

Iran's Uranium Enrichment Program: An Update

In July 2015 an agreement, known as the Joint Comprehensive Plan of Action (JCPOA), was reached between Iran and the E3/EU+3² to temporarily restrict Iran's nuclear program. These restrictions focused mainly on Iran's centrifuge enrichment program and its construction of a heavy water moderated, natural uranium fueled reactor which would produce significant amounts of plutonium. In May 2018 the United States withdrew from this agreement. Iran initially continued to abide by the terms of the JCPOA but in May 2019 said that it would no longer be bound by the agreement. In July 2019 it began to operate its centrifuge enrichment facilities beyond the limits of the JCPOA and has taken further steps through May 2020 to expand its centrifuge uranium enrichment program.

Iran is currently producing low enriched uranium with an enrichment of 4.5%. However, one of the most worrisome aspects of centrifuge enrichment plants is that even if they are configured to produce only low enriched uranium, they can easily be used to produce the highly enriched uranium (HEU) required for nuclear weapons using a batch recycling process. In my prior analysis, I described how Iran could carry out this process by sending the enriched uranium back through the cascade three more times.³ In the first step, the enrichment would be increased to 23.7%, the second step to 67.1% and the third step to 93.1%.⁴ Only minor modifications to the centrifuge plant are needed to carry out this process.

This prior analysis showed that *given a sufficiently large* stockpile of 4.5% enriched uranium, Iran could produce enough HEU for a nuclear weapon in just two to two and one half months. The analysis showed that Iran would need about 1,845 kilograms of 4.5% enriched uranium to be able to produce enough HEU for a nuclear weapon (20 kilograms of uranium enriched to 93.1%). However according to reporting by the International Atomic Energy Agency (IAEA) as of February 20, 2020, Iran only had a stockpile of 537.8 kilograms of 4.5% enriched uranium. At its then production rate of 4.5% enriched uranium, Iran would not reach the total of 1,845 kilograms of 4.5% enriched uranium for about eleven months from February 2020, that is January 2021.

¹ This paper is the product of the author's personal research and the analysis and views contained in it are solely his responsibility. Though the author is also a part-time adjunct staff member at the RAND Corporation, this paper is not related to any RAND project and therefore RAND should not be mentioned in relation to this paper. I can be reached at GregJones@proliferationmatters.com

² These are China, Russia, the United States, France, Germany and the United Kingdom.

³ Gregory S. Jones, "Iran's Uranium Enrichment Program Making Strides but Still At Least Six Months From Being Able to Produce Enough HEU for a Nuclear Weapon." April 2, 2020. <https://nebula.wsimg.com/0110bd8db6cebe189303e8aa10b23ece?AccessKeyId=40C80D0B51471CD86975&disposition=0&alloworigin=1>

⁴ The tails for these three steps are 2.0%, 11.8% and 46.9% respectively.

On June 5, 2020 the International Atomic Energy Agency (IAEA) published its latest safeguards update on Iran's nuclear program.⁵ This update reports that Iran's stockpile of 4.5% enriched uranium as of May 20, 2020 was a total of 873.4 kilograms. This is an increase of 335.6 kilograms since February 20, 2020. Iran's current rate of increase is slightly slower than the prior reporting period (November 3, 2019 to February 20, 2020). At this current rate of increase Iran will reach a total of 1,845 kilograms in early February 2021, which is about seven months from now.

Iran could shorten this time somewhat by deploying additional centrifuges. Since February 20, 2020, Iran deployed an additional 63 advanced centrifuges in line 6 at its Pilot Fuel Enrichment Plant (PFEP). It will likely deploy an additional 29 centrifuges to complete the cascade in line 6 and appears to be readying for the deployment of a cascade (presumably 164 advanced centrifuges) in line 1 at the PFEP. But these deployments will probably increase Iran's enrichment capacity by only about 10%. Therefore, even if these additional centrifuges are deployed, Iran will likely not accumulate 1,845 kilograms of 4.5% enriched uranium until January 2021.

Note that since it would take Iran two to two and a half months to then process this 4.5% enriched uranium into HEU, Iran would not have sufficient HEU for a nuclear weapon before March or April 2021. Even then Iran will probably not actually produce this HEU. It is more likely that Iran will accumulate additional 4.5% enriched uranium so that if it should eventually produce HEU it could have a sufficient quantity for more than one nuclear weapon. This is unlikely to occur before the end of 2021 at the earliest. As a result, it will probably be at least 2022 before Iran will actually construct and deploy nuclear weapons.

The current U.S. program of maximum pressure appears to be the only chance to prevent an Iranian nuclear weapon in the long-term. Whether this policy will succeed is unclear but it has already imposed serious costs on Iran and these costs could well further slow the speed with which Iran could deploy a nuclear arsenal. Given the pace with which Iran is accumulating its 4.5% enriched uranium stockpile, there is still time to prevent an Iranian nuclear weapon. The current policy of maximum pressure should be maintained.

⁵ "Verification and monitoring in the Islamic Republic of Iran in light of United Nations Security Council resolution 2231 (2015)," GOV/2020/26, International Atomic Energy Agency, June 5, 2020. <https://www.iaea.org/sites/default/files/20/06/gov2020-26.pdf>