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Iran's Uranium Enrichment Program: Approaching Breakout

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EXECUTIVE SUMMARY: Iran continues to insist that its nuclear program is designed for peaceful purposes despite all evidence of its military nature. This evidence includes the IAEA's recent findings regarding Tehran's progress in the field of uranium enrichment. Given Iran's current uranium holdings and enrichment capabilities, it can theoretically break out from its NPT commitment and develop its first nuclear bomb within four months.

The International Atomic Energy Agency (IAEA) Director-General issued a report on June 5, 2020 that is worded to deflate Iran's renunciation of its signing of the JCPOA nuclear agreement. The report notes Tehran's announcement on January 5 that its nuclear program is no longer "subject to any restrictions in the operational sphere," but also notes that it claims a willingness to "continue to cooperate with the agency as in the past."

Be that as it may, the report is hardly reassuring.

On June 1, Iran notified the agency that it has decided to stop implementing its commitment to limit centrifuge research and development. The report goes on to detail Tehran's many deviations from the nuclear agreement, as discovered by the IAEA inspectors. These deviations include the following:

- On July 1, 2019, the agency verified that Iran's accumulated enriched uranium stock exceeds the allowable amount of 300 kg of UF₆ (uranium hexa-fluoride compound used in the uranium enrichment process) enriched to 3.67% (uranium content at 300 kg UF₆ is 202.8 kg).
- On July 9, 2019, Iran began enriching uranium up to 4.5%, above the allowable rate of 3.67%.

- On November 6, 2019, Iran began once again to enrich uranium at the Fordow facility using 1,044 IR-1 centrifuges (Iran's first centrifuge model).
- On May 11, 2020, Iran's heavy water stockpile reached 132.6 tons. This exceeds the quantity allowed for aggregation (up to 130 tons).
- According to recent IAEA examinations, Iran has developed and manufactured centrifuge components as well as assembled centrifuge cascades in violation of the nuclear agreement.
- On May 20, 2020, the IAEA verified that the enriched uranium stockpile accumulated by Iran had reached a volume of 1,571.6 kg (550.7 kg over the amount found in the previous quarterly report). This quantity included 873.4 kg of enriched uranium to 4.5%, 215.1 kg of uranium enriched at 3.67%, and uranium enriched up to 2% or less. This is a significant breach of the agreement by Iran.
- The most significant deviation from the agreement, which was discovered on June 1, 2020, was the operation at the Natanz enrichment plant of advanced centrifuges developed in Iran for uranium enrichment to 4.5%: 164 IR-2m centrifuges, 164 IR-4 centrifuges, and 164 IR-6 centrifuges. According to a report by the Washington-based Institute of Science and International Security (ISIS) of June 8, 2020, which referred to the latest IAEA report, the IR-2m centrifuge enrichment capacity is 3.7 SWU (Separative Work Unit) per year, the estimated capacity of the IR-4 model is about 3.3 SWU/year, and the estimated capacity of the IR-6 centrifuge is 6.8 SWU/year. This can be compared with the first Iranian model, the IR-1, which, based on IAEA reports from the first half of this decade, is about 0.9 SWU/year.

As previously reported in the media, for example in the case of Pakistan's nuclear weapons project (which, as is well known, has supplied knowhow on this topic to Iran in the past), to enrich natural uranium (whose fissile uranium-235 isotope's concentration is about 0.7%) to 90% (weapons grade), the enrichment process must be performed in four steps. They are: enrichment to less than 5%; enrichment of the product obtained from the previous stage to 20%; enrichment to 60%, and finally to 90%. Theoretically, if Iran's current uranium quantities—one portion enriched to 4.5% (873.4 kg) and the other to 3.67% (215.1 kg) as of May 20—were subsequently enriched to 20%, 60%, and 90%, the final product would be about 15 kg of uranium enriched to 90%. That is enough to produce one nuclear bomb core.

The enrichment capacity required for this is approximately 2,800 SWU. If we include the IR-1 centrifuges that Iran operates—5,600 at Natanz and 1,044 at Fordow—Iran's current enrichment capacity is about 8,240 SWU/year. This

implies that within four months, Iran could break out of its commitment to the NPT and enrich the amount of uranium it needs for its first nuclear bomb.

Kazem Garibabadi, Iran's representative at the IAEA, confirmed the data presented in the IAEA's latest report. He stressed that while Iran has suspended its 2015 commitments under the JCPOA nuclear agreement, it continues to cooperate with the IAEA in "nuclear verification and monitoring." As for its decision in January to withdraw from the agreement, Tehran said that was in response to the sanctions imposed on it by the US and a signal to the EU, which it believes has not acted sufficiently to revoke or circumvent those sanctions.

Garibabadi's comments appeared to reflect his country's official statement that its nuclear program is "peaceful," and that its signing of the 2015 nuclear agreement was "voluntary." He also apparently wanted to send a message to the IAEA member states that Iran's significant progress in developing its enrichment program is of a civilian nature.

Iran's presentation of itself as a country building a peaceful nuclear program is flatly contradicted by the vast amount of intelligence revealed to date, particularly that gleaned from the "Iran's Nuclear Archive" operation. That intelligence unequivocally indicated that the program is intended primarily for nuclear weapons production.

According to a March 3 report, the IAEA said it has identified three sites in Iran, undisclosed by the regime, where it may be storing undeclared nuclear materials or carrying out nuclear-related activities. In a statement to the IAEA's Board of Governors on March 9, IAEA Director-General Rafael Grossi urged Iran to fully cooperate with IAEA inspectors and allow them quick access to the suspected sites.

Garibabadi had this to say on the matter: "'Intelligence services' (of course Western services) fabricated information... [which] creates no obligation for Iran to consider such requests."

In April, a cyberattack attributed to Iran on Israeli water facilities was intended to increase the concentration of chlorine in the drinking water of Israeli citizens. Had it succeeded, the attack would have sickened many Israeli civilians and deprived many more of drinking water during a heat wave. Fortunately, the Iranian attack was detected at its beginning and thwarted before it could do any damage.

Iran's attempt to poison the citizens of a country it considers to be an enemy demonstrates its willingness to go far to harm the State of Israel. As it has stated many times over four decades, it wishes to destroy Israel completely. If it succeeds in achieving a nuclear arsenal, that would constitute an existential threat to Israel.

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