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The Pleasures of Self-Deception:
The Fiction That Cyber Attacks Have Slowed Iran's Drive for Nuclear Weapons

Writing over 30 years ago, the distinguished intelligence analyst Roberta Wohlstetter noted that deception played an important role in the intelligence battle between adversaries.[1] There are many well known instances where false information was deliberately used to mislead an adversary. But Wohlstetter noted a more interesting phenomenon. Faced with intelligence that has unpleasant implications, analysts instead construct a more pleasant fiction that allows the analysts to avoid facing up to the more unpleasant reality.

One example given by Wohlstetter, related to the German construction of the battleship Bismarck in the 1930s. Treaty restrictions limited battleships of the time to a displacement of 35,000 tons. British intelligence found that the dimensions of the Bismarck were such that it was likely to violate treaty restrictions. Indeed the Bismarck displaced 45,000 tons. However, the Germans claimed that the Bismarck displaced only 35,000 tons. The obvious implication was that the Germans were lying, violating the treaty and planning for a war against England. This conclusion would require the British to greatly increase defense spending—something they were loath to do.

Instead British analysts decided that the Bismarck had a very shallow draft, which would keep the ship within the 35,000 ton limit. They decided that the reason for this shallow draft was so the ship could use the Kiel Canal and have easy access to the Baltic Sea. This in turn implied that the construction of the Bismarck was aimed at Russia and not England. Problem solved! And as Wohlstetter noted, the interesting thing about this whole sequence is that other than the false claim that the Bismarck displaced 35,000 tons, the Germans did not make any of the other claims. Instead the hypothesis that the Bismarck had a shallow draft and therefore was aimed at Russia was all the invention of the British analysts themselves.

We are seeing a similar phenomenon today with regard to Iran gaining the capability to acquire nuclear weapons. Iran has already produced a quantity of 3.5% enriched uranium that exceeds 1,900 kilograms. If Iran were to batch recycle 1,900 kilograms of 3.5% enriched uranium at its main enrichment facility at Natanz, it could produce a weapon's worth of 90% enriched uranium (20 kilograms). The batch recycling could be completed in about two and one half months. In fact Iran has already started the first step of this process by converting its stock of 3.5% enriched uranium into 20% enriched uranium with the blessings of the International Atomic Energy Agency (IAEA).[2] Iran could

[1] Roberta Wohlstetter, "The Pleasures of Self-Deception", *The Washington Quarterly*, Vol. 2, Number 4, 1979, pp. 54-63.

[2] For a technical discussion of Iran's uranium enrichment efforts and how Iran could quickly produce the 90% enriched uranium for a nuclear weapon see: Gregory S. Jones, "Iran's Rate of Enriched Uranium

produce the mechanical parts needed for a nuclear weapon in less than a year. Instead of facing this unpleasant fact and acknowledging a policy failure, a new version of self-deception is taking place.

Since Iran began producing enriched uranium in 2007, it has steadily increased its production. By 2010, it was clear that Iran's cumulative production of 3.5% enriched uranium would exceed 1,900 kilograms sometime during the year (Iran reached this mark in August 2010—by October 31, 2010, the total had reached 2,152 kilograms). Yet despite this obvious Iranian success, U.S. government officials stated that due to technical problems at the Iranian enrichment facility at Natanz, Iran was three to five years away from being able to produce a nuclear weapon.[3] More recently (at the turn of the year) the Israelis have been making similar statements.[4]

At the same time, David Albright and his research group at the Institute for Science and International Security discussed evidence that the Stuxnet worm had been specifically designed to attack the Iranian enrichment effort and may have been responsible for taking 984 centrifuges (6 cascades[5]) out of service.[6] It did not take very long for some in the press to meld this information with the official statements regarding the technical problems at the Iranian facility at Natanz and conclude that cyber attacks had significantly delayed Iran's push for nuclear weapons by disrupting Iran's centrifuge enrichment effort.[7] Officials in the U.S. and Israel have not confirmed this story but when Israeli officials were asked about it they were reported to have "grinned widely."

Unfortunately this tale can not pass even the most cursory of analytical examinations and is just a pleasant self-deception. Since prior estimates predicted that Iran could produce a nuclear weapon in a year or less, saying that it would now take Iran three to five years implies that efforts against Iran's enrichment program has led to a tripling to quintupling of the time require for it to produce nuclear weapons.

Production Continues to Increase: Centrifuge Enrichment and the IAEA November 23, 2010 Update", November 30, 2010, http://www.npolicy.org/files/Irans_Rate_of_Enriched_Uranium_Production.pdf

[3] For my analysis of these statements see: Gregory S. Jones, "When Could Iran Have the Bomb? An Analysis of Recent Statements That Iran is 3 to 5 Years Away", April 26, 2010, http://www.npolicy.org/node/1255

[4] Gregory S. Jones, "An Analysis of Recent Israeli Statements Regarding When Iran Could Have the Bomb: Have the Israelis Given Up Trying to Stop an Iranian Nuclear Weapon?", January 13, 2011, http://www.npolicy.org/node/1404

[5] In order to obtain meaningful levels of uranium enrichment it is necessary to operate many centrifuges together in series. This grouping of centrifuges is known as a cascade. Since the output of a single cascade is not high, it is necessary to operate many cascades in parallel.

[6] David Albright, Paul Brannan, and Christina Walrond, "Did Stuxnet Take Out 1,000 Centrifuges at the Natanz Enrichment Plant?", *Institute for Science and International Security*, December 22, 2010, http://isis-online.org/isis-reports/detail/did-stuxnet-take-out-1000-centrifuges-at-the-natanz-enrichment-plant/

[7] William J. Broad, John Markoff and David E. Sanger, "Israeli Test on Worm Called Crucial in Iran Nuclear Delay", *The New York Times*, January 16, 2011, http://www.nytimes.com/2011/01/16/world/middleeast/16stuxnet.html?_r=1&ref=iran and Ken Dilanian, "Iran's nuclear program and a new era of cyber war", *Los Angeles Times*, January 17, 2011, http://articles.latimes.com/2011/jan/17/world/la-fg-iran-cyber-war-20110117

The evidence for Iran having problems with its enrichment program comes from IAEA inspections. On May 31, 2009, Iran had 30 cascades in operation and by November 2, 2009, this had fallen to only 24 cascades in operation. For most of 2010, the number of cascades Iran had in operation has varied between 23 and 24. However, this is only a decline of 20% to 23%, as the press has reported in the accounts of these supposed successful cyber attacks. However, no one seems to have asked the question of how a mere 20% to 23% decline in centrifuge operations could lead to a tripling or quintupling of the time required to Iran to be able to produce the Highly Enriched Uranium (HEU) needed for a nuclear weapon. This question is even more pertinent since as of the latest IAEA inspection (November 5, 2010), Iran had brought the number of cascades back to 29 which is an increase of 6 cascades since August 28, 2010. Even if the amount of enriched uranium produced was proportional to the number of centrifuges in operation (and as we will see it is not) then a 20% to 23% decline in production for only about 18 months would lead to only about a four month loss of production, not the 3 to 5 years claimed.

Furthermore, even this four month loss of production has not occurred, since what actually matters is not the number of centrifuges in operation but rather the amount of 3.5% enriched uranium produced. The IAEA inspections provide specific information which allow us to calculate Iran's average monthly production of 3.5% enriched uranium, complied at roughly quarterly intervals. These calculated production rates are shown in table 1.

What is immediately apparent is that Iran's production of 3.5% enriched uranium is not slowing down but rather increasing. It held fairly steady in 2009 at around 55 kilograms per month and then significantly increased near the beginning of 2010 to around 80 kilograms per month—a 45% increase. How was this result possible given that the number of cascades that Iran was operating in this interval declined from 30 to 23 or 24? Iran was able to increase the amount of enriched uranium produced per centrifuge by about 75%.[8] As was mentioned above, in the latest IAEA reporting interval, Iran brought 6 additional cascades on line which increased the monthly production rate to 91 kilograms per month. This means that in the second half of 2010, Iran was producing enriched uranium at a rate of about 65% higher than it was in 2009. Though the supposed cyber attack on Iran's enrichment effort is reported to have occurred in the second half of 2009, one looks in vain at the production data to see any effect.

And there is more. Iran's conversion of its stockpile of 3.5% enriched uranium into the 90% enriched uranium by batch recycling at Natanz involves a two-step process, whereby the 3.5% enriched uranium is converted into 20% enriched uranium and then the 20% enriched uranium is converted into 90% enriched uranium. Since February 2010 Iran has been performing the first step of the process, by converting 3.5% enriched uranium into 20% enriched uranium at its pilot enrichment facility at Natanz. This involves using two of Iran's standard cascades which are interconnected to function as

[8] In technical terms Iran increased the output of its centrifuges from 0.5 SWU per centrifuge-year to 0.87 SWU per centrifuge-year.

one cascade.[9] The output is relatively small (2.0-2.5 kilograms per month) and by November 19, 2010 Iran had produced 22 kilograms of 20% enriched uranium. This is significantly less than the 160 kilograms needed to produce a weapon's worth of HEU but by doing so Iran has established the principle that it is allowed to possess and produced this material. As its stockpile of 20% enriched uranium grows, the time that would be required for Iran to produce 90% enriched uranium for nuclear weapons continues to shrink.

By having the equivalent of 2 cascades of centrifuges in operation at its pilot enrichment facility and having 29 cascades in operation at its main enrichment facility at Natanz, Iran now has the equivalent of 31 cascades of centrifuges in operation, which is more than the 30 cascades Iran had in operation at its peak in mid-2009. Since each of its centrifuges today has 75% more output than its centrifuges had in 2009, one can see how much progress Iran has made in its uranium enrichment efforts.

Iran recognizes that it is now in a position of strength as was demonstrated by its stance during negotiations regarding its nuclear program with the United States and five other world powers on January 21-22. As preconditions to negotiations, Iran demanded the lifting of sanctions and the recognition of its right to enrich uranium. Iran obviously had no intention of negotiating seriously, and nothing was accomplished at the meetings.

It is time to relinquish the fantasy that cyber attacks have seriously delayed Iran's uranium enrichment program. However pleasing this self-deception is, the fact of the matter is that the U.S. has failed to prevent Iran from gaining the ability to produce nuclear weapons whenever Iran wishes to do so. It is time to recognize this policy failure and decide what to do next, based on a realistic assessment of Iran's uranium enrichment efforts.

[9] Initially Iran used only one cascade to produce the 20% enriched uranium. The second interconnected cascade did not start operation until July 2010.

Table 1
Average Iranian Production Rate of 3.5% Enriched Uranium for 2009 and 2010

IAEA Reporting Interval	Average 3.5% Enriched Uranium Production Rate (Kilograms Uranium per Month)
11/17/08-1/31/09	52
2/1/09-5/31/09	53
6/1/09-7/31/09	57
8/1/09-10/31/09	57
11/22/09-1/29/10	78
1/30/10-5/1/10	81
5/2/10-8/6/10	80
8/7/10-10/31/10	91

Note on the calculation of the data in the table.

The IAEA reports Iran's total cumulative production of 3.5% enriched uranium since its start of production in 2007. The information is given as of the end date of each interval in the table. We simply subtract the amount given for the cumulative production at the prior date to find the amount of uranium produced in the interval. The IAEA reports the production in terms of kilograms of uranium hexafluoride. We multiply by 0.676 to convert this into kilograms uranium. The average daily rate is then multiplied by 30.44 (30.44 x 12 = 365.25) to find the average monthly production rate. Note that on 11/17/08 and 11/22/09 the IAEA conducted inventories of Iran's 3.5% enriched uranium holdings. On the intermediate dates, the IAEA estimated Iran's 3.5% enriched uranium holdings based on centrifuge operating data. While reasonably accurate, these estimates were not exact and when the 11/22/09 inventory was carried out, it was found that the estimates were a little low. We did not want to add this "extra" uranium to the last interval since it would distort the calculated production rate. Rather we did our calculation using the 11/22/09 inventory as a starting point which is why there is a gap between 10/31/09 and 11/22/09. The average production rate for the interval 11/19/08 to 11/22/09 (including the interval from 10/31/09 to 11/22/09) is 54 kilograms of uranium per month.