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Iran's Provocative 20% Enriched Uranium Claims

Blaise Misztal - *Vice President for Policy*
Jonathan Ruhe - *Director of Foreign Policy*

European officials recently expressed grave concern about Iran's July 6 announcement that it would begin using its stockpile of 20 percent enriched uranium to produce enriched uranium metal. But it is another, earlier, and mostly unremarked on Iranian announcement that should be much more alarming. On June 15, Iran claimed to have 108 kilograms of 20 percent enriched uranium on hand. This would represent a remarkable advance over the 62.8 kilograms it had just 24 days earlier. If this rate of growth were sustained, Iran would be on course to accumulate enough 20 percent enriched uranium for a nuclear weapon, thereby dropping its breakout time to as little as 6 weeks, by mid- to late-July.

Producing 20 percent enriched uranium at this rate, however, would represent an incredible leap in Iran's enrichment capabilities, almost tripling what it had been able to accomplish earlier this year. Such an advance strains credulity, suggesting that Iran is intentionally misrepresenting the size of its stockpile. Such exaggeration might be aimed at pressuring the United States into granting Iran sanctions relief in order to curtail its escalating nuclear activities. The timing of Iran's announcement, however, just two days after the Bennett-Lapid coalition took office in Israel, could indicate that Iran sought to test the resolve of the new government.

What Happened?

- In the last month, Iran has claimed several remarkable and concerning developments regarding the production and use of 20 percent enriched uranium in its nuclear program.
- On June 15, 2021, a government spokesman declared Iran's 20 percent enriched [stockpile](#) had reached 108 kilograms (kg).
 - This would represent [precipitous, unprecedented growth](#) from the 62.8 kg of 20 percent enriched uranium the IAEA reported Iran had on hand as of May 21.
- On July 6, 2021, Iran informed the International Atomic Energy Agency (IAEA) of its plans to produce enriched [uranium metal](#) at a [new nuclear facility](#) using its 20 percent uranium stockpile, ostensibly for civilian nuclear reactor fuel.

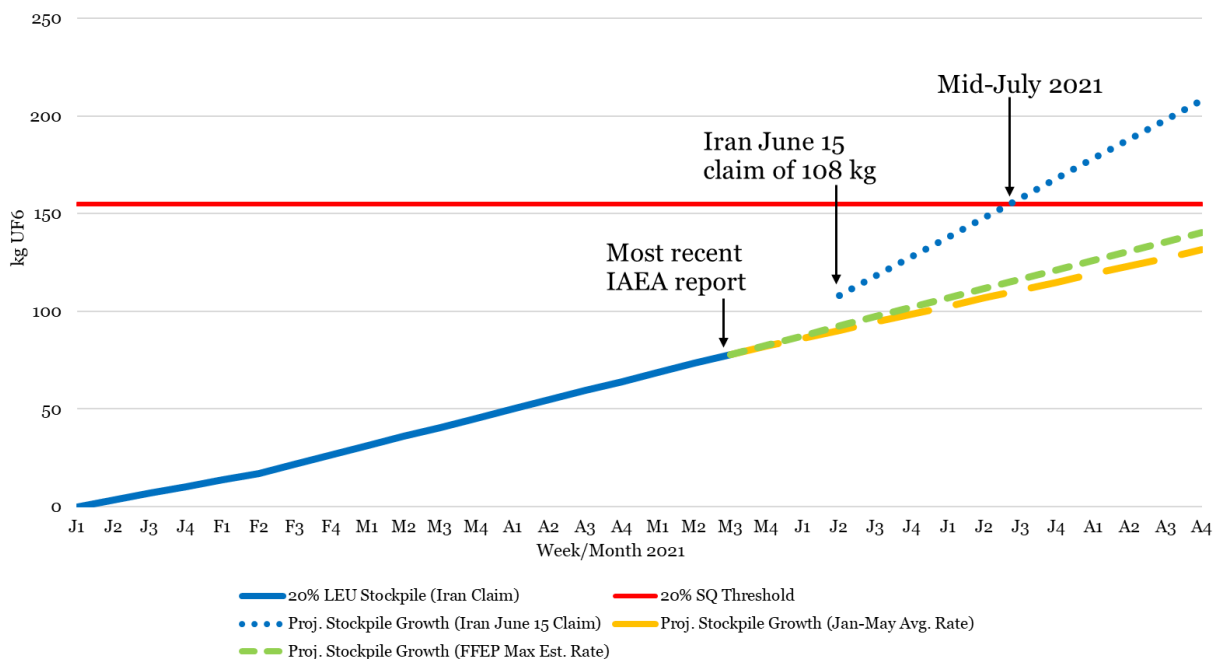
- Iran is already producing *unenriched* uranium metal, having [originally](#) announced its intention to do so in January 2019 and actually begun doing so in December 2020.
- Nevertheless, the production of *enriched* uranium metal, a critical step in the making of a nuclear weapon, represents a major advance.
- Under the JCPOA, Iran is [prohibited](#) from R&D and production of uranium metal until at least 2026, and is prohibited from [20 percent](#) enrichment until 2030.

Why Is It Important?

- Western nations seeking to return Iran to the 2015 nuclear deal, known as the Joint Comprehensive Plan of Action (JCPOA), elicited the most concern about Tehran’s announcement that it would begin producing 20 percent enriched uranium metal.
 - European parties to the JCPOA, and the United States, conveyed their “[grave concern](#)” and noted Tehran has “no credible civilian need” for such activities, which represent “a key step in the development of a nuclear weapon.”
 - Iran claims this work is [necessary](#) to fuel its Tehran Research Reactor (TRR), despite already receiving safeguarded supplies from abroad for this purpose.
- Yet, it is the Iranian claims about the current size, and recent growth, of its 20 percent enriched uranium stockpile that should raise alarms.
 - If accurate, and sustained since June, its claimed 20 percent stockpile growth **suggests Iran would acquire an effective nuclear weapons capability later this month, in mid-to-late July.**
 - A nuclear weapons capability is defined as possessing enough 20 percent uranium – roughly 155 kg, known as a significant quantity (SQ) – to, with further enrichment, quickly produce sufficient 90 percent enriched uranium, about 20 kg, for a nuclear weapon.
 - If inaccurate, Tehran’s claims raise questions as to why **Iran might be misleading the world about its nuclear advances.**
 - **Either option should be concerning for countries committed to preventing a nuclear Iran.** Whether Iran has made a massive leap in its nuclear capabilities or is exaggerating its achievements, **it indicates Tehran seems confident no one will actually stop its progress.**
- Despite Iran currently advancing its nuclear program and violating the JCPOA in numerous dimensions, its production of 20 percent enriched uranium is the single most important and worrying development.
 - Enriching uranium to 20 percent represents 90 percent of the work needed to reach weapons-grade purity.

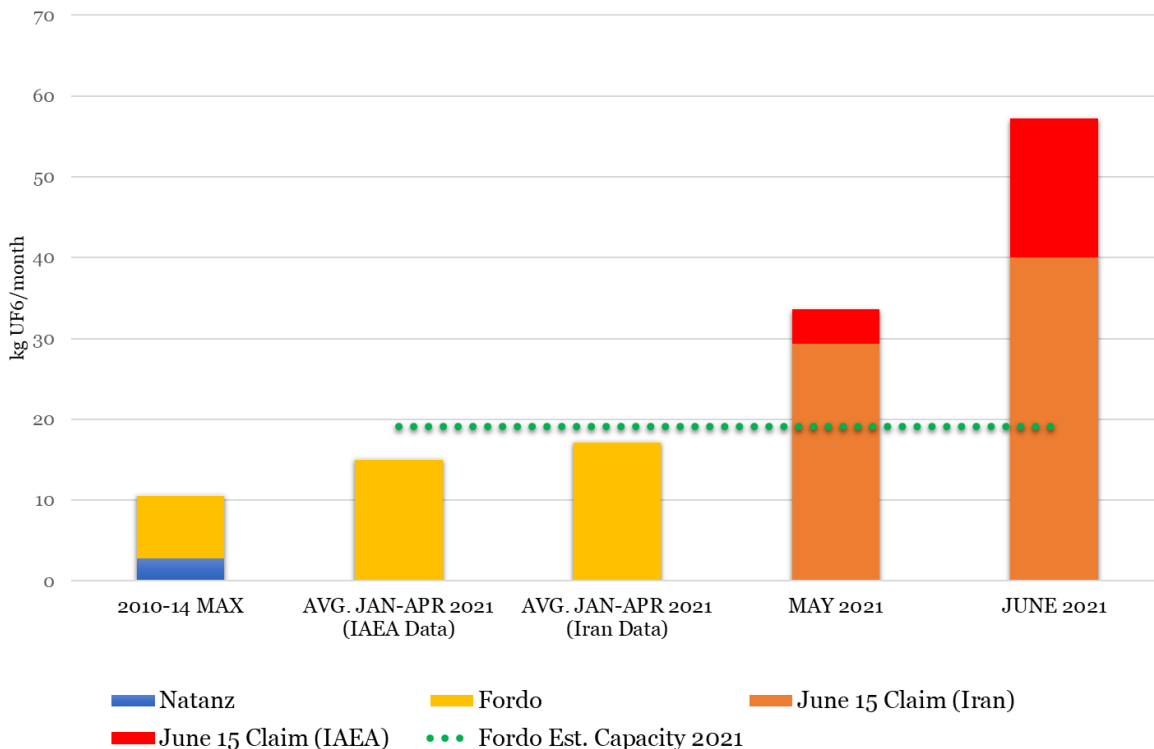
- Because of this, the size of Iran’s 20 percent stockpile is one of the primary factors determining its “breakout time,” i.e. how long it would take to produce enough fissile material for a bomb.
 - Iran’s breakout time will fall precipitously if it acquires an SQ of 20 percent uranium, and would be limited only by Iran’s enrichment capacity, i.e. the number and efficiency of its operational centrifuges.
 - Should it decide to break out, Iran already has sufficient centrifuges to turn 155 kg of 20 percent enriched uranium into a bomb’s worth of 90 percent uranium in as little as three weeks (see Chart 5).
- That is why, in 2012, then-Israeli Prime Minister Netanyahu publicly drew a [literal redline](#) at the point “before Iran completes... [the medium enrichment] necessary to make a bomb,” that is effectively at an SQ of 20 percent enriched uranium.
- Iran’s June 15 claim about the size of its 20 percent enriched uranium stockpile suggests it might already, or will soon, exceed the SQ threshold (Chart 1).
 - According to the most recent [IAEA report](#), during the last reporting period (February 16-May 21) Iran claimed it produced 61 kg of 20 percent uranium, of which the IAEA could verify 48.1 kg.
 - Depending on which of these figures is right, as of May 21, Iran had a stockpile of either 62.8 (according to the IAEA) or 75.7 kg (based on Iran’s claim) of 20 percent enriched uranium.

Chart 1: Iran 20% Stockpile Growth Projection



- For Iran to have increased that stockpile to 108 kg by June 15 would require it to produce between 45.2 (starting from the IAEA stockpile number) and 32.3 kg (starting from Iran's numbers) of 20 percent enriched uranium in just 24 days.
 - This equals a production rate of either 40.4 or 56.5 kg of 20 percent enriched uranium per month (using Iran's and the IAEA's May stockpile numbers, respectively).
- At these rates, Iran would cross the SQ threshold for 20 percent enriched uranium in mid-to-late July.
- Yet Iran's implied growth rate of 40-57 kg of 20 percent enriched uranium per month since May 21 is double or even triple any reasonable output from Fordo, its only declared site for 20 percent enrichment (Chart 2).
 - During February-May, Iran likely was already enriching 20 percent uranium much more quickly than it did between 2010 and 2014 and almost as quickly as it could at Fordo.
 - During 2010-14, Iran's highest [production rate](#) was 10.5 kg/month, using roughly the same total number and model of centrifuges as currently.
 - Given the IAEA and Iran figures, Iran's average February-May 2021 production rate was between 15.4 and 19.5 kilograms per month.
 - These figures are at the higher end of Fordo's estimated effective production capacity, given the approximately 1,044 IR-1 centrifuges currently operating there.

Chart 2: Iran 20% Enrichment Rates

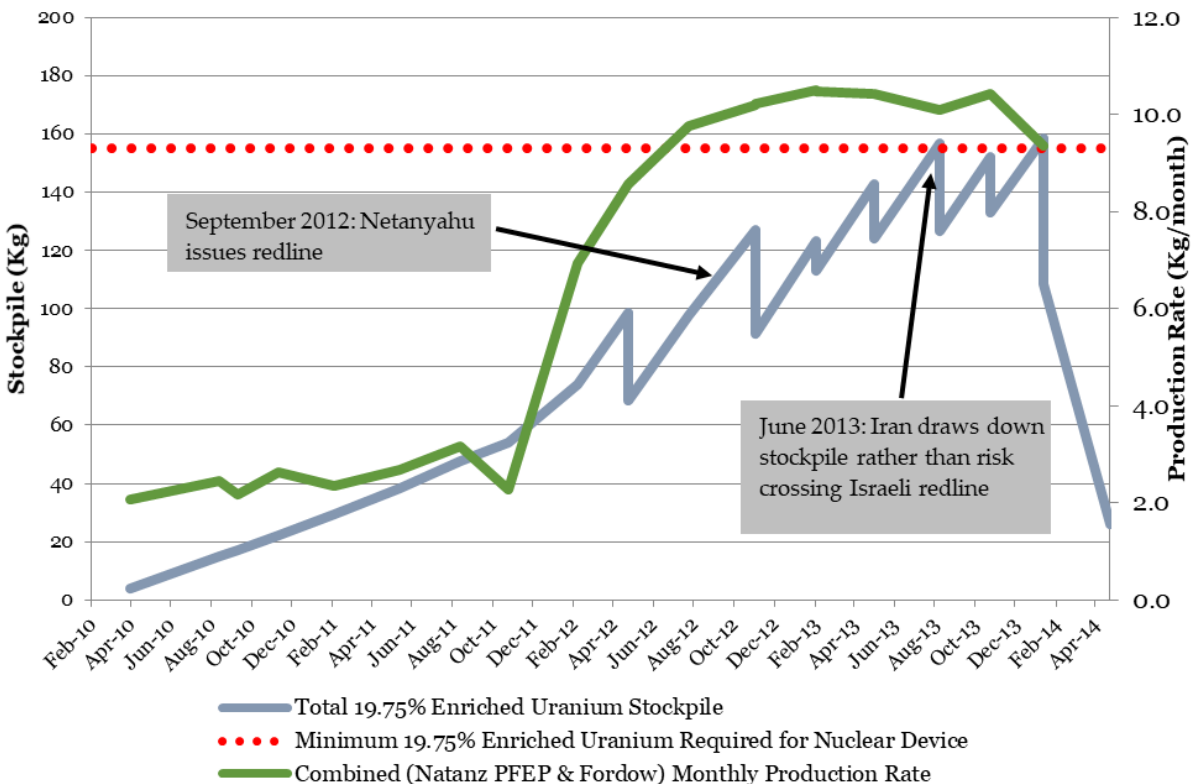


- These figures also are in line with Iran's [atomic energy chief](#) quote from January that the country would produce roughly 0.5 kg of 20 percent uranium daily, or about 15 kg per month.
- There are circumstances under which Iran might have been able to make this enormous surge in its 20 percent enrichment rate, but all such explanations appear highly unlikely:
 - Centrifuge efficiency improvement: Iran might have succeeded in tripling the output of its IR-1 centrifuges.
 - This is profoundly improbable from a technical standpoint, especially considering Iran has been operating the IR-1 for nearly two decades and has never approached similar enrichment levels. It also makes little sense given Iran's concerted development of advanced centrifuges to replace the IR-1.
 - Advanced centrifuge installation: Iran might have put into operation the approximately 328-348 IR-6 centrifuges (estimated to be 7-10 times as efficient as the IR-1) it has been installing at Fordo.
 - This would represent an improbable engineering feat consider that, according to the IAEA, as recently as May 26 less than three percent of these machines were even installed (and none were actively enriching).
 - A second facility: Iran might have conducted the enrichment at another facility with far greater capabilities than Fordo.
 - The IAEA verified in May that Iran was not enriching to 20 percent at any other declared sites. While it is possible that Iran has a secret, undeclared enrichment facility, it seems unlikely it would hint at the existence of such a facility in this manner.
- Compared to historical levels and known technical limitations, Iran's rate of 20 percent enrichment strains credulity. It appears likely, therefore, that Iran is intentionally overstating its 20 percent stockpile.
 - This begs the questions of why Iran would want to misrepresent its 20 percent enriched uranium stockpile size and what it hopes to gain by doing so.
 - The most obvious answer is that Iran is hoping to convince the United States and European nations that its nuclear program is making tremendous strides, in order to scare them into granting extensive sanctions relief as quickly as possible as part of the current JCPOA re-entry negotiations in Vienna.
 - Such nuclear counter-pressure is a well-established and commonly used Iranian negotiating tactic.
 - If Iran is misleading the world about its 20 percent enriched uranium stockpile, it is only able to do so because Iran, as part of its violations of the JCPOA and following the U.S. withdrawal from the deal, has blocked IAEA inspectors from fully verifying

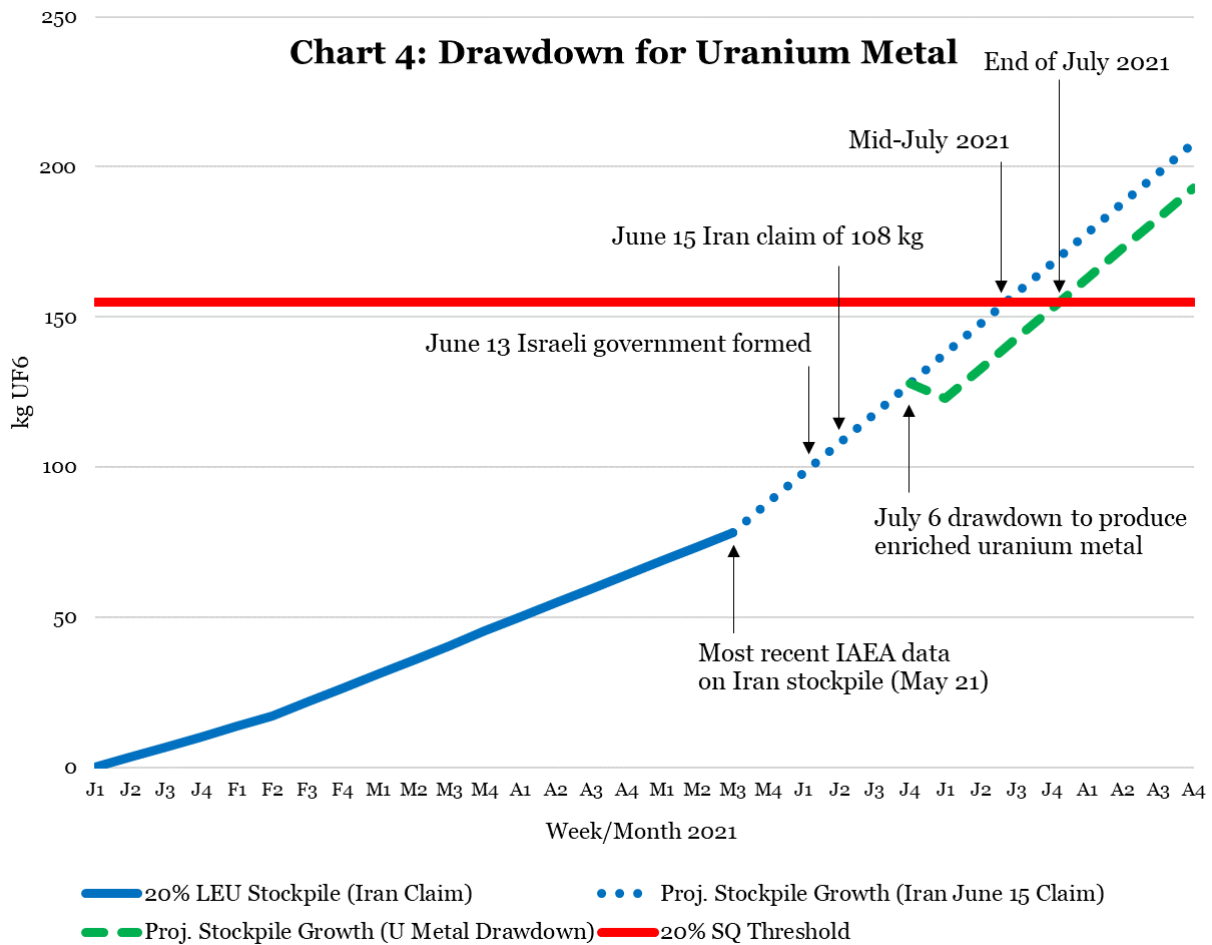
its nuclear program since February. This only highlights the risks of not having comprehensive IAEA inspections of Iran's nuclear program.

- It is risky for nations concerned about preventing a nuclear Iran, because they can no longer have confidence about the status of Iran's nuclear program and are unable to verify whether Iran is taking actions to break out.
- It is also risky for Iran, however, because the uncertainty that results from lack of inspections can raise the likelihood that military action will be taken against its nuclear facilities.
- There is a very real and well understood risk for Iran in inflating its 20 percent enriched uranium stockpile for leverage, namely Israel.
 - Iran took Netanyahu's 2012 [literal redline](#) seriously enough that it repeatedly drew down its 20 percent enriched uranium stockpile to avoid reaching the SQ threshold (Chart 3).
 - Given its past reticence to cross this redline, it is unclear why Iran would make claims that strongly imply it is about to cross it, thereby risking potential Israeli military action against its nuclear program.

Chart 3: Effect of Israeli Redline on Iran's 20% Enriched Uranium Stockpile



- One potential explanation, especially given the timing of Iran's claims, is that **Iran was specifically interested in testing the intentions and resolves of Israel's new coalition government.**
 - The 2012 redline was drawn by then Prime Minister Netanyahu, who left office after 12 years in power in June 2021.
 - On June 13, the new Bennett-Lapid government in Israel officially formed.
 - Two days later, on June 15, Tehran announced its 20 percent stockpile had reached 108 kg.
 - The lack of public reaction from the new Israeli government, or the Biden administration in the United States, might have served to convince Iran that it currently faces no resolute opposition to its nuclear expansion.
- Yet, Iran's announcement that it would initiate production of 20 percent uranium metal on July 6 came right around the time that, based on its claims, its 20 percent enriched uranium stockpile would be expected to cross the SQ threshold.
 - This might not be a coincidence, but rather an attempt to signal that it would be reducing its stockpile of 20 percent enriched uranium available for further enrichment – that is, backing away from the SQ threshold – without losing face.
 - If that is the case, Tehran might have received a signal that its nuclear facilities were at risk or decided that its purpose had already been served and further risk is unnecessary.
- Iran's recently-initiated production of 20 percent uranium metal actually represents a short-term reduction in breakout risk, but presents yet another long-term obstacle to preventing a nuclear Iran (Chart 4).
 - Producing 20 percent enriched uranium metal will reduce Iran's stockpile available for further enrichment.
 - Uranium is enriched in gaseous form as uranium hexafluoride (UF₆). All of Iran's enriched uranium stockpile is kept as UF₆.
 - For use in a nuclear weapon, or for reactor fuel, UF₆ has to be transformed into a solid.
 - By producing 20 percent enriched uranium metal, Iran will be using up some as yet unspecified amount of its stockpile, reducing the amount of 20 percent enriched uranium it has on hand that could be used in an eventual breakout.
 - Once converted to uranium metal, these 20 percent stocks are no longer suitable for further enrichment to fissile material; however, if first enriched to sufficient purity (90 percent), uranium metal is critical for building the core of a [nuclear weapon](#).



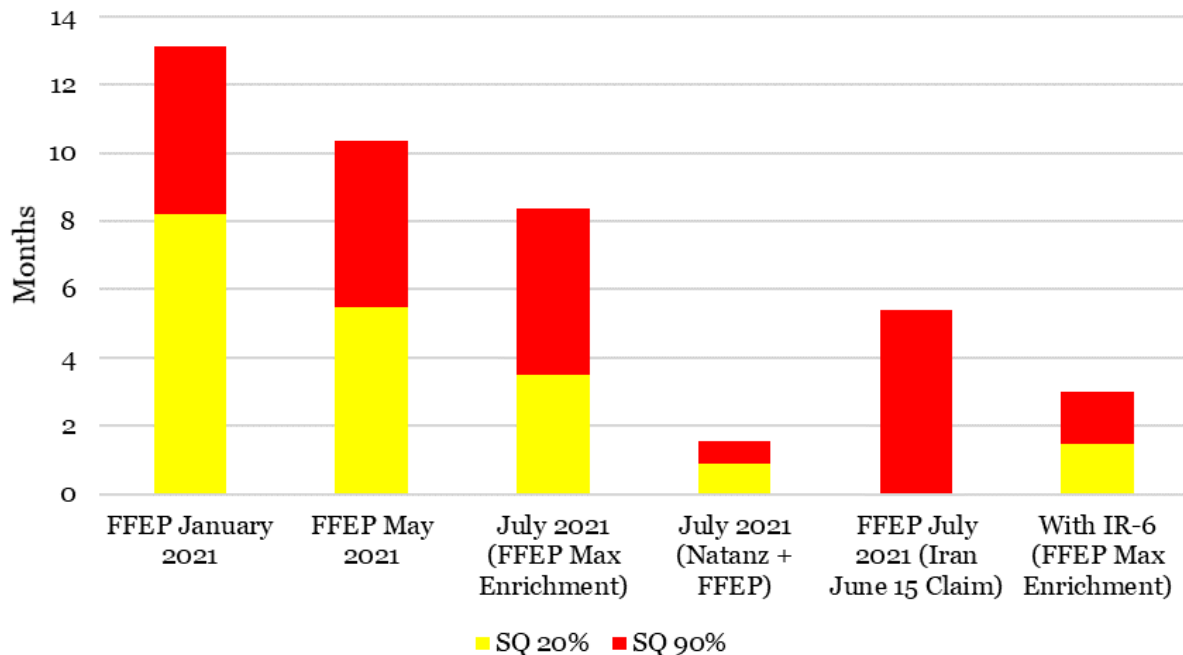
- During the February-May 2021 period, the IAEA reported that although Iran produced at least 48.1 kg of 20 percent uranium, its stockpile only grew by 45.7 kg, suggesting it had already begun setting aside some of its stockpile growth for producing uranium metal at this level.
- Iran's initial [laboratory experiments](#) with unenriched uranium metal in February and May, and now its inauguration of a [dedicated facility](#) to produce enriched uranium metal, provide it with irreversible know-how ultimately for converting fissile material to the uranium metal required for a nuclear device.
 - Compared to February, its May experiment was more than [twice as efficient](#) in converting natural (unenriched) uranium to metal, and it did so in much larger quantities.
 - Now its experience producing enriched uranium metal could shorten the amount of time Iran would need to convert fissile material into a warhead and thus achieve nuclear weapons capability.

What Can the United States Do Next?

- President Biden and his administration [must make](#), and mean, the same commitment that President Obama made in 2009, to “use all elements of American power to prevent Iran from developing a nuclear weapon.”
 - The administration must both be unequivocal in publicly stating their determination to stop a nuclear Iran by whatever means necessary, and demonstrate their resolve by taking concrete steps to signal their readiness to use military options, if necessary.
 - To bolster the credibility of such statements, the United States should:
 - Update contingency plans and force deployments for neutralizing Iran’s nuclear facilities;
 - Deploy Massive Ordnance Penetrator munitions and strategic bombers to the British territory Diego Garcia in the Indian Ocean;
 - Boost the U.S. Navy’s carrier and missile-defense presence in the Persian Gulf and Arabian Sea as part of a general strengthening of America’s global force posture and broader increase in defense spending; and
 - Conduct military exercises with these capabilities, and strategic communications to publicize them.
- Strengthened by these measures, American negotiators should not play into Iran’s hands by taking its proclaimed stockpile growth at face value, but instead press for a resumption of IAEA monitoring and verification of Iran’s nuclear program, curtailed since February.
 - The current ambiguity surrounding Iran’s enrichment activities encourages Tehran’s attempts to compel a return to the JCPOA (and with it, sanctions relief) by potentially exaggerating its progress toward a nuclear weapon.
 - Assuming Iran has enriched 20 percent uranium at Fordo’s maximum capacity since January, its current stockpile at this level would be an estimated 95 kg.
 - While certainly unwelcome, this is far less than the 168 kg that it otherwise would now possess if it was enriching at its proclaimed high rate since May.
 - Assuming Fordo continues enriching at its estimated current rate of 15.4-19.5 kg per month, Iran could be expected to have a bomb’s worth of 20 percent by mid-to-late October.
 - Crossing this threshold would be delayed further if Iran withdraws additional 20 percent stocks for conversion to enriched uranium metal.

- American and partner officials also must pay very close attention to Iran's looming completion of two IR-6 cascades at Fordo, which would cut breakout time rapidly.
- As Chart 5 shows, Iran's breakout time at Fordo has decreased inversely with its 20 percent stockpile, though currently it is still an estimated 8 months.
- This would fall overnight by more than half when the IR-6 cascades come online.
- Resumed IAEA monitoring is becoming all the more imperative, given the need to verify Iran's progress with operationalizing these advanced centrifuges.

Chart 5: Iran Breakout Estimates



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