

## Nuclear Armed Iran: How Big A Threat?

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On April 8 of this year, Iran made a big show of its capabilities to enrich Uranium. The president of Iran, Mr. Ahmadinejad made a point to tour Natanz and trumpet the centrifuge enrichment facilities, including the latest IR-2 centrifuge and carbon fiber rotors [1]. The efficiency of the existing Iranian P-1 enrichment cascades is around 2 or so SWU compared with IR-2's double yield. So how much highly enriched Uranium (HEU) do they need for a fission bomb, and how long will it take them?



### How Much HEU Does Iran Need?

A simple cylindrical HEU shell implosion design provides a compression of HEU by a factor of approximately 3. The critical mass of 93.9% HEU is 51.9kg [2], so with a density increase by a factor of 3, the critical mass decrease by about a factor of 9, or to about 5.8 kg. Of course, one needs a supercritical mass, so adding another 10%, we are talking about 6.5kg of HEU. Iran can use one of the many neutron generators purchased for use for oil logging to serve as a precision neutron initiator at the moment of maximum compression. The whole fission explosive can weigh less than 50kg and be less than 40cm in diameter.

Assuming Iran would want a minimum stockpile of 3 weapons as a deterrent against “regime change”, we are still talking about around 20 kg of HEU.

Contrary to ignoramuses in Western governments and posturing politicians, Iran has a cadre of highly capable engineers and physicists, trained at the best universities in the

world; many of them have also worked in high technology companies in the US or EU. A recently published Iranian Nuclear Science bibliography shows the depth of the expertise, including mastery of Monte Carlo simulations for neutronic-hydrodynamic analysis, and sophisticated Inertial Confinement Fusion target design theory, directly applicable to H-bomb design [3]. It would be a grave mistake to underestimate their capability to successfully build a modern fission type nuclear weapon.

The key to success is having the HEU fissile material; the design of a fission bomb is rather trivial and straightforward, and can be designed “free hand” [4]. Many university students have demonstrated that. One does not really need “blueprints”, computer codes, or supercomputers; this is all mythology perpetrated by an ignorant and sensationalist Western press.

### **How Long Does it Take Iran to Produce 20kg of 93.9% HEU?**

This question has been answered by Richard Garwin (one of the designers of the first hydrogen bomb, the Ivy Mike shot). His estimate [5] is that the 3000 odd IR-1 (Pakistani P1) centrifuges can produce about 23.6kg/year. Using the more efficient IR-2 centrifuge would double the SWU, and reduce the time to produce the 20 or so kg of 90% HEU to about 6 months. Iran, of course, is not yet capable to operate reliably the 3000+ centrifuge cascades, but within two years, that is, around 2010 - 2011, it could.



## **How Big a Threat is a Nuclear Iran?**

The biggest antagonists in the Middle East are Iran and Israel. Iran's leadership has used intemperate and grotesque fighting words threatening the very existence of the state of Israel. But what can a nuclear Iran do to Israel? In reality, nothing much except irritate Israelis with provocative bluster; and certainly, it will not inhibit Israel from defending its interests. Neither Iran nor Israel really have any aggressive intentions either for conquering each other or for conquering neighboring countries, so the friction between them is more of a clash of culture and civilization. Yes, geographically, Israel is a tiny country, but Iran's leadership knows that Israel and its ally, the US can literally wipe Iran off the map, so they will safeguard their nuclear technology and weaponry from terrorist groups because the "return address" is very clear. Nor will they use nuclear weapons on behalf of other Moslems entities, such as Al-Qaeda, Hezbollah or Hamas. So what are we talking about is Iran wasting scarce resources for the privilege of boasting and blustering, and buying insurance against "regime change" a la Irak...

## **Can Iran Be Stopped?**

Remember Pakistan's Bhutto and his famous "we will eat grass but have our bomb"; they certainly did. And any country that decides to go ahead, can.

How do you stop Iran? Not by conventional military air or missile strikes; they learned from the Osirak episode, and have their dispersed facilities built underground and basically impervious to conventional aerial bombing. Yes, you could take them out either by "boots on the ground" such as commandos, by occupying the country, or with nuclear bunker-buster penetrators, but that could trigger another world war.

So, what is to be done? Serious sanctions, by completely isolating Iran in all aspects of life, such as insuring that nobody buys one drop of Iranian oil. This requires political will that neither the US or EU has (in fact, the trade is still flourishing), and China and India will only be happy to oblige and buy the oil... So the alternative is to let Iran "eat grass" and have its bomb and waste its money....With the majority of Iranians under 24 years of age, the Internet and instant communication provides a reality check and a window of possibilities for a better life for the ordinary Iranians. Since nobody lives forever, eventually the younger generation will come to power, get rid of the nuclear drag on their life, and join the rest of the world in pursuit of a better life.

## **References**

- [1] President Ahamadinejad visit to Natanz; April 8, 2008 [www.president.ir](http://www.president.ir)
- [2] Hansen, G. et al, LA-1356 "Precision Critical Mass Determination"; February 1952
- [3] Gorwitz, Mark, Iranian Nuclear Science Bibliography; July 2008; available at <http://www.fas.org/sgp/news/secretcy/2008/07/071108.html#3>

- [4] Taylor, Theodore, in “Curve of Binding Energy”, McPhee, J., pp. ,189, 1974
- [5] Garwin, R.L. “When could Iran deliver a nuclear weapons?”, Bull Atomic Scientists, 17 January 2008 issue