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The Future of the Iran Nuclear Deal: Pretty Bright from Its Verification Lens

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Abstract

This manuscript discusses the JCPOA's verification mechanism, especially its four innovative additional safeguards measures: much broader monitoring of Iran's nuclear program, access with a deadline and dispute resolution mechanism, the Procurement Channel, and the prohibition of weaponization activities. It considers the possible implications of such safeguards measures for the future of the deal and for the non-proliferation regime. This manuscript found that the four additional safeguards measures, if implemented with the Iran's Comprehensive Safeguards Agreement and the Additional Protocol, would increase the effectiveness of monitoring and verification measures under the deal. In short, they will significantly contribute to the success of the deal. The deal is a success if its verification mechanism prevents Iran from producing weapons-grade uranium and weapons-grade plutonium at its declared nuclear facilities for 10-15 years, and deters the country from building clandestine facilities to secretly produce those fissile materials.

I. Introduction

Iran and the EU3+3 – the United Kingdom, France, Germany, the United States, Russia, and China – finalized the Joint Comprehensive Plan of Action (JCPOA) on 14 July 2015. The deal intends to ensure that Iran's civilian nuclear program can only be used toward peaceful ends, not for military purposes. In exchange, Iran will enjoy a wide-ranging suspension of sanctions from the U.S., European Union, and United Nations, including the unfreezing of approximately $100 billion of Iranian assets held mostly in Western financial institutions **[*1*]**. More than 70 nuclear non-proliferation specialists released a joint statement arguing that the deal "is a strong, long-term, and verifiable agreement that will be a net-plus for international nuclear non-proliferation efforts" **[*2*]**. A group of 29 nuclear scientists and engineers also showed their support for the deal through a letter addressed to President Barack Obama, stating that they believe the deal "meets key non-proliferation and security objectives and see no realistic prospect for a better nuclear agreement." Moreover, three dozen retired generals and admirals, and more than 100 former U.S. ambassadors support the deal and echo the arguments made by the aforementioned nuclear experts **[*3*]**.

On the other hand, opponents of the JCPOA argue that the deal could give the potential for Iran to indigenously develop a nuclear weapon within 15 years and that tougher sanctions should be imposed. They believe that the deal's snapback of sanction mechanism will not prevent continuous and minor violations that would allow Iran to gradually undermine the deal **[*4*]**. This article does not aim to specifically support or reject any arguments made by either proponents or opponents of the deal, nor does it aim to evaluate each of the deal's terms. However, it is important to note that despite its debatable perfection and imperfection, the deal puts in place an unprecedented and multilayered monitoring and verification mechanism **[*5*]**. Therefore, this article aims to discuss the JCPOA's verification mechanism, especially its advanced safeguards measures. It considers the possible implications of such safeguards measures for the future of the deal and for the non-proliferation regime.

II. Advanced Safeguards Measures

The verification mechanism under the JCPOA is advanced in nature. It consists not only of Iran's Comprehensive Safeguards Agreement with the International Atomic Energy Agency (IAEA) and the Additional Protocol, but also includes several advanced safeguards measures. Iran currently implements its Comprehensive Safeguards Agreement with the IAEA and the Additional Protocol as it did voluntarily from 2003 to 2006. The JCPOA requires Iran to ultimately ratify the Additional Protocol on Transition Day (18 October 2023), which is eight years after Adoption Day (18 October 2015), or the date on which the IAEA reaches the broader conclusion that all of Iran's nuclear material is being used peacefully, whichever comes first. Iran's adherence to the Comprehensive Safeguards Agreement with the IAEA is permanent. Once ratified, Iran's Additional Protocol is also permanent as long as it does not withdraw from the Non-Proliferation Treaty. The advanced safeguards measures under the deal that will be further discussed below are not permanent, but will remain in effect for 10 to 25 years **[*6*]**.

A. Broader Monitoring of Iran's Nuclear Program

Under the Comprehensive Safeguards Agreement with the IAEA, Iran is required to declare the entire inventory of its nuclear material—the material's capacity and location in Iran—and all activities involving nuclear material to the IAEA. Under the Subsidiary Arrangements stemming from Article 39 of Iran's Comprehensive Safeguards Agreement with the IAEA, Iran has also agreed to accept the modified version of Code 3.1, which requires the country to provide a notice of a new nuclear facility to the IAEA as soon as it decides to build it. The modified Code 3.1 is a more enhanced measure than the original 1976 Code 3.1 that required Iran to provide a notice "normally no later than 180 days before the facility is scheduled to receive nuclear material for the first time." This means that the modified Code 3.1 provides a better understanding of Iran's nuclear plans and simplifies the process of planning safeguards measures for new facilities as they are being constructed.

The Additional Protocol is more enhanced than Iran's Comprehensive Safeguards Agreement with the IAEA and requires Iran to provide additional information about its nuclear program and additional access to nuclear-related facilities to the IAEA. The Additional Protocol requires Iran to provide the agency with additional information on the sites of nuclear facilities and other sites normally related to nuclear material, nuclear material not otherwise regularly inspected by the agency under Iran's Comprehensive Safeguards Agreement with the IAEA, main activities related to nuclear fuel cycle, and exports and imports of certain nuclear fuel cycle-related material and equipment. The Additional Protocol also provides information and access concerning the nuclear material (e.g., uranium mines, uranium ore processing, and yellow cake production) earlier than traditional safeguards measures. Under the Additional Protocol, the IAEA can demand access to any location at Iran's declared nuclear facilities, and the Additional Protocol extended declaration through the complementary access provision with only short notice. The notification time for such access is two hours if the agency is already conducting an inspection at the location or design information verification and 24 hours in all other cases. The Additional Protocol also provides the IAEA

with access to undeclared nuclear facilities or related facilities (e.g., factories for enrichment components) if such access is needed to complete the agency's verification work **[*7*]**.

The JCPOA is even more enhanced and intrusive than Iran's Comprehensive Safeguards Agreement with the IAEA and the Additional Protocol and will give the IAEA much broader access to Iran's nuclear material, equipment, and facilities. The agency will have access to monitor Iran's entire nuclear fuel cycle for 25 years, including its uranium mining at Gniche and Saghand, milling at Ardakan, and all of its uranium ore concentrate stocks that could be converted into uranium hexafluoride for enrichment at Isfahan. The agency will also have continuous surveillance of Iran's centrifuge manufacturing and research and development for 20 years. Such oversight includes access to Iran's stocks of centrifuge rotors and bellows, which could be used to make new centrifuges, including the main equipment for centrifuge production such as low-forming machines, filament-winding machines, and mandrels **[*6*]**.

Moreover, for 15 years, the IAEA will monitor the stored Iranian centrifuges and related infrastructure. During that time, Iran will provide the IAEA with daily access to all relevant buildings at Natanz—the only location where Iran is allowed to enrich uranium 235 up to 3.67% **[*6*]**. Such rigorous safeguards measures will considerably decrease the likelihood of clandestine activity because Iran would have to find another source of uranium for enrichment if it wished to secretly develop a nuclear weapon through a uranium pathway. These advanced safeguards measures on the front-end of the nuclear fuel cycle seem to be the major innovation of the verification mechanism under the JCPOA.

Another advanced safeguards measure under the JCPOA also will significantly block Iran from using plutonium to develop a nuclear weapon. Iran has agreed to ship out its spent fuel for the lifetime of the reactor and has also agreed to redesign the Arak heavy water research reactor so that it is unable to produce large quantities of plutonium. Iran will sell all of its heavy water that is not needed for Arak to the international market for 15 years. Also, for at least 15 years, Iran is not allowed to build additional heavy water reactors or a reprocessing facility to separate plutonium from spent fuel **[*6*]**. Any effort to covertly produce or divert plutonium from Bushehr would be swiftly detected by the IAEA. The agency will have access to real-time monitoring of Iran's heavy water production and stocks with more intense and efficient safeguards measures than the ones under the Additional Protocol to verify its compliance indefinitely. These physical restrictions on the production of plutonium, as argued by a number of nuclear scientists, will essentially shut down Iran's abilities to use plutonium to develop a nuclear weapon **[*4, 8, 9*]**.

B. Access with a Deadline & Dispute Resolution Mechanism

Under Iran's Comprehensive Safeguards Agreement with the IAEA, the IAEA can request access to Iran's (and any other NPT States having the Comprehensive Safeguards Agreement with the IAEA) undeclared nuclear facilities through a special inspection if the IAEA Director General believes that such access is necessary to verify the correctness and completeness of information submitted by Iran. The agency is obligated to consult with Iran when faced with situations or conditions that may lead to a special inspection. No deadline is established in Iran's Comprehensive Safeguards Agreement with the IAEA in solving disputes on special inspections between Iran and the agency, but the Director General will usually report the problem to the IAEA Board of Governors **[*4*]**.

The Additional Protocol is more comprehensive than Iran's Comprehensive Safeguards Agreement with the IAEA and gives broader access to the IAEA for asking follow-up questions and examining inconsistencies. In such a situation, the agency should give Iran the opportunity to answer the questions and explain the inconsistencies before it requests access, unless it believes that any delay would prejudice the purpose for which the access is requested. If Iran cannot provide the requested access, then the country is obligated to make every effort to fulfill the agency's requirements through other means and

without further delay. The agency will then give Iran at least 24 hours' notice before access occurs to give the country an opportunity to solve the issue by other means. Like Iran's Comprehensive Safeguards Agreement with the IAEA, the Additional Protocol does not have a deadline for solving disputes on complementary access if Iran cannot provide access to the location requested by the agency **[*7*]**.

Another advanced aspect of the JCPOA is that it contains an access with a deadline and dispute resolution mechanism that will last for 15 years. This mechanism improves the IAEA's capability to acquire access to any undeclared facilities (including military facilities) within a defined time if the agency has concerns about certain materials or activities inconsistent with the JCPOA. After a request to access the suspected facility is made, the agency and Iran have 14 days to make arrangements for access or to decide on other means to solve the issue. If such efforts are ineffective, the issue is referred to the Joint Commission, which includes eight members: United States, United Kingdom, France, Germany, European Union, Russia, China, and Iran. The Joint Commission has seven days to find a solution either through a consensus or voting of five or more of its eight members, which means that the West has the ability to pass any decision. Iran then has three days to implement the Joint Commission's decision. If Iran is found to be in non-compliance, the EU3+3 could decide to re-impose the sanctions **[*6*]**.

Such access with a deadline and dispute resolution mechanism would be useful since it could considerably mitigate concerns regarding covert activities in Iran. The 24 days' limit on any delay to access is unprecedented. The limit will allow inspections to covert enrichment, construction of reprocessing or reconversion facilities, and implosion tests using uranium **[*3*]**. Under the JCPOA, inspections and intelligence will work together. Information gathered by the IAEA inspectors will strengthen the assessment made by intelligence agencies, and intelligence data will help guide the IAEA inspections **[*4*]**. The 24 days' limit, a deadline, and provisions for automatically re-imposing sanctions improve the agency's special inspection provisions under Iran's Comprehensive Safeguards Agreement with the IAEA and the Additional Protocol that have no deadline for action or penalty for Iran's non-compliance.

C. Procurement Channel

Another advanced safeguards measure under the JCPOA is a mechanism called the Procurement Channel, which is designed to monitor and control the supply of nuclear-related items to Iran. Under this mechanism, three categories of items will regularly be referred to the Procurement Working Group of the Joint Commission: Nuclear Suppliers Group's Trigger List goods, non-listed goods with a nuclear utility, and Nuclear Suppliers Group's dual-use goods **[*6*]**. However, dual-use components remain debatable despite different annexes issued by the IAEA. The missile's range and capability are still interpretable differently by both sides. The Procurement Working Group membership consists of one voting member each from Iran and the EU3+3, whereby the European Union High Representative will serve as the coordinator. If Iran wants to purchase any goods or materials that could be used for its nuclear program that are identified on established IAEA dual-use lists, the Procurement Working Group would need to review the request and authorize the purchases.

Within the Procurement Channel mechanism, the suppliers must seek approval from their own governments, and the governments must forward the request to the Procurement Working Group and the United Nations Security Council. The Procurement Working Group has 20 working days (and an additional 10 working days by request) to make decisions regarding whether to approve or reject the sale of direct use, nuclear-related dual-use, or certain dual-use goods to Iran. It requires consensus to authorize exports to Iran. If no party objects, the proposal is then approved. If a disagreement within the Procurement Working Group ensues, two members can request referral of the case to the Joint Commission for consensus vote. The Joint Commission then has 10 days to decide, and the United

Nations Security Council must be notified of recommendation within 45 days of receiving the proposal **[*6*]**.

Under the JCPOA, the Procurement Working Group would also be permitted to conduct end-user checks to ensure that the materials ended up in the correct places. Moreover, the IAEA will have access to check the end use of direct-nuclear-use goods. The agency could check dual-use goods during safeguarding and ostensibly also invoke access provision in extreme cases. Combined with the complete inventory of the materials that Iran uses for its nuclear program, this end-user checks measure will help ensure a thorough accounting of dual-use materials to prevent diversion for a covert nuclear program **[*10, 11*]**. In other words, the Procurement Channel will help ensure that neither single- nor dual-use nuclear-related items could be diverted to any covert nuclear program in Iran.

The country has committed to guarantee that all procurement of nuclear-relevant items, both for civilian and military purposes, will be procured through this mechanism, which will last for 10 years, and all restrictions will end on the Termination Day (18 October 2025).

D. Prohibition of Weaponization Activities

Another innovation under the JCPOA is the explicit prohibition of Iran's nuclear weapons research and development, as opposed to merely nuclear weapons manufacture, as expressed in Article II of the Non-Proliferation Treaty. Iran has also agreed to permanent restrictions prohibiting activities relevant to developing a nuclear explosive device. While Iran committed to not pursue nuclear weapons when it joined the Non-Proliferation Treaty, the JCPOA requires Iran to adhere to restrictions beyond its NPT obligations. The Non-Proliferation Treaty does not explicitly prohibit research or use of explosives suitable for nuclear weapons for non-nuclear purposes. Iran has never admitted such a military nuclear program and has denied all accusations. In its Final Assessment on Past and Present Outstanding Issues regarding Iran's Nuclear Program of 2 December 2015, the IAEA Board of Governors officially states that the agency "found no credible indications of the diversion of nuclear material in connection with the possible military dimensions to Iran's nuclear program **[*12*]**.

Under the JCPOA, Iran has also agreed to forgo computer modeling to simulate nuclear explosive devices, testing, developing, or acquiring multi-point explosives and neutron sources, as well as the design and development of nuclear explosive diagnostic systems **[*6*]**. While some of these activities are relevant for developing conventional explosives and for activities like drilling, in the future, if caught conducting research in these areas, Iran will not be able to claim that it is undertaking any such activities for non-nuclear purposes. As Squassoni **[*13*]** notes, unlike most safeguards agreements related to peaceful nuclear energy use, the JCPOA specifies prohibited nuclear weapons-related activities. However, the word "related" is not well defined, which has led to multiple interpretations, particularly related to Iran's missile program. The addition of prohibition of weaponization activities is important to give the IAEA access to military sites, considering that access must be "exclusively for resolving concerns regarding fulfillment of JCPOA commitments" **[*6*]**.

Furthermore, if some dual-use technology falls within the definitions regulated under Annex 1, Iran is mostly not allowed to use it for any purpose, even for civilian, non-nuclear research that other states would be allowed to conduct. As Acton **[*14*]** argues, it is possible that a disagreement over the interpretation of Annex 1 could exist, such as in deciding if a specific "multi-point explosive detonation system" was actually "suitable for a nuclear explosive device." If such a disagreement did occur, a dispute resolutions mechanism through the Joint Commission could be used even though the JCPOA does not specify clearly that the Joint Commission is responsible for interpreting the meaning of "related" activities or dual-use goods.

III. Concerns

Overall, the verification mechanism under the JCPOA provides the IAEA with considerably sufficient tools to verify declared facilities with great confidence that Iran is complying with the nuclear limits, as well as to detect and report in a timely manner any substantial diversion of nuclear material or use of undeclared material. The advanced measures prevent Iran from secretly using significant amounts of nuclear material from its declared facilities for secret nuclear activity without a high risk of detection. In other words, to build nuclear weapons secretly using highly enriched uranium, Iran would need to acquire or build a separate and secret fuel cycle, including a secret source of natural uranium, a secret conversion facility to produce uranium hexafluoride, and a secret enrichment plant to produce highly enriched uranium, plus secret facilities to produce uranium metal and fabricate nuclear weapons components. Such development is not impossible, but seems very unlikely if the IAEA and the EU3+3 intelligence agencies continue to effectively monitor Iran's nuclear program.

However, the verification mechanism under the JCPOA is not perfect. As many nuclear experts note, the JCPOA requires Iran to declare its entire stock of centrifuges, but the IAEA may not be able to verify that Iran has declared all of its centrifuges and other sensitive uranium enrichment equipment. Many key dual-use manufacturing equipment and materials are also used for Iran's military program, particularly its ballistic missile program **[*4*]**. Therefore, it is possible for Iran to secretly use key dual-use manufacturing equipment and materials for its covert centrifuge production in the future.

Another concern, as noted by Rockwood **[*15*]**, is that Iran may have undeclared equipment and materials that might be used for undeclared uranium enrichment, not just the diversion of equipment and materials that the IAEA is already aware of. Therefore, it seems difficult to confirm and verify that Iran is not retaining additional centrifuges over and above those declared or testing centrifuges on a small scale at an undeclared facility. Although difficult, such verification is not impossible. While there are also debates about whether such verification is within the scope of Iran's Comprehensive Safeguards Agreement with the IAEA, it is certainly not beyond the agency's statutory authority to carry out such verification if the United Nations Security Council requests that it do so. In fact, the IAEA has performed such verification work related to weaponization in the past, such as in Iraq, Libya, and South Africa **[*15*]**.

Furthermore, there is also a possibility that Iran would build or acquire equipment or materials secretly on the black market. That is, Iran might attempt to circumvent the Procurement Channel. Such concern seems reasonable considering that its nuclear program has been built mostly using imported material, equipment, and technology from other countries illegally **[*11*]**. Iran has also publicly bragged about its capability to circumvent sanctions aimed at blocking its ability to enrich uranium 235, as well as publicly stated the intention to illegally acquire it for missile and other military programs. For example, during a televised address to the nation on 30 August 2014, President Rouhani stated, "Of course we bypass sanctions. We are proud that we bypass sanctions, because the sanctions are illegal" **[*16*]**. Moreover, The Iranian Special Commission tasked with approving the nuclear deal on 4 October 2015 also reported, "The Islamic Republic of Iran's government has said that it does not intend to implement sections of United Nations Security Council Resolution 2231 that compromise defense and national security" **[*17*]**. If Iran decides to continue its illicit trade, then it will be violating the JCPOA. Thus, such non-compliance might result in sanctions related to its nuclear program being re-imposed.

IV. A Modest Recommendation

After looking at the advanced safeguards measures and how they complement Iran's Comprehensive Safeguards Agreement with the IAEA and the Additional Protocol, as well as discussing the reasonable concerns, there are two steps that should be taken to ensure the success of the JCPOA. First, besides

relying on its own sources of information, the IAEA should work together with private intelligence agencies, considering the false intelligence information given to the IAEA concerning the nuclear military program of other states that had been proven wrong as the case for Iraq, North Korea, and Syria. The IAEA is indeed effective at verifying compliance at declared facilities, but intelligence agencies are more capable and experienced in detecting covert activities.

Second, the EU3+3 should take the lead in ensuring that the IAEA has all of the additional technology, human, finance, and other resources necessary to complete its additional tasks under the JCPOA. The EU3+3 should also strongly encourage other states to share the resources burden. Such distribution is important because the deal would place a significant additional workload on the agency, especially its safeguards directorate, which is already stretched thin. Unfortunately, as Persbo **[*18*]** notes, many member states have been reluctant to support the agency's proposal for budget increases. On 25 August 2015, Director General Yukiya Amano requested additional resources from the agency's Board of Governors. He estimated that the agency would need approximately $10.6 million or €9.2 million per year: 3 million euros for provisional implementation of Additional Protocol; and 6.2 million euros for verification and monitoring work under the deal **[*19*]**. On the same day, the Board of Governors authorized Amano "to undertake the verification and monitoring" of Iran's nuclear-related JCPOA commitments "subject to the availability of funds and consistent with our standard safeguards practices" (Amano, 2015b).

The IAEA receiving the full support that it needs to permit enhanced safeguards measures in Iran. As the agency gains experience with a more intensive and intrusive verification regime in Iran, it may be able to apply the experience to safeguards in other states in the future. A comprehensive and efficient monitoring and verification mechanism can improve the global non-proliferation regime since it will increase confidence in the regime's capability and credibility in detecting and responding to non-compliance.

V. Conclusion

The verification mechanism under the JCPOA is advanced because it consists not merely of Iran's Comprehensive Safeguards Agreement with the IAEA and the Additional Protocol, but also of four advanced safeguards measures. The four advanced safeguards measures include much broader monitoring of Iran's nuclear program, access with a deadline and dispute resolution mechanism, the Procurement Channel, and the prohibition of weaponization activities. These advanced safeguards measures, if implemented with Iran's Comprehensive Safeguards Agreement with the IAEA and the Additional Protocol, will increase the effectiveness of monitoring and verification measures under the deal. In short, they will significantly contribute to the success of the deal. The deal's success can be measured by its verification mechanism preventing Iran from producing weapons-grade uranium and weapons-grade plutonium at its declared nuclear facilities for 10-15 years, and deterring the country from building clandestine facilities to secretly produce weapons-grade uranium and weapons-grade plutonium.

If Iran cheats, as it were, as many are concerned, the IAEA would become aware promptly through such a comprehensive verification mechanism under the deal, and sanctions might snap back. In undertaking such intensive, intrusive, and multilayered monitoring and verification mechanism under the deal, the IAEA should work carefully with no political interference with the private intelligence agencies and should be equipped with all necessary resources. If the agency's work in verifying the implementation of the deal is effective, it will increase the confidence level in the global non-proliferation regime and will considerably strengthen the credibility of the regime itself. The agency may then also be able to apply lessons identified in relations with Iran to safeguards in other countries in the future.

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