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Verification and monitoring in the Islamic Republic of Iran in light of United Nations Security Council resolution 2231 (2015)

Report by the Director General

A. Introduction

1. This report of the Director General to the Board of Governors and, in parallel, to the United Nations Security Council (Security Council), is on the Islamic Republic of Iran's (Iran's) implementation of its nuclear-related commitments under the Joint Comprehensive Plan of Action (JCPOA) and on matters related to verification and monitoring in Iran in light of Security Council resolution 2231 (2015). It also provides information on financial matters, and the Agency's consultations and exchanges of information with the Joint Commission, established by the JCPOA.

B. Background

2. The background to the matters outlined in this report can be found in previous quarterly reports of the Director General on this subject, most recently in GOV/2021/39 (paras 2–21) of 7 September 2021, as updated in GOV/2021/51.

3. The estimated cost to the Agency for the implementation of Iran's Additional Protocol and for verifying and monitoring Iran's nuclear-related commitments as set out in the JCPOA is €9.2 million per annum. For 2022, extrabudgetary funding is necessary for €4.0 million of the €9.2 million per

annum.[1] As of 21 February 2022, €5.7 million of extrabudgetary funding had been pledged to meet the cost of JCPOA-related activities for 2022 and beyond.[2,3]

C. Agency monitoring and surveillance equipment under JCPOA

4. As previously reported,[4] following further constructive consultations between the Director General and the Vice-President of Iran and Head of the Atomic Energy Organization of Iran (AEOI) on 15 December 2021, new terms were agreed in relation to the Agency's monitoring and surveillance equipment under the JCPOA. In line with those agreed terms:

- on 19 December 2021, the Agency made available a sample camera and related technical information to Iran for analysis by its relevant security and judiciary officials, in the presence of the Agency inspectors; and
- by the end of December 2021, the Agency had reinstalled cameras to replace those removed from the workshop at Karaj and performed other related technical activities, including the replacement of all storage media in JCPOA-related cameras.

5. As also previously reported,[5] on 19 January 2022, Iran informed the Agency that it intended to produce centrifuge rotor tubes and bellows at a new location, in Esfahan, instead of at the workshop at Karaj and that the Agency could adjust its surveillance and monitoring activities accordingly. On 22 January 2022, the Agency applied seals on all the production machines at the Karaj workshop and then removed the surveillance cameras. On 24 January 2022, Agency inspectors installed and set up cameras in a new workshop at the aforementioned location at Esfahan to ensure the machines intended for the production of centrifuge rotor tubes and bellows were under Agency monitoring.

6. It continues to be the Agency's understanding that surveillance data from all Agency cameras installed for activities in relation to the JCPOA, as well as its on-line enrichment monitors, electronic seals or installed measurement devices, will continue to be stored and made available to the Agency if and when Iran resumes implementation of its nuclear-related commitments under the JCPOA.

D. JCPOA Verification and Monitoring Activities

7. Between 16 January 2016 (JCPOA Implementation Day) and 23 February 2021, the Agency verified and monitored Iran's implementation of its nuclear-related commitments in accordance with the modalities set out in the JCPOA,[6] consistent with the Agency's standard safeguards practices, and

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[1] The cost of the provisional application of Iran's Additional Protocol (€3.0 million) and €2.2 million for the inspector costs related to the verification and monitoring of Iran's nuclear-related commitments as set out in the JCPOA are being met from the regular budget (GC(63)/2).

[2] On the basis of the current funding estimates, the existing funding will meet the cost of Agency activities in relation to the JCPOA until early June 2023.

[3] The additional costs that the Agency has been incurring since 23 February 2021, while Iran has not been implementing its nuclear-related commitments under the JCPOA, will be communicated in due course once they have been assessed.

[4] GOV/INF/2021/47.

[5] GOV/INF/2022/3, paras 2–5.

[6] Including the clarifications referred to in para. 3 of GOV/2021/39.

in an impartial and objective manner.[7,8] From 23 February 2021 onwards, however, the Agency's verification and monitoring activities in relation to the JCPOA have been seriously affected as a result of Iran's decision to stop the implementation of its nuclear-related commitments under the JCPOA, including the Additional Protocol (see Annex 1). The Agency reports the following for the period since the issuance of the Director General's previous quarterly report[9] and three subsequent updates (see Annex 2).

D.1. Activities Related to Heavy Water and Reprocessing

8. As of 16 February 2022, the Agency verified that Iran has not pursued the construction of the Arak heavy water research reactor (IR-40 Reactor) based on its original design.[10,11,12,13,14] The Agency also verified that Iran has not produced or tested natural uranium pellets, fuel pins or fuel assemblies specifically designed for the support of the IR-40 Reactor as originally designed. All existing natural uranium pellets and fuel assemblies have remained in storage under continuous Agency monitoring (paras 3 and 10).[15]

9. Since 23 February 2021, Iran has neither informed the Agency about the inventory of heavy water in Iran and the production of heavy water at the Heavy Water Production Plant (HWPP),[16] nor allowed the Agency to monitor the quantities of Iran's heavy water stocks and the amount of heavy water produced at the HWPP (para. 15).[17]

10. Iran has continued to process irradiated LEU mini plates (targets) for the intended purpose of testing the process for producing fission Mo-99 at the Molybdenum, Iodine and Xenon Radioisotope Production (MIX) facility. Since the previous quarterly report, Iran has irradiated two additional LEU targets enriched up to 20% U-235 and shipped them to the MIX facility.[18] Iran has not carried out activities related to reprocessing at the Tehran Research Reactor (TRR), the Jaber Ibn Hayan Multipurpose Laboratory (JHL) and the MIX facility or at any of the other facilities it has declared to

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[7] GOV/2016/8, para. 6.

[8] Note by the Secretariat, 2016/Note 5.

[9] GOV/2021/51.

[10] The calandria was removed from the reactor and rendered inoperable during preparation for Implementation Day and has been retained in Iran (GOV/INF/2016/1, Arak Heavy Water Research Reactor, paras 3(ii) and 3(iii)).

[11] As indicated previously (GOV/2017/24, footnote 10), Iran has changed the name of the facility to the Khondab Heavy Water Research Reactor (KHRR).

[12] On 16 February 2021, the Agency verified that Iran had completed the installation of the refuelling machine (see GOV/2021/10, footnote 17). Iran had indicated previously that this machine was constructed based on the original design and was planned to be adapted to the new design of the reactor (see GOV/2020/41, footnote 17).

[13] During the DIV activities on 10 November 2021, the Agency observed a number of routine activities were taking place at this facility (see GOV/2021/51, footnote 17).

[14] On 16 February 2022, the Agency observed that the construction of the control room for the refuelling machine has started, that civil construction works on the equipment airlock were continuing and that the lining of the spent fuel pond with steel plates was still ongoing.

[15] Unless otherwise indicated, the paragraph references in parentheses throughout Sections D, E and F of this report correspond to the paragraphs of 'Annex I – Nuclear-related measures' of the JCPOA.

[16] In June 2017, Iran informed the Agency that the "maximum annual capacity of the Heavy Water Production Plant (HWPP) is 20 Tons" (see GOV/2017/35, footnote 12).

[17] Based on its analysis of commercially available satellite imagery, the Agency assesses that the HWPP has continued to operate during the reporting period.

[18] During a DIV at the MIX facility on 22 February 2022, the Agency observed that three irradiated targets made of uranium enriched up to 20% U-235 were being used for testing the Mo-99 production process.

the Agency (paras 18 and 21).[19,20]

D.2. Activities Related to Enrichment and Fuel

11. Iran has continued the enrichment of UF_6 at the Fuel Enrichment Plant (FEP) and the Pilot Fuel Enrichment Plant (PFEP) at Natanz,[21] and at the Fordow Fuel Enrichment Plant (FFEP) at Fordow.[22] As previously reported, Iran has been enriching UF_6 up to 5% U-235 since 8 July 2019[23] (para. 28), has been enriching UF_6 up to 20% U-235 since 4 January 2021,[24] and has enriched UF_6 up to 60% U-235 since 17 April 2021.[25] Iran has continued to conduct enrichment activities that are not in line with its long-term enrichment and enrichment research and development (R&D) plan, as provided to the Agency on 16 January 2016 (para. 52).[26]

12. Since 23 February 2021, the Agency has not had access to the data and recordings collected by its surveillance equipment being used to monitor centrifuges and associated infrastructure in storage (paras 29, 47, 48 and 70).

13. Since 23 February 2021, while the Agency has had regular access to FEP, PFEP and FFEP, it has not been able to perform daily access upon request (paras 51 and 71). In addition, following an incident at FEP on 11 April 2021, due to continuing safety and security concerns, Iran and the Agency agreed to a temporary alternative approach to verify the status of the cascades instead of Agency inspectors accessing the area between the cascades.

D.2.1. FEP

14. As previously reported, in addition to the 30 cascades of IR-1 centrifuges provided for under the JCPOA (para. 27), Iran has informed the Agency that it intends to install another 19 cascades at FEP – six of IR-1 centrifuges, six of IR-2m centrifuges, six of IR-4 centrifuges, and one of IR-6 centrifuges.[27]

15. On 22 February 2022, the Agency verified at FEP that 36 cascades of IR-1 centrifuges,[28] six cascades of IR-2m centrifuges and two cascades of IR-4 centrifuges were installed to enrich natural UF_6 up to 5% U-235 at FEP, of which 31 IR-1 cascades, six IR-2m cascades and two IR-4 cascades were being fed with natural UF_6. The Agency also verified that installation of centrifuges in the remaining four cascades of IR-4 centrifuges and the single cascade of IR-6 centrifuges had yet to begin.

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[19] In an updated DIQ for the MIX facility, dated 9 May 2021, Iran informed the Agency of its plan to extract Mo-99, I-131 and Xe-133 from irradiated targets of natural uranium and low enriched uranium enriched up to 20% U-235 (GOV/2021/28, footnote 25).

[20] In an updated DIQ for the JHL facility, dated 5 January 2021, Iran had informed the Agency of its research and development (R&D) plan to extract caesium from irradiated targets.

[21] GOV/INF/2019/12, para. 4.

[22] Under the JCPOA, "[f]or 15 years the Natanz enrichment site will be the sole location for all of Iran's uranium enrichment related activities including safeguarded R&D" (para. 72).

[23] GOV/INF/2019/9, para. 3.

[24] GOV/INF/2021/2, para. 5.

[25] GOV/INF/2021/26, para. 3. According to Iran, fluctuations of the enrichment levels of UF_6 were experienced. This was confirmed by the Agency's analysis of the environmental samples taken on 22 April 2021, which showed an enrichment level of up to 63% U-235 (see GOV/INF/2021/29, para. 7).

[26] GOV/INF/2019/10, GOV/INF/2019/12, GOV/INF/2019/16, GOV/INF/2020/10 and Section D.2.2 of this report.

[27] GOV/INF/2020/10, para. 2; GOV/INF/2021/15, para. 2, and GOV/INF/2020/17, para. 2; GOV/INF/2021/19, para. 3, and GOV/INF/2021/27, para. 2; GOV/INF/2021/24, para. 2.

[28] The 30 cascades comprising 5060 IR-1 centrifuges at the time the JCPOA was agreed remained in the configurations as provided for in the JCPOA (para. 27).

16. Since 23 February 2021, the Agency has not had access to the data and recordings collected by its surveillance equipment installed at FEP to monitor any withdrawals by Iran of IR-1 centrifuges from those held in storage for the replacement of damaged or failed IR-1 centrifuges installed at FEP (para. 29.1).

D.2.2. PFEP

17. Since the previous quarterly report, Iran has not progressed further with the planned transfer of its enrichment R&D activities to a segregated area of Building A1000 at FEP, to create a new area of PFEP (paras 27 and 40–42).[29] As previously reported,[30] the Agency verified in February 2021 that Iran had completed the installation of sub-headers for 18 cascades for R&D activities in this new, segregated area of PFEP. On 21 February 2022, the Agency verified that there had been little progress in the installation of the infrastructure for these 18 cascades during this reporting period.

18. The following is reported regarding the R&D activities involving R&D lines 1–6 in the original area of PFEP (paras 32–42):

- **R&D production lines 1, 4 and 6:** As previously reported,[31] on 17 April 2021, Iran began the production of UF_6 enriched up to 60% U-235. On 21 February 2022, the Agency verified that Iran was continuing to feed UF_6 enriched up to 5% U-235 into the two cascades in R&D production lines 4 and 6, comprising up to 164 IR-4 and up to 164 IR-6 centrifuges, respectively, to produce UF_6 enriched up to 60% U-235 and feeding the tails produced from these two cascades into the cascades of IR-5 and IR-6s centrifuges in R&D production line 1 to produce UF_6 enriched up to 5% U-235.
- **R&D lines 2 & 3:** As previously reported,[32] the Agency verified on 25 October 2021 that Iran had started feeding UF_6 enriched up to 20% U-235 in R&D line 2 and that the resulting product and tails streams were re-combined. On 17 November 2021, the Agency verified that feeding of UF_6 enriched up to 20% U-235 in R&D line 2 had stopped, that the associated temporary feeding and withdrawal set up had been removed, and that feeding of natural UF_6 in R&D line 2 was ready to resume.

  R&D line 2 (from 17 November 2021) and R&D line 3 (throughout the reporting period) continued to accumulate uranium enriched up to 2% U-235 through feeding of natural UF_6. On 21 February 2022, the Agency verified that Iran had been using, for this purpose, single cascades of up to: nine IR-4 centrifuges; seven IR-5 centrifuges; five IR-6 centrifuges, (two cascades of) ten IR-6 centrifuges; 19 IR-6 centrifuges; and ten IR-s centrifuges. The following single centrifuges were being tested with natural UF_6 but not accumulating enriched uranium: three IR-2m centrifuges, two IR-4 centrifuges; three IR-5 centrifuges; five IR-6 centrifuges; one IR-6s centrifuge; one IR-7 centrifuge; one IR-8 centrifuge; one IR-8B centrifuge; and one IR-9 centrifuge.
- **R&D line 5:** On 21 February 2022, the Agency verified that Iran continued to accumulate uranium enriched up to 2% U-235 through feeding of natural UF_6 into an intermediate cascade of 18 IR-1 centrifuges and an intermediate cascade of 33 IR-2m centrifuges in R&D line 5 to produce uranium enriched up to 2% U-235.

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[29] GOV/INF/2020/15, para. 2.

[30] GOV/2021/10, para. 22.

[31] GOV/INF/2021/26, para. 3.

[32] GOV/INF/2021/51, para.22.

D.2.3. FFEP

19. As previously reported, Iran began to enrich UF_6 (para. 45) in one wing (Unit 2) of the facility in November 2019[33] and, since January 2020, has been using a total of six cascades, containing up to 1044 IR-1 centrifuges, to enrich UF_6 (para. 46).[34] In January 2021, Iran reconfigured these six cascades as three sets of two interconnected cascades and began feeding UF_6 enriched up to 5% U-235 into the process to start the production of UF_6 enriched up to 20% U-235.[35]

20. As previously reported,[36] in July 2021, Iran provided the Agency with an updated design information questionnaire (DIQ) for FFEP which described a new configuration of two cascades of IR-6 centrifuges that would either be fed with natural UF_6 to produce UF_6 enriched up to 5% U-235 or be fed with UF_6 enriched up to 5% U-235 to produce UF_6 enriched up to 20% U-235.

21. As previously reported,[37] in October 2021, the Agency verified that Iran had completed the installation of modified sub-headers for one cascade of IR-6 centrifuges that would enable Iran to change the operating configuration of the cascade more easily and, subsequently, Iran informed the Agency that the second cascade of IR-6 centrifuges would remain in its original, fixed configuration.

22. As also previously reported,[38] in November 2021, the Agency verified that Iran began feeding the cascade of 166 IR-6 centrifuges (with fixed configuration) with UF_6 enriched up to 5% U-235 to produce UF_6 enriched up to 20% U-235. On 23 February 2022, the Agency verified that: Iran was using up to 1044 IR-1 centrifuges in three sets of two interconnected cascades and one cascade of 166 IR-6 centrifuges (with fixed configuration) to enrich uranium up to 20% U-235;[39] a second cascade of 166 IR-6 centrifuges (with modified sub-headers) was installed but had yet to be fed with UF_6; one IR-1 centrifuge was installed in a single position.[40]

D.2.4. FPFP

23. As previously reported,[41] in November 2021, the Agency verified the receipt at FPFP of 33 kg of uranium in the form of UF_6 enriched up to 20% U-235 from PFEP, for the purpose of producing fuel assemblies[42] for the TRR, according to both the original design and the new silicide design.[43]

24. As previously reported,[44] Iran informed the Agency that the new uranium silicide TRR fuel would be produced through a three-stage process. In January 2022, the Agency verified that the installation of the equipment for the first stage of the process, i.e. production of UF_4 from UF_6, while almost complete, had progressed only slightly since the previous quarterly report. On 21 February 2022, the Agency observed that the first stage of the process had yet to undergo testing.

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[33] GOV/2019/55, para. 15.

[34] GOV/2020/5, para. 17.

[35] GOV/INF/2021/2, para. 5.

[36] GOV/2021/39, para. 37.

[37] GOV/2021/51, para. 25.

[38] GOV/2021/46, para. 5.

[39] GOV/2021/10, para. 26.

[40] On 29 January 2018, Iran provided the Agency with updated design information for FFEP, which included a temporary setup for a single IR-1 centrifuge position for "separation of stable isotopes" in Unit 2 (see GOV/2018/7, footnote 19).

[41] GOV/2021/51, para.27.

[42] A standard fuel assembly comprises 19 fuel plates and a control fuel assembly comprises 14 fuel plates.

[43] GOV/INF/2021/36, para. 4.

[44] GOV/INF/2021/3, para. 5.

25. As previously reported,[45] in June 2021, Iran informed the Agency about a four-step process by which it intended to produce the new TRR fuel for R&D purposes, which included the use of natural uranium, depleted uranium and uranium enriched up to 20% U-235.

26. In July 2021, the Agency verified that Iran had transferred, from FPFP to UCF, small batches of uranium in the form of AUC enriched up to 20% U-235, which had been produced from UO_2F_2, for the conversion to UO_2 enriched up to 20% U-235 at the R&D laboratory of UCF.[46] The Agency had verified all the batches of UO_2 enriched up to 20% U-235 produced at UCF before their transfer to the R&D laboratory of FPFP, where the UO_2 had been converted to UF_4 and then to uranium metal (paras 24 and 26). In August 2021, the Agency verified the first uranium metal sample at FPFP.

27. As previously reported,[47] in November 2021, Iran had completed the manufacturing of two fuel plates using uranium silicide containing 0.25 kg of uranium enriched up to 20% U-235 and shipped them to the TRR to undergo irradiation tests. Since the previous report, no uranium metal has been produced by Iran. On 28 February 2022, the Agency verified that Iran had converted the remaining 900g of uranium in the form of UF_4 enriched up to 20% U-235, previously intended for the production of uranium metal, into U_3O_8.

28. In January 2022, the Agency verified the receipt at FPFP of 23.3 kg of uranium in the form of UF_6 enriched up to 60% and 147.8 kg of uranium in the form of UF_6 enriched up to 20% U-235 from PFEP. This nuclear material is under Agency containment and surveillance.

29. On 19 February 2022, the Agency verified that Iran had produced 87 targets containing 1304 g of uranium enriched up to 20% U-235 in the form of U_3O_8. On 28 February 2022, the Agency verified that Iran had produced three targets containing 70g of uranium enriched up to 20% U-235 in the form of uranium silicide.

30. On 19 February 2022, the Agency verified that ten out of 17 fuel assemblies produced[48] at FPFP had been transferred to the TRR. The remaining seven fuel assemblies are stored at FPFP under Agency seal.

31. On 25 February 2022, the Agency received an updated DIQ, including changes to the facility that would enable the production of mini-plates (targets) using HEU enriched up to 60% U-235. On the same date, the Agency informed Iran that it would perform a design information examination and that additional safeguards measures would need to be applied by the Agency before Iran started the new process.

32. On 27 February 2022, the Agency examined at the facility the updated DIQ and conducted a design information verification (DIV) to verify that the changes were as declared by Iran. Following agreement on, and implementation of, the required safeguards measures, the Agency detached the seals on a cylinder containing HEU enriched up to 60% U-235, and immobilised it under Agency surveillance measures.

33. The process declared by Iran for manufacturing targets using HEU enriched up to 60% U-235 is identical to that using LEU enriched up to 20% U-235. The Agency will monitor each relevant step of the process by maintaining continuity of knowledge of the nuclear material and verifying it, where and when appropriate.

34. On 28 February 2022, the Agency verified that Iran had begun the conversion of HEU enriched

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[45] GOV/INF/2021/36, para. 5.

[46] GOV/INF/2021/36, paras 6–9.

[47] GOV/2021/51, para. 31.

[48] GOV/2021/51, para.34.

up to 60% U-235 in the form of UF_6 into UO_2F_2.

D.2.5. UCF

35. As previously reported, in November 2021, the Agency verified that installation of equipment for the production of uranium metal had been completed and that it was ready to operate with either natural or depleted uranium. On 12 February 2022, the Agency verified that no nuclear material had been introduced into the production area.

D.2.6. TRR

36. On 19 February 2022, the Agency verified that all previously irradiated TRR fuel elements in Iran had a measured dose rate of no less than 1 rem/hour (at one metre in air), except one single irradiated fuel plate.[49] The Agency also verified that the two new TRR fuel plates (see Section D.2.4 above) had been irradiated and that the ten TRR fuel elements received from FPFP between August 2021 and February 2022 (see Section D.2.4 above) had yet to be irradiated.

D.2.7. Fuel Manufacturing

37. As previously reported,[50] in September 2021, the Agency verified at the Enriched UO_2 Powder Plant (EUPP) at Esfahan that Iran had converted 103 kg of uranium in the form of UF_6 enriched up to 3.5 % U-235, which had been transferred from Natanz, into UO_2F_2. In the same month, the Agency verified that 105.0 kg of uranium in the form of UO_2F_2[51] had been transferred to FPFP to be converted into AUC and subsequently transferred to UCF for the production of UO_2 powder and to the Fuel Manufacturing Plant (FMP) at Esfahan for the production of fuel for the Khondab Heavy Water Research Reactor (KHRR). On 13 November 2021, the Agency verified that UO_2 enriched up to 3.5% U-235 has been received at FMP for the manufacture of fuel for KHRR.

38. On 21 November 2021, the Agency verified the receipt at EUPP from FEP of 141.1 kg of uranium in the form of UF_6 enriched up to 3.5% U-235, of which 139.7 had been converted in December 2021 into UO_2F_2. In December 2021, the Agency verified that 134.7 kg of uranium in the form of UO_2F_2 had been transferred to FPFP to be converted into AUC, which had subsequently been transferred to UCF for the production of UO_2 powder and to FMP for the production of fuel for KHRR. On 19 December 2021, the Agency also verified at EUPP the receipt of 143.1 kg of uranium in the form of UF_6 enriched up to 3.5% U-235 from FEP. This nuclear material is kept under Agency seal.

39. On 21 February 2022, the Agency verified at FMP 52 kg of uranium in the form of UO_2 powder and fuel pellets enriched up to 3.5% U-235 for KHRR.

D.3. Centrifuge Manufacturing, Mechanical Testing and Component Inventory

40. Since 23 February 2021, the Agency has not had access to the data and recordings collected by its surveillance equipment installed to monitor Iran's mechanical testing of centrifuges as specified in

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[49] One fuel plate containing 75 g of uranium enriched up to 20% U-235 had a dose rate below that limit. Decision of the Joint Commission of 24 December 2015 (INFCIRC/907).

[50] GOV/2021/51, paras 37-38.

[51] Of the 105 kg of uranium in the form of UO_2F_2, 27.0 kg of uranium in the form of UO_2F_2 had an enrichment level of to 3.5% U-235 and 78.0 kg of uranium in the form of UO_2F_2 had an enrichment level up of 3.3% U-235. The latter was obtained by mixing the uranium in the form of UO_2F_2 with an enrichment level of to 3.5% U-235 with depleted uranium in the form of UO_2F_2.

the JCPOA (paras 32 and 40). In January 2021, Iran began using a new location (at a workshop at Natanz), beyond those specified in the JCPOA, for mechanical testing of centrifuges.

41. Since 23 February 2021, Iran has no longer provided declarations to the Agency of its production and inventory of centrifuge rotor tubes, bellows and rotor assemblies, nor has it permitted the Agency to verify the items in the inventory (para. 80.1). Previously, the centrifuge component manufacturing equipment declared by Iran had also been used for activities beyond those specified in the JCPOA, such as the installation of the cascades described above (para. 80.2).

42. Since 23 February 2021, the Agency has not had access to the data and recordings collected by its surveillance equipment installed to monitor both the manufacturing of rotor tubes and bellows. Consequently, the Agency has been unable to verify whether Iran has produced any IR-1 centrifuges, including IR-1 centrifuge rotor tubes, bellows or rotor assemblies to replace those that have been damaged or failed (para. 62) and has no information on the inventory of rotor tubes, bellows and rotor assemblies. Nor can the Agency confirm the extent to which Iran is continuing to manufacture centrifuge rotor tubes using carbon fibre that had not been subject to previous continuous Agency containment and surveillance measures.[52,53]

43. As previously reported[54] and mentioned earlier (paragraph 5), on 19 January 2022, Iran informed the Agency that it intended to produce centrifuge rotor tubes and bellows at a new location, at Esfahan, and on 24 January 2022, Agency inspectors installed and set up cameras in a new workshop at the aforementioned location to ensure the machines intended for the production of centrifuge rotor tubes and bellows were under Agency monitoring.

D.4. Enriched Uranium Stockpile

44. As previously reported, since 1 July 2019, the Agency has verified that Iran's total enriched uranium stockpile has exceeded 300 kg of UF_6 enriched up to 3.67% U-235 (or the equivalent in different chemical forms) (para. 56).[55] The quantity of 300 kg of UF_6 corresponds to 202.8 kg of uranium.[56]

45. Since the previous report the changes to the inventory of uranium enriched up to 2% U-235, enriched up to 5% U-235, enriched up to 20% U-235 and enriched up to 60% U-235, as declared by Iran and verified by the Agency at the enrichment facilities, were as follows (see also Annex 3):

- **FEP:** Iran has estimated[57] that from 6 November 2021 to 18 February 2022, 882.2 kg of UF_6 enriched up to 5% U-235 were produced from natural UF_6.[58]

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[52] GOV/INF/2019/12, para. 6.

[53] Decision of the Joint Commission of 14 January 2016 (INFCIRC/907).

[54] GOV/INF/2022/3, paras 2–5.

[55] GOV/INF/2019/8, paras 2 and 3.

[56] Considering the standard atomic weight of uranium and fluorine.

[57] Since 23 February 2021, as the Agency has only been able to verify Iran's production of enriched UF_6 once the enriched uranium product has been removed from the process, the quantity of nuclear material that remains in the process can only be estimated.

[58] Out of the overall production of UF_6 enriched up to 5% U-235 at FEP since 16 February 2021, the Agency has verified 1893.8 kg of UF_6.

- **FFEP:** Iran has estimated that from 6 November 2021 to 18 February 2022, 668.7 kg of UF_6 enriched up to 5% U-235 were fed into cascades at FFEP,[59] and that 101.2 kg of UF_6 enriched up to 20% U-235 were produced,[60] and that 566.6 kg of UF_6 enriched up to 2% U-235 were accumulated as tails.
- **PFEP:** Iran has estimated that from 6 November 2021 to 18 February 2022: 167.3 kg of UF_6 enriched up to 2% U-235 were produced in R&D lines 2, 3 and 5; 876.5 kg of UF_6 enriched up to 5% U-235 were fed into cascades installed in R&D production lines 1, 4 and 6; 360.9 kg[61] of UF_6 enriched up to 5% U-235 were produced in R&D production line 1; 22.9 kg of UF_6 enriched up to 60% U-235 were produced in R&D production lines 4 and 6;[62] and 496.3 kg of UF_6 enriched up to 2% U-235 were accumulated as tails from R&D production line 1.[63]

46. On 18 February 2022, the Agency verified that the inventory of uranium enriched up to 20% U-235 in forms other than UF_6 was of 36.5 kg of uranium[64] and consisted of: 26.6 kg of uranium in the form of fuel assemblies, 6.4 kg of uranium in the form of intermediate products,[65] and 3.5 kg of uranium in the form of liquid and solid scrap.

47. Since 16 February 2021, the Agency has not been able to verify Iran's total enriched uranium stockpile, comprising enriched uranium produced at FEP, PFEP and FFEP and consumed as feed material at PFEP and FFEP.[66] Based on the information in the previous paragraphs, the Agency has estimated that, as of 19 February 2022, Iran's total enriched uranium stockpile was 3197.1 kg. This figure represents an increase of 707.4 kg since the previous quarterly report. The estimated stockpile comprised 2883.2 kg of uranium in the form of UF_6; 249.5 kg of uranium in the form of uranium oxide and other intermediate products; 37.8 kg of uranium in fuel assemblies and rods; and 26.6 kg of uranium in liquid and solid scrap.

48. As of 19 February 2022, the estimated total enriched uranium stockpile in the form of UF_6 of 2883.2 kg comprises: 1390 kg of uranium enriched up to 2% U-235 (+830.4 kg since the previous quarterly report); 1277.9 kg of uranium enriched up to 5% U-235 (-344.4 kg); 182.1 kg of uranium enriched up to 20% U-235 (+68.3 kg); and 33.2 kg of uranium enriched up to 60% U-235 (+15.5 kg).

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[59] Iran estimated that 0.8 kg of UF_6 enriched up to 5% U-235 were dumped (i.e. not used for the enrichment of UF_6 but remaining in the process); the nuclear material is still in process and has not been measured; its average enrichment could be slightly above the level of the feed material. This amount is included in the inventory of low enriched uranium at FFEP.

[60] Out of the overall production of UF_6 enriched up to 20% U-235 at FFEP since 16 February 2021, the Agency verified 236.7 kg of UF_6.

[61] This amount includes UF_6 enriched up to 5% U-235 in tails from R&D production lines 4 & 6 not fed into R&D production line 1.

[62] Out of the overall production at PFEP using lines 1, 4 and 6, since 14 April 2021, the Agency verified that the following amounts were produced: 611.6 kg of UF_6 enriched up to 5% U-235, 25.1 kg of UF_6 enriched up to 20% U-235 and 47.9 kg of UF_6 enriched up to 60% U-235.

[63] Tails from R&D production line 1 consist of UF_6 enriched up to 2% U-235.

[64] The stockpile increase of 2.3 kg of uranium enriched up to 20% in forms other than UF_6 resulted from mixing LEU enriched up to 20% U-235 with LEU enriched up to 5% U-235.

[65] Including the uranium enriched up to 20% U-235 used in the experiments of the uranium metal production for the new TRR fuel.

[66] Under Iran's Safeguards Agreement, the Agency is able to verify the physical inventory of nuclear material at each declared facility at the annual PIV.

E. Transparency Measures

49. Since 23 February 2021, the Agency has not: had access to the data from its on-line enrichment monitors and electronic seals, or access to the measurement recordings registered by its installed measurement devices (para. 67.1); been provided with any information or access to data from containment and surveillance measures relating to the transfer to UCF of UOC produced in Iran or obtained from any other source (para. 68); had access to the data and recordings collected by its surveillance equipment installed to monitor the production of UOC. Iran has also not provided the Agency with any information on the production of UOC or on whether it has obtained UOC from any other source (para. 69).

50. Iran has continued to issue long-term visas to Agency inspectors designated for Iran as requested by the Agency, provided proper working space for the Agency at nuclear sites and facilitated the use of working space at locations near nuclear sites in Iran (para. 67.2).

F. Other Relevant Information

51. Since 23 February 2021, Iran has no longer provisionally applied the Additional Protocol to its Safeguards Agreement in accordance with Article 17(b) of the Additional Protocol (para. 64). Iran has not provided updated declarations and the Agency has not been able to conduct any complementary access under the Additional Protocol to any sites and locations in Iran during this reporting period. In addition, Iran has not implemented modified Code 3.1 of the Subsidiary Arrangements to Iran's Safeguards Agreement during this reporting period (para. 65). Subsequently, Iran informed the Agency that it does not have a plan to construct a new nuclear facility in the near future and that it was ready to work with the Agency to find a mutually acceptable solution to address the issue of modified Code 3.1. Other matters previously addressed in this section relating to Iran's implementation of its Safeguards Agreement and Additional Protocol[67] are addressed in GOV/2022/5.

52. During this reporting period, the Agency was unable to verify Iran's other JCPOA nuclear-related commitments, including those set out in Sections D, E, S and T of Annex I of the JCPOA.

53. During this reporting period, the Agency has not attended any meetings of the Procurement Working Group of the Joint Commission (JCPOA, Annex IV – Joint Commission, para. 6.4.6).

G. Summary

54. From 23 February 2021 onwards, the Agency's verification and monitoring activities have been seriously affected as a result of Iran's decision to stop the implementation of its nuclear-related commitments under the JCPOA, including the Additional Protocol.

55. The Director General will continue to report as appropriate.

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[67] GOV/2020/51, paras 33-35.

Annex 1

Impact on Agency verification and monitoring resulting from Iran stopping implementation of its nuclear-related commitments as envisaged in the JCPOA[68]

The Agency is unable to:

Monitor or verify Iranian production and inventory of heavy water;	Para. 14 and para. 15
Verify that use of shielded cells, referred to in the decision of the Joint Commission of 14 January 2016 (INFCIRC/907), are being operated as approved by the Joint Commission;	Para. 21
Monitor and verify that all centrifuges and associated infrastructure in storage remain in storage or have been used to replace failed or damaged centrifuges	Para. 70
Perform daily access upon request to the enrichment facilities at Natanz and Fordow	Para. 71 and para. 51
Verify in-process material at enrichment facilities to enable an accurate stockpile of enriched uranium to be calculated	Para. 56
Verify whether or not Iran has conducted mechanical testing of centrifuges as specified in the JCPOA	Para. 32 and para. 40
Monitor or verify Iranian production and inventory of centrifuge rotor tubes, bellows or assembled rotors	Para. 80.1
Verify whether produced rotor tubes and bellows are consistent with the centrifuge designs described in the JCPOA	Para. 80.2
Verify whether produced rotor tubes and bellows have been used to manufacture centrifuges for the activities specified in the JCPOA	Para. 80.2
Verify whether rotor tubes and bellows have been manufactured using carbon fibre which meets the specifications agreed under the JCPOA	Para. 80.2
Monitor or verify Iranian production of UOC	Para. 69
Monitor or verify Iranian procurement of UOC from any other source	Para. 69
Monitor or verify whether UOC produced in Iran or obtained from any other source has been transferred to UCF	Para. 68
Verify Iran's other JCPOA nuclear-related commitments, including those set out in Sections D, E, S and T of Annex I of the JCPOA	
Receive any updated declarations from Iran or conduct any complementary access to any sites and locations in Iran during this reporting period	Additional Protocol

[68] Implementation of modified Code 3.1 is a legal obligation and is not reflected in the table.

Annex 2

Three updates since the Director General's previous Quarterly Report

GOV/INF	Date	Content
2021/46	1 December 2021	Update on developments related to enrichment activities at FFEP and FEP
2021/47	15 December 2021	Update on developments related to Agency monitoring and surveillance equipment in Iran
2022/3	31 January 2022	Removal of the surveillance cameras at the Karaj workshop and installation of cameras in a new location at Esfahan for the production of centrifuge rotor tubes and bellows

Annex 3

Enriched UF_6 Feed, Production and Inventory since the Director General's previous Quarterly Report

Facility	Centrifuge Type	Installed Cascades[69]	Total Planned Cascades	Feed Enrichment Level (% U-235)	Quantity Fed ($kgUF_6$)	Product Enrichment Level (% U–235)	Quantity produced (kg UF_6)
FEP	IR-1	36	36	Natural	-	<5%	882.2
	IR-2m	6	6				
	IR-4	2	6				
	IR-6	0	1				
FFEP	IR-1	6	6	<5%	668.7	<20% <2%	101.2 566.6
	IR-6	2	2				
PFEP	IR-4 (Line 4)	1	1	<5%	876.5	<60%	22.9
	IR-6 (Line 6)	1	1				
	IR-5 and IR-6s (Line 1)	1		Tails from Lines 4 & 6	N/A	<5% <2%	360.9 496.3
	Various (Lines 2, 3 and 5)			Natural	-	<2%	167.3

Enrichment level (% U-235)	Inventory as at 5 November 2021 (kgU)	Quantity Fed (kgU)	Quantity Produced (kgU)	Inventory as at 19 February 2022 (kgU)
<2%	559.6		830.4	1390.0
<5%	1622.3	1043.0	839.1	1277.9[70,71]
<20%	113.8		68.3	182.1
<60%	17.7		15.5	33.2

[69] Different numbers of cascades were fed during the reporting period.

[70] See paragraph 38 above.

[71] See footnote 59.