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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 subsequent reports.

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 23 May 2022, €5.8 million of extrabudgetary funding had been pledged to meet the cost

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).

of JCPOA-related activities for 2022 and beyond.^{2,3}

C. JCPOA Verification and Monitoring Activities

4. 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,⁴ consistent with the Agency's standard safeguards practices, and in an impartial and objective manner.^{5,6} 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 report⁷ and three subsequent updates (see Annex 2).

C.1. Agency monitoring and surveillance equipment

5. Since 21 February 2021, the Agency and Iran agreed that the information collected by the Agency's monitoring and surveillance equipment installed for activities in relation to the JCPOA would continue to be stored and that the equipment would continue to operate and be able to collect and store further data to enable the Agency to recover and re-establish the necessary continuity of knowledge.⁸ Prior to the end of March 2022, the Agency replaced all of the storage media in JCPOA-related cameras. On 12 April 2022, the Agency completed the installation of surveillance cameras, as requested by Iran, at the Natanz site, where Iran had moved the machines for the production of centrifuge rotor tubes and bellows which were earlier located at the centrifuge component production workshop at the TESA Karaj complex (Karaj workshop) (see Section D.3 below).⁹ 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.

C.2. Activities Related to Heavy Water and Reprocessing

6. As of 11 May 2022, the Agency verified that Iran has not pursued the construction of the Arak

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 mid-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 Including the clarifications referred to in para. 3 of GOV/2021/39.

⁵ GOV/2016/8, para. 6.

⁶ Note by the Secretariat, 2016/Note 5.

⁷ GOV/2022/4.

⁸ GOV/2021/10, Annex I; GOV/INF/2021/31, para. 4; GOV/INF/2021/42, para. 5; GOV/INF/2021/47.

⁹ GOV/INF/2022/10, para. 3; GOV/INF/2022/11, para. 3; GOV/2022/4, para. 5.

heavy water research reactor (IR-40 Reactor) based on its original design.^{10,11} On the same day, the Agency observed that there was no further progress in the construction of the control room for the refuelling machine, that civil construction works on the equipment airlock were almost complete and that the second layer of lining of the spent fuel pond with steel plates had begun. The Agency also verified on 11 May 2022 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).¹²

7. 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),¹³ 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).¹⁴

8. Iran has not carried out activities related to reprocessing at the Tehran Research Reactor (TRR), the Jaber Ibn Hayan Multipurpose Laboratory (JHL) and the Molybdenum, Iodine and Xenon Radioisotope Production (MIX) facility or at any of the other facilities it has declared to the Agency (paras 18 and 21).^{15,16}

C.3. Activities Related to Enrichment and Fuel

9. Iran has continued the enrichment of UF₆ at the Fuel Enrichment Plant (FEP) and the Pilot Fuel Enrichment Plant (PFEP) at Natanz,¹⁷ and at the Fordow Fuel Enrichment Plant (FFEP) at Fordow.¹⁸ As previously reported, Iran has been enriching UF₆ up to 5% U-235 since 8 July 2019¹⁹ (para. 28), has been enriching UF₆ up to 20% U-235 since 4 January 2021,²⁰ and has enriched UF₆ up to 60% U-235 since 17 April 2021.²¹ Iran has continued to conduct enrichment activities that are not in line with its

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 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.

¹³ 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).

¹⁴ Based on its analysis of commercially available satellite imagery, the Agency assesses that the HWPP has continued to operate during the reporting period.

¹⁵ 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 uranium enriched up to 20% U-235 (GOV/2021/28, footnote 25).

¹⁶ 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.

¹⁷ GOV/INF/2019/12, para. 4.

¹⁸ 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).

¹⁹ GOV/INF/2019/9, para. 3.

²⁰ GOV/INF/2021/2, para. 5.

²¹ GOV/INF/2021/26, para. 3. According to Iran, fluctuations of the enrichment levels of UF₆ 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).

long-term enrichment and enrichment research and development (R&D) plan, as provided to the Agency on 16 January 2016 (para. 52).²²

10. 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).

11. 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).²³

C.3.1. FEP

12. As previously reported, in addition to the 30 cascades of IR-1 centrifuges provided for under the JCPOA (para. 27), Iran informed the Agency that it intended 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.²⁴

13. On 23 May 2022, the Agency verified at FEP that 36 cascades of IR-1 centrifuges,²⁵ six cascades of IR-2m centrifuges and two cascades of IR-4 centrifuges were installed to enrich natural UF₆ up to 5% U-235, of which 34 IR-1 cascades, six IR-2m cascades and one IR-4 cascade were being fed with natural UF₆. On the same day, the Agency verified that one additional cascade of IR-4 centrifuges was being installed, while the installation of centrifuges in the remaining three cascades of IR-4 centrifuges and the single cascade of IR-6 centrifuges had yet to begin.

14. Iran has estimated²⁶ that from 19 February 2022 to 14 May 2022, 718.1 kg of UF₆ enriched up to 5% U-235 were produced from natural UF₆.²⁷

15. 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).

C.3.2. PFEP

16. 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).²⁸ On 25 May 2022, the Agency verified that there had been little further progress in the installation of the infrastructure for the 18 cascades to be installed for R&D activities in this new, segregated area of PFEP during this reporting period.²⁹

17. The following is reported regarding the R&D activities involving R&D lines 1–6 in the original

²² GOV/INF/2019/10, GOV/INF/2019/12, GOV/INF/2019/16, GOV/INF/2020/10 and Section D.2.2 of this report.

²³ 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.

²⁴ 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.

²⁵ 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).

²⁶ Since 23 February 2021, as the Agency has only been able to verify Iran's production of enriched UF₆ 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.

²⁷ Out of the overall production of UF₆ enriched up to 5% U-235 at FEP since 16 February 2021, the Agency has verified 2925.8 kg of UF₆.

²⁸ GOV/INF/2020/15, para. 2.

²⁹ GOV/2021/10, para. 22.

area of PFEP (paras 32–42):

- **R&D production lines 1, 4 and 6:** On 25 May 2022, the Agency verified that Iran was continuing to feed UF₆ 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 UF₆ 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 UF₆ enriched up to 5% U-235.
- **R&D lines 2 & 3:** Iran has continued to accumulate uranium enriched up to 2% U-235 through feeding of natural UF₆. On 25 May 2022, the Agency verified that Iran had been using, for this purpose, small and intermediate cascades of up to: eleven IR-4 centrifuges; six IR-5 centrifuges; ten IR-6 centrifuges, (two cascades of) five IR-6 centrifuges; nineteen IR-6 centrifuges; and ten IR-s centrifuges. The following single centrifuges were being tested with natural UF₆ but not accumulating enriched uranium: four IR-2m centrifuges; one IR-4 centrifuge; three IR-5 centrifuges; three IR-6 centrifuges; three IR-6s centrifuges; one IR-7 centrifuge; one IR-8 centrifuge; one IR-8B centrifuge; and one IR-9 centrifuge.
- **R&D line 5:** On 25 May 2022, the Agency verified that Iran continued to accumulate uranium enriched up to 2% U-235 through feeding of natural UF₆ into an intermediate cascade of 18 IR-1 centrifuges and an intermediate cascade of 33 IR-2m centrifuges in R&D line 5.

18. Iran has estimated that from 19 February 2022 to 14 May 2022:

- 185.3 kg of UF₆ enriched up to 2% U-235 were produced in R&D lines 2, 3 and 5;
- 722.5 kg of UF₆ enriched up to 5% U-235 were fed into cascades installed in R&D production lines 1, 4 and 6;
- 229.0 kg³⁰ of UF₆ enriched up to 5% U-235 were produced in R&D production line 1;
- 476.9 kg of UF₆ enriched up to 2% U-235 were accumulated as tails from R&D production line 1;³¹ and
- 17.8 kg of UF₆ enriched up to 60% U-235 were produced in R&D production lines 4 and 6.³²

C.3.3. FFEP

19. As previously reported, Iran began to enrich UF₆ (para. 45) in one wing (Unit 2) of the facility in November 2019³³ and, since January 2020, has been using a total of six cascades, containing up to 1044 IR-1 centrifuges, to enrich UF₆ (para. 46).³⁴ In January 2021, Iran reconfigured these six cascades as three sets of two interconnected cascades and began feeding UF₆ enriched up to 5% U-235 into the process to produce UF₆ 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

³⁰ This amount includes UF₆ enriched up to 5% U-235 in tails from R&D production lines 4 & 6 not fed into R&D production line 1.

³¹ Tails from R&D production line 1 consist of UF₆ enriched up to 2% U-235.

³² Out of the overall production at PFEP using R&D production lines 1, 4 and 6, since 14 April 2021, the Agency verified that the following amounts were produced: 810.0 kg of UF₆ enriched up to 5% U-235, 25.1 kg of UF₆ enriched up to 20% U-235 and 67.0 kg of UF₆ enriched up to 60% U-235.

³³ GOV/2019/55, para. 15.

³⁴ GOV/2020/5, para. 15.

³⁵ GOV/INF/2021/2, para. 5.

³⁶ GOV/2021/39, para. 37.

centrifuges that would either be fed with natural UF₆ to produce UF₆ enriched up to 5% U-235 or be fed with UF₆ enriched up to 5% U-235 to produce UF₆ 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 UF₆ enriched up to 5% U-235 to produce UF₆ enriched up to 20% U-235.

23. On 24 May 2022, the Agency verified that: Iran was using up to 1044 IR-1 centrifuges in three sets of two interconnected cascades to enrich uranium up to 20% U-235;³⁹ one cascade of 166 IR-6 centrifuges (with fixed configuration) was not being fed; a second cascade of 166 IR-6 centrifuges (with modified sub-headers) was installed but had yet to be fed with UF₆; and one IR-1 centrifuge was installed in a single position.⁴⁰

24. Iran has estimated that from 19 February 2022 to 14 May 2022, 555.3 kg of UF₆ enriched up to 5% U-235 were fed into cascades at FFEP,⁴¹ and that 83.3 kg of UF₆ enriched up to 20% U-235 were produced,⁴² and that 470.2 kg of UF₆ enriched up to 2% U-235 were accumulated as tails.

C.3.4. FFPF

25. As previously reported,⁴³ in November 2021, the Agency verified the receipt at the Fuel Plate Fabrication Plant (FPFP) of 33 kg of uranium in the form of UF₆ enriched up to 20% U-235 from PFEP, for the purpose of producing fuel assemblies⁴⁴ for the TRR, according to both the original design and the new uranium silicide-based design.⁴⁵

26. As previously reported,⁴⁶ Iran informed the Agency that the new uranium silicide TRR fuel would be produced through a three-stage process. On 17 May 2022, the Agency verified that the installation of the equipment for the first stage of the process, i.e. production of UF₄ from UF₆, had been completed and observed that the first stage of the process had yet to undergo testing.

27. As previously reported,⁴⁷ 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

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 Iran estimated that 1.7 kg of UF₆ enriched up to 5% U-235 were dumped (i.e. not used for the enrichment of UF₆ 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.

⁴² Out of the overall production of UF₆ enriched up to 20% U-235 at FFEP since 16 February 2021, the Agency verified 329.8 kg of UF₆.

⁴³ GOV/2021/51, para.27.

⁴⁴ A standard fuel assembly comprises 19 fuel plates and a control fuel assembly comprises 14 fuel plates.

⁴⁵ GOV/INF/2021/36, para. 4.

⁴⁶ GOV/INF/2021/3, para. 5.

⁴⁷ GOV/INF/2021/36, para. 5.

uranium, depleted uranium and uranium enriched up to 20% U-235.

28. In July 2021, the Agency verified that Iran had transferred, from FPF to the Uranium Conversion Facility (UCF), small batches of uranium in the form of ammonium uranyl carbonate (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.⁴⁸ 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 FPF, where the UO_2 had been converted to UF_4 and then to uranium metal. In August 2021, the Agency verified the first uranium metal sample at FPF.

29. As previously reported,⁴⁹ 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.

30. In February 2022, the Agency verified that Iran had converted the remaining 0.90 kg 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 . Since the previous quarterly report, no uranium metal has been produced by Iran.

31. As previously reported, in January 2022, the Agency verified the receipt at FPF 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. On 19 April 2022, the Agency verified the receipt at FPF of 15.3 kg of uranium in the form of UF_6 enriched up to 60% U-235. The Agency also verified the receipts at FPF on 19 April 2022 of 11.7 kg and on 17 May 2022 of 16.6 kg of uranium in the form of UF_6 enriched up to 20% U-235. All this nuclear material is under Agency containment and surveillance.

32. As previously reported, in 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 and three targets containing 70g of uranium enriched up to 20% U-235 in the form of uranium silicide. Between 8 and 20 March 2022, the Agency verified that Iran had produced an additional 66 targets containing 1.03 kg of uranium enriched up to 20% U-235 in the form of U_3O_8 and shipped 90 targets, containing 1.36 kg of uranium enriched up to 20% U-235 in the form of U_3O_8 to TRR under Agency seals. On 17 May 2022, the Agency also verified that 63 targets containing 0.96 kg of uranium enriched up to 20% U-235 in the form of U_3O_8 had remained in storage at FPF under Agency seals.

33. As previously reported, in February 2022, Iran provided an updated DIQ, including information on changes to the facility that would enable the production of targets using uranium enriched up to 60% U-235. The process declared by Iran for manufacturing targets using uranium enriched up to 60% U-235 is identical to that using uranium enriched up to 20% U-235. Following agreement on, and implementation of, the required safeguards measures, on 27 February 2022, the Agency detached the seals on a cylinder containing uranium enriched up to 60% U-235, and immobilised it under Agency surveillance measures. On 6 March 2022, the Agency verified the cylinder after its removal from the process and left it under Agency seal; there has been no further feeding of UF_6 enriched up to 60% U-235 during this reporting period.

34. As previously reported,⁵⁰ in March 2022, the Agency verified that Iran had converted at FPF 2.1 kg of uranium in the form of UF_6 enriched up to 60% U-235 into 1.7 kg of uranium enriched up to 60% U-235 in the form of U_3O_8 . Iran then informed the Agency that it had begun to use this U_3O_8 to produce high enriched uranium (HEU) targets, each of which would contain about 5.8 g of uranium enriched up to 60% U-235 and that these HEU targets would be irradiated at the TRR. Iran also informed

⁴⁸ GOV/INF/2021/36, paras 6–9.

⁴⁹ GOV/2021/51, para. 31.

⁵⁰ GOV/INF/2022/8.

the Agency that after irradiation, the targets would be transferred to the MIX facility for the production of fission Mo-99 when the facility becomes fully operational.

35. Between 11 and 19 March 2022, the Agency verified that Iran had produced at FPF 264 HEU targets, containing a total of 1.6 kg of uranium enriched up to 60% U-235. All HEU targets were shipped to TRR under Agency seals.

36. On 13 May 2022, the Agency verified that the seven fuel assemblies that were previously stored at the facility^{51,52} had been transferred to the TRR under Agency seals.

C.3.5. UCF

37. 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 16 May 2022, the Agency verified that no nuclear material had been introduced into the production area.

38. On 9 March 2022, the Agency verified the receipt at UCF from JHL of 302.7 kg of natural uranium in the form of metal items and solid waste, and verified the dissolution of this material from 10 to 18 March 2022. During and after the dissolution process, the Agency took samples of the different batches of dissolved material, the analysis of which is still ongoing.

C.3.6. TRR

39. Between 12 and 20 March 2022, the Agency verified the receipts at TRR from FPF of 264 HEU targets, containing a total of 1.6 kg of uranium enriched up to 60% U-235. (see Section C.3.4 above).

40. On 19 and 20 March 2022, the Agency also verified the receipts at TRR from FPF of 90 low enriched uranium (LEU) targets, containing 1.36 kg uranium enriched up to 20% U-235 in the form of U₃O₈ and three LEU targets containing 70 g of uranium enriched up to 20% U-235 in the form of uranium silicide.

41. On 16 April 2022, the Agency verified that all the above-mentioned HEU and LEU targets received at TRR from FPF during March 2022, including those in the form of uranium silicide, had been irradiated and kept at the TRR in the reactor pond. On 14 May 2022, the Agency verified that all the above-mentioned targets remained in the reactor pond.

42. Iran has continued to process irradiated LEU targets for the intended purpose of testing the process for producing fission Mo-99 at the MIX facility. Since the previous quarterly report, Iran has irradiated at TRR three additional LEU targets enriched up to 20% U-235 shipped from FPF to the MIX facility prior to August 2021,⁵³ and shipped them back to the MIX facility.⁵⁴

43. On 14 May 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.⁵⁵ As previously reported, the Agency verified that the two new TRR fuel plates using uranium silicide (see Section C.3.4 above) had been irradiated.

44. On 14 May 2022, the Agency verified the receipt at TRR from FPF of seven fuel assemblies

⁵¹ GOV/2021/51, para.34.

⁵² GOV/2022/4, para.30.

⁵³ GOV/2021/51, para.32.

⁵⁴ During a DIV at the MIX facility on 18 May 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.

⁵⁵ 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).

enriched up to 20% U-235 and that all 17 TRR fuel assemblies received from FFPF between August 2021 and May 2022 (see Section C.3.4 above) had yet to be irradiated.

C.3.7. EUPP

45. As previously reported,^{56,57} in September and November 2021, the Agency verified at the Enriched UO₂ Powder Plant (EUPP) at Esfahan that Iran had transferred from Natanz three batches totalling 387.2 kg of uranium in the form of UF₆ enriched up to 3.5 % U-235. Two of these batches, totalling 244.1 kg of uranium in the form of UF₆ enriched up to 3.5 % U-235, were converted into UO₂F₂ and transferred to FFPF to be converted into AUC and subsequently transferred to UCF for the production of UO₂ powder and to the Fuel Manufacturing Plant (FMP) at Esfahan for the production of fuel for the Khondab Heavy Water Research Reactor (KHRR). The third batch of 143.1 kg of uranium in the form of UF₆ enriched up to 3.5 % U-235 remains at EUPP under Agency seal. Since the last report, Iran has been undertaking maintenance activities at EUPP.

C.3.8. FMP

46. On 23 May 2022, the Agency verified at FMP 64.3 kg of uranium in the form of UO₂ powder and fuel pellets and fuel pins enriched up to 3.5% U-235 for KHRR.

C.4. Centrifuge Manufacturing, Mechanical Testing and Component Inventory

47. 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 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.

48. 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).

49. 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.^{58,59}

50. As previously reported,⁶⁰ in January 2022, Iran informed the Agency that it intended to produce centrifuge rotor tubes and bellows at a new location, at Esfahan, and later in that month, Agency inspectors installed and set up cameras in a new workshop at the aforementioned location to ensure the

⁵⁶ GOV/2021/51, paras 37-38.

⁵⁷ GOV/2022/4, para.38

⁵⁸ GOV/INF/2019/12, para. 6.

⁵⁹ Decision of the Joint Commission of 14 January 2016 (INFCIRC/907).

⁶⁰ GOV/INF/2022/3, paras 2-5.

machines intended for the production of centrifuge rotor tubes and bellows were under Agency monitoring.

51. As previously reported,⁶¹ on 4 April 2022, Iran informed the Agency that it had moved all of the machines for the production of centrifuge rotor tubes and bellows from the former Karaj workshop and placed them in what was to be a new workshop at a location at the Natanz site. On 12 April 2022, the Agency completed the installation of the surveillance cameras at this new workshop. Iran informed the Agency that these machines would be used for the production of centrifuge rotor tubes and bellows and that they would start operating on 13 April 2022.⁶²

C.5. Enriched Uranium Stockpile

52. As previously reported, since 1 July 2019, the Agency has verified that Iran's total enriched uranium stockpile has exceeded 300 kg of UF₆ enriched up to 3.67% U-235 (or the equivalent in different chemical forms) (para. 56).⁶³ The quantity of 300 kg of UF₆ corresponds to 202.8 kg of uranium.⁶⁴

53. 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 are as stated in Sections C.3.1, C.3.2 and C.3.3 and summarised in Annex 3.

54. On 15 May 2022, the Agency verified that the inventory of uranium enriched up to 20% U-235 in forms other than UF₆ was 35.9 kg,⁶⁵ consisting of 27.6 kg of uranium in the form of fuel assemblies,⁶⁶ 6.2 kg of uranium in the form of intermediate products,⁶⁷ and 2.0 kg of uranium in the form of liquid and solid scrap.

55. On 15 May 2022, the Agency verified that the inventory of uranium enriched up to 60% U-235 in forms other than UF₆ was 2.0 kg, consisting of 1.6 kg of uranium in the form of mini-plates⁶⁸ and 0.4 kg of uranium in the form of liquid and solid scrap.

56. 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.⁶⁹ Based on the information in the previous paragraphs, the Agency has estimated that, as of 15 May 2022, Iran's total enriched uranium stockpile was 3809.3 kg. This figure represents an increase of 612.2 kg since the previous quarterly report. The estimated stockpile comprised 3491.8 kg of uranium in the form of UF₆; 238.9 kg of uranium in the form of uranium oxide and other

⁶¹ GOV/INF/2022/10.

⁶² GOV/INF/2022/11.

⁶³ GOV/INF/2019/8, paras 2 and 3.

⁶⁴ Considering the standard atomic weight of uranium and fluorine.

⁶⁵ The stockpile decrease of 0.6 kg of uranium enriched up to 20% in forms other than UF₆ resulted from in-process mixing with uranium at lower enrichment levels.

⁶⁶ Of the items (plates and mini-plates) produced since May 2021, 1.7 kg of uranium has been irradiated at TRR and stored in the reactor pool. This amount includes: two U₃Si₂ standard plates (0.25 kg U), three U₃Si₂ miniplates (0.07 kg U), and 90 U₃O₈ miniplates (1.36 kg of uranium).

⁶⁷ Including the uranium enriched up to 20% U-235 used in the experiments of the uranium metal production for the new TRR fuel.

⁶⁸ Irradiated at TRR and stored in the reactor pool.

⁶⁹ 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.

intermediate products; 48.1 kg of uranium in fuel assemblies and rods; and 30.6 kg of uranium in liquid and solid scrap.

57. As of 15 May 2022, the estimated total enriched uranium stockpile in the form of UF₆ of 3491.8 kg comprises: 2154.4 kg of uranium enriched up to 2% U-235 (+764.4 kg since the previous quarterly report); 1055.9 kg of uranium enriched up to 5% U-235 (–222.0 kg); 238.4 kg of uranium enriched up to 20% U-235 (+56.3 kg); and 43.1 kg of uranium enriched up to 60% U-235 (+9.9 kg).

D. Transparency Measures

58. 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).

59. 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).

E. Other Relevant Information

60. 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 Protocol⁷⁰ are addressed in GOV/2022/26.

61. 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.

62. 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).

⁷⁰ GOV/2020/51, paras 33–35.

F. Summary

63. 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.

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

Annex 1

Impact on Agency verification and monitoring resulting from Iran stopping implementation of its nuclear-related commitments as envisaged in the JCPOA⁷¹

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

⁷¹ 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
2022/8	16 March 2022	Update on production of high enriched uranium targets
2022/10	6 April 2022	Centrifuge components to be produced at new workshop at the Natanz site
2022/11	14 April 2022	Iran informed the Agency that the new workshop at the Natanz site was to start operating

Annex 3

**Enriched UF₆ Feed, Production and Inventory
since the Director General's previous Quarterly Report**

Facility	Centrifuge Type	Installed Cascades ⁷²	Total Planned Cascades	Feed Enrichment Level (% U-235)	Quantity Fed (kg UF ₆)	Product Enrichment Level (% U-235)	Quantity produced (kg UF ₆)
FEP	IR-1	36	36	Natural	-	<5%	718.1
	IR-2m	6	6				
	IR-4	2	6				
	IR-6	0	1				
FFEP	IR-1	6	6	<5%	555.3	<20%	83.3
	IR-6	2	2	<2%		<2%	470.2
PFEP	IR-4 (Line 4)	1	1	<5%	722.5	<60%	17.8
	IR-6 (Line 6)	1	1				
	IR-5 and IR-6s (Line 1)	1		Tails from Lines 4 & 6	N/A	<5% <2%	229.0 476.9
	Various (Lines 2, 3 and 5)			Natural	-	<2%	185.3

Enrichment level (% U-235)	Inventory as at 19 February 2022 (kgU)	Quantity Fed (kgU)	Quantity Produced (kgU)	Inventory as at 14 May 2022 (kgU)
<2%	1390.0		764.4	2154.4
<5%	1277.9	862.5	639.3	1055.9 ⁷³
<20%	182.1		56.2	238.4
<60%	33.2		12.0	43.1 ⁷⁴

⁷² Different numbers of cascades were fed during the reporting period.

⁷³ See footnote 41.

⁷⁴ See para. 34.

Annex 4

List of acronyms

AEOI	Atomic Energy Organization of Iran
DIQ	Design Information Questionnaire
DIV	Design Information Verification
EUPP	Enriched Uranium Powder Plant
FEP	Fuel Enrichment Plant
FMP	Fuel Manufacturing Plant
FPFP	Fuel Plate Fabrication Plant
FFEP	Fordow Fuel Enrichment Plant
HWPP	Heavy Water Production Plant
JCPOA	Joint Comprehensive Plan of Action
JHL	Jaber Ibn Hayan Multipurpose Laboratory
KHRR	Khondab Heavy Water Research Reactor
MIX facility	Molybdenum, Iodine and Xenon Radioisotope Production facility
PFEP	Pilot Fuel Enrichment Plant
PIV	Physical Inventory Verification
TRR	Tehran Research Reactor
UCF	Uranium Conversion Facility
UOC	Uranium Ore Concentrate