THE IAEA AND WHETHER IRAN IS TELLING THE WHOLE TRUTH

We continue to watch and assess the Iranian nuclear situation. Over the last week or so Israeli Prime Minister Netanyahu has been lobbying the leaders of Germany, France and the UK to accept his, and President Trump's, assertion that Iran is already developing nuclear weapons. He backed this up by sharing with them many thousands of Iranian secret files. He says he's not out to persuade the Europeans to withdraw from the Joint Comprehensive Plan of Action (JCPOA), stating in a recent BBC *Newsnight* interview that the nuclear deal is "already dead".

Iran's reaction to recent events was to announce that it will increase its uranium enrichment capacity, which will, in itself, not violate the terms of the JCPOA as long as it stays within certain limits. What does "uranium enrichment" mean and what are the implications of Iran's announcements?

Uranium Enrichment

To explain this its worth looking at some basic physics and chemistry.

The chemical element uranium (symbol U) in nature comes in two main forms, or isotopes. Isotopes are atoms of the same element having the same numbers of protons and thus the same chemical properties, but different numbers of neutrons and different physical properties. The main isotopes of uranium are U-238 and U-235. On average, in nature, natural uranium contains ~0.7% U-235 and ~ 99.3% of the heavier U-238; there's also a very small amount of U-234. U-235 is the important isotope as far as civil nuclear power stations and nuclear weapons are concerned because it can "fission" (split in two) and release energy.

Some nuclear reactor designs, including the UK's Magnox and the Canadian CANDU designs, ran on natural uranium fuel. However, modern reactors and nuclear weapons require larger proportions of U-235 in the mix, achieved primarily through using centrifuges. A centrifuge is a spinning cylinder (not unlike a spin-dryer) in which uranium hexafluoride gas is fed into the spinning chamber and the heavier molecules of gas containing U-238 migrate towards the outside and the lighter gas molecules with U-235 towards the centre. The lighter gas will still contain much U-238, and so the process is repeated many thousands of times until the required concentration of U-235 is achieved.

Modern light water reactors need fuel which is between 3% and 5% enriched uranium, research and medical application reactors sometimes go up to 20% enrichment, and nuclear weapons require about 90% enrichment. Under the JCPOA, Iran had to give up its 20% enriched uranium and limit its enrichment programme to 3.67%, and its number of centrifuges to 5060.

Developments in Iran

In announcing its intent to increase enrichment capacity, Iran showed off some new, more efficient designs of centrifuge, which under the JCPOA it is not allowed to use, and it is this that is worrying to some. What this means is that it would need fewer centrifuges to produce weapons-grade material. Fewer units can be more easily hidden from the eyes of the outside world and the IAEA's inspectors.

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Iran doesn't need to produce more enriched uranium for civil nuclear purposes, but with these announcements is demonstrating that it can, and possibly will, step up its campaign for higher enrichments in retaliation to the stance of the US and Israel in particular.

In his address to the IAEA Board of Governors on 4th June, IAEA Director General Yukiya Amano stated "the Agency continues to verify the non-diversion of nuclear material declared by Iran under its Safeguards Agreement. Evaluations regarding the absence of undeclared nuclear material and activities in Iran continue." Previous statements by the Agency have given comfort to the first sentence of this extract. The second sentence however is causing some people to question whether the IAEA believes that Iran is in fact providing the "whole truth" about its programme

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