

Safeguards

Objective

To provide credible assurance to the international community that nuclear material and other items placed under safeguards are not diverted or misused; for States with comprehensive safeguards agreements, to provide credible assurance that all nuclear material remains in peaceful activities; and to support the efforts of the international community in connection with nuclear disarmament.

Safeguards Conclusion for 2007

At the end of each year, the Agency draws a *safeguards conclusion* for each State with a safeguards agreement in force, based upon the evaluation of all information available to it for that year. With regard to States with comprehensive safeguards agreements (CSAs), the Agency seeks to conclude that all nuclear material remained in peaceful activities. To draw such a conclusion, the Secretariat must conclude: (i) that there is no indication of diversion of declared nuclear material from peaceful activities (including no misuse of declared facilities or other locations to produce undeclared nuclear material); and (ii) that there is no indication of undeclared nuclear material and activities for the State as a whole.

In order to conclude that there is no indication of undeclared nuclear material and activities for the State as a whole, and ultimately to be able to draw the broader conclusion that all nuclear material remained in peaceful activities, the Secretariat considers the results of its verification activities under CSAs *and* the results of its evaluation and verification activities under additional protocols (APs). Therefore, for the Agency to draw such a broader conclusion, both a CSA and an AP must be in force, *and* the Agency must have been able to conduct all necessary verification and evaluation activities. For States that have CSAs in force but no APs, the Agency does not have sufficient tools to provide credible assurance regarding the absence of undeclared nuclear material and activities for the State as a whole, and therefore only draws a conclusion for a given year with respect to whether *declared* nuclear material remained in peaceful activities.

In 2007, safeguards were applied for 163 States with safeguards agreements in force with the Agency. Eighty-two States had both CSAs and APs in force. For 47 of these States,¹ the Agency concluded that all nuclear material remained in peaceful activities. For 35 of the States, the Agency had not yet completed all the necessary evaluations and could therefore only conclude that the declared nuclear material remained in peaceful activities. Similarly, for 72 States with CSAs in force but without APs, the Agency was only able to draw that conclusion.²

Three States had in force item specific safeguards agreements which require the application of safeguards to specified nuclear material, facilities and other items or material. For these States, the Secretariat concluded that nuclear material, facilities or other items to which safeguards were applied remained in peaceful activities.

Five nuclear weapon States had voluntary offer safeguards agreements in force. Safeguards were implemented with regard to declared nuclear material in selected facilities in four of the five States. For these four States, the Agency concluded that nuclear material to which safeguards were applied in selected facilities remained in peaceful activities or was withdrawn as provided for in the agreements.

As of 31 December 2007, 30 non-nuclear-weapon States party to the NPT had yet to bring CSAs into force pursuant to the Treaty. For these States, the Secretariat could not draw any safeguards conclusions.

A broader conclusion was drawn for the first time for Armenia, Belgium, Cuba, Denmark, Estonia, Finland, Italy, Malta, the Netherlands, Palau, the Republic of Korea, Slovakia, Spain, Sweden and Uruguay, and was reaffirmed for 32 States.

"In 2007, safeguards were applied for 163 States with safeguards agreements in force with the Agency."

¹ And for Taiwan, China.

² The 72 States do not include the Democratic People's Republic of Korea as the Agency was not able to implement safeguards in that State and, therefore, could not draw any conclusion.

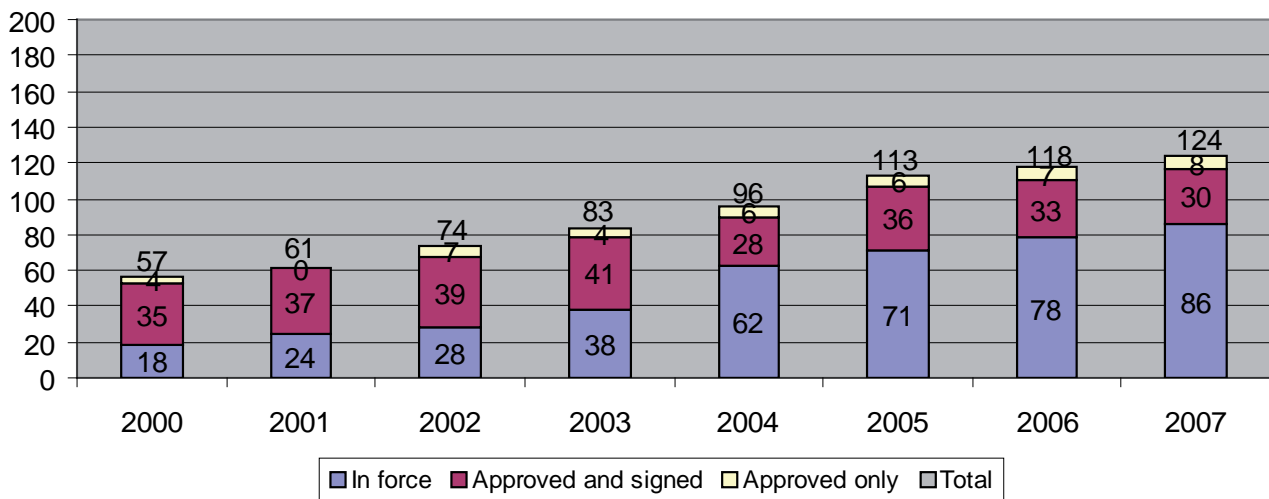


FIG. 1. Number of APs in force and approved by the Board of Governors at the end of 2007.

Conclusion of Safeguards Agreements and APs

The Agency continued to facilitate the conclusion of safeguards agreements and APs. As a result of these and other activities, the number of States party to the NPT that had yet to conclude CSAs decreased from 31 to 30. APs entered into force for eight States during 2007, so that by the end of 2007, 86 States had APs in force (Fig. 1). Five States signed APs in 2007, and seven States had APs approved by the Board of Governors.

Small Quantities Protocol

Following a decision by the Board of Governors in 2005, the Agency initiated exchanges of letters with all States having a small quantities protocol (SQP) in order to give effect to the modifications in the standard text and the change in the SQP criteria. During 2007, SQPs were amended to reflect the modified text for four States. An SQP was rescinded and a new safeguards agreement with a modified SQP was concluded. By the end of 2007, there were 69 States with operative SQPs still requiring modification in accordance with the Board's decision.

"Integrated safeguards can be defined as the optimum combination of all safeguards measures available to the Agency."

Implementation of Integrated Safeguards

Integrated safeguards can be defined as the optimum combination of all safeguards measures

available to the Agency under CSAs and APs to achieve maximum effectiveness and efficiency in meeting the Agency's safeguards obligations. They are implemented in a State for which the Agency has drawn the broader conclusion that all nuclear material has remained in peaceful activities. Under integrated safeguards, measures may be applied at reduced levels at certain facilities.

Integrated safeguards continued to be implemented in Australia, Bangladesh, Bulgaria, Canada, Ghana, Hungary, Indonesia, Japan, Latvia, Norway, Peru, Poland, Slovenia and Uzbekistan. During 2007, integrated safeguards implementation was initiated in the Czech Republic, Ecuador, Jamaica, Lithuania, Mali and Romania. In addition, State level integrated safeguards approaches were approved for Austria, Greece, Ireland and Portugal. In total, at

the end of 2007, State level integrated safeguards approaches were approved for 24 States.

Progress has been made on the arrangements between the European Commission and the Agency for the introduction of integrated safeguards in States party to INFCIRC/193. Discussions on procedural matters began at the regular Liaison Committee meetings, with the aim of introducing integrated safeguards in the relevant Member States in 2008.

The phased implementation of integrated safeguards in Japan continued at the site and facility levels during 2007, and started in Canada. The use of low frequency unannounced inspections has substantially decreased the inspection effort needed

in both States and it is further anticipated that the transition to full implementation of integrated safeguards will result in additional savings in the inspection effort.

Safeguards Implementation Issues

Implementation of safeguards in the Democratic People's Republic of Korea

Since December 2002, the Agency has not been able to implement safeguards in the Democratic People's Republic of Korea (DPRK) and, therefore, cannot draw any safeguards conclusion.

In March 2007, pursuant to a request from the States in the Six-Party talks, and at the invitation of the DPRK, the Director General, along with a team of Agency experts, visited the DPRK. Following this visit, and subsequent expert level consultations, the Agency agreed with the DPRK on monitoring and verification arrangements related to the shutdown of the Yongbyon nuclear facility.

On 17 July 2007, the Agency confirmed the shutdown status of the following installations at the Yongbyon nuclear facility: the Nuclear Fuel Fabrication Plant; the Radiochemical Laboratory (the reprocessing plant); the 5 MW(e) Experimental Nuclear Power Plant; and the 50 MW(e) Nuclear Power Plant. The Agency also confirmed the shutdown status of the 200 MW(e) Nuclear Power Plant in Taechon. As of 31 December 2007, these installations remained shut down.

On 4 November 2007, the DPRK started the disablement of the Yongbyon nuclear facilities. The Agency was able to observe and document the disabling work, including the 5 MW(e) Experimental Nuclear Power Plant No. 1 core discharge activities, while conducting facility monitoring activities. The spent fuel rods from the 5 MW(e) reactor were measured by the Agency upon discharge. These fuel rods, and the remaining items in the reactor core, are under Agency containment and surveillance. The nuclear material which has been generated during the disabling activities at the Nuclear Fuel Fabrication Plant also remains under Agency containment and surveillance.

Implementation of safeguards in the Islamic Republic of Iran

During 2007, the Director General submitted four reports to the Board of Governors, including reports in February and May to the United Nations

Security Council, on the implementation of the NPT safeguards agreement in Iran. Pursuant to its CSA, Iran continued to provide the Agency with access to declared nuclear material and facilities, and provided the required nuclear material accountancy reports in connection with such material and facilities. Iran also concluded a Facility Attachment for the Fuel Enrichment Plant at Natanz. In 2007, the Agency did not receive the type of information that Iran had previously been providing pursuant to the AP and as transparency measures.

In March 2007, Iran suspended the implementation of the modified Code 3.1 of its Subsidiary Arrangements to its CSA with respect to the early provision of design information. In August 2007, agreement was reached on a work plan for resolving outstanding safeguards implementation issues. By the end of 2007, the Agency was able to clarify Iran's statements with respect to the plutonium experiments and its declared past P-1 and P-2 centrifuge programmes. The Agency also received a copy of the 15 page uranium metal document describing the procedures for the reduction of uranium hexafluoride (UF_6) to uranium metal and the casting and machining of enriched and depleted uranium metal into hemispheres. The Agency will continue, in accordance with its procedures and practices, to seek corroboration of its findings and to verify these issues as part of its verification of the completeness of Iran's declarations. The clarification of the issues relating to HEU contamination, polonium-210, the Gchine mine and the alleged studies on the green salt project, high explosives testing and the missile re-entry vehicle, was ongoing.

While the Agency was able to verify the non-diversion of the declared nuclear material in Iran in 2007, the Agency was not in a position to provide credible assurances regarding the absence of undeclared nuclear material and activities in Iran.

On 24 March 2007, the United Nations Security Council adopted resolution 1747 (2007), inter alia, re-affirming its decision in Security Council resolution 1737 (2006) that Iran suspend all enrichment related and reprocessing activities, including research and development, and work on all heavy water related projects, including the construction of a heavy water moderated research reactor.

In 2007, Iran continued with the operation of the Pilot Fuel Enrichment Plant and the Fuel Enrichment Plant. Construction of the IR-40 reactor, and operation of the heavy water production plant, were

also continuing at the end of 2007. There were no indications of reprocessing related activities at any declared sites in Iran in 2007.

Implementation of safeguards in the Republic of Korea

In 2004, following Agency enquiries, and in connection with the submission of its initial declaration pursuant to its AP, the Republic of Korea declared that laboratory scale experiments on uranium enrichment had been previously carried out without having been reported to the Agency. It also acknowledged past undeclared experiments, which involved uranium conversion, chemical enrichment of uranium and fuel irradiation followed by an experiment involving the separation of plutonium. These activities should have been reported by the Republic of Korea to the Agency in accordance with its obligations under its safeguards agreement. Information on these issues was provided in a report by the Director General submitted to the Board of Governors in November 2004 and in the Safeguards Implementation Report for 2004.

On the basis of the assessment of the information provided by the Republic of Korea on its previously undeclared nuclear activities, and other verification activities carried out by the Agency – including inspections, verification of design information and complementary access – the Agency was able to clarify the scope of the undeclared experiments and the amounts of nuclear material involved. The Agency’s findings show that the Republic of Korea’s past experiments and activities involving uranium conversion, uranium enrichment and plutonium separation were terminated prior to 2001, that the equipment used has been dismantled or is being used for other non-nuclear activities, and that there is no indication of the continuation of these activities.

For 2007, the Agency has found no indication of the diversion of declared nuclear material, and no indication of undeclared nuclear material and activities in the Republic of Korea. Therefore, the Agency was able to conclude for this State that all nuclear material remained in peaceful activities.

In the Republic of Korea, relevant procedures for the future implementation of integrated safeguards started, and some were tested through joint rehearsals between the Agency and the Republic of

Korea at various nuclear facilities and sites in 2007. These activities were in anticipation of the Agency drawing the broader conclusion for this State.

Detecting Undeclared Nuclear Material and Activities: Improved Technical Capabilities and Methods

Safeguards equipment development

Under the Agency’s project for the identification and development of effective and appropriate techniques for Safeguards, a workshop sponsored by the USA studied the area of advanced sensors for safeguards. Task proposals, covering semiconductor sensors and equipment for sampling airborne gases, are currently under consideration in two Member States. In addition, 13 Member States and the European Commission have indicated their support of the Novel Technologies Project by establishing tasks in this area.

Given the growing use of laser methods for rapid on-site analysis of materials, elements and isotopes, a technical meeting on the ‘Application of Laser Spectrometry Techniques in IAEA Safeguards’ was convened. The experts agreed that laser spectrom-

etry was an effective and cost efficient alternative to some existing inspection methods, as well as a novel solution for emerging safeguards

verification and detection needs. As an outcome, development began on a low cost on-line enrichment monitor and an in-field forensics instrument for on-site sampling and analysis of compounds and elements.

A workshop on ‘Advanced Safeguards Technology for the Future Nuclear Fuel Cycle’ was hosted by Japan in November to provide guidance on the future expected scenarios of the nuclear industry and to focus on the development of new safeguards methods and instruments to support the Agency’s verification activities. A study was also initiated to model releases of signature isotopes from nuclear fuel cycle processes.

Sample analysis

Environmental sampling continues to be used extensively to confirm the absence of undeclared nuclear material and activities in facilities and

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FIG. 2. Analysing environmental samples at SAL.

locations subject to inspections and complementary access (Fig. 2). In 2007, the Safeguards Analytical Laboratory (SAL) completed the installation of a new inductively coupled plasma-mass spectrometer for measurements of uranium and plutonium in swipe samples.

The laboratories of the Network of Analytical Laboratories (NWAL) performing environmental sample analysis, including SAL, were used at full capacity in 2007. Laboratories in Brazil and China have started qualification processes to join the NWAL.

A special SAL study group was established in 2007 to make recommendations for the future development of the laboratory. The report, which was presented at the November meeting of the Board of Governors, recommended that the Agency's Laboratories, Seibersdorf, be consolidated and reconstructed, its independent analytical capabilities strengthened and further utilization of the NWAL investigated. In particular, the report gave higher priority to the procurement and installation of an ultra-high-sensitivity secondary-ion mass spectrometer (UHS-SIMS). The Board of Governors expressed its support for independent and timely analysis of safeguards samples and encouraged Member States to provide extrabudgetary support.

Design information verification

In States with CSAs and significant nuclear activities, the Agency verifies design information at any stage in the life of nuclear facilities. By the end of 2007, design information verification plans for the entire life cycle of a facility had been prepared for 596 facilities.

Research and development programme

Research and development activities carried out with the assistance of Member State Support Programmes are essential to meet safeguards challenges in the absence of independent Agency R&D capabilities. During 2007, the Agency prepared its R&D programme for 2008–2009, which contains 23 projects in such areas as development of safeguards concepts, information processing and analysis, verification technologies and training.

Covert nuclear trade

The Agency continued to analyse safeguards relevant information on possible covert trade in nuclear material. In addition, the procurement outreach programme gathered information, provided

on a voluntary basis, on procurement enquiries and export denials of nuclear related equipment, materials and technology in order to detect early proliferation indicators.

Neptunium and americium

While several States have not yet responded to the Agency's requests for voluntary information on neptunium and americium and others have not properly reported on them, evaluation of the information, when provided by States, has continued. During 2007, flow sheet verification for neptunium was carried out at a European Commission laboratory and at a reprocessing and plutonium conversion facility in Japan.

Information technology

The Agency's project to re-engineer the safeguards information system reached a turning point in 2007 with completion of Phase II (foundation projects), dealing with the installation of the architecture and development of common building blocks. Phase III (implementation projects) began in 2007 with the aim of establishing a new integrated safeguards environment, primarily through the installation of a new production environment based on a single modular platform and a future-proof service oriented architecture. Information from open sources, commercial satellite imagery, in-house databases and other sources was collected, analysed and used extensively to support the evaluation of State nuclear activities in 2007.

Remote monitoring

By the end of 2007, 146 systems (96 surveillance and 50 radiation monitoring systems) with remote transmission capabilities were authorized for inspection use in 16 States.³ The application of this technology has resulted in the enhanced effectiveness and efficiency of safeguards implementation.

Full remote monitoring was implemented during 2007 in Lithuania, Romania, Slovakia, the Czech Republic and Ukraine. Partial remote monitoring (i.e. 'status of health' information) was implemented in the Czech Republic, Ukraine, Kazakhstan and Bulgaria. Significant progress was made with the implementation of remote monitoring in Canada:

³ As well as in Taiwan, China.

unattended, remotely monitored systems were operating at all three multi-unit on-load refuelled power reactor facilities, resulting in a reduction of the inspection effort.

Significant Safeguards Projects

Rokkasho Reprocessing Plant

Most of the commissioning activities for the Rokkasho Reprocessing Plant (RRP) in Japan were completed in 2007. This included the first shearing and reprocessing of PWR and BWR spent fuel and the production and storage of the first canisters of MOX powder. Safeguards inspection procedures, based on continuous presence during operation, were implemented. The safeguards approach for the RRP was further elaborated during 2007 and at the end of 2007 was being subject to review before approval.

JMOX

During 2007, development of a safeguards approach for the MOX fuel fabrication plant in Japan (JMOX) continued including elements of the integrated safeguards approach for the site. The basic systems for safeguarding JMOX and the sharing of costs have been agreed. Construction of JMOX at the Rokkasho site is due to start in 2008.

Pebble Bed Modular Reactor

The Agency initiated a task for safeguarding the Pebble Bed Modular Reactor in cooperation with South Africa. The main objective is to complete system studies of the reactor, its supporting facilities and processes as well as to develop the necessary procedures and equipment for safeguards implementation.

Chernobyl

A feasibility study for the installation of a safeguards site data integration system was successfully completed in 2007. A camera system for monitoring the reactor hall of Unit 4 was also successfully tested.

Quality Management

During 2007, new elements of the quality management system (QMS) of the Department of

Safeguards were developed, implementation was extended and the elements of the system already in place were operated successfully.

A methodology to assess safeguards implementation costs was also established within the scope of the QMS. In addition, arrangements for recording and following up of non-conformities, as well as for implementing corrective actions, were established. Finally, training was provided in essential areas of QMS, such as corrective actions, process improvement, quality auditing and document control.

Seven internal quality audits were carried out during 2007. Selection of the areas to be audited was based on their importance to the overall process of drawing sound safeguards conclusions.

Assistance to State Systems of Accounting for and Control of Nuclear Material

The effectiveness and efficiency of Agency safeguards depend, to a large extent, on the effectiveness of State systems of accounting for and control of nuclear material (SSACs) and regional systems of accounting for and control of nuclear material (RSACs), and on the level of their cooperation with the Agency. The Secretariat continued to work with SSACs and RSACs on safeguards implementation issues such as the quality of operators' systems for the measurement of nuclear material, the timeliness and accuracy of State reports and declarations, and support for the Agency's verification activities.

Emphasis was placed on the implementation of the IAEA SSAC Advisory Service (ISSAS). Upon the request of States, ISSAS missions were conducted in Armenia, Switzerland and Ukraine. A preparatory meeting for an ISSAS mission was held in Niger.

With regard to the provision of training to SSAC personnel, 11 national, regional and international training courses were conducted in 2007. These included: an international SSAC course in the USA; a regional SSAC course in Argentina; two regional

courses devoted to the establishment of an SSAC at the facility level in China and Ukraine; seven national training courses in Egypt, South Africa and Vietnam; and courses at Agency Headquarters for SSAC personnel from Egypt, Lebanon, Niger and the Republic of Korea.

Two regional technical meetings on AP implementation were conducted in Botswana (for African States) and in Australia (for the Asia-Pacific region). With the aim of assisting in the establishment and strengthening of SSACs, two outreach activities were conducted in Vietnam and Turkmenistan. In addition, in coordination with the Governments of Australia, Japan and Vietnam, the Agency hosted a seminar on APs for Vietnam in August 2007.

Standing Advisory Group on Safeguards Implementation

The Standing Advisory Group on Safeguards Implementation held two plenary meetings in 2007. The main issues considered were the State evaluation process, the physical model and its use in information analysis, the nuclear trade and technology analysis, long term strategic planning, and proliferation resistance and its impact on safeguards.

Advisory Committee on Safeguards Verification within the Framework of the IAEA Statute

The Advisory Committee on Safeguards and Verification within the Framework of the IAEA Statute (Committee 25) met twice in 2007, concluding its work of considering ways and means to strengthen the Agency's safeguards system. The documentation and clarifications provided by the Secretariat to the Committee described measures to improve the effectiveness and efficiency of the safeguards system in several areas, which increased the understanding and awareness of Member States in this regard.