



## Analysis of the IAEA's Fourth Iran Deal Report: Time of Change

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On November 9, 2016, the International Atomic Energy Agency (IAEA) released its fourth [report](#) on Iran's compliance with United Nations Security Council (UNSC) resolution 2231 (2015). UNSCR 2231 codified into international law the Joint Comprehensive Plan of Action (JCPOA), an agreement reached between the P5+1 and Iran in July 2015 aimed at limiting Iran's nuclear program. The JCPOA was implemented on January 16, 2016, a date known as Implementation Day. The latest IAEA report again states: "Since Implementation Day, the Agency has been verifying and monitoring the implementation by Iran of its nuclear-related commitments" under the Iran deal. Nowhere in the report does the IAEA state that Iran is fully compliant with the JCPOA. The report lists many areas where Iran has met the conditions of the JCPOA's provisions. However, it states that Iran has exceeded its cap on heavy water, and the IAEA is still unable to determine or provides no information about its efforts to determine the absence of undeclared nuclear material and activities in Iran. Moreover, the IAEA reporting is so sparse as to confirm suspicions that compliance controversies are being deliberately omitted from the report.

### Key Findings

- 1) Iran for the second time is in violation of the cap on 130 metric tonnes<sup>1</sup> of heavy water. In addition, Iran continued to produce heavy water during the two-week period after the IAEA learned and pointed out that it had reached the cap.
- 2) The quarterly IAEA report on Iran continues to lack critical information, but additional information we have learned implies that Iran continues to push the envelope of compliance, which can be interpreted as Iran not being fully compliant with the JCPOA.

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<sup>1</sup> We are now using the unit metric tonnes, when earlier we simply called this tonnes.

- 3) The report does not discuss, and is cast in a way as to doubt, whether the inspectors have visited Iranian military sites, including the Parchin site, as part of its legitimate need to verify bans on certain nuclear weaponization activities and develop confidence in the absence of undeclared nuclear material and activity as mandated by IAEA safeguards and reinforced by the Additional Protocol.
- 4) We have learned that Iran has started feeding uranium into a ten machine IR-6 cascade. If true, this represents a significant development both due to the IR-6's higher separative work capacity and concerns about whether it is allowed to do so under its long term enrichment plan.
- 5) We have learned that Iran has used or will use an advanced IR-6 centrifuge for stable isotope work under a special project with Russia. The JCPOA allows stable isotope production (via enrichment or depletion) in the context of using IR-1 centrifuges. It makes no mention of using advanced centrifuges for this purpose. The long term enrichment and R&D program does not discuss any stable isotope production using advanced centrifuges. This use of the IR-6 is at odds with the stated JCPOA requirements. However, we do not know if the Joint Commission has made an exemption for the use of the IR-6 for stable isotope production or otherwise interpreted this use of the IR-6 as "not incompatible" with the deal.
- 6) The IAEA reported that Iran's total enriched uranium stockpile did not exceed 300 kilograms (kg) of low enriched uranium (LEU) hexafluoride (or the equivalent in different chemical forms). However, this statement apparently ignores LEU exempted from this value by Joint Commission decisions based on a determination of its relative ease of recoverability. Thus, the use of total in the IAEA's statement may be inaccurate. As we have reported in our last quarterly report and in an earlier [report](#), the total amount of LEU may exceed 300 kg and the basis for judging the material as nonrecoverable is suspect, reinforced by the overly secretive nature of the Joint Commission deliberations.
- 7) Overall, the IAEA effort in Iran needs to be strengthened and that strengthening should be fully supported by the Board of Governors and the P5+1.

## **Institute Statement**

The IAEA reporting continues to lack critical technical details about implementation of the agreement. The IAEA's sparse and overly generalized reporting borders on deception by omission and is contradicted by independent reporting pointing to problems in the implementation of the JCPOA, some of which are discussed below. This continued lack of information in the IAEA reports combined with the ongoing secrecy surrounding the decision-making of the Joint Commission is a serious shortcoming in the implementation of the JCPOA and raises legitimate questions about the adequacy of Iran's compliance.

We continue to call for the IAEA to include much more information than it is currently providing and for the Joint Commission to make public its decisions, particularly those that change the nature of the agreement's provisions. This information is needed to allow for independent assessment of Iran's adherence to the JCPOA. We will continue seeking out and making available information on JCPOA implementation due to this ongoing lack of transparency.

We are increasingly concerned that Iran is not fully complying with the JCPOA. Based on discussions with senior United Nations officials close to the IAEA, while Iran had appeared to be following exactly what it is supposed to do with respect to the deal, increasingly, Iran has stated to inspectors that it did not understand the meaning of the requirements or acted surprised when confronted. In earlier periods, when Iran was resisting IAEA safeguards requirements, Iran used a similar strategy, professing not to grasp what was required, as one official remembered. These developments need to be closely followed.

Much of the current IAEA report covers many of the same issues as the previous one. We did not cover all the issues in this report, such as reprocessing, ongoing enrichment of LEU, and the Enriched Uranium Oxide Powder Plant (EUPP). We would refer the reader to our [previous report](#) for a discussion of these issues.

## **Heavy Water Activities**

The IAEA reports that on November 8, for the second time, Iran's stock of heavy water inside Iran exceeded the 130 metric tonnes cap. Although the excess amount is relatively small, 0.1 metric tonnes, there is no justified reason for exceeding the cap. The heavy water is non-radioactive and can be easily diluted to normal water by simply dumping it into the nearby river. Moreover, Iran continued to make heavy water during a two-week period after reaching the cap of 130.0 tonnes.

This violation happened despite warnings from the IAEA that the cap had been reached. On October 25, 2016, the IAEA verified that Iran's stock of heavy water had reached the cap of 130.0 metric tonnes. On November 2, the Director General expressed concerns to the head of the Atomic Energy Organization of Iran (AEOI). On November 8, the IAEA verified that the cap had been breached, reaching 130.1 metric tonnes. On November 9, the IAEA received a letter from Iran stating its plan to send out five metric tonnes of heavy water. Despite knowing that the cap was reached, Iran continued to produce more heavy water. Although the excess amounts are relatively small, this is the second time that Iran exceeded the cap. In this case, the fact that Iran was aware is documented in the IAEA's reporting.

The Associated Press [reported](#) on November 9, 2016 that a senior diplomat stated the heavy water would leave Iran within "the next few days." We do not know if the five metric tonnes have left Iran or whether the shipment has been delayed and Iran continues to produce heavy water in violation of the cap.

As in the previous report, Iran continues to produce heavy water at a greater than expected level. It is producing at a rate of about 25 metric tonnes of heavy water per year.<sup>2</sup> Thus, under current arrangements, Iran is likely to continue pushing up against this cap.

The IAEA did not provide information on the destination of the heavy water or whether it had been sold. The destination could be Oman, which earlier is known to have received about 70 metric tonnes of heavy water from Iran under a [special loophole](#) to the JCPOA agreed to by the Joint Commission. It is unknown if more heavy water than 70 metric tonnes had already been sent to Oman. The IAEA report does not provide information about the quantity of heavy water held in Oman in the past or today, despite the heavy water technically being under Iranian control. Combined, the United States and Russia bought 70 metric tonnes of heavy water from Iran stored in Oman.

The IAEA did not report on whether this Oman heavy water is subject to direct IAEA monitoring. But our Institute has learned that the heavy water is not monitored by the IAEA in Oman.

The ongoing penchant of Iran to surpass the heavy water cap represents a *de facto* weakening of the JCPOA. As long as Iran claims it will ship out any excess heavy water found by the IAEA to be present, the P5+1 appear willing to tolerate repeated violations of that cap. We have [argued](#) that encouraging Iran to overproduce heavy water for sale also legitimizes Iran as a nuclear supplier long before it has proven it will abide by international rules. We also pointed out that the purchase by the United States of Iranian heavy water disrupted the establishment of a nascent, needed North American supply chain and new investment in a reliable source of heavy water for both U.S. government and private industry.

## **Fundamental Verification for Ensuring a Peaceful Nuclear Program**

The IAEA report states that it has “continued to conduct complementary accesses under the Additional Protocol to sites and other locations in Iran.” However, the report again does not contain any information about sites the inspectors have visited under the Additional Protocol in its effort to reach a broader conclusion about the peaceful nature of Iran’s nuclear program, and establish confidence about the absence of undeclared nuclear material and activities in

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<sup>2</sup> As of May 9, 2016, Iran had 116.7 metric tonnes of heavy water, and on August 30, 2016, it had 126.5 metric tonnes. Assuming no heavy water was shipped out during this period, the November 8, 2016 total of 130.1 metric tonnes represents an increase of 13.4 tonnes since May 2016, assuming none was shipped out but not reported by the IAEA. Iran is still producing more heavy water than expected but its average daily production slowed since the previous report. Over the past 70 days (since the last amount of heavy water reported on August 30, so from August 31 through November 8), Iran produced 3.6 tonnes, or an average of 0.051 metric tonnes per day. From May 9 to August 30, 2016, by contrast, the net amount produced in the 113 day period was 9.8 tonnes, or 0.087 tonnes per day. Taking the two periods together for a total of 183 days between May 9 and November 8, 2016, Iran produced 13.4 metric tonnes of heavy water, or 0.073 tonnes per day. This extrapolates to an average annual rate of 26.65 metric tonnes. Prior to Implementation Day, the IAEA reported, by contrast, that the Arak heavy water production plant has a nominal design capacity of 16 tonnes of nuclear-grade heavy water per year. This rate of production thus greatly exceeds the nominal annual production value given by the IAEA. The IAEA does not discuss this discrepancy in annual output. Thus, Iran is producing more heavy water than expected.

Iran. Iran is provisionally applying the Additional Protocol pending consideration of ratification at Year 8 of the JCPOA. The IAEA reported in its previous report that on July 13, 2016, “Iran submitted its declarations under the Additional Protocol” and the IAEA was evaluating those declarations. The IAEA does not provide an update as to its efforts to evaluate those declarations in the latest report. However, one senior official close to the IAEA stated that the IAEA has many unanswered questions related to the broader conclusion that have not been followed up on by the IAEA.

The report also does not report on any efforts to verify the weaponization activity bans in the JCPOA. Currently, those bans may be unverified.

The IAEA did not report on any progress at resolving the uncertainty about the environmental sampling at the Parchin site. The sampling detected uranium particles but the inspectors were unsure of how to interpret them. Normally, the IAEA would be expected to re-visit Parchin and take additional samples. We believe that the IAEA has not re-visited Parchin, so this issue remains unresolved.

As part of its effort to reach a broader conclusion and verify nuclear weaponization-related limits in the JCPOA, we have urged the IAEA to [insist](#) on visiting and inspecting former sites associated with Iran’s military nuclear program, including the Parchin site, in order to ensure that those sites are devoid of any military nuclear related activity. An open question remains whether the IAEA has sought access to military sites and has been thwarted (and not reported here) or will seek such access and whether, if prompted, Iran will agree.

Given Iran’s long history of refusing IAEA access to military sites, there is little reason to be optimistic that the IAEA will get the access it needs to carry out its safeguards mandate. With that in mind, an important question is when to consider Iranian noncooperation on granting access as leading the United States and its partners to believe that Iran is not meeting its commitments under the JCPOA.

## **IAEA Report and Other Information on Iranian Enrichment Activities**

Additional, limited information described in the IAEA’s latest report, supplemented by information we have learned, includes:

### **IR-6 Centrifuges**

We have learned that Iran has started feeding uranium into a ten machine IR-6 cascade. If true, this represents a significant development. The IR-6 has achieved a single machine enrichment output of 6.8 separative work units per year (vs. less than one swu/yr in an IR-1), and this centrifuge is likely Iran’s most promising advanced centrifuge. Its rotor has a diameter of about 200 millimeters and is composed of two carbon rotor tubes connected by a bellows. The IAEA does not report on this development but does state that Iran is conducting its “enrichment activities **in line** with its long-term enrichment and R&D enrichment plan (emphasis added).”

According to this [plan](#), which we published on our website, and by our reading, Iran can start this activity after year 1 of the deal. However, year 1, in theory, does not start until the first anniversary of the JCPOA or January 16, 2017. The language used in the long-term enrichment plan is not straightforward in what it means by year 1. Is Iran now conducting an activity allowed only on or after January 16, 2017? Or does Iran interpret the deal as starting on October 18, 2015, or Adoption Day?<sup>3</sup> It is unclear how to interpret this situation. The “clock” could have started in October 2015 but the most straightforward interpretation is that it started on Implementation Day, particularly as the timetable for the implementation of commitments indicates in Annex V of the JCPOA. So, is Iran’s action to feed the ten-machine IR-6 cascade a violation of Iran’s long term enrichment plan? How does the Joint Commission view this situation? How should the United States view it?

### **IR-8 Centrifuge**

In our last quarterly report analysis, we raised the possibility that Iran could be feeding uranium into an IR-8 centrifuge, its most advanced albeit undeveloped centrifuge. Iran has declared that the IR-8 has a theoretical enrichment output of 16 separative work units per year. This possibility was based on interpreting the allowed multi-year activities in the JCPOA as starting from July 2015. As discussed elsewhere, this start date may be Adoption Day or Implementation Day.

In any case, we have learned that the Iranians have moved one IR-8 centrifuge to the Natanz pilot enrichment plant to conduct mechanical testing, which is in accordance with the JCPOA. We are unaware of whether Iran has moved subsequently to feed it with uranium hexafluoride.

### **Fordow and Stable Isotope Production**

The IAEA states that during the reporting period Iran has not conducted any uranium enrichment or related research and development activities at the Fordow Fuel Enrichment Plant (FFEP), and there has not been any nuclear material at the FFEP.

However, the IAEA report omits potentially significant activities involving advanced centrifuges that could be used to make stable isotopes. We have learned that Iran has used or will use an advanced IR-6 centrifuge for stable isotope work. The JCPOA allows stable isotope production (via enrichment or depletion) in the context of using IR-1 centrifuges. It makes no mention of using advanced centrifuges for this purpose. Moreover, the long term enrichment and R&D enrichment program does not discuss any stable isotope production using advanced centrifuges. Reportedly, Russia has created a special project using the IR-6 centrifuge for stable isotope production. It is unknown where this project has occurred. It is also unknown how this work was reconciled with the JCPOA requirements which most readings would understand as allowing the use of only IR-1 centrifuges for stable isotope production. This use of the IR-6 thus

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<sup>3</sup> An earlier version of this report listed the date that Iran may consider as the start of the agreement as July 2015, after the agreement was announced.

appears at odds with the stated JCPOA requirements. However, we do not know if the Joint Commission has made an exemption for the use of the IR-6 centrifuge for stable isotope production or otherwise interpreted this use of the IR-6 as “not incompatible” with the deal.

### **300 Kg Cap**

The IAEA reports that Iran’s total enriched uranium stockpile “did not exceed 300 kg of UF<sub>6</sub> enriched up to 3.67% U-235 (or the equivalent in different chemical forms).” Notably the IAEA again avoided detailing in its report the quantities of any forms that we [reported](#) may have been exempted by the Joint Commission and allowed to not count against the JCPOA’s 300 kg cap on low enriched uranium. The exempted LEU is reportedly in forms that render it “unusable” for further enrichment. However, the basis for such an important determination is not available publicly and requires greater scrutiny.

Moreover, the IAEA report does not contain any information that clarifies statements last summer that the 300 kg cap was exceeded. In our last report, we cited a senior Russian official who stated that Iran had more than 300 kg of LEU in July 2016. He stated that the Joint Commission must address “the difficulties with enriched uranium accumulated during the enrichment in the pipes and other devices. *What has been discovered exceeds the allowed limit of 300 kilograms* (emphasis added).” Another P5+1 official involved in implementing the JCPOA had earlier said to one of us that Iran exceeded the 300 kg cap.

The total amount and its forms matter because the LEU may be recoverable by Iran in a breakout to produce highly enriched uranium, thereby lowering breakout times. Separating LEU from its chemical constituents in such products is typically straightforward. A country intent on breaking out and making highly enriched uranium as national priorities may make an entirely different assessment about the LEU’s worth and devote considerable effort to recovering the LEU, such as during a push to acquire nuclear weapons in a crisis. Any discussion of such an important issue as exempting LEU from the 300 kilogram cap or from export should be public and subject to more rigorous review than it currently is receiving in secret deliberations within the membership of the Joint Commission.

### **Near 20 Percent LEU**

The IAEA again does not report on the size or status of Iran’s stock of near 20 percent LEU. Iran is prohibited under the JCPOA from retaining any near 20 percent LEU unless it is in fuel elements, subsequently modified, based on a Joint Commission decision after the JCPOA was negotiated to be irradiated fuel elements. However, public information is lacking on the amount of near 20 percent LEU that remains in Iran and the irradiation level of the fuel.

In addition, there is no information about the near 20 percent LEU lab contaminants revealed in our [paper](#) as exempted by the Joint Commission. In one positive development, we have learned that the amount of near 20 percent LEU in lab contaminants is less than a half of kilogram.