Safeguards

Objective

To provide independent, impartial, timely and credible safeguards conclusions, and assurance that States are abiding by their nuclear non-proliferation commitments; and to contribute, as appropriate, to verifying nuclear arms control and reduction agreements.

Safeguards Conclusions for 2009

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. This is a continuous, iterative process that involves the integration and assessment of all of the information available to the Agency about that State's nuclear activities and plans. Information is at the heart of modern verification; in fact, the Agency frequently refers to its work as being 'information driven' safeguards. Information driven safeguards are safeguards whose planning, conduct and evaluation are based on an ongoing analysis of all safeguards relevant information available to the Agency about a State to focus verification activities in the field and at Headquarters.

"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 has remained in peaceful activities. To draw such a conclusion, the Secretariat must ascertain that: (i) there are no indications 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) there are no indications of undeclared nuclear material or activities for the State as a whole.

In order to ascertain that there are no indications of undeclared nuclear material or activities in a State, and ultimately to be able to draw the broader conclusion that all nuclear material has remained in peaceful activities, the Secretariat considers the results of its verification and evaluation activities under CSAs and additional protocols (APs). The Agency only draws a broader conclusion if the State has both a CSA and an AP in force, and the Agency has 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 in a State, and therefore the Agency draws a conclusion for a given year only with respect to whether *declared* nuclear material remained in peaceful activities.

In 2009, safeguards were applied for 170[1] States with safeguards agreements in force with the Agency. Eighty-nine States had both CSAs and APs in force. For 52 of these States,[2] the Agency concluded that all nuclear material remained in peaceful activities. For the remaining 37 States, the Agency had not yet completed all the necessary evaluations and could therefore conclude only that the declared nuclear material remained in peaceful activities. Similarly, for 73 States with CSAs in force but without APs, the Agency was only able to draw that conclusion.[3]

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 had been 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 had been applied in selected facilities remained in peaceful activities or had been withdrawn as provided for in the agreements.

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1 The 170 States do not include the Democratic People's Republic of Korea (DPRK), where the Agency did not implement safeguards and, therefore, could not draw any conclusions.

2 And for Taiwan, China.

3 The 73 States do not include the DPRK as the Agency was not able to implement safeguards in that State and, therefore, could not draw any conclusion.

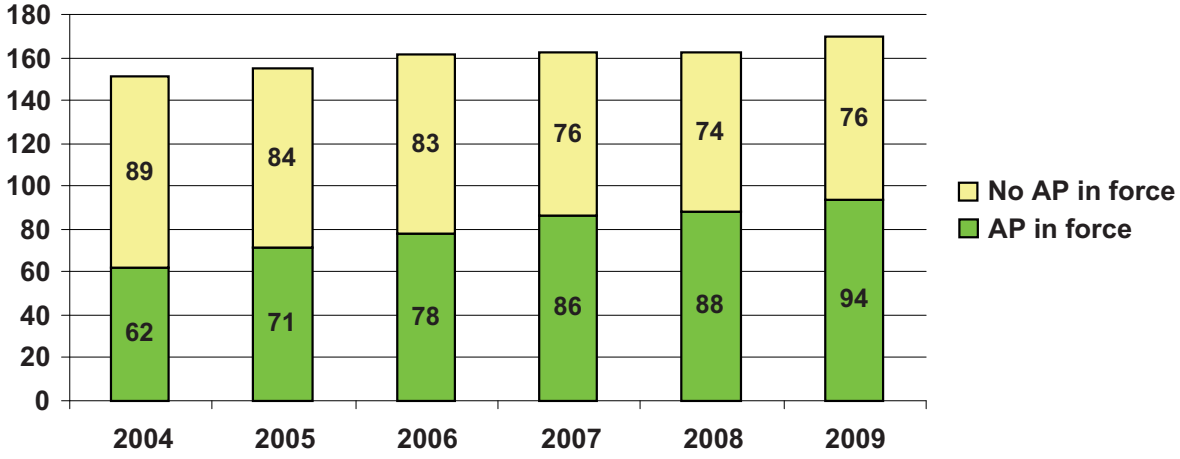

FIG. 1. Status of APs for States with safeguards agreements in force, 2004–2009 (the DPRK is not included).

As of 31 December 2009, 22 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 1 State and was reaffirmed for 51 States.

Conclusion of Safeguards Agreements and Additional Protocols

The Agency continued to facilitate the conclusion of safeguards agreements and APs, and the amendment or rescission of small quantities protocols.[4] During 2009, CSAs entered into force for eight States,[5] and APs entered into force for six States.[6] The status of safeguards agreements and APs as of 31 December 2009 is shown in Fig. 1. During the year, six States[7] signed CSAs and nine States[8] signed APs. The Board of Governors approved CSAs for five States[9] and APs for nine States.[10] By the end of 2009, three quarters of States with CSAs had signed APs and more than half of States with CSAs had APs in force. Moreover, nearly three quarters of the countries with nuclear material under safeguards had APs in force.

In order to implement a Board decision in 2005, the Agency continued to communicate with States with a view to amending or rescinding their SQPs. During 2009, SQPs were amended to reflect the modified text for five States.[11]

An INFCIRC/66/Rev.2-type safeguards agreement for India, covering India's civilian nuclear facilities, was signed and entered into force.

The Secretariat continued to implement the Plan of Action to Promote the Conclusion of Safeguards Agreements and Additional Protocols, which was updated in September 2009. During the year, the Secretariat convened two outreach initiatives: a briefing on Agency safeguards in New York in May as a side event at the Preparatory Committee for the 2010 NPT Review Conference; and an interregional seminar on the Agency's safeguards system for

[4] Many States with minimal or no nuclear activities have concluded a small quantities protocol (SQP) to their CSA. Under SQPs, the implementation of most of the safeguards procedures of CSAs is held in abeyance as long as certain criteria are met. In 2005, the Board of Governors took the decision to revise the standardized text of the SQP and change the eligibility criteria for an SQP, making it unavailable to a State with an existing or planned facility and reducing the number of measures held in abeyance. The Agency initiated exchanges of letters with all States concerned in order to give effect to the revised SQP text and the change in the criteria for an SQP.

[5] Bahrain, Central African Republic, Comoros, Kenya, Mauritania, Qatar, Saudi Arabia, Sierra Leone.

[6] Central African Republic, Colombia, Comoros, Kenya, Mauritania, United States of America.

[7] Central African Republic, Chad, Kenya, Qatar, Rwanda, Timor-Leste.

[8] Central African Republic, Chad, India, Kenya, Rwanda, Serbia, Timor-Leste, United Arab Emirates, Zambia.

[9] Djibouti, Congo, Kenya, Rwanda, Vanuatu.

[10] Bahrain, Congo, Djibouti, India, Kenya, Rwanda, Serbia, United Arab Emirates, Vanuatu.

[11] Lesotho, Nicaragua, The Former Yugoslav Republic of Macedonia, Uganda, the United Republic of Tanzania.

States with limited nuclear material and activities, conducted in Arusha, United Republic of Tanzania, in November. In addition, consultations on the amendment of SQPs and the conclusion and entry into force of safeguards agreements and APs were held throughout the year with representatives from both Member and non-Member States.

Cooperation with SSACs/RSACs

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 their regional equivalents (RSACs), and on the level of their cooperation with the Agency. In 2009, the Secretariat continued to work with SSACs and RSACs on safeguards implementation issues, such as the quality of operator systems for the measurement of nuclear material, the timeliness and accuracy of State reports and declarations, and support for the Agency's verification activities.

"Member State Support Programmes continued to make substantial contributions to Agency safeguards."

A number of States improved the timeliness and quality of their safeguards reporting in 2009. To help other States in this area, a series of training courses were held and an IAEA SSAC Advisory Service (ISSAS) mission was carried out.

Member State Support Programmes continued to make substantial contributions to Agency safeguards. As of 31 December 2009, 21 States and organizations had formal Support Programmes.[12]

The Agency held three liaison meetings with the European Commission in 2009 to discuss the implementation of integrated safeguards approaches in European Union countries, and agreement was reached on a joint IAEA–European Commission safeguards approach for all major facility types.

Implementation of Integrated Safeguards

For those States for which a broader conclusion has been drawn, the Secretariat is able to implement 'integrated safeguards' — an 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. Integrated safeguards were implemented during the whole of 2009 in 36 States.[13] Safeguards implementation activities were carried out for these States in accordance with the State level safeguards approaches and annual implementation plans approved for each individual State. By the end of 2009, integrated safeguards approaches were approved for 24 of the 25 non-nuclear-weapon States in the European Union and integrated safeguards were being implemented in 21 of them.

The Secretariat concluded that the evaluation and verification activities planned for 2009 for the 36 States under integrated safeguards had been satisfactorily implemented and that the State-specific technical objectives had been achieved.

Owing to the size and complexity of their fuel cycles, integrated safeguards are being introduced in a phased manner in Canada and Japan. The use of 'low frequency' unannounced inspections has substantially decreased the inspection effort needed in both States, and the transition to full implementation of integrated safeguards is expected to result in additional savings.

Implementing Safeguards in the Islamic Republic of Iran (Iran)

During 2009, the Director General submitted four reports to the Board of Governors on the implementation of Iran's CSA and relevant provisions of United Nations Security Council resolutions.

While the Agency has continued to verify the non-diversion of declared nuclear material in Iran, Iran has not provided the necessary cooperation to permit the Agency to confirm that all nuclear material in Iran is in peaceful activities.

Since March 2007, Iran has not implemented the modified text of its Subsidiary Arrangements on the early provision of design information and has not

[12] Argentina, Australia, Belgium, Brazil, Canada, China, the Czech Republic, Finland, France, Germany, Hungary, Japan, Netherlands, the Republic of Korea, the Russian Federation, South Africa, Spain, Sweden, the United Kingdom, and the United States of America, and the European Commission.

[13] Australia, Austria, Bangladesh, Bulgaria, Canada, Chile, Croatia, Cuba, the Czech Republic, Ecuador, Finland, Ghana, Greece, the Holy See, Hungary, Indonesia, Ireland, Italy, Jamaica, Japan, Latvia, Lithuania, Luxembourg, Mali, Malta, Monaco, Norway, Palau, Peru, Poland, Portugal, the Republic of Korea, Romania, Slovenia, Uruguay and Uzbekistan.

been forthcoming in providing information about the design of facilities. Contrary to the requests of the Agency's Board of Governors and of the United Nations Security Council, Iran has not implemented the AP, without which the Agency remained unable to provide credible assurances about the absence of undeclared nuclear material and activities in Iran.

Nor did Iran cooperate with the Agency to address a number of outstanding issues regarding possible military dimensions to its nuclear programme. These issues relate to the alleged studies on the green salt project, high explosives testing, the design of a missile re-entry vehicle; the circumstances of the acquisition of the 'uranium metal' document; procurement and R&D activities of military related institutes and companies that could be nuclear related; and the production of nuclear equipment and components by companies belonging to defence industries.

"Until 14 April 2009, in the context of the ad hoc monitoring and verification arrangement ... foreseen in the Initial Actions agreed at the Six-Party Talks, the Agency continued to implement monitoring and verification measures ..."

Contrary to the decisions of the United Nations Security Council, Iran did not suspend its enrichment related activities, and continued with the operation of the Pilot Fuel Enrichment Plant and the construction and operation of the Fuel Enrichment Plant at Natanz. Moreover, in October, Iran announced that it was constructing an additional enrichment facility, the Fordow Fuel Enrichment Plant. Subsequently, Iran announced its intention to build ten new enrichment plants.

Iran continued its work on heavy water related projects, again contrary to the requirements of the United Nations Security Council, including the construction of the IR-40 heavy water moderated research reactor at Arak and operation of a Heavy Water Production Plant.

Since August 2008, Iran has declined to discuss outstanding issues related to possible military dimensions of its nuclear programme, asserting that the allegations are baseless and that the information to which the Agency is referring is based on forgeries. The relevant information available to the Agency, however, is extensive, broadly consistent and credible. In order to confirm that all nuclear material is in peaceful activities, the Agency needs to have confidence in the absence of possible military dimensions to Iran's nuclear programme. It is important, therefore, that Iran cooperate with the Agency to clarify those outstanding issues which give rise to concerns.

Implementing Safeguards in the Syrian Arab Republic (Syria)

During 2009, the Director General submitted four reports to the Board of Governors on the implementation of Syria's CSA. The Agency continued its verification activities in relation to the allegations that an installation destroyed by Israel at Dair Alzour in Syria in September 2007 had been a nuclear reactor under construction. Syria has yet to provide a credible explanation for the origin and presence of particles of anthropogenic natural uranium (i.e. produced as a result of chemical processing). Syria has not cooperated with the Agency since 2008 in connection with the unresolved issues related to the Dair Alzour site and the three other locations to which it is allegedly functionally related.

In 2009, the Agency found anthropogenic natural uranium particles at the Miniature Neutron Source Reactor (MNSR) near Damascus. Though Syria has provided some information about the experiments carried out at the MNSR and the origin of the material, it did not cooperate fully with the Agency by providing design information related to MNSR, required nuclear material accountancy reports and detailed explanations of experiments carried out with undeclared natural uranium.

Implementing Safeguards in the Democratic People's Republic of Korea (DPRK)

Since December 2002, the Agency has not implemented safeguards in the DPRK and, therefore, cannot draw any safeguards conclusion regarding nuclear material in that country.

Until 14 April 2009, in the context of the ad hoc monitoring and verification arrangement agreed between the Agency and the DPRK, and foreseen in the Initial Actions agreed at the Six-Party Talks, the Agency continued to implement monitoring and verification measures related to the shutdown of three installations and construction of one installation at the Yongbyon nuclear facility, and the construction of one installation at Taechon. On that date, the DPRK informed the Agency that it had decided to cease all cooperation with the Agency immediately. It requested Agency personnel to remove all Agency containment and surveillance

FIG. 2. Installing surveillance equipment at a nuclear facility.

equipment from the facilities (not allowing them to access the facilities thereafter), and required them to leave the DPRK as soon as possible. The DPRK also informed the inspectors that it had decided to reactivate all facilities and to proceed with the reprocessing of spent fuel.

During 2009, until 14 April, the Agency neither observed any operation of the three shutdown installations at Yongbyon, nor any construction activities at the two installations under construction at Yongbyon and Taechon. On 15 April, following the DPRK's decision to cease all cooperation with the Agency, the Agency inspectors at Yongbyon removed all seals and switched off the surveillance cameras and departed from the DPRK the following day. Since that time, the Agency has not been able to implement the ad hoc monitoring and verification arrangement in the DPRK. Consequently, the Agency is unable to make any statements in relation to nuclear material inventories in the DPRK.

Following the DPRK's announcement on 25 May 2009 that it had conducted an underground nuclear test, the United Nations Security Council adopted resolution 1874 (2009), which, inter alia, required the DPRK to abandon its nuclear weapons programme, return to the NPT and Agency safeguards at an early date, and re-enter the Six-Party Talks without any preconditions.

Equipment Development and Implementation

In 2009, 964 attended non-destructive assay (NDA) systems were used in the field, along with a number of related technical support activities. Technological advances continue: for example, load cells used at enrichment and fuel fabrication plants have been modernized, and complementary access kits have been repackaged to facilitate use. Development work continued on defining cost effective and non-intrusive verification measures for spent fuel storage in situations where access is difficult. High resolution gamma spectrometry, combined with the In Situ Object Counting System (ISOCS) data evaluation methodology, have been used in several facilities to quantitatively verify uranium hold up, HEU scraps, and uranium and plutonium waste.

To ensure the reliability of the Agency's standard equipment systems, significant resources were expended on preventive maintenance and equipment upgrades. By the end of 2009, the Agency had 1133 cameras connected to 587 systems operating at 240 facilities (Fig. 2) in 33 States.[14] More joint use surveillance equipment was deployed in European Union States (in particular, in Germany at light water reactors receiving MOX fuel), and joint use surveillance equipment was installed in India, where new facilities came under safeguards, and in Japan at MOX facilities and the Monju Fast Breeder Reactor.

"To ensure the reliability of the Agency's standard equipment systems, significant resources were expended on preventive maintenance and equipment upgrades."

The Agency made significant progress in the implementation of new sealing systems and containment verification techniques. In 2009, two ultrasonic sealing systems were finalized and

[14] And in Taiwan, China. These figures include the DPRK.

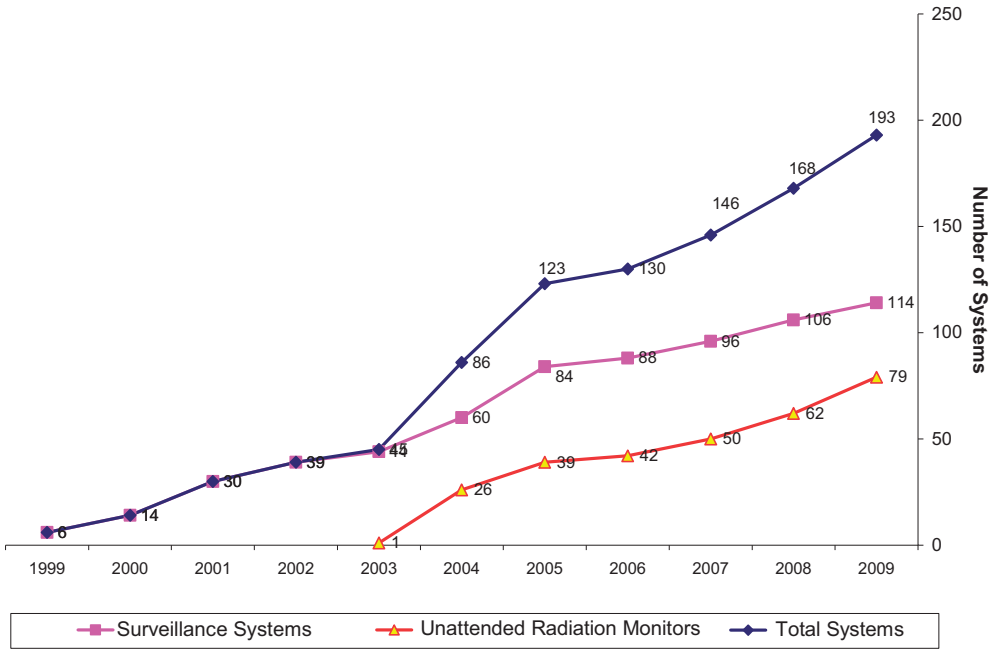

FIG. 3. Increased use of remote monitoring over the last ten years.

authorized for use as the underwater Joint Research Centre (JRC) Candu Sealing System and JRC Dry Storage Seal.

Remote Monitoring

The use of remote monitoring systems to transmit data is helping to enhance the effectiveness and efficiency of safeguards implementation. The IAEA Remote Monitoring Data Centre was strengthened and is now able to monitor systems on a near real time basis.

At the end of the year, 193 surveillance and radiation monitoring systems with remote transmission capabilities were installed at 84 facilities in 18 States.[15] Twenty-five new safeguards systems with remote monitoring were implemented during 2009. Figure 3 shows the increased use of remote monitoring over the last ten years. By the end of 2009, there were 129 unattended monitoring systems (UMSs) installed in 21 States at 48 facilities. During the year, three new installations of UMSs were carried out, 11 major upgrades were implemented and 56 maintenance missions were conducted.

A satellite project with the European Space Agency was officially started in July which will provide satellite communications for three remotely monitored facilities. One more such site will be added before the end of the pilot stage.

Enhancing Sample Analysis

The safeguards analytical service provides logistical support, analysis of samples and evaluation of results (Fig. 4). In 2009, more than 150 shipments of nuclear material samples and around 35 quality control samples were made. The sample analysis is performed in the Agency's Safeguards Analytical Laboratory (SAL) in Seibersdorf and the Network of Analytical Laboratories (NWAL) comprising SAL and 14 national laboratories located in Member States. Approximately 800 environmental samples were analysed by NWAL (excluding SAL) in 2009, with a further 120 nuclear material samples and 50 heavy water samples analysed throughout the entire network. The Agency needs to expand the NWAL and there is a growing willingness among Member States to contribute.[16]

A new thermal ionization mass spectrometer was installed at SAL for the measurement of uranium isotopes, and a method for determining impurities in uranium samples was validated. The

[15] And in Taiwan, China.

[16] Belgium, Czech Republic, Finland, France, Hungary and the Russian Federation have indicated their wish to provide additional laboratory support, and laboratories in Brazil, China, Hungary and the Republic of Korea are currently undergoing qualification to join the NWAL.

FIG. 4. Taking environmental samples at a nuclear facility.

development of a new software application for the control of a robot arm system and its associated hardware was completed in SAL and will be used for making automatic chemical separations. A shipment of loaded mass spectrometer filaments from the On-Site Laboratory in Rokkasho, Japan, was shipped to SAL and analysed as part of an external quality control exercise.

Satellite Imagery Analysis

In 2009, the Agency took advantage of new, higher resolution commercial sensors to improve capabilities for monitoring nuclear sites and facilities worldwide. Contracts were arranged with new imagery providers to diversify sources and ensure the integrity and authenticity of satellite imagery. New high resolution radar imagery was used operationally, providing the Agency with day/night and all weather monitoring capabilities. The ongoing demand for mapping products resulted in the production of more and standardized maps, 3-D visualization products and interactive geospatial tools. Considerable effort was expended in 2009 by satellite imagery analysts to identify and monitor high priority undeclared sites and activities. The use of imagery analysis to gain insight into previously undeclared programmes and activities proved to be a great asset to the Agency's investigations, particularly in those cases where access was either restricted or denied.

"In 2009, the Agency took advantage of new, higher resolution commercial sensors to improve capabilities for monitoring nuclear sites and facilities worldwide."

During the year, the Secretariat acquired 503 commercial satellite images in support of safeguards verification activities (up from 317 in 2008). The imagery was acquired from 24 different Earth observation satellites and covered 26 countries. Among these images, 317 were purchased from the public archives of the Agency's commercial satellite imagery providers, and the remaining 186 were specially requested by the Agency itself. The Secretariat produced 156 imagery analysis reports, including several imagery derived and geographical information system products to support inspection activities (up from 95 in 2008).

Open Source Information

The Agency conducts daily searches of open media, compiles information to assist in preparing annual State evaluation reports, and responds to specific requests for open source information. During the year, State files containing open source information were provided for over 100 State evaluations, and open source analytical reports were provided to support evaluations on high priority safeguards issues, as well as in-field activities. Approximately 2500 articles on issues relating to safeguards were disseminated via daily information bulletins. Open source research also supported the analysis of clandestine procurement networks and the evaluation of incidents involving nuclear material trafficking.

Further developments in information processing were achieved including, for example, a translation service that can translate text and files from several

languages into English, without sending data over the Internet. It is now also possible to search multiple Internet search engines from a single interface, and to perform simple analysis of the results. Approximately 9700 items were added to the Open Source Information System in 2009.

Significant Safeguards Projects

IRP

The objective of the Agency's safeguards information system reengineering project (IRP) is to increase the effectiveness and efficiency of information processing by replacing the current obsolete system with a modern, integrated one. The project will ensure better support and accessibility of data, including remote access by field offices and inspectors. A new safeguards portal was implemented from the beginning of 2010. Phase III of the IRP continued in 2009, having been revised to ensure the integration and consistency of the overall project. Phase III comprises 16 projects, including six that were completed at the end of 2008. In 2009, the majority of the remaining contracts were awarded and preparation made for the technical implementation. The eventual goal is to complete the entire project in 2011. 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 2009.

"In 2009, the majority of the remaining contracts were awarded and preparation made for ... technical implementation [of the IRP]. The eventual goal is to complete the entire project in 2011."

Japan MOX Fuel Fabrication Plant

A draft safeguards approach, based primarily on the use of random interim inspections supported by unattended NDA and containment/surveillance measures, was developed for the Japan MOX Fuel Fabrication Plant (JMOX). The approach is designed to ensure effective safeguards while achieving greater efficiency. The Joint Technical Committee (JTC), comprising representatives from the Agency and Japanese bodies, is coordinating the development of the JMOX safeguards equipment and software. The conceptual studies of the NDA equipment to be developed by the Agency were completed in 2009, and some of the equipment developed by Japan has already been manufactured. The operator's revised construction schedule for the plant envisages construction to start in May 2010, with commercial operation scheduled for mid-2015.

Novel Technology Project

The Novel Technology Project, aimed at identifying and developing advanced technologies capable of detecting undeclared nuclear activities, focused on: atmospheric gaseous compound detection to verify the status of a reprocessing facility as well as the absence of unreported activities; laser induced breakdown spectrometry (LIBS) for the on-site sampling and analysis of unknown substances found during inspections; optically stimulated luminescence to verify the absence of previous nuclear material storage or activities at inspected locations; and technologies required for safeguards implementation at geological repositories, which include microseismic monitoring, inspector geo-location and underground communications. In December 2009, the handheld LIBS prototype instrument, developed for the Agency by the Canadian Member State Support Programme, was delivered to the Agency.

Chernobyl

The objective of the Chernobyl Safeguards Project is to develop safeguards approaches and instrumentation for routine safeguards implementation at the existing and newly built facilities at the Chernobyl site. The new spent fuel conditioning plant and new safe confinement over the damaged Reactor Unit 4 are expected to be in operation in 2013. Construction of the spent fuel conditioning facility (part of the new dry spent fuel storage) has been delayed due to a revision of the facility's design. The Agency is directly involved in the early design stages in order to integrate appropriate safeguards systems. In 2009, the Agency performed additional tests of surveillance systems inside the damaged reactor hall of Unit 4. Testing of Phase 1 of the site data integration was also completed.

ECAS

Enhancing the capabilities of the safeguards analytical services — the ECAS project — consists

of two parallel projects. Project 1 addresses the sustainability and enhancement of the Agency's particle analysis capabilities for environmental samples, and Project 2 addresses the new Nuclear Material Laboratory. For Project 1, a contract was concluded for the acquisition and installation of the ultrahigh sensitivity secondary ion mass spectrometer for the Clean Laboratory at SAL. Another contract was concluded for designing and building a Clean Laboratory Extension to accommodate the new spectrometer. Construction work is expected to be completed by the end of 2010 and the laboratory to be fully operational by mid-2011. The specification of the new Nuclear Material Laboratory has been prepared. The contract for the conceptual design was signed in 2010 and construction is planned to start in the middle of 2011.

Two workshops on the future of SAL were held in 2009. Member States were informed of progress with the ECAS project and of the Agency's plan to enhance and expand the NWAL. A number of Member States provided extrabudgetary contributions and expert consultants to this end.

Support

Training

The requirements of training have increased significantly for a number of reasons. Developments in safeguards and nuclear fuel cycle related technologies, an increasing focus on the State level approach, and the pace towards information driven safeguards have all necessitated a corresponding evolution in training practice. Moreover, the expansion of tasks and responsibilities of safeguards staff, particularly inspectors and analysts, in combination with the introduction of new safeguards equipment and technologies, has added to the importance of proper training.

As a result, the safeguards training curriculum is being maintained and updated in a continual and reactive process. Two major challenges are: to provide safeguards staff with new skills and abilities while maintaining existing competencies, particularly in nuclear material accountancy; and to offer a balanced training programme to meet the needs of safeguards staff in both technical and behavioural competencies. Support from Member States has been essential to the safeguards training programme, particularly in hosting courses involving practical exercises requiring nuclear facilities and/or nuclear material. In 2009, 48 different courses were conducted for safeguards staff.

"Support from Member States has been essential to the safeguards training programme, particularly in hosting courses involving practical exercises requiring nuclear facilities and/or nuclear material."

Quality Management

During 2009, the Agency continued to implement its quality management system. Staff training to raise awareness of the system was undertaken and quality managers regularly reviewed the system's performance — taking corrective action where necessary. The Agency continued to develop a methodology to establish and monitor the cost of carrying out safeguards activities and to enable cost comparisons of different safeguards implementation options. Implementation of a formal knowledge management programme, focused on retaining critical expertise of staff members who will retire or otherwise leave the Agency, began in late 2009. A methodology for analysing safeguards processes is being developed so as to embed the sharing of knowledge.

Standing Advisory Group on Safeguards Implementation

The Standing Advisory Group on Safeguards Implementation (SAGSI) held two plenary meetings in 2009, at which it considered: strategic planning; guidelines for SSACs; the State level concept, including cost methodology; the resolution of anomalies under integrated safeguards; and the *Safeguards Research and Development Plan 2010–2011*. SAGSI also finalized its longstanding work on two important issues: cooperation between the Agency and SSACs; and the strategic objectives, structure and content of future *Safeguards Implementation Reports* (the Agency's annual report on the Secretariat's safeguards findings and conclusions).

The Future

Strategic Planning

The Agency continued to develop its long range strategic planning process in order to be better

prepared for future safeguards challenges and to increase both its effectiveness and efficiency. Under this process, a new set of strategic objectives was developed and approved. In light of these objectives, potential strategic issues facing the Agency were identified by considering opportunities and challenges against its current capability to address them. The process is aimed at developing the Agency's first ever long term strategic plan, including a long term R&D plan, covering the period 2010–2021.

Research and Development Programme

Research and development are essential to meet the safeguards challenges of the future. As the Secretariat lacks its own research capabilities, the assistance of Member State Support Programmes (MSSPs) is crucial. The new Research and Development Programme for Nuclear Verification 2010–2011, which reflects the need to achieve greater efficiency and effectiveness, consists of 24 projects in such areas as verification technology development, safeguards concepts, information processing and analysis, and training. At the beginning of 2009, 344 MSSP tasks were in progress. During the year, 27 were completed, 8 were terminated, and 31 new tasks were started, leaving 340 ongoing at the end of 2009. Workshops to facilitate the further development of safeguards included the second Japan–IAEA workshop on Advanced Safeguards Technology for Future Nuclear Fuel Cycles, held in Japan in November.

"In June 2009, the Agency agreed on an extended Memorandum of Understanding with the International Science and Technology Centre (ISTC) on how to further mutual cooperation."

In June 2009, the Agency agreed on an extended Memorandum of Understanding with the International Science and Technology Centre (ISTC) on how to further mutual cooperation. Russian scientific research institutes and universities reconfirmed their willingness to support the Agency through the ISTC in the areas of, for example, NDA techniques for safeguards verification, novel safeguards technologies, and training for inspectors and analysts. As mentioned earlier, a project with the European Space Agency to provide satellite communications started in July.

Safeguards for Future Facilities

The Agency has undertaken activities to prepare for safeguarding new types of facilities in the future. These activities include not only evaluating safeguards approaches for specific facility types, but also assessing the proliferation resistance of overall nuclear energy systems and the implementation of safeguards early in the design stages of a facility. For the effective and efficient implementation of safeguards at a new facility, safeguards concepts need to be considered in the initial design planning stages, not only to improve its ability to be safeguarded and its proliferation resistance, but also to facilitate design changes when the costs of making such changes are still reasonably low.

During 2009, the Agency participated in assessments of proliferation resistant nuclear energy systems through INPRO and the Generation IV International Forum (GIF), specifically in three assessment and review meetings under INPRO and in two working group meetings under GIF.

The Agency also issued its initial report addressing work required to develop a safeguards by design (SBD) methodology. Under the SBD concept, international safeguards would be fully integrated into the design process of a nuclear facility from the initial planning through design, construction, operation and decommissioning. A general SBD document is under preparation that will provide the basis for facility specific guidance to identify design features and operating practices that will ensure effective and cost efficient safeguards implementation for facility designers and operators, as well as for the Agency.