

ASSESSING THE IAEA ‘ASSESSMENT’ OF “POSSIBLE MILITARY DIMENSIONS” OF IRAN’S NUCLEAR PROGRAMME’

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VIENNA, 15 December 2015: This morning the Board of Governors (BoG) of the International Atomic Energy Agency (IAEA) adopted a resolution² closing what has been referred to as a ‘manufactured crisis’³ regarding allegations of “possible military dimensions” of Iran’s nuclear programme. This process has taken nearly a decade to reach a solution that easily could have been reached many years ago, had not ill advised politicization interfered with the IAEA’s technical work; and an incautious report issued by the IAEA in November 2011⁴ based on dubious “third party” or intelligence information and non-expert analysis. The IAEA BoG resolution inter alia takes note of the “clarification of past and present outstanding issues regarding Iran’s nuclear programme...and further notes that this closes the Board’s consideration of this item”. The resolution also “[r]eaffirms that Iran shall cooperate fully and in a timely manner with the IAEA through implementation of its Comprehensive Safeguards Agreement and Additional Protocol, including by providing access, reaffirms that such cooperation and implementation are essential for the IAEA to reach the Broader Conclusion that all nuclear material in Iran remains in peaceful activities”.

This assessment, reflecting personal views, written by two former IAEA officials with direct experience with the Iran nuclear file at the IAEA aims to shed light on the political pressures exerted on the IAEA by some of its powerful Member States and ‘intelligence’ information injected by them to influence the technical workings of the Agency. It is also to highlight, in this context, some of the complex matters relating to allegations of military dimensions to Iran’s nuclear programme, as well as to discuss structural weaknesses in the management of the IAEA by its senior leadership and its governing bodies, and above all to make recommendations to strengthen the IAEA which is the global body charged to implement nuclear verification, and promote nuclear safety and security.

It must be stated at the outset that both authors are fully supportive of the Joint Comprehensive Plan of Action (JCPOA), signed by the EU/E3+3 and Iran on 14 July 2015 in Vienna, as well as of the IAEA conducting its important mission in a non-political, open, accountable and transparent manner. This

¹ Tariq Rauf and Robert Kelley both served in senior positions at the International Atomic Energy Agency and covered safeguards matters among other duties. Rauf is Director of the Disarmament, Arms Control and Non-Proliferation Programme and Kelley in an Associated Senior Fellow with the same programme at SIPRI. Full biographical details are available at [www.sipri.org along with technical assessments of Iran’s nuclear programme](http://www.sipri.org/along_with_technical_assessments_of_Iran's_nuclear_programme) at <http://www.sipri.org/research/disarmament/nuclear/iran>. This assessment reflects the personal views of the two authors.

² IAEA Board of Governors, *Joint Comprehensive Plan of Action implementation and verification and monitoring in the Islamic Republic of Iran in light of United Nations Security Council Resolution 2231 (2015)*, resolution submitted by China, France, Germany, the Russian Federation, the United Kingdom and the United States of America, (GOV/2015/70).

³ Gareth Porter, *Manufactured Crisis: The Untold Story of the Iran Nuclear Scare*, (Charlottesville, VA: Just World Books 2014).

⁴ IAEA, *Implementation of the NPT Safeguards Agreement and relevant provisions of Security Council resolutions in the Islamic Republic of Iran, Report by the Director General*, (GOV/2011/65, 8 November 2011).

assessment begins with a brief description of the allegations made by the IAEA in November 2011 regarding possible military dimensions of Iran's nuclear programme. It then briefly recounts the final assessment of all past and present outstanding issues issued by the IAEA in December 2015, along with the authors' commentary. This is followed by a short discussion on the clash of cultures between the scientific method and the law enforcement method in the Agency's treatment of the Iran nuclear file, and pseudo-scientific analyses in the Google era. The last section provides some recommendations on strengthening the governance structures of the IAEA.

IAEA Safeguards Reporting Process

Before starting it is useful to set the context and recall how the IAEA carries out its important nuclear verification mission. In 2009, the IAEA Secretariat explained its safeguards reporting process. The IAEA said that as a matter of course, the Agency receives information from a variety of sources that may have relevance to the implementation of safeguards. The Secretariat's safeguards conclusions for a State are reached through the implementation of the State's Safeguards Agreement and (if the State has one in force) Additional Protocol. In addition, as part of the process, the Secretariat also analyses information it receives/acquires from a variety of sources. The Agency has limited means to determine the veracity of such information independently. To the extent possible, as permitted by the third parties regarding their supplied information, the Agency shares such information with the State concerned with a view to obtaining clarification. This process is strictly based on the rights and obligations of the Secretariat enshrined in the safeguards agreement (and Additional Protocol) with the State, and in certain cases in pursuance of a pertinent request of the Security Council. The Secretariat's reports are the product of an internal team of safeguards analysts and agreed to by all relevant members of the Secretariat and, of course, the Director General. Drafting any such report is an iterative process and, as with all its reports, the Secretariat goes through several different drafts with a view to improving technical quality. This is to ensure that, at the end of a thorough discussion and assessment among all staff involved in the process, the Board of Governors will be presented with a product that is transparent, objective, balanced and factually correct.⁵ It is highly debatable whether the IAEA reports on Iran from 2010 onward, in particular the December 2015 report, have met this standard.

The authors are not alone in questioning whether the IAEA Secretariat is being faithful to its longstanding safeguards reporting process. The Governor to the IAEA Board of Governors from one of the founding Member States of the Agency recently pointed out that:

“Firstly, the Secretariat has the right to use for safeguards implementation all safeguards relevant information available to the Agency about a State. As stated in the 2014 report, this information includes, inter alia, data from open sources and data provided by third parties. It should be noted that third parties include not only States that provide information with regard to another State but also organizations and even private individuals. No proper mechanism that could guarantee

⁵ One of the authors, Tariq Rauf, was a part of the IAEA Secretariat's integrated team of experts that made determinations of safeguards conclusions for States pursuant to their safeguards agreements and additional protocols. See, IAEA Media Advisory 2009/18, *IAEA Safeguards Reporting Process*, 28 August 2009. The other author, Robert Kelley, was a Director with the IAEA Iraq Action Team.

the accuracy and authenticity of information used for safeguards purposes is provided for in the 2014 report. In essence it is suggested that all analysis should be done by the Secretariat as decisions on whether certain data can be used for safeguards purposes are left entirely with the Secretariat. Member States according to this approach should simply trust the Secretariat's choice of information. The risk here is obvious. False allegations generated by interested parties in order to exercise political pressure on a State unfortunately remain part of current international landscape. They are quite common in many areas, including non-proliferation and one should admit could be very important sometimes involving issues of war and peace.

Moreover, the intelligence services of some States may be tempted to use the IAEA as a tool to verify the information they receive via their operative channels. In other words – they may wish to turn the IAEA Department of Safeguards into their branch. We do not want this to happen. We stress that the right to use all available safeguards relevant information should not be perceived as a blank check that Member States have given to the Secretariat in the area of information handling. The Secretariat remains a technical body of an international organization, which should work with data submitted via official channels or received during performing its statutory functions. The SLC [State Level Concept] shall not turn the Secretariat into a supranational structure tasked to collect and analyze intelligence information. We think that if the Secretariat decides to use any information, except for data obtained through its own inspection activity, it should duly disclose its origin and be ready to defend its credibility in an open discussion at the Board of Governors. Every State should have the right to publicly defend itself against false allegations and accusations generated by interested third parties or by the media. Moreover, any third party information should be taken on board by the Secretariat in the process of planning and implementing the safeguards measures, as well as of drawing conclusions, only if it is provided to the IAEA in an official and open manner. History of “nuclear dossiers” of different States shows that such measures are essential and urgent for maintaining and strengthening the confidence of Member States in the safeguards activities performed by the Secretariat.”⁶

Possible Military Dimensions

The IAEA's case on “possible military dimensions” (PMD) to Iran's nuclear programme is based primarily on intelligence information provided to the Agency by a handful of its Member States that cleverly distributed the information amongst themselves and drip fed it to the Agency over a period of time. The initial information on PMD was made available in electronic form around 2005 – this was digital information purported to be from Iranian nuclear and defence establishments. No hard copies of the original documentation were ever provided to the Agency which made its already difficult authentication task impossible. Furthermore, of the some 1,200 pages of documentation only about

⁶ Statement by the Head of the Delegation of the Russian Federation, Ambassador-at-Large, Grigory Berdennikov, at the IAEA “Symposium on International Safeguards: Linking Strategy, Implementation and People”, https://www.iaea.org/safeguards/symposium/2014/images/pdfs/Russian_Statement.pdf.

10% was allowed by the “owners of the information” to be shared by the Agency with Iran and the IAEA therefore requested these States to agree to the Agency providing copies of the information to Iran.⁷ From 2005 through September 2009, under Director General Mohamed ElBaradei, the IAEA continued to press Iran for answers to the allegations but also was careful to point out that “...although the Agency has limited means to authenticate independently the documentation that forms the basis of the alleged studies, the information is being critically assessed, in accordance with the Agency’s practices, by corroborating it, inter alia, with other information available to the Agency from other sources and from its own findings” and that “the Director General urges Member States which have provided documentation to the Agency to work out new modalities with the Agency so that it could share further documentation with Iran, as appropriate, since the Agency’s inability to do so is rendering it difficult for the Agency to progress further in its verification process”.⁸

In its February 2006 report, the IAEA stated that it had continued to follow up on all information pertaining to Iran’s nuclear programme and activities. Although absent some nexus to nuclear material the Agency’s legal authority to pursue the verification of possible nuclear weapons related activity was limited, the Agency had continued to seek Iran’s cooperation as a matter of transparency in following up on reports related to equipment, materials and activities which have applications both in the conventional military area and in the civilian sphere as well as in the nuclear military area. In this regard, Iran had permitted the Agency to visit defence related sites at Kolehduz, Lavisan and Parchin. The Agency did not observe any unusual activities in the buildings visited at Kolehduz and Parchin, and the results of environmental sampling did not indicate the presence of nuclear material at those locations.⁹ Despite nearly a decade of safeguards, monitoring and verification activities in Iran in pursuit of possible military dimensions, the Agency has not found indications of the use of nuclear material in military activities as reiterated in its December 2015 report – the Agency’s legal mandate pursuant to the nuclear Non-Proliferation Treaty (NPT) and Iran’s NPT comprehensive safeguards agreement is “for the exclusive purpose of verifying that such [nuclear] material is not diverted to nuclear weapons or other nuclear explosive devices”.¹⁰

Starting in 2010, under the leadership of a new Director General, the tone of IAEA reports changed somewhat and references to the inability of the Agency to verify the authenticity of the PMD information and restrictions on its sharing with Iran disappeared. Instead, the reports inter alia stated that “[b]ased on an overall analysis undertaken by the Agency of all the information available to it, the

⁷ See, for example, IAEA, Implementation of the NPT Safeguards Agreement and relevant provisions of Security Council resolutions 1737 (2006), 1747 (2007) and 1803 (2008) in the Islamic Republic of Iran, Report by the Director General, (GOV/2008/15, 28 May 2015), para. 16: <https://www.iaea.org/sites/default/files/gov2008-15.pdf>; and (GOV/2009/8, 19 February 2009), para. 21: <https://www.iaea.org/sites/default/files/gov2009-8.pdf>.

⁸ IAEA, Implementation of the NPT Safeguards Agreement and relevant provisions of Security Council resolutions 1737 (2006), 1747 (2007), 1803 (2008), and 1835 (2008) in the Islamic Republic of Iran, Report by the Director General, (GOV/2009/55, 28 August 2009), paras. 19 and 28: <https://www.iaea.org/sites/default/files/gov2009-55.pdf>.

⁹ IAEA, Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran, Report by the Director General, (GOV/2006/15, 27 February 2006), para. 52: <https://www.iaea.org/sites/default/files/gov2006-15.pdf>.

¹⁰ IAEA, INFCIRC/153 (Corr.), paras. 1-2; NPT, Article III.1 (INFCIRC/140).

Agency remains concerned about the possible existence in Iran of past or current undisclosed nuclear related activities...”.¹¹

In April 2011, Director General Yukiya Amano reorganized the arrangements for the Iran reports. The first report under this new process was that of May 2011 in which the allegations of PMD were formally listed under seven particular areas of concern:¹²

- Neutron generator and associated diagnostics: experiments involving the explosive compression of uranium deuteride to produce a short burst of neutrons.
- Uranium conversion and metallurgy: producing uranium metal from fluoride compounds and its manufacture into components relevant to a nuclear device.
- High explosives manufacture and testing: developing, manufacturing and testing of explosive components suitable for the initiation of high explosives in a converging spherical geometry.
- Exploding bridgewire (EBW) detonator studies, particularly involving applications necessitating high simultaneity: possible nuclear significance of the use of EBW detonators.
- Multipoint explosive initiation and hemispherical detonation studies involving highly instrumented experiments: integrating EBW detonators in the development of a system to initiate hemispherical high explosive charges and conducting full scale experiments, work which may have benefitted from the assistance of foreign expertise.
- High voltage firing equipment and instrumentation for explosives testing over long distances and possibly underground: conducting tests to confirm that high voltage firing equipment is suitable for the reliable firing of EBW detonators over long distances.

This paved the way for an even more significant change in the November 2011 report in which the IAEA conflated Iran’s past undeclared nuclear fuel cycle activities with aspects of PMD and deemed as credible the information provided to the Agency on PMD, “the information consolidated and presented in this Annex comes from a wide variety of independent sources, including from a number of Member States, from the Agency’s own efforts and from information provided by Iran itself. It is overall consistent in terms of technical content, individuals and organizations involved and time frames. Based on these considerations, and in light of the Agency’s general knowledge of the Iranian nuclear programme and its historical evolution, the Agency finds the information upon which Part C of this Annex is based to be, overall, credible”.¹³ Journalists probing the same assessment came up with a very different answer:

¹¹ IAEA, Implementation of the NPT Safeguards Agreement and relevant provisions of Security Council resolutions 1737 (2006), 1747 (2007), 1803 (2008) and 1835 (2008) in the Islamic Republic of Iran, Report by the Director General, (GOV/2010/28, 31 May 2010), para. 35: <https://www.iaea.org/sites/default/files/gov2010-28.pdf>.

¹² IAEA, Implementation of the NPT Safeguards Agreement and relevant provisions of Security Council resolutions in the Islamic Republic of Iran, Report by the Director General, (GOV/2011/29, 24 May 2011), para. 35: <https://www.iaea.org/sites/default/files/gov2011-29.pdf>.

¹³ IAEA, Annex: Possible Military Dimensions to Iran’s Nuclear Programme, (GOV/2011/65, 8 November 2011), para.14: <https://www.iaea.org/sites/default/files/gov2011-65.pdf>.

“CIA analysts, some of whom had been involved only a year earlier on the flawed assessments of Iraq's weapons programmes, initially speculated that a third country, such as Israel, may have fabricated the evidence. But they eventually discounted that theory.

British intelligence, asked for a second opinion, concurred last year that the documents appear authentic. German and French officials consider the information troubling, sources said, but Russian experts have dismissed it as inconclusive”.¹⁴

In its November 2011 Annex on PMD, the IAEA based its allegations on a nuclear weapon acquisition path involving high-enriched uranium (HEU) relevant to the development of an HEU implosion device, and listed twelve areas of concern:

- 1) Programme management structure.
- 2) Procurement activities.
- 3) Nuclear material acquisition.
- 4) Nuclear components for an explosive device.
- 5) Detonator development.
- 6) Initiation of high explosives and associated experiments.
- 7) Hydrodynamic experiments.
- 8) Modelling and calculations.
- 9) Neutron initiator.
- 10) Conducting a test.
- 11) Integration into a missile delivery system.
- 12) Fuzing, arming and firing system.

Fast forward to December 2015 when the IAEA issued its final assessment on past and present outstanding issues regarding Iran's nuclear programme, in accordance with the “Road Map” or work plan agreed in Vienna on 14 July 2015 in parallel with the EU/E3+3¹⁵ and Iran JCPOA. The December 2015 final assessment is a political artifact to bring to closure the ill-advised charge sheet of allegations outlined in November 2011, which does not accord with the standard safeguards practices of the IAEA. It is, however, understandable that this politically determined course of action was necessary to begin the implementation of the JCPOA. The JCPOA represents the most practical way forward to deal with the Iran nuclear file, to assure the implementation of the additional protocol and other measures relating to Iran's nuclear programme.

Assessment of the IAEA December Report

1. Programme management Structure

The final report summarizes the programmatic structure of the alleged nuclear weapons programme in much less detail than the 2011 report. In 2015 the Agency reports that “A significant proportion of the

¹⁴ <http://www.washingtonpost.com/wp-dyn/content/article/2006/02/07/AR2006020702126.html>.

¹⁵ European Union + France, Germany and the United Kingdom + China, Russian Federation and the United States of America.

information available to the Agency on the existence of organizational structures was confirmed by Iran during implementation of the Road-map". Given that much of what the IAEA is alleging in its organizational description is readily available and not in dispute, it would be useful to know if any of the suspicious activities alleged are confirmed?

The Agency assesses that there was an organized effort that could support a nuclear weapons programme before 2003. This is consistent with the US National Intelligence Estimate of 2007. The IAEA also assesses that "Although some activities took place after 2003, they were not part of a coordinated effort". This very general statement could apply to a serious governmental effort or university studies outside the government altogether. As noted later, the IAEA is willing to describe ordinary university experiments with Dense Plasma Focus under the heading "Neutron Initiators" which is purely hyperbole.

2. Procurement Activities

Iran, a sovereign country, does not recognize the legality of all of the sanctions and prohibitions on it. It should come as no surprise that Iran purchases equipment through whatever channel it sees fit and is not apologetic for bypassing sanctions.

Iran's failed attempt to buy a high speed camera is interesting. If the Agency would specify what type of camera (streak, framing etc.) and give the dates of the attempt, it would allow independent correlation of the timing of other allegations in the final report where such a camera might be useful.

In the 2011 report, the Agency lists many attempted procurements in paragraph 26. A useful exercise for the Agency and the reader would be to enumerate those largely dual use items and list their ordinary and clandestine uses. The dates of acquisition attempts and successful acquisition would improve transparency.

The Agency might want to consider the accommodation made during investigations of the South African nuclear programme in 1993. The Agency agreed not to investigate details of certain procurement attempts because there were current legal cases pending against individuals and companies.

3. Nuclear Material Acquisition

The IAEA devotes three paragraphs (29- 31) in the December 2015 report repeating old charges against Iran on various topics. After the old charges are rehashed, paragraph 32 says IAEA found nothing to indicate that the charges were true. This conclusion should have been made up front before repeating the charges.

In paragraph 29, the IAEA repeats its concern that surrogate materials were being used in place of uranium to avoid contamination. This topic might raise concerns but the Agency has not revealed how the use of non-nuclear materials in general chemistry development falls under its mandate. They do not.

In Paragraph 31, the Agency unnecessarily confuses "discrepancy" with "diversion". IAEA refers to a case where a new measurement of a container of natural uranium waste at an Iranian plant differed by 19.8 kg after a hiatus of 8 years.

First, this is not a PMD issue. It is a nuclear material accounting issue. In the 2011 report, it was not even mentioned under PMD but under *Other Issues*. Second, the final report fails to make clear that the material in question was under seal from 2003 until 2011. No material was ever missing or diverted. It is only a case where a new measurement technique produced a new accounting result. The IAEA once again shows a remarkable reluctance to clearly state its position and instead implicates Iran by innuendo. The Agency also fails to mention that Iran offered to reprocess all the waste to adjudicate the dispute.^{16, 17} Does this make a difference? It certainly did in 2011 when the Governor of the IAEA from the United States added it to his list of concerns about Iran.¹⁸ The Agency also fails to point out the triviality of this discrepancy, 19.8 kilograms when its own internal standard for a Significant Quantity discrepancy in natural uranium is 10,000 kg!

4. Nuclear components for an Explosive Device

This section also repeats a list of old charges and then concludes that none of them are true. Another case where putting the conclusion up front would be useful.

This is time to put the so-called “Uranium Metal Document” to bed. The IAEA now cannot seem to bring itself to say that Iran provided the document voluntarily back in 2005. Iran received the document from the clandestine nuclear supply network of Pakistani metallurgist A. Q. Khan involving individuals and entities from some 30 countries as reported by the Director General in 2005. Iran says it was included in other material and they did not request it, hence they gave it to the IAEA. This raises the legal issue of whether a person receiving unsolicited illegal materials is guilty of a crime, especially if he reports it. The Uranium Metal Document has never been publicly released but is frequently cited. It is said to describe a number of processes such as producing uranium compounds such as UF₄ and machining uranium hemispheres. As serious as this may seem to the layman, these topics are all unclassified and have been described in the scientific literature since the 1950s. The IAEA needs to do research into these topics; they are simply outside of the expertise of the Secretariat or they are being deliberately used to excite rather than quiet hysteria.

Finally this section includes more junk science, specifically the use of lead oxide as a surrogate for uranium conversion. If the IAEA cannot explain this, it should be deleted.

5. Detonator Development

In 2011 the Agency wrote: “The Agency recognizes that there exist non-nuclear applications, *albeit few*, for detonators like exploding bridge wire detonator (EBW), and of equipment suitable for firing multiple detonators with a high level or simultaneity.”¹⁹ Iran provided information about its work, in Farsi. Farsi is the language of Iran. In several cases the Agency expresses frustration that information is provided in a foreign language but they do not indicate whether they had it translated into a UN language.

In 2015, “The Agency acknowledges that there is a growing use of EBW detonators for civilian and conventional military purposes. Iran is moving towards the best and safest technology”. The Agency

¹⁶ GOV/2012/9.

¹⁷ GOV/2012/23.

¹⁸ <http://vienna.usmission.gov/111118iran.html> and <http://www.reuters.com/article/us-nuclear-iran-usa-idUSTRE7AH1CL20111119#TjMPTm0zEboCjZ1G.97>.

¹⁹ GOV/2011/65.

makes no mention of other modern detonators: exploding foil and slappers, for example. If Iran had been questioned on other related topics, knowledge might have been greatly increased but the section suggests the IAEA limited itself to the topic of the EBW accusation by an anonymous source.

6. *Initiation of High Explosives and Associated Experiments*

The IAEA makes a curious correction to the 2011 report and now says that the most significant alleged Iranian nuclear weapons experiment was done at “Marivan” and not in “the region of Marivan.” The Agency summarizes the very significant allegation of the Marivan experiment but provides no new information or analysis.

Remarkably the Agency does not state that Iran offered to take the Agency to Marivan on at least three occasions and the Agency declined. That is an unacknowledged example of Iranian cooperation. The refusal of the IAEA to go to Marivan is extremely troubling. A Member State provided great detail on a multi-point explosive initiation system which has applications in nuclear weapons. The same Member State informed the Agency that the experiment to confirm this concept was done at or near Marivan. The reluctance to go to Marivan is likely the realization that the information was “not actionable.” Despite the detail about the experiment itself there probably is not enough information to identify the exact site and the Agency is ill-equipped to investigate such a site. Note that experienced weapons designers from the US, UK, and France are not allowed to carry out inspections in Iran leaving few qualified individuals to visit that site. This is a case where Iran is responsible for prolonging the verification process. If the information from the Member State is wrong, then it bears on the credibility of all information from that Member State.

In the future, the IAEA should designate which Member State provided information, such as “Member State A.” This would aid in understanding how much of information is coming from anonymous State “A” etc. As information is validated or discarded a track record for State “A” could be established. In the 2011 report the IAEA states: “The Agency has shared with Iran information provided by a Member State which indicates that Iran has had access to information on the design concept of a multipoint initiation system that can be used to initiate effectively and simultaneously a high explosive charge over its surface.” There is no indication in the 2015 report that security safeguards have been put in place to avoid sharing sensitive technical information with Iran that Member States have confirmed is used in actual nuclear weapons, especially since Iran indicated this was new information for them.

7. *Hydrodynamic Experiments*

This topic contains the kind of hyperbole that makes the IAEA report extremely irresponsible and unconvincing. The Director General reports visiting the contested building at Parchin and seeing a floor with an “unusual cross-section.” From an engineering point of view, reporting that a floor had an “unusual cross-section” is completely useless information. It has no value other than to disturb, to imply something insidious, to create unease and to highlight the distress of the observer who could not think of a better description. This is regrettable.

Hydrodynamic experiments are designed to compress natural uranium or surrogate materials in a configuration mocking up a real nuclear explosive. Results from the experiment can validate calculations and simpler experiments. Use of a chamber to contain a full-scale hydrodynamic experiment would be an expensive and unnecessary move on the part of Iran. A hydrodynamic experiment using explosives

and uranium to mock up a neutron initiator is also a possibility. The IAEA has not specified either or other alternatives.

The IAEA created a huge controversy by extracting six sentences from a Russian book and claiming they were related to a building in Iran at Parchin. The book extract was about civil uses of explosives in industrial compaction; however, the IAEA connected this concept to the idea that Iran would do secret nuclear weapons development in a containment chamber hidden in a building. The actual experiments were never defined, but the possible uses leaked to the press were unlikely. A Member State directed the IAEA to acquire satellite pictures of a building at Parchin. The pictures of the building described in 2011 did not show the alleged chamber. After an astonishing lapse of four years, the IAEA also acquired a new image from 2000 that also does not show the chamber. The IAEA has reported no initiative on its part to analyze the technical content of the allegations or to follow up with the manufacturer of the alleged chamber, the Azarab Industries Co. in the town of Arak. The Director General of the IAEA visited the building and observed nothing of use for analysis. Environmental samples were taken and analyzed for traces of uranium and the two particles found were deemed insignificant. The environmental samples were also analyzed for traces of explosives but nothing was found. The Agency does not normally use environmental radiation samples for chemical detection, so the limits of sensitivity are unknown. The finding of no explosives is deemed inconclusive.

Given the failure to justify the need for such a chamber, the absence of the chamber in all publicly available information, and its absence during the Director General's visit, this topic can clearly be put to rest.

8. Modeling and Calculations

The Agency's section E.8, Modelling and Calculations, is a centerpiece of its claim that Iran conducted computer modeling of nuclear explosive devices between 2005 and 2009. The only source cited throughout is "Member States" without any elaboration or comment on quality or quantity of information. In paragraph 58, there is the claim that Iran undertook studies of "various component arrangements" – a vague term. It connects the work to high explosives modeling and code development but makes no mention of neutronics. High explosive code development would not normally be considered part of the IAEA mandate.

Paragraph 59 states the concern that Iran was considering modeling the equation of state for "materials of concern". In other parts of the report, the IAEA states that there is no secret fuel cycle in Iran and no uranium diverted, hence the materials of concern are not nuclear materials and not subject to IAEA safeguards. There is no reason that the IAEA cannot name the "materials of concern" just as it did with tungsten and lead oxide.

Neutronics work apparently is only the work of one named individual who published a thesis in Farsi. There is no indication that the thesis has any relationship to the topics in this section of the report. The claim that the Agency "notes some similarity between open source and Member State information" is a non-sequiter. If the Member States found the open source, fed it to the Agency as their own information, and then allowed the Agency to discover it in the open source for itself, then the Agency has just been duped.

The final conclusion of the Agency that Iran worked on dual-use hydrodynamic modelling, and possibly neutronic modelling is unclear. There is no assertion that Iran worked on coupled neutronic-

hydrodynamic codes which would be much more convincing. Given that this conclusion is based upon anonymous sources, which could even include the discredited Marivan source, it is of very low credibility.

9. Neutron Initiator

The language of this section is largely the same as in 2011. It does not divulge that some of the charges it is leveling against Iran come from tainted documents whose authenticity have not been proven, some leaked to *The Times* of London and also described in Director General Mohamed ElBaradei's book as unverifiable.²⁰

In paragraphs 63 and 64, the Agency describes its allegations concerning shock compression initiators that could certainly be useful in nuclear weapons. The language of its conclusion is tortuous but the Agency seems to be retracting its claim:

"Prior to the implementation of the Road-map, the Agency assessed that one of the indicators of the manufacture of shock-driven neutron sources was weaker than previously considered."

The syntax of this conclusion is left for the reader to discern. Also under the heading of Neutron Initiators is a visit to an unnamed university in paragraph 64. This visit was an examination of a dense plasma focus (DPF) neutron source. DPF are not normally used in nuclear weapons and the use in a university is unremarkable. Placing this topic under the heading Neutron Initiators is prejudicial and misleading. It explains to a large extent why Iran is reluctant to volunteer anything to IAEA knowing it will possibly be misused.

10. Conducting a Test

The Agency claims that Iran "may have planned and undertaken preparatory experimentation relative to testing a nuclear explosive device". The language is virtually identical to 2011. The Agency still has not discovered that a high voltage firing pulse to detonators is not sent from a firing set located hundreds of meters from the explosive device. The high voltage firing set is located immediately adjacent to the explosive device and triggered from far away. They have not described whether the alleged information is serious and detailed or more like a cartoon. Is the information a plan for a test or simply a sketch of how tests are done? In fact, the *Washington Post* describes the test in far more detail than IAEA in February 2006.²¹ The U.S. analysis claims the "shaft" is 400 metres deep and has a control team parked a "safe" 10 km away. This may be the basis of the IAEA claim that the high voltage pulses travel a long distance. However, "As far as U.S. intelligence knows, the idea has not left the drawing board".

The Agency does not provide any other information about analysis of the alleged test site, such as how much earth would be required to fill the giant excavation shown in the sketches. IAEA inspectors visited the 338 metre deep granite shafts at Saghand that belong to the Atomic Energy Organization of Iran, but

²⁰ Mohamed ElBaradei, *The Age of Deception: Nuclear Diplomacy in Treacherous Times*, Metropolitan Books, New York: 2011, p. 290.

²¹ <http://www.washingtonpost.com/wp-dyn/content/article/2006/02/07/AR2006020702126.html>, Strong Leads and Dead Ends in Nuclear Case Against Iran.

unfortunately their observations of use for a nuclear test have not been published.²² Shafts of this depth are almost exactly the standard depth of burial for a 20 kt nuclear test and should be of interest to the IAEA.

11. Integration into a Missile Delivery Vehicle

This is a very important and interesting topic and one that could have been covered in more detail. The Agency does not report on the form and format of the alleged integration studies. Was the information textual and specific to nuclear warheads? Were the studies done by the AMAD programme or was this the work of other organizations? Did the studies utilize commercially available software and if so which software? The *Washington Post* indicates that scientists from the U.S. Sandia National Laboratories studied the information: “Experts at Sandia National Laboratories in New Mexico ran the schematics through computer simulations. They determined two things: The drawings were an effort to expand the nose cone of the Shahab-3 to carry a nuclear warhead, and the modification plans, if executed, would not work”. The IAEA has no known expertise whatsoever in re-entry vehicle design characteristics. Sandia integrates all U.S. nuclear warheads.

The Agency’s Final Report verifies the existence of two “workshops” that were seen in videos provided by a Member State. These workshops were visited and determined to be the same ones in the alleged studies. There is no mention of the size of the workshops, technical capabilities, security, workforce and whether they were civil or military facilities?

12. Fuzing, Arming and Firing System

The IAEA repeats four year-old accusations that it has evidence but does not present it in any detail. The Agency reports it “has not received additional information on this area since the 2011 Annex”. It is not clear whether this refers to information from Iran, the anonymous source, or both.

The Agency reports that it has a number of documents referring to the development of a *firing* system for a warhead payload. It is not clear, however, if the Agency had a number of documents that relate to a *fusing* system that would trigger the firing system. This is an important technical distinction that is left ambiguous.

Iran frequently parades its ballistic missiles publicly. There is no mention by the Agency of assessments of missile characteristics relevant to this topic, such as radar windows on the RV. There is no discussion of Member State information about telemetry signals from test flights that would give information on systems such as terminal radar height of burst measurements. The Member States should be very interested in collecting such information and should share it along with expertise if the IAEA requests it.

A Clash of Cultures

On 2 December 2015, the IAEA released its final final assessment of all past and present outstanding issues regarding the possibility that Iran was using its civil nuclear weapons programme as a cover for an

²² Optimization of Spacing between Explosion Holes in Advancing Shafts, of Uranium Mine in Saghand by M. R. Nikgoftar, A. Bahrami, A. Shoja, *J. of Nuclear Sci. and Tech*, No. 30, 2004, pp. 49-55.

alleged nuclear weapons programme. The IAEA's approach to investigating the allegations highlights the difference between problem solving approaches.

Comparison of the Scientific Method and the Law Enforcement Method

In the Scientific Method, every effort is given to the quality of data used for a discovery. There is also an attempt to postulate one or more possible causes for a given outcome and then study each to eliminate some and choose among others. In the scientific method, researchers are required to state each of their initial hypotheses. Then they must explain how and why some were excluded and how the best – possibly more than one explanation was chosen.

In the Law Enforcement model there is a different emphasis. Suspects may be identified, but then the investigators chose the most likely suspect, in their opinion, often the one for which there is the most evidence. From that point on the examiners tend to ignore other suspects. The emphasis is on trying to prove every piece of data fits the prime suspect. In some cases that means that contradictory information is discarded if it does not fit the case against the prime suspect.

In the case of the Iran nuclear file, it is clear that since 2010 the IAEA acted as a political organization run by lawyers and diplomats familiar with the Law Enforcement Model. Evidence against Iran was accepted at face value. The allegation was chosen and every effort was made to “pin the blame” on that suspect. Other possible explanations for Iran's activities were ignored because there was only one accusation. Inconvenient evidence was excluded if it did not prove the accusation against the prime suspect.

This cultural difference explains why since 2010 IAEA continued to cast Iran as a lying and uncooperative suspect, when in fact the scientific method would yield very different results.

Take the case of Marivan, for example. The IAEA had twice accused Iran of conducting critically important nuclear weapons development activities in or near Marivan. The source of the accusation was anonymous but the amount of detail provided by the IAEA in its reports was very considerable. If all the details were true it would be damning evidence. The “hydrodynamic experiments” claimed by the IAEA to have been carried out by Iran at Marivan would be significant evidence.

How did IAEA approach this evidence? First it made the accusation. Then there was no IAEA report that it studied the Marivan region in detail with tools such as maps or satellite imagery. There was no record of searches of Iranian scientific organizations, factories or universities in Marivan. The IAEA did not discuss the strange absurdity that Iran would conduct its most vital experiments on the border with Iraq, at a time when U.S. Special Forces were nearby and could infiltrate. Instead of using much more secure sites in the eastern parts of the country, Iran put its national security at risk.

When the Scientific Method is applied to the same set of data, an obvious conclusion would be that the initial data was false and that one should be highly skeptical that the alleged experiment took place in this unlikely location.

But the Law Enforcement Model dictated that the accusation cannot be withdrawn if it was part of the body of evidence being used to convict. The IAEA also was trapped by its very narrow competence in

detecting suspicious nuclear-military activities. The IAEA only learned after making the accusation that the alleged experiment did not use uranium, which was the only evidential trace the IAEA was really qualified to detect. So even if the IAEA knew where to visit, it would have few or no tools to make measurements and draw conclusions. In the case of the IAEA and Marivan, the IAEA declined to visit the site because evidence was mounting that it would find nothing and this would damage the case.

This was also obvious in the case of the alleged large explosion containment chamber at the Parchin military factory. Under the Law Enforcement Model, an anonymous source claimed that Iran had built a large chamber, the size of a reactor pressure vessel, held in place on a massive 700-ton block of concrete. The IAEA did not inform us why Iran needs this massive chamber when other States do not use similar ones, but it did provide fairly precise dimensions based upon a book.

In the IAEA analysis, it assumed that this chamber did actually exist. There was no proof it existed, so the Agency provided a verbal description of satellite imagery, without showing the images, that was “consistent” with hearsay. The IAEA seized upon a statement by the book author that he was designing this chamber in 1999 and 2000 and that it was calculated to contain the blast of 70 kg of explosives.

In the Law Enforcement Model, the IAEA did not provide any facts or analysis. Were there any ground or aerial photographs of this chamber? Was it feasible to fabricate such a chamber and install it in 2000 as claimed by the anonymous source? Had the IAEA done its own calculations of the strength of such a chamber?

But during this period another anonymous source provided a journalist with a cartoon of the alleged chamber that was suspiciously similar to a different much smaller chamber in the same book. The journalist identified the Azarab factory where the chamber was allegedly made. This was a lead of major proportions. The IAEA could study the factory details on the Internet. It could demand new satellite images that might show the chamber at the factory or during the difficult cross country movement of the massive object. It could ask Iran for a visit to this factory. But the final indictment did not include any of this analysis and follow-up. Because it might very inconveniently show that it was more likely that the chamber did not exist and was never installed. So, in the four years before the final trial, there was no independent effort to develop a case for alternatives, only a dogged determination to hold to the initial allegation without corroborating hard evidence. The purpose of the experiment is never explained by the IAEA because it had no idea what such a chamber would be used for; only that the informant had made a vague claim outside their expertise. How does the chapter end? The IAEA final report repeated all of the initial accusations as if they were true, and then proclaimed that after four years it had a commercial satellite image that confirmed the IAEA’s suspicions but unfortunately did not show the chamber—these commercial images were not included in the report.

The Scientific Method would begin with a review of the value of such a chamber in a nuclear weapons programme. Do other countries use chambers like this for such purposes? What are those purposes? Are there more reasonable alternatives such as outdoor testing or testing in tunnels? The alleged purpose of such a chamber, according to the IAEA, was to hide traces of uranium particles from weapons experiments. Was Iran really worried about IAEA finding traces of uranium when this chamber

was conceived as late as 1999? Do the satellite images show anything useful? Have all available images been found and examined. Has the Board of Governors been shown any of the images of the building of interest at Parchin?

How to Lead a Source in the Google Era

In the Internet era there are many ways to create a legend and then lead an unsuspecting party to find it and endorse it. It begins with creating a story and feeding it to the intended victim. Take the story that the IAEA accepted that:

*“Information which the Agency has been provided by Member States, some of which the Agency has been able to examine directly, indicates that Iran has manufactured simulated nuclear explosive components using high density materials such as tungsten”.*²³

The IAEA does not have the experience to know that this simple claim is actually much more complicated than it realizes and is probably wrong. This has been described at length in a SIPRI Technical Note. <http://www.sipri.org/research/disarmament/nuclear/iran>. But it is actually quite easy to search the Internet and find that an Iranian scientist did do at least one experiment to compress tungsten powder with high explosives.²⁴ This has nothing to do with hydrodynamic experiments in connection with a nuclear weapon programme, the supposed topic of IAEA claims. It is actually aimed at making crude tungsten parts using explosive compression and it appears the work was very unsuccessful. But the trap was set and the tungsten myth permeated the blogosphere in a short time. Soon the scientist and his experiments were ‘proof’ of an Iranian nuclear weapon. Names of scientists on the scientific publications were transformed into suspected Iranian nuclear weapon scientists. This was a dangerous list to join given the subsequent assassination of four Iranian scientists.

The Danger of Propagating Shallow Conclusions in a Politically Charged World

In this era of “mouthpiece journalism” great care must be taken to not provide bullets to journalists. Many of the major journalists spend only a few hours on a story. They read a summary of key findings and parrot them without any critical thinking of their own. An example would be a major newspaper of record in the U.S. Within hours of the IAEA final report, the paper had endorsed it and accused Iran of non-cooperation. It endorsed the IAEA’s extremely weak conclusion that Iran had carried out nuclear weapons experimentation between 2005 and 2009 and made that the headline. These are very important claims. They will have political impact well into the future when only the bottom line claim will be remembered and not the failure to do due-diligence. The paper knows well that its technical claims are publicly criticized—earlier the paper was misled on Iraq’s chemical weapon-related activities and had to issue a retraction. The paper knows that Marivan was a key consideration in the IAEA case

²³ GOV 2011/65.

²⁴ 1st International Conference on Manufacturing Engineering, Tehran, Iran, 2005, M. Zohoor, A. Mehdipoor, M.R. Khalili and N. Parvin, Explosive Compaction of Tungsten Powder.

against Iran and should have noticed that the IAEA had rejected Iran's invitation to visit that site and had not given any explanation why, especially when the IAEA earlier had linked Marivan to alleged nuclear weapon activities. Since the obvious reason was that the information fed to the IAEA was false there should be journalistic follow-up. Sadly that is not happening in the Internet age. When the most important accusation made by the IAEA turns out to be false and was supplied by one of the ubiquitous anonymous Member States alarm bells should be ringing.

Structural Weakness in the Governance of the IAEA

The IAEA was established in 1957 and its functions are elaborated in its Statute. The IAEA safeguards system has evolved over time and is based on common technical criteria and safeguards goals for different types of nuclear fuel cycle activities in States with differing legal obligations. Non-nuclear-weapon States (NNWS) party to the NPT implement a comprehensive safeguards agreement (INFCIRC/153 (Corr.)) and are obligated to declare and place under safeguards the entirety of their nuclear material holdings and nuclear activities. Nuclear-weapon States (NWS) party to the NPT voluntarily offer civilian facilities and excess defence nuclear material in some cases to be placed under safeguards. And, States not party to the NPT place under safeguards certain nuclear material and facilities but are not obligated to accept safeguards on the entirety of their nuclear programmes. The IAEA implements safeguards on nuclear material and nuclear facilities in a standard manner regardless of the type of State, i.e. a uranium enrichment facility would be subject to the same safeguards measures regardless of whether it is a NNWS, NWS or non-NPT State. Safeguards practices and technologies are constantly upgraded – in 1997, the Board of Governors approved the Additional Protocol to safeguards agreements that provides additional verification and administrative tools and recently the Secretariat is considering moving to a State Level Concept that assesses a State holistically.

Starting in 1991 after the discovery of a large clandestine nuclear weapon development programme in Iraq, the IAEA began to accept intelligence or third party information to facilitate safeguards implementation. As an international organization, the IAEA has limited means to authenticate and independently verify intelligence information provided to it, thus Directors General Blix and ElBaradei were extremely careful in accepting the veracity of intelligence information unconditionally. In the 2002-2003 period the IAEA informed the Board of information provided to it on Iraq that was not authentic.

A structural weakness of the IAEA is that is no transparent process for the supply of intelligence information and confirmation of its authenticity. The usual process is for the Member State(s) to provide the intelligence information either in documentation or electronic form to a special assistant in the Director General's office and/or to the Deputy Director General for Safeguards, alternatively to give a closed briefing in its embassy/mission. The IAEA then deals with the information as described in an earlier section above. There is no established process to share such information with the accused State or with the BoG. In 1993, however, the IAEA Secretariat was allowed by the US to show classified satellite imagery provided by the US to the Board in a technical briefing. To the authors' knowledge this modality has not been repeated.

The supply and use of intelligence information is a sensitive yet complex issue as noted in the excerpt from an IAEA BoG Governor cited in an earlier section above. The IAEA cannot serve as a feedback loop to intelligence agencies on the veracity of information provided by them through safeguards inspections and assessments. Nor can or should the IAEA rely on such information without confirming its authenticity. This obviously leaves the IAEA in a difficult position as is clearly evidenced by the Iran PMD file where the Agency seems to have been caught short.

Recommendations

The authors recommend that the BoG put in place a methodology for the acceptance and use of intelligence information drawing from the practices of the Organization for the Prohibition of Chemical Weapons (OPCW) and the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO). In these two organizations, allegations of non-compliance can be raised by any State Party which provides its information to the Director General, who in turn shares it with the Executive Council. The Executive Council is convened; the Accuser State puts forward its case on allegations of non-compliance or suspicious activities in another State along with supporting information/evidence. The Accused State has the opportunity to present its defence. Following deliberations, the Executive Council can stop a challenge inspection in the case of the OPCW or authorize an on-site inspection in the case of the CTBTO. Such a practice could serve the IAEA well – the Accuser State to provide information to the IAEA Director General, who then shares it with the BoG, the Board convenes to examine the information presented by both the Accuser and Accused States and then to decide on the way forward preferably on the basis of consensus but by a vote if necessary. In fact, the JCPOA contains a somewhat similar provision for the Joint Commission in paragraph 36 on dispute resolution, and as noted previously in 1993, the IAEA Secretariat presented satellite imagery on DPRK from the U.S. to the Board of Governors.

It is essential that the IAEA BoG expeditiously comes up with a mechanism governing the provision and handling of intelligence information to the IAEA Secretariat. There is great potential for misuse of such information and of suborning the independence of the Agency in the absence of such a mechanism, as abundantly demonstrated by the cases of Iraq, Iran and Syria in recent times.
