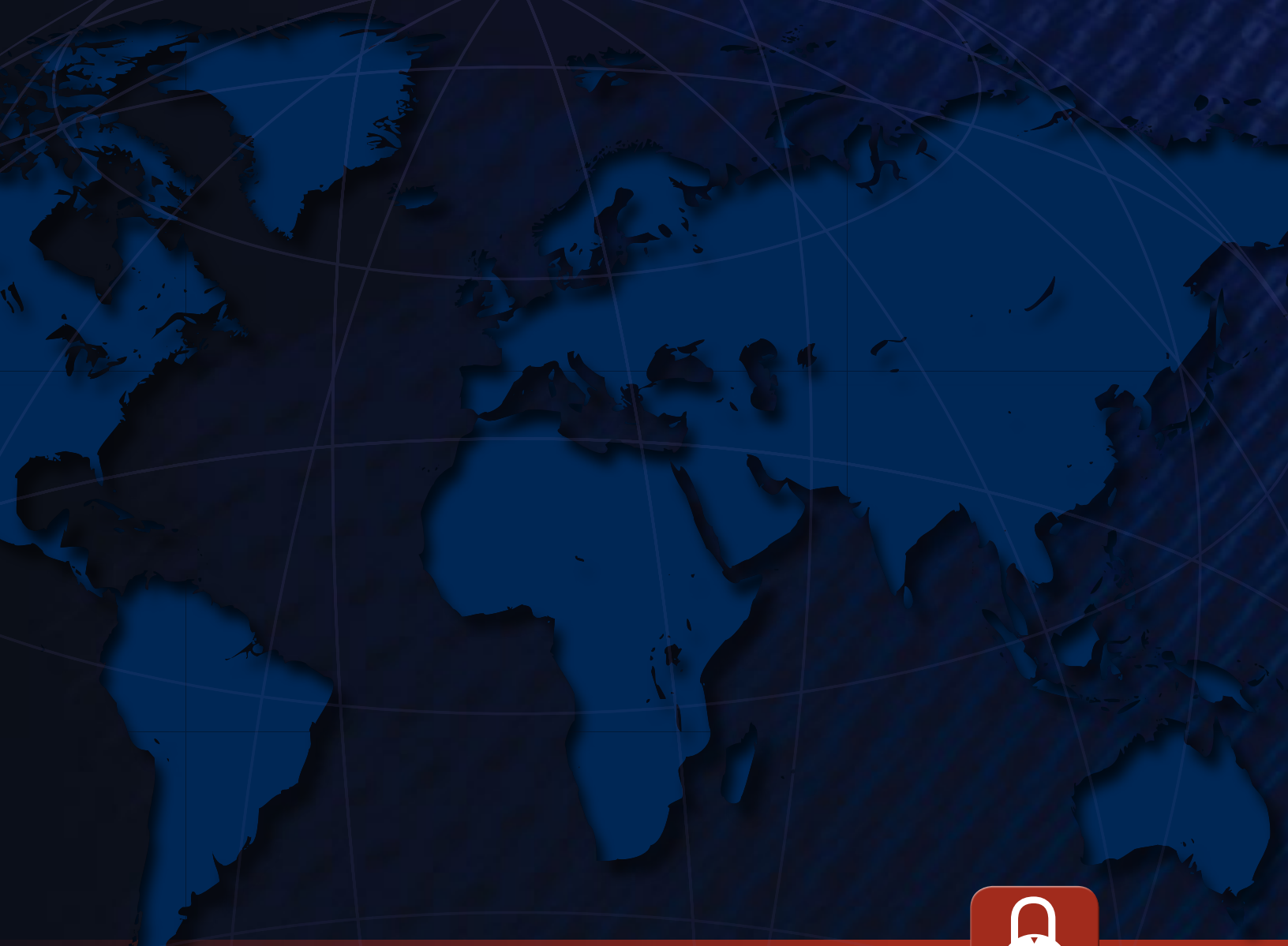


Introduction to International Safeguards

National Nuclear Security Administration

OFFICE OF
NONPROLIFERATION AND
ARMS CONTROL (NPAC)

The Safeguards System of the International Atomic Energy Agency (IAEA)

The purpose of this booklet is to provide background information on how and why International Atomic Energy Agency (IAEA) safeguards play a central role in international efforts to prevent the spread of nuclear weapons.

IAEA safeguards provide assurances to the international community that nuclear material and facilities are not being used for the illicit manufacture of nuclear weapons. Under Article III of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), each non-nuclear weapon State (NNWS)[1] Party is required to conclude with the IAEA a comprehensive safeguards agreement (CSA). The State's primary obligation under the CSA is "to accept safeguards on all source or special fissionable material in all peaceful nuclear activities... for the exclusive purpose of verifying that such material is not diverted to nuclear weapons or other nuclear explosive devices." The NPT has near-universal global adherence; 190 countries have joined the Treaty.[2]

The application of IAEA safeguards promotes international confidence that States are using nuclear energy exclusively for peaceful purposes, deters and provides early warning of incipient nuclear weapon programs, and establishes a basis for States to make judgments regarding compliance with Article III of the NPT. Under the IAEA's Statute, the IAEA Board of Governors (see page 5) is authorized to report noncompliance with a safeguards agreement—a judgment that alerts the international community to possible undeclared nuclear weapons programs—to the United Nations (UN) Security Council. Under Chapter VII of the United Nations charter, the UN Security Council has the authority to impose punitive economic and political sanctions on States that are violating their safeguards agreements with the IAEA as part of the Council's responsibility to maintain international peace and security.

Contents

[1] The NPT, which entered into force in 1970, defines nuclear-weapon States as those that "manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January 1967": The United States (1945); the Soviet Union, now Russia (1949); the United Kingdom (1952); France (1960); and China (1964). All other parties to the NPT are non-nuclear weapon States.

[2] India, Israel, and Pakistan have never joined the NPT. North Korea acceded to the NPT in 1985, and announced its withdrawal from the NPT in 2003.

What are International Safeguards?

International safeguards are the set of technical measures applied by the IAEA to independently and objectively verify that a State's nuclear material is accounted for and not diverted to nuclear weapons or other nuclear explosive devices. In States with comprehensive safeguards agreements, safeguards also provide credible assurance of the absence of undeclared nuclear material and activities, in accordance with the terms of the State's bilateral safeguards agreement with the IAEA.

These technical measures include, for example, on-site inspections, nuclear material accountancy, physical measurements, facility design information verification, containment using tamper-indicating tags and seals, surveillance, and environmental sampling.

The objective of IAEA safeguards is to deter the spread of nuclear weapons by early detection of misuse of nuclear material or technology, thereby providing credible assurances that States are honoring their legal obligations.

Basics of IAEA Safeguards. Retrieved from https://www.iaea.org/safeguards/basics-of-iaea-safeguards

Why are Safeguards Necessary?

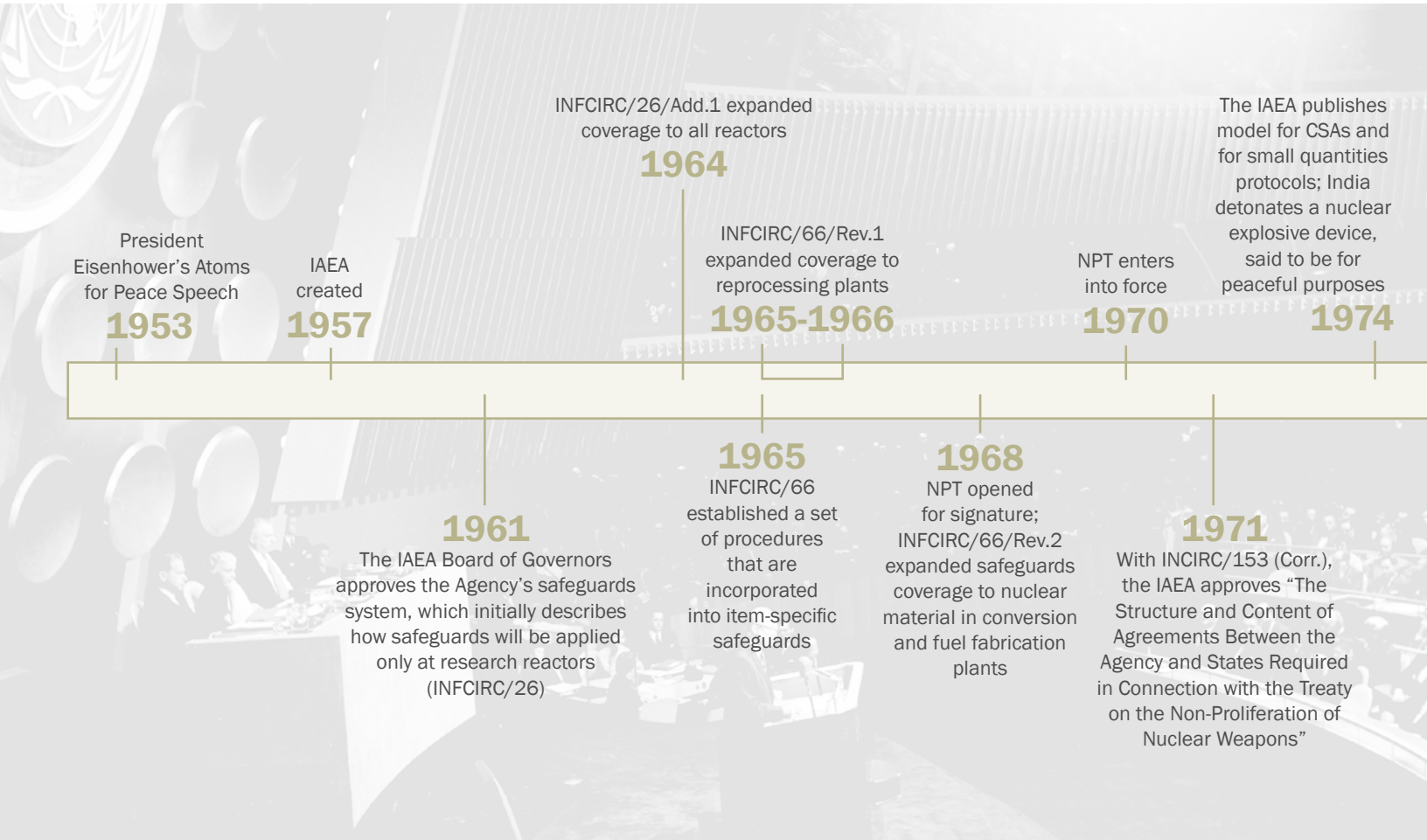
The peaceful uses of nuclear technology include such applications as electricity generation, seawater desalination, the mapping of underground aquifers to improve groundwater management and investigate contamination events, the diagnosis of and treatment for cancer, and the control and eradication of disease-bearing insects. However, the nuclear materials employed for some of these applications—and the facilities used to produce and process those materials—also can be used for the production of nuclear weapons.

With its access to nuclear expertise, facilities, and information, the IAEA is uniquely positioned to reassure the international community that an NNWS is not diverting nuclear material from peaceful purposes to a nuclear weapon program. A robust IAEA capability to verify peaceful activities and to detect and investigate indications of clandestine programs can reduce States' incentives to develop nuclear weapons or latent nuclear weapon capabilities. By the same token, confidence in the IAEA safeguards system can help to facilitate the peaceful uses of nuclear technology, thereby helping to address global energy, environment, and human health challenges.

Historical Overview

In his "Atoms for Peace" speech of December 1953, U.S. President Eisenhower proposed to the United Nations General Assembly "an acceptable solution" that would place all nuclear materials capable of sustaining a chain reaction under the control of an international atomic energy agency. This agency would be responsible for holding the materials in "special safe conditions," making them "immune to surprise seizure." The more important responsibility, President Eisenhower emphasized, would be to "allocate [these materials] to serve the peaceful pursuits of mankind." Stemming from these lofty objectives, the IAEA subsequently was established in 1957 with the dual objectives of facilitating access by all States to the benefits of peaceful uses of atomic energy while also ensuring, through a system of safeguards, that such assistance would not be misused for military purposes.

Seeking a binding mechanism to limit the spread of nuclear weapons without precluding access to peaceful uses of nuclear energy, a number of countries negotiated the text of the NPT in the late 1960s. The NPT was opened for signature in 1968 and entered into force in 1970. Balanced on three mutually reinforcing pillars designed to limit weapons proliferation, encourage nuclear disarmament, and promote the peaceful uses of nuclear energy, the NPT has become a cornerstone of international peace and security.



The IAEA has 164 Member States and more than 180 countries have entered into safeguards agreements with the IAEA.

NPT Article III

Serves as the primary legal basis for the application of international safeguards in NNWSs party to the NPT. Under Article III, NNWSs agree to accept safeguards, as set forth in an agreement with the IAEA, on all nuclear material in all peaceful uses for the purpose of verification of the fulfillment of their NPT obligations "to prevent diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices."

NPT Article IV

Recognizes the "inalienable right" of States "to develop research, production and use of nuclear energy for peaceful purposes" and encourages the "fullest possible exchange of equipment, materials, and scientific and technological information."

NPT Article VI

Requires States to "pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control."

1991 — Iraq found to have nuclear weapons program; the IAEA reports Iraq's non-compliance to the UN Security Council; South Africa accedes to NPT after dismantling its nuclear weapons program

1993 — The IAEA Board concludes the DPRK is in non-compliance with its safeguards agreement and reports matter to the UN Security Council; the IAEA initiates a two-year program ("Programme 93+2") to develop measures to strengthen safeguards

1995 — The IAEA Board reaffirms comprehensive safeguards system should be designed to verify both correctness and completeness of declarations

1997 — The IAEA Board approves Model Additional Protocol, under which States voluntarily bring into force an obligation to provide the IAEA with more information and more access

1998 — Pakistan and India detonate nuclear explosive devices

2002 — Iran's undeclared enrichment plant at Natanz is revealed to public, setting the stage for the IAEA to investigate and reveal extensive undeclared activities and safeguards violations

2003 — DPRK withdraws from NPT and the IAEA Board reports matter to the UN Security Council; Libya agrees to disclose and permit verified elimination of a secret nuclear program

2004 — President Bush announces the A.Q. Khan network sold centrifuge technology to Iran, Libya, and the DPRK

2006 — The IAEA reports Iran case to the UN Security Council; DPRK detonates a nuclear explosive device and subsequently announced a 2nd and 3rd test in 2009 and 2013

2011 — The IAEA Board finds Syria in non-compliance with its safeguards agreement and reports matter to the UN Security Council; the IAEA Director General provides detailed report to the Board on Possible Military Dimensions (PMD) of Iran's nuclear program

Structure of the IAEA

As established in the IAEA's Statute, the Agency functions through the operation of its administrative/operational arm (the Secretariat) as well as two policymaking bodies (the Board of Governors and the General Conference)

The IAEA Department of Safeguards

The Department of Safeguards is the IAEA's largest department, with about 850 staff.

Division of Concepts and Planning (SGCP)

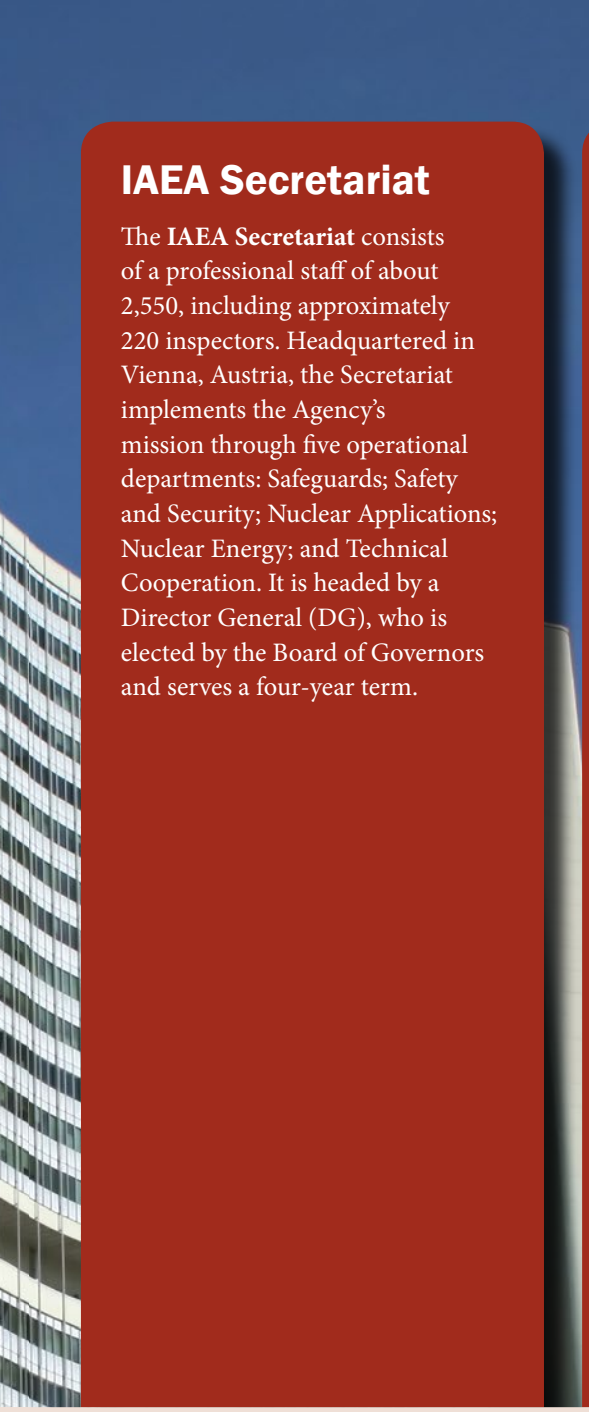
Among its many responsibilities, SGCP "develops concepts, approaches, and methods for safeguarding nuclear material, facilities, and activities; prepares safeguards policy and guidance documentation; conducts strategic planning and coordination and management of Member State Support Programmes and related extra-budgetary funds."

Division of Technical Support (SGTS)

SGTS provides scientific and technical support to the Operations Divisions for the implementation of safeguards. Its responsibilities include "the design, development, testing, calibration, installation, and maintenance of safeguards equipment; performance and contamination monitoring of equipment; and inspection logistics."

Operations Divisions

Three Operations Divisions are responsible for safeguards implementation in different geographical areas: Operations A in Australia and East Asia; Operations B in the Middle East, South Asia, Africa, some non-EU European States, and the Americas; and Operations C in Europe, the Russian Federation, and Central Asia.



IAEA Secretariat

The **IAEA Secretariat** consists of a professional staff of about 2,550, including approximately 220 inspectors. Headquartered in Vienna, Austria, the Secretariat implements the Agency's mission through five operational departments: Safeguards; Safety and Security; Nuclear Applications; Nuclear Energy; and Technical Cooperation. It is headed by a Director General (DG), who is elected by the Board of Governors and serves a four-year term.

Board of Governors

The **Board of Governors** is composed of representatives of 35 IAEA Member States. The Board of Governors consists of 13 Member States that are deemed to be the most advanced in nuclear technology. The remaining 22 Member States are elected by the General Conference (GC) and represent eight geographical regions to ensure that there is equitable representation on the Board. The Board usually meets five times each year to decide or deliberate on a wide range of issues, including the IAEA budget, applications for technical cooperation projects, applications for membership, implementation of and compliance with safeguards agreements, and recommendations made to it by the General Conference. The Board of Governors also is responsible for electing the IAEA's DG, although the appointment is subject to the approval of the General Conference.

General Conference

The **General Conference** (GC) is composed of representatives of all 164 IAEA Member States. The GC meets annually in Vienna, Austria, to consider issues brought before it by the Board of Governors, the DG, and Member States. These issues include approving the Agency's program and budget, considering recommendations by the Board of Governors on membership applications and election of members to the Board of Governors, and voting on amendments to the Statute. With regard to safeguards, the GC may adopt resolutions requesting reports from the Secretariat on the status of various safeguards issues. For example, one recurring GC resolution requires the DG to report annually on the status of "strengthening the effectiveness and improving the efficiency of the safeguards system and application of the Model Additional Protocol." In addition to addressing such broad issues, the GC has requested the DG to report on the status of the implementation of safeguards agreements in particular countries, such as the Democratic People's Republic of Korea (DPRK).

Office of the Deputy Director General. The Deputy Director General and Head of the Department of Safeguards supervises the Department and oversees the implementation of IAEA safeguards.

Division of Information Management (SGIM)

SGIM is responsible for "data processing, secure information distribution, information analysis, and knowledge generation," for the purpose of planning safeguards activities and drawing safeguards conclusions.

Office of Analytical Services (SGAS)

SGAS "analyzes nuclear material and environmental swipe samples; provides associated sampling and quality control materials; coordinates sample shipment logistics; and coordinates work of the Network of Analytical Laboratories (NWAL)." The office also includes the Safeguards Analytical Laboratory (SAL) at Seibersdorf.

Office of Information and Communication Systems (SGIS)

SGIS has responsibility for the production and maintenance of information and communication technology (ICT) systems and for the management of all ICT infrastructure and services to support safeguards. In partnership with other organizational units, SGIS is responsible for planning and implementing an ICT strategy, as well as enforcing ICT standards.

Legal Context

Safeguards agreements reflect the rights and legally binding obligations of both the State and the IAEA with regard to the implementation of safeguards.

Comprehensive Safeguards Agreements (CSAs)
The objective of safeguards, as described in CSAs, is "the timely detection of diversion of significant quantities of nuclear material from peaceful nuclear activities to the manufacture of nuclear weapons or of other nuclear explosive devices or for purposes unknown, and deterrence of such diversion by the risk of early detection." Under a CSA, the State is required to provide the IAEA with information on all imports, exports, inventories, and flows of nuclear material and on the design of nuclear facilities, and the IAEA is charged with not only verifying that nuclear material declarations made by the State are *correct* (i.e., confirming that they accurately describe the types, quantities, and locations of nuclear material in a State's declared nuclear inventory), but also that they are *complete* (i.e., determining that all nuclear material that is required to be safeguarded has actually been declared).

Voluntary Offer Agreements
Under a Voluntary Offer Safeguards Agreement, a nuclear weapon State (NWS) voluntarily offers nuclear material and/or facilities for inspection. By applying safeguards in an NWS, the IAEA can test new safeguards approaches or gain experience in using advanced equipment and technology. In some situations, the IAEA can enhance cost efficiency by applying safeguards in the exporting State to nuclear materials that will be shipped to States with CSAs in force.

INFCIRC/66 Agreements[3]
INFCIRC/66 Agreements specify the nuclear material, non-nuclear material, facilities, and/or equipment to be safeguarded and prohibit the use of specified items from furthering any military purpose. The IAEA implements this type of agreement in India, Pakistan, and Israel–States that have not acceded to the NPT.

[3] Information circulars are published from time to time under the symbol INFCIRC/ for the purpose of bringing matters of general interest to the attention of all Members of the Agency. INFCIRC/1/Rev.14, May 2002

Strengthening Safeguards:

The Model Additional Protocol

Between 1991 and 1993, the IAEA was confronted with unique challenges in Iraq and the DPRK. Following the 1991 Gulf War, the UN Security Council empowered the IAEA to conduct intrusive inspections, including short-notice access to suspect undeclared locations, that resulted in the revelation of an extensive undeclared nuclear weapon program in Iraq. In 1992, discrepancies between the initial nuclear material declarations and the IAEA's inspection findings led to a conclusion that the DPRK was concealing an unknown quantity of undeclared plutonium in violation of its safeguards agreement. As a result of these undeclared activities, the Board of Governors found Iraq and the DPRK to be in noncompliance with their respective safeguards agreements.

These circumstances demonstrated the need for new safeguards tools and methods, expanded access, and expanded information in order for the IAEA to fulfill its verification responsibilities more effectively, in particular with respect to detecting and deterring undeclared nuclear activities.

In 1993, the IAEA and Member States began an intensive effort to identify and evaluate measures to strengthen the IAEA safeguards system. The target date for finishing this work was the 1995 NPT Review and Extension Conference, which led to the name "Programme 93+2."

When the results and recommendations of Programme 93+2 were reported to the Board of Governors, several Member States expressed concern that the proposed measures went beyond the requirements of a CSA and would require complementary legal authority. In response, the Secretariat presented a revised version of its proposals, calling for "Part I" measures that could be implemented under existing authority and "Part II" measures that would require new authority. The Board took note of the DG's intention to begin implementing Part I measures (e.g., environmental sampling, unannounced inspections, and improved analysis of information) in cooperation with States. To achieve the new legal authorities needed to implement Part II measures (enhanced access to locations where

Noncompliance

To maintain the credibility and effectiveness of the international nuclear nonproliferation regime, the world must be confident that non-nuclear weapon States are meeting their legal obligations.

If a State fails to meet its obligations, the State can be found in noncompliance with its safeguards agreement. To reach such a finding, the IAEA Secretariat, through the DG, reports any cases of noncompliance to the IAEA Board of Governors. The Board is empowered to report any noncompliance it finds to have occurred to Member States, the UN General Assembly, and the UN Security Council.

The types of actions[4] that could constitute noncompliance under a State's legally binding CSA include diversion of declared nuclear material, failure to declare nuclear material that is required to be placed under safeguards, undeclared production or processing of nuclear material at declared facilities, undeclared nuclear material or activities within the State, obstruction of the activities of IAEA inspectors, interference with the operation of safeguards equipment, prevention of the IAEA from carrying out its verification activities, or starting the construction or modifying the design of a nuclear facility without informing the IAEA.

The Board has determined noncompliance to have occurred in a number of cases and has reported that noncompliance to the UN Security Council. For example:

- In 1991, the Board found Iraq in noncompliance for its extensive undeclared nuclear program and its misuse of declared nuclear materials and facilities.[5]
- In 1993, after the DPRK refused to address anomalies in its initial declaration of nuclear material that were discovered by the IAEA[6], the Board found the DPRK to be in noncompliance with its safeguards agreement.[7] Ten years later, after the DPRK unilaterally removed IAEA seals and surveillance equipment and expelled inspectors, the IAEA determined that it was still not in a position to verify the non-diversion of nuclear material and the Board found the DPRK to be in "further noncompliance" before referring the matter to the UN Security Council.[8]
- In 2004, the Board found Libya in noncompliance based on its past pursuit of an extensive undeclared nuclear program that it recently had disclosed and had agreed to verifiably eliminate. Libya's noncompliance was reported to the UN Security Council for information purposes.[9]
- In 2005, the Board found Iran to be in noncompliance based on its past concealed nuclear program, as the DG had reported to it in 2003.[10] The Board delayed reporting its noncompliance finding to the UN Security Council until 2006.
- In a 2011 report on Syria presenting the Secretariat's conclusions concerning an alleged nuclear reactor destroyed in a 2007 air strike, the DG stated that *'the [IAEA] concludes that the destroyed building was very likely a nuclear reactor and should have been declared by Syria pursuant to…its Safeguards Agreement and… Subsidiary Arrangements.'*[11] The Board subsequently determined that Syria was in noncompliance with its safeguards agreement and reported the matter to the UN Security Council.

[4] See below examples and GOV/2011/30, GOV/2003/75, GOV/2005/77 and Safeguards Glossary: http://www-pub.iaea.org/MTCD/publications/PDF/nvs-3-cd/PDF/NVS3_prn.pdf, section 2.1
[5] GOV/2531, July 1991; GC (XXXV)/978/add.1, September 1991
[6] INFCIRC/419
[7] GOV/2645
[8] IAEA Media Advisory 2003/48
[9] Director General Mohamed ElBaradei, "IAEA Director General Briefs Board on Iran, Libya, Other Topics," 8 March 2004.
[10] GOV/2003/75
[11] GOV/2011/30 Challenges

nuclear material might not be present, such as centrifuge rotor manufacturing plants) and provide more credible assurance of the absence of undeclared nuclear material and activities anywhere in a State, the Secretariat drafted a new protocol additional to States' existing safeguards agreements. The Model Additional Protocol (AP), published as INFCIRC/540 (Corr.), was adopted by the Board of Governors in 1997.

The AP includes two important elements to strengthen the IAEA's authorities. First, it provides for additional information through an expanded State declaration. The expanded declaration includes information on, for example, nuclear fuel cycle R&D activities *not involving nuclear material*; the use and contents of buildings on a site surrounding nuclear facilities; certain nuclear fuel cycle-related manufacturing and assembly activities; uranium mining and ore concentration activities; and exports of certain nuclear-related equipment. Second, the AP provides the IAEA with "complementary access" (in addition to routine and ad hoc inspections) in order to, inter alia, provide assurances of the absence of undeclared nuclear material or activities, including the resolution of questions and inconsistencies about the completeness or correctness of a State's declaration. The AP identifies activities that the IAEA may conduct during such complementary access, and the basis upon which the State can manage that access.

Implementation: Tools, Methods, and Sources

Safeguards implementation involves the use of advanced technologies and equipment in ways that are cost effective and efficient for both inspectors and the State. Trained personnel are required to ensure these measures are applied according to international standards and best practices. Common tools and methods employed for the implementation of safeguards include the following:

- *Nuclear Material Accountancy (NMA)* methods to establish the quantities of nuclear material present within defined areas and the changes in those quantities within defined periods. The IAEA applies NMA, complemented by containment and surveillance measures (see below) to independently verify the correctness of the accounting information provided by the State, so as to detect and deter the diversion of nuclear materials and provide assurance that nuclear materials are present in their declared locations.
- *Containment and Surveillance (C/S)* methods are designed to detect undeclared activities, such as attempts to alter the composition or quantities of nuclear material. Tools such as cameras, tags, seals, and other sensors provide "continuity of knowledge

The U.S. Support Program (USSP) to IAEA Safeguards

The USSP provides the IAEA with extra-budgetary assistance for targeted projects to make international safeguards more effective and efficient and to address specific technical safeguards issues. In recent years, the USSP has sponsored projects to assist the IAEA across a broad spectrum of activities, including nondestructive analysis of nuclear material, containment/surveillance capabilities, environmental sampling and analysis techniques, remote monitoring, information collection, processing, analysis, training, and development of expertise. The USSP receives funding from the Department of State through the U.S. Program of Technical Assistance to IAEA Safeguards (POTAS), established in 1977. Representatives from the Department of State, the Department of Energy, the Nuclear Regulatory Commission, and the Department of Defense provide program coordination.

There are two types of nuclear fuel cycle facilities that are placed under safeguards: item facilities and bulk facilities.

1 Item facilities are facilities where nuclear material is contained in individual, identifiable items, such as fuel assemblies. Examples of item facilities include power reactors (e.g., light water reactors), research reactors, critical assemblies, and separate spent fuel storage facilities.

2 Bulk facilities are facilities where nuclear material is in loose form, such as powder, liquid, or fuel pellets, or in large numbers of non-identifiable units. Examples of bulk facilities include plants for conversion, fuel fabrication, reprocessing, or enrichment. Implementing safeguards at bulk facilities can be significantly more complicated, expensive, and time consuming than at item facilities because the material does not exist exclusively as discrete items and quantitative measurement—not just verification of the presence of an item with the proper identification and attributes—is required.

between inspections by preventing undetected access to, movement of, or interference with nuclear or other materials."[12]

  - » *Tags and Seals* also help to "ensure continuity of knowledge of the identity and integrity of the material" in facilities, containers, and equipment by making "access to their contents without opening the seal difficult."[13]

- *Environmental Sampling (ES)* refers to the collection and analysis of samples from inside the facility or the local environment in order to detect traces of materials that can reveal information about nuclear processes conducted in the vicinity.
- *Nondestructive Assay (NDA)* refers to the process of measuring the nuclear material content or the elemental or isotopic concentration of an item without producing significant physical or chemical changes in the item.
- *Destructive Analysis (DA)* refers to the process of measuring the nuclear material content or the elemental or isotopic concentration of a sample through methods that alter the physical or chemical form of the sample.
- *Unattended and Remote Monitoring (URM)* refers to non-destructive assay and/or C/S measures that operate for extended periods without inspector presence. The data collected by remote monitoring systems may be transmitted off-site via secure communication networks for review and evaluation by the IAEA. Unattended monitoring systems can store data on-site.[14]

[12] Safeguards Glossary: http://www-pub.iaea.org/MTCD/publications/PDF/nvs-3-cd/PDF/NVS3_prn.pdf, section 8.1
[13] Safeguards Glossary: http://www-pub.iaea.org/MTCD/publications/PDF/nvs-3-cd/PDF/NVS3_prn.pdf, section 12.20
[14] Safeguards Glossary: http://www-pub.iaea.org/MTCD/publications/PDF/nvs-3-cd/PDF/NVS3_prn.pdf, section 8.15

Special Nuclear Material Timeliness Goals

The goal of safeguards under CSAs is to provide "timely detection" of diversion of "significant quantities" of nuclear material from peaceful nuclear activities and the deterrence of such diversion by the risk of early detection. The required "timeliness" of diversion detection is dependent on material "attractiveness." The more directly a material could be applied to nuclear explosives, the shorter the time window for detecting diversion. Direct-usability is influenced by enrichment levels for uranium and by isotopic purity levels in the case of plutonium. A Significant Quantity (SQ) is the approximate amount of nuclear material required to manufacture a nuclear weapon.

Special Nuclear Material	Significant Quantities in kg	Timeliness
Plutonium (<80% Pu-238)	8 kg total Pu	Irradiated = 3 months Unirradiated = 1 month
Highly Enriched Uranium (>20% U-235)	25 kg U-235	Irradiated = 3 months Unirradiated = 1 month
Low Enriched Uranium (<20% U-235) – including natural uranium (NU) and depleted uranium (DU)	75 kg U-235 (or 10 t NU or 20 t DU)	12 months

Challenges

Since the international safeguards system is a central pillar of the nuclear nonproliferation regime, it is critical to ensure its effectiveness. As the peaceful use of nuclear technology continues to play in important role in international economic and social development, the IAEA will need more financial resources, political support, and personnel with specialized skills to meet the expanding safeguards challenges of the 21st century. However, in recent years, a convergence of factors has challenged the IAEA's ability to carry out its safeguards mission effectively.

- The number of nuclear facilities coming under IAEA safeguards continues to grow steadily–by 12 percent in the past five years alone. The amount of nuclear material to be safeguarded also has risen by nearly 14 percent in the same period.
- High-profile investigations in Iran, DPRK, Iraq, and Syria have strained the IAEA's resources.
- The number of States with APs in force has increased to more than 125, thereby strengthening the international safeguards regime but increasing the number and scope of State declarations the IAEA must verify.

The State-Level Concept

The IAEA continuously works to make international safeguards more effective and more efficient.

The State-level concept (SLC) continues long-standing efforts and trends in the evolution of safeguards implementation. The SLC is described by the IAEA as an approach to safeguards implementation that considers a State's nuclear and nuclear-related activities and capabilities as a whole, within the scope of the State's safeguards agreement, rather than mechanistically carrying out activities according to a rigid checklist of criteria for specific types of nuclear facilities. This approach, which does not require new legal authority, is driven by the IAEA's need to carry out its safeguards activities more effectively and efficiently and continuously improve its productivity. The SLC is implemented using an ongoing and collaborative State evaluation process and applied to all States with safeguards agreements, including those without Additional Protocols.

State Evaluation Process

Since the introduction of strengthened safeguards in the 1990s, the IAEA gradually has been acquiring more information about nuclear and nuclear-related activities in a State. To capture the expanded focus on information, the IAEA has established a more collaborative State evaluation process—in which interdisciplinary State Evaluation Groups with representatives from multiple offices within the Safeguards Departments collect, synthesize, and analyze all available information, including inter alia, State declarations, inspectors' observations, information from open sources, and third-party information. The ongoing State evaluation process contributes directly to the formulation of State-level approaches tailored to each State and helps the IAEA prioritize the allocation of its limited resources in an Annual Implementation Plan (AIP) for each State.

Information Sources:

Under the State-level concept, various information sources, in addition to State declarations and inspections, are used to develop and maintain an extensive picture of the State's nuclear activities and to support the IAEA's ability to derive safeguards conclusions. These other sources include satellite imagery, open source information, scientific publications, third-party information, and trade and procurement data.

At the same time

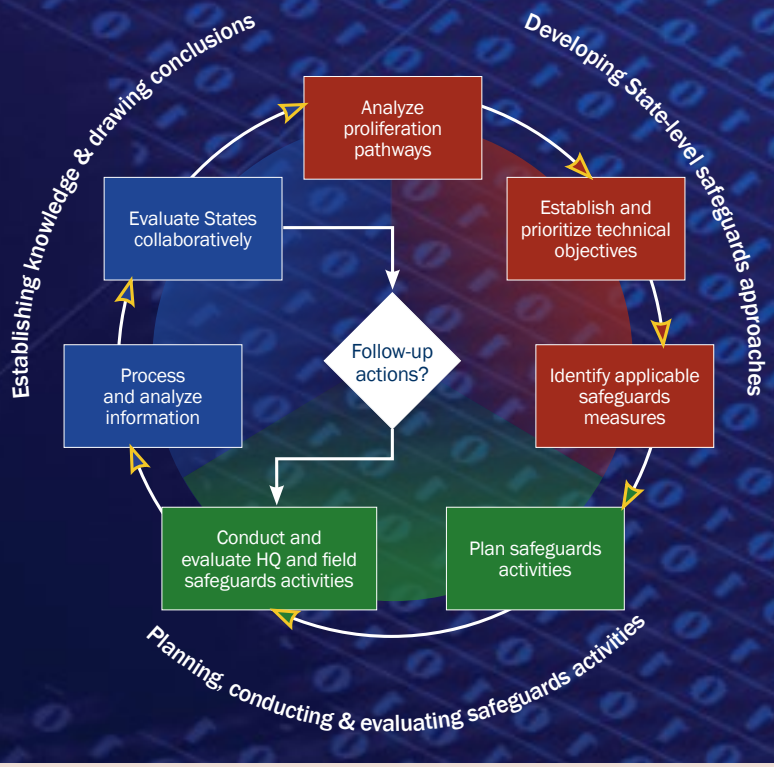
- The IAEA budget has remained relatively static;
- Many proven safeguards technologies are increasingly expensive to maintain; and
- The community of safeguards professionals is experiencing a high rate of attrition due to retirement.

Without a systematic, concerted effort to reverse these trends, the disparity between the IAEA's resources and responsibilities will continue to increase.

IAEA Safeguards Budget

In 2015, the IAEA's total Regular Budget amounted to €345 million. Of the total Regular Budget, €133 million—or 39%—went to nuclear verification activities.

Through the SLC, the IAEA seeks to complement routine on-site inspection activities with ongoing State-level evaluations that take advantage of all safeguards-relevant information to plan, conduct and evaluate safeguards activities, and inform the conclusions about Member States' compliance with their safeguards obligations. This holistic approach to safeguards implementation takes into account the unique characteristics of each State. The resulting "State-level" safeguards approach entails planning, conducting, and evaluating safeguards customized to a particular State. Implementation of the SLC ideally will be responsive to changes in analysis, thereby ensuring that the assurances provided to the international community remain credible and informed by the best available information.



State Declared

- Nuclear Material Accounting Data
- Imports/Exports
- Facility Design Descriptions
- R&D Projects, People, Locations

Inspection Information

- Inspection Reports
- Design Information Verification
- Environmental Sampling
- Consultation
- Clarification Letters

Other Information

- Open Sources *(news, Internet, catalogs, TV/radio transcripts, publications)*
- Scientific Literature *(tables of authors, organizations, date, abstract, keywords)*
- Third-Party Information
- Trade and Procurement Data
- Internal Databases
- Trip Reports

Information Types

- Text Descriptions or News Articles
- Maps
- Photographs
- Commercial Satellite Imagery
- Diagrams
- Formatted Output Tables
- Excel Spreadsheets
- Project Plans
- Budget Tables
- Locations Organizations
- Personnel
- Presentation Charts

Office of International Nuclear Safeguards

Next Generation Safeguards Initiative

In 2008, the Department of Energy, National Nuclear Security Administration (DOE/NNSA) established the Next Generation Safeguards Initiative (NGSI) to develop the policies, concepts, technologies, expertise, and international safeguards infrastructure necessary to strengthen and sustain the international safeguards system as it evolves to meet new challenges.

Safeguards Policy

The NGSI Safeguards Policy subprogram, working with other U.S. agencies and the IAEA, conducts activities designed to:

- Strengthen and encourage full use of existing IAEA authorities and examine possible new authorities;
- Develop policies and strategies that will help the IAEA plan, evaluate, and report on the implementation of safeguards agreements in a manner that is effective, efficient, objective, transparent, and non-discriminatory; and
- Increase public awareness and understanding of the role of international safeguards in international efforts to prevent the spread of nuclear weapons.

Policy Studies

Some recent NGSI policy studies have examined ways to help the IAEA use all relevant information to customize safeguards approaches to each State, optimize its inspection activities, and draw conclusions as effectively and efficiently as possible.

Concepts and Approaches

The NGSI Concepts and Approaches subprogram focuses on: (1) identifying and analyzing safeguards best practices, gaps in current capabilities, and new requirements; and (2) demonstrating and evaluating advanced methods to safeguard nuclear material and facilities. These efforts help inform investment decisions about future safeguards technology research and development to support enhanced safeguards concepts and approaches.

Safeguards by Design (SBD)

NGSI promotes the concept of Safeguards by Design (SBD) in which international safeguards are fully integrated into the design process of a new nuclear facility from the initial planning through design, construction, operation, and decommissioning. NGSI supports the ongoing IAEA SBD guidance development effort, and engages directly with U.S. nuclear industry facility designers to assist the U.S. nuclear industry in better understanding and implementing SBD for specific projects. The NGSI series of SBD guidance documents are available at www.nnsa.energy.gov/safeguardsbydesign.

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International Nuclear Safeguards Engagement

Through cooperation with more than 25 international partners, the NGSI International Nuclear Safeguards Engagement subprogram conducts activities that are designed to:

- Prepare the safeguards infrastructure necessary to support the safe, secure, and peaceful uses of nuclear energy;
- Enhance the implementation of IAEA safeguards and strengthen State accounting and reporting systems through capacity building, regulatory development, and technology transfers to reduce the likelihood of theft or diversion of nuclear material for non-peaceful purposes; and
- Test and implement new safeguards technologies to meet future and current safeguards challenges.

Additional Protocol (AP) Outreach

A number of countries require legislative and technical support in order to prepare the infrastructure and procedures necessary to provide timely, correct, and complete declarations pursuant to their AP. The NGSI International Nuclear Safeguards Engagement subprogram currently cooperates with nearly a dozen partner countries in strengthening AP implementation.

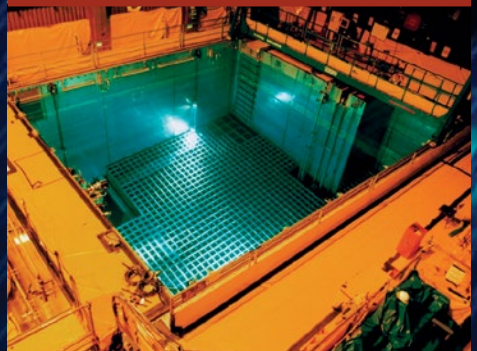
Technology Development

The NGSI Technology Development subprogram directs the DOE National Laboratories in the development and testing of tools, technologies, and methods that optimize the effectiveness and efficiency of safeguards implementation. In particular, this subprogram focuses on transitioning advanced and maturing technologies with near-term safeguards applications from the laboratory into the field. Focus areas include:

- Advanced nuclear measurement technologies;
- Field-portable, near-real-time analysis tools;
- Data integration and authentication applications;
- Improved detector materials; and
- Strengthened technology development infrastructure at the National Laboratories.

Advanced Technologies

The NGSI Technology Development subprogram has undertaken a multi-year effort to develop and test new nondestructive assay (NDA) techniques capable of measuring certain characteristics of spent nuclear fuel.



Human Capital Development

The Human Capital Development (HCD) subprogram of NGSI is developing sustainable academic and technical programs that support the recruitment, education, training, and retention of the next generation of international safeguards professionals to help meet the needs of both the United States and the IAEA for decades to come. Focus areas include:

- University engagement through curriculum development, guest lectures, and textbook development;
- Internships, post-doctoral fellowships, and graduate assistant positions at DOE National Laboratories;
- Safeguards policy and technology courses to strengthen young and mid-career professional development;
- Career opportunities for safeguards experts returning to the United States from positions at the IAEA; and
- Ongoing analysis of workforce needs of safeguards-relevant staff at DOE National Laboratories.

Metrics of Success

Of past NGSI students and interns, nearly four in ten pursue multiple NGSI opportunities, one in five are converted to permanent DOE National Laboratory staff, and nearly two in ten pursue a nonproliferation or safeguards-focused graduate degree.

Introduction to

International Safeguards

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