Missile control agreements: a general approach to monitoring and verification

Michael VANNONI and Kent BIRINGER

Since the end of the Cold War, international concern about missile proliferation has increased significantly. Missiles present some unique security problems because of their long range, their potential to deliver both high-explosive and nuclear warheads, and the difficulty in defending against them. The political and psychological reaction to missiles can be out of proportion to their actual effects—largely because of the feeling of helplessness that missiles can inspire.

This paper focuses on generic strategies and techniques for controlling the deployment, growth and spread of missile forces. It focuses especially on the role of monitoring procedures and technology—techniques that should be integrated into a system (a "regime") for transparency or verification. A number of concepts are outlined for achieving these objectives. Their appropriateness and effectiveness depends on a complicated mix of political, technical and operational factors, as with any form of international cooperation.

Missile characteristics

The terminology used to describe missiles is somewhat complex. In general, a *rocket* is a self-propelled cylinder using liquid or solid fuel. A *missile* is a flying object intended to strike a designated target. In modern military terminology, a rocket is an unguided weapon propelled by a rocket engine. Military rockets are used like artillery and typically have ranges of less than 75km. A missile is a rocket with a guidance system that adjusts its flight path toward the target after launch. Military missiles fall into two categories: ballistic and cruise. Ballistic missiles have an initial powered boost phase followed by supersonic free flight along a high, arcing trajectory. Guidance occurs during the boost phase and, in more advanced systems, during the re-entry of the missile or warhead into the atmosphere. The term *cruise missile* refers to unmanned, automatically guided, self-propelled, air-breathing vehicles that sustain flight through the use of aerodynamic lift.

Michael Vannoni is a Principal Member of the Technical Staff and Kent Biringer is a Department Manager at Sandia National Laboratories, Albuquerque, New Mexico. This work was supported by the United States Department of Energy through the Cooperative Monitoring Center at Sandia National Laboratories. Sandia is a multi-programme laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under contract DE-AC04-94AL85000.

A framework for missile agreements

Missile agreements can be broadly divided into confidence-building measures (CBMs) and arms control (or constraint measures). CBMs for missiles normally involve sharing information to clarify national capability or intent. Sharing information unilaterally, bilaterally or multilaterally is often referred to as transparency. Security analysts often recommend that transparency measures to build confidence be introduced before formalized arms control agreements because excessive secrecy about military status can damage relations by fostering suspicions. Confidence building can be an excellent first step in reducing tensions and cultivating an atmosphere in which formal arms control measures can be credibly implemented.

The role of transparency in reducing missile threat perceptions

The United Nations defines transparency in arms matters as “systematic provision of information on specific aspects of activities in the military field under formal or informal international arrangements”.[1] Transparency measures can be unilateral, bilateral or multilateral and governments do not typically ratify transparency agreements. Sometimes it is in a nation’s security interest to act unilaterally to avoid misinterpretation of intent.

There is a role for both transparency and opacity in missile threat reduction.

The concept of transparency, however, has limitations and does not fundamentally change military realities. In practice, there is a role for both transparency and opacity in missile threat reduction. Choosing *not* to share certain information can enhance stability by not allowing vulnerabilities to be exploited. Such information could include system deployment locations and performance capabilities. Generally, transparency leads to greater stability when it achieves the following:

- increased symmetry of forces and/or capabilities;
- increased warning time or reduced likelihood of pre-emption success;
- reduced likelihood of misinterpretation of intent; and
- reduced vulnerabilities for either side.

Constructing control agreements for missiles

Arms control is normally implemented in formal and ratified agreements that commit the signatories to conduct specified actions (e.g. eliminate a defined type of weapon). Arms control is accompanied by verification activities that evaluate compliance with mandated commitments. A standard conceptual approach helps to generate strategies for missile control agreements: six steps describe the process of constructing an agreement.

1. Determine the topic of concern of the agreement.
2. Select the geographic area where the agreement is to be applied.
3. Define the actions to be taken and, if information is to be exchanged, provide the mechanisms and details of information to be shared.

4. Identify the parameters that define the above actions. This step is used to determine the objectives for subsequent monitoring and verification.
5. Identify the specific items to which the above actions are to be applied.
6. Specify the point(s) in the missile life cycle where the control actions are applied.

Missile systems move through a life cycle, which begins at the research stage and ends in retirement. Actions for control are easier to implement at some stages than others. For example, while it may be difficult to determine the state of research, the number of missile tests may be counted and measured.

Figure 1 lists choices from which the basic structure of a missile agreement can be constructed. The shaded areas illustrate the applicable elements for the 1987 Intermediate-Range Nuclear Forces (INF) Treaty between the Soviet Union and the United States.[2] The INF treaty eliminated ground-launched ballistic and cruise missiles with ranges of between 500km and 5,500km. Both launchers and missiles were eliminated, and the agreement obligated the parties not to produce, test or deploy these systems, thus covering three phases of the life cycle.

Figure 1. Elements of a missile control agreement, with the INF Treaty as illustration

Topic	*Geographic scope*	*Action*	*Action parameters*	*Specific items*	*Point in life cycle*
Ballistic missiles	Global	Limit	Quantity	Complete systems	Research
Cruise missiles	Multilateral	Promote	Physical parameters	Components/ materials	Development
Space launch vehicles	Bilateral	Inform	Location	Facilities	Production
			Operations/use	Processes/ activities	Test
				Movements	Storage
					Transfer
					Deployment
					Use
					Retirement

Monitoring techniques

Monitoring is the collection of information that is then used to build confidence and verify arms control agreements. The information used to confirm compliance of parties with an agreement is collected using declarations, inspectors and sensors. In addition, states use their own intelligence systems and national technical means (NTM) to complement and confirm information collected by cooperative monitoring. The process of monitoring can be conducted unilaterally or cooperatively. For example, the Soviet Union and United States agreed in the 1972 SALT Interim Agreement on the limitation of strategic offensive arms to use their own NTM (primarily images from satellites) to monitor the agreement.

There are two major steps in designing a monitoring system. The first is determining the "observables" to be monitored. Observables are physical characteristics that can be measured by human or technological means. The nature of the observables depends on the terms of the agreement.

For example, under the Strategic Arms Limitation Talks, the number of missile silos was an observable. Observables fall into five general categories.

- Presence or absence of specific items of interest.
- Number of specific items of interest.
- Location of specific items of interest.
- Physical characteristics of specific items of interest.
- Movement of specific items of interest.

The second step is to select the types of monitoring equipment to be used. Equipment selection must account for operational factors including the physical characteristics of the observable (e.g. weight or length), the active area and range of the sensor, the physical environment of the sensor, the reliability of sensors and communication equipment, the level of cooperation required and the impact of monitoring on government and civilian activities.

Declarations

Declarations and notifications can be useful confidence-building measures when used with respect to missile development and deployment. Missile quantities, movements, test launches and exercises may be declared in order to avoid the risks associated with misinterpretation of intent. Notification agreements have been an important element of Russian–US nuclear cooperation. The two countries agreed under the first Strategic Arms Reduction Treaty (START) in 1991 to inform each other about launches of intercontinental and submarine-launched ballistic missiles.[3] A 2000 memorandum of understanding expanded the requirement to include shorter-range ballistic missiles, space launch vehicles and research.[4]

Notification agreements have been an important element of Russian–US nuclear cooperation.

In February 2002 more than 80 countries met to evaluate an International Code of Conduct against Ballistic Missile Proliferation. Renamed the Hague Code of Conduct (HCOC), 93 countries signed the agreement on 25 November 2002. The HCOC is a politically binding (but not verified) regime that encourages states to outline their ballistic missile programmes once a year and provide notification of ballistic missile tests.[5] In September 2006 111 states were signatories.

As a regional example of confidence-building declarations, in October 2005 India and Pakistan signed a bilateral Agreement on Pre-notification of Flight Testing of Ballistic Missiles. This transparency measure is intended to reduce tensions between the two nuclear-capable states. The agreement requires each country to provide the other with advance notification of all planned flight tests of ballistic missiles.

On-site inspections

Inspectors were first used systematically to assess conditions at military-related facilities under the 1919 Treaty of Versailles. On-site inspection requires access to a site and a certain level of intrusiveness. Intrusiveness can be defined as the degree of physical access of the monitoring regime (human or technical) to the territory, facilities and controlled systems of the parties to an agreement. It can also cover the type of information collected, the duration of information collection, the potential for the collection of national security information unrelated to the agreement, and the disruptive effect of monitoring on facility operations.

An advantage of human inspection is that trained observers can evaluate information and detect indications of non-compliance immediately; the interpersonal contact between inspectors and hosts can also build trust. On-site inspectors may use a variety of portable data collection and analysis equipment to assist their observations. This equipment can include cameras, radiation and chemical detectors, tape measures and equipment to obtain physical samples. A variant of on-site inspection is the examination of written records and determination of their validity.

Remote monitoring

Remote monitoring is the collection of data by unattended sensors and the transmission of that data from the point of collection to another location for evaluation. Complementary layers of sensors are integrated into a remote monitoring system to monitor and report a specific activity while ignoring unrelated activity. Data can be collected continuously or only when activity occurs. For example, the entry of a ferrous object could activate a magnetic sensor, which can command a video camera to take an image, which can then be used to identify the object.

The ability to collect information selectively may, in some circumstances, make remote monitoring less intrusive than human inspectors. An advantage of using sensors is that they can operate continuously over long periods, which may be impractical for human observers. A system must be designed to report credible data and installed to minimize the potential for evasion. Examples of monitoring functions and sensor types are contained in Table 1, overleaf.

Remote sensing

Remote sensing is the collection of information when the sensor is a significant distance away from an object or activity of interest. It is generally viewed as less intrusive than on-site monitoring. Remote sensing includes satellite or aerial imaging; radar data collection; electronic signal collection; and the collection of effluent samples (such as air or water) outside the boundary of a facility. A limitation of remote sensing is that some observables, such as the radiation emitted by nuclear material, are only detectable at distances of a few metres. However, the growth of the commercial satellite industry means any country can now purchase an image of virtually any location on the globe for a relatively low price.

Aerial monitoring may be conducted cooperatively. The Open Skies Treaty entered into force in 2002 and makes military status more transparent among its signatories in North America and Europe.[6] It permits a signatory to fly a jointly staffed aircraft over the territory of another signatory, subject to certain operational rules and using approved sensors (optical, thermal infrared and imaging radar with defined resolutions). Hungary and Romania also signed a bilateral agreement (with fewer operational and technical provisions) to permit cooperative aerial overflight in 1991.

Applying monitoring techniques to missile control

The goal of missile non-proliferation and control can be pursued in a variety of ways: reducing the missile threat by decreasing missile readiness; restricting the export of missiles and associated equipment; limiting missile development by restrictions on flight or engine tests; restricting the operational deployment of existing missile forces; or reducing existing missile forces by number or type or both.

Table 1. Examples of remote monitoring systems

Monitoring function	*Example of sensor type*	*Sensor description*	*Example of application*
Tracking	Commercial transport tracking system	Portable, GPS-linked device determines/broadcasts location	Monitor location of patrol, vehicle or cargo; record route taken
Detection of access to a closed or secured item or facility	Passive seals	Tape, wire, fibre-optic cable, plastic shrink-wrap, other means of sealing doors or containers	Reveal whether a sealed item or room has been opened since closure
	Active seals	Seals linked to audible/visual alarm or radio transmitter	Provide immediate alert of tampering with sealed item
Access control	Personal entry identifiers	Code locks, magnetic badges, hand geometry readers, other ID devices	Limit access to authorized people
Detection of specific materials and activities	Metal detectors	Walk-through and hand-held magnetic sensors	Locate concealed weapons or other metallic items
	Chemical detectors	Detection of traces of specific chemicals on vehicles, people or cargo	Locate missile-related chemicals or explosives
	Portable X-ray machines	Standard airport baggage viewers	Identify contents of bags and small boxes
	Alarmed fences	Standard security fence with pressure-sensitive wires linked to alarm, camera or transmitter	Provide visible access barrier, intrusion warning
	Buried fibre-optic cable	Pressure-sensitive buried cable linked to alarm, camera or transmitter	Detect people or vehicles crossing a line of control
	Seismic, magnetic, acoustic sensors	Transmitter activated by vibration, ferrous metal or sound waves	Detect people, weapons, vehicles
	Infrared and microwave break-beam devices	Alarm or transmitter activated when line-of-sight beam interrupted	Detect people or vehicles crossing a line of control
Identification of objects	Ground-based photography	Commercial video and still cameras	Provide recorded moving and still images in real time or with a time delay
	Aerial or satellite-based photography and imaging sensors	Visual, infrared, multi-spectral collecting charged couple devices (CCDs), Synthetic Aperture Radar	Image through darkness, clouds, vegetation; detect objects, terrain not visible to the human eye
Confirm identity of specific items	Bar codes	Adhesive tape with readable bar code; bar code scanner	Identify individual pieces of equipment; facilitate inventory
	Reflective particle tag	Metallic particles suspended in polymer coating form unique pattern on equipment	Identify individual pieces of equipment
	Electronic tag	Passive or active electronic tag that can be queried by a tag reader	Identify or provide information about the location or characteristics of the item tagged

Decreasing readiness

De-alerting

De-alerting measures are defined as "reversible actions taken to increase the time or effort required to launch a strategic ballistic missile".[7] States retain their missiles and continue training, but operational impediments are intentionally put in place. These measures are designed to prevent unauthorized use and to slow the intentional use of a weapon system by requiring time to re-activate or redeploy the system. Actions can be declaratory or verified by on-site inspection or remote monitoring. The following paragraphs summarize several de-alerting approaches (in order of increasing delay).

De-alerting could be achieved by storing fully assembled missiles rather than deploying them. Higher levels of de-alert could be achieved by removing critical missile components. Components that have been removed could be stored together, in another building or even at a separate base. Liquid-fuelled missiles could be stored unfuelled.

Delay could be increased by installing physical or electronic barriers to access at storage facilities. Such barriers would lengthen the process of deploying the missiles.

The continued presence of barriers can be verified by monitoring systems to detect removal. Various approaches are technically feasible: a massive block of concrete (requiring special equipment to move) could be placed in front of the door to a storage facility; electronic timers could be used to require a fixed time interval before opening or unlocking the door to a storage facility; or an item could be attached to a missile or missile launcher that makes the missile or launcher inoperable unless the item is removed.

De-targeting

De-targeting is the process of entering harmless target coordinates, such as broad ocean areas, into a missile guidance system. Precedents for de-targeting are the January 1994 Russian Federation–United States agreement, the September 1994 China–Russian Federation agreement and the June 1998 China–United States agreement. In practice, new target coordinates can be entered fairly quickly and the process is best applied to relatively sophisticated missiles with programmable guidance systems. Although de-targeting is primarily a symbolic gesture and difficult to verify, it can provide value as a unilateral measure.

Restricting the export of missiles and equipment

Because not all proliferation results from indigenous capabilities, international efforts have been undertaken to address the issue of trade and commerce in weapons of mass destruction and their delivery systems.

The Missile Technology Control Regime (MTCR) is a voluntary and informal association of states. MTCR adherents follow common export policy guidelines and seek to coordinate national export licensing policies and procedures in missile-related technologies and components to prevent the proliferation of unmanned delivery systems capable of delivering weapons of mass destruction (WMD).

The MTCR lacks any provisions for verification. Created in 1987, 34 countries participated in the MTCR as of September 2006.[8] As mentioned earlier, the Hague Code of Conduct was adopted in 2002 as a supplement to the MTCR (but it does not require MTCR membership). The HCOC provides for more information sharing on missile programmes and test flights.

In May 2003, the United States initiated the Proliferation Security Initiative (PSI) as a multinational response to the threat of proliferation of WMD, their delivery systems and related materials worldwide. The PSI seeks to promote international cooperation to prohibit WMD-related shipments at sea, in the air or on land that flow to or from state or non-state actors of proliferation concern. In addition to the prohibition, PSI partners are working to expand their cooperation to the enhancement of military, intelligence and law enforcement actions in support of non-proliferation objectives. In September 2006, there were 77 participants in PSI.[9]

Since the terrorist attacks in the United States in 2001, there has been growing global concern over the role of non-state actors in proliferation. In April 2004 the United Nations Security Council adopted resolution 1540, which, among other things, notes "that all States shall refrain from providing any form of support to non-State actors that attempt to develop, acquire, manufacture, possess, transport, transfer or use nuclear, chemical or biological weapons and their means of delivery".[10] It encourages the adoption and enforcement of laws and domestic controls to help achieve these objectives. These controls would not only apply to the weapon systems themselves but also to the knowledge, experience and other skills that could be used to develop these weapon and delivery systems. National reports submitted pursuant to resolution 1540 are reviewed by a committee established for that purpose.[11]

Limiting missile development activities

Actions to limit missile development usually focus on testing activities. Missile test limits are intended to make the development of new or significantly modified missiles more difficult. Systems that lack sufficient development and testing are less likely to be used operationally. Testing can include static motor ignition, vibration, stress and balance tests on the ground. Other tests may validate safety features, such as the behaviour of the system under exposure to fire. The number, trajectory and type of test can limit development. For example, UN Security Council resolution 687 (April 1991), the cease-fire agreement ending the 1991 Gulf War, required that all Iraqi missiles with a range over 150km as well as all research and development, support and manufacturing facilities be dismantled. The subsequent resolution 715 (paragraph 7) called for the development of a mechanism for monitoring missile-related activities. This resulted in the formation of a missile monitoring group at the Baghdad Monitoring and Verification Centre. Activities included the installation of remote-controlled camera systems at two missile engine test stands. The cameras were arranged to enable the United Nations to assess whether a test was of a prohibited missile, engine or motor.

Monitoring flight tests

The objective of monitoring a test missile's flight is to detect when a flight has occurred, confirm that the trajectory is not a threat, confirm the type of missile being tested (if this is limited) and determine the range of the test (if this is limited).

Remote sensing, as in imagery from satellites or aircraft, can detect preparations for a test flight, missiles on launchers and post-launch effects such as burn marks. The observables associated with a test launch are transient and relatively small in physical size, so the spatial resolution of commercial satellite imagery and its fixed revisit times limit its effectiveness. Collecting imagery from aircraft results in higher resolution and operational flexibility. Optical sensors are adversely affected by weather conditions but imaging radar can be used in cloud or darkness.

Ground-based radar can detect test missiles as they rise above the launch site. A possible cooperative approach is to place autonomously operated radar at a test site. This system would detect and provide the initial trajectory for launches. Another approach is to incorporate a beacon on the test missile that announces the missile's launch and assists tracking by radars.

To confirm a test has occurred, if the test is declared in advance, observers could be invited to the site to observe test preparations and the launch. If there were concerns about preparations for undeclared launches, one option would be to permit a number of challenge inspections.

Remote monitoring using sensors installed at a launch site could confirm launches with less intrusiveness than inspectors. Video cameras could continuously observe certain locations at the test site or the testing country could activate the camera before the test.

Monitoring ground-based tests

The objective of monitoring a ground test is to detect when a test has occurred, confirm the type of missile component being tested (if this is limited) and determine the type of test being conducted (if this is limited).

Given that ground-based tests are smaller than complete missile tests and may be conducted inside buildings, remote sensing has a limited role. On the other hand, the presence of on-site observers is intrusive. Observers would not be able to detect undeclared tests unless they had unrestricted access to the site. Remote monitoring can provide continuous observation with less intrusiveness. However, facility access would be required to place monitoring and communication equipment. An example of potential remote monitoring is the use of visual and thermal video to record the duration of a rocket motor test and the size of the plume.

Restricting operational deployment of existing missile forces

Non-deployment zones

Restricting deployment of missiles from specific geographic locations moves them away from preferred launching points, so that potential targets are outside their range. This approach could include confining mobile missiles to their garrisons. Monitoring of such an agreement must supply information that is sufficiently geographically and temporally specific to provide assurance that the parties are in compliance, yet not so specific that it creates vulnerabilities. Knowledge of specific locations of missiles would permit a pre-emptive attack if one side decided to violate the agreement.

If missiles were located in fixed sites, the closure of bases could be monitored by imagery from commercial satellites or aircraft. Missiles are large enough to be easily identifiable on external launchers.

Silo doors could be opened during imaging to confirm that no missile is present. Facilities with vertical doors, such as tunnels or storage buildings, do not offer a line of site for imaging and their closure would need to be verified by on-site inspection.

Mobile missile launchers could be monitored if imagery were collected cooperatively. One approach is based on restricting missiles to a geographic zone with the option for parties to call a "census" of declared missiles. The census would require the missile launchers to move to positions within the zone where they could be photographed. (The time lag required to process the images provides the launchers with several hours to move into new positions, thereby reducing their vulnerability to attack if one side decides to violate the agreement.) Aside from remote sensing, observers could survey the non-deployment zone periodically to determine if any missiles are present. This is an intrusive process that is largely ineffective unless the non-deployment zone is small or observation is conducted frequently.

Remote monitoring could be used if the non-deployment zone is geographically separated by mountains or some other terrain feature; chokepoint monitoring could be established on routes that missile transporters-erectors-launchers (TELs) must physically traverse to enter the zone. Monitoring equipment applicable to chokepoints includes seismic, magnetic and infrared sensors to detect and count traffic. Additional information can be collected by using strain cables (to measure weight), multiple infrared break beams (to measure profile and length), radiation detectors and X-ray equipment (to examine characteristics of the cargo), and cameras (to check number, shape and colour).

Missile system capability

Setting limits on missile capability bounds threats and could include parameters such as range, payload capacity or multiple warheads. Capability limits could also seek to eliminate or prevent the development or deployment of an entire category of missiles such as sea-launched missiles. Verification would require inspections or remote monitoring or both to confirm the absence of banned missile characteristics or systems at garrisons or production facilities. For example, under the INF Treaty, the Soviet Union and the United States monitored shipments leaving their respective production facilities for 13 years (production areas inside the facilities were not inspected). Inspectors visually observed the destruction of missiles specified in the treaty. Traffic leaving the missile assembly plant in Votkinsk, Russia, was examined by a variety of sensors to determine whether a controlled item could be in the cargo. If the cargo appeared able to contain a treaty-controlled item, on-site inspectors examined it following agreed procedures.[12]

Reducing existing missile forces

Setting quantity and production limits for missiles limits their threat but verification requires significant intrusiveness. The existing number of weapon systems of a particular type is declared and a "baseline" inspection is conducted to confirm the declaration. Tagging might be necessary to ensure the accuracy of the count. Any items discovered without tags in subsequent inspections would be in violation of the agreement. If quantity limits require reductions in the existing inventories of missiles, destruction would need to be monitored.

Conclusions

The operational concepts described in this paper represent a wide range of possibilities for missile confidence building and control. However, political will, suspicion, custom and security perceptions do not make them equally acceptable. Furthermore, options for monitoring and control need to be integrated into a system to meet the needs of the participating states effectively. The characteristics of the system can evolve over time as confidence and cooperation develop. Table 2 presents some ideas in a generic sequence of implementation. The first step must be a willingness to discuss security and missiles. Dialogue could be initially limited in scope, with more topics addressed as experience and conditions permit.

Table 2. Potential missile control initiatives and time frames

Missile control initiatives	*Short term*	*Medium term*	*Long term*
General transparency	Establish communication infrastructure Determine participants and topics Initiate dialogue on selected topics	Conduct orientation visits Define and conduct cooperative monitoring experiments	Define and conduct cooperative monitoring experiments
Readiness	Declare de-targeting policy Declare de-alert status	Monitor de-alert status	
Exports	Participate in UN Arms Registry Join HCOC	Declare exports and imports consistent with MTCR	Formally join MTCR
Development	Declare tests	Formalize missile test notifications	Limit number or characteristics of tests and monitor
Deployment		Declare non-deployment zones	Formalize non-deployment zones and monitor
Force level		Declare missile force numbers	Establish and monitor missile quantity and/or elimination limits

Notes

1. United Nations Group of Experts, *Study on Ways and Means of Promoting Transparency in International Transfers of Conventional Arms*, UN Document A/46/301, 9 September 1991.
2. Intermediate-Range Nuclear Forces Treaty, signed 8 December 1987, entry into force 1 June 1988, at <www.state.gov/www/global/arms/treaties/inf2.html>.
3. Strategic Arms Reduction Treaty, signed 31 July 1991, at <www.state.gov/t/ac/trt/18535.htm>.
4. Elaine Monaghan, "Russia, US, Cut Risk of Inadvertent Nuclear Strike", *Reuters,* 16 December 2000.
5. Mark Smith, 2002, "Rules for the Road? The International Code of Conduct Against Ballistic Missile Proliferation," *Disarmament Diplomacy 63,* March–April, at <www.acronym.org.uk/dd/dd63/63op3.htm>.

6. Treaty on Open Skies, signed 24 March 1992, entry into force 1 January 2002.
7. Michael W. Edenburn et al, 1999, *De-alerting Strategic Ballistic Missiles,* Cooperative Monitoring Center Occasional Paper no. 9, Albuquerque, NM, Sandia National Laboratories, March, at <www.cmc.sandia.gov/links/cmc-papers/sand-98-0505-9/sand-98-0505-9.html>.
8. For information, visit the MTCR's web site at <www.mtcr.info>.
9. For more information, visit the US government web site presenting the PSI at <www.state.gov/t/np/c10390.htm>.
10. UN Security Council resolution 1540 (2004), UN document S/RES/1540(2004), 28 April 2004.
11. For more information, see the web site of the 1540 Committee at <disarmament2.un.org/Committee1540>.
12. Joseph Harahan, 1993, *On-site Inspection under the INF Treaty*, On-Site Inspection Agency, Department of Defense, US Government Printing Office.