



## KEY FACTS & TERMS ON THE IRANIAN NUCLEAR PROGRAM

### FACILITIES



**The “Big Four:”** according to Dr. Matthew Kroenig, a nuclear proliferation expert from Georgetown University, there are four key nuclear facilities which are crucial to Iran getting a bomb: the heavy water production facility at Arak, the uranium conversion facility at Isfahan, and the uranium enrichment facilities at Natanz and Fordow. Because of their importance, any successful negotiation with Iran must put limits on these sites and any successful military strike against Iran’s nuclear program would have to include them as targets.

**Arak:** first exposed by the National Council of Resistance of Iran in 2002, this heavy water production plant is intended to replace Tehran Nuclear Research Center research reactor. It was planned to become operational in late 2014, though construction of certain components were supposedly stopped under the interim deal in 2013. Heavy water facilities produce large amounts of plutonium which can be weaponized. Dr. Kroenig claims that when fully operational, this facility could produce enough plutonium for two nuclear weapons per year.

**Isfahan:** this uranium conversion facility produces the hexafluoride gas necessary to later enrich uranium at the Natanz & Fordow uranium enrichment facilities.

**Natanz\*:** revealed by Iranian dissidents in 2002, this hardened and partially underground facility enriches uranium to produce fuel rods for nuclear reactors.

**Fordow\* (Qom):** Iran’s second uranium enrichment facility. Revealed in 2009, this secret facility is built into the side of a mountain and became operational in 2012.

**\*NOTE:** Under the 2013 interim deal, Iran is supposed to have limited enrichment at both Natanz and Fordow. If these facilities were to operate at full capacity, experts predict it would take 2-3 months for Iran to obtain enough fuel for a nuclear weapon.

## Secret Facilities

**Lavizan-3:** It has been speculated that Iran maintains or is developing secret facilities outside of the purview of the IAEA and international community. In February 2015, the National Council of Resistance of Iran released a report claiming that Iran has a secret military research facility which is engaging in enrichment with advanced centrifuges. The site is claimed to be approximately 62 acres large with underground facilities of up to .5 acres. The report has yet to be independently verified. When queried on the report, State Department officials neither confirmed nor denied it, only saying they had no evidence to support the report's conclusions. Additionally, there has been some skepticism as to the authenticity of the evidence provided in the report.

## PRIMARY TYPES OF NUCLEAR/RADIOLOGICAL WEAPONS

**Nuclear Fission:** AKA Atom Bomb, this is a nuclear weapon which uses enriched uranium or plutonium to create a nuclear explosion by either using a "Gun Type" assembly method or implosion assembly method. This is the most basic version of a nuclear weapon. Fat Man (plutonium based) and Little Boy (uranium based) are examples of fission bombs. If Iran were to create a nuclear weapon, it would probably be a fission bomb, likely of the gun type design.

-**Gun Type:** this method 'shoots' one piece of uranium or plutonium into another in order to create an explosion.

-**Implosion:** this method creates an explosion by compressing a piece of uranium or plutonium with small internal explosions (explosive lenses).

**Nuclear Fusion:** AKA thermonuclear bomb/Hydrogen bomb. These weapons use a fission bomb to "trigger" fusion reactions which can then also trigger multiple fission reactions, though most are two stage weapons. Thermonuclear weapons tend to be much more destructive and therefore more difficult to manufacture than the more rudimentary fission weapons. Most of the nuclear arsenals of advanced nuclear powers are fusion based, due to their higher effectiveness.

**Radiological:** AKA dirty bomb, a weapon which combines radioactive material with conventional explosives. The explosives act as a dispersal mechanism for the radioactive material, contaminating the area around the explosion. It is important to note that these weapons do not create a nuclear explosion. That being said, radiological weapons are much easier to produce than nuclear weapons and do not require weapons grade material. Many types of material are suitable for a dirty bomb, including spent fuel rods and radioactive medical waste. Because they are not as deadly as nuclear weapons, radiological weapons are used to cause disruption or terror. Should Iran ever proliferate a weapon to their terrorist subsidiaries, it would most likely be in the form of a dirty bomb.

## TERMINOLOGY

**Centrifuge:** a device used in uranium enrichment. Centrifuges spin uranium hexafluoride gas, separating the U235 isotope from the heavier U238.

**Uranium 235:** the isotope required for nuclear weapons and power. U235 makes up about 0.72% of uranium found in nature, making it very rare.

**Uranium 238:** the most common uranium isotope. While not suitable for nuclear weapons or energy, it can be transformed into weapons grade Plutonium 239.

**Plutonium 239:** an isotope of plutonium which is used for production of nuclear weaponry. It is created in nuclear reactors and made from Uranium 238.

**Highly Enriched Uranium (HEU):** Uranium enriched beyond 20% concentration of U235 isotope. Most nuclear weapons are 85% or higher (weapons grade), though 20% is technically sufficient if in a high quantity, although impractical.

Low Enriched Uranium (LEU): Uranium enriched below 20% concentration of <sup>235</sup>U isotope. LEU is primarily used in light water reactors which are primarily used for civilian purposes. LEU usually only requires enrichment between 3 to 5% and is not usually suitable for a nuclear weapon. A civilian nuclear program generally does not require enrichment beyond 5%.

Dirty Bomb/Radiation Bomb: a weapon which combines radioactive material with conventional explosives. The explosives act as a dispersal mechanism for the radioactive material, contaminating the area around the explosion. A dirty bomb is fundamentally different than a nuclear weapon which uses nuclear energy to create a much more deadly blast.

IAEA: International Atomic Energy Agency, the international body responsible for monitoring peaceful nuclear energy and preventing the spread of nuclear weaponry.

Additional Protocol/IAEA AP: a supplemental and voluntary measure that increases the latitude and breadth of the IAEA. The AP gives inspectors greater access for inspections and information, depending on the state in question.

ICBM: Intercontinental Ballistic Missile, a guided ballistic missile primarily designed to travel over 3,400 miles and to deliver nuclear warheads.

MOP: Massive Ordnance Penetrator, a 30,000 pound 'bunker buster' guided bomb which is capable of penetrating up to 200 feet.

Bunker Buster: a bomb designed to penetrate hardened or underground targets. Approximately 5,000 pounds in weight, it can penetrate between 6 to 20 ft.

NPT: Treaty on the Nonproliferation of Nuclear Weapons. Iran is a signatory to the NPT which requires the government to forego all pursuits of nuclear weapons.

Breakout Capability/Critical Capability: the amount of time it would take Iran to produce enough fissile material to create a nuclear weapon, should they choose to. Currently Iran's breakout capacity is considered to be between 2-3 months.

JPOA/JPA/Geneva Interim Agreement: Joint Plan of Action of November 2013, the interim agreement reached by Iran and the P5+1 in November 2013. In exchange for decreased economic sanctions, Iran agreed to halt certain portions of its nuclear program.

P5+1: the five permanent members of the UN Security Council (US, UK, France, Russia, China) plus Germany.

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