

# AN IDEALIZED APPROACH TO SUPPORTING IAEA COMPLEMENTARY ACCESSES - THE CANADIAN EXPERIENCE

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## Abstract

Canada has a long-standing political commitment to the peaceful use of nuclear energy. 2022 marked the fiftieth anniversary of the implementation of Canada's comprehensive safeguards agreement with the IAEA. In the year 2000, Canada brought into force an Additional Protocol to complement its safeguards agreement. In 2005, Canada achieved the broader conclusion from the IAEA that all nuclear material remains in peaceful activities. Given Canada's large and complex fuel cycle and long nuclear history, Canada receives the third most IAEA inspection effort in the world. Since 2001, the IAEA has performed 190 Complementary Accesses (CAs) – an average of 8.5 per year. The operators' preparation and support for CAs can depend on their regulatory obligation to the CNSC and their familiarity with safeguards. This paper describes how Canada typically prepares for, supports, and manages complementary access from the IAEA. Select cases from previous CAs will also be provided as examples to illustrate both routine and unique scenarios that can arise when carrying out CAs under an Additional Protocol.

## 1. INTRODUCTION

The International Atomic Energy Agency (IAEA) ensures that the State complies with their commitments, under the Non-Proliferation Treaty (NPT) and other non-proliferation agreements, to use nuclear material and facilities only for peaceful purposes [1]. The Comprehensive Safeguards Agreement (CSA) and the Additional Protocol (AP) are legal instruments that serve as critical tools for the application of IAEA safeguards. These tools assist the IAEA to detect the diversion of nuclear material, the misuse of a facility and to detect undeclared activities.

Pursuant to the NPT, the CSA mandates the State to provide the IAEA with the right and obligation to monitor their nuclear-related activities and verify nuclear material inventories and flows. The IAEA will verify the State's declarations through on-site inspections and monitoring activities. In 1972, Canada brought into force a CSA with the IAEA. The CSA provides the IAEA with broad access to nuclear facilities and locations, including research and development sites, uranium mines, and other locations where nuclear-related activities may be taking place. The IAEA conducts regular inspections of nuclear facilities to verify that the declared nuclear material is being used for peaceful purposes and to detect any undeclared nuclear activities.

In the year 2000, Canada brought into force the AP to its safeguards agreement with the IAEA. As part of international efforts to strengthen IAEA safeguards, the AP addresses the limitations of the CSA. The AP gives the IAEA enhanced rights of access to nuclear sites as well as other relevant locations and provides the IAEA with access to information about nuclear-related activities in Canada above and beyond its rights under the original safeguards agreement. All States must declare and accept safeguards on all nuclear material and the IAEA has a right and obligation to ensure that safeguards are applied to all such material as per Articles 1 and 2 of the CSA [2]. However, there are no provisions or means for the IAEA to assure all material is declared. The AP addresses the limitations of the CSA.

A CSA and an AP need to be in force to enable the IAEA to conclude that all nuclear material in a State remains in peaceful activities. A broader conclusion is drawn based on a comprehensive evaluation by the IAEA finding that there are no indications of diversion of declared nuclear material from peaceful nuclear activities in a State, no indications of undeclared production or processing of nuclear material at declared facilities

and locations outside facilities (LOFs), and no indications of undeclared nuclear material or activities in a State as a whole. When the evaluation has been completed, and if the IAEA has not found any safeguards concerns, the Secretariat can draw the broader conclusion that all nuclear material in a State remains in peaceful activities [3]. The attainment of the broader safeguards conclusion allows the IAEA to adjust fundamental safeguards assumptions and technical parameters within the State, thereby drastically reducing overall inspection efforts and redirecting resources to safeguard activities in areas of greater proliferation risk.

## 2. COMPLEMENTARY ACCESS

### Overview

Complementary Access (CA) is access provided by the State and carried out by the IAEA inspectors under the provisions of an AP [3]. As per Article 4.a. of the AP, the IAEA shall not mechanistically or systematically seek to verify the information provided by the State under Article 2 of its AP; however, the IAEA shall have access to the following:

- (i) Any location referred to in Article 5.a.(i) or 5.a.(ii) of the AP on a selective basis to ensure the absence of undeclared nuclear material [4];
- (ii) Any location referred to in Article 5.b. or 5. c. to resolve a question relating to the correctness and completeness of the information provided by the State pursuant to Article 2, or to resolve an inconsistency relating to that information [4];
- (iii) Any location referred to in Article 5.a.(iii) to the extent necessary for the IAEA to confirm, for IAEA safeguards purposes, the declaration of the decommissioned status of a facility or location outside facilities (LOF where nuclear material was customarily used.

In certain cases where the State is unable to provide the required access, it should make every reasonable effort to satisfy the IAEA's requirements, without delay, through other means and/or at adjacent locations, depending on the context as outlined in Article 5. b, 5. c and 9 of the AP [4].

Under Article 9, the State shall provide the IAEA with access to locations specified by the IAEA to carry out wide-area environmental sampling. The IAEA shall not seek such access until the use of such wide area environmental sampling and the procedural arrangements have been approved by the IAEA Board of Governors and following consultations between the IAEA and the State [4].

Under Article 8 of the AP, the State may offer the IAEA access to or request the IAEA to perform verification activities at a particular location in addition to those referred to in Articles 5 and 9.

A CA is a tool that is exercised by the IAEA on a selective basis. It provides the IAEA with the right to go to certain locations for the reasons outlined in the AP. It is important to note that a CA is not an inspection, and it does not give the IAEA the right to go anywhere at any time for any reason.

### Evolution of Canadian Safeguards with Respect to Complementary Accesses

The Government of Canada has designated the Canadian Nuclear Safety Commission (CNSC) as the safeguard regulatory authority for Canada. The CNSC is responsible for implementing the Canada/IAEA safeguards agreement and the additional protocol. The regulatory controls for the production, use, storage, and movement of nuclear materials in Canada are implemented by the CNSC through the Nuclear Safety and Control Act (NSCA), regulations, and licences. [5].

The CNSC regulates all nuclear facilities and activities in Canada, this includes:

- (i) uranium mining and milling, refining, conversion and fuel fabrication facilities;

- (ii) CANDU nuclear power reactors;
- (iii) waste management facilities for spent fuel and other wastes;
- (iv) nuclear substance processing and industrial and medical applications; and,
- (v) nuclear research and development

Beyond the current 33 safeguarded nuclear facilities and 13 Location Outside Facilities, Canada's nuclear industry has a long past and plans for the future. The historical past dates to World War II and then the operation of nuclear facilities much before the implementation of comprehensive safeguards. Many of these projects created legacy waste containing nuclear material that are now subject to safeguards. As Canada looks into the future, there has been a spark in new proposed projects such as small modular reactors (SMRs) at new and existing nuclear sites [6].

Given such a large and complex fuel cycle and long nuclear history, Canada typically receives the third most IAEA inspection effort in the world. The IAEA has performed approximately 190 complementary accesses in Canada since 2001 [6].

#### Purpose of Complementary Accesses

Complementary Accesses are conducted to assure the absence of undeclared nuclear material and activities. CAs ensure the correctness and completeness of the information provided pursuant to Article 2 or resolve an inconsistency relating to that information. They also confirm the decommissioned status of any facility or LOF. The primary objective of the CSA is to provide the IAEA with a framework for verifying that a State's nuclear activities are consistent with its declared peaceful purposes. To achieve this, the CSA allows the IAEA to conduct inspections and other measures to verify the State's declarations. The CSA has limitations, however, and the AP was created to address these limitations. The AP supplements the CSA by providing the IAEA with additional information and access rights, including the ability to conduct Complementary Accesses.

CAs serve as a mechanism to enhance the IAEA's ability to verify the correctness and completeness of the State's declarations. This access is facilitated by providing the IAEA with direct access to locations identified in Article 5 of the AP. CAs and the AP are key tools for the IAEA to detect undeclared activities. They also serve in detecting and deterring non-compliance with the safeguards agreements and in providing the international community with confidence that nuclear material and facilities are being used only for peaceful purposes.

#### Procedures for Complementary Accesses

Complementary Accesses can be conducted at any location where nuclear material is present or where there are activities related to nuclear material. The AP allows the IAEA to conduct CAs at any location in a State that is not declared as a nuclear facility or location. A CA can be conducted at any time, and the State is required to provide the IAEA with access to the location within a reasonable timeframe.

Under the AP, the IAEA must provide the State with a written request for a CA, which will include the purpose, scope, and timing of the visit. The State will then facilitate access to the location and provide any necessary assistance during the visit.

During a CA, the IAEA inspectors will carry out a range of activities, including visual observation; environmental sampling; use of radiation detection and measurement devices; and containment/surveillance measures for sites with decommissioned facilities or LOFS. Additional activities where there is nuclear material include non-destructive and destructive assay sampling, item counting, and examination of records relating to the material. Record review of documents may include relevant product and shipping records for research & development, manufacturing and exports related to nuclear material and the fuel cycle. The results of the visit will be documented in a report, which will be provided to the State.

#### Challenges of Complementary Accesses

One of the significant challenges associated with Complementary Accesses is ensuring that they are conducted in a timely and efficient manner. Facilitating access to ensure the operator and site operational support is available for the CA can be a challenge. The State will facilitate access to the IAEA inspectors to ensure they have

the necessary access and information to carry out their activities. The operator may restrict access to certain areas or provide incomplete information. The AP addresses this by providing the IAEA with additional access rights and information requirements. For example, the AP requires the State to provide design information for any new nuclear facilities which allows the IAEA to verify that the design is consistent with peaceful purposes and does not pose a proliferation risk.

Another significant challenge is maintaining the confidentiality of sensitive information. The State may be concerned that the disclosure of certain information could harm national security or other legitimate interests. The AP addresses this by requiring the IAEA to protect sensitive information and only use it for safeguards purposes.

There are both routine and occasional challenges for all CAs. For example:

- (i) Environmental samples are one of the measures available to the IAEA during CAs. For safeguarded facilities, the operators need to ensure that by accommodating the IAEA's taking of the samples, especially in areas with high contamination, they are also meeting their radiation protection requirements and not releasing samples that could impact the inspector's health or the public. For non-licensees, the request by an international inspector to take samples in their laboratory can sometimes be met by surprise [6].
- (ii) The scope of inspection when a CA is called on a large site. When a country has many sites that comprise multiple facilities and LOFs this may present a challenge. When the IAEA notifies the State of a CA at a large site, the regulator must inform all of the operators and wait until the start of the activity before knowing the specific objectives [6].
- (iii) Providing access to decommissioned facilities outside of regulatory control. When the IAEA was in the process of drawing the broader conclusion for the first time, they performed CAs at many decommissioned facilities, some of which had been released from regulatory control and others that had been repurposed. In some cases, the IAEA visited locations that were now converted businesses such as carwashes, call centers, or factories. At times, finding such locations, identifying contacts, and providing access can be a challenge [6].

### 3. THE CANADIAN EXPERIENCE

#### Preparation for Complementary Accesses

The preparation and support for a CA can depend on the operators' regulatory obligation to the CNSC and their familiarity with safeguards. On review of the CAs performed in Canada, it was found that the IAEA performed 80% of those CAs at safeguarded facilities and LOFs, 15% at locations that are licensed by the CNSC but are not safeguarded facilities, and 5% at locations that are not currently licensed by the CNSC. At an average of approximately 8.5 per year, the IAEA has performed more than 190 CAs since 2001 in Canada [6].

For all Canadian licensees, Paragraph 12(1)(i) of the General Nuclear Safety and Control Regulations (GNSCR) states that "every licensee shall...take all necessary measures to facilitate Canada's compliance with any applicable safeguards agreement [7]." Further to the GNSCR, licensees that are subject to IAEA safeguards have a condition to meet the requirements in the Regulatory Document (REGDOC) 2.13.1 Safeguards and Nuclear Material Accountancy. REGDOC 2.13.1 sets out the CNSC requirements and guidance for the establishment and maintenance of a safeguards program [8]. This includes facilities such as nuclear power plants, waste management facilities, bulk handling facilities and research and test establishments, along with the Locations Outside Facilities which are involved in nuclear applications or R&D. As per Section 6 of the REGDOC, it requires licensees to facilitate access if a request for a "CA to any location in Canada with at least 24 hours' notice, or 2 hours' notice if the IAEA is already present at a facility or location outside the facility, on the same site, for an inspection or DIV [8]."

Overall, the licensees that have a safeguards condition are well prepared to support the IAEA notification. For locations that are licensed by the CNSC but are not safeguarded facilities or LOFs, there is less familiarity with the IAEA and safeguards requirements. These licensees mainly include universities and research labs that possess small quantities of nuclear material or material that have been exempted from safeguards. These licensees are required to take all measures to facilitate Canada's safeguards obligations but may not necessarily have a documented safeguards program or be familiar with IAEA inspectors. To assist in the gap, the CNSC has performed outreach to disseminate the concept of safeguards and CAs. At times, a CA may be because of a question to the State pursuant to Article 4.d. of the AP and in such cases, the CNSC will engage with the operator on the possibility of an IAEA follow-up [6].

In addition, some locations are decommissioned and there are locations that are operational but do not require a CNSC license. These locations are either managed or operated by organizations that hold CNSC licenses and who are familiar with safeguards. In general, access has been granted voluntarily in a prompt manner [6].

#### Support for Complementary Accesses

Approximately 25% of CAs in Canada are called with 2-hour notice, a majority with about 24 hours' notice, and some with greater than 2 days' notice [6]. The AP requires the IAEA to provide "at least" 24 hours, and there are some remote locations in Canada, such as the mines and mills, where the logistics dictate a longer notification window.

For CAs with 2 hours' notice, historically, the CNSC has participated in approximately 11% of activities. For these CAs, the written notification is provided directly to the operator. If the CNSC is not on site, an electronic notification from the IAEA is communicated and the support is provided remotely to answer any questions or respond to concerns from the IAEA or operator. For CAs with at least 24 hours' notice, the CNSC has participated in approximately 50%, including remote participation during the pandemic [6]. Even with 24 hours notice, some locations are difficult to access within the short window and for others the CNSC has determined that supporting remotely would be sufficient given the planned scope. For these CAs, notification is provided to the CNSC. The role of the State is to facilitate the IAEA's access to the requested location and coordinate with the designated IAEA inspectors.

While coordinating IAEA inspections and complementary accesses, a common approach is followed. These steps include, amongst other things:

- (i) Determine participation, whether in-person or remote
- (ii) Notify the operator, and confirm receipt of the IAEA notification
- (iii) Review the scope of the CA
- (iv) Identify access requirements (training and paperwork), required personal protective equipment, conditions that may require Managed Access or that could impact the CA
- (v) Review available safeguards-relevant information, including past reports, IAEA statements of inspections, Additional Protocol declarations, Operational Programme, design information questionnaire, the Canada-IAEA practical arrangements, and regulatory documents.
- (vi) Establish logistics (start time and meeting location) and plans for an opening and closing meeting

The short notice nature of the CAs makes their facilitation challenging, especially at locations that are not accustomed to IAEA safeguards activities. The CNSC has tried to establish a process that helps make the preparation more efficient. Facilitating the access typically begins with the CNSC's notification to the operator of the IAEA's CA [6].

For locations familiar with hosting IAEA complementary accesses, the discussion then turns to logistics and administration, including:

- (i) Scope of the CA and review of the IAEA's planned activities
- (ii) Entry requirements
- (iii) Start time, meeting location, points of contact

- (iv) Determination of required records to provide
- (v) Identification of the equipment the IAEA will be bringing on site
- (vi) Arrangements for an opening and closing meeting
- (vii) Factors that may impact the inspection.

For locations less familiar with hosting CAs, the discussion typically begins with an explanation of Canada's long strong political commitment to the peaceful uses of nuclear energy, the obligations under the Safeguards Agreement and Additional Protocol, the CNSC's regulatory framework, and requirements and expectations for CAs [6].

#### Utilization of Managed Access Accesses

Article 7 of the Additional Protocol addresses "managed access" whereby a State and the IAEA may make arrangements for preventing the dissemination of proliferation-sensitive information to meet safety or physical protection requirements, or to protect proprietary or commercially sensitive information. Such arrangements must not preclude the Agency from conducting activities necessary to provide credible assurance of the absence of undeclared nuclear material and activities at a given location [4].

In a proactive measure, Canada's regulatory document on Safeguards and Nuclear Material Accountancy recommends that licensees communicate known managed access requirements in their annual Additional Protocol 2.a.iii declaration to the IAEA. This promotes transparency of a licensee's access expectations to both the CNSC and IAEA to ensure efficient CA visits; however, this does not preclude the possibility of an unforeseen need for managed access arising during a CA.

Managed access has been applied in approximately 15% of CA visits in Canada. Of those, most have had managed access arrangements to protect personnel from workplace safety risks (e.g., deteriorating structural components of a building, areas with hazards requiring special work permits and personnel training unavailable in short-notice CA windows, etc.). When a CA is called, staff at the location are notified of the upcoming visit and asked to support the IAEA in their verification efforts. At the time of notification, the contact for the location is sometimes informed of the provision for managed access if necessary – particularly if the location is unaccustomed to IAEA inspections (e.g., a university that conducts nuclear fuel cycle research but holds no nuclear material). Should a need for managed access be known or identified, the IAEA is informed as soon as possible. The CNSC will make every effort to have a member of its International Safeguards Division attend the CA in person, although this is not always possible given that location of IAEA interest may be spread across Canada's considerable land mass and that the CNSC headquarters are stationed in Ottawa, Ontario. As a result, a virtual presence is sometimes maintained to provide the CNSC with an opportunity to remain engaged in the CA at certain meeting intervals (typically teleconference at the beginning and end). An opening meeting at the commencement of the CA is generally where managed access arrangements are reiterated for awareness to all personnel involved.

Although the majority of CA visits do not involve the use of managed access, it continues to be a valuable tool for ensuring the effective coordination of safeguards inspection activities and helping to assure licensees that their facilities, and contents therein, are protected against disclosure of commercial, technological and industrial secrets, and any other confidential information.

## 4. CASE STUDY

### Case Study #1

A CA was called with a 48-hour notice at a Canadian research institution that was considered a Location Outside Facility. The LOF's safeguards contact was notified the same day of the upcoming CA and informed that the following activities may be carried out during the visit:

- Visual observation
- Collection of environmental samples

- Utilization of radiation detection and measurement devices
- Application of seals or other identifying or tamper-indicating devices
- Item counting of nuclear material
- Non-destructive measurements and sampling
- Examination of records relevant to the quantities, origin, and disposition of material

The purpose of the CA was to verify the absence of undeclared nuclear material and the location was selected due to 1) a significant amount of exempted material present on site and 2) a recent announcement the IAEA discovered through open-source information reviews identifying funding to expand nuclear medicine research capabilities with the addition of a new facility on the site. One officer from the CNSC's International Safeguards Division, two IAEA inspectors, and three LOF staff members coordinated and attended the CA.

After an opening meeting to discuss CA objectives and facilitate coordination of the day's activities, the LOF staff members gave participants a tour of the site. This provided an opportunity to actively discuss operations as they were observed and explained and to share development plans for future operation expansions. During the tour, IAEA inspectors were granted permission to take photos and they also collected environmental samples from certain locations. Additionally, IAEA guidance was provided on AP declarations for forthcoming changes to the site as a result of plans to expand operations. Measurements with non-destructive assay equipment were performed by the IAEA on particular nuclear material items selected from an itemized list of nuclear materials that the LOF staff had provided.

In total, the CA lasted 8.5 hours and was concluded following a closing meeting. At this closing meeting, the day's activities and discussions were summarized, while actions were also assigned to the various parties; these actions included the provision of additional guidance from the IAEA to the LOF staff on particular topics that arose during the CA, as well as the LOF's proactive declaration of particular planned operation expansion activities during the next annual Additional Protocol update cycle. All persons involved in the CA were thanked for their participation and bid farewell. Several weeks later, a formal statement detailing the results of the CA was sent from the IAEA to the CNSC and, following CNSC review, was forwarded to the facility for their records.

### Case Study #2

A CA was called with a 24-hour advance notice at a Canadian business establishment that was not a safeguarded location in Canada. A CNSC safeguards officer immediately notified the business point of contact by telephone and emailed the notification to them. The operator at the location was also informed about the activities that may be carried out, which may include the following:

- Visual observation
- Utilization of radiation detection and measurement devices
- Collection of environmental samples.

The purpose of the IAEA access request was to permit the IAEA to resolve questions relating to the correctness and completeness of the information provided pursuant to Article 2 or to resolve an inconsistency relating to the information.

The CNSC accompanied the IAEA inspectors onsite during this access. On the arrival at the site, introductions were made, and the purpose of CA was reiterated. A tour was provided immediately after the opening meeting. After the site tour, follow-up discussions were held. The IAEA indicated that they wanted to pose a series of questions related to the owner's work and the establishment's operations.

The questions posed by the IAEA centred around the scope of work being performed by the establishment, prior completed projects, and the recipients of such projects along with the documentation associated with them. Finally,

the IAEA requested to take photos and environmental samples in the work areas. The owner agreed to accommodate all requests.

The IAEA then informed the owner that once the environmental sample results were available, they would be communicated through the CNSC. The IAEA and CNSC thanked the owner and establishment for their collaboration with this activity. After the CA, the follow-up documentation was submitted by the owner in response to the questions that were posed by the IAEA for the supplemental information. The IAEA and CNSC both responded to the owner thanking him for this information and acknowledging that the request had been fulfilled. There are no outstanding requests as a result of this complementary access activity.

The uniqueness of this CA was that its location was an industrial establishment that was not safeguarded nor under the CNSC regulatory framework. This required the State Authority to ensure the proper engagement and dissemination of information on the purpose and scope of the visit to ensure access is granted. Good preparation and clear communication of expectations are key to achieving these goals. The engagement with operators to provide the rationale for why Canada is hosting these inspectors, establishing their routine nature, and addressing questions and concerns transparently have helped resolve many issues to the CNSC and the IAEA's satisfaction.

## 5. CONCLUSION

Complementary Access is a critical component of the IAEA's safeguards system and plays a significant role in verifying the correctness and completeness of a State's nuclear declarations. The purpose of Complementary Accesses is to enhance the IAEA's ability to detect and deter non-compliance with the safeguards agreements and provide the international community with confidence that nuclear material and facilities are being used only for peaceful purposes. The Comprehensive Safeguards Agreement and the Additional Protocol provide the legal framework for the IAEA to detect the diversion of nuclear material, the misuse of a facility and to detect undeclared activities.

Complementary Access promotes transparency and confidence in a State's nuclear activities and enhances the IAEA's ability to prevent nuclear proliferation. The request for Complementary Access must be made in good faith and be based on credible information. The State being inspected has the right to impose specific conditions on the access. The confidentiality of information obtained through inspections is also an essential feature of Complementary Access. With the development of new nuclear technologies and the increasing number of states with nuclear capabilities, the IAEA's ability to detect undeclared nuclear activities is becoming increasingly important. Complementary Access plays a crucial role in ensuring the safety and security of nuclear materials and facilities and promoting the peaceful use of nuclear energy.



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