

Israel's Bombing Campaign Against Iran's Centrifuge Enrichment Program Will Not By Itself Stop an Iranian Nuclear Weapon

In the early morning hours of June 13, 2025, Israel launched airstrikes against Iran's centrifuge enrichment program in an effort to prevent Iran from producing nuclear weapons. As I wrote ten years ago, the nature of centrifuge enrichment is such that bombing strikes will have no long-term effect in such a prevention effort.² In the intervening ten years, the growth of Iran's centrifuge enrichment facilities and its accumulation of substantial stockpiles of highly enriched uranium have greatly reduced the impact of bombing on Iran's nuclear weapon program. I will first reprint what I wrote in 2015 and then update my assessment based on the current state of Iran's enrichment program.

My 2015 Analysis³

In the past Israel effectively carried out one time strikes on nuclear reactors in Iraq in 1981 and in Syria in 2007⁴. But attacks on centrifuge enrichment facilities, even if carried out by the U.S. are quite different from attacking single nuclear reactors and it would be difficult for such attacks to be effective in the long-term. At its main enrichment facility at Natanz, Iran has 54 cascades operating in parallel. An air strike on Natanz that scored multiple bomb hits would shut down the entire facility. But the majority of the cascades would be undamaged and not able to operate only due to damage to piping and the loss of utilities. It would only take a few months of repairs before these undamaged cascades were back in operation. Even for the cascades that suffered bomb hits, the majority of the centrifuges would still be undamaged. Iran could pull out the undamaged centrifuges and use them to build new cascades. It would only take four to six months before Iran would return to close to full production.

A further problem is Iran's current stockpile of nearly 8,000 kilograms of 3.5% enriched uranium in a variety of chemical forms at a number of different facilities. This stockpile represents years of centrifuge plant operation but would be very difficult to destroy by air attack. The total volume of this dispersed stockpile is fairly small and it would be easy to hide or protect.

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 Gregory S. Jones, "An Iran Nuclear Deal That Spreads Nuclear Weapons," August 10, 2015, pp. 10-11. <https://nebula.wsimg.com/15ade78476e4c1c7a550dcd7f7694844?AccessKeyId=40C80D0B51471CD86975&disposition=0&alloworigin=1>

³ Ibid.

⁴ The Syrian reactor site has since fallen into the hands of ISIS which underscores the importance of the destruction of this reactor. This episode provides another illustration of the dangers of nuclear proliferation.

It is small wonder that in the past U.S. officials talked of bombing campaigns rather than single strikes.⁵ By bombing Iran's facilities every few months, it would be possible to keep Iran's enrichment facilities shut down. Such a campaign would also have the advantage that the question of whether U.S. large bunker-buster bombs can actually penetrate and hit Iran's underground enrichment facility near Qom would largely be moot. No matter how deep and well protected a bunker is, it is always possible to collapse the entrance tunnels and cut off the utilities from the outside.

There are two problems with such an air bombing campaign. First, Iran could respond by dispersing its centrifuges. Indeed centrifuge enrichment with its many parallel cascades would be ideal for such dispersal. The U.S. would be able to find and bomb some of these dispersed enrichment sites but many would continue in operation undetected. Second, such a prolonged bombing campaign would run a serious risk of turning into a large-scale war with Iran. Though no doubt the U.S. would eventually win such a war, I think that given the war-weary condition of the U.S., such a war would be ill-advised and I am opposed to a major war with Iran.

My 2025 Updated Analysis

In 2015 I expected that only the U.S. would have the military capability to bomb Iran's enrichment facilities. In the intervening 10 years Israel's military capabilities have grown sufficiently, so that it is now the county carrying out these attacks. Yet, the problems that accompany attempts to eliminate Iran's centrifuge enrichment facilities via a bombing campaign remain the same.

Prior to Israel's recent airstrikes, the number of cascades in operation at Natanz had grown to 89. Though Israel bombed this site, it is reported that only a small number of centrifuges (seven cascades) have been destroyed. Due to the loss of utilities, the site will be out of operation for only a few months. What is worse, Natanz which was a key site in 2015, is no longer essential to Iran's nuclear weapon program.

Iran now has a stockpile of around 440 kilograms of 60% enriched uranium.⁶ This material could be further enriched to produce about 250 kilograms with the 90% enrichment desired for nuclear weapons. Using 20 kilograms per weapon, Iran could manufacture 12 weapons, enough for a small arsenal. This 60% enriched uranium's volume is very small and it is stored in robust metal gas cylinders. It is very unlikely that this material can be destroyed by bombing attacks.

Israel has not bombed Iran's enrichment facility at Fordow. Even if Iran used just the two interconnected cascades that it has been using to produce 60% enriched uranium at Fordow, it

⁵ Joby Warrick, "Iran's underground nuclear sites not immune to U.S. bunker-busters, experts say," *The Washington Post*, February 29, 2012.

⁶ The International Atomic Energy Agency (IAEA) reported that on May 17, 2025, Iran's stockpile of 60% enriched uranium was 409 kilograms and that it was producing about 39 kilograms per month. "Verification and monitoring in the Islamic Republic of Iran in light of United Nations Security Council resolution 2231 (2015), IAEA, GOV/2025/24, May 31, 2025. <https://www.iaea.org/sites/default/files/25/06/gov2025-24.pdf>

could produce sufficient 90% enriched uranium for a nuclear weapon every two and one half weeks by using the 60% enriched uranium as feed. Given that it is already being bombed by Israel, Iran now has little reason not to take this step. As I indicated in 2015, Israel would need to bomb the electricity supply to Fordow every few months for the foreseeable future to prevent Iran's production of 90% enriched uranium.

Iran would also need to develop the nonnuclear components for a nuclear weapon but the IAEA has stated that Iran has made substantial progress in this area.⁷ Though many still believe that a country's first nuclear weapon will need to be as large and heavy as the Nagasaki weapon, Prime Minister Netanyahu's 2018 presentation on Iran's nuclear archive showed that even in 2003, Iran was working on a much smaller and lighter design that would easily fit on Iran's long-range ballistic missiles.⁸

The threat of an Iranian nuclear weapon will remain quite real, unless Iran agrees to relinquish its entire stockpile of enriched uranium and eliminates its centrifuge enrichment program. It is unclear whether Iran will make such concessions.

⁷ "NPT Safeguards Agreement with the Islamic Republic of Iran," IAEA, GOV/2025/25, May 31, 2025, pp. 9-10. <https://www.iaea.org/sites/default/files/25/06/gov2025-25.pdf>

⁸ "PM Netanyahu Reveals the Iranian Secret Nuclear Archive," April 30, 2018. The video details the Iranian nuclear weapon design from 6:15 to about 8:15. <https://www.youtube.com/watch?v=pkIhrV4cZLE>