



IAEA Iran Safeguards Report Analysis

Iran continues violating low enriched uranium provisions of nuclear deal, breakout timeline down by half of a month, cooperation with IAEA may be decreasing, Oman heavy water loophole may still be in play, and advanced centrifuge issue persists

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On August 30, 2019, the International Atomic Energy Agency (IAEA) released its [latest safeguards report](#) on the verification and monitoring of the Iran nuclear deal in light of United Nations Security Council Resolution 2231 (2015). The IAEA reports that Iran continues to push past its enrichment-related restrictions and be in violation of three quantitative nuclear limits set in the Joint Comprehensive Plan of Action (JCPOA). This report also alludes to concerns about the implementation of routine safeguards in Iran, confirmed on September 2 by a *Wall Street Journal* [story](#). Highlights and analysis of key points follows.

Verification and Monitoring: The IAEA includes its usual statements that it is verifying non-diversion of declared nuclear materials in Iran but is continuing its “evaluations regarding the absence of undeclared nuclear material and activities.” The latter essentially states that the IAEA has not determined that Iran’s nuclear program is exclusively peaceful.

This IAEA report includes a new statement in paragraph 24: “Ongoing interactions between the Agency (IAEA) and Iran relating to Iran’s implementation of its Safeguards Agreement and Additional Protocol require full and timely cooperation by Iran. The Agency continues to pursue this objective with Iran.” According to *The Wall Street Journal* and other sources consulted by the Institute, the IAEA submitted a questionnaire to Iran about [radioactive particles](#) that Israel claimed the IAEA found at a warehouse in Turquz-Abad, and Iran failed to return responses by the closure date of this report. Israel stated that the Turquz-Abad warehouse allegedly contained nuclear-related equipment and material associated with Iran’s past nuclear weapons program and lamented the IAEA’s speed of investigations and reporting on this matter. Iran [moved the contents](#) of the warehouse over the summer of 2018, following the revelation of Israel’s seizure of a vast archive of related files and CDs from a separate Tehran warehouse, known as the Nuclear Archive. The IAEA finally [visited](#) the warehouse in

early 2019 and took environmental samples and detected the radioactive material, likely uranium. The IAEA seems to underscore in this report the need for Iran's more proactive cooperation under the Comprehensive Safeguards Agreement and Additional Protocol, although the language does not suggest that Iran is in violation of these agreements. However, *The Wall Street Journal* report states that the IAEA had planned to more strongly confront Iran in the report about its lack of timely cooperation on this issue, and then reportedly reversed its decision.

The IAEA report is completely silent on the issue of the Nuclear Archive and whether this matter could rise to the level of a violation of the JCPOA, under which Iran committed "under no circumstances will [it] ever seek, develop or acquire any nuclear weapons." Retaining the archive likely violates that commitment. If the Turquz-Abad warehouse held nuclear weaponization-related equipment and nuclear material, as Israel alleges, the possession of these items, whether prior to or after the nuclear deal, could also be a violation of the JCPOA and Iran's safeguards agreements. The IAEA has not yet reported in quarterly safeguards reports the status of its investigations into the Nuclear Archive or Turquz-Abad warehouse, which are vital safeguards and JCPOA implementation matters.

Low Enriched Uranium: The IAEA reports that Iran has continued to exceed the JCPOA's cap of 300 kilograms (kg) of low enriched uranium (hexafluoride mass), or 202.8 kg (uranium mass). The excess enrichment occurs at the Natanz enrichment plant. These quantities of LEU do not include those forms of LEU exempted by the JCPOA Joint Commission, which remain secret as to their quantity and chemical form. (The IAEA does not provide a total inventory for all forms of LEU in Iran. However, it reports on quantities of several forms). On July 1, the IAEA reported that Iran had surpassed the JCPOA's LEU stock limit by enriching 205.0 kg of LEU (uranium mass).

The IAEA stated soon after that Iran was enriching up to a level 4.5 percent, in violation of the 3.67 percent enrichment limit, starting on July 8, 2019. During this reporting period, it has continued to enrich up to the level of 4.5 percent.

On August 19, the IAEA's most recent sampling date, Iran possessed about 357.4 kg of low enriched uranium (hexafluoride mass), all enriched below 5 percent, or the equivalent of 241.6 kg (uranium mass). The IAEA reports that of that latter figure, Iran has produced 25.1 kg of up to 4.5 percent LEU (uranium mass), in the form of uranium hexafluoride (UF_6).

It is worth noting that Iran is not producing additional LEU at its full capacity. Between July 1 and August 19, Iran produced on average 32.5 kilograms per month of less than 5 percent enriched uranium (hexafluoride mass). This is well below the maximum average amount Iran could produce in the 5060 IR-1 centrifuges at Natanz, which can produce up to 100 kg per month.

In the table below, the February vs. May vs. August 2019 comparisons of these quantities show how Iran has increased its production of LEU, as measured in uranium mass only. The net

increase in the total stock of LEU in Iran from May 20 to August 19 was 67.5 kilograms LEU (uranium mass), at an overall average rate of 22.3 kilograms (uranium mass) per month. Alternatively, these values convert to 99.9 kg LEU (hexafluoride mass), or an average of 32.9 kg LEU (hexafluoride mass) per month. Over the summer, Iran thus decreased slightly its average monthly production of enriched uranium (see above).

Table. Enriched Uranium Quantities, less than 5 percent and all quantities in uranium mass

	February 2019	May 2019	August 2019
Chemical Form			
UF ₆	139.8 kg	153.2 kg	218.9 kg
Uranium oxides and their intermediate products	10.4 kg	10.4 kg	11.1 kg
Uranium in fuel assemblies and rods	4.3 kg	4.3 kg	4.6 kg
Uranium in liquid and solid scrap	9.3 kg	6.2 kg	7.0 kg
Enrichment Level Subtotals			
Uranium enriched to 3.67 percent	163.8 kg	174.1 kg	216.5 kg
Uranium enriched to 4.5 percent	0	0	25.1 kg
Totals of Enriched Uranium, <5%	163.8 kg	174.1 kg	241.6 kg

Decrease in Breakout Timeline

With Iran exceeding its caps on enriched uranium stocks and levels, the breakout timeline, or the amount of time Iran would need to produce enough weapon-grade uranium for a nuclear weapon, has shifted downward. The total shift downward in the breakout time is about one half of a month, meaning that the total breakout time has decreased by one half of a month from its value when Iran had a stock of 300 kg of less than 3.67 percent enriched uranium.

Centrifuge Deployments: At the Natanz Fuel Enrichment Plant, the IAEA reports that Iran withdrew 18 IR-1 centrifuges during the reporting period. During the previous reporting period, it withdrew 52 IR-1 centrifuges, most of which likely were installed as a result of scaling up enrichment activities. The report before, in February 2019, stated that no IR-1 centrifuges were withdrawn.

The total withdrawn during the last two reporting periods was 70 centrifuges. Assuming that most of these centrifuges were needed since mid-May 2019, this means that the average rate of withdrawal, which tracks closely the centrifuge breakage rate, is about 23 centrifuges per month. Further assuming that Natanz is enriching at about one third of its capacity, then this

average breakage rate is in line with (or somewhat below) the Natanz IR-1 breakage rate of about 20 percent per year, as reported by senior officials close to the IAEA.

Fordow Fuel Enrichment Plant: The IAEA reports no change in Iran's activities at Fordow or with the stable isotope separation project carried out there with the assistance of Russia. Ten IR-1 centrifuges were installed in a layout of 16 IR-1 centrifuge positions and one IR-1 centrifuge was installed in a single position "for the purpose of conducting initial research and R&D activities related to stable isotope production." The IAEA has not provided any update on Iran's efforts to convert the Fordow plant to a nuclear, physics, and technology research center. Instead, Iran appears to be retaining its enrichment plant at Fordow four years into the JCPOA's implementation, and has been [actively creating](#) a domestic nuclear equipment production effort at nearby Fordow support facilities.

Heavy Water Production and Arak Reactor Conversion: Iran remains under the JCPOA limit of 130 metric tonnes on the stock of heavy water it can possess, at 125.5 metric tonnes. Under IAEA monitoring, during the reporting period, Iran used 2.2 metric tonnes of heavy water for "research and development activities related to the production of deuterated compounds for medical applications."

The IAEA reports that Iran exported 2.2 metric tonnes of heavy water during the reporting period. It is unclear whether Iran had a customer for this heavy water. If Iran did not have a customer for this 2.2 metric tonnes of heavy water and sent the heavy water to Oman, then a well-known loophole in the JCPOA may remain active. Under this loophole, Iran exports a portion of its heavy water stock to Oman for storage pending finding an international buyer for it, in order to keep producing heavy water and not exceed the cap of 130 metric tonnes. In response to the existence of this loophole, the Trump administration [revoked](#) waivers for sanctions on Iran's exports of heavy water in May, meaning that a buyer of this heavy water could come under U.S. sanctions. It is unclear if sanctions would be applied to the Omani entity storing Iranian heavy water.

Iran appears to not yet have acted on threats to reverse conversion efforts at the Arak nuclear reactor, provided for under the JCPOA, and assisted by Britain and China. The IAEA reports that Iran has "not pursued the construction of the Arak heavy water research reactor (IR-40 Reactor) based on its original design." The IAEA again does not discuss whether it questioned Iran about a spare set of calandria tubes that the head of its Atomic Energy Organization stated that Iran [procured](#) during JCPOA negotiations in order to hedge and be able to circumvent the deal restrictions.

Advanced Centrifuges: During the reporting period, Iran deployed and tested with uranium an additional IR-6 centrifuge, bringing the number it has tested from 10 to 11. Iran has installed a total of 33 IR-6, which appears to be a violation in the sense that the number of deployed centrifuges should correspond to the number tested, not exceed that value by a factor of three, where the numerical limits are in Iran's [long-term enrichment plan](#):

Between years 1 to 8 and a half (of the JCPOA)...[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).

Between years 8 to 10... [Iran will] commence the testing of up to 30 IR-6 centrifuges from one and a half years before the end of year 10.

The IAEA stated that technical discussions on this matter were ongoing. Iran's other advanced centrifuge deployments remained constant over the previous reporting period, with up to 11 IR-4 installed and tested with UF₆ (permitted), a single IR-5 installed (permitted), and a single IR-8 installed (permitted).

Illicit Procurements: The IAEA reports that it did not attend any meetings of the JCPOA Procurement Working Group at the UN. It does not report on findings by the United States which may suggest that Iran procured goods controlled on Nuclear Suppliers Group (NSG) dual-use lists via a missile procurement network. The Shariat network was sanctioned by the United States on August 28 for conducting alleged illicit procurements for Iranian end-users. Those end-users are controlled by Iran's Defense Ministry and are sanctioned by the United States, European Union, and several other governments for outfitting Iran's nuclear and long-range missile delivery system programs. Iran is required to use the JCPOA's Procurement Channel, headquartered at the UN Secretariat, to obtain NSG-listed items. It would be useful for the IAEA to report on such procurement matters which concern JCPOA implementation and Iran's adherence to its commitments.