special meeting of **United Nations General Assembly (UNGA)** convened to deal exclusively with issues related to arms control and disarmament. The First Special Session on Disarmament (SSOD I) held

in 1978 adopted a final document which called for a programme of action leading towards the ultimate goal of general and complete disarmament, and proposed a wide range of disarmament measures to enhance the security of all nations at progressively lower levels of armaments. It also stressed the central role and primary responsibility of the United Nations in the field of disarmament and emphasized the need to inform the Organization of all disarmament efforts outside its aegis. The establishment of the **Conference on Disarmament (CD)** (until 1983 called the Committee on Disarmament) and of the United Nations Institute of Disarmament Research (UNIDIR), as well as the reactivation of the **United Nations Disarmament Commission (UNDC)**, were all direct results of SSOD I. The Second Special Session on Disarmament (SSOD II) held in 1982, and the Third Special Session on Disarmament (SSOD III) held in 1988, were unable to adopt a final document.

UNITED NATIONS DISARMAMENT COMMISSION (UNDC)

Deliberative body and a subsidiary organ of the **United Nations General Assembly (UNGA)**. The Commission is mandated to consider and make recommendations on various arms control and disarmament related issues and to follow up on the relevant decisions and recommendations of the **Special Sessions on Disarmament (SSOD)**. Since 1990, the UNDC has limited its work agenda to a maximum of four substantive items for in-depth consideration. No substantive item can be maintained on the UNDC agenda for more than three consecutive years. The UNDC was established at the First Special Session on Disarmament (SSOD I) in 1978, succeeding an earlier disarmament commission that had ceased to convene after 1965. It is composed of all members of the UNGA, and meets annually in late spring for approximately three months at the United Nations Headquarters in New York.

UNITED NATIONS GENERAL ASSEMBLY (UNGA)

Main deliberative body of the United Nations. The United Nations Charter stipulates that the UNGA may consider the general principles of cooperation in the maintenance of international peace and security, including the principles governing disarmament and the regulation of armaments. The **First Committee** and the **United Nations**

Disarmament Commission (UNDC) are subsidiary bodies of the UNGA that are exclusively concerned with arms control and disarmament matters. The UNGA is comprised of all members of the United Nations, which have equal voting rights. While its decisions are not legally binding, the UNGA may consider and make recommendations on any question relating to peace and security except when the issue is being addressed by the **United Nations Security Council (UNSC)**. Decisions on important issues relating to peace and security, the admission of new members, and budgetary matters require a two-thirds voting majority. For other decisions a simple majority is sufficient. The UNGA holds its annual session from September until mid-December at the United Nations Headquarters in New York.

UNGA involvement in disarmament issues began early in the history of the United Nations. In the 1940s and early 1950s, the Assembly appointed special commissions to address the problems of nuclear and conventional weapons. By 1959, however, the obvious inability of the UNGA to advance in the matter led the Assembly to create and transfer authority over disarmament negotiations to the Ten Nation Committee on Disarmament (TNCD). Established as an autonomous organ outside the supervision of the United Nations, the TNCD in effect transformed the UNGA into a deliberative body exclusively, thereafter with functions limited to debating and issuing recommendations on disarmament matters. Throughout the 1950s and 1960s the UNGA adopted a series of landmark resolutions on the peaceful use of atomic energy, general and complete disarmament, the prevention of the transfer and acquisition of nuclear weapons, and the prohibition of the deployment of nuclear weapons on celestial bodies, the ocean sea floor and in Latin America. Subsequently many of these resolutions became the basis for multilateral arms control conventions negotiated in the Eighteen Nation Disarmament Committee (ENDC) and the Conference of the Committee on Disarmament (CCD), two of the successors to the TNCD. In 1978, at the prompting of the non-aligned nations which sought a greater role in multilateral disarmament discussions, the UNGA convened a **Special Session on Disarmament (SSOD)**. The Session reaffirmed the goal of general and complete disarmament, outlined measures for the progressive multilateral reduction of armaments, revived the United Nations Disarmament Committee (UNDC) and established the Committee on Disarmament

(CD). However, two subsequent instalments of the SSOD held in 1982 and 1988 respectively, failed to produce any substantive agreements. In 1980 the Inhumane Weapons Convention was negotiated at a special conference held under the auspices of the UNGA, and in 1982 the Assembly empowered the United Nations Secretary-General to investigate alleged uses of chemical and biological weapons. In 1991, the UNGA passed a resolution leading to the establishment of the United Nations Register of Conventional Arms under the auspices of the office of the Secretary-General of the United Nations.

UNITED NATIONS SECURITY COUNCIL (UNSC)

Main decision-making body of the United Nations. Under the Charter of the United Nations, the UNSC is responsible for the maintenance of international peace and security in accordance with the principles thereof. With respect to arms control and disarmament the Charter requires the UNSC to submit plans to United Nations members for the establishment of a system for the regulation of armaments. The Security Council approves peacekeeping and other operations designed to observe, assist, or implement cease-fires and the collection and elimination of armaments. It is composed of 15 members, of whom five are permanent, with the rest being elected by the **United Nations General Assembly (UNGA)** for two-year terms. All UNSC members have one vote, and Council decisions must be approved with at least nine votes including those of all permanent members (in substantive matters). The decisions taken by the Security Council are legally binding and must be implemented by all members of the United Nations. The Security Council meets continuously at the United Nations headquarters in New York.

Historically the UNSC has had in practice a limited involvement in the area of arms control and disarmament. In 1968, in support of the Non-Proliferation Treaty (NPT), the UNSC adopted a resolution pledging assistance to any non-nuclear weapon State threatened with nuclear aggression, while in 1992 it identified the proliferation of weapons of mass destruction as a threat to international peace. In addition, several multilateral arms control treaties identify the UNSC as the authority responsible for handling breaches of their provisions, although to date these obligations have solicited little attention from the Council. In 1991, following the Gulf War, the UNSC established the United

Nations Special Committee (UNSCOM) to supervise the destruction of all Iraqi stocks of chemical and biological weapons, agents, related systems and components, and research, development and production facilities; as well as all ballistic missiles with a range of 150 kilometres or more, related systems and components, and production and repair facilities. UNSCOM operated until December 1999, when, by resolution 1284, it was replaced with the United Nations Monitoring, Verification and Inspection Committee (UNMOVIC). Thus far, the efforts to ensure that Iraq is fully deposed of all weapons of mass destruction capabilities represent by far the Council's most extensive venture into the restriction of national armaments.

9.2.2 Regional Institutions

Arms Control and Regional Security (ACRS): see page 144.

ASEAN Regional Forum (ARF)

Deliberative body established by the Association of South-East Asian Nations (ASEAN) that serves as an arena for inter-governmental consultation on regional security matters. The Forum convenes annually at the ministerial level during the ASEAN Ministerial Meeting. This gathering is then followed by a meeting with its dialogue partners, which among others include the European Union, the Russian Federation, and the United States. In 1995 the ARF established the **Inter-Sessional Support Group on Confidence-Building Measures (ISG-CBM)** to study and recommend appropriate regional confidence-building measures.

Conference on Security and Cooperation in Europe (CSCE): see **Organization for Security and Cooperation in Europe (OSCE)**

Council for Security Cooperation in the Asia Pacific (CSCAP)

Deliberative, non-governmental forum engaged in **track II** activities aimed at improving the security environment in the Asia-Pacific region. CSCAP brings together in an informal manner researchers, security experts and government officials from Association of South-East Asian

Nations (ASEAN), and other regions including Europe and the United States in order to foster discussion and understanding on regional security and arms control issues. CSCAP's efforts complement the work undertaken by the **ASEAN Regional Forum (ARF)**, as part of a **two-track** approach.

FORUM FOR SECURITY COOPERATION (FSC)

Negotiations and consultations forum on military security and stability-related matters, established in 1992 by the **Conference on Security and Cooperation in Europe (CSCE)**. The FSC provides an institutional framework for negotiating arms control and confidence- and security-building measures (CSBMs), for discussing and clarifying of information exchanged under existing CSCE CSBM obligations, and for assessing the implementation of agreed provisions. In 1993 the FSC adopted a series of documents dealing with action in localized crisis situations, the regulation of conventional arms transfers, military contacts and defence planning. A year later, negotiations under the auspices of the FSC resulted in the conclusion of the Vienna Document, and the adoption of further obligations with regard to the exchange of military information and non-proliferation by members. As part of its implementation tasks, the FSC holds Annual Implementation Assessment Meetings which review compliance with CSBM obligations. The FSC comprises representatives from the delegations of the 55 States participating in the **Organization for Security and Cooperation in Europe (OSCE)**. Forum meetings are held on a weekly basis in Vienna. Notable arms control agreements concluded under the FSC framework include the 1994 and 1999 Vienna Documents, and the Treaty on Open Skies.

INTER-SESSIONAL SUPPORT GROUP ON CONFIDENCE-BUILDING MEASURES (ISG-CBM)

Discussion and consultation body established by the **ASEAN Regional Forum (ARF)** at its second meeting in August 1995. The purpose of the ISG is to foster dialogue on security matters in the region, and to study and propose region-wide confidence-building measures. Current ISG confidence-building recommendations comprise several information and communication provisions including the exchange of information, the voluntary annual release of defence policy statements and of

briefings on regional security issues, the creation of a multilateral communications network and of liaison links with other similar regional forums, military contacts, greater participation in the United Nations Register of Conventional Arms and the voluntary circulation of reports submitted thereto amongst Group members, and possibly the set-up of a regional arms register. See also **ASEAN Regional Forum (ARF)**.

NORTH ATLANTIC COOPERATION COUNCIL (NACC)

Forum for consultation and coordination on mutual security issues between North Atlantic Treaty Organization (NATO) members, former Warsaw Pact members (including the former republics of the Soviet Union), and other neighbouring countries. Established by NATO in 1991 with a membership which eventually reached 40 countries, NACC held high-level meetings on political, economic and security-related topics at least once a year. In 1997, NACC was replaced with the Euro-Atlantic Partnership Council (EAPC) which provides for expanded consultations between participating States on issues such as crisis management, regional security, arms control, and defence planning and policy.

ORGANIZATION FOR SECURITY AND COOPERATION IN EUROPE (OSCE)

Pan-European multilateral forum for the deliberation and negotiation of regional arms control and disarmament, security, and human rights issues. Launched in 1972 as a platform for dialogue and negotiation between East and West under the name of **Conference for Security and Cooperation in Europe (CSCE)**, the OSCE is currently the primary instrument for early warning, conflict prevention, crisis management and post-conflict rehabilitation in Europe. The OSCE is considered to be a regional arrangement under Chapter VIII of the Charter of the United Nations. Its member States span a geographical area ranging from Vancouver to Vladivostok. Because the OSCE is premised on political agreement rather than legal treaty, the Organization does not have legal status under international law. Its decisions, therefore, are politically but not legally binding. OSCE decisions are made on the basis of consensus, except in specific instances where a decision may be adopted without the agreement of the State(s) involved. Major arms control agreements negotiated under the CSCE/OSCE framework

include the Helsinki Final Act, the Vienna Documents, the Conventional Forces in Europe (CFE) Treaty and its follow-ons, and the Treaty on Open Skies.

Since 1992, arms control and disarmament issues within the OSCE have been addressed under the **Forum for Security Cooperation (FSC)**.

PARTNERSHIP FOR PEACE (PFP)

Mechanism for consultation on military matters and military contacts between North Atlantic Treaty Organization (NATO) and former Warsaw Pact members (including the former republics of the Soviet Union) . Established in 1994, PfP provides participating countries with an institutional framework through which consultation and co-operation on military issues such as air defence, command, control and communications, the democratic control of defence forces, defence planning and budgeting, and military procurement may be carried out. PfP also allows member States to engage in exchanges of military staff, joint conceptual planning, and joint exercises and training.

UNITED NATIONS STANDING ADVISORY COMMITTEE ON SECURITY QUESTIONS IN CENTRAL AFRICA

Deliberative body established by the Secretary-General of the United Nations in May 1992. Its task is to promote confidence- and security-building measures (CSBMs), ease regional tensions, and further disarmament, nuclear non-proliferation, and development in the central African subregion. The Committee consists of 11 United Nations Member States, and the Organization of African Unity (OAS) which has observer status. It meets twice a year, or more often if warranted by events.

9.2.3 Bilateral Institutions

INDIA-CHINA JOINT WORKING GROUP ON THE BOUNDARY QUESTION

Deliberative forum established by India and China in December 1988 to serve as an institutional framework for the discussion and settlement of border issues between the two countries along the Line of Actual

Control (LAC) on their Himalayan frontiers. Since its inception, the Group has been used to elaborate a number of confidence- and security-building measures (CSBMs) the most important of which include biannual military contacts along the LAC, military-to-military communication links along the LAC, and hotlines between military headquarters; exchanges of information about the position of military units along the LAC; prior notification of military manoeuvres and movements along the LAC; prevention of airspace violations; exchanges between defence officials and military officer trainees; as well as the creation of another working group charged with addressing matters regarding economic and scientific cooperation.

INDIA-PAKISTAN JOINT WORKING GROUP

Deliberative forum established by India and Pakistan in June 1997 as an institutional framework to carry out consultations aimed at improving relations between the two countries. Subjects of discussion within the purview of the Working Group include peace and security, confidence- and security-building measures (CSBMs), the situation in Kashmir, water management, terrorism and drug trafficking, economic and commercial cooperation, and more widely, any other issue of concern to both sides.

9.3 NEGOTIATION TERMS

ADHERENCE

Procedure whereby a State becomes party to a **treaty** which is already in existence. Adherence can also be referred to as accession or adhesion.

CONTRACTING STATE

According to the Vienna Convention on the Law of Treaties: A State which has consented to be bound by the treaty, whether or not the treaty has entered into force. A contracting State may also be referred to as a contracting party.

ENTRY INTO FORCE

Point in time at which a **treaty** becomes binding on the parties. The conditions for a treaty's entry into force are stipulated by the treaty itself. Sometimes, a treaty enters into force upon signature by the parties, though usually, entry into force requires that the treaty be first ratified. Multilateral treaties customarily stipulate that the treaty is to enter into force only after a specified number of ratifications have been deposited.

RATIFICATION

Act whereby a State consents to be legally bound by a **treaty**, involving the signing and exchange or deposit of the instruments of ratification. Ratification is carried out by the highest national legislative authorities in accordance with national legislation. Generally, ratification is carried out at the discretion of the parties, although it is expected to be completed within a reasonable amount of time following the conclusion of the treaty. Failure to meet the ratification requirements renders the treaty void. See also **entry into force**.

TRACK I

Diplomatic term sometimes used to signify negotiations that are formal and official, that is, that are carried out as part of established processes by dignitaries explicitly representing their party that have the authority to make binding commitments.

TRACK II

Diplomatic term occasionally used to describe informal talks and other activities that aim at to facilitate the beginning or progression of formal negotiations. Track II activities are generally carried out by dignitaries, scholars, and so on that act in an unofficial capacity.

TREATY

Agreement between legal entities that becomes legally binding upon **entry into force**. A treaty may enter into force upon signature or upon completion of the stated **ratification** requirements. The latter are specified within the treaty itself.

TWO-TRACK

Diplomatic term used to describe the deliberate combination of **track I** and **track II** activities. The track II activities bring together representatives of the negotiating parties, usually lower-level government representatives, technical experts, or academics. The participants, acting in an unofficial capacity, discuss in a non-binding way possible approaches to formal agreement. Since the opinions, proposals and assessments of the participants do not have to reflect official government policies, the participants can probe a wider range of possible solutions than would otherwise be the case. Formulas for accommodation devised in track II meetings are hoped to somehow percolate to and influence proceedings at the track I level.

PART V

Implementation of Arms Control and Disarmament Agreements

CHAPTER 10

VERIFICATION AND COMPLIANCE

10.1 BACKGROUND

Once an arms control or disarmament agreement enters into force, the States parties are formally bound to comply with its provisions. Compliance, refers to the parties' implementation of the terms of the agreement. In practice, the parties are said to comply with or abide by the terms of an agreement when their behaviour is consistent with the rights and obligations stipulated by the agreement. Historically expectations about compliance with arms regulation agreements were based mainly on trust. Having entered into accord, the parties were expected to act in good faith and honour their commitments. Since the end of the Second World War, however, this approach has come to be considered inadequate, and compliance has increasingly become subject to control.

The process of establishing whether States parties are complying with the provisions of an agreement is called **verification**. Verification has several functions. First, it allows the parties to assess an agreement's state of implementation. By establishing how each party is fulfilling its obligations, verification gives a good indication about the functioning of the agreement. Second, it discourages non-compliance with agreement provisions. Because parties know that breeches of obligations carry the risk of detection, they should be less inclined to attempt to renege secretly on their commitments. Third, verification can give timely warning of violation(s) of agreement conditions. In case of non-compliance, verification can reveal transgressions before these have a chance to turn alarming. Finally, by checking that obligations are indeed being honoured, verification helps generate confidence that the agreement and its verification mechanism are functioning as intended, thereby fostering trust and confidence between the parties.

Although no arms limitation agreement can be verified with absolute certainty, in order to fulfil the functions outlined above, a verification regime must be sufficiently effective. There is no general agreement on what constitutes effective verification, however, depending on how it is construed, this has a significant impact on the nature of a verification regime. For instance, if effective verification is taken to mean the ability to detect in a timely manner any deviation from the terms of the agreement, then extensive and intrusive measures are probably going to be required. On the other hand, if effective verification is taken to entail the ability to identify non-compliance in a timely manner only when this occurs on a scale large enough to become threatening, then less onerous measures are probably going to suffice. Ultimately, because verification implies intrusion, deciding upon the appropriate nature of a verification regime, generally entails finding a suitable trade-off between access and information gained and conceded. This, in turn, is a matter of national policy that is determined by factors that go beyond the mere scope of verification.

In practice, verification involves a three-step process of monitoring, analysis, and determination. Monitoring describes the process of observing the activities of the parties relevant to their obligations under an agreement. Depending on the specifics of the agreement, monitoring can be carried out unilaterally, cooperatively, or through some combination thereof. Unilateral monitoring relies on the use of **national technical means (NTMs)**. NTMs refer to nationally owned instruments for surveying a party's compliance with agreement obligations, without intruding onto its territory, airspace, or national waters. Typically NTMs comprise a wide range of **remote sensing** devices such as **reconnaissance satellites**, **reconnaissance aircraft**, **electronic intelligence**, radar, **seismic stations**, **hydro-acoustic stations**, and **infra-sound stations**. These **sensors** detect agreement-limited objects and/or activities at a distance thereby allowing parties to observe relevant information without intruding, and hence without relying on the collaboration of those being observed.

The manner in which NTMs are utilized to perform monitoring depends on the nature of the objects and/or activities to be surveyed and on the provisions of the agreement. Certain arms control agreements explicitly identify NTMs as the means by which compliance is to be verified. In this case, an accompanying clause stipulating that the parties are not to interfere with each other's use of NTMs is typically included. This officially

sanctioned use of NTMs greatly enhances their capacity to gather pertinent information. Nevertheless, because NTMs generally operate at great distances from the areas of interest, their utility in performing monitoring tasks, is inherently limited. Moreover, within the context of multilateral agreements, worries have been expressed that parties possessing disproportionate NTMs capabilities can have an undue advantage if monitoring is to be performed exclusively by such means. To address these concerns, States have devised so-called cooperating monitoring practices.

Cooperative measures permit monitoring to be carried out multilaterally, on a collaborative basis. They entail a wide range of information-gathering techniques including **data declarations**, **continuous monitoring**, and various kinds of **on-site inspections**. These can be implemented either directly by the parties themselves or can be entrusted to a specially designated international organization, as is often the case with multilateral agreements.

Data declarations or exchanges are voluntary releases of information by the parties on matters relevant to the provisions of the agreement. Such exchanges can relate to a multitude of items, such as for instance the number, location, characteristics and periodic updates on the status of treaty-limited equipment, production capacity of such equipment, and schedules for and descriptions of constrained activities. Data declarations are valuable both in and of themselves in providing transparency, as well as in laying the basis for the execution of on-site inspections. They are part of several bilateral and multilateral arms control treaties.

Continuous monitoring is a data-gathering technique that involves the supervision of activities or facilities subject to permanent observation under an agreement. Typically continuous monitoring entails the deployment of fixed, continuously operating sensors within and around a facility in order to verify that treaty-prohibited activities are not occurring. A common example of continuous monitoring is **portal monitoring** which entails the continuous observation of all traffic entering and exiting a treaty-controlled production facility. Sometimes, continuous monitoring activities can also involve the permanent posting of personnel at designated sites to assist the operation of sensors. When this is the case, continuous monitoring activities are generally understood to become part of on-site inspections.

On-site inspections are by far the most potent instruments of cooperative measures monitoring. They allow the parties both to verify the accuracy of previously submitted data declarations, as well as to gather further valuable information regarding the implementation of agreement obligations which would otherwise be unavailable. Commonly on-site inspections can be classified into three broad categories: **non-challenge inspections**, **challenge inspections**, and **ad hoc inspections**. The precise meaning of each type of inspection is usually clarified in the language of the treaty itself. General descriptions of these inspections, however, are provided here for illustrative purposes.

Non-challenge inspections are on-site visits conducted on a periodic basis or in accordance with some predetermined arrangement. These inspections are the most common type of on-site inspections. They are typically used to check inventories of treaty-limited items, the progress of the elimination of treaty-prohibited equipment, and/or the activities of **declared facilities** in order to verify that treaty-prohibited events are not taking place. Depending on the specifics of the agreement, regular on-site inspections can take several forms including **routine inspections**, **clarification visits**, **baseline inspections**, **reduction inspections**, **close-out inspections**, and short-notice inspections. Routine inspections subject declared facilities to periodical examination. They carry no implications of impropriety. Clarification visits allow parties to verify suspicious events to remove ambiguities that might have arisen for some reason. Typically they supplement routine inspections. Baseline inspections are on-site inspections usually carried out only in the period immediately following the entry into force of an agreement to confirm the initial data declarations on treaty-controlled items. Reduction inspections are used to confirm the process of reduction or elimination of equipment or facilities subject to arms control or disarmament provisions. Close-out inspections verify that prohibited activities at designated sites have actually ceased, and are therefore conducted only after commitments in this respect have been declared to be met. Short-notice inspections are special kinds of on-site inspections which are conducted on an unpredictable basis. They subject declared facilities to monitoring at unexpected times, thereby enhancing the ability of a monitoring regime to detect violations of agreement obligations.

Challenge inspections are conducted at the request of a State party or a verification institution established under the agreement. They permit the scrutiny of declared facilities suspected of violating agreement obligations over and above what is provided for by non-challenge inspections with which they are generally applied in combination. Challenge inspections are carried out on very short notice to ensure that suspect activities are difficult to cover up. The conditions under which challenge inspections can be initiated and the manner in which they are performed, are indicated by the verification provisions of the agreement. Depending on the specifics of the agreement the party to be inspected may or may not have the right to refuse the inspection. Because potential violators are liable to prompt monitoring on request, challenge inspections discourage deliberate non-compliance by increasing the likelihood that cheating will be detected. They can therefore greatly strengthen the verification capacities of an agreement.

The term ad hoc inspections is used in different ways for various agreements. In some cases, it refers to inspections that are not otherwise provided for in the agreement or treaty. In other cases, such as under the **International Atomic Energy Agency (IAEA)** safeguards system, an ad hoc inspection is carried out in the initial period of a treaty's application, prior to further negotiations on detailed implementation approaches at specific facilities.

Monitoring techniques involving NTMs and cooperative measures are not mutually exclusive. In some cases, the implementation of cooperative monitoring actually relies to a great extent on the use of NTMs. NTMs employed as part of cooperative monitoring are either decided upon on an ad hoc basis through consultations between the inspecting and inspected parties just prior to the carrying out of the inspection, or are specified a priori in the verification clauses of the agreement. Sometimes, as part of cooperative monitoring, the parties may even agree to facilitate the use of NTMs by openly displaying treaty-limited equipment for observation. In addition, certain verification arrangements stipulate that data obtained through the authorized use of NTMs be made available to all the parties upon request, while others rely in part on data gathered through NTMs for the conduct of cooperative analysis.

Monitoring collects information with respect to the implementation of agreement provisions by the parties. The information obtained from

monitoring is then analyzed and used to determine whether non-compliance has occurred. As with monitoring, depending on the provisions of the accord, data analysis may be carried out either unilaterally or multilaterally. Typically international organizations responsible for implementing cooperative monitoring, will also perform the requisite analysis. In any event, irrespective of the actual modalities for analyzing the data, the determination of non-compliance is the prerogative of the parties.

If after a process of monitoring and analysis a party is deemed to be in breach of its agreement obligations, the matter may be referred to a **compliance mechanism**. Some agreements provide for consultation procedures which allow the parties to confer with a view to resolving differences by reaching mutually acceptable solutions about how to rectify causes of concern. Others refer disputes over compliance to a designated international authority such as the United Nations Security Council (UNSC) or the International Court of Justice, for arbitration. When a suitable international arbitrator is not available, an alternative course of action is for the parties to act to attempt to reverse non-compliance. As a last recourse, the parties may suspend or even abrogate their participation in the agreement.

10.2 History of Verification

10.2.1 Global Attempts

Since the Second World War, verification has been a growing concern in global arms control and disarmament negotiations. In 1959 resolution 1378 of the United Nations General Assembly (UNGA) established general and complete disarmament under effective international supervision as the aim of global disarmament efforts. Since then, verification has been part of all multilateral arms control activities endorsed by the Assembly. In 1991 in its most serious involvement in arms control implementation, the United Nations Security Council established the **United Nations Special Commission (UNSCOM)**. UNSCOM was mandated to implement UNSC resolution 687, which called for the elimination of Iraq's weapons of mass destruction capabilities, and of its ballistic missiles with a range of over 150 kilometres and related facilities. Towards this end, the Commission was

entitled to conduct extensive on-site inspections and to arrange for the destruction of all prohibited items. Paragraph 14 of UNSC resolution 687 stated that the elimination of the Iraqi weapons of mass destruction (WMD) programme was considered a step towards establishing a WMD-free zone in the Middle East. In 1999 the UNSC set up the **United Nations Monitoring, Verification and Inspection Commission (UNMOVIC)** to complete UNSCOM's work of in Iraq.

Outside United Nations forums, significant verification measures have been incorporated into the Nuclear Non-Proliferation Treaty (NPT), the Chemical Weapons Convention (CWC), and the Comprehensive Nuclear Test Ban Treaty (CTBT). The 1968 NPT, negotiated under the auspices of the Eighteen Nations Disarmament Commission (ENDC), was the first main arms control agreement to contain important verification provisions. Article III of the NPT directed the non-nuclear weapon States (NNWS) parties to accept safeguards negotiated with the **International Atomic Energy Agency (IAEA)** to ensure that nuclear materials in their possession were not diverted towards non-peaceful purposes. The safeguards were to apply to all source and special fissionable materials employed in peaceful nuclear activities within the territory or under the jurisdiction or control of a NNWS. Later, under so-called **voluntary offer agreements**, the IAEA negotiated the application of safeguards within nuclear-weapon States (NWS) to verify that nuclear materials declared to be for peaceful purposes were not shifted towards military ends.

The IAEA safeguards system endorsed by the NPT comprises a set of technical and legal measures designed to monitor the compliance of States parties with their treaty obligations. Initially the main focus of the IAEA was to account for nuclear materials stocks slated for use in declared, peaceful nuclear activities. Towards this end, as per INFCIRC/153, the IAEA collected information from NNWS subject to so-called **full-scope safeguards** on the quantities, whereabouts and status of their nuclear materials and facilities, and carried out routine on-site inspections to verify the information received. In 1993, on account of concerns over clandestine nuclear activities in Iraq, South Africa and North Korea, the IAEA launched a review of its safeguards operations aimed at improving its abilities to detect illicit activities. The resulting **strengthened safeguards system** features expanded information collection and facility access rights designed to help the Agency verify that no undeclared nuclear activities are taking place in a

NNWS. These measures are incorporated under the Additional Model Protocol contained in INFCIRC/ 540.

The CWC, concluded in 1993 by States participating in the Conference on Disarmament (CD), bans the development, production, stockpiling, and use of chemical weapons. In addition, the Convention includes provisions for the establishment of the **Organization for the Prohibition of Chemical Weapons (OPCW)** to monitor the implementation of Convention obligations by parties on the basis of cooperative measures. To achieve its aim, the OPCW may carry out routine inspections to verify activities at declared chemical weapons storage, production and destruction facilities, challenge inspections to clarify possible questions about non-compliance, and **investigations of alleged use** to confirm the use or actual threat of use of chemical weapons. The CWC also provides for extensive data declarations about the chemical weapons stocks, storage, dismantlement and production facilities of the parties, as well as for the submission of annual reports regarding the implementation of Convention measures and describing activities related to Convention measures to be carried out in the following year.

The CTBT concluded in 1996, prohibits States parties from carrying out any nuclear explosion field tests and establishes the **Comprehensive Nuclear Test Ban Treaty Organization (CTBTO)** for the purpose of verifying compliance with the terms of the Treaty. The CTBTO is slated to begin operation after the CTBT enters into force. It will administer an **International Monitoring System (IMS)** which will carry out monitoring on the basis of a combination of cooperative measures and NTMs. Once operational, the IMS will consist of various types of data collection stations that report their data back to an **International Data Center (IDC)**. States parties can also operate **National Data Centers (NDC)** and receive data from the IDC for national evaluation. Monitoring provisions envisaged under the IMS include the operation of seismic stations, radionuclide stations, hydro-acoustic stations, and infra-sound stations. These are to detect nuclear tests carried out in the atmosphere, under ground, or under water. On-site **clarification inspections** are also provided for.

10.2.2 Regional Attempts

Extensive verification measures are part of several regional arms control agreements. The **European Atomic Energy Community (EURATOM)** established by the Treaty of Rome in 1957, administers a common market for nuclear materials in Europe and ensures that these are not diverted for purposes other than those stated. The EURATOM Safeguards Directorate applies the **EURATOM safeguards system**, which oversees all nuclear materials in EURATOM NNWS and all civil-use nuclear materials in EURATOM NWS. The system subjects the declared nuclear facilities of member States liable to IAEA oversight to on-site inspections.

In addition to EURATOM, three other European arms control agreements contain notable verification provisions: the confidence- and security- building measures (CSBMs) regime of the Organization for Security and Cooperation in Europe (OSCE), the Conventional Forces in Europe (CFE) Treaty, and the Open Skies Treaty. Verification measures were introduced into the OSCE's CSBMs regime by the Stockholm Document which contained provisions for mandatory inspections with no right of refusal. Subsequently these measures were strengthened under the Vienna Documents.

The CFE Treaty was concluded in 1990 within the framework of the OSCE (at the time called the Conference on Security and Cooperation in Europe). The Treaty calls for substantial reductions in five categories of major weapon systems deployed on the European continent. To verify the implementation of treaty obligations, the CFE Treaty provides for detailed exchanges of information and on-site inspections. Under the Treaty's Protocol on Notification and Exchange of Information, the parties are required to exchange detailed data on their possessions, deployments, and activities of conventional forces and equipment. Under the Protocol on Inspection, specified on-site inspections include inspections to declared sites to verify exchanged data, inspections to monitor the process of reduction of treaty-limited equipment without quota limits, inspections to monitor the re-categorization of permitted items, aerial inspections, and challenge inspections to undeclared sites. Inspections can be conducted jointly by two or more States parties, and are not subject to refusal. For the purpose of monitoring the Treaty, the use of national or **multinational technical means (MTMs)** is also permitted. A **Joint Consultative Group (JCG)** composed of participating States and charged with addressing

questions arising from the implementation of the agreement, acts as a consulting mechanism. In 1999 the States parties agreed to amend the CFE Treaty to adapt it to the changed security situation in Europe and to ensure its continued viability and relevance.

In 1992 the member States of the OSCE concluded the Treaty on Open Skies for the purpose of promoting mutual transparency and confidence. The Treaty allows parties to overfly each other's territory by means of reconnaissance aircraft. The overflights are mandatory and are distributed according to so-called active and passive quotas assigned on the basis of a party's geographic size. The aircraft employed can be equipped with an array of sensors—cameras, video cameras, infra-red line scanning devices, and side-looking synthetic aperture radars—bearing specific technical properties, all of which must be commercially available to all parties. Information collected during overflights is made available to any party upon request and compensation for the costs of reproduction. Implementation of the Treaty is facilitated by the **Open Skies Consultative Commission (OSCC)** tasked with addressing questions of compliance and with devising measures to improve the effectiveness of the Treaty. The Treaty entered into force on 1 January 2002, although, the parties had conducted regular overflights on a voluntary basis since its signature.

Outside Europe, verification measures are found in the agreements establishing the nuclear-weapon-free zones (NWFZ) in Latin America, South-East Asia, the South Pacific, and Africa. The Treaty of Tlatelolco establishes a NWFZ in Latin America. Under the Treaty, the IAEA is entrusted with the responsibility of verifying compliance with treaty obligations, and with applying its safeguards system accordingly. Similar arrangements for the application of IAEA safeguards are contained in the Treaty of Rarotonga, the Treaty of Bangkok, and the Treaty of Pelindaba.

10.2.3 Bilateral Attempts

Verification measures were incorporated into several arms control agreements negotiated between the Soviet Union/Russia and the United States during and after the Cold War. The Strategic Arms Limitation Treaties (SALT) I and II, and the Anti-Ballistic Missile (ABM) Treaty were the first American-Soviet agreements to incorporate verification. SALT I, which was concluded in 1972, limited the deployment of intercontinental ballistic

missiles (ICBMs) and of sea-launched ballistic missiles (SLBMs)by the two countries. To verify compliance, the Treaty provided explicitly for the use of NTMs. In addition, the agreement stipulated that neither party would interfere with the other's use of NTMs, nor would it deliberately use concealment methods to obstruct monitoring. SALT II, which built on SALT I in every respect including verification, reaffirmed the measures contained in the earlier SALT agreement with the added proviso that neither side would purposefully block the other's interception of telemetric information resulting from the testing of new missile launchers. In addition, SALT II required the parties to exchange data voluntarily on their possessions of treaty-limited equipment. The ABM Treaty, which was agreed to at the same time as SALT I, contained verification provisions with respect to the use of NTMs similar to those of SALT, including a coordinating **Standing Consultative Commission (SCC)** which continues to meet regularly.

The Intermediate-range Nuclear Forces (INF) Treaty signed by the Soviet Union and the United States in 1987 marked a significant breakthrough in super-Power bilateral arms control efforts, including verification. In addition to eliminating an entire class of weapons from the arsenals of the two countries, the Treaty featured an unprecedentedly stringent verification regime based on cooperative monitoring. To confirm compliance with agreement obligations, the INF Treaty provided for data declarations and established a wide range of on-site inspections, including baseline inspections to confirm the initially exchanged data, close-out inspections of former INF facilities and missile operation bases, **quota inspections** of declared and formerly declared facilities, elimination inspections to confirm elimination of all INF systems, and continuous portal monitoring of one production facility in each country for a period of up to 13 years. A **Special Verification Commission (SVC)** established under Article XIII of the Treaty, provided a forum for the parties to address issues related to implementation of the Treaty, to consider improvements to the Treaty, and to determine the methods and equipment to be utilized during inspections.

The Strategic Arms Reduction Treaty (START) I concluded by the Soviet Union and the United States in 1991 mandates significant reductions in the strategic nuclear weapons arsenal of each country. To verify implementation of its complex provisions, START I contains an extensive verification regime based on a combination of NTMs and cooperative measures. Under the START I verification regime, each party has the right

to employ all NTMs at its disposal to verify compliance with the terms of the Treaty. In addition, each party undertakes not to interfere with the NTMs of the other, not to use concealment measures or environmental shelters that obstruct verification, not to deny access by the other to the telemetric data emitted during the course of a missile test, and to make available to the other all telemetric measurements taken as part of such a test. Moreover, in order to facilitate verification, the parties undertake to provide all mobile ICBMs with a unique identifier and to restrict and notify each other of their movements, as well as to perform upon request **technical characteristics exhibitions** or **distinguishability exhibitions** of specific equipment (road- and rail-mobile ICBM launchers, heavy bombers, and former heavy bombers) in order to enhance the recognizability of these items.

The START I cooperative monitoring regime provides the two parties with regular access to data on quantities and other aspects of treaty-limited equipment, allows them to conduct various kinds of on-site inspections, and entitles them to carry out continuous monitoring activities. The wide range of on-site inspections provided by START I include: baseline inspections at facilities to confirm the accuracy of initially exchanged data; **data update inspections** at facilities to confirm the accuracy of provided updated data; **new facility inspections** to confirm the accuracy of data provided in notifications of new facilities; **suspect site inspections** to confirm that covert assembly of treaty-restricted equipment is not occurring; **re-entry vehicle inspections** to confirm that deployed ICBMs and SLBMs contain no more re-entry vehicles than permitted; **post-exercise dispersal inspections** to check the number of mobile ICBM launchers and their associated missiles at an ICBM base following an exercise; conversion or elimination inspections to confirm the conversion or elimination of equipment; close-out inspections to confirm the elimination of facilities slated for removal; and **formerly declared facility inspections** to confirm that facilities for which notification of elimination has been provided are no longer engaging in prohibited activities. Continuous monitoring activities can be applied at production facilities for ICBMs and for mobile launchers of ICBMs to confirm the number of ICBMs and mobile launchers produced. To promote the implementation of its provisions, START I also establishes a **Joint Compliance and Inspection Commission (JCIC)** as a discussion forum for questions related to the Treaty.

The Strategic Arms Reduction Treaty (START) II, signed by Russia and the United States in January 1993, broadens the scope of START I's provisions. In terms of verification, START II encompasses the earlier START I measures and establishes a **Bilateral Implementation Commission (BIC)** to coordinate action and resolve differences between the parties arising from the implementation of the Treaty.

10.3 VERIFICATION INSTITUTIONS

10.3.1 Global Institutions

COMPREHENSIVE NUCLEAR TEST BAN TREATY ORGANIZATION (CTBTO)

Implementation body established under the Comprehensive Nuclear Test Ban Treaty (CTBT). Scheduled to become operational once the CTBT enters into force, the CTBTO will ensure the Treaty's implementation and provide a forum for consultation and cooperation. The CTBTO is to comprise three organs. The Conference of States Parties will oversee the Treaty's implementation and the activities of the other two organs—the Executive Council, and the Technical Secretariat. The Conference of States Parties will be comprised of one representative from each State party, and will convene annually. Its decisions will be taken by consensus. However, if consensus cannot be reached, a two-thirds majority will be required to break the impasse on issues of substance. The Executive Council will be the principal decision-making body of the Organization and will be responsible for supervising its activities. It will consist of 51 members, elected by the Conference of States Parties. The Council will decide whether an inspection should take place on the basis of information gathered from the **International Monitoring System (IMS)** system, **national technical means (NTMs)**, or a combination thereof. If approved, the inspections must begin within six days of the submitted request, but may not last more than 70 days and may not exceed an area of 1,000 square kilometres or have a linear distance greater than 50 kilometres in any direction. The inspection team must be granted unlimited access to inspect, except when necessary to protect national security interests. Decisions in the Executive Council will be taken by consensus and, if consensus cannot be reached, by a two-thirds majority on issues of substance. The Technical Secretariat, headed by a Director-General, will assist States parties to implement the Treaty

and carry out **verification** and other functions. It will supervise and coordinate the operation of the IMS and operate the **International Data Centre (IDC)**.

The Preparatory Commission of the Comprehensive Nuclear Test Ban Treaty Organization (CTBTO PREPCOM) was established on 19 November 1996 at a Meeting of States Signatories to the CTBT held in New York, in order to bridge the period until the Treaty's entry into force. The main task of the Preparatory Commission is to establish the global verification regime provided for in the CTBT so that it will be operational by the time the Treaty enters into force. A worldwide network of 321 monitoring stations will be set up and operated by the host countries in cooperation with the Provisional Technical Secretariat. The stations will transmit data to IDC which is to be established in Vienna. Procedures for **on-site inspections** and confidence- and security- building measures are still to be developed. See also the Comprehensive Test Ban Treaty (CTBT).

INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA)

Organization established in 1957 by the United Nations General Assembly (UNGA) to encourage and assist in the research and development and practical application of atomic energy for peaceful purposes throughout the world. The Agency establishes and administers the **IAEA safeguards** designed to ensure that the activities in which it assists are not used to further military purposes. Under the Non-Proliferation Treaty (NPT) and some other international treaties, mandatory **full-scope safeguards (FSS)** are applied in non-nuclear-weapon States (NNWS) parties to these treaties.

The IAEA consists of three main bodies, the General Conference, the Board of Governors and a Technical Secretariat, all of which are based in Vienna. The General Conference has a broad policy guidance function, examines a variety of matters brought to its attention, and approves applications for membership, programmes and the IAEA's budget. It convenes on an annual basis and is comprised of one representative from each of its 127 member States. Decisions are taken by a two-thirds majority vote on substantive issues and by simple majority on procedural issues. The Committee on Assurances of Supply is an ad-hoc committee established by the Board of Governors in 1980 which seeks agreement between supplier and recipient States on a

regime that would assure the latter more dependable supplies, under adequate international non-proliferation safeguards. The Board of Governors is responsible for approving safeguard procedures and safeguard agreements, and for the general supervision of the Agency's safeguard activities. In case of non-compliance with safeguards, the Board is to call upon the violator to remedy such non-compliance and to report the non-compliance to the UNGA and the United Nations Security Council. Decisions are taken by a two-thirds majority on substantive issues and by simple majority on procedural issues. The Technical Secretariat, headed by the Director-General who is appointed by the Board of Governors, carries out the activities of the IAEA. The Standing Advisory Group on Technical Assistance and Cooperation assesses and recommends policies, strategies and measures to enhance the scientific, technological, and socio-economic benefits to IAEA members, especially developing countries, through the transfer of nuclear and associated technologies. The Standing Group on Safeguards Implementation advises the Director-General on matters related to the improvement of safeguards procedures. The Department of Safeguards carries out practical safeguarding activities. See also Non-Proliferation Treaty (NPT).

ORGANIZATION FOR THE PROHIBITION OF CHEMICAL WEAPONS (OPCW)

Implementation body established under the **Chemical Weapons Convention (CWC)**. The OPCW verifies the implementation of CWC measures by the member States. As part of its monitoring tasks OPCW is entitled to carry out **routine inspections**, **challenge inspections**, and **investigations of alleged use**. Routine inspections are conducted at declared **chemical weapons** storage, production, and destruction facilities as well as processing sites that use chemicals listed in the three Schedules to the Convention above specified thresholds. These inspections are performed on the basis of information obtained from yearly **data declarations**. Challenge inspections can be mounted at the request of any State party to the Director-General, following approval by the Organization's Executive Council. Investigations of alleged use may be carried out at the request of a State party to examine the use or threat of use of chemical weapons.

The OPCW consists of three organs. The Conference of the States Parties is the principal decision-making organ of the Organization, and

is composed of representatives of those States that have ratified or acceded to the Convention. The Conference meets annually and in special sessions. Decisions are made by consensus, or if consensus cannot be reached, by a two-thirds majority on substantive issues and by simple majority on procedural matters. The Executive Council is the governing body of the Organization and is responsible to the Conference. The members of the Council include 41 representatives of the member States. The Council is required to cooperate with the National Authority of each State party and to facilitate consultations and cooperation among States parties at their request. Decisions are made by consensus, or if consensus cannot be reached, by a two-thirds majority on substantive issues and by simple majority on procedural matters. In cases of particular gravity and urgency, the Council may bring the matter, including relevant information and conclusions, directly to the attention of the United Nations General Assembly and the United Nations Security Council. The Secretariat is responsible for implementing the tasks of the Organization, and disseminates information to member States on the implementation of the Convention. The Secretariat is headed by the Director-General of the OPCW. In addition to its verification role, the Secretariat works with governments, representatives of the chemical industry, the media, research institutes, and governmental and non-governmental organizations that are in a position to assist in the task of achieving the effective implementation of the Convention. Two further subsidiary bodies have been set up to assist the Organization. The Confidentiality Commission is to deal with breaches of confidentiality involving either a State party or the Organization, and the Scientific Advisory Board is mandated to render specialized advice in areas of science and technology relevant to the Convention. See also Chemical Weapons Convention (CWC).

UNITED NATIONS MONITORING, VERIFICATION AND INSPECTION COMMISSION (UNMOVIC)

Body established by United Nations Security Council resolution 1284 on 17 December 1999 to replace and complete the work of the **United Nations Special Commission on Iraq (UNSCOM)**. Under the executive chairmanship of Dr Hans Blix, the Commission is mandated to operate an ongoing monitoring and verification system to ensure the compliance of Iraq with United Nations Security Council resolution

687 (which states that Iraq shall unconditionally accept the destruction, removal, or rendering harmless of all chemical and biological weapons, stocks, related components, research and development, and manufacturing facilities, as well as of all ballistic missiles with a range greater than 150 kilometres and related parts, repair and production facilities), and related resolutions. Under resolution 1284 Iraq was to allow UNMOVIC immediate, unconditional, and unrestricted access to all areas, facilities, equipment, records, and officials and other persons the latter deemed necessary to fulfil its mandate. UNMOVIC did not take up its duties until 27 November 2002 when, following United Nations Security Council resolution 1441, inspections were resumed. Resolution 1441 declared Iraq to be in material breach of its obligations and offered it a final opportunity to rectify matters by submitting within 30 days an accurate, full, and complete declaration of all aspects of its weapons of mass destruction programme and by fully cooperating with UNMOVIC. On 18 March 2003, amidst deteriorating conditions owing to charges that Iraq was failing to comply with its obligations under resolution 1441 and related resolutions, UNMOVIC personnel were withdrawn from the country, before the onset of military hostilities.

UNITED NATIONS SPECIAL COMMISSION ON IRAQ (UNSCOM)

Subsidiary organ of the United Nations Security Council established in 1991 for the purpose of implementing resolution 687 which called for the elimination of all Iraqi weapons of mass destruction and ballistic missiles with a range greater than 150 kilometres, and associated capabilities, research, development, production and support facilities.

UNSCOM operated under a mandate to gather information to assess Iraq's capabilities in the areas of chemical, biological and nuclear weapons, and of ballistic missiles with a range greater than 150 kilometres; to dispose of all Iraqi stocks of biological and chemical agents and related sub-components and components as well as research, development, support and manufacturing facilities; to supervise the destruction of all Iraqi ballistic missiles having a range of at least 150 kilometres and related major parts as well as of all production and repair facilities; to establish a mechanism to ensure Iraq's future compliance with its obligations; and to assist the

International Agency for Atomic Energy (IAEA) in performing similar duties with respect to nuclear weapons. To fulfil its mandate, UNSCOM was entitled to carry out short or no notice inspections, on the ground or by aerial means without hindrance at any time, at any site, facility, activity or other items located in Iraq. UNSCOM inspectors had the right of unrestricted freedom of entry and exit, of movement, of access, of initiative, and of communication. To assist the work of the Commission, Iraq was required to provide complete information on a regular basis on all activities, sites, facilities, material or other items, whether military or civilian, that might relate to UNSCOM's mandate. Iraq, however, never fully complied with its obligations and, by the end of 1998, suspended all cooperation with UNSCOM and IAEA.

10.3.2 Regional Institutions

AGENCY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (OPANAL)

Organization established by the Treaty of Tlatelolco (1967) charged with overseeing the implementation of Treaty provisions by the parties. The Agency comprises a General Conference, a Council, and a Secretariat. The General Conference is composed of representatives from all the States parties, and holds regular sessions every two years. Special sessions may also be convened as warranted. The Council is made up of representatives from five States parties elected by the Conference. It may address any matter covered by the Treaty and establish procedures for the operation of the Treaty's **verification** mechanism. It may also request special **data declarations** and, in conjunction with the **International Atomic Energy Agency (IAEA)**, carry out special inspections when the violation of Treaty provision is suspected. The Secretariat is responsible for overseeing the application of the Treaty's verification provisions, and with disseminating pertinent information to the States parties. See also Treaty of Tlatelolco.

EUROPEAN ATOMIC ENERGY COMMUNITY (EURATOM)

Accord signed as part of the Treaty of Rome (1957) establishing a regime for the management of nuclear materials aimed at promoting the development of peaceful uses of atomic energy in Europe.

EURATOM comprises two main institutions: the Safeguards Directorate, and the Supply Agency. The Safeguards Directorate administers the **EURATOM safeguards system** with which it oversees all nuclear material in EURATOM non-nuclear-weapon States (NNWS) and all civil-use nuclear material in EURATOM nuclear-weapon States (NWS). The Supply Agency nominally owns all non-military nuclear materials held by EURATOM countries, and has the right to review all purchases of nuclear materials produced by or imported within the EURATOM area. All transfers of nuclear materials and contracts relating to the processing, conversion or shaping of ores, source materials or special fissile materials are to be notified to the Agency. If the Agency refuses to approve a contract, its decision can be referred to the European Commission whose ruling in turn can be challenged before the European Court of Justice. The Supply Agency also plays a role in the negotiation and implementation of international agreements relating to the supply of nuclear fuels. Currently EURATOM is comprised of all 15 member States of the European Union.

SOUTH PACIFIC FORUM (SPF)

Body comprising the Heads of Government of all the independent and self-governing Pacific island countries, Australia, and New Zealand. The Director of the SPF's Bureau for Economic Co-operation operates the exchange of information and reports mandated by the Treaty of Rarotonga. A Consultative Committee reporting to the SPF, can sanction the conduct of special inspections to clarify complaints regarding non-compliance with the provisions of the Treaty. See also Treaty of Rarotonga.

10.3.3 Bilateral Institutions

BRAZILIAN-ARGENTINE AGENCY FOR ACCOUNTING AND CONTROL OF NUCLEAR MATERIALS (ABACC)

Implementation body established to administer the Common System of Accounting and Control of Nuclear Materials (SCCC) agreed to by Argentina and Brazil in 1990 for the purpose of verifying that the nuclear materials of the two parties are being used exclusively for peaceful purposes. The ABACC collects information from the two parties on matters such as nuclear facilities design, nuclear materials

inventories and changes therein, and transfers of nuclear materials out of or between facilities. Additionally it conducts **on-site inspections**. In 1991 a Quadripartite Agreement was signed between Argentina, Brazil, the ABACC, and the **International Atomic Energy Agency (IAEA)** providing for the application of **full-scope safeguards (FSS)** by the IAEA in cooperation with the ABACC to all Argentinian and Brazilian nuclear materials and installations subject to bilateral and international restrictions. Under the Agreement the ABACC is assigned the principal safeguarding responsibility. The IAEA has the right to conduct on-site inspections of each nuclear facility, but in practice, only inspects sensitive parts of the nuclear fuel cycle in cooperation with the ABACC. The agreement also allows the IAEA to order a party to comply with the SCCC if the party obstructs any safeguard procedure. If the party fails to satisfy the order, the IAEA can bring the matter before the United Nations Security Council.

South-North Joint Nuclear Control Commission (JNCC)
Implementation body for the Joint Declaration on the Denuclearization of the Korean Peninsula concluded by the Democratic People's Republic of Korea and the Republic of Korea in 1992. The JNCC is supposed to exchange information necessary to verify the denuclearization of the Korean Peninsula, to decide on the composition and operation of inspection teams, and to settle disputes related to the implementation of the Declaration.

10.4 Compliance Mechanisms

10.4.1 Global Institutions

International Court of Justice (ICJ)
Main judicial organ of the United Nations. It was created in 1945 as the successor to the Permanent Court of International Justice established by the League of Nations. The jurisdiction of the ICJ covers all questions that States refer to it and all matters provided for in the United Nations Charter or in treaties in force. Cases may be brought before the ICJ through special agreement, when all parties agree to submit the matter to the ICJ, and through unilateral application, when one party to the dispute submits the matter to the ICJ. Private persons may not bring cases before the ICJ. The ICJ renders its judgments on

the basis of the general principles of international law, international customs, and the rules of treaties recognized by the disputing parties. The judgment of the ICJ is final and binding and no appeals are possible. The United Nations Security Council (UNSC) is empowered to take measures to enforce the decisions of the ICJ if the parties to the dispute fail to do so themselves. The ICJ consists of 15 judges elected by absolute majority by the United Nations General Assembly and the UNSC, each voting independently.

United Nations General Assembly (UNGA): see page 173.

United Nations Security Council (UNSC): see page 175.

10.4.2 Regional Institutions

Joint Consultative Group (JCG)

Consultative body established by the Conventional Forces in Europe Treaty (CFE) to address questions relating to compliance with the Treaty, to seek to resolve ambiguities and differences of interpretation, to consider measures to enhance the viability and effectiveness of the Treaty, and to consider and work out details of implementation. The CFE Treaty Amendments of 1996 and 1999, were negotiated within the JCG.

Open Skies Consultative Commission (OSCC)

Consultative body established under the Treaty on Open Skies for the purpose of considering questions relating to compliance with the provisions of the Treaty, resolving ambiguities and differences arising from the implementation of the Treaty, and deciding on the accession to the Treaty by other States. The OSCC is comprised of all parties to the Treaty. Decisions within the OSCC are taken on the basis of consensus. The Commission became operational in April 1992.

10.4.3 Bilateral Institutions

Bilateral Consultative Commission (BCC)

Consultative body established under the Threshold Test Ban Treaty (TTBT) concluded by the Soviet Union and the United States in 1974.

The BCC deals with questions relating to the implementation of and compliance with the Treaty or its 1990 Protocol as well as possible amendments to these documents, and coordinates all activities between the two parties relating to the monitoring of a nuclear explosion. Notifications and other communications related to the TTBT, are transmitted through the Nuclear Risk Reduction Centers (NRRC) established in 1987.

BILATERAL IMPLEMENTATION COMMISSION (BIC)

Consultative body established under the Strategic Arms Reduction Treaty (START) II concluded by the Soviet Union and the United States in 1993. Following the entry into force of START II, the BIC is slated to serve as the institutional framework charged with resolving questions related to Treaty compliance and with evolving additional measures necessary to improve the viability and effectiveness of the Treaty.

JOINT COMPLIANCE AND INSPECTION COMMISSION (JCIC)

Consultative body established under the Strategic Arms Reduction Treaty (START) I concluded by the Soviet Union and the United States in 1991. It is charged with resolving questions of compliance, agreeing on additional provisions to improve the viability and effectiveness of the treaty, clarifying ambiguities in the treaty provisions arising during implementation, and considering questions related to the development of a new kinds of strategic arms. The JCIC was originally a bilateral commission made up of representatives form the Soviet Union and the United States, but since the adoption of the Lisbon Protocol in 1992 it consists of members from Belarus, Kazakhstan, the Ukraine, Russia, and the United States.

JOINT CONSULTATIVE COMMISSION (JCC)

Consultative body established under the Peaceful Nuclear Explosion Treaty (PNET) concluded by the Soviet Union and the United States in 1976. The JCC provides a forum for consultation and discussion of questions related to the implementation of and compliance with the Treaty, and considers possible amendments to improve the functioning of the Treaty. Under the 1990 Protocol, the JCC is to designate standardized procedures and equipment to be used by the parties for the monitoring of a nuclear explosion. Similar to the Threshold Test Ban Treaty (TTBT), notifications and information pertaining to the Treaty do not fall within the purview of the implementing body but are

rather to be transmitted through the Nuclear Risk Reduction Centers (NRRC) established in 1987.

STANDING CONSULTATIVE COMMITTEE (SCC)

Consultative body of the Anti-Ballistic Missile (ABM) Treaty signed by the Soviet Union and the United States in 1972. Its role is to promote the objectives of the Treaty, to consider questions of compliance, to consider the possible amendments to the provisions of the Treaty, and to agree upon procedures and dates for destruction or dismantling of ABM systems or their components in cases provided for by the Treaty. The SCC has addressed the distinction between anti-ballistic missiles systems, which are limited under the ABM Treaty, and theatre ballistic defence systems, which are not. Negotiations resulted in the conclusion of the ABM Demarcation Agreement in 1997. The SCC was originally comprised of representatives from the Soviet Union and the United States. Since 1997, Belarus, Kazakhstan, the Ukraine, and Russia act as successors of the Soviet Union in the SCC which meets in Geneva.

SPECIAL VERIFICATION COMMISSION (SVC)

Consultative body of the Intermediate-range Nuclear Forces (INF) Treaty concluded by the Soviet Union and the United States in 1987. The SVC is charged with resolving questions of compliance with the Treaty, elaborating measures to improve its viability and effectiveness, and deciding the procedures and equipment to be used in the conduct of **on-site inspections**. The Nuclear Risk Reduction Centers (NRRC) established in 1987 are used for regular communication between the two parties. Twelve former Soviet Republics have become successor States to the INF Treaty, although only four participate in the work of the SVC. The members of the SVC are Belarus, Kazakhstan, Russia, Ukraine, and the United States.

10.5 VERIFICATION TERMS

AD HOC INSPECTIONS

Term used in different ways for various agreements. In some cases, it refers to a form of **on-site inspections** conducted on an unpredictable basis. Such inspections are typically applied in combination with **routine inspections**. Their aim is to enhance the capacity of a

verification regime to detect non-compliance with treaty obligations by subjecting **declared facilities** to the possibility of unexpected (i.e., non-routine) inspection. In other cases, such as under the **International Atomic Energy Agency (IAEA) safeguards** system, ad hoc inspections are carried out in the initial period of a treaty's application, prior to further negotiations on detailed implementation approaches at specific facilities.

BASELINE INSPECTIONS

Form of **on-site inspections** that help verify the initial number of declared treaty-limited items such as missiles and launchers deployed at each missile base or military support facility.

BOOK INVENTORY

Term employed under **International Atomic Energy Agency (IAEA) safeguards**. It refers to the sum of the most recent **physical inventory** of a **material balance area** and of all inventory changes that have occurred since that physical inventory was taken.

CERTIFICATION INSPECTIONS

Form of **on-site inspections** applied under the Conventional Forces in Europe (CFE) Treaty to verify the re-categorization of multipurpose attack helicopters or combat-capable trainer aircraft at designated certification sites. Certification inspections are not subject to quotas or refusal.

CHALLENGE INSPECTIONS

Type of **on-site inspections** conducted at very short notice. Challenge inspections are carried out upon request by a State party or an institution responsible for the implementation of monitoring tasks. Typically challenge inspections are applied in combination with **routine inspections** and possibly **ad hoc inspections**. Depending on the provisions of the agreement, the party on whose territory the inspection is to take place may or may not have the right to refuse the request. Challenge inspections are included in the verification provisions of a number of treaties.

CITIZENS' VERIFICATION

Verification of State party compliance by private groups or individuals. Whistle-blowers, journalists, and various non-governmental actors can

act to support verification by bringing non-compliance to the attention of the international community. The *Landmine Monitor* as a forum of citizens' verification for the Ottawa Convention is such an example.

CLARIFICATION INSPECTIONS/VISITS

Form of non-challenge, **on-site inspections** carried out to clear up suspicions of non-compliance. Clarification visits are provided for under the Comprehensive Nuclear Test Ban Treaty (CTBT), and are being considered as part of the **verification** measures for the Biological and Toxin Weapons Convention (BTWC) which are currently under negotiation.

CLOSE-OUT INSPECTIONS

Form of **on-site inspections** applied under the Intermediate-range Nuclear Forces (INF) Treaty and the Strategic Arms Reduction Treaty (START) I. Under the INF Treaty they help to verify that treaty-limited items such as missiles and launchers are no longer stored at designated missile bases or military support facilities. Under START they serve to confirm that facilities scheduled to be dismantled have indeed been eliminated.

COMPLIANCE MECHANISM

Procedure specifying the appropriate course of action to be followed in resolving a dispute over non-compliance.

CONTINUOUS MONITORING

Technique employed to supervise activities or facilities designated by an arms control or disarmament agreement as subject to permanent observation. Continuous monitoring can be carried out by **sensors** and/or personnel. When carried out by personnel, continuous monitoring is considered to be a form of **on-site inspection**. A typical example of continuous monitoring is **portal monitoring**. Provisions for continuous monitoring are included in the Intermediate-range Nuclear Forces (INF) Treaty and the Strategic Arms Reduction Treaty (START) I both of which provide for the application of portal monitoring at specified production facilities. The **International Atomic Energy**

Agency (IAEA) also uses continuous monitoring as part of its **safeguards** system.

CONVERSION INSPECTIONS

Form of **on-site inspections** applied under the Strategic Arms Reduction Treaty (START) I and the Conventional Forces in Europe (CFE) Treaty to confirm the conversion of treaty-limited items.

COOPERATIVE MEASURES

Compliance monitoring provisions implemented on a collaborative basis. Typically they include activities such as **data exchanges**, **continuous monitoring**, and **voluntary on-site inspections**. They form an essential part of all major monitoring regimes.

DATA DECLARATIONS/EXCHANGES

Information reports released by States parties on matters relevant to the provisions of a treaty. Data declarations are instruments of cooperative monitoring. Typical data declarations report on the location, number, characteristics and status of treaty-limited equipment, and the schedule and details of restricted activities. Data declarations can be exchanged either directly by the individual parties or through an international organization. They are part of several bilateral and multilateral treaties including the Strategic Arms Limitation Treaty (SALT) II, the Intermediate-range Nuclear Forces (INF) Treaty, the Conventional Forces in Europe (CFE) Treaty, the Strategic Arms Reduction Treaty (START) I, and the Chemical Weapons Convention (CWC).

DATA UPDATE INSPECTIONS

Form of **on-site inspections** used to confirm the accuracy of data declarations at facilities. Data update inspections are part of the Strategic Arms Reduction Treaty (START) I, where they are employed to verify information pertaining to items such as intercontinental ballistic missile (ICBM) bases, submarine bases, air bases, ICBM and sea-launched ballistic missile loading facilities, rail garrisons, test ranges, static display sites, or production, repair, storage, training, conversion, space launch, or elimination facilities.

DECLARED FACILITY

A facility that has been identified by a State party as subject to continuous or non-challenge and possibly **challenge inspection.** Under **International Atomic Energy Agency (IAEA) full-scope safeguards** agreements parties are required to declare and subject to appropriate monitoring all their nuclear facilities, while under the Chemical Weapons Convention (CWC) they are required to do so for all their chemical weapons related facilities. Under the CWC, even undeclared facilities can be subject to challenge inspections.

DISTINGUISHABILITY EXHIBITIONS

Measure applied under the Strategic Arms Reduction Treaty (START) I to help parties distinguish between various types of heavy bombers, former heavy bombers, and nuclear air-launched cruise missiles when using **remote sensors**.

ELECTRONIC INTELLIGENCE

In terms of **verification**, signal information gathered through the use of **national technical means (NTMs)** employed to monitor compliance with arms control agreements. May comprise the use of any device suitable for this task.

ELIMINATION INSPECTIONS: see **Reduction Inspections**.

EURATOM SAFEGUARDS SYSTEM

Compliance verification system established by the **EURATOM Treaty** of 1957 aimed at ensuring that nuclear materials in the possession of European Union members are not diverted to non-peaceful purposes and at assuring that the Treaty provisions relating to the supply of nuclear materials to a third party are complied with. The system comprises two elements: accountancy and **on-site inspections**. Accountancy entails the keeping of records for ores, source materials and special fissile materials used or produced, and for their transport. Member States are required to inform the European Commission of the type of reactors operated, their principal use, thermal power rating, fuels, general plans of the installation, and technical processes employed. They are also obliged to provide details about their stocks of nuclear materials and the movements thereof. On-site inspections are carried out by EURATOM inspectors. Member States do not have the right to object to the appointed inspectors or to delay inspections.

In case of opposition to inspections the European Commission can call upon the European Court of Justice or it can impose sanctions to enforce compliance with the EURATOM Treaty.

A new safeguard system, established in 1975 under INFCIRC/193, coordinates the safeguard activities between the **European Atomic Energy Agency (EURATOM)** and the **International Atomic Energy Agency (IAEA)** in order to satisfy the requirements of the Non-Proliferation Treaty (NPT) of subjecting all non-nuclear-weapon States parties to the treaty to **full-scope safeguards (FSS)**. This required the establishment of a State System of Accounting and Control and arrangements between EURATOM, the IAEA and the two nuclear-weapon States, France and the United Kingdom. The latter are subject to two sets of safeguards: EURATOM/IAEA safeguards which cover all civil nuclear materials; and IAEA safeguards which cover a set of voluntary-offered facilities.

Exit Monitoring

Procedure provided for by the **Chemical Weapons Convention (CWC)**. Both the **inspected party** and the inspection team participate in exit monitoring. The former is required, not later than twelve hours after the inspection team's arrival at the **point of entry** to begin collecting information on vehicular exit activity at requested perimeter exit points for land, air, and water vehicles. These records are to be provided to the inspection team upon arrival at the site. The inspection team has the right throughout the inspection to engage in exit monitoring activities, which include identifying vehicular exits, making traffic logs, taking photographs, making video recordings of exits or exit traffic, and other agreed activities. The inspection team also has the right to check non-personal vehicular traffic exiting the site.

Facilities List

List of **declared facilities** submitted by States parties to the relevant verification organism.

Facility Agreement

Agreement between a State party and the organization responsible for carrying out verification defining the procedures to be followed during the **on-site inspection** of specified facilities.

FACILITY ATTACHMENT

A detailed plan for applying **International Atomic Energy Agency (IAEA) safeguards** at a particular plant. It usually defines the areas and strategic points which the IAEA inspectors may access during inspections and which safeguard instruments may be installed.

FORMERLY DECLARED FACILITY INSPECTIONS

Form of **on-site inspections** used to confirm that a facility is not engaging in prohibited activities. Formerly Declared Facility Inspections are applied under the Strategic Arms Reduction Treaty (START) I.

FULL-SCOPE SAFEGUARDS (FSS)

Safeguards administered by the **International Atomic Energy Agency (IAEA)** that cover all declared nuclear materials and facilities in a non-nuclear-weapon State (NNWS). FSS were developed by the IAEA (INFCIRC/153) in 1971 as part of the implementation of the Non-Proliferation Treaty (NPT). They comprise **data declarations** by States, as well as **ad hoc inspections**, **routine inspections** and **challenge inspections**, which are carried out by the IAEA. See also **IAEA safeguards**.

HOST STATE

State on whose territory a facility to be inspected is located.

HYDRO-ACOUSTIC STATIONS

Installations used to monitor underwater events. Hydro-acoustic stations employ hydrophones which measure variations in water pressure to accurately detect underwater nuclear explosions and determine their location. Hydro-acoustic stations are part of the **International Monitoring System (IMS)** that is to be established under the Comprehensive Nuclear Test Ban Treaty (CTBT).

HYDRODYNAMIC YIELD MEASUREMENT

Monitoring technique employed by the Soviet Union and the United States to verify the Threshold Test Ban Treaty (TTBT). Hydrodynamic yield measurement records the velocity of the expanding shock wave in the rock surrounding an explosive test device. These recordings are subsequently compared to theoretical expectations premised on

mathematical models generated from data collected from previous experiments, to estimate the explosive yield of the detonated device.

INFRA-SOUND STATIONS

Installations used to monitor low-frequency acoustic signals resulting from **nuclear explosions**. The detection capability of infra-sound stations depends on the size of the event, the number of stations and background noise. Infra-sound stations are part of the **International Monitoring System (IMS)** established under the Comprehensive Nuclear Test Ban Treaty (CTBT), and will be used to monitor mainly atmospheric but also shallow-buried underground and underwater nuclear explosions.

IN-COUNTRY ESCORT

Group of individuals designated by the party on whose territory an **on-site inspection** is carried out to accompany and assist inspectors throughout the **in-country period**.

IN-COUNTRY PERIOD

Period spanning from the arrival of the inspection team at the **point of entry** until its departure from the territory of the **inspected party**.

INITIAL INSPECTIONS

First **on-site inspections** of **declared facilities** used to verify **data declarations** and to plan future verification.

INSPECTED PARTY

State party on whose territory or in any other place under its jurisdiction or control an inspection takes place, or the State party whose facility or area on the territory of a host State is subject to an inspection.

INSPECTION MANDATE

Instructions issued to the **inspection team** outlining the scope and modalities of a particular inspection.

INSPECTION SITE

Any facility or area at which an inspection is carried out.

INSPECTION TEAM

Group of inspectors and inspection assistants assigned to conduct an **on-site inspection**.

INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA) SAFEGUARDS

Set of technical and legal provisions administered by the IAEA in order to ensure that nuclear materials declared by a State to be held for peaceful purposes are not diverted towards military ends. IAEA safeguards consist of three major components: **nuclear material accountancy**, **continuous monitoring** and **on-site inspections**. Nuclear material accountancy entails the submission of periodic reports by States on the nature and quantities of nuclear materials present in a **material balance area** and their change over time. Continuous monitoring comprises the use of seals, cameras, and other electronic devices to automatically record the activities occurring at strategic points in a material balance area. On-site inspections involve **IAEA inspectors** checking accountancy records, verifying installed instruments and seals, and confirming physical inventories of nuclear materials. The intensity and frequency of on-site inspections are determined by the character of the facilities involved and the amount of nuclear materials contained therein.

IAEA safeguards were introduced in 1961. At the time, only nuclear reactors up to 100 megawatts were subjected to safeguards, and the Director-General of the IAEA was required to obtain the formal consent of the country concerned before appointing an inspector to that country. Comprehensive or **full-scope safeguards** were introduced with the implementation of the Non-Proliferation Treaty (NPT). These safeguards subject all nuclear materials and facilities in a non-nuclear-weapon State (NNWS) to verification by the IAEA in the manner described above. In 1993, the IAEA launched the Program 93+2 to strengthen its ability to detect undeclared inventories of nuclear materials and installations, to assure the absence of undeclared nuclear activities in States which are subject to full-scope safeguards, and to make the safeguard system more cost-effective. The resulting **strengthened safeguard system** was endorsed by the IAEA Board of Governors as INFCIRC/540 in 1997. **Voluntary offer agreements**, concluded between the IAEA and all five nuclear-weapon States (NWS), allow the application of full-scope safeguards to all or some of the peaceful nuclear installations on the territories of the NWS.

INTERNATIONAL DATA CENTER (IDC)

Establishment set up under the Comprehensive Nuclear Test Ban Treaty (CTBT) to process the data obtained from the **International Monitoring System (IMS)**. The IDC is to be attached to the Technical Secretariat of the **Comprehensive Nuclear Test Ban Treaty Organization (CTBTO)**.

INTERNATIONAL MONITORING SYSTEM (IMS)

Verification regime based on **cooperative measures** established under the Comprehensive Nuclear Test Ban Treaty (CTBT). Once the CTBT is in force, the IMS will consist of various types of data collection stations that report their data back to an **International Data Center (IDC)**. States parties can operate **National Data Centers (NDC)** and obtain data from the IDC for evaluation. Fifty main stations are to provide the States parties with the capability for initial detection, location, and identification of under ground and most under water events. These are to be supplemented by 119 auxiliary seismic stations that will provide additional data for events detected by the primary stations. The auxiliary seismic stations will transmit their data only by request and will be used to improve event location and identification. Eighty radionuclide stations, which sense the particle and gas by-products of nuclear explosions, are to be the primary instruments for the detection and identification of events which release radionuclides into the atmosphere. Six hydro-acoustic stations are to complement the seismic networks and to allow for the detection and identification of explosions, which are underwater, or at a low enough altitude to couple energy into the water. Five auxiliary hydro-acoustic stations—so-called T-phase stations—are to be installed on islands with deep shore lines. Although less sensitive, these stations will be capable of observing under water explosions at great ranges. The auxiliary hydro-acoustic stations are to transmit data only upon request and are to be used to improve event location and identification for underwater events. Finally, 60 infra-sound stations, which can sense low-frequency acoustic signals resulting from explosions, are to be the primary means for the detection of explosions in the atmosphere. These stations can also be used to augment the seismic and hydro-acoustic networks for shallow underground or underwater events. Suspicious events identified by the IMS may be subject to **clarification inspections**.

INVESTIGATION OF ALLEGED USE

Form of **on-site inspections** that aims to verify the use or the threat of use of prohibited weapons. Investigations of alleged use are provided for under the Chemical Weapons Convention (CWC).

MANAGED ACCESS

Provision under the Chemical Weapons Convention (CWC) concerning the extent and nature of access to a particular place or places during a **challenge inspection**. The inspected party must allow the greatest possible degree of access, but has the right to manage access to protect national security and sensitive installations, and to prevent disclosure of confidential information and data not related to chemical weapons. If the inspected party provides less than full access to places, activities, or information, it must make every reasonable effort to provide alternative means by which to clarify the non-compliance concern that triggered the inspection.

MATERIAL BALANCE AREA (MBA)

Term employed under **International Atomic Energy Agency (IAEA) safeguards**. It refers to an area in or outside a facility in which the transferred quantity of nuclear material in or out can be determined to produce a **physical inventory**.

MATERIAL UNACCOUNTED FOR (MUF)

Term employed under **International Atomic Energy Agency (IAEA) safeguards**. It refers to the difference between **book inventory** and **physical inventory**.

MODEL FACILITY AGREEMENT

Document specifying the general form and content for a **facility agreement** concluded between a State party and the organization responsible for carrying out the on-site inspections.

MULTINATIONAL TECHNICAL MEANS (MTMS)

All internationally-owned instruments employed in the monitoring of treaty-related obligations. Typically MTMs are employed by an international institution charged with verifying treaty implementation as part of the application of **cooperative measures**. Currently MTMs are used under the Conventional Forces in Europe (CFE) Treaty and by

the **International Atomic Energy Agency (IAEA)**, and will also constitute part of the **International Monitoring System (IMS)** which is scheduled to become operational after the entry into force of the Comprehensive Nuclear Test Ban Treaty (CTBT).

NATIONAL AUTHORITY

National body designated by each State party to serve as a liaison between itself and the **Organization for the Prohibition of Chemical Weapons (OPCW)**.

NATIONAL DATA CENTERS (NDCS)

Establishments which may be operated by individual States parties under the Comprehensive Nuclear Test Ban Treaty (CTBT). NDCs can receive data gathered by the networks comprised in the **International Monitoring System (IMS)**, transmit information for processing to the **International Data Center (IDC)**, or obtain data from the IDC for evaluation.

NATIONAL TECHNICAL MEANS (NTMS)

Nationally-owned technical instruments used to monitor the treaty-related obligations of another State without intruding onto its territory or airspace. NTMs can be used both to verify compliance with a treaty in the absence of any **cooperative measures**, and as part of a cooperative monitoring system.

NEW FACILITY INSPECTIONS

Form of **on-site inspections** carried out under the Strategic Arms Reduction Treaty (START) I to confirm the accuracy of data declarations at new facilities including intercontinental ballistic missile (ICBM) bases, submarine bases, air bases, ICBM and sea-launched ballistic missiles loading facilities, rail garrisons, test ranges, static display sites, or production, repair, storage, training, conversion, space launch or elimination facilities.

NON-CHALLENGE INSPECTIONS

Type of **on-site inspections** carried out as part of the normal course of monitoring compliance with agreement provisions. Non-challenge inspections are conducted at regular intervals and possibly also on an ad hoc basis, and carry no implications of alleged misconduct. They are the most common type of on-site inspections, and are typically applied

in combination with **data declarations**, and possibly **challenge inspections**. The most common type of non-challenge inspections are **routine inspections**.

NUCLEAR MATERIAL ACCOUNTANCY

Data declaration technique employed under **International Atomic Energy Agency (IAEA) safeguards**. Each State party with which a **safeguards agreement** has been concluded is obliged to operate an accounting system which keeps track of the inventory of nuclear materials in each **material balance area (MBA)** under its jurisdiction, and changes therein. These accounting records are submitted to the IAEA on a regular basis. IAEA **on-site inspections** verify the accuracy of the presented records. See also **IAEA safeguards**.

OBJECTS OF VERIFICATION (OOVS)

A formation, unit, or site subject to **on-site inspections** under the Conventional Forces in Europe (CFE) Treaty. To be classified as an OOV, an object must meet several specific criteria. OOVs form the basis on which national inspection quotas are calculated under the CFE Treaty.

OBSERVATION PERIOD

Period of time elapsed as part of an observation flight under the Treaty on Open Skies. Sensors may be operated during the entire observation period, provided that the observation aircraft does not deviate from the agreed flight path and altitude.

ON-SITE INSPECTIONS (OSIS)

Inspections carried out by designated inspectors to verify that particular activities prohibited by an arms limitation agreement are not performed, to check that particular activities prescribed by an arms limitation agreement are implemented, or to examine the nature of a suspicious event. OSIs can be divided into three main categories: **ad hoc inspections**, **non-challenge inspections** and **challenge inspections**. **Continuous monitoring** carried out by personnel may also be classified as OSIs. OSIs are often used to supplement **data declarations**. Together, these two measures form the main instruments of cooperative monitoring. The application of OSIs requires the mutual consent of all parties. Generally OSIs are considered to be one of the most intrusive instruments of **verification**,

and hence tend to be among the most contentious measures to negotiate and, as demonstrated by the experience of the **United Nations Special Committee (UNSCOM)**, to implement. Examples of treaties incorporating provisions for OSIs include the Non-Proliferation Treaty (NPT), the Intermediate-range Nuclear Forces (INF) Treaty, the Conventional Forces in Europe (CFE) Treaty, the Strategic Arms Reduction Treaties (START) I and II, the Chemical Weapons Convention (CWC), and the Comprehensive Nuclear Test Ban Treaty (CTBT).

PERIMETER

External boundary of a declared inspection site, defined by either geographic coordinates or description on a map or chart.

PERIOD OF INSPECTION

Period ranging from the arrival of the **inspection team** at the **inspection site** until its departure from the inspection site, not including the time spent on briefings before and after an inspection, except for **challenge inspections**.

PHYSICAL INVENTORY

Term employed in the context of **International Atomic Energy Agency (IAEA) safeguards**. It refers to the sum of all units of nuclear material present at a given time within a **material balance area (MBA)**, obtained in accordance with specified **nuclear material accountancy** procedures.

POINT OF DEPARTURE

Designated location through where the inspection team leaves the territory of the **inspected party** after having completed its mission.

POINT OF ENTRY

Designated location where an inspection team enters the territory of the **inspected party**.

PORTAL MONITORING

Technique employed as part of **continuous monitoring** whereby all vehicles and rail cars that enter and exit the main gate of a designated production facility are subject to continuous surveillance.

PORTAL PERIMETER MONITORING

As **portal monitoring** with the addition of periodic or ad hoc monitoring of the perimeter.

POST-EXERCISE DISPERSAL INSPECTIONS

Form of **on-site inspection** applied under the Strategic Arms Reduction Treaty (START) I to keep track of mobile intercontinental ballistic missiles or launchers.

QUOTA INSPECTIONS

A number of **on-site inspections** within an agreed quota used to verify obligations related to the possession/destruction of treaty-limited equipment as specified under an arms regulation treaty. Inspection quotas are provided for under the Conventional Forces in Europe (CFE) Treaty, the Intermediate-range Nuclear Forces (INF) Treaty, and the Treaty on Open Skies. Under the CFE Treaty the quota inspections permissible is calculated on an individual basis for each party as a percentage of the number of **objects of verification (OOVs)** present on its territory. Under the INF Treaty a fixed quota of inspections was used to verify the absence of treaty-limited items at declared or formerly declared missile operating bases or missile support facilities. Under the Treaty on Open skies, so-called active and passive quotas calculated in function of the size of the territory of each party, indicate respectively how many overflights a party may conduct and receive each year.

RADIONUCLIDE STATIONS

Installations used to detect atmospheric explosions as well as underground or underwater explosions that vent gases or particulate debris into the atmosphere. For timely and accurate measurement of radionuclides released from nuclear explosions, radionuclide stations are placed in areas with low background radioactivity and favourable wind currents. Particulate analyzers pass air through a large-area, low-pressure-drop filter at a high flow rate for selected time periods, and then seal, bar-code and perform a gamma-ray analysis of the filter. The gamma-ray spectrum and radionuclide composition can identify nuclear explosions from great distances. Similarly, xenon gas analyzers pass filtered air through a molecular aluminium oxide bed for removal of moisture and carbon dioxide, and then through a charcoal sorption bed for xenon collection. The xenon is then measured by x-ray and

gamma ray spectrometry. The gamma ray spectra and radionuclide concentrations identify nuclear explosions from great distances. Radionuclide stations are part of the **International Monitoring System (IMS)** which is to be established under Comprehensive Nuclear Test Ban Treaty (CTBT) after this enters into force.

RECONNAISSANCE AIRCRAFT

Virtually any type of aircraft equipped with an array of **sensors** for the purpose of gathering information about military and non-military objects. Under the Treaty on Open Skies, States parties may employ reconnaissance aircraft equipped with permitted sensors to overfly one another's territory in accordance with the provisions of the Treaty.

RECONNAISSANCE SATELLITES

Satellites used for the purpose of aerial reconnaissance. Reconnaissance satellites may be equipped with high-resolution cameras, infra-red cameras, and radars. Modern high-resolution cameras no longer use photographic film but rather a focal plane that directly converts a focused image into electronic signals, which are instantaneously transmitted to earth. The high resolution enables observation of uncovered military equipment, troop movements, and test preparations. Infra-red cameras detect the infra-red radiation emitted by objects. Although infra-red radiation is invisible to the human eye, it can be made visible by using photographic or digital processing which produce a colour image. This allows detection of camouflaged military equipment, nuclear and chemical facilities, and industrial and research facilities. Reconnaissance satellites are a key component of **national technical means (NTMs)**.

REDUCTION INSPECTIONS

Form of **on-site inspections** used to confirm the reduction and elimination of treaty-prohibited items. Reduction inspections were implemented under the Intermediate-range Nuclear Forces (INF) Treaty, the Strategic Arms Reduction Treaty (START) I, and Conventional Forces in Europe (CFE) Treaty.

RE-ENTRY VEHICLE INSPECTIONS

Form of **on-site inspections** applied under the Strategic Arms Limitation Treaty (START) I to confirm that deployed intercontinental

ballistic missiles and submarine-launched ballistic missiles do not contain more than the number of warheads attributed to them.

REMOTE SENSING

Method of detecting treaty-related objects and/or activities at a distance by means of **sensors**. Remote sensing is typically a key component of any compliance-monitoring process, be it based on **national technical means (NTMs)** or **cooperative measures**. Remote sensing methods include the use of **reconnaissance satellites**, **reconnaissance aircraft**, **electronic intelligence**, radar, **seismic stations**, **hydro-acoustic stations** and **infra-sound stations**. See also **sensor**.

ROUTINE INSPECTIONS

Form of non-challenge **on-site inspections** conducted periodically. Routine inspections are the most common instrument of cooperative monitoring measures. They are typically applied on the basis of initial **data declarations**, and may be supplemented by **ad hoc inspections**, **challenge inspections**, and **continuous monitoring**. They are sometimes also referred to as systematic inspections. Agreements containing provisions for routine inspections include the **International Atomic Energy Agency (IAEA) safeguards**, the Intermediate-range Nuclear Forces (INF) Treaty, the Conventional Forces in Europe (CFE) Treaty, the Strategic Arms Reduction Treaty (START) I, and the Chemical Weapons Convention (CWC).

SAFEGUARDS AGREEMENT

Agreement between the **International Atomic Energy Agency (IAEA)** and non-nuclear-weapon States (NNWS) that gives the IAEA the right to verify that nuclear materials and facilities in NNWS are not employed for non-peaceful purposes.

SAMPLING

Provision of the Chemical Weapons Convention (CWC) allowing the **inspection team** to collect chemical samples in quantities it deems necessary to check for the absence of undeclared substances contained in the Schedules of Chemicals of the CWC. The inspection team can request the assistance of the **inspected State party**, and can supervise sample collection. Samples of importance include toxic chemicals, munitions, devices and their remnants, environmental

samples, and biochemical samples from human or animal sources. In case of unresolved ambiguities, samples can be analyzed in at least two designated off-site laboratories, subject to the inspected State party's consent.

SEISMIC STATIONS

Installations used to detect underground events. An earthquake or underground explosion creates seismic waves that travel through the body of the earth and over its surface. Devices for detecting seismic waves are called seismographs. They are relatively small electro-magnetic instruments whose main components are a magnet fixed to the ground and a spring-suspended mass with an electric coil. The magnet is moved by seismic waves inducing a weak electrical current that is proportional to their velocity and that can be recorded for analysis. Since seismographs are capable of detecting very small motions the "seismic noise" caused by ocean waves, wind, and human activity makes the identification of a weak seismic event difficult. This difficulty can be reduced by tuning the seismograph to frequencies that are characteristic for underground explosions, or by setting up an array of seismographs to enhance the seismic signal relative to the background noise. Since the seismic characteristics between underground explosions and earthquakes differ, seismic stations can usually distinguish between the two types of events. Seismic stations represent the core component of the **International Monitoring System (IMS)** established under the Comprehensive Nuclear Test Ban Treaty (CTBT).

SENSOR

Device that converts emitted or reflected energy into a signal that can be further processed. The energy can take different forms such as nuclear, seismic or electromagnetic radiation ranging over a broad spectrum of wavelengths including radar, radio, infra-red, visible light, ultraviolet, x-rays and gamma rays, or ground vibrations, sound, heat, and so on. Sensors can be either attended or unattended, and can be fitted to a wide variety of air, ground, and sea platforms. In more technical language sensors are sometimes referred to as transducers. See also **remote sensing**.

STRENGTHENED SAFEGUARDS SYSTEM (SSS)/ADDITIONAL MODEL PROTOCOL

Safeguards administered by the **International Atomic Energy Agency (IAEA)** to non-nuclear-weapons States (NNWS) parties to the Nuclear Non-Proliferation Treaty (NPT). SSS (INFCIRC/540) evolved as a result of the IAEA Programme 93+2 launched in 1993 following the discovery of clandestine nuclear activities in Iraq, South Africa, and possibly North Korea. The system aims to ensure that no undeclared nuclear activities are taking place within a NNWS. Towards this end, the SSS features requirements for expanded declarations by NNWS, expanded access for IAEA inspectors, and an expanded range and scope of on-site monitoring activities. Application of the SSS is carried out on the basis of voluntary agreements between NNWS and the IAEA. See also **IAEA safeguards**.

SUSPECT SITE INSPECTIONS

Form of challenge **on-site inspections** used under the Strategic Arms Reduction Treaty (START) I to confirm that mobile intercontinental ballistic missiles (ICBMs) are not being covertly assembled at a particular site.

TECHNICAL CHARACTERISTICS EXHIBITIONS

Measure adopted under the Strategic Arms Reduction Treaty (START) I to confirm that the characteristics of intercontinental ballistic missiles and submarine-launched ballistic missiles correspond to the declared data.

VERIFICATION

The process of establishing whether States parties are complying with their obligations under an arms control or disarmament agreement. It entails monitoring the activities of the parties relevant to their treaty commitments, analysing the information colleted from monitoring, and determining whether the parties are complying with their agreement obligations. Monitoring can be carried out either unilaterally through **national technical means (NTMs)**, or multilaterally through **cooperative measures**. Often, in the case of multilateral agreements, monitoring is assigned to a specially-designated international organization. As with monitoring, the analysis of gathered data can be performed unilaterally at the national level, or multilaterally by the international organization responsible for collecting the data. The determination of non-compliance is the

prerogative of the State parties. After a determination of non-compliance, the dispute can be referred to a **compliance mechanism**.

VISIT WITH SPECIAL RIGHT OF ACCESS (SAV)

Specific term for a **challenge inspection** with the right of refusal under the Strategic Arms Reduction Treaty (START) I.

VOLUNTARY OFFER AGREEMENTS

Safeguards agreements concluded between nuclear weapon-States (NWS) and the **International Atomic Energy Agency (IAEA)** whereby some peaceful nuclear activities of a NWS are placed on a voluntary basis under **IAEA safeguards**. Voluntary offer agreements have been concluded with all NWS.

INDEX