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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 €9.8 million per annum, of which €4.3 million is funded by extrabudgetary contributions.[1] As of 1 September 2022,

[1] These figures have been adjusted to reflect current costs and the latest 2023 budget update. The cost of the provisional application of Iran's Additional Protocol (€3.2 million) and €2.3 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).

extrabudgetary funding had been pledged sufficient to meet the cost of JCPOA-related activities for the entirety of 2022 and until late August 2023.[2]

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,[3] consistent with the Agency's standard safeguards practices, and in an impartial and objective manner.[4,5] From 8 May 2019 onwards, however, Iran has reduced on a step-by-step basis the implementation of its nuclear-related commitments under the JCPOA and from 23 February 2021 onwards, the Agency's verification and monitoring 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).

5. The Agency reports the following for the period since the issuance of the Director General's previous quarterly report[6] and seven subsequent updates (see Annex 2).

C.1. Agency monitoring and surveillance equipment under the JCPOA

6. Between 21 February 2021 and 8 June 2022, 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 with the aim of enabling the Agency to recover and re-establish the necessary continuity of knowledge.[7]

7. As previously reported,[8] following a request from Iran on 8 June 2022, from 9–11 June 2022, the Agency removed all of its equipment previously installed in Iran for surveillance and monitoring under the JCPOA. In total, 27 cameras, the on-line enrichment monitor (OLEM) at the Fuel Enrichment Plant (FEP) in Natanz and the Flow-rate Unattended Monitoring (FLUM) equipment installed at the Khondab Heavy Water Production Plant (HWPP) were removed by the Agency. All of the equipment was placed in storage at the respective locations under Agency seals, as agreed with the Atomic Energy Organization of Iran (AEOI).

8. More than 12 weeks have passed since the removal of the Agency's surveillance and monitoring equipment. In the event of a full resumption of implementation by Iran of its nuclear-related commitments under the JCPOA, the Agency, in order to be able to re-establish its knowledge of Iran's nuclear-related activities during the period when the Agency's surveillance and monitoring equipment was not in operation, would need to take remedial action. The Agency would need to apply additional safeguards measures, including under the AP, and Iran would need to provide all related records to the Agency, the consistency of which the Agency would then need to confirm. The Agency would also need

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[2] 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.

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

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

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

[6] GOV/2022/24 and Corr.1.

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

[8] GOV/INF/2022/14, para. 5.

to determine the comprehensiveness and accuracy of the data recorded by its surveillance equipment between 21 February 2021 and 8 June 2022, currently under Agency seal in Iran. Moreover, even if all records were provided by Iran, additional safeguards measures were applied by the Agency, and the recovered data proved to be comprehensive and accurate, considerable challenges would remain to confirm the consistency of Iran's declared inventory of centrifuges and heavy water with the situation prior to 21 February 2021.

C.2. Activities Related to Heavy Water and Reprocessing

9. As of 30 August 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.[9,10] On the same day, the Agency observed that the pumps for the primary cooling system had been installed but not yet tested. The Agency also observed that there had been no further progress in the construction of the control room for the refuelling machine, that civil construction works on the equipment airlock were not yet completed and that the second layer of lining of the spent fuel pond with steel plates had been completed. On 27 August 2022, 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).[11]

10. 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 HWPP,[12] 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).[13] As mentioned earlier, since 11 June 2022, when the FLUM equipment at HWPP was removed, no monitoring has taken place.

11. 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).[14,15]

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[9] 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)).

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

[11] 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.

[12] 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).

[13] Based on its analysis of commercially available satellite imagery, the Agency assessed that parts of the HWPP have been shut down for maintenance during the reporting period, leading to reduced operation of the plant.

[14] 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).

[15] 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 (Cs-137) from irradiated targets.

C.3. Activities Related to Enrichment and Fuel

12. Iran has continued the enrichment of UF_6 at the Fuel Enrichment Plant (FEP) and the Pilot Fuel Enrichment Plant (PFEP) at Natanz,[16] and at the Fordow Fuel Enrichment Plant (FFEP) at Fordow.[17] As previously reported, Iran has enriched UF_6 up to 5% U-235 since 8 July 2019[18] (para. 28), has enriched UF_6 up to 20% U-235 since 4 January 2021,[19] and has enriched UF_6 up to 60% U-235 since 17 April 2021.[20] 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).[21]

13. 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, and since 10 June 2022, when it was removed, no such monitoring has taken place (paras 29, 47, 48 and 70).

14. 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).

C.3.1. FEP

15. 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 intended to install another 27 cascades at FEP – six of IR-1 centrifuges, twelve of IR-2m centrifuges,[22] six of IR-4 centrifuges, and three of IR-6 centrifuges.[23]

16. On 6 August 2022, Iran also informed the Agency that it intended to increase the number of IR-1 centrifuges installed in some of the 30 cascades of IR-1 centrifuges that had remained in the same configuration since JCPOA Implementation Day (para. 27). On 31 August 2022, the Agency confirmed that no additional IR-1 centrifuges had yet been added to these IR-1 cascades and that their configuration remained unchanged.

17. Iran has estimated[24] that, from 15 May 2022 to 20 August 2022, 980.1 kg of UF_6 enriched up to 5% U-235 were produced[25] either from UF_6 enriched up to 2% U-235 (971.3 kg of UF_6)[26] or from natural UF_6.

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

[17] 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).

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

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

[20] 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).

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

[22] GOV/INF/2022/17, para. 7.

[23] GOV/INF/2020/10, para. 2; GOV/INF/2020/15, para. 2, and GOV/INF/2020/17, para. 2; GOV/INF/2021/19, para. 3, GOV/INF/2021/24, para. 2; GOV/INF/2021/27, para. 2; and GOV/INF/2022/13, para. 2.

[24] 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.

[25] Out of the overall production of UF_6 enriched up to 5% U-235 at FEP since 16 February 2021, the Agency has verified 4094.8 kg of UF_6.

[26] UF_6 enriched up to 2% U-235 was fed for a short period.

18. On 31 August 2022, the Agency verified that 36 IR-1 cascades, six IR-2m cascades, two IR-4 cascades and two IR-6 cascades were being fed with UF_6 enriched up to 2% U-235 to produce UF_6 enriched up to 5% U-235.

19. On the same day, the Agency verified that the installation of one IR-4 cascade was still ongoing; the installation of four IR-2m cascades had begun; the installation of centrifuges in the remaining three IR-4 cascades had yet to begin; and the installation of sub-headers had been completed for two additional IR-2m cascades, but no centrifuges had yet been installed.

20. On 6 September 2022, the Agency verified at FEP that Iran had begun feeding the third IR-6 cascade with UF_6 enriched up to 2% U-235 for the production of UF_6 enriched up to 5% U-235.

21. 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. On 10 June 2022 this surveillance equipment, was removed and no data has since been recorded for verification and monitoring (para. 29.1).

C.3.2. PFEP

22. Since the previous quarterly report, Iran has progressed 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).[27] On 30 August 2022, the Agency verified that in preparation for the planned installation of a new feed and withdrawal area for the new enrichment R&D activities in Building A1000 at FEP, Iran had almost completed the removal of infrastructure and equipment previously used for the same purpose at FEP. On the same day the Agency verified that there had been no 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.[28]

23. On 2 August 2022 Iran informed the Agency that the facility operator at PFEP had interchanged the numbering of R&D lines 1 and 5. The new numbering, which had no impact on the operating mode of the facility, is used throughout this report. Activities involving R&D lines 1–6 in the original area of PFEP were as follows (paras 32–42):

- **R&D production lines 4, 5 and 6:** On 30 August 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 5 to produce UF_6 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 natural UF_6. On 30 August 2022, the Agency verified that Iran had been using, for this purpose, small and intermediate cascades of up to: six IR-2m centrifuges; twenty IR-4 centrifuges; six IR-5 centrifuges; five IR-6 centrifuges, ten IR-6 centrifuges, twenty IR-6 centrifuges; and ten IR-s centrifuges. The following single centrifuges were being tested with natural UF_6 but not accumulating enriched uranium: five IR-2m centrifuges; two IR-4 centrifuges; three IR-5 centrifuges; three 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 1:** On 30 August 2022, the Agency verified that Iran has continued to accumulate uranium enriched up to 2% U-235 through feeding natural UF_6 into an intermediate cascade of

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

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

18 IR-1 centrifuges and an intermediate cascade of 54 IR-2m centrifuges in R&D line 1.

24. On 5 September 2022 Iran informed the Agency that the operator at PFEP intended to add a new mode of operation for R&D production lines 4, 5 and 6. On 6 September 2022 the Agency examined the design information questionnaire (DIQ) update which described how, in this new mode of operation, the IR-4 and IR-6 cascades in R&D production lines 4 and 6 would be interconnected to produce UF_6 enriched up to 60% U-235 from UF_6 enriched up to 5%. The tails produced from line 6 will continue to be fed into the cascades of IR-5 and IR-6s centrifuges in R&D production line 5 to produce UF_6 enriched up to 5% U-235. On the same day the Agency verified that the operator had started implementing the said modifications.

25. Iran has estimated that from 15 May 2022 to 20 August 2022:

- 183.0 kg of UF_6 enriched up to 2% U-235 were produced in R&D lines 1, 2 and 3;
- 838.4 kg of UF_6 enriched up to 5% U-235 were fed into cascades installed in R&D production lines 4, 5 and 6;
- 327.0 kg[29] of UF_6 enriched up to 5% U-235 were produced in R&D production line 5;
- 493.0 kg of UF_6 enriched up to 2% U-235 were accumulated as tails from R&D production line 5;[30] and
- 18.5 kg of UF_6 enriched up to 60% U-235 were produced in R&D production lines 4 and 6.[31]

C.3.3. FFEP

26. As previously reported, Iran began to enrich UF_6 (para. 45) in one wing (Unit 2) of FFEP in November 2019[32] 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).[33] 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 produce UF_6 enriched up to 20% U-235.[34]

27. As previously reported,[35] in July 2021, Iran informed the Agency that it would use 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.

28. In an updated DIQ, dated 31 August 2022, Iran informed the Agency that it planned to install a new product withdrawal line to allow for the separate collection of the UF_6 enriched up to 5% U-235 produced by the two IR-6 cascades being fed with natural UF_6.[36] On 5 September 2022, the Agency confirmed that the new product withdrawal line had been installed.

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[29] 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 5.

[30] Tails from R&D production line 5 consist of UF_6 enriched up to 2% U-235.

[31] Out of the overall production at PFEP using R&D production lines 4, 5 and 6, since 14 April 2021, the Agency verified that the following amounts were produced: 1197.5 kg of UF_6 enriched up to 5% U-235, 25.1 kg of UF_6 enriched up to 20% U-235 and 86.8 kg of UF_6 enriched up to 60% U-235.

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

[33] GOV/2020/5, para. 15.

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

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

[36] GOV/INF/2021/9 para.3.

29. 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. Iran subsequently informed the Agency that the second cascade of IR-6 centrifuges would remain in its original, fixed configuration. In November 2021, Iran began using the cascade of 166 IR-6 centrifuges with a fixed configuration to produce UF_6 enriched up to 20% U-235.[38] On 7 July 2022, Iran informed the Agency that it had begun feeding UF_6 enriched up to 5% U-235 into the cascade of 166 IR-6 centrifuges with modified sub-headers to produce UF_6 enriched up to 20% U-235.[39]

30. On 31 August 2022, the Agency verified that Iran was using up to 1044 IR-1 centrifuges in three sets of two interconnected cascades and both cascades of 166 IR-6 centrifuges to enrich uranium up to 20% U-235.[40] One IR-1 centrifuge was installed in a single position but was not being fed.[41]

31. Iran has estimated that from 15 May 2022 to 20 August 2022: 958.3 kg of UF_6 enriched up to 5% U-235 were fed into cascades at FFEP;[42] 138.5 kg of UF_6 enriched up to 20% U-235 were produced;[43] and 836.7 kg of UF_6 enriched up to 2% U-235 were accumulated as tails.

C.3.4. FPFP

32. On 15 August 2022, the Agency verified that the installation of the equipment for the first stage of the process for the production of UF_4 from UF_6, had been completed and observed that it had yet to undergo testing. No progress has been observed regarding the remaining two stages of the process.[44] Since the Director General's previous quarterly report, Iran has not produced any uranium metal.

33. On 28 May 2022, the Agency verified the receipt at FPFP of 15.9 kg of uranium in the form of UF_6 enriched up to 20% U-235 from PFEP.

34. On 22 August 2022 the Agency verified at the storage area of FPFP a total of 36.5 kg of uranium in the form of UF_6 enriched up to 60% and 192 kg of uranium in the form of UF_6 enriched up to 20% U-235.[45] The Agency also verified two mini plates containing 0.035 kg of uranium enriched up to 20% U-235 in the form of U_3O_8 and 15 TRR fuel plates containing a total of 1.2 kg of uranium enriched up to 20% U-235 in the form of U_3O_8, of which one fuel plate is not qualified.

C.3.5. UCF

35. As previously reported, in November 2021, the Agency verified at the Uranium Conversion Facility (UCF) at Esfahan 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 30 August 2022, the Agency verified that no nuclear material had been introduced into the production area.

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

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

[39] GOV/INF/2022/16, para. 4.

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

[41] 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).

[42] Iran estimated that 10.1 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.

[43] Out of the overall production of UF_6 enriched up to 20% U-235 at FFEP since 16 February 2021, the Agency verified 466.0 kg of UF_6.

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

[45] All this nuclear material is under Agency containment and surveillance.

36. 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, from 10 to 18 March 2022 verified the dissolution of this material. During and after the dissolution process, the Agency took samples of the different batches of dissolved material. The results of the Agency's analysis of these samples are being evaluated.

C.3.6. TRR

37. As previously reported, in March 2022, the Agency verified the receipts at TRR from FPFP of: 264 HEU targets, containing a total of 1.6 kg of uranium enriched up to 60% U-235 in the form of U_3O_8; 90 LEU targets, containing 1.36 kg uranium enriched up to 20% U-235 in the form of U_3O_8; and three LEU targets containing 0.07 kg of uranium enriched up to 20% U-235 in the form of uranium silicide. On 20 August 2022, the Agency verified that these targets, all of which had been irradiated, remained in the TRR reactor pond.

38. Since the previous report, the Agency verified the receipt from FPFP of 63 LEU targets, containing 0.96 kg of uranium enriched up to 20% U-235 in the form of U_3O_8; these targets are being kept under Agency seals.

39. 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, the Agency has verified that Iran has irradiated at TRR four LEU targets enriched up to 20% U-235 in the form of U_3O_8, transferred from the MIX facility,[46] and then shipped back to the MIX facility.[47]

40. On 20 August 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.[48] On the same day, the Agency observed that the two new TRR fuel plates using uranium silicide were again being irradiated.

41. On 20 August 2022, the Agency verified that no additional fuel assembly had been received and that all 17 TRR fuel assemblies, previously received from FPFP between August 2021 and August 2022, had yet to be irradiated.

C.3.7. EUPP

42. On 24 August 2022, the Agency observed that maintenance activities at the Enriched Uranium Powder Plant (EUPP) at Esfahan were ongoing. On the same day, the Agency also observed that some equipment for the first stage of the UF_6 to UO_2 conversion process using the 'integrated dry route'[49] were being installed.

C.3.8. FMP

43. On 1 August 2022, the Agency verified the receipt at the Fuel Manufacturing Plant (FMP) at Esfahan of 4.2 kg of uranium in the form of UO_2 enriched up to 3.5% U-235 from UCF. On 28 August 2022, the Agency verified at FMP 68.5 kg of uranium in the form of UO_2 powder and fuel pellets and fuel pins enriched up to 3.5% U-235 for KHRR.

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[46] GOV/2021/51, para.32.

[47] During the physical inventory verification (PIV) at the MIX facility on 22 August 2022, the Agency confirmed that four irradiated targets made of uranium enriched up to 20% U-235 were being used for testing the Mo-99 production process.

[48] 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).

[49] The integrated dry route is a process used for the conversion of UF_6 to UO_2F_2 powder and then UO_2F_2 powder to UO_2 Powder.

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

44. 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, and since 9–11 June 2022, when this surveillance equipment was removed, no such monitoring has taken place (paras 32 and 40).

45. 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).

46. 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, and since 9–11 June 2022, when this surveillance equipment was removed, no such monitoring has taken place. 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 relevant to any type of Iranian centrifuge. 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.[50,51] On 29 August 2022, at Iran's request, the Agency removed seals that had been attached in December 2021 to one flow forming machine that had been used for the manufacturing of centrifuge components in the past.

47. As previously reported,[52] in January 2022, the Agency installed surveillance cameras at a new location at Esfahan intended for the production of centrifuge rotor tubes and bellows. The Agency removed its surveillance cameras on 9–11 June 2022.

48. As previously reported,[53] on 12 April 2022, the Agency completed the installation of surveillance cameras at a new workshop at a location at the Natanz site intended for the production of centrifuge rotor tubes and bellows, which was due to start the following day.[54] The Agency removed its surveillance cameras on 9–11 June 2022.

C.5. Enriched Uranium Stockpile

49. 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] The changes to the inventory of enriched uranium since the previous report are summarised in Annex 3.

50. Since 16 February 2021, the Agency has not been able to verify Iran's total enriched uranium

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

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

[52] GOV/INF/2022/3, paras 2–5.

[53] GOV/INF/2022/10.

[54] GOV/INF/2022/11.

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

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

stockpile, comprising enriched uranium produced at FEP, PFEP and FFEP and consumed as feed material at PFEP and FFEP.[57] Based on the information in the previous paragraphs, the Agency has estimated that, as of 21 August 2022, Iran's total enriched uranium stockpile was 3940.9 kg. This figure represents an increase of 131.6 kg since the previous quarterly report. The estimated stockpile comprised 3621.3 kg of uranium in the form of UF_6; 252.3 kg of uranium in the form of uranium oxide and other intermediate products; 48.2 kg of uranium in fuel assemblies and rods; and 19.1 kg of uranium in liquid and solid scrap.

51. As of 21 August 2022, the estimated total enriched uranium stockpile in the form of UF_6 of 3621.3 kg comprises:

- 2519.9 kg of uranium enriched up to 2% U-235 (+365.5 kg since the previous quarterly report);
- 713.9 kg of uranium enriched up to 5% U-235 (–342.0 kg);
- 331.9 kg of uranium enriched up to 20% U-235 (+93.5 kg); and
- 55.6 kg of uranium enriched up to 60% U-235 (+12.5 kg).

52. As of 21 August 2022, the Agency verified that the inventory of uranium enriched up to 20% U-235 in forms other than UF_6 was 30.8 kg,[58] consisting of 27.8 kg of uranium in the form of fuel assemblies,[59] 2.4 kg of uranium in the form of intermediate products,[60] and 0.6 kg of uranium in the form of liquid and solid scrap.

53. As of 21 August 2022, the Agency verified that the inventory of uranium enriched up to 60% U-235 in forms other than UF_6 was 2.0 kg, consisting of 1.6 kg of uranium in the form of mini-plates[61] and 0.4 kg of uranium in the form of liquid and solid scrap.

D. Transparency Measures

54. 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: on 10 June 2022 this monitoring equipment was removed and placed in storage at the respective locations under Agency seals, and therefore ceased operation (para. 67.1);
- been provided with any information or access to data from containment and surveillance measures relating to the transfer to UCF of uranium ore concentrate (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, and since 11 June 2022, when this surveillance equipment was removed, has ceased operation;

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[57] 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.

[58] The stockpile decrease of 5.2 kg of uranium enriched up to 20% in forms other than UF_6 resulted from in-process mixing with uranium at lower enrichment levels.

[59] Of the items (plates and mini-plates) produced since May 2021, 1.45 kg of uranium that had been irradiated at TRR remains stored in the reactor pool.

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

[61] Irradiated at TRR and stored in the reactor pool.

- been provided with any information on the production of UOC or on whether it has obtained UOC from any other source (para. 69).

55. 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

56. 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). Consequently, for more than 18 months 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.

57. 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). Implementation of modified Code 3.1 is a legal obligation for Iran under the Subsidiary Arrangements to its Safeguards Agreement which, in accordance with Article 39 of Iran's Safeguards Agreement, cannot be modified unilaterally and there is no mechanism in the Safeguards Agreement for the suspension of implementation of provisions agreed to in the Subsidiary Arrangements. Since the Director General's previous report, Iran has made no offer to the Agency to address this issue.

58. Iran has 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.[62]

59. 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.

60. 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).

F. Summary

61. 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.

62. In the event of a full resumption of implementation by Iran of its nuclear-related commitments under the JCPOA, the Agency, in order to address the gap in its knowledge of what took place while its surveillance and monitoring equipment was not in operation, would need to apply additional safeguards measures and Iran would need to provide comprehensive and accurate records to the Agency. The Agency would also need to determine the comprehensiveness and accuracy of the data recorded by its surveillance equipment between 21 February 2021 and 8 June 2022. Even then, considerable challenges would remain in order to confirm the consistency of Iran's declared inventory of centrifuges and heavy water with the situation prior to 21 February 2021.

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[62] Iran has recently provided an updated DIQ for a previously declared research reactor that it intends to build in the future.

63. Iran's decision to remove all of the Agency's equipment previously installed in Iran for surveillance and monitoring activities in relation to the JCPOA has also had detrimental implications for the Agency's ability to provide assurance of the peaceful nature of Iran's nuclear programme.

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 JCPOA[63]

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	Additional Protocol

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

Annex 2

Seven updates since the Director General's previous Quarterly Report

GOV/INF	Date	Content
2022/13	8 June 2022	Actual and planned installation of IR-6 centrifuges at FEP
2022/14	9 June 2022	Iran's decision to require Agency to remove from operation its JCPOA-related surveillance and monitoring equipment
2022/15	20 June 2022	Iran preparation to use the IR-6 cascade with modified sub-headers to produce enriched UF_6 at FFEP.
2022/16	9 July 2022	The Agency verifies that Iran had begun to use the IR-6 cascade with modified sub-headers to produce enriched UF_6 at FFEP.
2022/17	3 August 2022	Increase in enrichment-related activities at FEP.
2022/18	29 August 2022	Iran starts using one of the IR-6 cascades at FEP to produce low enriched uranium.
2022/19	31 August 2022	Iran starts using second IR-6 cascade at FEP to produce low enriched uranium.

Annex 3

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

Facility	Centrifuge Type	Installed Cascades[64]	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 UF_6	-	<5%	980.1
	IR-2m	6	12				
	IR-4	2	6	UF_6 enriched up to 2% U-235	971.3		
	IR-6	3	3				
FFEP	IR-1	6	6	<5%	958.3	<20%	138.5
	IR-6	2	2			<2%	836.7
PFEP	IR-4 (Line 4)	1	1	<5%	838.4	<60%	18.5
	IR-6 (Line 6)	1	1				
	IR-5 and IR-6s (Line 5)	1	1	Tails from Lines 4 & 6	N/A	<5%	327.0
						<2%	493.0
	Various (Lines 1, 2 and 3)			Natural	-	<2%	183.0

Enrichment level (% U-235)	Inventory as at 14 May 2022 (kgU)	Quantity Fed (kgU)	Quantity Produced (kgU)	Inventory as at 21 August 2022 (kgU)
<2%	2154.4	655.6	1021.1	2519.9
<5%	1055.9	1224.3	882.3	713.9[65]
<20%	238.4		93.5	331.9
<60%	43.1		12.5	55.6

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

[65] 5% enriched uranium in the dump is not included.

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
OLEM	On-Line Enrichment Monitor
PFEP	Pilot Fuel Enrichment Plant
PIV	Physical Inventory Verification
TRR	Tehran Research Reactor
UCF	Uranium Conversion Facility
UOC	Uranium Ore Concentrate