



A Technical Note on Iran's Current Stocks of 20 and 60 Percent Enriched Uranium

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Yesterday, on November 4, 2021, the spokesperson for the Atomic Energy Organization of Iran (AEOI) announced that Iran's current stockpile of enriched uranium comprises 25 kg of uranium enriched to 60 percent and 210 kg of uranium enriched to 20 percent.¹ The spokesperson did not state the chemical forms of the enriched uranium, although these masses appear to be in the units of equivalent uranium hexafluoride mass. The new numbers appear consistent with previous production rates for near 20 percent enriched uranium, but the rate of production of 60 percent highly enriched uranium (HEU) reflects Iran's continued use of two advanced centrifuge cascades to make this HEU, a practice it started at the end of the last IAEA reporting period.²

Assuming that the spokesperson is describing the mass of the material in terms of uranium hexafluoride mass, the most likely choice, the new numbers can be understood, starting with the declared values in August 2021, all contained in the last quarterly International Atomic Energy Agency (IAEA) Iran report. In terms of uranium hexafluoride mass, these stockpiles indicate an increase of 10.2 kg for the 60 percent stock and 37 kg for the 20 percent stock from the last quarterly IAEA report.

As of August 29, 2021, Iran's stock of 20 percent enriched uranium was reported by the IAEA as 84 kg in uranium mass in the chemical form of uranium hexafluoride. While the terminology is admittedly confusing, the value of 84 kilograms translates to a mass of 124 kg when the hexafluoride mass is included in the total mass (hex mass). Iran also had 33 kg (uranium mass) in different chemical forms, which would convert to the equivalent of 49 kg uranium hexafluoride mass. In total, therefore, Iran had a stock of 173 kg when measured in terms of equivalent hexafluoride mass. As of August 14, Iran only produced 20 percent enriched uranium at its Fordow Fuel Enrichment Plant (FFEP). An increase of 37 kg (hex mass) over

¹ "Highly-Enriched Uranium Stock Grows As Iran 'Hits The Table Hard'," *Iran International*, November 4, 2021, <https://www.iranintl.com/en/20211104548477>.

² David Albright, Sarah Burkhard, and Andrea Stricker, "Analysis of IAEA Iran Verification and Monitoring Report - September 2021," *Institute for Science and International Security*, September 2, 2021, <https://isis-online.org/isis-reports/detail/analysis-of-iaea-iran-verification-and-monitoring-report-september-2021>.

about two months tracks well with a monthly average production rate of 18.6 kg (hex mass) at Fordow observed during the last IAEA reporting period, which spanned from May to August 2021. If the 33 kg (uranium mass) of 20 percent enriched uranium in other chemical forms were not included in the November 4 total, Iran's production of 20 percent enriched uranium would have doubled since August, but there is no information we have seen that supports such a large increase, such as additional cascades being dedicated to 20 percent production.

For most of the last IAEA reporting period, Iran has been enriching uranium to 60 percent in one cascade of 164 IR-6 centrifuges at the Pilot Fuel Enrichment Plant (PFEP). Since August 14, it has been also enriching uranium to 60 percent in an additional cascade, one comprising 153 IR-4 centrifuges. The previous average production rate was about 2.3 kg per month (uranium mass) or 3.4 kg per month (hexafluoride mass). The increase of 10.2 kg (hex mass) over the past roughly two months represents an average rate of about 5 kg (hexafluoride mass) per month. Therefore, the rate increased by about 50 percent from the previous average monthly rate. A doubling of this rate, 6.8 kg (hex mass) per month, would have been expected if both cascades operated the same. Since the rate is less than 6.8 kg, it is possible that the IR-4 centrifuge cascade has been less efficient than the IR-6 centrifuge cascade. Nonetheless, an increase to 5 kg per month would not be unexpected as the new average production rate as Iran uses two advanced centrifuge cascades to make 60 percent HEU.