



## **Analysis of the IAEA's Third Iran Deal Report: Filling in Missing Details**

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On September 8, 2016, the International Atomic Energy Agency (IAEA) released its third [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.

### **Key Findings**

- 1) The quarterly IAEA report on Iran continues to lack critical information.
- 2) The IAEA report states: "Since Implementation Day, the Agency has been verifying and monitoring the implementation by Iran of its nuclear-related commitments" under the Iran deal. The report outlines a large number of areas in which Iran is meeting its obligations under the Iran deal and does not mention any areas where Iran is in non-compliance with its obligations under the deal.
- 3) Although the IAEA reported that Iran did not exceed its 300 kilogram (kg) cap on low enriched uranium (LEU), this tally does not include all of Iran's LEU. The excess LEU would not be counted in the 300 kg limit because of a determination that it is "unusable" in a breakout and exempted by the JCPOA's Joint Commission. However, the basis for such an important determination is not public and deserves greater scrutiny.
- 4) Iran continues to enrich uranium at its Natanz site but the amount of LEU produced is not provided in the report. In addition, to avoid exceeding the 300 kg cap, Iran may be enriching depleted uranium up to natural uranium. This type of enrichment is not banned by the Iran deal but it may represent a loophole in the deal.

- 5) Iran has resumed the manufacture of centrifuge rotor tubes. The IAEA notes that technical discussions over the issue are ongoing. Typically, this type of language is inserted into a report when disagreements are unresolved.
- 6) Although the IAEA report does not include this specific information, the report's general statements about Iran's centrifuge progress, combined with other available information, imply that Iran may have recently started enriching uranium in a single IR-8 centrifuge, which is Iran's most advanced centrifuge.
- 7) The IAEA reports that Iran's stock of heavy water inside Iran remains under the 130 metric tonnes cap imposed by the JCPOA. It did not report on the heavy water held in Oman that is technically under Iranian control and did not report on whether this heavy water is subject to IAEA monitoring.
- 8) Iran is producing heavy water at double the expected nominal rate given in the IAEA report. The reason for the discrepancy is not discussed.
- 9) The IAEA reports that it has not attended any meetings of the Procurement Working Group (PWG) of the Joint Commission during this reporting period. The PWG has still only received one proposal to date.
- 10) The IAEA report does not contain much information about its monitoring of reprocessing-related facilities and activities or about transparency related visits to sites in Iran.

## **Statement**

The IAEA reporting continues to lack critical technical details about implementation of the agreement. This lack of information in the IAEA reports combined with the secrecy surrounding the decision-making of the Joint Commission is a serious shortcoming in the implementation of the JCPOA and erodes support for this important deal.

On September 1, 2016 we released a [report](#) detailing a set of exemptions allowed for Iran by the JCPOA's Joint Commission prior to Implementation Day. These exemptions allowed Iran to be in compliance with its JCPOA requirements by January 16, 2016. The IAEA report does not include any technical details relating to these exemptions including: the quantities, status, and locations of exempted forms of Iran's 3.67 percent low enriched uranium stocks that do not count as part of the 300 kilogram cap mandated by the JCPOA; the quantity and status of 20 percent enriched LEU in lab contaminant that was judged as unrecoverable; or its exempted operation of 19 hot cells at four locations that are larger than the six cubic meters mandated under JCPOA requirements. In addition, the IAEA does not discuss the quantity and status of any Iranian-produced heavy water held in Oman or elsewhere and whether it monitors these heavy water stocks located in Oman, a non-nuclear weapon state.

We continue to call on the IAEA and the Joint Commission to make public information on the technical implementation of the JCPOA in order to allow independent analysis of the strength and enforcement of the agreement. We call on the Joint Commission states to disclose publicly its decisions and their basis. We urge the United States and its European partners to not agree to any further exemptions unless the Joint Commission agrees they will be made public. We will continue seeking out and making available information on JCPOA implementation due to this ongoing lack of transparency.

## **IAEA Report on Iran**

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

### **1) Enrichment Related Activities**

#### **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 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 have any information that would clarify a recent statement by a senior Russian official that Iran had more than 300 kg of LEU in July 2016. As the Institute stated in its September 1, 2016 [exemptions](#) report, Russian Permanent Representative to the International Organizations in Vienna, Vladimir Voronkov, told TASS in July 2016 prior to an impending Joint Commission meeting that Iran may have exceeded the 300 kg cap on LEU. 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).*" In any case, the IAEA has not provided any clarification of the total amount of LEU in Iran and its chemical forms.

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.

## **EUPP**

On July 27, 2016, the IAEA reports that Iran provided it with “a report regarding the quantity of enriched uranium in the process lines at the Enriched UO<sub>2</sub> Powder Plant (EUPP) at Esfahan following Iran’s recovery of the enriched uranium that it had stated as recoverable from the process lines at EUPP.” The IAEA reported that it “has reviewed Iran’s report and determined that Iran has overestimated the quantity of enriched uranium in the process lines at EUPP” and requested that it “reassess this quantity.” The IAEA and Iran are continuing technical discussions on the subject.

On May 23, 2016, the Institute released a [report](#) discussing the LEU likely held up in the EUPP process lines and tanks. Between September 2015 and January 2016 (during months ahead of Implementation Day), Iran focused on emptying the EUPP of this LEU. However, not all the LEU was removed from the processing lines and associated equipment. Although the precise amount is unknown, an estimated 100 to 200 kg of LEU (uranium mass) were still held up at the EUPP as of Implementation Day. The value may be closer to 100 kg than 200 kg. This LEU was a major fraction of the LEU that remained in Iran on Implementation Day.

### **Amount of Enrichment; A New Loophole?**

The report does not contain any information on the amount of LEU produced by Iran in this reporting period, or since Implementation Day. The amount cannot be very large because of the LEU stock associated with the EUPP.

We reported in an earlier [report](#) that since Implementation Day, Iran has engaged in a new enrichment variation using depleted uranium instead of natural uranium feed and enriching to the level of natural uranium. Enrichment up to the level of natural uranium is not included in the cap, and is not explicitly banned by the JCPOA. However, by enriching some of its large stock of depleted uranium, it would be able to continue operating its IR-1 centrifuge cascades at Natanz and add to its stock of natural uranium hexafluoride.

### **Near 20 Percent LEU**

The IAEA does not report on the size or status of Iran’s stock of near 20 percent LEU. In addition, there is no information about the near 20 percent LEU lab contaminants revealed in our paper as exempted by the Joint Commission. Iran is prohibited under the JCPOA from retaining any near 20 percent LEU unless it is in fuel elements, subsequently modified to irradiated fuel elements. However, public information is lacking on the amount of near 20 percent that remains in Iran and the irradiation level of the fuel.

## **Fordow**

The IAEA reports 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.

## **2) Centrifuge and Component Manufacture and Replacement**

The IAEA states that since the last report in May 2016, Iran has “withdrawn 96 IR-1 centrifuges from those held in storage for the replacement of damaged or failed IR-1 centrifuges” at the Natanz Fuel Enrichment Plant (FEP). In addition, the IAEA reported that Iran has not manufactured any IR-1 centrifuges to replace those that have been damaged or failed.

Typically, the IR-1 centrifuge cascades experience a failure rate exceeding 20 percent per year, according to IAEA information established prior to Implementation Day. Over a three month period, with 5,060 IR-1 centrifuges at the FEP, one would expect that about 250 IR-1 centrifuges would fail. Given that only about 38 percent of that number did fail in the last quarter, Iran may be enriching in fewer centrifuges than 5060 or its IR-1 centrifuges are working better.

The IAEA reports that at the Fordow Fuel Enrichment Plant, on August 13, 2016, Iran removed two IR-1 centrifuges used for “initial research and R&D activities related to stable isotope production,” according to a letter to the IAEA from Iran dated July 5, 2016.

According to the IAEA, “all declared rotor tubes, bellows and rotor assemblies have been under continuous monitoring by the Agency, including those rotor tubes and bellows manufactured since Implementation Day.” As reported in its May 2016 report, “Iran informed the Agency on 2 May 2016 that it intended to resume the manufacture of rotor tubes.” The IAEA reports that it has “verified that Iran resumed such manufacturing on 26 June 2016.” In a point that may indicate disagreement over the acceptable number of rotor tubes Iran should produce or the level of monitoring required, the IAEA notes that technical discussions over the issue are ongoing. Typically, this type of language is inserted into a report when disagreements are unresolved.

## **3) Enrichment Related Research and Development (R&D) and Long Term Plan**

According to the IAEA, “Iran has conducted its enrichment related activities in line with its long term enrichment and R&D plan, as provided to the Agency on 16 January 2016.” The IAEA does not provide any specific information about such activities. On August 2, 2016, the Institute released a [report](#) that included all of Iran’s secret long term enrichment and R&D plan following a related Associated Press report on the subject. Iran worked out this plan with the P5+1 and submitted it to the IAEA. According to the long term plan from Implementation Day until Year 8 of the JCPOA, Iran stated it would be carrying out:

- Mechanical testing (typically not involving use of uranium) on up to two centrifuges of the IR-2m, IR-4, IR-5, IR-6, IR-7, and IR-8 types at Natanz.
- Testing on a single IR-4 centrifuge machine and IR-4 centrifuge cascade of up to 10 centrifuges, and testing on a single IR-5 centrifuge machine, all using uranium.

These activities are also specified in the JCPOA and are public.

Also under the plan, Iran will:

- “Continue the testing of the IR-6 on single centrifuges and intermediate cascades (testing with uranium of roughly 10 centrifuges and then roughly 20 centrifuges, with each of these groups being tested with uranium for approximately equal time periods.”
- “Start, upon implementation of the JCPOA, testing of the IR-8 centrifuge on single centrifuges and its intermediate cascades (completion of mechanical testing of single centrifuges in one year, testing with uranium of a single centrifuge, three centrifuges, roughly 10 centrifuges, and roughly 20 centrifuges sequentially with each of these groups being tested for approximately equal time periods).”

Much of this section is also in the JCPOA with the exception that the timing of steps is more precisely defined in the non-public plan than in the public JCPOA.

In particular, the non-public declaration would imply that Iran may have recently started enriching uranium in a single IR-8 centrifuge, which Iran has declared has a theoretical enrichment output of 16 separative work units per year. In comparison, the IR-1 has a declared theoretical value about ten times smaller. Of course, Iran has to remix enriched uranium produced in the IR-8 centrifuge with the depleted uranium but not before measuring the enrichment level achieved. The IAEA report does not add any information on this important potential development.

#### **4) Heavy Water Activities**

The IAEA reports that Iran’s stock of heavy water remains under the 130 metric tonnes cap imposed by the JCPOA. On August 30, 2016, Iran had 126.5 metric tonnes of heavy water. This represents an increase of 9.8 tonnes since the last reporting period.

The report does not include details on the [Joint Commission decision](#) reported by our Institute and detailed by it in an [earlier report](#) about an arrangement to allow Iran to have Oman take consignment of heavy water produced in excess of the cap. Thus, some unreported quantity of heavy water is held in Oman that is technically under Iranian control. The IAEA report does not state whether the heavy water in Oman, a non-nuclear weapons state, is subject to IAEA monitoring.

The United States has purchased 32 tonnes of this heavy water. The Institute has argued that this arrangement encourages Iranian overproduction of heavy water, legitimizes Iran as a nuclear supplier long before it has proven it will abide by international rules, and that the purchase by the United States disrupted a nascent North American supply chain of heavy water.

Iran is producing more heavy water than expected. The IAEA reports that the Arak heavy water production plant has a nominal design capacity of 16 tonnes of nuclear-grade heavy water per year. However, the plant is exceeding this nominal capacity by a factor of two. According to the last IAEA [report](#), “On 9 May 2016, the Agency verified that Iran’s stock of heavy water had reached 116.7 metric tonnes.” On August 30, 2016, the value was 126.5 tonnes, according to the current report. Assuming that no heavy water has been sent to Oman since May 9, 2016, the net amount produced in this 113 day period is 9.8 tonnes, or 0.87 tonnes per day. This extrapolates to an annual rate of 31.7 tonnes, about double the nominal annual production value given by the IAEA. The IAEA does not discuss this discrepancy in annual output.

## 5) Reprocessing Activities

The IAEA reports that “Iran has not carried out activities related to reprocessing at the Tehran Research Reactor (TRR) and the Molybdenum, Iodine and Xenon Radioisotope Production (MIX) Facility or at any of the other facilities it has declared to the Agency.” These two locations are [reportedly](#) two of four locations of hot cells Iran has been allowed to retain under Joint Commission exemptions that are in excess of a six cubic meter limitation described in the JCPOA. The report does not include specific information about IAEA monitoring of the hot cells at these two identified locations or the other two locations containing hot cells in excess of the JCPOA size limit of six cubic meters. In fact, the report does not make clear if all the exempted hot cell locations have been declared by Iran and thus are subject to regular IAEA monitoring. The existence of these larger hot cells and their monitoring regime are of concern because any of the hot cells exceeding the size limit could be used in reprocessing activities if Iran were to violate the JCPOA.

## 6) Transparency Measures

The IAEA report does not contain any information about sites it has visited under the Additional Protocol or otherwise in its effort to reach a broader conclusion about the peacefulness of Iran’s use of nuclear material. It has “continued to conduct complementary accesses under the Additional Protocol to sites and other locations in Iran.” Iran is provisionally applying the Additional Protocol pending seeking ratification at Year 8 of the JCPOA. The IAEA also reports that on July 13, 2016, “Iran submitted its declarations under the Additional Protocol” and the IAEA is evaluating those declarations. 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 related activity.

As urged by the Institute, the IAEA reports that it has not attended any meetings of the Procurement Working Group of the Joint Commission. It is unclear whether Iran intends to use the Procurement Channel set up under the JCPOA which is intended to regulate the import of nuclear and nuclear-related commodities by Iran; Iran has stated its intention to continue illicitly procuring missile and military related goods. We reported that the Atomic Energy Organization of Iran also recently [attempted](#) a large purchase of carbon fiber, a material usable in gas centrifuges or missiles, but the supplier and its government denied the sale. It is unclear whether Iran expected that the supplier would provide the commodity without using the Procurement Channel. We have also learned that the PWG has still only received one proposal to date, which was denied due to a lack of key information and subsequently withdrawn.