The IAEA and Iran: Crisis averted – for the time being

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Key Points

• Iran signed the nuclear Non Proliferation Treaty (NPT) in 1970 and concluded a Safeguards Agreement with the IAEA in 1974. However, unease about the intent behind its developing nuclear programme has long persisted.
• Disquiet was heightened considerably in August 2002 when an Iranian opposition group disclosed the existence of secret uranium enrichment and heavy water production facilities at Natanz and Arak respectively.
• Each successive IAEA report on Iran since February 2003 has provided instances of nuclear fuel cycle activities and experiments undertaken by Iran which were not declared to the IAEA in accordance with Iran's obligations under its Safeguards Agreement.
• The overall assessment of the Direct General of the IAEA is that although all declared material is accounted for the Agency is "not yet in the position to conclude that there are no undeclared nuclear materials or activities in Iran" that could be used for weapons purposes.
• In the light of the EU-Iranian agreement it is extremely unlikely that the upcoming IAEA Board meeting will find Iran in non-compliance with its NPT obligations and there will be, thus, no referral to the United Nations Security Council - this time.
• An early statement of intent by the Iranian government to seek ratification of the IAEA Additional Protocols by the Iranian parliament, and to proactively invite full on-site inspection of all its nuclear facilities would be excellent confidence building measures.
• The underlying hostility between the United States and Iran will have to be addressed and Iran's security needs will have to be met, for a sustainable and credible long-term solution. Continued US economic sanctions and veiled threats of military action are counterproductive in this regard.

Introduction

On November 25, 2004 the Board of Governors of the International Atomic Energy Agency (IAEA) meets in Vienna to consider the latest report by its Director General on the implementation of the NPT Safeguards Agreement with Iran. This is the seventh special report into Iran's compliance with its Safeguards Agreement presented to the Board since June 2003.[1]

This BASIC Note examines the current state of play. Other BASIC analyses on Iran's nuclear programme include:

• The IAEA and Iran - Iran's check-mate prematurely called', 10 September 2004
• The IAEA and Iran - Once More to the Brink?', 12 June 2004
• 'The IAEA and Iran: No smoking guns so far but the smell of gunpowder lingering in the air', 5 March 2004

Background

Notwithstanding the fact that Iran signed the nuclear Non Proliferation Treaty (NPT) in 1970 and concluded a Safeguards Agreement with the IAEA in 1974, unease about the intent behind its developing nuclear programme has long persisted. For this reason the country has for many years been under a virtual embargo on the provision of nuclear equipment and technology by the West. Western concerns regarding Iranian intentions are focused on four issues:

• Iran's desire to complete the construction of the German-built Bushehr reactors, work on which ceased in 1979;
• a history of suspicious procurement efforts by Iran in Europe and elsewhere;
• alleged clandestine attempts develop a centrifuge enrichment programme; and
• Iran's medium and long-range missile development programme.[2]

Disquiet was thus heightened considerably in August 2002 when an Iranian opposition group disclosed the existence of secret uranium enrichment and heavy water production facilities at Natanz and Arak respectively. In particular, suspicions were increased around the activities at the Natanz facilities in central Iran, when satellite photographs showed that much of the plant was

being built underground at a depth of 75 feet in order to withstand aerial attack.[3]
These revelations raised concerns that Iran had breached its obligations under the NPT and, after some initial delay, an intensive round of discussions and inspections were instigated by the IAEA in February 2003. Following an initial verbal report to the 35 Member States that comprise the IAEA's Board of Governors in March 2003, the Director General has subsequently submitted written reports at three monthly intervals.[4]
Each successive report has provided instances of nuclear fuel cycle activities and experiments undertaken by Iran which were not declared to the IAEA in accordance with Iran's obligations under its Safeguards Agreement. In particular, activities relating to uranium enrichment, uranium conversion and plutonium separation have been carried out over a period of up to 18 years and on a scale far greater than anyone had suspected.
Iran supposedly gave the IAEA a full picture of its nuclear activities in October 2003, including a complete uranium enrichment centrifuge research and development chronology. It was subsequently learnt by the IAEA that Iran had received drawings of more advanced centrifuges capable of greater separative work in 1994 and had carried out research and development activities on these during 1999 -2000.

The Significance of Uranium Enrichment

The main obstacle for any non-nuclear weapon state seeking to manufacture nuclear weapons today is acquiring the necessary fissile material - either plutonium or highly enriched uranium (HEU). Illegal acquisition of a few kilograms of such material would not in itself be sufficient to support a credible military nuclear arsenal. To maintain such an arsenal a country must be able to produce for itself the required fissile material. However, in choosing between the two types of fissile material, it is much easier to construct a nuclear device using HEU rather than plutonium for several reasons:[5]

- HEU allows for easy manufacture of nuclear weapons without the need for the sophisticated implosion designs and technology associated with weapons made using plutonium;
- With sufficient quantities of HEU the chances of achieving a kiloton range nuclear explosion, with a yield approaching that of the Hiroshima bomb, are relatively good; and
- The radiation levels from unirradiated HEU are low and its handling involves minimal health hazards compared to processing plutonium, which is produced in a reactor and then subjected to chemical separation.

Natural uranium consists of approximately 99.3% U238 and 0.7% U235. For both reactor fuel and nuclear weapons the concentration of the fissile U235 needs to be enriched. Most civil power reactors generally use low enriched uranium (LEU) with a U235 content of 2-5%. HEU is defined as uranium containing over 20% U235. For nuclear weapons U235 concentrations of over 90% are usually favoured for purity and predictability but HEU with concentrations lower than this can also used. Thus in safeguards terms, far less stringent standards are applied to LEU, which has no direct military value, than are applied to HEU.[6]

However, whilst LEU has no utility for nuclear weapons, its production in an enrichment plant takes a prospective nuclear-armed country a considerable way, in terms of cost and effort, down the road to producing HEU. Roughly speaking only an additional cost and effort of 20% is needed to produce HEU from LEU, compared to the cost and effort involved in producing LEU from natural uranium.[7]

Verifying that this extra 20% (or more) activity is not taking place is achievable provided the IAEA is permitted to conduct on-site inspections. This applies to all non nuclear weapon states (NNWS) under the NPT - not specifically to Iran.

Iran is constructing two uranium enrichment facilities at Natanz comprising:

- a Pilot Fuel Enrichment Plant (PFEP), which is planned to have around 1000 centrifuges for enrichment of natural uranium, mined in Iran, up to about 5% U235; and
- a commercial scale Fuel Enrichment Plant (FEP) containing over 50,000 centrifuges.

The centrifuges will be manufactured locally, based on drawings and parts obtained from other countries. This capacity is just about sufficient to produce enough LEU fuel each year for the Bushehr reactor. Batch recycling (successive recycling of the end product into the feed point of the enrichment cascade) until the desired enrichment is attained of the LEU in one tenth of the centrifuges could produce enough HEU for around three nuclear weapons per year.[8] When complete Natanz as a whole could produce roughly 500 kg of weapon-grade uranium per year sufficient for 25-30 nuclear weapons.[9] With the ability to indigenously manufacture centrifuges Iran could also construct a small clandestine plant elsewhere in the country.

Moreover, the 2003 IAEA reports also uncovered undeclared activities relating to laser isotope techniques for uranium enrichment. By combining enrichment technologies using initial centrifuge enrichment to produce LEU and subsequent laser enrichment for HEU, it would again be possible for the 'finishing' plant to be relatively small and thus easily hidden.

It is also difficult to understand Iran's pursuit of uranium enrichment capability in terms of cost effectiveness. Iran says it wants to develop uranium enrichment facilities for the Bushehr reactor and its subsequent civil nuclear programme. However, overcapacity on a worldwide basis has existed in the civil uranium enrichment business since the 1970s[10] and this situation has recently been exacerbated by the downblending of surplus weapons-grade uranium from Russia, which will supply about half of all power reactor fuel required by the United States (the largest market) for the next decade.[11]

It would be much cheaper for Iran to purchase LEU from abroad rather than develop domestic production, so the question of why Iran is intent on developing an indigenous nuclear fuel cycle remains (the most likely reasons, but not mutually exclusive, are for national prestige, security of supply and/or preparations for an active nuclear weapons programme). Iran's costs are also increased by building much of the production facility underground which also raises questions about secrecy and ability to survive an attack.

Other Areas of Concern

The other secret site disclosed in August 2002 is at Arak where two heavy water facilities are planned - a heavy water production plant (HWPP) and a 40MW heavy water reactor (IR-40), which uses natural uranium oxide as fuel. The former is due to begin production before the end of 2004 whilst the reactor will be built in the next decade.

In July 2003, the IAEA was shown drawings and plans for the IR-40 reactor said to be intended for the production of medical and industrial isotopes. Since February 2003, Iran has given conflicting information about the 'hot cells' associated with this reactor and in which the isotopes would be produced. This is an issue that the IAEA's latest report says it is still assessing. IR-40 could present a significant proliferation challenge when completed, as such reactors are effective producers of weapons-grade plutonium. Both India and Israel used similar heavy water moderated, natural uranium reactors to produce plutonium for their nuclear arsenals. Moreover, Iranian officials have stated that they would be ultimately interested in reprocessing spent fuel and the IAEA reports have detailed undeclared plutonium separation experiments carried out by Iran during 1988 -93 and possibly later although this is still under investigation, as the latest report makes clear.

The IAEA also found that during 1989-93 Iran experimented in the production of polonium, stated to be intended for use in radioisotope thermoelectric batteries. The November 2004 report remains uncertain as to the plausibility of this stated purpose. Used in conjunction with beryllium, polonium can be a neutron initiator for nuclear weapons of early design.

The Latest IAEA Report

As requested by the resolution passed by the Board of Governors in September 2004, the latest report by the Director General reviews the Agency's findings on the Iranian nuclear programme since September 2002, gives a full account of Iran's past and present cooperation with the IAEA

and an analysis of the implications of the IAEA's findings in relation to Iran's implementation of its Safeguards Agreement. It concludes:

Based on all information currently available to the Agency, it is clear that Iran has failed in a number of instances over an extended period of time to meet its obligations under its Safeguards Agreement with respect to the reporting of nuclear material, its processing and its use, as well as the declaration of facilities where such material has been processed and stored.[12]

It goes on to list fourteen instances of Iran's failure either to report imports and activities related to nuclear material, to declare facilities to the IAEA or to provide design information or updated design information on facilities as well as a failure to cooperate as evidenced by "extensive concealment activities".[13]

However, the overall assessment is that although all declared material is accounted for the Agency is "not yet in the position to conclude that there are no undeclared nuclear materials or activities in Iran" that could be used for weapons purposes. Given the past history of concealment reaching such a conclusion can be expected to "take longer than in normal circumstances".[14]

The International Dimension

Throughout the debate on Iran's nuclear intentions the approach of the US Administration and the EU, particularly France, Germany and the UK, has differed markedly. On the whole the US Administration has been more hawkish, convinced that Iran is pursuing a weapons programme and repeatedly arguing at the IAEA Board meetings for a finding of 'non-compliance' and a referral to the United Nations Security Council (UNSC). The Europeans, whilst also having doubts about Iran's intentions, have been more dovish, arguing that Iran needs incentives to cease uranium enrichment activities rather than the threat of sanctions or worse from the UNSC.

At the eleventh hour, on 14 November 2004, the European troika and the EU High Representative reached an agreement with Iran under which all uranium enrichment and reprocessing activities will be suspended in a verifiable way before the Board meeting on 25 November whilst negotiations continue on a long-term agreement. The EU troika had announced this agreement on 8 September along with the November suspension deadline.[15] This latest interim agreement includes three elements:

- a commitment from Iran to provide further reassurances about the peaceful nature of its nuclear programme;
- European promises to transfer nuclear technology to Iran; and
- the establishment of a number of working groups to look at issues affecting Iran, including national security concerns.

Once the IAEA has verified the suspension of uranium enrichment the EU will resume negotiations on trade and cooperation with Iran.

UK Foreign Secretary Jack Straw issues a supportive statement the following day:

> I welcome Iran's decision to support the agreement ... . We believe that the conclusion of this agreement can both allow for confidence-building in respect of Iran's nuclear programme and represent a significant development in relations between Europe and Iran. ... It is essential now for the agreement to be implemented in full.[16]

On 22 November, Dr ElBaradei said: "I think pretty much everything has come to a halt right now, so we are just trying to make sure that everything has been stopped".[17]

Conclusions

While Europe and the United States appear to have adopted a 'good cop, bad cop' approach to Iran, the ultimate resolution of the problem is more difficult to envisage.

In the light of the EU-Iranian agreement it is extremely unlikely that the upcoming IAEA Board meeting will find Iran in non-compliance with its NPT obligations and there will be, thus, no referral to the UNSC - this time.

In any case, referral to the UNSC, as requested by the 'bad cop', is not likely to be a panacea since it may well be divided about the appropriate action to take. Unilateral preemptive strikes by the United States (or possibly Israel) would be militarily problematical as there are many potential targets and some are underground. Military strikes are also unlikely to be undertaken so long as the situation in Iraq remains uncertain, especially as Iran retains significant influence amongst Iraq's majority Shia community.

On the other hand, however, the European 'good cop' approach may just be delaying the inevitable: it will ensure, if both sides honour the agreement, that Iran will obtain nuclear and other technology which could at some stage in the future facilitate the very breakout and development of weapons capability that the approach is trying to forestall.

Under the NPT Iran has the 'inalienable right' to develop nuclear technology for peaceful purposes and needs to give only three months notice to withdraw from the regime. There is no mechanism for either preventing Iran from following this course of action or for making it accountable to international non-proliferation norms once such a declaration has been made.

Full, open, proactive disclosure of its developing nuclear programme is an absolute requirement if the IAEA Board is to remain confident that Iran does not have clandestine intent to divert technological advances to a weapons programme. An early statement of intent by the Iranian government to seek ratification of the IAEA Additional Protocols by the Iranian parliament, and to grant full on-site inspection of all its nuclear facilities would be excellent confidence building measures.

However, it may also be time to review whether the suggested EU-US 'good cop, bad cop' approach to Iran is sufficient in the long term. On the surface, it might seem to have been productive in 'encouraging' Iran to stay in compliance with its NPT obligations. However, the underlying hostility between the United States and Iran will have to be addressed and Iran's security needs will have to be met, for a sustainable and credible long-term solution. Continued US economic sanctions and veiled threats of military action are counterproductive in this regard.

At the end of a BBC Radio 4 Today Programme interview on 4 November, Jack Straw responded to a question about what might happen should tensions be escalated by saying: "No military action, full stop."

Although constructive diplomatic engagement and the application of legal pressures cannot guarantee that Iran will not develop a nuclear weapons capability at some later date, these diplomatic tools are more likely to produce something approaching the desired results. The threat of punitive action, on the other hand, may simply hasten the very result it is intended to prevent. Following the military strike on the Iraq' nuclear reactor at Osirak in 1981, for example, Saddam Hussein simply diversified and accelerated his clandestine nuclear weapons programme. The same result can be expected should the United States or Israel attempt a military strike on Iran.

Finally we should recognise what former EU External Relations Commissioner Chris Patten referred to as the 'application of double standards in attempts to inhibit the proliferation of weapons of mass destruction': when we don't, in the countries which actually have nuclear weapons, for example, live up to all our commitments under the NPT ... So we have, I think, if we are going to make progress in this area, to look to our own responsibilities as well as what we expect of others. [18]

For now the 'Iran problem' may have been put on hold but it will, most likely, return to haunt the world stage at some point in the not too distant future, possible under UNSC Resolution 1540 on WMD proliferation, possibly during a rancorous exchange at the 2005 NPT Review Conference.

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Endnotes

[1] ‘Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran’, GOV/2004/83 (15 November 2004) available at http://www.globalsecurity.org/wmd/library/report/2004/iran_iaea_gov-2004-83_15nov2004.pdf.

[2] See, for example, G Kemp et al, ‘Iran’s Nuclear Weapons Options: Issues and Analysis’, Nixon Centre, Washington DC, Jan. 2001; and J Cirincione et al, ‘Deadly Arsenals: Tracking Weapons of Mass Destruction’, CEIP, Washington DC, 2002.

[3] D Albright and C Hinderstein, ‘Furor over Fuel’, Bulletin of Atomic Scientists, May/June 2003 available at http://www.thebulletin.org/issues/2003/mj03/mj03albright.html.

[4] Prior to the latest report, the previous six written reports were: Gov/2003/40 (6 June 2003); GOV/2003/63 (26 August 2003); GOV/2003/75 (10 November 2003); GOV/2004/11 (24 February 2004); GOV/2004/34 (1 June 2004); and GOV/2004/60 (1 September 2004). These are available on the IAEA website.

[5] G Arbman et al, ‘Eliminating Stockpiles of Highly Enriched Uranium’, Report Submitted to the Swedish Ministry of Foreign Affairs, SKI Report 2004:15, April 2004.

[6] ‘The Physical Protection of Nuclear Material and Nuclear Facilities’, IAEA, INFCIRC/225/Rev.4 (Corrected). In contrast to uranium a single set of safeguard regulations is applied to plutonium since it can be used in nuclear weapons in all isotopic mixes except that containing over 80% Pu238.

[7] ‘Nuclear terrorism: The Danger of Highly Enriched Uranium’, Pugwash Issue Brief, Vol. 2 No. 1, September 2002. The seeming paradox about cost and effort is illustrated in the following way. Every 1000 atoms of natural uranium contain 993 atoms of U238 and 7 atoms of U235. To transform this material into LEU enriched to 3.5%, say, 800 atoms of U238 must be shed to leave 200 atoms containing 7 atoms of U235. Subsequently in the next stage of enrichment it will be sufficient to shed less than 200 atoms of U238 to increase the percentage of U235.

[8] As note 3.

[9] D Albright and C Hinderstein, ‘The centrifuge connection’, Bulletin of Atomic Scientists, March/April 2004 available at http://www.thebulletin.org/issues/2004/ma04/ma04albright.html.

[10] S Davies, ‘Trends in Enrichment’, paper presented at World Nuclear Fuel Market, June 13 2000, available at http://www.wnfm.com/2000proceedings/SashiDavies-sp.pdf.

[11] F von Hippel, ‘Reducing Stockpiles and use of HEU to reduce the risk of nuclear terrorism’, Presentation to Spring Meeting of the German Physical Society, Hannover, March 2003.

[12] As note 1, para 85.

[13] As note 1, para 86.

[14] As note 1, para 112.

[15] For further detail see: ‘The IAEA and Iran - Iran’s check-mate prematurely called’, 10 September 2004 (http://www.basicint.org/pubs/Notes/BN040910.htm).

[16] ‘Iran - Jack Straw Welcomes Signature of Nuclear Agreement’, Foreign & Commonwealth Office News, 15/11/04 available at http://www.fco.gov.uk.

[17] ‘Iran stops key nuclear activities’ by Elaine Sciolino in The New York Times Tuesday, November 23, 2004 available at http://www.iht.com/articles/2004/11/22/news/iran.html.

[18] Interview with James Cox, BBC World This Weekend, 10 October 2004.