

# Board of Governors

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Item 8(d) of the provisional agenda  
(GOV/2004/51)

## Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran

*Report by the Director General*

1. At its meeting in June 2004, the Board of Governors considered the report submitted by the Director General on the implementation of the Agreement between the Islamic Republic of Iran (hereinafter referred to as Iran) and the Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons (the Safeguards Agreement)<sup>1</sup>. That report, published as GOV/2004/34 (1 June 2004) and Corr.1 (18 June 2004), provided a chronology from March 2004, summaries of the outstanding issues, next steps and assessments, and an annex on the Agency's verification activities.
2. On 18 June 2004, the Board of Governors adopted resolution GOV/2004/49, in which it:
  - acknowledged that Iranian cooperation had resulted in Agency access to all requested locations, including four workshops belonging to the Defence Industries Organisation;
  - deplored, at the same time, the fact that, overall, as indicated by the Director General's written and oral reports, Iran's cooperation had not been as full, timely and proactive as it should have been, and, in particular, that Iran had postponed until mid-April visits originally scheduled for mid-March — including visits of Agency centrifuge experts to a number of locations involved in Iran's P-2 centrifuge enrichment programme — resulting in some cases in a delay in the taking of environmental samples and their analysis;
  - underlined that, with the passage of time, it was becoming ever more important that Iran work proactively to enable the Agency to gain a full understanding of Iran's enrichment programme by providing all relevant information, as well as by providing prompt access to all relevant places, data and persons; and called on Iran to continue and intensify its cooperation so that the Agency may provide the international community with required assurances about Iran's nuclear activities;

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<sup>1</sup> INFCIRC/214.

- called on Iran to take all necessary steps on an urgent basis to help resolve all outstanding questions, especially that of low enriched uranium (LEU) and high enriched uranium (HEU) contamination found at various locations in Iran, including by providing additional relevant information about the origin of the components in question and explanations about the presence of a cluster of 36% HEU particles; and also the question of the nature and scope of Iran's P-2 centrifuge programme, including by providing full documentation and explanations at the request of the Agency;
- welcomed Iran's submission of the declarations under Articles 2 and 3 of its Additional Protocol; and stressed the importance of Iran complying with the deadlines for further declarations required by Articles 2 and 3 of the Protocol, and that all such declarations should be correct and complete;
- emphasized the importance of Iran continuing to act in accordance with the provisions of the Additional Protocol to provide reassurance to the international community about the nature of Iran's nuclear programme; and urged Iran to ratify without delay its Additional Protocol;
- recalled that in previous resolutions the Board had called on Iran to suspend all enrichment related and reprocessing activities; welcomed Iran's voluntary decisions in that respect; regretted that those commitments had not been comprehensively implemented and called on Iran immediately to correct all remaining shortcomings, and to remove the existing variance in relation to the Agency's understanding of the scope of Iran's decisions regarding suspension, including by refraining from the production of UF<sub>6</sub> and from all production of centrifuge components, as well as to enable the Agency to verify fully the suspension;
- in the context of Iran's voluntary decisions to suspend all enrichment related and reprocessing activities, called on Iran, as a further confidence building measure, voluntarily to reconsider its decision to begin production testing at the Uranium Conversion Facility (UCF) and also, as an additional confidence building measure, to reconsider its decision to start construction of a research reactor moderated by heavy water, as the reversal of those decisions would make it easier for Iran to restore international confidence undermined by past reports of undeclared nuclear activities in Iran;
- recalled that the full and prompt cooperation with the Agency of all third countries was essential in the clarification of certain outstanding questions, notably contamination;
- commended the Director General and the Secretariat for their professional and impartial efforts to implement Iran's Safeguards Agreement, and, pending its entry into force, Iran's Additional Protocol, as well as to verify Iran's suspension of enrichment related and reprocessing activities, and to investigate supply routes and sources;
- decided to remain seized of the matter.

3. In resolution GOV/2004/49, the Board also requested the Director General to report well in advance of the September Board — or earlier if appropriate — on the above issues as well as on the implementation of this and prior resolutions on Iran. The present report is the sixth in a series of written reports addressing the implementation of safeguards in Iran<sup>2</sup>, and provides the Board with an update of developments since the Director General's last report in June 2004.

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<sup>2</sup> The initial report to the Board of Governors on this specific matter was provided by the Director General orally at the Board's meeting on 17 March 2003. The Director General subsequently submitted five written reports to the Board: GOV/2003/40, dated 6 June 2003; GOV/2003/63, dated 26 August 2003; GOV/2003/75, dated 10 November 2003; GOV/2004/11, dated 24 February 2004; and GOV/2004/34 dated 1 June 2004 and Corr.1 dated 18 June 2004.

## A. Chronology from June 2004

4. From 29 May to 3 June 2004, Agency inspectors visited a number of workshops in Iran to establish a baseline for monitoring the suspension of production of centrifuge components, held discussions on the P-2 centrifuge programme and visited a workshop where P-2 composite rotor cylinders had been manufactured.
5. During a mission to Iran which took place from 22 to 30 June 2004, the Agency: conducted inspections at the Pilot Fuel Enrichment Plant (PFEP) at Natanz, and at the Uranium Conversion Facility (UCF); carried out complementary access at the Esfahan Nuclear Technology Centre (ENTC); and conducted design information verification at the Fuel Enrichment Plant (FEP) at Natanz and at the Molybdenum, Iodine and Xenon Radioisotope Production (MIX) Facility at the Tehran Nuclear Research Centre (TNRC).
6. On 22 June 2004, during the same mission, the Agency requested access to the Lavisan-Shian site in Tehran which had been referred to in the June 2004 Board of Governors meeting as having been relevant to alleged nuclear activities in Iran before the site was razed after November 2003. The Agency visited the site on 28 June 2004.
7. On 23 June 2004, the Agency received from Iran a letter of the same date stating that Iran “plan[ned] to suspend implementation of the expanded voluntary measures conveyed in [its] Note dated 24 February 2004”, and that Iran “thus, intend[ed] to resume, under IAEA supervision, manufacturing of centrifuge components and assembly and testing of centrifuges as of 29 June 2004.” In the letter, Iran requested the Agency to “take steps necessary to enable resumption of such operation as of 29 June 2004.”
8. On 25 June 2004, the Director General wrote to Iran, referring to its letter of 23 June 2004, and expressing the hope that Iran would “continue to build international confidence through implementing its voluntary decisions to suspend all enrichment related and reprocessing activities” and informing Iran that the Agency would be in contact to clarify the practical implications of the decision of the Iranian authorities. Both letters were circulated to the Board of Governors for information under cover of a Note dated 25 June 2004.
9. On 29 June 2004, the Agency received from Iran a letter dated 27 June 2004 in which, referring to its own letter of 23 June 2003, Iran provided a list of seals which “[have] to be removed from material, components and equipment related to the restart of manufacturing, assembling and testing of gas centrifuge machines.” In that letter, Iran also requested the Agency’s response regarding “removal of the seals either by the Agency inspectors...or by the operator...” In a letter dated 29 June 2004, the Agency acknowledged receipt of Iran’s letter and agreed to the removal of the seals by the operator in the absence of Agency inspectors.
10. From 30 June to 2 July 2004, the Agency met in Vienna with an Iranian delegation to discuss outstanding safeguards implementation issues. At the close of the meeting, Iran and the Agency agreed on actions to be taken in July and August 2004 to achieve progress on the resolution of those issues.
11. As agreed during that meeting, in a letter dated 2 July 2004, the Agency provided Iran with comments on the initial declarations submitted by Iran on 15 June 2004 pursuant to Articles 2 and 3 of the Additional Protocol. On 2 July 2004, the Agency also forwarded to Iran for its comments information that it had acquired through open sources on some dual-use equipment and materials, and associated locations, that could also be used for non-peaceful nuclear applications.

12. As also agreed during the meeting of 30 June to 2 July 2004, on 5 July 2004, the Agency provided Iran with a list of questions in relation to its centrifuge enrichment programme and asked that the answers be provided in writing by 20 July 2004.

13. During a visit of Agency inspectors to Iran from 6 to 18 July 2004, an Agency team met with Iranian officials to discuss the Agency's comments on Iran's Additional Protocol declarations. The team also visited Natanz to recover nuclear material left over in equipment and piping that had been used in the centrifuge research and development (R&D) programme at the Kalaye Electric Company workshop.

14. During that visit, Iran also returned to the Agency 40 seals which it had removed from equipment and centrifuge components located at Natanz, Pars Trash and Farayand Technique (see para. 9 above). The Agency team also held discussions with Iranian officials on outstanding uranium conversion issues. In addition, the team visited the waste disposal site located at Qom, and performed complementary access at Lashkar Ab'ad, at a uranium production plant located near Bandar Abbas, and at TNRC.

15. On 19 July 2004, the Agency received a letter from Iran dated 15 July 2004 concerning the source of contamination of the room under the roof of the Tehran Research Reactor (TRR). In the letter, Iran provided new information concerning the source of the material involved in the contamination.

16. From 25 July to 2 August 2004, Agency inspectors carried out inspection activities at TRR and PFEP, and at facilities on the Esfahan site, where complementary access was also carried out. At Natanz, the inspectors also visited the administrative building and the centrifuge rotor storage building in connection with the monitoring of Iran's suspension of enrichment related activities.

17. From 3 to 8 August 2004, an Agency team, led by the Director of the Division of Safeguards Operations B (DIR-SGOB), met with Iranian officials in Tehran to discuss the outstanding safeguards implementation issues identified at the meeting of 30 June to 2 July 2004. At the opening of the meeting, Iran provided the Agency with written answers to some of the questions that the Agency had previously sent to Iran. These answers were discussed in detail during the meeting.

18. At the close of the meeting, Iran agreed to complete its written answers and to provide additional documentation to the Agency. On 8 August 2004, Iran provided the Agency with more information and documentation. Following a preliminary review of that information and documentation, the Agency wrote to Iran on 16 August 2004 to request information that remained outstanding.

19. On 16 August 2004, the Agency received a letter from Iran dated 14 August 2004 stating that the operator of UCF was "intending to perform hot test to be started on 19 August 2004."

20. Between 21 and 25 August 2004, discussions at TNRC were held, and complementary access at Karaj and inspections and design information verification at PFEP and UCF were carried out.

21. Between 19 and 30 August 2004, the Agency received from Iran a number of communications forwarding additional information relevant to the outstanding issues as discussed during the 3-8 August 2004 meeting in Iran and responding to the Agency's letter of 16 August 2004.

## **B. Outstanding Issues and Assessments**

### **Centrifuge programme**

22. The Agency has continued to investigate the statements made by Iran regarding the chronology of its P-2 centrifuge enrichment programme (GOV/2004/34, para. 26), particularly as regards the period 1995 to 2002.

23. During the discussions which took place in August 2004, Iran repeated that, although the design drawings of a P-2 centrifuge had been acquired in 1995, no work on P-2 centrifuges was carried out until early 2002 when, according to Iran, the Atomic Energy Organization of Iran (AEOI) management decided that “work on a modified P-2 machine based on a sub-critical rotor design would not hurt,” and, in March 2002, a contract to study the mechanical properties of the P-2 centrifuge was signed with a small private company. Iran stated that no feasibility or other preliminary studies or experiments were conducted by Iran during the period between 1995 and 2002.

24. Iranian officials also stated that, in spite of frequent contacts between 1995 and 1999 on P-1 centrifuge issues with the intermediaries (who, according to Iran, had provided both the P-1 and P-2 drawings), the topic of P-2 centrifuges was not addressed at all in those meetings nor in the course of making any other foreign contacts. Iran attributed this to the fact that a decision had been made to concentrate on the P-1 centrifuge enrichment programme, and that, in addition, the AEOI was undergoing senior management and organizational changes during that period of time.

25. During the 3–8 August 2004 meeting, and subsequently, the Agency received from Iran more details on the manufacturing and mechanical testing of the modified P-2 composite rotors under the contract with the private company during the period 2002–2003. The Agency reiterated its previous requests for further information from Iran on the procurement of magnets for the P-2 centrifuges, in particular on the source of all such magnets, with a view to facilitating completion by the Agency of its assessment of the P-2 experiments said to have been carried out by the private company. In a letter dated 30 August 2004, Iran informed the Agency that it was “trying to receive that information which would then be transmitted to the Agency”.

26. In connection with the Agency’s overall assessment of Iran’s P-2 centrifuge enrichment programme, the reasons given by Iran for the apparent gap between 1995 and 2002 do not provide sufficient assurance that there were no related activities carried out during that period. The Agency is continuing its investigations of the supply network. Information in this regard will be essential for confirming the statements made by Iran with regard to the acquisition of detailed P-2 manufacturing drawings in 1995, and for understanding the subsequent developments in connection with Iran’s P-2 centrifuge enrichment programme. The investigations into the supply network will also provide an opportunity for the Agency to confirm the accuracy of the information provided by Iran on its P-1 centrifuge enrichment programme.

### **Origin of contamination**

27. Iran has continued to maintain that the LEU and HEU particles found at Natanz, the Kalaye Electric Company workshop, Farayand Technique and, more recently, at Pars Trash, are due to contamination originating from imported P-1 centrifuge components. However, a number of unanswered questions remain:

- why, if the contamination of the domestically manufactured centrifuge components was due solely to contamination from the imported components, the domestic components showed predominantly LEU contamination, while the imported components showed both LEU and HEU contamination.

- why, if the source of contamination is the same (imported components), the contamination at PFEP differed from that found at the Kalaye Electric Company workshop and Farayand Technique.
- why 36% uranium-235 (U-235) particles were found mainly in three of the locations where the imported components were located, and not at others, and why, at the Kalaye Electric Company workshop, there was a relatively large number of particles of 36% U-235 compared to the number of particles of U-235 with other enrichment levels.

28. For the Agency to be able to resolve the issue of LEU and HEU contamination, more information is needed on the locations where the imported components were manufactured and where they were subsequently used or moved to in transit to Iran (i.e. all locations where contamination of the components might have occurred).

29. While Iran provided some information in October 2003 on intermediaries involved, it continues to maintain that it does not know the origin of the components. During the 3–8 August 2004 meetings, the Agency again discussed this matter with Iran and reiterated its request that Iran make every effort possible to identify the origin of the components and the locations outside of Iran that Iranian officials had visited in the 1990s in connection with centrifuge related issues. Subsequently, Iran provided some additional information on one of those locations.

30. The Agency has also continued its discussions with the State from which most of the contaminated centrifuge components originated. The State has provided the Agency with new information on the results of its investigations into the supplier, which indicate that the components imported by Iran may not all have originated from that State. However, additional work, including swipe sampling by the Agency of equipment, is required by the Agency to help it confirm the origin of the contamination from that equipment and to verify the new information. In connection with this work, information from intermediaries and/or the companies and workshops involved in the production and storage of centrifuge components (including information derived from environmental sampling) is indispensable. The Agency is pursuing this matter through contacts with other States and with companies and individuals.

31. The Agency's analysis to date has shown that most of the HEU contamination found at the Kalaye Electric Company workshop and Natanz correlates reasonably with the HEU contamination found on imported components. Given this analysis, other correlations and model enrichment calculations based on the enrichment process in a possible country of origin, it appears plausible that the HEU contamination found at the Kalaye Electric Company workshop and Natanz may not have resulted from enrichment of uranium by Iran at those locations. Other explanations for this and the LEU contamination continue to be investigated by the Agency.

32. As indicated above, on 19 July 2004, the Agency received a letter from Iran reiterating its previous assertion that the source of contamination of the room under the roof of the Tehran Research Reactor building had been "UF<sub>6</sub> which [had] been produced through R&D conversion" (not UF<sub>6</sub> imported in 1991, as Iran had initially informed the Agency), but providing additional information on the source of the material which had been used as feed for that conversion. The Agency continues to regard as not technically plausible Iran's explanation that the contamination was due to a leaking bottle. However, the Agency will only be able to pursue this issue if new information becomes available.

### **Uranium conversion experiments**

33. Between 1981 and mid-1993, small scale uranium conversion experiments were conducted by Iran at research laboratories at ENTC and TNRC. The Agency has been reviewing the information

provided by Iran with a view to assessing Iran's declarations regarding these experiments. The Agency has concluded that Iran's statements and declarations regarding the technical scope of its work, the equipment used and the amounts of nuclear material consumed and produced are consistent with what was ascertained by the Agency as a result of its investigations.

### **Laser enrichment**

34. The Agency has completed its review of Iran's atomic vapour laser isotope separation (AVLIS) programme and has concluded that Iran's descriptions of the levels of enrichment achieved using AVLIS at the Comprehensive Separation Laboratory (CSL) and Lashkar Ab'ad and the amounts of material used in its past activities are consistent with information available to the Agency to date. Iran has presented all known key equipment, which has been verified by the Agency. For the reasons described in the Annex to this report, however, detailed nuclear material accountancy is not possible.

35. It is the view of the Agency's AVLIS experts that, while the contract for the AVLIS facility at Lashkar Ab'ad was specifically written for the delivery of a system that could achieve 5 kg of product within the first year with enrichment levels of 3.5% to 7%, the facility as designed and reflected in the contract would, given some specific features of the equipment, have been capable of limited HEU production had the entire package of equipment been delivered. The Iranian AVLIS experts have stated that they were not aware of the significance of these features when they negotiated and contracted for the supply and delivery of the Lashkar Ab'ad AVLIS facility. They have also provided information demonstrating the very limited capabilities of the equipment delivered to Iran under this contract to produce HEU (i.e. only in gram quantities).

### **Plutonium separation experiments**

36. As of the last report to the Board, there remained a number of questions concerning the dates and quantities of material involved in the plutonium separation experiments carried out by Iran (GOV/2004/34, Annex, paras 15–16)

37. Iran has now agreed with the Agency's estimate of the amounts of plutonium that had been produced by irradiation (milligram quantities). During the August 2004 discussions, Iran explained the reasons for the high level of americium-241 (Am-241) and the plutonium-240 (Pu-240) contamination found in samples taken from a used glove box stored at Esfahan. As noted in the previous report, there are indications that the age of the plutonium in solutions could be less than the 12–16 years declared by Iran; that is to say, that the separation activities were carried out more recently than that. The Iranian officials maintain their earlier statements regarding the age of the plutonium. The Agency is continuing to look into this matter.

### **Hot cells**

38. In response to questions by the Agency about past efforts by Iran to procure hot cell windows and manipulators, and the specifications associated with those items, Iran informed the Agency that there had been a project for the construction of hot cells for the production of "long lived radioisotopes" but that it had been abandoned due to procurement difficulties. In August 2004, Iran presented to the Agency detailed drawings that Iran had received from a foreign company in 1977 for hot cells which were to have been constructed at Esfahan. Iran stated that it had not yet made more detailed plans for hot cells for the Iran Research Reactor (IR-40) site at Arak, but that it had used information from those drawings as the basis for specifications in its efforts to procure manipulators for hot cells intended for the production of cobalt and iridium isotopes. In a letter dated 19 August 2004 Iran reiterated its previous statement that the hot cell project at Arak consisted of nine hot cells — four for the

“production of radioisotopes”, two for the production of cobalt and iridium<sup>3</sup>, and three for “waste management processing” — and would require ten back-up manipulators.

39. The Agency will continue to follow up on this issue with a view to achieving a better understanding of Iran’s plans with respect to hot cells.

### **Additional Protocol**

40. The Agency is reviewing the initial declarations submitted by Iran pursuant to its Additional Protocol on 21 May 2004, as well as the clarifications and supplementary information provided by Iran following the detailed discussions in July and August 2004 between the Agency and Iran.

### **Investigation of supply routes and sources**

41. As requested by the Board in resolution GOV/2004/21, the Agency is continuing to pursue its investigation of the supply routes and sources of conversion and enrichment technology and the sources of related equipment and nuclear and non-nuclear materials. The Director General will provide more information to the Board about the results of this investigation upon its completion.

### **Transparency visits and discussions**

42. The Lavisian-Shian site in Tehran was referred to in the June 2004 meeting of the Board of Governors in connection with alleged nuclear related activities and the possibility of a concealment effort through the removal of the buildings from that site.

43. As indicated above, in response to an Agency request, Iran provided access to that site. Iran also provided access to two whole body counters, and to a trailer declared to have been previously located on that site and to have contained one of the whole body counters. The Agency took environmental samples at these locations. Iran also gave the Agency a description and chronology of activities carried out at the Lavisian-Shian site. According to Iran, a Physics Research Centre had been established at that site in 1989, the purpose of which had been “preparedness to combat and neutralization of casualties due to nuclear attacks and accidents (nuclear defence) and also support and provide scientific advice and services to the Ministry of Defence.” Iran provided a list of the eleven activities conducted at the Centre, but, referring to security concerns, declined to provide a list of the equipment used at the Centre. Iran stated further that “no nuclear material declarable in accordance with the Agency’s safeguard[s] was present” and that “no nuclear material and nuclear activities related to fuel cycle [were] carried out in Lavisian-Shian.”

44. According to Iran, the site had been razed in response to a decision ordering the return of the site to the Municipality of Tehran in connection with a dispute between the Municipality and the Ministry of Defence. Iran recently provided documentation to support this explanation.

45. The documentation provided by Iran is currently being assessed, and the environmental samples are being analysed.

46. In accordance with Agency practice in connection with its evaluation of other States’ nuclear programmes, the Agency has discussed with the Iranian authorities open source information relating to dual use equipment and materials which have applications in the conventional military area and in the civilian sphere as well as in the nuclear military area. The Agency welcomes Iran’s willingness to discuss these topics.

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<sup>3</sup> Cobalt-60 and iridium-192 have half-lives of 5.2 years and 74 days, respectively.



## Suspension

47. In its Note Verbale of 29 December 2003, Iran informed the Agency that, with immediate effect, it would suspend:

- the operation and/or testing of any centrifuges at PFEP at Natanz;
- further introduction of nuclear material into any centrifuges;
- installation of new centrifuges at PFEP and installation of centrifuges at FEP.

48. Iran also indicated that it would withdraw nuclear material from any centrifuge enrichment facility if and to the extent practicable. It further stated that:

- it currently was not constructing any type of gas centrifuge enrichment facility at any location in Iran other than the facility at Natanz, nor did it have plans to construct new facilities capable of isotopic separation during the suspension;
- it had dismantled its laser enrichment projects and removed all related equipment;
- it was not constructing or operating any plutonium separation facility;
- during the period of suspension, it did not intend to make new contracts for the manufacture of centrifuge machines and their components;
- the Agency could fully supervise storage of all centrifuge machines assembled during the suspension period;
- Iran did not intend to import centrifuge machines or their components, or feed material for enrichment processes, during the suspension period; and
- there was no production of feed material for enrichment processes in Iran.

49. On 24 February 2004, Iran invited the Agency to verify its further voluntary decisions to:

- suspend the assembly and testing of centrifuges; and
- suspend the domestic manufacture of centrifuge components, including those related to the existing contracts, to the furthest extent possible (and said that any components that were manufactured under existing contracts that could not be suspended would be stored and placed under Agency seal).

50. Iran also confirmed that the suspension of enrichment activities applied to all facilities in Iran.

51. On 21 May 2004, Iran informed the Agency that it had not, at any time, made any undertaking not to produce feed material for the enrichment process, and that its voluntary and temporary suspension did not include suspension of the production of UF<sub>6</sub>.

52. As previously indicated in the Director General's report to the Board (GOV/2004/34, para. 42; Annex, paras 60–61), Iran informed the Agency that it was conducting hot tests at UCF that would generate UF<sub>6</sub> product. One such test, which generated about 30–35 kg UF<sub>6</sub>, was conducted between May and June 2004. Another larger test involving 37 tonnes of yellowcake is planned for August/September 2004.

53. As indicated above, Iran notified the Agency on 23 June 2004 of its intention to resume, "under IAEA supervision, manufacturing of centrifuge components and assembly and testing of centrifuges". Following this, the seals that had been used by the Agency as one of the measures for monitoring Iran's suspension of the manufacture, assembly and testing of centrifuge components at Natanz, Pars

Trash and Farayand Technique were removed by Iran and returned to the Agency during its visit to Iran between 6 and 18 July 2004. As of mid-August 2004, about 70 rotors had been newly assembled and tested, and were shown to the Agency. The Agency is discussing with Iran the necessary arrangements for the Agency to exercise "supervision". In that regard, the Agency has proposed that it seal the tested rotors, a measure which Iran has not to date accepted. It must be noted that, in the absence of such seals, the Agency's supervision of the activities identified by Iran cannot be considered effective.

54. Since the last report of the Director General to the Board of Governors, the Agency has been able to verify that there has been no operation or testing of any centrifuges at PFEP; that there has been no further introduction of nuclear material into any centrifuges at PFEP; that there has been no installation of new centrifuges at PFEP or installation of centrifuges at FEP; and that there has been no reprocessing at the Jabr Ibn Hayan Multipurpose Laboratories (JHL).

55. The Agency has also been able to reconfirm that it has not observed to date at TNRC, Lashkar Ab'ad, Arak, the Kalaye Electric Company workshop, Natanz or UCF any activities inconsistent with the Agency's understanding of Iran's current suspension undertakings.

## **C. Findings and Next Steps**

56. The Agency welcomes the new information provided recently by Iran in response to the Agency's requests, although the process of providing information needs, in certain instances, to be accelerated. In some cases, such as Iran's clarifications related to its initial declarations pursuant to its Additional Protocol, the provision of new information has been prompt. In other cases, sufficiently detailed information has, despite repeated requests, been provided so late that it has not been possible to include an assessment of its sufficiency and correctness in this report. The Agency also welcomes the cooperation by Iran in providing access to locations in response to Agency requests, including at the Lavisian-Shian site.

57. Although the Agency is not yet in a position to draw definitive conclusions concerning the correctness and completeness of Iran's declarations related to all aspects of its nuclear programme, it continues to make steady progress in understanding the programme. In this regard, the Agency's investigations have reached a point where, with respect to two aspects previously identified by the Agency as requiring investigation (i.e. Iran's declared laser enrichment activities and Iran's declared uranium conversion experiments), further follow-up will be carried out as a routine safeguards implementation matter.

58. Two issues remain key to understanding the extent and nature of Iran's enrichment programme:

- The first issue relates to the origin of uranium contamination found at various locations in Iran. As stated above, some progress has been made towards ascertaining the source of the HEU contamination found at the Kalaye Electric Company workshop and Natanz. From the Agency's analysis to date, it appears plausible that the HEU contamination found at those locations may not have resulted from enrichment of uranium by Iran at the Kalaye Electric Company workshop or at Natanz. However, the Agency will continue to pursue the identification of sources and reasons for such contamination. The Agency will also continue with its efforts to understand the source of the LEU contamination found in various locations in Iran, including on domestically manufactured components.

- The second issue relates to the extent of Iran's efforts to import, manufacture and use centrifuges of both the P-1 and P-2 design. While the Agency has gained a better understanding of Iran's efforts relevant to both designs, additional work by the Agency will be necessary, inter alia, to confirm Iran's statements regarding the absence of P-2 centrifuge related activities in Iran between 1995 and 2002 and regarding P-2 centrifuge procurement related activities.

59. There are other issues that will also require further follow-up, for example the timeframe of Iran's plutonium separation experiments.

60. The Agency has been able to verify Iran's suspension of enrichment related activities at specific facilities and sites, and has been able to confirm that it has not observed, to date, any activities at those locations inconsistent with its understanding of Iran's current suspension undertakings.

61. It is important for Iran to support the Agency's efforts to gain a full understanding of all remaining issues by continuing to provide access to locations, personnel and information relevant to safeguards implementation in response to Agency requests — as well as by proactively providing any additional information that could enhance the Agency's understanding of Iran's nuclear programme.

62. The Agency welcomes the cooperation of other States in response to Agency requests, which is key to the Agency's ability to resolve some of the outstanding issues. Information received to date from other States has proven useful in understanding aspects of the uranium contamination found in Iran. The Agency will continue to request States to actively assist the Agency in resolving these issues.

63. The Director General will report to the Board as appropriate and not later than the November 2004 meeting of the Board.



## Verification Activities

### A. Uranium Conversion – Experiments and Testing

1. Between 1981 and mid-1993, Iran conducted a variety of small scale uranium conversion experiments which encompassed the conversion of uranium ore concentrate (UOC) to ammonium diuranate (ADU) and  $UO_2$ , the conversion of UOC to ammonium uranyl carbonate (AUC), the conversion of uranyl nitrate (UN) directly to  $UO_3$ , the conversion of  $UO_2$  to  $UF_4$  through wet and dry processes and the conversion of  $UF_4$  to  $UF_6$ . During the period 1995 to 2002, techniques to convert  $UF_4$  to uranium metal were developed and, during the period 1997 to 2002, research and development on processes in connection with the Uranium Conversion Facility (UCF) at Esfahan was also conducted.

2. These activities, the time periods during which they were conducted, the quantities of nuclear material used and the quantities of products and wastes are summarized in the following table.

PROCESS	TIME PERIODS	DISPOSITION OF NUCLEAR MATERIAL <sup>4</sup>
Conversion of UOC to ADU (ENTC)	1983 to mid-1987	49.6 kg imported $U_3O_8$ used to produce 36 kg ADU
Conversion of ADU to $UO_2$ (ENTC)	Early 1985 to mid-1987	34 kg of the 36 kg ADU used to produce 28 kg of $UO_2$ ; 2 kg ADU unused  12 kg of the 28 kg $UO_2$ used in subsequent experiments, 16 kg $UO_2$ unused  Total of 6.7 kg U as liquid waste from UOC–ADU and ADU– $UO_2$ conversion disposed of at Qom
Conversion of UOC to AUC (ENTC)	1986 to mid-1987	About 5.5 kg imported UOC used to produce about 7 kg AUC
Conversion of UOC to AUC (TNRC)	1989 to end 1992	About 2.7 kg imported UOC used to produce about 4.5 kg AUC
Wet process production of $UF_4$ (TNRC)	1990 to mid-1991	12.8 kg imported UOC used to produce 10 kg $UF_4$ ; waste disposed of at Qom

<sup>4</sup> For the sake of simplicity, natural and depleted uranium have been combined.

Dry process production of UF <sub>4</sub> (TNRC)	End 1991 to early 1992	About 2.7 kg imported UO <sub>2</sub> used to produce about 3 kg UF <sub>4</sub> ; 2.5 kg UF <sub>4</sub> remains on inventory; 0.5 kg waste disposed of at Qom
Conversion of UF <sub>4</sub> to UF <sub>6</sub> (TNRC)	Mid-1991 to mid-1993	9.8 kg imported UF <sub>4</sub> used to produce 6.9 kg UF <sub>6</sub> ; 2.7 kg U disposed of as waste
Conversion of UN to UO <sub>3</sub> (TNRC)	Second half 1992	2.2 kg imported UOC used to produce 0.3 kg UO <sub>3</sub> ; waste disposed of at Qom
Pulse column experiments (TNRC)	Early 1997 to early 2002	22.5 kg UO <sub>2</sub> used for various experiments, out of which equivalent of 8.6 kg UO <sub>2</sub> remains as liquid waste; equivalent of 14 kg UO <sub>2</sub> disposed of as waste at Qom
Conversion of UF <sub>4</sub> to uranium metal (TNRC)	1995 to early 2002	358.7 kg UF <sub>4</sub> (mainly imported) used to produce 126.4 kg uranium metal; 3 kg uranium metal recovered from waste

3. With the exception of the studies on uranium metal conversion and pulse columns, the small scale conversion activities started in the early to mid-1980s and continued for several years. The last of these, the UF<sub>4</sub>-UF<sub>6</sub> experiments, ended in June of 1993. There are inherent difficulties with investigating activities which ended over a decade ago, and it is not possible to verify in detail the chronologies and descriptions of the experiments which took place in Iran. Therefore, the Agency's activities have been focused on assessing the consistency of information provided by Iran and examining remaining equipment and nuclear material.

4. Very detailed documentation was provided for some of the conversion experiments and tests, for example, the UO<sub>2</sub>-UF<sub>4</sub>, UF<sub>4</sub>-UF<sub>6</sub>, UN-UO<sub>3</sub> and uranium metal activities. Less detailed documentation was provided for the older activities, such as those associated with the UOC-ADU, ADU-UO<sub>2</sub> and UOC-AUC activities. The documentation was supplemented by technical meetings with scientific staff involved with and responsible for these activities. Except for the equipment associated with the UOC-AUC experiments, equipment used during the experiments was examined and, where possible, compared with documentation. Inventory examination and verification activities, including the recovery of nuclear material hold-up from the equipment, were performed to confirm, where possible, the quantities of nuclear material used, produced and lost as waste.

5. An issue of concern since the outset of the investigation of the small scale conversion activities has been the very small quantities of nuclear material used and produced relative to the size, quality and capacity of the equipment involved, particularly in connection with the UOC-ADU, ADU-UO<sub>2</sub>, UO<sub>2</sub>-UF<sub>4</sub> and the UF<sub>4</sub>-UF<sub>6</sub> projects. The large scale experimental equipment, if used for full scale production, could consume and produce far in excess of what was declared to have been consumed and produced during the declared life of these activities.

6. A related issue is the use of the equipment during the period between when the activities were said to have ceased (1991-1993) and April 1999, when the equipment is said to have been dismantled and put into storage. Iran has stated that the equipment was kept in storage until January 2004, when it was examined by the Agency and the nuclear material hold-up recovered therefrom, and the equipment was destroyed at the initiative of the Iranian authorities.

7. Examination of the equipment prior to and during its destruction showed that the equipment was in very good condition and appeared to have been little used, which is consistent with the declared scale of its use.

## **B. Irradiation and Reprocessing Experiments**

### **B.1. Plutonium separation**

8. As described in the Director General's report to the March 2004 Board meeting (GOV/2004/11, para. 21), Iran had irradiated depleted UO<sub>2</sub> targets and reprocessed them on the site of TNRC. According to Iran, 6.9 kg of UO<sub>2</sub> had been irradiated, 3 kg of which were subsequently reprocessed to separate plutonium, and the remaining 3.9 kg had been buried in containers at the site.

9. However, on the basis of information available to it, the Agency concluded (GOV/2004/34, para. 36; Annex, paras 15–16): that the amount of plutonium declared by Iran had been understated (quantities in the milligram range rather than the microgram range as stated by Iran); that the plutonium samples taken from a glove box said to have been involved had plutonium-240 abundance higher than that found in the plutonium solution bottles presented; that the age of the plutonium solution in the bottles appeared to be less than the declared 12–16 years; and that there was an excess amount of americium-241 in samples.

10. With regard to the quantity of plutonium in solution, a recalculation by Iran based on corrected irradiation data and using a corrected equation indicated a quantity of plutonium in the range of that estimated by the Agency. During the meeting in Iran on 16 May 2004, Iran acknowledged that its theoretical estimations of the produced plutonium had been understated and accepted the Agency's estimate as being correct.

11. The age of the plutonium solutions was discussed during the meetings that took place between 3 and 8 August 2004. The Agency explained in detail the methodology it had used for dating the plutonium that had been separated, and the additional on-going work to validate the results. The Iranian officials reiterated their previous statement that the experiments had been completed in 1993 and that no plutonium had been separated since then. The Agency agreed to analyse the available data further.

12. Iran also stated that plutonium with higher Pu-240 abundance originated from work carried out between 1982 and 1984 at the Radiochemistry Laboratory of the TNRC to produce smoke detectors using Am-241. This, in Iran's view, not only explained the Pu-240 contaminant, but also the high Am-241 content in the samples. Iran stated that the Am-241 had been imported from abroad prior to the Iranian revolution in 1979, and explained that, in 1990, the glove box that had been used in connection with the Am-241 was transferred to the building where plutonium separation took place, but that it had been used for training purposes and not for plutonium experiments. According to Iran, that glove box, along with others, was moved in 2000 to a warehouse at ENTC.

13. The overall assessment with respect to the plutonium experiments is pending finalization of the results of the plutonium dating.

## **B.2. Polonium-210 (Po-210) production**

14. The Agency has continued to follow up the explanations given by Iran on the purposes of the irradiation of bismuth metal samples that took place in TRR between 1989 and 1993 (GOV/2004/34, Annex, paras 17–19). Iran has reiterated its statement that when the project “Po-210 production by Bismuth irradiation in NRC Reactor” was approved by the Nuclear Research Centre (NRC) (later renamed the Tehran Nuclear Research Centre) in 1988, the researcher, in his project proposal, had only referred to a potential application of radioisotope batteries.

15. The Agency had previously requested further documentary information to support Iran’s claims that the purpose of the project was to study the production of Po-210 on a laboratory scale only, and that there were no other clearly defined objectives or other projects that dealt with the application of Po-210. The Agency had also requested to see the original of the project proposal. Iran stated that the original documentation could not be found, but provided a statement by the Director of NRC certifying that the copy provided to the Agency, as well as the copy of the letter of approval by the former Directors of NRC also provided to the Agency, were “correct and accurate and authentic.”

16. Iran subsequently reiterated in writing that it “does not have project for neither production of Po-210 nor production of neutron sources, using Po-210” and that “there [had] not been in the past any studies or projects on the production of neutron sources using Po-210”. The Agency is still assessing the information provided by Iran.

## **C. Uranium Enrichment**

### **C.1. Gas centrifuge enrichment**

17. As described in GOV/2004/34 (Annex, para. 21), Iran has acknowledged that 1.9 kg of UF<sub>6</sub> contained in two small cylinders received from abroad in 1991 had been used to test centrifuges at the Kalaye Electric Company workshop. During a visit to Natanz on 10–11 July 2004, Agency inspectors, with the cooperation of Iran, recovered about 650 g of uranium from the dismantled equipment from the Kalaye Electric Company workshop. The recovered material is currently being analysed.

18. In late May 2004, the Agency visited the workshop where Iran states the composite rotor cylinders for the modified P-2 design had been manufactured. The Agency concluded that the cylinders had in fact been manufactured at the workshop, and that only very limited technical capability exists there. In late May/early June 2004, further discussions were held with the owner of the private company that had received a contract from the AEOI to investigate the P-2 design. The detailed discussions covered the chronology of events that took place between 1995, when Iran says the P-2 centrifuge drawings were received from intermediaries, and 2002, when the contract was signed, including the work carried out by the private company and any development work.

19. During the 3–8 August 2004 meeting, and subsequently, the Agency received from Iran more details on the manufacturing and mechanical testing of the modified P-2 composite rotors under the contract with the private company during the period 2002–2003. The Agency reiterated its previous requests for further information from Iran on the procurement of magnets for the P-2 centrifuges, in particular, on the source of all such magnets, with a view to facilitating completion by the Agency of its assessment of the P-2 experiments said to have been carried out by the private company. In a letter dated 30 August 2004, Iran informed the Agency that it was “trying to receive that information which would then be transmitted to the Agency.”



20. On 8 August 2004, the Agency received a written communication from Iran outlining in more detail key dates of the P-2 related work. More detail was also provided about the enquiries made by the contractor concerning potential procurements from abroad.

21. The reasons given by Iran for the apparent gap between 1995 and 2002 do not provide sufficient assurance that there were no related activities carried out during that period, given that Iran had acquired a full set of drawings in 1995, and given that the owner of the private company was able to make the modifications necessary for the composite cylinders within a short period after early 2002 when, according to Iran, he had seen the drawings for the first time. The Agency is attempting to verify this information, inter alia, through the network of suppliers.

### **C.1.1. Origin of contamination**

22. As described in GOV/2004/34 (Annex, paras 25–31), environmental samples taken by the Agency at Natanz and at the Kalaye Electric Company workshop (and, more recently, Pars Trash) revealed particles of natural uranium, LEU and HEU that called into question the completeness of Iran's declarations about its centrifuge enrichment activities. The following unanswered questions remained to be resolved:

- Analysis of samples taken from domestically manufactured centrifuge components showed predominantly LEU contamination, while analysis of samples from imported components showed both LEU and HEU contamination. It is still not clear why the components would have different types of contamination if, as Iran states, the presence of uranium on domestically manufactured components is due solely to contamination originating from imported components.
- The types of uranium contamination found at the Kalaye Electric Company workshop and at Farayand Technique differ from those at PFEP at Natanz, even though Iran has stated that the source of contamination in both cases is the imported P-1 centrifuge components.
- Environmental samples showing the presence of uranium particles enriched to 36% U-235 were found mainly in one room in the Kalaye Electric Company workshop and on the balancing machines which had been relocated from the Kalaye Electric Company workshop to Farayand Technique, both of which locations seemed to be contaminated by more than trace quantities of that material. Samples were also taken at the centrifuge assembly workshop at Natanz where Iran stated that the balancing machines had been located between February and November 2003.

23. Another distinct particle cluster of about 54% U-235, with U-236 contamination, was identified in samples taken from the surfaces of imported centrifuge components, which tends to support Iran's assertion that the source of that contamination had been imported components. However, further assessment is required to understand why 54% particles were also found in a sample collected from the chemical traps of the PFEP, which had not yet commenced operation at the time the sample was taken.

24. Since the issuance of the last report to the Board, the Agency and the State from which most of the imported P-1 centrifuges originated have, in a cooperative effort, continued to share their respective analytical results. The results provided by the State indicate that not all HEU found in the samples taken in Iran may have originated in that State. However, additional work, including swipe sampling by the Agency of equipment at appropriate locations, is required by the Agency to help it confirm the origin of the contamination from that equipment and to verify this new information. The Agency has also been in contact with a third State with a view to facilitating the resolution of the contamination questions.

25. In April 2004, the Agency was able to visit two locations in Tehran which Iran declared as also having been involved in the centrifuge R&D programme and where mechanical testing of centrifuge rotors was said to have been carried out. In the course of these visits, environmental samples were taken which also indicated the presence of HEU particles in the tested rotors for the P-1 centrifuge programme. Iran states that the R&D involved the use of imported P-1 centrifuge components and that they were likely to have been the source of the contamination. This matter was discussed again with the Iranian authorities in August 2004, and additional samples were taken from those components.

26. Iran maintains its assertion that it has not enriched uranium to more than 1.2% U-235 using centrifuge technology, and that it has not had and does not have any HEU.

27. The Agency's analysis to date has shown that most of the HEU contamination found at the Kalaye Electric Company workshop and Natanz correlates reasonably with the HEU contamination found on imported components. Given this analysis, other correlations and model enrichment calculations based on the enrichment process in a possible country of origin, it appears plausible that the HEU contamination found at the Kalaye Electric Company workshop and Natanz may not have resulted from enrichment of uranium by Iran at those locations. Other explanations for this and the LEU contamination continue to be investigated by the Agency.

28. With regard to the outstanding question relating to UF<sub>6</sub> contamination in the room under the roof of the Tehran Research Reactor (TRR) building (see GOV/2004/34, para. 30; Annex, paras 21–23; GOV/2003/63, paras 17–19), Iran originally attributed the contamination to the leakage of small bottles of UF<sub>6</sub> that had been imported in 1991. Subsequently, however, Iran acknowledged that this was not the case, as that material had been used for P-1 centrifuge tests at the Kalaye Electric Company workshop. In a letter dated 4 February 2004, Iran stated that “for a period of time 2S bottles of UF<sub>6</sub> [imported in 1991] as well as UF<sub>6</sub> bottles from conversion R&D programme had been stored in this storage. It is most probable that the particles, which have been found in the samples [taken by the Agency], could be the result of leakage of UF<sub>6</sub> bottles from R&D conversion, which have been kept in this storage from 1997 to 1998.” It was understood from Iran's communication that the “conversion R&D programme” to which Iran refers in its letter of 4 February 2004 is the conversion between 1991 and 1993 of UF<sub>4</sub> which had been imported in 1991 to UF<sub>6</sub>, as referred to in GOV/2003/75 (Annex 1, Table 1 and para. 23).

29. On 19 July 2004, the Agency received a letter from Iran dated 15 July 2004, in which Iran reiterated the statement it made in its 4 February 2004 letter that the source of contamination of the room under the roof of the Tehran Research Reactor building had been “UF<sub>6</sub> which [had] been produced through R&D conversion”, but confirmed the Agency's understanding about the source of the material which had been used as feed for that conversion process. During the Agency's August 2004 visit, the team re-visited the room. Based on all information presently available to the Agency, its current assessment remains as stated in para. 23 of the Annex to GOV/2003/34 that the Agency continues to regard as not technically plausible Iran's explanation that the contamination was due to a leaking bottle.

## **C.2. Laser enrichment**

30. As reported earlier (GOV/2003/75, Annex 1, para. 59), Iran in its letter dated 21 October 2003 acknowledged that, starting in the 1970s, it had had contracts related to laser enrichment using both atomic vapour laser isotope separation (AVLIS) and molecular laser isotope separation (MLIS) techniques with foreign entities from four countries:

- 1975 — a contract for the establishment of a laboratory to study the spectroscopic behaviour of uranium metal; this project had been abandoned in the 1980s as the laboratory had not functioned properly.

- Late 1970s — a contract with a second supplier to study MLIS, under which four carbon monoxide (CO) lasers and vacuum chambers were delivered, but the project had ultimately been terminated due to the political situation before major development work had begun.
- 1991 — a contract with a third supplier for the establishment of a “Laser Spectroscopy Laboratory “ (LSL) and a “Comprehensive Separation Laboratory” (CSL), where uranium enrichment would be carried out on a milligram scale based on the AVLIS process. The contract also provided for the supply of 50 kg natural uranium metal.
- 1998 — a contract with a fourth supplier to obtain information related to laser enrichment, and the supply of relevant equipment. However, due to the inability of the supplier to secure export licences, only some of the equipment was delivered (to Lashkar Ab’ad).

31. In August 2004 Iran provided additional documentary evidence to support the descriptions previously provided by it with respect to its laser programme. Further discussions were held with Iranian authorities between 3 and 8 August 2004 during the meetings in Tehran.

32. With regard to the first two contracts, Iran has stated that the laser spectroscopy laboratory and the MLIS laboratory were never fully operational. These statements are supported by the information obtained by the Agency thus far from the suppliers, from the inspection of the declared equipment, from interviews with the scientists involved and from the results of environmental sampling analysis.

33. With regard to the third contract, Agency experts have reviewed a number of documents provided by Iran in May and August 2004 on the operation of the LSL and CSL prior to their dismantlement in 2000. Discussions have also been held with Iranian officials on this matter, and environmental samples taken and the results assessed. The Agency’s review indicates that the equipment at the CSL operated fairly well until 1994, when foreign scientists completed their work. According to Iran, “the enrichment separation envisaged in the contract [for the CSL], and in some experiments higher enrichment were achieved in mgr” (the contract provided for “getting one milligram Uranium enriched with 3% concentration of U235 in no longer than eight hours”). As confirmed in an analysis, provided to the Agency, that had been carried out by the foreign laboratory involved in the project, the highest average enrichment achieved was 8%, but with a peak enrichment of 13%.

34. As described earlier, Iran had received 50 kg uranium metal as part of the third contract. According to the information provided to the Agency, a total of 8 kg uranium metal was used in LSL and CSL experiments. However, according to Iran, 500 g of it was evaporated in the experiments, in the course of which milligram quantities of uranium were collected. If, as declared by Iran, the evaporated uranium and collectors had been discarded with wastes, mainly at the Qom disposal site (which the Agency has visited twice), recovery of the small quantities of nuclear material involved would not be feasible and therefore accurate nuclear material accountancy is not possible.

35. According to Iran, the LSL and CSL laboratory experiments carried out between 1994 and 2000 were unsuccessful due to continuous technical problems encountered with copper vapour lasers (CVLs), electron beam guns or dye lasers. Examination by the Agency of the laboratory notebook and other supporting documents provided by Iran confirms Iran’s statement that isotope separation was not successful during that period.

36. The fourth contract was for the supply of AVLIS equipment to Lashkar Ab’ad. Iran stated that, due to the inability of the supplier to secure export licences for some of the equipment (in particular, the CVLs and dye lasers, some collector parts, the electron beam gun and the power sources), only some of the equipment (including a large process vessel with supporting diffusion pumps and some diagnostics instruments), along with some training and documentation, was provided under the

contract. Iran has stated that it made attempts to procure the missing equipment, such as additional CVLs and electron beam guns, with limited success.

37. According to Iranian officials, as a consequence of these difficulties, Iran took advantage of the existing CVLs and dye lasers from CSL, and installed them in the pilot scale vessel in Lashkar Ab'ad where, in late 2002, a total of four runs with uranium feed using a total of about 500 g uranium metal were carried out. As evidence to support this statement, Iran has presented laboratory notebooks of one of the scientists involved in these activities. As described earlier, the Agency has taken environmental samples, and metal parts were taken from the chamber, with a view to determining whether enrichment levels higher than the 0.8% U-235 declared by Iran were achieved. The results of the Agency's analysis indicate enrichment levels (0.99%  $\pm$  0.24% U-235) consistent with those declared by Iran.

38. While the contract for the AVLIS facility at Lashkar Ab'ad was specifically written for the delivery of a system that could demonstrably achieve enrichment levels of 3.5% to 7%, it is the opinion of Agency experts that the system at Lashkar Ab'ad, as designed and reflected in the contract, would have been capable of HEU production had the entire package of equipment been delivered. In that connection, the experts point to the Lashkar Ab'ad AVLIS vacuum vessel, which incorporated a number of features specific to HEU separation work, including:

- an ion trap for the extraction of ion impurities for increased HEU yield; and
- a collector assembly designed for the relatively low throughput of HEU.

39. In response to the Agency's questions in connection with this assessment, Iran referred to the contract and the design parameters contained therein, which provide that the design was guaranteed by the supplier to "have actual production of at least 5 kg of a product within the first year after installation. The product will be 3.5% up to 7% enriched." Iran also provided information demonstrating the very limited capabilities of this particular equipment delivered to Iran under this contract to produce HEU (i.e. only in gram quantities). Iranian AVLIS researchers maintain that they were not aware of the significance of these features when they negotiated and contracted the supply and delivery of the Lashkar Ab'ad AVLIS facility.

## **D. Heavy Water Reactor Programme**

### **D.1. Heavy Water Reactor IR-40**

40. As referred to in the report of the Director General to the March 2004 Board meeting (GOV/2004/11, para. 56), Iran has provided preliminary design information on the IR-40, which is to be constructed at Arak. Iran has also provided information on the IR-40 pursuant to Articles 2.a.i. and 2.b.i. of its Additional Protocol. Iran's declarations concerning R&D activities related to the design of the heavy water reactor were further discussed in the meetings in Tehran which took place in July and August 2004, following upon which, Iran provided additional information. That information is being reviewed by the Agency.

### **D.2. Hot Cells**

41. In response to questioning by the Agency about past efforts by Iran to procure hot cell windows and manipulators, and the specifications associated with those items, Iran informed the Agency that

there had been a project for the construction of hot cells for the production of “long lived radioisotopes” but that it had been abandoned due to procurement difficulties. In August 2004, Iran presented to the Agency detailed drawings that Iran had received from a foreign company in 1977 for hot cells which were to have been constructed at Esfahan. Iran stated that it had not yet made more detailed plans for hot cells for the IR-40 complex at Arak, but that it had used information from those drawings as the basis for specifications in its efforts to procure manipulators for hot cells intended for the production of cobalt and iridium isotopes. In a letter dated 19 August 2004 Iran reiterated its previous statement that the hot cell project at Arak consisted of nine hot cells — four for the “production of radioisotopes”, two for the production of cobalt and iridium<sup>5</sup>, and three for “waste management processing” — and would require ten back-up manipulators. The Agency is continuing to assess the information provided by Iran.

## **E. Implementation of the Additional Protocol**

### **E.1. Declarations**

42. Iran has continued to act as if its Additional Protocol is in force. Following receipt of the initial declarations submitted by Iran on 21 May 2004 under the Additional Protocol, the Agency began its review of the declarations and, on 2 July 2004, provided comments to Iran on those declarations. During the early July 2004 visit of inspectors to Iran, the Agency reviewed its comments with Iran. During the Agency’s August 2004 visit to Iran, additional comments were provided by the Agency to Iran and a number of revisions requested, which Iran agreed to provide by mid-August 2004. Clarifications were also sought by Iran on the interpretation of some of the provisions of the Additional Protocol. The Agency and Iran intend to revisit some of the issues raised by Iran in the near future.

### **E.2. Complementary Access**

43. Since the June 2004 Board meeting, the Agency has carried out complementary access in Iran on six occasions at five locations: twice at ENTC, and once each at TNRC, Lashkar Ab’ad, Karaj and the Bandar Abbas uranium mine and production plant at Gchine.

## **F. Transparency Visits and Discussions**

44. During the June 2004 meeting of the Board of Governors, the Director General asked Iran to provide the Agency, in the interest of transparency, access to the Lavisian-Shian site. The request was prompted by a reference made during that meeting to the Lavisian-Shian site in connection with alleged nuclear related activities (including the use of whole body counters) carried out at that site and the possibility of a concealment effort by Iran to hide these activities through the removal of all of the buildings from the site after November 2003.

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<sup>5</sup> Cobalt-60 and iridium-192 have half-lives of 5.2 years and 74 days, respectively.

45. On 28 June 2004, the Agency visited the Lavisian-Shian site, where it took environmental samples. Iran gave the Agency a description and chronology of activities carried out at the Lavisian-Shian site. As described by Iran in a follow up letter to the Agency dated 8 August 2004, a Physics Research Centre had been established at that site in 1989, the purpose of which had been “preparedness to combat and neutralization of casualties due to nuclear attacks and accidents (nuclear defence) and also support and provide scientific advice and services to the Ministry of Defence.” Iran provided a list of the eleven activities conducted at the Physics Research Centre, but, referring to security concerns, declined to provide a list of the equipment used at the centre. In a letter to the Agency dated 19 August 2004, Iran stated further that “no nuclear material declarable in accordance with the Agency’s safeguard[s] was present” and reiterated its earlier statement that “no nuclear material and nuclear activities related to fuel cycle were carried out at Lavisian-Shian.”

46. During its discussions with the Agency in June 2004, Iran confirmed its acquisition from a foreign entity of two whole body counters and their installation in two trailers. Iran further confirmed that one of these whole body counters, together with its trailer, had previously been located at the Lavisian-Shian site. Between 28 and 30 June 2004, Iran provided the Agency access to two whole body counters, and to a trailer said to have contained one of the whole body counters while it was located at Lavisian-Shian. The Agency collected environmental swipe samples from the whole body counters and the trailer.

47. According to Iran, the site had been razed in response to a decision ordering the return of the site to the Municipality of Tehran in connection with a dispute between the Municipality and the Ministry of Defence. Iran recently provided documentation in support of this explanation, which is currently being assessed.

48. The environmental swipe samples from the whole body counters and the trailer, along with the vegetation, soil and swipe samples collected from the Lavisian-Shian site, are currently being analysed, and the documents provided by Iran in support of these explanations are being assessed.

49. In accordance with Agency practice in connection with its evaluation of other States’ nuclear programmes, the Agency has discussed with the Iranian authorities open source information relating to dual use equipment and materials which have applications in the conventional military area and in the civilian sphere as well as in the nuclear military area.

## **G. Suspension of Enrichment Related and Reprocessing Activities**

### **G.1. Scope of suspension**

50. As described in the previous Board report (GOV/2004/34, Annex, para. 51), Iran informed the Agency on 29 December 2003 that:

- it would suspend the operation and/or testing of any centrifuges, either with or without nuclear material, at PFEP at Natanz;
- it would suspend further introduction of nuclear material into any centrifuges;
- it would suspend installation of new centrifuges at PFEP and installation of centrifuges at the Fuel Enrichment Plant (FEP) at Natanz; and

- it would withdraw nuclear material from any centrifuge enrichment facility if and to the extent practicable.

51. Iran stated further that it did not currently have any type of gas centrifuge enrichment facility at any location in Iran other than the facility at Natanz that it was now constructing, nor did it have plans to construct, during the suspension period, new facilities capable of isotopic separation; it had dismantled its laser enrichment projects and removed all related equipment; and it was not constructing nor operating any plutonium separation facility.

52. Iran also stated on 29 December 2003 that, during the period of suspension, Iran did not intend to make new contracts for the manufacture of centrifuge machines and their components; the Agency could fully supervise storage of all centrifuge machines assembled during the suspension period; Iran did not intend to import centrifuge machines or their components, or feed material for enrichment processes, during the suspension period; and “[t]here is no production of feed material for enrichment processes in Iran.”

53. On 24 February 2004, Iran informed the Agency that instructions would be issued by the first week of March to implement the further decisions voluntarily taken by Iran to: (i) suspend the assembly and testing of centrifuges, and (ii) suspend the domestic manufacture of centrifuge components, including those related to the existing contracts, to the furthest extent possible. Iran also informed the Agency that any components that were manufactured under existing contracts that could not be suspended would be stored and placed under Agency seal. Iran invited the Agency to verify these measures. Iran also confirmed that the suspension of enrichment activities applied to all facilities in Iran.

54. On 15 March 2004, Iran notified the Agency that the Agency’s verification of the suspension of centrifuge component production could begin as of 10 April 2004. However, due to disputes between the AEOI and some of its private contractors, three private companies would continue with centrifuge component production.

55. Iran stated in a letter dated 18 May 2004, received by the Agency on 21 May 2004, that “Iran has not, at any time, made any undertaking not to produce feed material for the enrichment process. The decision taken for voluntary and temporary suspension is based on clearly defined scope which does not include suspension of production of UF<sub>6</sub>.”

56. On 23 June 2004, the Director General received a letter from Iran informing him that Iran “plan[ne]d to suspend implementation of the expanded voluntary measures conveyed in [its] Note dated 24 February 2004” and that Iran “thus, intend[ed] to resume, under IAEA supervision, manufacturing of centrifuge components and assembly and testing of centrifuges as of 29 June 2004.” In the letter, Iran requested the Agency “to take steps that may be necessary to enable resumption of such operations as of 29 June.” On 25 June 2004, the Director General wrote to Iran, referring to its letter of 23 June 2004, and expressed the hope that Iran would “continue to build international confidence through implementing its voluntary decisions to suspend all enrichment related and reprocessing activities” and informing Iran that the Agency would be in contact to clarify the practical implications of the decision of the Iranian authorities. Both letters were circulated to the Members of the Board of Governors for their information under cover of a Note dated 25 June 2004.

57. On 29 June 2004, the Agency received a letter forwarding a list of seals which, as foreseen in its letter of 23 June 2004, would be removed from material, components and equipment related to centrifuge component manufacturing and assembling. In a letter dated 29 June 2004, the Agency acknowledged receipt of Iran’s letter and agreed to the removal of the seals by the operator in the absence of Agency inspectors.

## G.2. Monitoring activities

58. The status of the Agency's monitoring activities as of May 2004 was provided in the Director General's previous report to the Board of Governors (GOV/2004/34, Annex, paras 56–68). The Agency has continued its monthly monitoring activities at PFEP, most recently on 21–22 August 2004, to ensure that the suspension of enrichment activities at PFEP is fully implemented. The surveillance records from the cascade hall have been reviewed to ensure that no additional centrifuge machines were installed; the seals on equipment and nuclear material were verified to ensure that they had not been tampered with and replaced. The cascade hall continues to be under Agency surveillance and all the previously declared UF<sub>6</sub> feed material remains under Agency seal. Other activities conducted by the Agency in connection with the monitoring of Iran's suspension undertakings have included:

- design information verification at FEP;
- monitoring of the decommissioned status of the AVLIS pilot plant at Lashkar Ab'ad through complementary access; and
- inspections at JHL.

59. During the Agency's June 2004 visit to Esfahan, the operator of UCF stated that, of the 143 kg of UF<sub>4</sub> produced and verified by the Agency previously, 60 kg had been fed into the UF<sub>6</sub> process line. About 25 to 30 kg of UF<sub>6</sub> produced from those activities was being kept in two condensers and another 5 kg of UF<sub>6</sub> had been stored in a container. The operator told Agency inspectors that the equipment testing had been completed and that another larger test involving 37 tonnes of yellowcake is planned for August/September 2004.

60. Following on this, the seals that had been used by the Agency as one of the measures for monitoring Iran's suspension of the manufacture, assembly and testing of centrifuge components at Natanz, Pars Trash and Farayand Technique were removed by Iran and returned to the Agency during its visit to Iran between 6 and 18 July 2004. As of mid-August 2004, about 70 rotors had been newly assembled and tested, and were shown to the Agency. The Agency is discussing with Iran the necessary arrangements for the Agency to exercise "supervision". In that regard, the Agency has proposed that it seal the tested rotors, a measure which Iran has not to date accepted. It must be noted that, in the absence of such seals, the Agency's supervision of the activities identified by Iran cannot be considered effective.