Analysis of IAEA Iran Verification and Monitoring Report

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This report assesses information in the International Atomic Energy Agency (IAEA's) quarterly report for November 11, 2020, *Verification and monitoring in the Islamic Republic of Iran in light of United Nations Security Council resolution 2231 (2015),* focusing on Iran's compliance with the limits in the Joint Comprehensive Plan of Action (JCPOA).

Summary and Breakout Estimate

Highlights of the IAEA report include:

1) Iran's low enriched uranium (LEU) stock now exceeds by twelve-fold the limit set in the JCPOA. As of November 2, 2020, Iran had a stockpile of about 3613.8 kilograms (kg) of LEU (hexafluoride mass), all enriched below 5 percent, or the equivalent of 2442.9 kg (uranium mass).

2) Of the 2442.9 kg LEU (uranium mass), 692.7 kg are enriched to up to 2 percent. 215.1 kg LEU is a stock of LEU enriched up to 3.67 percent before July 8, 2019. The remainder is 1535.1 kg enriched to more than 2 but less than 4.5 percent.

3) Overall monthly LEU production again decreased slightly, from 165.1 kg per month (uranium mass) as of the previous reporting period (May 2020 to August 2020) to 146.7 kg per month during this reporting period (August 2020 to Nov 2020). This decrease only affected the below 2 percent LEU production. The monthly average production of 2 to 4.5 percent LEU increased slightly.

4) Iran's estimated breakout time as of early November 2020 is as short as 3.5 months. Iran now has sufficient low enriched uranium to produce enough weapon-grade uranium for a second nuclear weapon, where the second one could be produced more quickly than the first. Iran would require, in total, as little as 5.5 to 6 months to produce enough weapon-grade uranium for two nuclear weapons.

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5) Iran's total estimated enrichment capacity decreased slightly to 6963 separative work units (swu) per year during this reporting period. (This value, while indicative of Iran's total enrichment output, should not be used in breakout estimates).

6) Iran is starting the process of installing advanced centrifuges in the Natanz Fuel Enrichment Plant (FEP) in violation of the JCPOA. The transfer of centrifuges from the Natanz Pilot Fuel Enrichment Plant (PFEP) to the FEP resulted in a temporary 10 percent decrease in enrichment capacity.

7) Iran is installing three full cascades of advanced IR-2m, IR-4, and IR-6 centrifuges at the underground Natanz Fuel Enrichment Plant, representing a potential additional enrichment capacity of 2152 swu/yr, the equivalent of installing an additional 2391 IR-1 centrifuges to the currently operating 5060 IR-1 centrifuges.

8) Iran continued to operate the Heavy Water Production Plant, but its stock of heavy water decreased to 128.5 metric tonnes, below the nuclear deal's heavy water limit. It continues to find international buyers for small quantities of heavy water and to use limited amounts of heavy water in domestic R&D activities related to medical applications.

9) The IAEA's JCPOA verification report harshly criticizes Iran for not addressing a critical issue involving undeclared nuclear material and activities, concluding that Iran's explanations are "unsatisfactory" and "not technically credible." The IAEA's judgment relates to the agency's finding of undeclared refined uranium particles at a warehouse in the Turquz Abad neighborhood of Tehran. This issue is, at heart, a safeguards issue under the Nuclear Non-Proliferation Treaty (NPT) and should be addressed via a resolution by the Board of Governors at its next meeting on November 18 to 20, where the Board should register its dissatisfaction with Iran's actions.

10) Related to findings regarding the Turquz Abad issue is the IAEA's investigation of undeclared materials and activities at two sites in Iran, the Tehran pilot uranium conversion plant and the Marivan site, which were part of Iran's nuclear weapons program in the early 2000s. Unexpectedly, the IAEA did not report on this issue either in this report or a separate safeguards report. It should inform the Board fully on the status of this investigation, so the Board can be aware of Iran's compliance or lack thereof. This issue should be merged with the issues surrounding undeclared uranium at Turquz Abad; after all -- they are all linked.

11) Iran has not pursued the construction of the Arak heavy water research reactor (IR-40 Reactor) based on its original design. It also has not produced or tested natural uranium pellets, fuel pins, or fuel assemblies for the original reactor design.

Part 1: Low Enriched Uranium Stocks

The IAEA reports that Iran now exceeds by twelve-fold the JCPOA's cap of 300 kilograms (kg) on the amount of low enriched uranium (hexafluoride mass) it may possess, which is the equivalent of 202.8 kg (uranium mass). On July 1, 2019, the IAEA first reported that Iran had surpassed the JCPOA's LEU stock limit by enriching 205.0 kg of LEU (uranium mass). Since then, it has added 2237.9 kg LEU (uranium mass) to its stockpile. Iran also continued, for over a year now, to enrich to 4.5 percent, in violation of the JCPOA's 3.67 percent enrichment limit. The IAEA first stated on July 8, 2019 that Iran was enriching up to a level of 4.5 percent.

On November 2, 2020, the IAEA's most recent verification date on enriched uranium stocks, Iran possessed a total stockpile of about 3613.8 kg of low enriched uranium (hexafluoride mass), all enriched below 5 percent, or the equivalent of 2442.9 kg (uranium mass). Iran added 337.5 kg (uranium mass) to its low enriched uranium stockpile during this latest reporting period, which spans August 26, 2020, to November 2, 2020, or a total of 69 days. The IAEA reports that of the 2442.9 kg figure, Iran has a stock of 1535.1 kg of LEU enriched between 2 percent to 4.5 percent (uranium mass), and 692.7 kg enriched in advanced centrifuges up to 2 percent (uranium mass), at the Natanz Pilot Fuel Enrichment Plant (PFEP). The remainder, 215.1 kg LEU, is uranium enriched up to 3.67 percent before July 8, 2019. In terms of uranium hexafluoride mass, Iran possessed 2270.9 kg of up to 4.5 percent but greater than 2 percent enriched uranium, 1024.7 kg of uranium enriched up to 2 percent, and 318.2 kg of uranium enriched to about 3.5 percent (produced before July 8, 2019).

Not all of the LEU enriched between 2 and 4.5 percent was produced at the Natanz and Fordow Fuel Enrichment Plants; an unstated amount was produced in advanced centrifuges at the Pilot Fuel Enrichment Plant at Natanz.

In Table 1 below, a stockpile comparison from November 3, 2019 to November 2, 2020 shows how Iran has increased its LEU stocks throughout the year, as measured only in uranium mass. The net increase in the total stock of LEU in Iran from November 2019 to November 2020 was 2070.6 kilograms LEU (uranium mass), at an overall average rate of about 172.5 kilograms (uranium mass) per month. Alternatively, these values convert to 3063 kg LEU (hexafluoride mass), or an average of about 255.3 kg LEU (hexafluoride mass) per month. During this reporting period, covering August 2020 to November 2020, the average production rate was about 146.7 kg per month of enriched uranium (uranium mass) and 217.1 kg per month of enriched uranium (hexafluoride mass). During this reporting period, compared to the previous one, Iran's overall average monthly production of enriched uranium again decreased slightly. This is due to decreased production in below 2 percent enriched uranium. As noted, during the last reporting period, Iran's average monthly production of the 2 to 4.5 percent enriched uranium stock increased slightly.

Table 1. Enriched Uranium Quantities,* less than 5 percent enriched and all quantities in uranium mass

Chemical Form	November 2019	February 2020	May 2020	August 2020	November 2020
UF6 (kg)	349.9	996.5	1546.7	2073.8	2408.5
Uranium oxides and their intermediate products (kg)	10.4	9.7	9.7	15.2	15.5
Uranium in fuel assemblies and rods (kg)	4.6	7.7	7.7	8.2	8.2
Uranium in liquid and solid scrap (kg)	7.4	7	7.5	8.2	10.7
Enrichment Level Subtotals					
Uranium enriched to 3.67 percent (kg)**	212.6	214.6	215.1	215.1	215.1
Uranium enriched up to 4.5 percent (kg) but more than 2 percent	129.2	537.8	873.4	1251.5	1535.1
Uranium enriched up to 2 percent (kg)	30.5	268.5	483.1	638.8	692.7
Totals of Enriched Uranium, <5% (kg)	**372.3**	**1020.9**	**1571.6**	**2105.4**	**2442.9**

* These totals do not include undisclosed stocks of enriched uranium exempted by the JCPOA Joint Commission.
**This value shifted slightly in IAEA quarterly reports prior to May 2020.

Part 2: Enrichment capacity

Natanz Fuel Enrichment Plant (FEP)

IR-1 Centrifuge Deployments. At the Natanz Fuel Enrichment Plant, the IAEA reported that Iran operated no more than 5060 IR-1 centrifuges in 30 cascades. Iran withdrew 20 IR-1 centrifuges from storage to replace broken ones in these cascades. During the previous reporting period, it withdrew 104 IR-1 centrifuges, and during the prior one, it withdrew 96 IR-1 centrifuges. The reduced number could imply the IR-1 centrifuges were working better, with fewer failures.

Advanced Centrifuges in the FEP. Iran is starting the process of installing advanced centrifuges in the FEP, in violation of the JCPOA. Iran shifted its plans again, stating that instead of installing new advanced centrifuges in the FEP and then ending the operation of the three corresponding cascades at the PFEP, it will move the three production-scale cascades from Lines 4, 5, and 6 in the PFEP to the FEP. Lines 4, 5, and 6, respectively, contain IR-4, IR-2m, and IR-6 cascades (see PFEP section below). On September 2, 2020, the IAEA verified that Iran had installed the headers and subheaders for these three cascades in one of the FEP's enrichment units. On October 11, 2020, the IAEA verified that Iran had installed the cascade of IR-2m centrifuges. By November 9, inspectors verified that this cascade was connected to the feed and withdrawal stations but was not being fed with uranium hexafluoride. On November 9, inspectors saw that Iran had started installing the cascade of IR-4 centrifuges from Line 4 but had not yet begun installing the IR-6 centrifuges from Line 6. The installation of these three cascades, assuming they all work, will significantly increase the enrichment output of the FEP.

Fordow Fuel Enrichment Plant (FFEP)

The IAEA reported that since January 22, 2020, the Fordow plant is enriching uranium in six cascades containing 1044 IR-1 centrifuges, in one wing or unit of the plant called Unit 2. An additional 12 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 in Unit 2; all were involved in initial research and development activities related to stable isotope production. In total, as of November 2020, 1057 IR-1 centrifuges were installed in Unit 2 of the FFEP.

Advanced Centrifuges in the PFEP

Iran continued to take steps during the IAEA reporting period to violate the JCPOA's limitations on advanced centrifuges. The following summarizes the deployment of advanced centrifuges in the six lines at the Natanz Pilot Fuel Enrichment Plant (PFEP), their enrichment status, and their enrichment capacity, if known, as of the end of the IAEA reporting period.

Iran is no longer uniformly remixing the product and tails (waste) from advanced centrifuges, but collecting it separately, meaning that Iran is accumulating enriched uranium at the PFEP. As of November 2, 2020, a total of 692.7 kilograms (uranium mass) of uranium enriched up to two percent had been collected from lines 2 and 3 of the six lines at the PFEP; 53.9 kilograms during the last reporting period. The IAEA does not provide the average enrichment of this material, although it can be safely assumed that it varies from just above natural uranium (0.71 percent uranium 235) up to 2 percent uranium 235. This average value matters because the amount of separative work to make, for example, a quantity of two percent enriched uranium, is several times the amount needed to make the same quantity of one percent enriched uranium. The IAEA did not reveal how much enriched uranium was collected in lines 4, 5, and 6 of the PFEP, but included this enriched uranium in the total amount of LEU enriched up to 4.5 percent.

Lines 2 and 3 contained a variety of centrifuge types and numbers, many accumulating enriched uranium. The following is a summary, as of the end of the last reporting period (November 10, 2020), of all the centrifuges installed in lines 2 and 3 (about 63 centrifuges in total), that were accumulating enriched uranium (so far about 692.7 kg, as mentioned above):

1. Currently 0 IR-2m centrifuges in a cascade;
2. Up to 9 IR-4 centrifuges in a cascade;
3. Up to 8 IR-5 centrifuges in a cascade;
4. Up to 26 IR-6 centrifuges, in a centrifuge cascade of 6 IR-6 centrifuges, and another cascade of 20 IR-6 centrifuges;
5. Up to 10 IR-6s centrifuges in a cascade; and
6. Up to 10 IR-s centrifuges in a cascade.

According to the IAEA report, as of November 10, 2020, Iran was testing the following single centrifuges with uranium hexafluoride in lines 2 and 3 but not accumulating enriched uranium:

1. One IR-1 centrifuge;
2. Four IR-2m centrifuges;
3. Zero IR-3 centrifuges;
4. One IR-4 centrifuge;
5. Two IR-5 centrifuges;
6. Zero IR-6 centrifuges;
7. Zero IR-6m centrifuges;
8. Two IR-6-s centrifuges;
9. Zero IR-6sm centrifuges;
10. Zero IR-7 centrifuges;
11. One IR-8 centrifuge;
12. Zero IR-8s centrifuges;
13. One IR-8B centrifuge;
14. One IR-s centrifuge; and
15. One IR-9 centrifuge.

Iran also accumulated enriched uranium in lines 4, 5, and 6. By late September, Iran had dismantled the cascade of IR-2m (previously containing 164 centrifuges) in Line 5 for deployment in the FEP. It also announced that it will move the centrifuges in Lines 4 and 6 to the FEP.

As of November 10, 2020, Line 4 contained a redeployed cascade of 152 IR-4 centrifuges. Line 6 contained a cascade of 110 IR-6 centrifuges. The IAEA did not specify how much enriched uranium had been produced so far in these lines, or its level of enrichment. This enriched uranium is likely included in the IAEA's aggregate, reported amount of enriched uranium enriched of more than 2 percent and up to 4.5 percent.

The production-level cascades of IR-2m and IR-4 centrifuges represent Iran's most successful advanced centrifuge types. When previously operated in a production-scale cascade, each IR-2m centrifuge had an enrichment capacity of about 3.7 swu per year. The cascade of 164 centrifuges installed at the FEP thus has an estimated enrichment capacity of about 607 swu per year. This is equivalent to about 675 IR-1 centrifuges operating in production cascades, where each IR-1 is assumed to have a capacity of 0.9 swu per year. The IR-4 has a lower capacity than the IR-2m, estimated here as ten percent lower, or about 3.3 swu per year per centrifuge. The production-scale cascade of 164 centrifuges would have a total output of about 541.2 swu per year, equivalent to about 601 IR-1 centrifuges. At its current number per cascade, Line 4 has 152 IR-4 centrifuges with a separative output of 501.6 swu per year, or the equivalent of 557 IR-1 centrifuges.

Line 6 at the PFEP held 110 IR-6 centrifuges in a single cascade (down from 120 during the last reporting period). Iran stated earlier that the line will hold 164 IR-6 centrifuges in a cascade; but it recently announced that it was moving this cascade to the FEP. The IR-6 has a single machine estimated capacity of 6.8 swu per year. No recent data are available publicly on its performance in this cascade. Assuming that the cascade value would be about 90 percent of the capacity achieved by an IR-6 operating by itself, or 6.12 swu per year, 110 IR-6 centrifuges in cascade would have an output of about 673.2 swu per year, and a cascade of 164 IR-6 would have total capacity of about 1,000 swu per year, or the equivalent of about 1,115 IR-1 centrifuges.

Iran announced that it would replace the inoperable cascade of IR-1 centrifuges in Line 1, with IR-5 and IR-6s centrifuges in a full cascade of 172 centrifuges, or two intermediate cascades of 84 centrifuges. As of October 31, 2020, the IAEA verified that Iran had not begun installing the subheaders necessary for the installation of these centrifuges in Line 1. Based on an extrapolation of centrifuge enrichment outputs, this additional cascade could add an estimated 727 swu per year to Iran's total enrichment capacity, or the equivalent of 807 IR-1 centrifuges.

Iran is planning to "transfer a part" of the PFEP to "building A1000," which houses the production hall at the FEP, aiming to concentrate all enrichment research and development in this area. The timeline for the move was not provided.

According to the quarterly report, Tehran continued to violate an additional JCPOA limitation by conducting mechanical testing of centrifuges at the Tehran Research Centre and a workshop at Natanz. On October 18, 2020, the IAEA verified that Iran had conducted mechanical testing of three IR-4 centrifuges simultaneously for 42 days. It also verified that Iran had not started using a new location, in violation of the JCPOA, for mechanical testing of centrifuges.

As can be seen above, Iran is developing a large number of centrifuges simultaneously, an unusual practice. The centrifuges under development at the PFEP include: IR-1, IR-2m, IR-3, IR-4, IR-5, IR-6, IR-6m, IR-6s, IR-6sm, IR-7, IR-8, IR-8s, IR-8B, IR-s, and IR-9. No information was provided in the IAEA report on how well each of these centrifuges work, their failure rates, or why so many are being developed. Typically, a centrifuge program with such characteristics is likely failing at developing a commercially viable centrifuge, although several of these centrifuges could work adequately in a nuclear weapons program, where efficiency, low failure rates, and low cost are not priorities. With the expected deployments of IR-2m, IR-4, and IR-6 cascades in the FEP, more data may be forthcoming.

Table 2 summarizes the enrichment capacity by facility. Iran's enrichment capacity has decreased from an estimated 7693.08 swu/yr to 6962.72 swu/yr during this reporting period, representing a decrease of 9.5 percent, assessed to be temporary only due to the changes at the PFEP. This total enrichment capacity represents the equivalent of 7736 IR-1 centrifuges. However, as will be noted below, this entire capacity cannot be used in a breakout, since many of the advanced centrifuges are not properly organized to contribute meaningfully to a breakout.

Table 2. Number of enriching centrifuges and enrichment capacity

	Number of centrifuges	**Enrichment capacity in swu/yr**	**IR-1 equivalent**
Natanz*	5060	4554	5060
Fordow	1044	940	1044
Natanz PFEP (advanced)**	325	1469	1632
Lines 2 & 3	See text		
Lines 4, 5, 6	See text		
Total	**6429**	**6963**	**7736**

*These values for Natanz do not yet include the new IR-2m centrifuge cascade, which was recently installed but is not yet enriching. Its inclusion would increase the number of centrifuges by approximately 164 centrifuges and enrichment capacity by 607 swu per year.
**The value for lines 2 and 3 of the PFEP is a rough estimate based on the use of estimated and measured values for the separative output of these centrifuges in cascades, drawn from IAEA information. The values for lines 4, 5, and 6 of the PFEP are given in the text. All of the values used to make these estimates reflect historical enrichment output values obtained by Iran prior to the nuclear deal and do not reflect current values, which are not included in the IAEA's quarterly reports.

Part 3: Current Breakout Estimates

The Institute's breakout calculator is used to estimate current breakout times based on Iranian LEU stocks and installed enrichment capacity, using the above values.

In the breakout estimate, the following conditions are assumed:

- An enrichment capacity at the Natanz and Fordow Fuel Enrichment Plants as drawn from the latest IAEA report. The enrichment contribution from advanced centrifuges at the Pilot Fuel Enrichment Plant is not included, as their use in a breakout would be complicated and likely not contribute to reducing breakout timelines. In addition, the newly installed IR-2m cascade in Natanz FEP is not yet included but will be considered in future estimates;

- Only LEU stocks above two percent enriched are used. Stocks of less than two percent enriched uranium are not used, since to do so would require additional modifications of the cascades to handle lower enrichments, likely significantly slowing or contributing only slightly, rather than speeding up breakout timelines; and

- Iran redeploys its 1000 IR-2m centrifuges, removed from the Natanz FEP prior to the JCPOA's Implementation Day; however, the rest of the centrifuges deployed are IR-1 centrifuges from Iran's existing stock. Iran may in fact deploy additional advanced centrifuges, but this effect is not yet included in this estimate, because of uncertainties about the additional number of advanced centrifuges in existence or the quantity that could be produced in the relatively short period of a breakout, particularly in light of the destruction of the Iran Centrifuge Assembly Center last summer. As Iran deploys its advanced centrifuges in the FEP over the coming months, the assumption about the deployment of IR-1 centrifuges will be reevaluated.

Iran's stock of LEU has grown sufficiently to not only decrease breakout timelines to a minimum for this level of enrichment capacity but to produce enough weapon-grade uranium for a second nuclear weapon. Two basic cases are considered.

First, if Iran's stock of uranium enriched up to 4.5 percent (2271 kg uranium hexafluoride mass) is taken as all 4.5 percent enriched, admittedly a worst case, then its current stock has grown sufficiently to support the production of enough weapon-grade uranium for two nuclear weapons. In this new situation, breakout for one nuclear weapon can be accomplished in 3.1 months, utilizing only this stock of enriched uranium, and assuming no initial setup time. Including a two-week setup time would increase this value to 3.6 months. If breakout continued, a second significant quantity of weapon-grade uranium could be produced two months later. The second could be produced more quickly because of the increased enrichment capacity installed during the first three months of breakout. So, enough weapon-grade uranium could be produced for two nuclear weapons in 5.5 months.

Second, Iran's stock of uranium enriched up to 4.5 percent is assumed to be enriched to only 3.5 percent (likely an overly conservative assumption). In this case, it is added together with the stock of up to 3.5 percent LEU produced prior to the end of the JCPOA limits, resulting in a total stock of 2590 kilograms (uranium hexafluoride mass), sufficient to produce enough weapon grade uranium for two nuclear weapons. In this case, the breakout timeline to produce enough weapon-grade uranium for one nuclear weapon is 3.4 months, assuming no setup time, and 3.9 months if setup time is included. With continued breakout, the second quantity of weapon grade uranium would be produced after a total of 5.65 months. In addition to the IR-2m re-deployment, a major factor in the first scenario is that the LEU is already enriched to 4.5 percent instead of 3.5 percent, a significant change from estimates performed before the JCPOA's Implementation Day, since this one percent increase in enrichment can provide up to a 15 to 20 percent reduction in breakout time to produce 25 kilograms of weapon-grade uranium. The greater enrichment level also means that the production of 25 kilograms of weapon grade uranium requires less LEU than if it were enriched to 3.5 percent: 900 kilograms of 4.5 percent LEU vs. 1250 kilograms of 3.5 percent LEU in hexafluoride mass. This last condition is particularly significant in the first scenario, since it means that the existing amount of LEU enriched up to 4.5 percent is enough to reach the requisite amount of weapon-grade uranium for two nuclear weapons without the need to also use some lesser enriched uranium, the 3.5 percent stock, or natural uranium, to make a portion of the needed WGU. As a result, the process is strictly a three-step one instead of a three-step followed by a four-step one, if natural uranium were required. This ability to use only three steps to reach weapon-grade, instead of four, is why the media and experts often discuss a key threshold of about 1000 kg of LEU as significant for producing enough weapon grade uranium for a nuclear weapon.[2]

Both scenarios are calculated because of the lack of information about the average enrichment of the LEU stocks. If the average of the range of 3.1 to 3.9 months is used, the estimated breakout time as of early November 2020 is as little as 3.5 months. It is also the case now that Iran could produce its second amount of weapon-grade uranium, and have enough for two nuclear weapons, within six months.

If the new IR-2m cascade at the FEP were included, with all other things being equal, the breakout timelines would drop by about five percent, viewed as within the error of the original breakout estimate. The decrease would become significant if all three advanced centrifuge cascades were installed and all work effectively. The decrease could reach fifteen percent.

Part 4: Other Information - Heavy water, Arak reactor, Additional Protocol, Undeclared uranium particles, NPT compliance investigation

Heavy Water Production Plant (HWPP)

Iran continued to operate the HWPP during the reporting period and shipped out heavy water to unknown buyers. According to the IAEA report, "On 20 October 2020, the Agency verified that the HWPP was in operation and that Iran's stock of heavy water had decreased to 128.0 metric tonnes (-0.5 metric tonnes since the previous quarterly report)." The nuclear deal's heavy water limit is 130 metric tonnes. During the reporting period, Iran produced 3.0 metric tonnes of heavy water and exported 2.2 metric tonnes, ostensibly to one or more unidentified buyers. Iran used 1.3 metric tonnes for the production of deuterated compounds for medical applications. It continued to permit IAEA monitoring of its heavy water production activities. It remains unclear whether Washington is pressuring such buyers of Iran's heavy water to halt purchases or considering sanctions against those it identifies.

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[2] David E. Sanger and William J. Broad, "Iran Crosses a Key Threshold: It Again Has Sufficient Fuel for a Bomb," *The New York Times,* March 3, 2020, https://www.nytimes.com/2020/03/03/world/middleeast/iran-nuclear-weapon-trump.html

Arak Reactor

The IAEA again reported that Iran "has not pursued the construction of the Arak heavy water research reactor (IR-40 Reactor) based on its original design." It also "has not produced or tested natural uranium pellets, fuel pins or fuel assemblies" for the original reactor design.

Additional Protocol implementation

The IAEA reported that Iran continues to provisionally apply the Additional Protocol, which it agreed to do under the terms of the JCPOA. The IAEA stated that it "continues to evaluate Iran's declarations" and "has conducted complementary accesses under the Additional Protocol to all the sites and locations in Iran which it needed to visit." The IAEA reported that it has not yet been able to reach a Broader Conclusion for Iran. It wrote, "Evaluations regarding the absence of undeclared nuclear material and activities for Iran are ongoing."

Uranium particles found at the Turquz-Abad warehouse

The IAEA reported that it finds "unsatisfactory" and "not technically credible" Iran's explanations about uranium particles found at an open-air warehouse in the Turquz-Abad neighborhood of Tehran. Neither the Turquz-Abad site nor the presence of nuclear material had been declared to the IAEA. The site was first disclosed by Israel in September 2018 when Jerusalem alleged that shipping containers at the site contained nuclear-related equipment and material from Iran's past and potentially ongoing nuclear weapons program.[3] Iran moved the containers from the site and sanitized the area during the summer of 2018, up until the IAEA's visit in February 2019.[4] During the IAEA visit, it took environmental samples and detected "uranium particles of anthropogenic origin." The IAEA also reported new information about the types of particles it found at the site: "isotopically altered particles of low enriched uranium, with a detectable presence of U-236, and of slightly depleted uranium."

Iran appears to be stonewalling the IAEA's investigation. Although this issue was reported in a quarterly verification report with respect to the JCPOA, it involves undeclared nuclear material, an issue rightly under Iran's NPT safeguards agreement. In any case, the IAEA Board of Governors has the authority to address this issue and should address Iran's non-cooperation at its meeting from November 18 to 20.

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[3] John Irish and Arshad Mohammed, "Netanyahu, in UN Speech, Claims Secret Iranian Nuclear Site," Reuters, September 27, 2018, https://www.reuters.com/article/us-un-assembly-israel-iran/netanyahu-in-un-speech-claims-secret-iranian-nuclear-site-idUSKCN1M72FZ

[4] David Albright, Sarah Burkhard, Olli Heinonen, and Frank Pabian, "Presence of Undeclared Natural Uranium at the Turquz-Abad Nuclear Weaponization Storage Location," *Institute for Science and International Security,* November 20, 2019, https://isis-online.org/isis-reports/detail/presence-of-undeclared-natural-uranium-at-the-turquz-abad-nuclear-weaponiza

Two other undeclared sites

Under a related investigation into Iran's compliance with its safeguards obligations, the IAEA is investigating Iran's previous undeclared military uranium conversion activities at a site called the Tehran Plant, and undeclared activities at the Marivan site, one of four high explosive test sites Iran used to develop nuclear weapons components under the Amad Plan in the early 2000s. Iran's Nuclear Archive, seized by Israel in 2018, contains information and photographs detailing activities at these two sites. The Institute assessed the information as credible, and recently published satellite imagery which showed that the Tehran Plant was dismantled and then razed by 2004.[5] The Institute has previously reported on the Marivan site and will soon release an updated, revised report.

Since the previous reporting period, the IAEA reportedly visited and took samples at these two sites, but has not yet reported its findings.[6] The IAEA is seeking to determine whether these sites involved undeclared nuclear materials and account for any undeclared nuclear material present or previously located at the sites.

After months of delay in granting access to these two sites, the IAEA Board of Governors demanded in a June 2020 resolution that Iran permit access. Unexpectedly, the IAEA did not report on this issue either in this report or a separate safeguards report. It should brief the Board on its findings to date, so the Board can be aware of Iran's compliance or lack thereof. This issue should be merged with the issues surrounding undeclared uranium at Turquz Abad; after all -- they are all linked.

[5] David Albright, Sarah Burkhard, Frank Pabian, "The Amad Plan Pilot Uranium Conversion Site, Which Iran Denies Ever Existed," *Institute for Science and International Security,* November 9, 2020, https://isis-online.org/isis-reports/detail/the-amad-plan-pilot-uranium-conversion-site

[6] "UN Nuclear Watchdog Inspects Second Iranian Site as Agreed with Tehran," Reuters, September 30, 2020, https://www.reuters.com/article/us-iran-nuclear-iaea/u-n-nuclear-watchdog-inspects-second-iranian-site-as-agreed-with-tehran-idUSKBN26L1FW