

CHAPTER 1

Iran and the evolution of safeguards

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Introduction

In February 2003, the International Atomic Energy Agency (IAEA) confirmed that the Islamic Republic of Iran had secretly developed the technical basis for an industrial-scale uranium enrichment programme using gas centrifuges. Shortly thereafter the IAEA determined that a deliberate Iranian ‘policy of concealment’ systematically deceived the IAEA for twenty years about the scope of Iran’s nuclear activities. These activities included undeclared uranium enrichment and plutonium separation, in contravention of Iran’s bilateral safeguards agreement with the agency.¹

These findings prompted a comprehensive IAEA investigation into Iran’s ongoing and past nuclear activities, and thrust Iran into the international nuclear verification spotlight where it has remained ever since. To the extent that the IAEA’s Iran probe concerned the actions of a fully sovereign state it was also unprecedented.² IAEA verification in Iran intensified following disclosure of Iran’s transgressions, while on a parallel track Iran negotiated with the United Nations Security Council and the IAEA Board of Governors about the future of its nuclear programme.

On July 14, 2015, Iran and six countries—China, France, Germany, the Russian Federation, the United Kingdom, and the United States—concluded a Joint Comprehensive Plan of Action (JCPOA) meant to resolve the Iran nuclear crisis. In the coming years the implementation of the JCPOA will be the single most important test case for the success or failure of multilateral nuclear verification and, beyond that, the nuclear non-proliferation regime.

The Iran nuclear crisis challenged the IAEA at a critical time in the evolution of its safeguards system. Five years before, the IAEA had established the Model Additional Protocol (MAP), providing the IAEA complementary legal authority to verify states’ safeguards obligations and detect activities like those Iran had concealed. The MAP was the centrepiece of a strategic reorientation underway at the IAEA since the early 1990s to rely less on routine accounting of nuclear material and activities declared to the IAEA by states, and instead to design safeguards activities in each state on the basis of proliferation risks identified by an analysis of that state’s entire and unique nuclear profile. Between 2002 and 2004, while IAEA inspectors and analysts learned

of Iran's hitherto undisclosed nuclear activities, the agency's safeguards planning staff adopted the label 'state-level' safeguards to underscore the IAEA's focus on the country as a whole, as distinct from its individual nuclear facilities and inventories.³ In response to revelations about Iran's nuclear programme, the IAEA has applied elements of a 'state-level approach' (SLA) for safeguards in Iran.

More recently, a number of IAEA member states have expressed reservations about the IAEA's 'state-level concept' (SLC) for safeguards. Some went on record saying that they would not support the SLC if it imposed additional or arbitrary obligations. Russia especially urged that the IAEA not encroach on states' sovereign rights as expressed in bilateral safeguards agreements. Consistent with Russian positions on the SLC, three years later Russian negotiators in 2015 insisted that the text of JCPOA should expressly underscore that 'All provisions and measures . . . should not be considered as setting precedents for any other state.'⁴

Russia's concerns notwithstanding, Western state parties to the JCPOA favour incorporating provisions of the agreement that go beyond existing obligations formally expressed by states' comprehensive safeguards agreements (CSA) and Additional Protocols (AP), into a global 'enhanced verification standard.'⁵ Should they try to universalise these provisions, it can be assumed that others will not agree, and thereby continue longstanding debate over how IAEA safeguards should be conceptualised, further developed, and implemented.

Beginning in 2014, the IAEA has more actively engaged member states to develop confidence in the SLC. Untroubled implementation of the JCPOA would also encourage states to conclude that the IAEA's safeguards concept is sound. Should implementation of the JCPOA instead become adversarial, discussion between states and the IAEA over safeguards would likely become more contentious.

Iran's safeguards obligations

Iran's nuclear programme began in the 1950s. Until the revolution in 1979 toppled Mohammad Reza Shah Pahlavi, Iran's fledgling nuclear activities resembled those in many countries that relied on assistance from advanced countries. Iran promptly joined the IAEA in 1959 and the Nuclear Nonproliferation Treaty (NPT) in 1970, and it concluded an NPT safeguards agreement in 1974.⁶ The Shah made ambitious plans for future nuclear power development, but when he was ousted, Iran had no infrastructure to produce direct-use nuclear materials.⁷ Twenty-four years later, however, the IAEA learned that, shortly after the Islamic Republic was established, Iran significantly accelerated the scope and extent of its nuclear activities.

Iran is one of 186 non-nuclear-weapon state parties to the NPT. Iran has a CSA that is based on the IAEA's document INFCIRC/153 (Corr.).⁸ Following from NPT

Article III, Iran's CSA obligates it 'to accept safeguards . . . on all source or special fissionable material . . . for the exclusive purpose of verifying that such material is not diverted to nuclear weapons or other nuclear explosive devices.' Iran is also obligated to cooperate with the IAEA in facilitating the implementation of safeguards pursuant to the safeguards agreement.⁹ When Iran's hidden activities were revealed in 2003, Iran had not concluded an AP.

The most important IAEA policy-making body is its board of governors, consisting of 35 member states. In September 2003, in response to findings of extensive safeguards violations by Iran, the board passed a resolution which, *inter alia*, requested the IAEA Secretariat to report to the board on safeguards implementation in Iran within three months.¹⁰ This resolution set in motion an IAEA investigation into Iran's nuclear activities that, 12 years later, is still in progress.

What is known in the public domain about Iran's nuclear history has been provided by the IAEA Secretariat in quarterly reports submitted to the board of governors since June 2003, based on its own findings and other sources. These reports provide an accounting of the IAEA's record of investigating and verifying Iran's nuclear activities from 2003 to the present.¹¹

Political and verification contexts

Iran was not the first case where the IAEA found that a state had violated an NPT safeguards agreement. The most serious transgressions led to non-compliance findings by the board of governors in Iraq in 1991 and North Korea in 1993. Each of these cases was unique but in both nuclear activities were concealed from the IAEA in violation of states' obligations.

The political context

The IAEA confirmed the existence of a uranium enrichment plant site in Iran four weeks before the United States launched what would become a discredited 'war of non-proliferation' against Saddam Hussein's Iraq.¹² Provoked by the build-up to war, the Non-Aligned Movement (NAM), representing 120 mostly developing countries, initiated a campaign focusing on North-South equity issues in nuclear diplomacy. In the background, the IAEA Department of Safeguards had been working for about a decade toward the establishment of a fundamentally more intrusive verification approach than that which it had applied since the IAEA was created in 1957.

In the months prior to the US invasion of Iraq, IAEA Director General Mohamed ElBaradei had crossed wires with Washington by challenging its rationale for going to war. After ElBaradei encountered friction with the US over Iraq, he injected himself

into nuclear diplomacy with Iran in an attempt to avoid conflict escalation. During this period speculation was rife that the US might also invade Iran, a step which ElBaradei warned would be an 'act of madness.'¹³ For six years, until ElBaradei was succeeded in 2009 as Director General by a Japanese diplomat, Yukiya Amano, US officials would scold ElBaradei that 'The IAEA is not in the business of diplomacy [but] is a technical agency that has a Board of Governors of which the United States is a member.'¹⁴ This deterioration of US-IAEA relations at the political level was unprecedented. Never were the US and the IAEA so divided over an important verification issue that ElBaradei, correctly, characterised as 'a matter of war and peace.'¹⁵

In late 2003 the NAM established a Vienna chapter. Iran, facing potential isolation over the IAEA's findings, was the most important NAM member driving this development. Iran crafted a narrative which portrayed itself as a victim of discrimination by the US and other advanced nuclear powers depriving the developing world of its right to peaceful cooperation enshrined in NPT Article IV. ElBaradei's defiance, on the eve of the war, of US allegations that Iraq had resumed trying to make nuclear weapons was followed by Iranian protests that the US and its allies also aimed to attack Iran on baseless grounds that Tehran, likewise, sought atomic arms. Not all NAM states shared Iran's conviction, but Iran's capacity to mobilise developing countries in its favour was a factor that both Western powers and the IAEA Secretariat had to consider in the board of governors and the IAEA General Conference, where policy decisions were taken. It was no coincidence that right after Amano was elected in 2009 by the board at the end of a polarised contest that pitted Amano's Western supporters against developing countries opposing his election, Amano assured developing states that he would prioritise their needs and not overly focus on safeguards and non-proliferation.¹⁶

During the Iran crisis the IAEA could no longer count on Western and non-Western powers finding common interests that, throughout the Cold War, had smoothed over delicate IAEA verification issues. In previous cases—North Korea, Romania, South Africa, and Iraq—the big powers were on the same page. But during the 2000s Tehran would exploit opportunities to divide the US, the European Union, and Russia, delaying sanctions and giving Iran more time to accumulate nuclear assets and improve its negotiating position with both the IAEA and its member states.¹⁷

The verification context

In 2003, the IAEA was in the midst of a long-term process of adjusting its safeguards system to be able to detect the kind of undeclared activities which the IAEA would now be challenged to discover in Iran. The MAP was in place in 1997, but Iran had not concluded an AP. The spectacular find at Natanz of a hidden large-scale, under-construction centrifuge enrichment plant, which touched off the Iran crisis, was unveiled by intelligence

agencies—not IAEA spadework. In 2002, the IAEA was briefed by member states about this discovery, and the IAEA followed up on that information with Iran.¹⁸

Until after the Gulf War, the IAEA relied nearly exclusively on material accounting to verify states' declarations of their nuclear activities. In response to post-war discovery of a secret, massive Iraqi nuclear weapons programme, IAEA management soon concluded that something like a paradigm shift in the IAEA's safeguards approach would be necessary.¹⁹ The IAEA began by making changes permitted under its existing legal authority, for example concerning the early reporting of design information. In 1993 it launched a coordinated effort, Programme 93+2, to identify and develop a comprehensive set of measures to strengthen safeguards. Between 1993 and 1997, the secretariat and member states systematically planned and negotiated a sweeping agreement on such measures, including some requiring additional legal authority. In 1997 this became the MAP.²⁰ As provided for in the foreword to the MAP, the board requested the director general to use the model as the standard for APs for states party to CSAs, and directed that such APs shall contain all of the measures in the model.

For states with CSAs that voluntarily agree to conclude and implement an AP, the protocol gives the IAEA greater access to information and locations in the interest of detecting undeclared activities. Where the IAEA under CSAs had been provided with information related to nuclear facilities and to the flow and inventory of nuclear material, under APs it would also receive data about a broad range of states' nuclear fuel cycle activities.²¹

The AP complements states' existing CSAs in important ways:

- *Correctness vs. completeness:* While INFCIRC/153 permits the IAEA to verify the correctness of a state's inventory declarations (non-diversion of declared nuclear materials) and the completeness of a state's declarations, the IAEA was less attentive to the issue of completeness regarding possible undeclared activities. Inspector access was focused, as a practical matter, mostly on declared facilities at locations identified by the state concerned. The IAEA in theory could carry out 'special inspections' at other locations, but this tool was largely avoided as it was regarded as confrontational.
- *Scope of verification:* Under INFCIRC/153, the earliest stages of nuclear material processing, and the production of low-grade, so-called 'pre-34(c)' nuclear material, were not subject to routine declaration and inspection. Iraq exploited this loophole for its clandestine programme. The MAP was therefore designed to capture states' entire nuclear fuel cycles. In addition, while NPT Article III.2 calls for safeguards as a condition of supply on equipment especially designed for the production of nuclear material, INFCIRC/153 provided the IAEA no mechanism for verifying

compliance with that obligation, nor did it cover R&D programmes not involving nuclear material. The MAP was intended to rectify these limitations as well.

- *Environmental sampling:* IAEA inspections in post-war Iraq for the first time made large-scale use of swipe samples including particle samples exposed to mass spectroscopic analysis, referred to as ‘environmental sampling’. CSAs permit the IAEA to carry out environmental sampling anywhere the IAEA has access, that is, during design information verification (DIV) and inspections. The MAP was designed to permit the IAEA broader access for such sampling.
- *Access to locations:* IAEA inspections showed that Iraq had conducted many undeclared activities at locations routinely off-limits to inspectors under a CSA. The AP significantly enlarged the IAEA’s access to locations beyond those declared as hosting nuclear activities.

Throughout the 1990s, the IAEA Secretariat argued to the board of governors that, because the above measures required additional authority to be routinely implemented, the IAEA needed a formal protocol that would legally commit states to cooperate and thus obviate concern that, at any time, a state could withdraw its permission.²²

Iran and IAEA safeguards

Developments before 2003

Before February 2003, when ElBaradei returned from Iran having seen that Iran was constructing a uranium enrichment plant, Iran had never been cited for any infractions of its safeguards agreement during the 29 years it had been in force. Nonetheless, the IAEA during the 1990s had been confronted with information suggesting that Iran was engaged in unreported nuclear activities. That information did not lead to IAEA confirmation that Iran had failed to declare nuclear activities. One former safeguards director later claimed that in early 2002, just before the IAEA was first briefed by member states about allegations that Iran was building an enrichment plant, IAEA personnel ‘suspected that Iran had been out of compliance [with its CSA] for about five years.’²³

In May 1991, the author of this chapter published an account based on information asserting that Iranian nuclear officials had met secretly with Pakistani scientist Abdul Qadeer Khan.²⁴ Outside the public domain, several states briefed the IAEA on data they obtained that ‘indicated possible undeclared nuclear activities in Iran.’²⁵ In response, the IAEA and Iran agreed to several so-called ‘transparency visits’ by the IAEA to Iran, including to a few sites identified in media reports as hosting nuclear activities. The IAEA was unable to confirm as a result of these visits that any undeclared activities had taken place in Iran.²⁶

Iran's Additional Protocol

Until late 2003, Iran limited its cooperation with the IAEA on the grounds that safeguards in Iran followed from Iran's CSA without an AP.²⁷ Iran signed an AP in December 2003, but to date Iran has not brought it into force.²⁸

When the IAEA began following up on its February 2003 findings, Iran refused to allow the IAEA to take environmental samples at previously undeclared locations which the IAEA believed were part of Iran's enrichment programme. Iran later permitted the sampling, which revealed traces of enriched uranium at one key workshop, and, in August, the IAEA found that this site had been modified, possibly affecting the accuracy of the sampling analysis.²⁹

Beginning in June the board of governors had urged Iran to 'promptly and unconditionally' conclude an AP.³⁰ Iran in October 2003 agreed to sign and then voluntarily implement an AP as part of a deal struck with the EU to avoid a finding by the Board of governors of non-compliance by Iran with its safeguards agreement and a concomitant reporting of Iran to the United Nations Security Council. This, ElBaradei told the board in November, was a major development, since 'the IAEA's ability to reach a conclusion on the nature of Iran's nuclear programme and the correctness and completeness of Iran's declaration of its nuclear activities will very much depend on the Agency being allowed by Iran to implement in full the verification measures provided for in the safeguards agreement and the Additional Protocol.' Iran had signed its AP in December to deflect a report by the Board on Iranian non-compliance to the Security Council and to permit Tehran to 'manage existing political and other pressure on Iran.'³¹ Iran told ElBaradei and the EU it 'would accept provisional implementation of the AP and pursue a policy of full transparency as a confidence-building measure.'³²

Less than a year after Iran signed and began implementing its AP, the Iran-EU accord that was the basis of Iran's voluntary AP commitment 'collapsed,'³³ and in February 2006 Iran formally suspended the provisional implementation of its AP.³⁴

Safeguards non-compliance

With hindsight, a few safeguards experts have suggested that, had the IAEA correctly interpreted Iran's extended delay in bringing its AP into force as a sign that Iran would not indefinitely cooperate, the IAEA would have taken greater advantage of what in fact was a small window of opportunity. But the record suggests that between December 2003 and February 2006, Iran cooperated significantly, and that the IAEA, by then benefiting from cooperation from member states providing intelligence findings, made significant discoveries. This was possible because the IAEA obtained documents, and carried out interviews, inspections, and environmental sampling in Iran, in particular at several undeclared locations where the IAEA suspected that Iran may have

been engaged in clandestine nuclear activities. During AP complementary access at several sites in early 2004,³⁵ including military locations, the IAEA found reprocessing equipment.³⁶ Between June and September 2004, the IAEA carried out complementary access at six locations related to: centrifuge enrichment and testing; laser development; uranium conversion, purification, and casting; plutonium separation; uranium mining and ore processing; and other theretofore undisclosed R&D activities.³⁷ During 2004 and 2005, the IAEA obtained and discussed with Iran its AP declarations, which contained information on projects for zirconium production and fuel fabrication.³⁸ In parallel, the IAEA made other findings through cooperation with member states that provided data on Iranian procurement for undeclared activities, including information that suggested that Iran might have worked on the development of nuclear weapons.

AP implementation contributed to these findings. But the most startling breakthroughs did not arise from complementary access under the AP *per se* but from Iran's declarations that it had previously deceived the IAEA about uranium dioxide (UO₂), uranium tetrafluoride (UF₄) and uranium hexafluoride (UF₆) conversion experiments; centrifuge testing using UF₆; plans to enrich uranium at the Natanz site; procurement of centrifuge design information; laser enrichment; and work on the more advanced P2 centrifuge.³⁹

During 2005, as the IAEA's knowledge about undeclared Iranian nuclear activities increased, diplomacy began breaking down. In September 2005, the board decided that Iran's many breaches of its obligations under its CSA constituted non-compliance, and, in February 2006, requested ElBaradei to report Iran's non-compliance to the UN Security Council.

Iran engaged NAM states to oppose the reporting. While they could not prevent board resolutions from being adopted,⁴⁰ NAM countries obstructed consensus adoption of the resolutions in September 2005 and February 2006, an outcome which Iran and some NAM states argued rendered the board's findings less legitimate.⁴¹ Iran contended that because the board did not promptly find it in non-compliance in 2003, and because the country had resolved numerous non-reporting issues with the IAEA between 2003 and 2006, the three-year delay weakened the case for the board's 2006 reporting of the matter to the UN Security Council.⁴² Absence of clarity in both the NPT and the IAEA Statute about what constitutes non-compliance delayed decision-making.⁴³ Iran argued, on the basis of Article XII.C of the IAEA Statute, that non-compliance must be determined by IAEA inspectors, and it pointed out that the IAEA's reports did not use the term 'non-compliance.' But Iran's view was not shared by the IAEA or other states.⁴⁴ A separate dispute arose about whether reporting of non-compliance to the UN Security Council by the board of governors was mandatory as suggested by Article XII. C of the Statute—as the United States argued—or instead was discretionary as suggested by paragraph 19 of INFCIRC/153.⁴⁵ A prompt non-compliance finding in

2003 might have bolstered the IAEA's credibility and blunted Iran's later claim that it was the victim of a conspiracy of big powers. But it might also have foreclosed the opportunity for the IAEA to discover much of what it subsequently learned about the extent of Iran's hidden nuclear programme.

PMD: beyond the Additional Protocol

Since 2006, the IAEA has collected data suggesting that Iran had begun to work on the development of nuclear arms in the mid-1980s and continued at least until 2003. As described by the secretariat, this information called into question the completeness of Iran's declarations.

As in the case of the non-compliance finding, politics influenced how IAEA data concerning 'possible military dimensions' (PMD) of Iran's nuclear programme would be handled. Here too, ElBaradei avoided taking actions that, in his view, would escalate the crisis.

Until succeeded by Amano, ElBaradei resisted urgings of some IAEA personnel and Western powers that he formally report on the contents of the PMD dossier to the board.⁴⁶ Amano personally reversed this policy and in November 2011 provided governors with the IAEA's summary analysis of that information.⁴⁷

As in the matter of delayed non-compliance, some participants have asserted that the IAEA's decision making on PMD allegations rendered conflict resolution more difficult. Russia warned throughout 2011 that Iranian leaders would never confess that Iran worked on nuclear weapons because that would seriously compromise the Iranian political regime. Should the IAEA formally air the PMD allegations, Moscow argued, Iran could never admit that they were true. Subsequent assertions by Iran that nuclear weapons are contrary to Islamic law made it still less likely that Iran would answer to the allegations.

During consideration in the 1990s about what should be included by states in their AP declarations, the IAEA Secretariat had proposed including weaponisation activities,⁴⁸ but the final text contained no reference to either weaponisation or to non-nuclear or dual-use equipment unrelated to production of nuclear material.⁴⁹ In reporting Iran to the Security Council in February 2006, members of the board of governors explicitly requested that the IAEA pursue PMD allegations, spelling out that Iran must 'implement transparency measures . . . which *extend beyond the formal requirements* of the Safeguards Agreement and Additional Protocol, and include such access to individuals, documentation relating to procurement, dual use equipment, certain military-owned workshops and research and development as the Agency may request in support of its ongoing investigations.'⁵⁰ On 31 July 2006, the Security Council required Iran to provide this access.⁵¹

The above-cited language was drawn directly from the most contemporary IAEA report to the board on Iran's safeguards implementation at that time, and represented, in the view of one former Western diplomat, ElBaradei's 'cautious understanding of what constitutes the IAEA's safeguards authority.' But it would be wrong, he said, to conclude from the text of this resolution 'that the IAEA could not ask questions and expect answers from states about whether they have done work relevant to making nuclear explosives.' Because weaponisation is not explicitly mentioned in the MAP as a domain for IAEA pursuit, and is not a component of the nuclear fuel cycle, the relationship between nuclear weapons-making activities outside the fuel cycle and the AP 'has long been a grey area.' It is not the only one. During the 1990s the United States proposed including in the MAP an obligation for states to report tritium production. This was debated and not included in the final text, but in the opinion of the former Western diplomat 'it would be absurd to conclude from this that the IAEA could not pursue allegations that a state may be making tritium.'⁵²

Iran claimed that it is under no legal obligation to address the PMD allegations.⁵³ Nonetheless, Iran and the IAEA concluded two successive agreements aimed at resolving them: a so-called 'Work Plan,' in August 2007 and a Framework for Cooperation, in November 2013.⁵⁴ Neither has been fully implemented, although cooperation under the latter is ongoing and is the basis for understandings between Iran, the powers, and the IAEA concerning resolution of PMD issues under the JCPOA.⁵⁵

State-level safeguards and Iran

Since the 1990s, the IAEA has adopted the view that safeguards under CSAs should be based on an evaluation of a state's nuclear programme as a whole, as opposed to being focused on individual nuclear facilities.

In evolving its approach to the planning, implementation and evaluation of strengthened safeguards, the IAEA has used the terms 'information-driven safeguards,' 'integrated safeguards,' and 'state-level' safeguards to describe certain aspects. But these terms are not interchangeable:

- *Information-driven safeguards* was a term used by the IAEA to describe the use of all available data sources to make safeguards judgments: state-supplied information, including data from nuclear material accountancy and declarations under CSAs and APs; results from IAEA verification activities, including inspections, DIV, and complementary access; and other safeguards-relevant information from open sources and third parties.⁵⁶
- *Integrated safeguards* was a term coined by the IAEA in 1998 to describe the optimisation of safeguards implementation in states with CSAs and APs, informed

by the desire to eliminate redundancies and reduce costs.⁵⁷ If the IAEA had no indications that a state had diverted any nuclear material from *declared* activities, and there were no indications of any *undeclared* nuclear material or activities, it could conclude that all nuclear material remained in peaceful activities—a judgment described as the ‘broader conclusion’. On that basis, the IAEA would have sufficient assurance to be able to reduce the state’s routine safeguards burden.

- *State-level approach (SLA)* is defined as safeguards ‘developed for a specific state, encompassing all nuclear material, nuclear installations and nuclear fuel cycle related activities in that state [including] safeguards measures . . . [to] enable the IAEA to draw and maintain a conclusion of the absence of undeclared nuclear material and activities in that state’.⁵⁸
- *State-level concept (SLC)* is the term used since 2004 to describe the process of the planning, implementation and evaluation of safeguards looking at the state as a whole. It was introduced ‘to describe safeguards implementation that is based on State-level approaches developed using safeguards objectives common to all States with CSAs and taking State-specific factors into account [and] . . . implemented for States with integrated safeguards’. Since 2004 IAEA officials have expressed the aim to apply state-level safeguards in all states subject to safeguards.⁵⁹ In 2014 the IAEA informed member states it would focus on implementation of state-level safeguards in countries with both CSAs and APs.

In recent years member states have questioned the IAEA about what the SLC means and implies, especially concerning the IAEA’s legal mandate to implement safeguards, issues of equity and discrimination, and the IAEA’s objectivity in forming safeguards judgments. These issues came to a head in 2012 when Russia and some others voiced objections and requested clarification from the IAEA.⁶⁰

Many of these issues had previously been discussed during negotiation of the MAP.⁶¹ Then, however, states widely shared the view that IAEA safeguards should be strengthened. This was so for specific reasons, including: the recent experience of the IAEA in Iraq, in North Korea, and South Africa; the leadership of influential board members and the secretariat; and the inability of a defeated Iraq to influence board decision making.⁶² By contrast, current safeguards diplomacy is often acrimonious, including objections that IAEA non-proliferation efforts detract from states’ access to peaceful nuclear development.⁶³

During the 1990s, the IAEA Secretariat had to involve its member states in the conceptualisation process for strengthening safeguards because the secretariat sought additional legal authority in the MAP. Since the 2000s, however, the secretariat has argued that no additional legal authority from the states was required for the development

of state-level safeguards. This may have encouraged safeguards personnel not to communicate their thinking to states.⁶⁴ By 2012 a number of member states felt that the IAEA had become unwilling to share information with them regarding how the agency wanted to move forward with safeguards development.

Outside the politicised IAEA boardroom, the secretariat continues to move forward with the development and implementation of safeguards at the state level. In practice, for a country subject to state-level safeguards, the IAEA derives an annual implementation plan in tandem with an annually updated state evaluation report (SER) based on all information available to it. Part C of SERs contains an analysis of possible proliferation scenarios examining all plausible acquisition paths for that state to obtain a nuclear explosive device, in consideration of the state's existing facilities, knowledge and expertise, past R&D activities, capacity to import technology and knowhow, and the state's available resources.⁶⁵ The IAEA then develops and prioritises state-specific technical safeguards objectives, also informed by state-specific factors, which include the history of the state's cooperation with the IAEA on safeguards implementation and the state's legal framework. Safeguards measures for the state are then identified to achieve the safeguards goals. The selection of measures in each case depends on the authority the IAEA has to carry out safeguards in the state, depending on whether a state has a CSA only or, also, an AP.

The term SLC was formally introduced one year after Iran's record of deception was revealed. Iran was by no means a prime driver behind the conceptualisation of state-level safeguards, but the SLC's aspirations closely matched the IAEA's goals for its expanding Iran investigation. As ElBaradei told the IAEA Board of Governors in February 2006, because of the 'existence in Iran of activities undeclared to the agency for 20 years,' the IAEA must 'fully reconstruct the history of Iran's nuclear programme.'⁶⁶ To do that, the IAEA drew on important tools used for state-level safeguards, including trade data, satellite imagery, and third-party information to develop a comprehensive and routinely updated country profile; acquisition path analysis for prioritising and pursuing investigations and identifying appropriate safeguards measures; and state-specific factors.

The IAEA's approach to Iran has departed in some ways from its blueprint for state-level safeguards. Instead of compiling an SER, the agency has regularly reported developments to the IAEA Board of Governors. While implementation of SLAs has become working-level routine for many states, the high visibility and priority of the Iran probe meant that it would be managed at the most senior level at the agency by the Director General and the Head of the Department of Safeguards.

As the IAEA uncovered an increasingly complex nuclear programme in Iran, this work accounted for a growing share of the IAEA's safeguards resources, funded

exclusively by member states' voluntary contributions. By 2012, the IAEA was spending annually over 12-million Euros on verification in Iran—more than for any other state except Japan.⁶⁷

Verification under the JCPOA

On 14 July 2015, Iran and its six negotiating parties concluded the JCPOA intended to lead to the resolution of all outstanding questions about Iran's nuclear programme. This agreement was the result of a twelve-year diplomatic process designed to trade off Iranian commitments to nuclear transparency and restraint for commitments by the other six parties to lift economic sanctions imposed on Iran. Before conclusion of the JCPOA, in November 2013 Iran and the six agreed to the Joint Plan of Action (JPA), a preliminary agreement aimed to point the way toward the final settlement.

The point of departure for negotiation of terms of verification was Iran's CSA. For numerous reasons, parties negotiating with Iran wanted the JCPOA to contain provisions that exceeded Iran's CSA and its AP.

When the agency began to make discoveries in 2003, it informed the IAEA Board of Governors that without more authority than expressed formally in Iran's CSA and AP, it could not assure that Iran's nuclear programme was wholly peaceful. In September 2005, for example, it said: 'Given Iran's past concealment efforts over many years, [needed additional verification] measures should extend beyond the formal requirements of the Safeguards Agreement and Additional Protocol and include access to individuals, documentation related to procurement, dual use equipment, certain military owned workshops and research and development locations. Without such transparency measures, the Agency's ability to reconstruct, in particular, the chronology of enrichment research and development, which is essential for the Agency to verify the correctness and completeness of the statements made by Iran, will be restricted.'⁶⁸

JCPOA negotiators envisaged the final result as a package that consisted of the JCPOA and an IAEA-Iran 'Roadmap' for 'clarification of past and present outstanding issues,' both of which were concluded and announced on 14 July. Together they would contain detailed arrangements concerning the IAEA's access to Iran. States negotiating with Iran sought for the IAEA as much access as possible because they were not confident that Iran would fully cooperate with the agency. Contrary to the official record in statements by governors and the IAEA Secretariat,⁶⁹ Iran has claimed, most recently in December 2014, that the IAEA is not authorised to verify both correctness and completeness of Iran's nuclear declarations.⁷⁰

To facilitate the IAEA reaching the 'broader conclusion' for Iran, the JCPOA included specific provisions concerning weaponisation that exceeded Iran's CSA and

AP. The aim of reaching the broader conclusion for Iran had been set forth in the first sentence of the JPA: 'The goal for these negotiations is to reach a mutually-agreed long-term comprehensive solution that would ensure Iran's nuclear programme [is] exclusively peaceful.' This is consistent with the aim of IAEA safeguards development since the 1990s to provide assurances that states are not engaged in undeclared activities and to reach broader conclusions for states that are implementing the AP. It is also consistent with the safeguards goal for Iran expressed routinely by the secretariat's reports to the board since 2003, namely, 'that all nuclear activities are dedicated to peaceful uses.'

But while states negotiating with Iran aimed to include provisions beyond Iran's CSA and AP, the result fell far short of what some observers had claimed was necessary. A former IAEA safeguards director argued before the agreement was concluded that 'Iran must provide the IAEA with unconditional and unrestricted access to any and all areas, facilities, equipment, records, people [and] materials . . . which are deemed necessary by the IAEA to fulfil its requirements under [Iran's] safeguards agreement and to verify Iran's declarations.'⁷¹ But Iran successfully brushed off demands that it agree to such 'anytime, anywhere' inspections and that it abandon its enrichment programme.⁷² Others had proposed that final sanctions-lifting be conditional on a 'broader conclusion' by the IAEA;⁷³ this also was not agreed to by Iran. JCPOA negotiators from Western states later said that they had insufficient collective leverage to compel Iran to provide greater access to the IAEA regarding persons, locations, and information.⁷⁴

The final result of negotiations for a comprehensive agreement nonetheless encompassed numerous provisions which went beyond Iran's CSA. The most important of these include:

- *Greater IAEA surveillance on Iran's enrichment programme:* For terms between 10 and 25 years for specific activities, Iran's enrichment programme will be subject to additional oversight. This will include IAEA verification of limits on production of enriched uranium and other enrichment-related activities, annual assessment of Iran's centrifuge R&D programme, and more extensive safeguards on uranium processing from uranium concentrate through to production of uranium hexafluoride. The agreement also provides for the IAEA's use of up-to-date technology for uranium enrichment safeguards.
- *Provisions concerning activities at the Arak site:* The IAEA will monitor a foreseen modification of the IR-40 research reactor, review design information for a replacement reactor, and oversee heavy water-related activities.
- *Implementation of the Additional Protocol:* Beginning in 2016 Iran will indefinitely implement its AP, toward the aim that the IAEA conclude that all nuclear activities

in Iran are for peaceful use. Should Iran not comply with requests for complementary access, parties will resort to an adjudication process with the goal of providing the IAEA access it requires.

- *Procurement*: A working group of state parties to the JCPOA will review and decide on all procurement transactions for Iran's nuclear programme, for items listed on the Nuclear Suppliers Group nuclear use and nuclear dual use lists. Iran will provide the IAEA access to all locations where imported nuclear use-listed goods will be used.
- *PMD and weaponisation activities*: For the purposes of safeguards under Iran's SLA, the IAEA needs a baseline understanding of Iran's capability to make nuclear weapons, provided by access to locations, personnel, and data in Iran. The JCPOA calls on the IAEA and Iran to resolve PMD allegations such that the IAEA has sufficient information; it will permit the IAEA to design safeguards goals and implementation plans. Separately, the JCPOA commits Iran not to engage in specific weaponisation activities.

In 2005, the IAEA Secretariat had concluded that the MAP has certain limitations. These include an absence of deadlines for states to respond to IAEA requests for information or clarification; the lack of obligations for states to report on domestic-sourced nuclear equipment; the absence of provisions concerning IAEA right of access to persons in a state; and strict limitations on the scope of IAEA activities that may be undertaken in a state related to complementary access. These limitations were the consequence of the negotiation of the MAP between 1995 and 1997.⁷⁵ For a state which has routinely and fully cooperated with the IAEA in implementing safeguards, these shortfalls may matter little in practice. But given Iran's record of selective cooperation with the IAEA, they might factor significantly. Some points were addressed by the JCPOA—such as the IAEA's access, adjudication deadlines, and verification of limits on uranium enrichment activities by Iran. Some issues may be addressed by Iran and the IAEA in confidential detailed access provisions.

The November 2013 JPA had called for a subsequent JCPOA to include 'agreed transparency measures and enhanced monitoring' going beyond the AP. During the ensuing negotiation, the parties and the IAEA negotiated understandings about what additional information Iran must provide, and what access to information, persons, and locations in Iran would be necessary to resolve 'past and present outstanding issues', including PMD allegations. While previously agreed 'transparency measures' were voluntary, the 'Roadmap' may include confidential and binding understandings about the IAEA's specific authority to resolve 'past and present outstanding issues', including PMD.⁷⁶

The JCPOA aspires to reach the 'broader conclusion' for Iran in eight years or less. Informal estimates of how much time the IAEA would need vary greatly. In 2010 a former IAEA safeguards director said that, because the IAEA had learned much about Iran's nuclear programme since 2003, it could, with full cooperation from Iran, reach a broader conclusion in about three years.⁷⁷ Five years later, and on eve of the JCPOA, a former director of safeguards asserted that the broader conclusion might take 'many years' and advised that 'the duration of [a comprehensive agreement] up to 20 years is reasonable in light of the two decades of non-compliance with [Iran's] safeguards obligations and non-cooperation with the IAEA.'⁷⁸

The challenge for nuclear verification under the JCPOA will be considerable for several reasons: the Iranian regime's track record of deliberate concealment of nuclear activities from the IAEA; the lack of trust between Iran and the other parties to the JCPOA; the complexity of Iran's nuclear programme and especially its nuclear fuel cycle; and the persistence of allegations that Iran has secretly worked on the development of nuclear weapons. Iran, unlike post-Gulf War Iraq, is a fully sovereign state and it can be expected to take all measures it deems appropriate to further its national interests during implementation of the JCPOA.

Iran and the future of nuclear verification

What can we conclude after a decade of intensified IAEA verification in Iran?

- Until third parties provided the IAEA with information revealing the extent of Iran's uranium enrichment programme, the agency had not identified any undeclared nuclear activities in the country. The agency in 2002 acted on this third-party information, and in 2003 confirmed the existence of Iran's enrichment project at Natanz. Before 2002, the IAEA may have been hindered in making findings by the absence of an AP in Iran and by the absence of well-founded third-party information, including from member states, and perhaps by certain provisions in Iran's CSA including those concerning inspector designation and access.
- Since 2005, the IAEA has had comparatively little difficulty in re-establishing and thereafter routinely assuring that all of Iran's declared nuclear materials and activities are accounted for.
- Iran's voluntary implementation of its AP in 2004 and 2005 gave the IAEA access to information that allowed it to discover hidden aspects of Iran's nuclear programme.
- Iran's withdrawal of consent to implement its AP in 2005 validated the IAEA's longstanding concern that the elements of the MAP should be implemented on the basis of legally binding instruments.

- The most significant revelations about Iran's nuclear activities in 2003 and 2004 resulted not from complementary access activities through an AP but from Iran's declarations. This underlines that, independent of the IAEA's legal authority, effective verification depends on the cooperation of the state subject to safeguards.
- The decision of the IAEA Board of Governors, encouraged by the secretariat, not to cite Iran for non-compliance in 2003 may have weakened the IAEA's credibility; it exposed the board and the secretariat to charges by Iran that the 2006 finding was arbitrary. But a prompt non-compliance finding might have prevented the IAEA from making important discoveries.
- In reporting Iran to the UN Security Council, the board pronounced that certain IAEA verification activities in Iran formally exceeded the scope of Iran's CSA and AP. This position may have reflected the then-Director General's conservative view of the IAEA's safeguards mandate, but it is not a consensus understanding of the IAEA's safeguards authority under the MAP and CSAs.
- Expressing increased concern since 2003, the IAEA routinely informed the board that it could not conclude that all nuclear material and activities in Iran are dedicated to peaceful use unless Iran implements its AP and provides access beyond its AP that is based so far on voluntary measures. The IAEA thereby encouraged negotiators to include in the JCPOA specific provisions going beyond Iran's AP.
- In light of Iran's perceived proliferation risk, beginning in 2003 and supported by the board, the IAEA has implemented state-level safeguards in Iran to an unprecedented degree of intensity and scope, given the comparatively modest size of Iran's nuclear programme. The IAEA's information collection, analysis, and verification activities account today for largest share of the effort and expense required to implement a state-level approach in a country with just one power reactor but where total safeguards costs may approach the level of costs in Japan, the world's most safeguarded country.⁷⁹

During the last quarter century, the IAEA has been reorienting safeguards away from routine accounting of declared materials and activities using universal implementation criteria that are explicitly non-discriminatory, and toward a more risk-based approach where implementation is based on unique conditions prevailing in each state subject to safeguards. But states want assurance that adjustments made by the IAEA will result in safeguards judgments that are objective and technically based, and that are not subject to political or other subjective considerations.

To be sure, the political environment surrounding safeguards decision making by the IAEA is today more contentious than at any previous time. During the 1990s, decisions taken by both the IAEA Secretariat and member states in response to violations

by Iraq and North Korea prompted little or no dissent in IAEA policy-making bodies. A decade later, key decisions taken on Iran proved highly controversial. These included the timing of a finding that Iran was in non-compliance with its safeguards obligations, and a decision of the Director General to report to the IAEA Board of Governors allegations that Iran had worked on nuclear weapons.

While for Western states the Iran crisis was about Iran's non-compliance with its obligations, Iran, joined by developing and non-aligned countries, brought forth a narrative which framed the crisis as being instead about the IAEA's objectivity, competence, and authority, and about states' 'nuclear rights'. In view of Iran's deception, most member states acquiesced to the IAEA Secretariat's decisions and findings on Iran. But the themes Iran raised in its defence increasingly resonated among some member states in discussion in the board and the IAEA General Conference about the agency's development of the SLC, especially since 2012.

Given this background, during implementation of the JCPOA the IAEA may be challenged to demonstrate that it is implementing safeguards in Iran according to the letter of its legal authority and obligations, and that it will not be unduly swayed by powerful member states that have concluded an informal political arrangement with Iran.

What the IAEA's Iran investigation will mean for the future of nuclear verification will depend more than anything else upon whether the JCPOA succeeds in reducing the threat posed by Iran's nuclear programme. If JCPOA parties and the IAEA implement the agreement smoothly, states' confidence in the SLC will be enhanced. If not, debate over the future of safeguards may intensify. A critical actor will be Russia, which contributed to the success of the JCPOA negotiation and has also raised critical questions in IAEA decision-making bodies over the future of the SLC.

During interventions in the IAEA boardroom, governments that negotiated the JCPOA with Iran underlined that intensified verification in Iran followed from IAEA Board of Governors and UN Security Council resolutions. They did this in part to get support from other states for resolutions and sanctions, and because they were fully aware of many states' lack of enthusiasm for additional safeguards activities, which beginning in 2012, was expressed in debate about the SLC in the board and the IAEA General Conference. Accordingly, most states currently understand that the IAEA's implementation of state-level safeguards does not imply that their nuclear activities will be subject to open-ended and wide-ranging IAEA investigations such as that carried out in Iran.⁸⁰

Many Western governments, including parties to the JCPOA, are on record as asserting that, while the decision to conclude an AP is voluntary, the AP is nonetheless a component of the 'current IAEA verification standard.'⁸¹ The JCPOA will in 2016 remove Iran from the very short list of states with large-scale and advanced nuclear

activities that are not implementing an AP. But the JCPOA does not require Iran's AP to enter into force, providing Iran a potential legal avenue to suspend AP implementation once all sanctions against Iran are lifted. Iran's future actions may therefore have significant bearing on efforts by the IAEA to universalise the MAP.

Western JCPOA parties also advocate that some unique provisions in the agreement, apart from Iran's CSA and AP, should in the future be incorporated into an 'enhanced verification standard.'⁸² A few of these elements might be accepted by most states with little difficulty, such as those permitting the IAEA to upgrade the technology standard of safeguards equipment. Western states may encourage the IAEA to move forward in Iran toward the establishment of a wide area environmental sampling program that could serve as a general model. Other measures in the JCPOA may be less willingly adopted elsewhere.

The most important aim of states negotiating the JCPOA with Iran was to assure that Iran's break-out time—the time Iran would need to produce enough weapons-grade uranium for one nuclear weapon—would be at least a year. Many of the safeguards provisions in the JCPOA that exceed the terms of Iran's CSA and AP, such as verified limits on enrichment and greater surveillance over centrifuge production, were included to support this outcome.⁸³ These provisions also track with the IAEA's state-level acquisition path analysis for Iran. An effort to extend these provisions to other states might be resisted by governments and industries in states with uranium enrichment programmes and which, following from their SLAs, pose less proliferation risk.

The JCPOA's verification costs must be met for a decade or more. Because the expense of implementing additional safeguards—including in Iran—must be supported by states' voluntary contributions, cost considerations may discourage adoption by other states of many or most JCPOA provisions exceeding CSAs and APs.

The Iran crisis focused discussion upon the significance of R&D activities related to making nuclear explosives, and proposals have been made to urge non-nuclear-weapon states to take on Iran's obligation not to engage in specific weaponisation-related activities.⁸⁴ Some, perhaps many, states may be willing to make this commitment. But should it be suggested that any obligation upon states not to weaponise be subject to special verification, difficulties would arise. States may not agree to grant the IAEA explicit authority to investigate weaponisation allegations based on third-party information. Indeed, the IAEA Secretariat might argue that it needs no such specific authority, since for a state with a CSA, allegations of weaponisation would question the completeness of that state's declaration. More generally, the IAEA may caution that a push to generalise specific provisions in the JCPOA for other states would be counterproductive to the IAEA's ongoing effort to universalise the MAP.

With many or most governments unwilling to assume more IAEA safeguards obligations, and no ironclad consensus among states about the IAEA's safeguards

mandate in certain areas, some observers propose that the UN Security Council instead be tasked to verify that states are not preparing to make nuclear explosives.⁸⁵ The council might be the logical locus for such an authority since its permanent members are nuclear-armed and because nuclear weapons-making would constitute a threat to peace under the United Nations Charter. But it is not obvious that states not prepared to grant the IAEA greater authority would endow an unreformed UN Security Council run by five nuclear weapons powers with the right to police R&D activities in 186 states that have pledged to forswear atomic arms.

Going beyond concerns about whether Iran was engaged in nuclear explosives-making, the Iran crisis increased worry that other states may hedge and develop capabilities that could give them a future nuclear weapons option. Debate over Iran exposed a lack of consensus about what activities are consistent with the 'use of nuclear energy for peaceful purposes' under NPT Article IV.⁸⁶ Perhaps in the future NPT parties might address the threat of 'safeguarded proliferation' in a multilateral accord that more precisely defines the scope of peaceful activities. But that would be decided in a realm far from the confines of IAEA safeguards.

States may not favour assuming additional and unique provisions of the JCPOA because they believe these were justified solely by Iran's record of concealment. Should this view prevail, Iran will be seen by many or most IAEA member states as an exception rather than a harbinger of greater future proliferation threats warranting additional obligations. Twenty years ago, IAEA member states created the MAP as a voluntary obligation; today however many states view it as an essential and standard safeguards instrument. Unique provisions in the JCPOA might in future become generalised, but likewise only on the basis of voluntarily commitments.

The views and opinions expressed are the author's own, as are any inaccuracies in fact or interpretation.

Endnotes

- 1 'Implementation of the NPT Safeguards in the Islamic Republic of Iran,' GOV/2003/40, Report by the Director General, International Atomic Energy Agency, June 2003. Available at: www.iaea.org/sites/default/files/gov2003-40.pdf
- 2 The IAEA carried out a comprehensive investigation of Iraq's nuclear program after that country's defeat and occupation in 1991 by a coalition of states led by the United States.
- 3 The IAEA began using the terms 'State Level Approach' and 'State Level Concept' during this period. See: James W. Tape, 'The State-Level Approach: Moving Beyond Integrated Safeguards', LA-UR-08-6114, Los Alamos National Laboratory, October 2008. Available at: www.inmm.org/AM/Template.cfm?Section=Evolving_the_IAEA_State_Level_Concept&Template=/CM/ContentDisplay.cfm&ContentID=2966
- 4 See: Joint Comprehensive Plan of Action Preamble and General Provisions, p.xi. Available at: www.eeas.europa.eu/statements-eeas/docs/iran_agreement/iran_joint-comprehensive-plan-of-action_en.pdf. According to Western JCPOA negotiators and safeguards officials, this language was introduced by Russia.

- 5 Private communications from several senior officials representing the United States and European state parties to the JCPOA, July, 2014 and September, 2015.
- 6 This safeguards agreement can be found in IAEA INFCIRC/214, available at: www.iaea.org/sites/default/files/publications/documents/infircs/1974/infirc214.pdf
- 7 Private communications from former United States government and former IAEA personnel, September 2014. In 2007, the IAEA informed the Board that, in addition to Iran's activities related to gas centrifuges, by the mid-1970s Iran had contracted with foreign entities to obtain laser enrichment-related assistance. 'Implementation of the NPT Safeguards Agreement and relevant provisions of Security Council resolutions 1737 (2006) and 1747 (2007) in the Islamic Republic of Iran', GOV/2007/58, International Atomic Energy Agency, November 2007. Available at: www.iaea.org/sites/default/files/gov2007-58.pdf
- 8 'The Structure and Content of Agreements Between the Agency and States Required in Connection With the Treaty on the Non-Proliferation of Nuclear Weapons', INFCIRC/153, International Atomic Energy Agency, June 1972. Iran's safeguards agreement can be found in IAEA INFCIRC/214. Available at: www.iaea.org/Publications/Documents/Infircs/Others/infirc153.pdf
- 9 INFCIRC/214, Article 1.
- 10 'Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran', GOV/2003/69, International Atomic Energy Agency, September 2003. Available at: www.iaea.org/sites/default/files/gov2003-69.pdf
- 11 Since June 2003 with few exceptions these reports have been compiled by the IAEA Secretariat every three months and routinely provided to the board as documents classified for restricted distribution. These reports have been declassified by the IAEA and are available on the IAEA website at: www.iaea.org/newscenter/focus/iran/iaea-and-iran-iaea-reports
- 12 The term 'war of non-proliferation' is used by Campbell Craig and Jan Ruzicka in 'The Nonproliferation Complex,' *Ethics & International Affairs*, Vol. 27, no. 3, 2013. pp. 329–348.
- 13 Mohamed ElBaradei, *The Age of Deception: Nuclear Diplomacy in Treacherous Times*, London: Bloomsbury, 2011. p. 255. Referring apparently to American neo-conservatives, ElBaradei wrote: 'Everybody wanted to know whom I meant by the 'new crazies' who say "let's go and bomb Iran." I let them draw their own conclusions.'
- 14 Sue Fleming, 'Rice swipes at IAEA, urges bold action on Iran', *Reuters*, 19 September 2007. Available at: www.reuters.com/article/2007/09/19/us-iran-usa-rice-idUSN1822732020070919. The citation is from US Secretary of State Condoleezza Rice.
- 15 Responding to the question whether it was a coincidence that Iran's violations were revealed 'just as the US was building up for the Iraq war,' ElBaradei said: 'The Iraqi war had an impact . . . to make everybody understand that weapons of mass destruction could mean the difference between war and peace and in that sense it makes any move to be undeclared very, very difficult, or, or to have — countries have to weigh very carefully whether to, to go for an undeclared programme.' (See the transcript of an interview with Mohamed ElBaradei on PBS Newshour, available at: www.pbs.org/newshour/bb/international-jan-june04-elbaradei_3-18/). According to a former IAEA participant in discussions of the IAEA's response to US allegations against Iran in 2003, ElBaradei 'wanted to make sure the IAEA would not take any decisions which would lead to a war.' According to a former US official at the time, the US position was that 'A decision about going to war wasn't [ElBaradei's] call to make.' Private communications, February 2015 and May 2009).
- 16 Julian Borger, 'Nuclear watchdog chief accused of pro-western bias over Iran', *The Guardian*, 22 March 2012. Available at: www.theguardian.com/world/2012/mar/22/nuclear-watchdog-iran-iaea. See also Mark Hibbs, 'Ten Lessons from September's IAEA Diplomacy', Carnegie Endowment for International Peace, October 2010. Available at: carnegieendowment.org/publications/?fa=41682&solr_jump=true&solr_hilite=Syria&reloadFlag=1

- 17 Seyed Hossein Mousavian, *The Iranian Nuclear Crisis*, Washington, D.C.: Carnegie Endowment for International Peace, 2012. pp. 80–96. Mousavian, spokesman for Iran’s nuclear negotiating team between 2003 until 2005, described how some Iranian strategists ‘maintained that, by widening the rift between Washington and Brussels, diplomatic activism with Europe could also increase the relative power of the Eastern bloc and lower the political cost of its support for Iran.’ Mousavian also said Iran’s negotiators beginning in 2005 and under President Mahmoud Ahmadinejad embraced a strategy of leveraging Iran’s relationship with Moscow to try to set back Western powers’ efforts to sanction Iran.
- 18 Private communications from former IAEA safeguards officials, June and September 2013.
- 19 During internal deliberations, members of the board of governors committee to prepare and negotiate the text of the Additional Protocol referred to this as a new ‘safeguards culture’ based not on trust but on rigorous investigation. See Michael D. Rosenthal, Lisa L. Saum-Manning, Frank Houck, ‘Review of the Negotiation of the Model Protocol Additional to the Agreement(s) Between State(s) and the IAEA for the Application of Safeguards’, Vol. II, Brookhaven National Laboratory, January, 2010. p. 10.
- 20 ‘Model Protocol Additional to the Agreement(s) between State(s) and the International Atomic Energy Agency for the Application of Safeguards’, INFCIRC/540(corrected), International Atomic Energy Agency, September 1997. Available at: www.iaea.org/sites/default/files/infirc540c.pdf
- 21 Michael D. Rosenthal, Lisa L. Saum-Manning, Frank Houck (2010). p. ii.
- 22 ‘Strengthening the Effectiveness and Improving the Efficiency of Agency Safeguards’, GC(39)/RES/17, General Conference, International Atomic Energy Agency, August 1995. p. 5.
- 23 Private communication, former IAEA official, July 2012.
- 24 Mark Hibbs, ‘Bonn Will Decline Tehran Bid to Resuscitate Bushehr Project’, *Nucleonics Week*, May, 1991. p. 17.
- 25 Nima Gerami and Pierre Goldschmidt, ‘The International Atomic Energy Agency’s Decision to Find Iran in Non-Compliance, 2002–2006’, Center for the Study of Weapons of Mass Destruction, National Defence University Press, December 2012. p. 1. Available at: wmdcenter.dodlive.mil/files/2013/01/WMD-Case-Study-6-December-2012.pdf
- 26 According to one participant in ‘transparency visits,’ these were unproductive because they were too public and conducted at the executive level, without experienced inspectors who could have made discoveries. Private communication, June 2014. Member states also shared with the IAEA information that Iran had imported, but had not declared, uranium hexafluoride (UF₆)—the feedstock for gas centrifuge uranium enrichment—from China. The IAEA did not pursue this because it had no actionable information about where the uranium was located in Iran. During the 1990s the IAEA unsuccessfully attempted to secure information from China considering this transaction. After Iran’s violations were exposed in 2003, China confirmed to the IAEA that the UF₆ had been exported to Iran in 1991.
- 27 ‘Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran’, GOV/2003/63, IAEA Board of Governors, International Atomic Energy Agency, August 2003. Available at: www.iaea.org/Publications/Documents/Board/2003/gov2003-63.pdf
- 28 ‘Iran Signs Additional Protocol on Nuclear Safeguards’, IAEA News Centre, International Atomic Energy Agency, December 2003. Available at: www.iaea.org/newscenter/news/iran-signs-additional-protocol-nuclear-safeguards. In accordance with Article 17 of Iran’s AP, the AP will enter into force on the date on which the Agency receives from Iran written notification that Iran’s statutory and/or constitutional requirements for entry into force have been met.
- 29 Nima Gerami and Pierre Goldschmidt (2012). p. 5.
- 30 ‘Statement by the Board, 19 June 2003 (Issued by the Chairwoman)’, IAEA News Centre, International Atomic Energy Agency, June 2003.
- 31 Mousavian (2012). p. 98.
- 32 *Ibid.* p. 99.
- 33 Nima Gerami and Pierre Goldschmidt (2012). p. 8.

- 34 'Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran', GOV/2004/11, IAEA Board of Governors, International Atomic Energy Agency, March 2004.
- 35 Under an AP, the IAEA may carry out 'complementary access' to assure the absence of undeclared nuclear material and activities, to resolve a question or an inconsistency relating to correctness and completeness of the information provided by a state.
- 36 See: GOV/2006/14
- 37 See: GOV/2004/60
- 38 See: GOV/2004/83
- 39 See: GOV/2003/75, GOV/2004/11, and GOV/2004/32
- 40 Mousavian reported that, on February 4, 2006, despite votes against by Cuba, Syria, and Venezuela, and abstentions by Algeria, Belarus, Indonesia, Libya, and South Africa, 'sixteen member countries of the NAM were present at the voting; the result shows that not only did the NAM fail to build support for Iran, but even India, Russia, and China, which were major members of the Eastern bloc, supported the resolution and voted against Iran.' Mousavian, p. 226.
- 41 ElBaradei expressed his regret after the November 24, 2005 vote that the resolution had not passed with consensus in the Board 'as is customary'.
- 42 These are summarised by Mousavian, pp. 226–227.
- 43 John Carlson, 'Defining Noncompliance: NPT Safeguards Agreements', *Arms Control Today*, Arms Control Association, May 2009. Available at: www.armscontrol.org/act/2009_5/Carlson
- 44 Private communications by former IAEA and member state officials, July and August, 2015.
- 45 Paragraph 19 of INFCIRC/153 states that, if the IAEA Board of Governors, 'upon examination of relevant information reported to it by the Director General finds that the Agency is not able to verify that there has been no diversion of nuclear material . . . to nuclear weapons or other nuclear explosive devices,' the Board may report the matter to the UN Security Council.
- 46 Mark Hibbs, 'Iran plant disclosure may prompt IAEA to focus on weapons data,' *Nucleonics Week* 50:39, October 2009. pp. 1, 12–14.
- 47 'Implementation of the NPT Safeguards Agreement and relevant provisions of Security Council resolutions in the Islamic Republic of Iran', GOV/2011/65, International Atomic Energy Agency, November 2011. Available at: www.iaea.org/sites/default/files/gov2011-65.pdf
- 48 'Strengthening the Effectiveness and Improving the Efficiency of the Safeguards System: Proposals for Implementation under Complementary Legal Authority', GOV/2863/Corr.1, International Atomic Energy Agency, May 1996. Available at: www.iaea.org/About/Policy/GC/GC40/Documents/gov2863.html
- 49 Michael D. Rosenthal, Lisa L. Saum-Manning, Frank Houck. p. 46.
- 50 See: GOV/2006/14. Emphasis added.
- 51 S/RES/1696 (2006), UN Security Council, July 2006. Available at: www.securitycouncilreport.org/atf/cf/%7B65BFCF9B-6D27-4E9C-8CD3-CF6E4FF96FF9%7D/Iran%20SRES1696.pdf
- 52 Private communication, former US government official, September, 2015.
- 53 Mark Hibbs, 'Amano's Move on Marivan', Carnegie Endowment for International Peace, December 2014. Available at: carnegieendowment.org/2014/12/17/amano-s-move-on-marivan
- 54 See: 'Communication dated 27 August 2007 from the Permanent Mission of the Islamic Republic of Iran to the Agency concerning the text of the 'Understandings of the Islamic Republic of Iran and the IAEA on the Modalities of Resolution of the Outstanding Issues'', INFCIRC/711, International Atomic Energy Agency, August 2007; and 'IAEA, Iran Sign Joint Statement on Framework for Cooperation', IAEA News Centre, November 2013, respectively.
- 55 Hibbs (2014).

- 56 IAEA GOV/2784 from February 21, 1995, 'Strengthening the Effectiveness and Improving the Efficiency of the Safeguards System' spelled out that the IAEA sought 'improved analysis and evaluation of all relevant information available to the agency' for making safeguards judgments (p. 5). Under the rubric 'Broader Access to Information,' GOV/2784 cited as the IAEA's goal: 'Information from all sources available to the Agency, including the public media, scientific publications and existing Secretariat databases (power reactors – PRIS, research reactors – RRDB, fuel cycle facilities – NFCIS and the International Nuclear Information System – INIS), as well as other information made available by Member States.' GOV/2784 also explained that the information would be used to develop a physical model called the proliferation critical path 'describing all known pathways (combinations of processes) for the production of weapons-usable material and weaponisation.' 'Strengthening the Effectiveness and Improving the Efficiency of the Safeguards System', GOV/2784, International Atomic Energy Agency, February 1995.
- 57 Victor Bragin, John Carlson, and Russell Leslie, 'Integrated Safeguards: Status and Trends', *The Non-proliferation Review*, Vol. 8, No. 2, 2001. pp. 102–110.
- 58 'IAEA Safeguards Glossary: 2001 Edition', *International Nuclear Verification Series*, No. 3, International Atomic Energy Agency, June 2002.
- 59 'The Conceptualization and Development of Safeguards Implementation at the State Level,' GOV/2013/38, International Atomic Energy Agency, August 2013. para. 12.
- 60 Mark Hibbs, 'The Plan for IAEA Safeguards', Carnegie Endowment for International Peace, November 2012; Mark Hibbs, 'Russia's Safeguards Problem', Carnegie Endowment for International Peace, December 2012; and Laura Rockwood, 'The IAEA's State-Level Concept and the Law of Unintended Consequences', *Arms Control Today*, August 2014.
- 61 Russia, beginning in 1995, raised concerns in the board about the objectivity of IAEA safeguards should the IAEA's use of third-party information expand.
- 62 Michael D. Rosenthal, Lisa L. Saum-Manning, Frank Houck (2010). p. D.
- 63 In 2009, NAM countries represented on the board prevented agreement on an IAEA plan for an international fuel bank, on the grounds that the IAEA should not be proposing initiatives intended to discourage developing countries from exercising their NPT Article IV rights. 'Developing countries block IAEA plans for n-fuel banks', *Hindustan Times*, 18 June 2009. Available at: www.hindustantimes.com/world-news/developing-countries-block-iaea-plans-for-n-fuel-banks/article1-422878.aspx
- 64 Private communications, IAEA member state officials and former IAEA personnel, October–November, 2015. 'The Secretariat kept reiterating that the SLC was all about safeguards implementation, so there was no obligation on the [Department of Safeguards] to inform the board about what they were doing,' one IAEA governor said.
- 65 Jill N. Cooley, 'Progress in Evolving the State-level Concept', Seventh INMM/ESARDA Joint Workshop: Future Directions for Nuclear Safeguards and Verification, October 2011. Available at: www.inmm.org/AM/Template.cfm?Section=Evolving_the_IAEA_State_Level_Concept&Template=/CM/ContentDisplay.cfm&ContentID=2965
- 66 'Implementation of the NPT Safeguards Agreement and Relevant Provisions of Security Council Resolution 1737 (2006) in the Islamic Republic of Iran', GOV/2007/8, International Atomic Energy Agency, February 2007.
- 67 'Safeguards Implementation Report for 2012', GOV/2013/20, International Atomic Energy Agency, April 2013. p. 46.
- 68 'Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran', GOV/2005/67, International Atomic Energy Agency, September 2005.
- 69 'The IAEA's State-Level Concept and the Law of Unintended Consequences' (2014); Olli Heinonen, 'The Iranian Nuclear Programme: Practical Parameters for a Credible Long-Term Agreement', The Henry Jackson Society, November 2014. p. 21.

- 70 'Communication dated 20 November 2014 received from the Permanent Mission of the Islamic Republic of Iran to the Agency regarding the Report of the Director General on the Implementation of Safeguards in Iran', INFCIRC/871, International Atomic Energy Agency, December 2014.
- 71 'The Iranian Nuclear Programme: Practical Parameters for a Credible Long-Term Agreement' (2014), p. 8.
- 72 Early in the Iran crisis, the United States adopted the position that one key outcome to a negotiated settlement should be 'zero enrichment' by Iran. During the initial phase of the negotiation of the JCPOA, some US officials asserted that the agreement would include the obligation by Iran to accept 'anytime, anywhere' inspections.
- 73 Oliver Meier, 'In der Krise liegt die Chance; Der Atomkonflikt mit Iran und seine Auswirkungen auf das nukleare Nichtverbreitungsregime', Stiftung Wissenschaft und Politik, October 2014. p. 13.
- 74 Private communications, Western country JCPOA negotiators, September 2015.
- 75 Pierre Goldschmidt, 'IAEA Safeguards: Dealing preventively with non-compliance,' Belfer Center for Science and International Affairs, July 2008. Available at: belfercenter.ksg.harvard.edu/publication/18456/iaea_safeguards.html
- 76 In August 2015, it was made public that the IAEA and Iran had reached confidential understandings concerning IAEA access to a military base at Parchin, which had been cited by IAEA member states in communications to the secretariat as a suspected location for nuclear weapons-related activity. Iran and the IAEA agreed to some technical verification measures at Parchin which were not routine. The point is that, in advance of performing verification as called for by the JCPOA's timetable, the IAEA and Iran had negotiated confidential agreements about how they would proceed in detail to resolve this issue. According to diplomatic sources, the IAEA and Iran have likewise negotiated other understandings about how to resolve other issues in the 'Roadmap' requiring clarification for Iran to comply with its obligations under the JCPOA.
- 77 Private communication, former IAEA safeguards official, June 2012.
- 78 'The Iranian Nuclear Programme: Practical Parameters for a Credible Long-Term Agreement' (2014). p. 22.
- 79 Data from the IAEA Programme and Budget for 2016 and from recent Safeguards Implementation Reports suggest that total safeguards expenditure for Iran for 2016 might approach EUR 18 million, which is the amount spent in recent years in Japan. Prior to conclusion of the JPA and then the JCPOA, the cost of safeguards implementation in Iran in 2012 was EUR 12.5 million.
- 80 Russian officials said that during board meetings Russia underlined the essential difference between the IAEA's routine safeguards mandate and its unique mandate in Iran. Private communication, November 2014.
- 81 'EU Statement – United Nations General Assembly: Report of the IAEA', European Union Delegation to the United Nations, November 2014. Available at: eu-un.europa.eu/articles/en/article_15688_en.htm.
- 82 Private communication, Western government safeguards policy official, October 2014.
- 83 Private communication, JCPOA negotiator, September 2015.
- 84 Research and discussion is ongoing about what technologies, dual-use items, materials, and activities might be included on such a no-weaponisation 'checklist,' and some observers have advocated that the list of proscribed activities for Iran be adopted by all NPT non-nuclear-weapon states. Dr Viatcheslav Kantor (eds.) *The Limits of Secure Nuclear Tolerance*, International Luxembourg Forum on Preventing Nuclear Catastrophe, 2014. Available at: www.luxembourgforum.org/eng/Forums_Library/items/Book%20by%20VVK%202014_eng.pdf
- 85 For example, Rolf Ekeus proposed that a subsidiary organ of the UN Security Council be empowered to handle weaponisation-related allegations, leaving the IAEA in charge of matters concerning nuclear materials, in *Ibid.*, p. 27.
- 86 *Ibid.*, p. 36.

