



## **Iran's nuclear programme**

### **A challenge for the nuclear non-proliferation regime**

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**Amsterdam, 10 December 2005**

#### **Introduction**

1. Thank you for your kind invitation. It is a pure delight to have a discussion with this interesting crowd of people and listen to the other presentations. I am looking forward to a stimulating debate after we conclude this session.
2. I recently attended a dinner at the House of Lords where the former Iranian ambassador to the United Kingdom gave a speech outlining his country's reasons for acquiring nuclear energy. His main theme was Iran's right, guaranteed by the 1968 Nuclear Non-Proliferation Treaty (or NPT for short), to develop the nuclear fuel cycle. The justification for this development, he argued, was his country's pressing need to diversify its energy supplies. He rhetorically asked why Iran should be denied its rights when other states remain free to engage on nuclear power development? He complained that Iran's compliance with the 1968 Nuclear Non-Proliferation Treaty remained an open issue, despite the fact that many thousand person-hours of International Atomic Energy Agency inspections had failed to produce any evidence of a nuclear weapons programme.
3. The Ambassador's remarks are the product of a quite clever line of negotiation that raises several questions relating to the operation of the NPT. These questions address a state's right to operate a domestic fuel cycle. These questions range from

verification to enforcement and compliance. Before I go into details about Iran's programme, it may therefore be useful to outline what is prohibited and what is allowed under the NPT.

## **The 1968 Nuclear Non-Proliferation Treaty**

### The three pillars (see slide 3)

4. As you know, the 1968 Nuclear Non-Proliferation contains three important sets of obligations. These three sets are sometimes referred to as the 'three pillars' of the treaty. The first pillar is the set of non-proliferation obligations outlined in articles I and II of the treaty. The second pillar is the right to development of a peaceful nuclear industry. This pillar is contained in article IV of the treaty. The third pillar is the commitment by nuclear-weapon states to conduct effective negotiations on nuclear disarmament. This commitment is enshrined in article VI of the treaty. All three pillars should have equal weight and should be equally enforced.

5. Non-nuclear weapon states such as Iran have committed themselves not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices and not to seek or receive any assistance in the manufacture of nuclear weapons or other nuclear explosive devices.

6. Non-nuclear weapon states have also undertaken to accept International Atomic Energy Agency safeguards. The purpose of safeguards is to verify the fulfilment of the non-nuclear weapon state's obligations under the NPT. Safeguards aim to do this by preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices. The idea is quite simple: a state cannot manufacture a nuclear device if it cannot get its hands on fissile material.

### Is a breach of safeguards a breach of the NPT? (see slide 4)

7. Article IV of the non-proliferation treaty states that nothing in the treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes. This right is not

unconditional, however. Article IV also states that the right should be exercised in conformity with Articles I and II of this Treaty. These articles outline a state's non-proliferation commitments.

8. What does that mean? Well, certainly nothing less than that the right to develop peaceful uses of nuclear energy is dependent on how a state conforms to its non-proliferation commitments under the treaty. The significant clue as to how to proceed when interpreting the treaty is to look more closely at the language of article IV.

9. Article IV does not refer back to article III, which requires all states to accept IAEA safeguards. The article also states what purpose those safeguards shall have, namely to prevent the diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices.

10. If a state accepts a safeguards agreement, it has fulfilled its obligations under article III. If the state does not accept a safeguards agreement, it has breached article III. So far the interpretation is straightforward. But what if a state accepts a safeguards agreement and does not honour it?

11. Some observers maintain that a breach of the safeguards agreement amount to a breach of article III. This conclusion apparently rests on an extensive interpretation of the word 'accept' in the article. Not all observers, lawyers as well as laymen, would accept this interpretation

12. Also keep in mind that a breach of a safeguards agreement by, say, neglecting to report a certain amount of nuclear materials does not mean that the state is 'manufacturing' a nuclear weapon. This would mean that a breach of a safeguards agreement is not necessarily a breach of article II of the NPT. This is a logically coherent interpretation but may not be the complete picture. While a certain behaviour may not amount to a technical breach of the NPT, it may constitute a threat to international peace and security. I will talk a little about that later on.

Iran's safeguards agreements (see slide 5)

13. The distinction between a breach of safeguards and a breach of the NPT is important, since one major prohibition in article II is the manufacture of nuclear devices. A diversion of materials may not be for weapons purposes. That said, safeguards agreements are bilateral agreements on the treaty level. They establish rights and responsibilities in their own right.

14. Iran has accepted such safeguards. Its comprehensive safeguards agreement entered into force on 15 May 1974. It signed an additional protocol to the comprehensive safeguards agreement quite recently, on 18 December 2003. Since the Iranian parliament has failed to ratify the agreement, it has yet to enter into force. In the meantime, Iran is applying the protocol on a provisional basis.

#### Objective of safeguards (see slide 6)

15. As I said, the nuclear safeguards system focuses on the diversion of nuclear materials. This is best described in the so-called technical objectives of safeguards, as stated in the model comprehensive safeguards agreement.

16. The safeguards system focuses on the timely detection of diversion of significant quantities of nuclear material from peaceful nuclear activities to the manufacture of nuclear weapons or other nuclear explosive devices or for purposes unknown, and deterrence of such diversion by the risk of early detection.

17. Note that it is not essential to establish that a diversion is to a nuclear weapons programme. It is sufficient that fissile material is diverted to purposes unknown. Also note that Agency safeguards are not primarily designed to detect weaponization programmes themselves.

#### The additional protocol (see slide 7)

18. With an additional protocol in place, the agency is better equipped to detect undeclared nuclear activities.

19. Additional protocols provide the legal authority necessary for the Agency to obtain more information about a state's nuclear activities and more access to sites and other locations where nuclear material is or could be present. Fundamental to strengthened safeguards is the shift in focus from drawing safeguards conclusions based on safeguards implementation at the facility level to drawing conclusions based on implementation and evaluation of information for the State as a whole.

Breaches and concerns (see slide 8)

20. The IAEA has confirmed several breaches of Iran's safeguards agreement, most recently in its report dated 2 September 2005. These breaches span almost two decades and include failure to report both import and processing of nuclear material, failing to declare enrichment facilities and failing to provide design information on several facilities handling nuclear materials.

21. Despite on-going verification efforts by the IAEA, there are also outstanding issues. The primary issues are the origins of low enriched uranium (LEU) and high enriched uranium (HEU) particle contamination found at various locations in Iran; and the extent of Iran's enrichment programme.

22. The IAEA reports on Iran paint a disturbing picture. Especially worrying is the finding of experiments surrounding Polonium-210 and the agency's discovery of materials on the casting and machining of enriched, natural and depleted, uranium metal into hemispherical forms. The Agency has also been obstructed from taking samples at certain facilities by the application of fresh layers of paint. In one instance, an entire site has been razed and the topsoil removed.

23. Take into account a pattern of clandestine purchases of nuclear weapons-related equipment, such as the export control violation in Sweden some six years ago, when a youth working at a local pizzeria was caught and convicted for sending a Teratron. This device can be used as a initiator on some types of nuclear weapons. The person sent the device to a university in Iran. He was using a fake end-user declaration to bypass export control legislation.

24. Also take into account Iran's advanced ballistic missile programme and you have reason to be suspicious of Iran's actions over the past two decades.

Compliance procedure under the CSA (see slide 9)

25. Iran has been found in breach of its safeguards obligations. The IAEA Board of Governors has also found that Iran's actions constitute non-compliance in the context of the IAEA Charter. The Board of Governors have, however, not stated that Iran is in breach of the NPT.

26. The recent determination of the Board of Governors is welcome, since it has been somewhat unclear what procedure to follow if the Agency establishes a breach of a safeguards agreement. Arguments have ranged from those reliant on the safeguards agreement itself to those centred on the IAEA Statute.

27. Article 19 of Iran's safeguards agreement with the IAEA sets out the procedure relating to non-compliance with the objectives of the agreement. The Director-General of the IAEA reports relevant information to the Board of Governors. The Board is tasked with examining this material. If the Board finds that the Agency is not able to verify that there has been no diversion of nuclear material required to be safeguarded to nuclear weapons or other nuclear explosive devices it may report its finding. The IAEA Statute outlines the reporting requirements and I will talk about that shortly. The Board is required to afford the state every reasonable opportunity to furnish the Board with any necessary reassurance before it reaches a decision on referral.

Compliance procedure under the IAEA Statute (see slide 11)

28. Article III (B) (4) of the IAEA Statute also requires the Board of Governors to report to the Security Council should there arise questions that are within the competence of the council. Once the Board of Governors determines that a question falls under the competence of the Council, it must so notify the Council. This is a mandatory requirement. Significantly, the Board of Governors applied this article in its resolution dated 24 September 2005.

Enforcement and reporting under the IAEA Statute (see slide 12)

29. As you know, the IAEA can take some measures once non-compliance has been established. First, it is required to make a report to all member states, the Security Council and the General Assembly. Second, it may:

- Curtail or suspend assistance to the state;
- Call for the return of materials and equipment;
- Suspend the state from the rights and privileges of IAEA membership.

30. The real enforcement powers, however, lie with the UN Security Council as the only body recognized in international law as responsible for the maintenance of international peace and security.

31. Politically speaking, the issue at hand is one of confidence building. Iran did embark on a programme to clandestinely acquire nuclear materials and equipment. Its reasons for doing so are irrelevant.

32. The task of restoring international faith in Iran's intentions is one that Tehran has to take seriously. That is relevant. The International Atomic Energy Agency is unlikely to find any 'smoking gun' evidence of Iranian non-compliance with article II of the NPT. Iran will simply deny the Agency access to sites manufacturing nuclear devices.

33. It is therefore important that Iran, as a confidence building measure, accepts inspections that go beyond what is required by the law. Anything less will hardly help build the required faith in Iran's intentions.

**Iran's nuclear facilities**

34. Before I conclude, I will share with you a few slides I have prepared on Iran's nuclear programme as it stands today. As you will see, taken individually the sites in themselves do not necessarily point towards a nuclear weapons capability, or an

attempt to attain one. When taken as a whole, however, the picture can be perceived as worrying.

#### Mining and milling (see slide 13)

35. Uranium ore is mined by methods similar to those used for other metal ores. The ore is removed from the ground by underground or open-pit mining techniques. The uranium market today has seen a shortfall in supply, which is evident by the fact that the price of uranium has risen considerably over the past 18 months. In fact, today's current uranium spot price of circa US\$59 per kilogramme is the highest seen in the market in the last 25 years.

36. Iran claims that it has proven national reserves of about 3,000 tons of uranium and potential resources in the range of 20,000-30,000 tonnes. This is mined at two locations, Gchine and Saghand. There is little public information on the scale of these deposits. Iran claims that Gchine will be able to produce circa 21 tonnes per year and Saghand circa 50-60 tonnes per year.

#### Conversion (see slide 14)

37. Milled uranium oxide (also known as yellowcake) is converted to uranium hexafluoride. This product is solid at room temperature but changes to gaseous form at moderately higher temperatures (circa 60 degrees Celsius). The product contains only natural uranium. It can be used in most enrichment facilities or can be converted to ceramic grade for used in reactors not requiring enriched fuel.

38. Iran currently has one declared uranium conversion facility. It has stated that the annual capacity of this facility will be 200 tonnes of uranium hexafluoride per year. It is nearing completion and is currently undergoing so-called hot tests.

#### Enrichment (see slide 15)

39. The prime use of uranium hexafluoride is as a feed material in a uranium enrichment process. Today, gaseous diffusion and gas centrifuge are the commonly used uranium enrichment technologies.

40. At present, Iran has declared one principal enrichment site. That is the Pilot Fuel Enrichment Plant in Esfahan. At present, only 164 centrifuges are installed. Iran has parts for approximately 1,000 centrifuges, which are still to be assembled. Iran has also announced plans for a large scale enrichment facility, comprising 50,000 centrifuges at that same site.

Enrichment cont. (see slide 16)

41. This slide shows an estimation of how much uranium Iran could produce in the short and long term. The calculation assumes that both facilities are fully operational and working perfectly, which is seldom the case with newly established uranium enrichment facilities. It also assumes the operation of P-1 centrifuges which are rated as having circa 2 SWU/year. It could be operated as high as 3 SWU/year. The P-2 centrifuge, for which Iran has access to blueprints, may be ranked at approximately 5 SWU/year. In other words, the P-2 is twice as effective as the P-1.

42. The Pilot Enrichment Plant would need to operate a little under two years to produce enough material for one nuclear device. Obviously, if IAEA safeguards were applied to the facility, this production would be very difficult to hide.

43. A commercial scale enrichment facility could produce weapons grade material enough for one weapon in a single month. As you can see, full operation for one year would require a feed of approximately 312 tonnes of uranium hexafluoride.

Fuel Fabrication (see slide 17)

44. For use as nuclear fuel, enriched uranium hexafluoride gas is converted into uranium dioxide powder, which is then processed into pellet form. At present, Iran has declared one such facility, namely the Uranium Chemistry Laboratory located in Esfahan. Iran seem to have taken interest in this part of the nuclear fuel cycle fairly recently.

Power and research plants (see slide 18)

45. Iran currently operates four research reactors in Esfahan and one research reactor in Tehran. These reactors are of little proliferation concern; especially after the

Tehran Research Reactor was converted in 1993 to use 19.7 per cent enriched fuel supplied by Argentina.

46. The IR-40 that is planned to be constructed in Arak would be able to produce some 14 kilograms of plutonium annually, enough for approximately 2 nuclear devices. Tehran estimates that this reactor will be in operation in 2014.

47. The Bushehr Nuclear Power Plant will be supplied by Russia. The Russian Federation is insisting that spent fuel will be returned to Russia for reprocessing. Even though a light-water reactor produces plutonium, it is generally considered of low quality for use in weapons. This is primarily due to the very high burn-up rate in pressurized light water reactors.

Reprocessing, spent fuel and other facilities (see slide 19)

48. Iran has not disclosed any plans regarding reprocessing of spent fuel. Iran carried out undeclared reprocessing at the Tehran Nuclear Research Centre between 1988 and 1993. IAEA samples indicated that additional research was carried out more recently, and Iran acknowledged in May 2005 that some experiments were carried out in 1995 and 1998.

49. It should also be mentioned that Iran, according to France, has tried to purchase equipment in 2000 and 2002, which could be used for reprocessing spent fuel.

Weaponization (see slide 20)

50. There are also concerns about some of Iran's other activities. This includes their experiments on Polonium-210 between 1989 and 1993. Due to its short half-life, this material has few civilian applications, but can be used, together with Beryllium, as an initiator for some designs of simple implosion devices. Polonium-210 is highly toxic and dangerous to handle and the Manhattan project had difficulties preventing people who handled it from absorbing it. The IAEA seem, however, to have accepted Iran's explanation that they were investigating the feasibility of using polonium in advanced batteries.

51. The extent of Iranian research and development of highly specialized explosives, for use in implosion devices, remains unknown. Research such as this is generally conducted in military facilities. The IAEA has had access to the Parchin complex in Iran, which contains facilities that could be used for weaponization research. In March 2005, the IAEA reported that it saw no relevant dual use equipment or materials at Parchin. Of course, it is possible that Iran is not conducting research of this kind.

52. In the latest IAEA report to the Board of Governors (GOV/2005/87), it was reported that Iran had in its possession documents on the casting and machining of enriched, natural and depleted uranium into hemispheric forms. Such documentation would be of great value to a state interested in nuclear weapons research and developments. It would be of less value to a state interested in peaceful uses of nuclear energy. Apparently, Iran acquired these schematics from the A.Q. Kahn network. It remains largely unknown what else Iran acquired from the network (apart from the P-1 centrifuges and the P-2 blueprints).

53. Finally, Iran is developing allistic missile capability that could be used to deliver nuclear warheads to target.

### **Conclusion (see slide 20)**

54. It is important to recognize that the nuclear safeguards regime operated by the International Atomic Energy Agency functions as a burglar alarm. It is not capable of locking out nuclear proliferation.

55. Iran's intentions are difficult to ascertain. The burglar alarm has sounded, however, and it is important to let the IAEA verification process run its course. The Agency is unlikely to find conclusive evidence that Iran is manufacturing a nuclear device. At some point in time, its investigations will end, and the so-called nuclear dossier is likely to have a few question marks remaining at that time. The Agency has already found Iran in violation of its safeguards agreement. This should be considered as a serious situation in itself and warrant referral to the UN Security Council.

56. The development of a weapon from an explosive device requires that it be made portable and deliverable. This packaging is distinct from the capacity to detonate a non-mobile test device under laboratory conditions. Ignition devices required for deliverable warheads are more complex, and a state wishing to develop a deliverable nuclear weapon would face the difficulties of electrical, mechanical, nuclear and high explosives component production. Here, there are many questions surrounding the Iranian nuclear programme which are unresolved and which are of a serious nature.

57. While Iran's argument that it has the peaceful right to develop nuclear energy is valid, it is equally true that its history of deception and concealment warrant the application of extraordinary confidence building measures. Clearly, the situation cannot be resolved without Iran going well beyond what is legally required of it. Additional transparency measures are well overdue. More intrusive verification by the IAEA, possibly with the assistance of other Agency member states, is highly desirable. Without such measures, the likelihood that Iran will enjoy the confidence of the international community remains remote.