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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. On 14 July 2015, China, France, Germany, the Russian Federation, the United Kingdom, the United States of America,¹ with the High Representative of the European Union for Foreign Affairs and Security Policy (E3/EU+3) and Iran agreed on the JCPOA. On 20 July 2015, the Security Council adopted resolution 2231 (2015), in which, inter alia, it requested the Director General to "undertake the necessary verification and monitoring of Iran's nuclear-related commitments for the full duration of those commitments under the JCPOA" (GOV/2015/53 and Corr.1, para. 8). In August 2015, the Board of Governors authorized the Director General to implement the necessary verification and monitoring

¹ On 8 May 2018, the President of the United States of America, Donald Trump, announced that the "United States will withdraw from the Iran nuclear deal", 'Remarks by President Trump on the Joint Comprehensive Plan of Action', at: <https://www.whitehouse.gov/briefings-statements/remarks-president-trump-joint-comprehensive-plan-action/>.

of Iran's nuclear-related commitments as set out in the JCPOA, and report accordingly, for the full duration of those commitments in light of Security Council resolution 2231 (2015), subject to the availability of funds and consistent with the Agency's standard safeguards practices. The Board of Governors also authorized the Agency to consult and exchange information with the Joint Commission, as set out in GOV/2015/53 and Corr.1.

3. In December 2016 and January 2017, the Director General shared with Member States nine documents,² developed and endorsed by all participants of the Joint Commission, providing clarifications for the implementation of Iran's nuclear-related measures as set out in the JCPOA for its duration.³

4. On 8 May 2019, Iran issued a statement including, inter alia, that "...in implementation of its rights set forth in Paragraph 26 and 36 of the JCPOA, the Supreme National Security Council the Islamic Republic of Iran has issued an order to stop some of Iran's measures under the JCPOA from today".^{4,5}

5. On 5 January 2020, Iran announced that its nuclear programme would no longer be "subject to any restrictions in the operational sphere" and stated that it would continue to cooperate with the Agency "as in the past".⁶ In this reporting period, the Agency has not observed any change in the level of cooperation by Iran in relation to Agency verification and monitoring activities under the JCPOA.

6. Despite the impact of the COVID-19 pandemic on travel arrangements, the Agency has continued to maintain its verification and monitoring activities in Iran. The Agency has continued to contract and use chartered aircraft services for the transport of inspectors to and from Iran as needed.⁷

7. 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 2020, extrabudgetary funding is necessary for €4.0 million of the €9.2 million.⁸ As of 6 November 2020, €5.1 million of extrabudgetary funding had been pledged to meet the cost of JCPOA-related activities for 2020 and beyond.⁹

C. JCPOA Verification and Monitoring Activities

8. Since 16 January 2016 (JCPOA Implementation Day), the Agency has verified and monitored Iran's implementation of its nuclear-related commitments in accordance with the modalities set out in the JCPOA,¹⁰ consistent with the Agency's standard safeguards practices, and in an impartial and

² Reproduced in INFCIRC/907 and INFCIRC/907/Add.1.

³ GOV/2017/10, para. 3.

⁴ Announced by H.E. Dr Hassan Rouhani, President of Iran, at: <http://president.ir/en/109588>.

⁵ GOV/INF/2019/8, GOV/INF/2019/9, GOV/INF/2019/10, GOV/INF/2019/12, GOV/INF/2019/16, GOV/INF/2019/17, GOV/INF/2020/10 and GOV/2020/15.

⁶ <http://irangov.ir/detail/332945>.

⁷ GOV/2020/26, para. 7.

⁸ 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).

⁹ This funding meets the cost of JCPOA-related activities until early April 2021.

¹⁰ Including the clarifications referred to in para. 3 of this report.

objective manner.^{11,12} The Agency reports the following for the period since the issuance of the Director General's quarterly report of September 2020¹³ and one update included in a report in October 2020.¹⁴

C.1. Activities Related to Heavy Water and Reprocessing

9. Iran has not pursued the construction of the Arak heavy water research reactor (IR-40 Reactor) based on its original design.^{15,16,17} 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, and all existing natural uranium pellets and fuel assemblies have remained in storage under continuous Agency monitoring (paras 3 and 10).¹⁸

10. Iran has continued to inform the Agency about the inventory of heavy water in Iran and the production of heavy water at the Heavy Water Production Plant (HWPP)¹⁹ and 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). On 20 October 2020, the Agency verified that the HWPP was in operation and that Iran's stock of heavy water had decreased to 128.0 metric tonnes (-0.5 metric tonnes since the previous quarterly report).²⁰ Throughout the reporting period, Iran had no more than 130 metric tonnes of heavy water (para. 14).

11. Iran has not carried out activities related to reprocessing at the Tehran Research Reactor (TRR) 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).²¹

¹¹ GOV/2016/8, para. 6.

¹² Note by the Secretariat, 2016/Note 5.

¹³ GOV/2020/41.

¹⁴ GOV/INF/2020/15.

¹⁵ 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)).

¹⁶ As indicated previously (GOV/2017/24, footnote 10), Iran has changed the name of the facility to the Khondab Heavy Water Research Reactor.

¹⁷ As indicated previously (GOV/2020/41, footnote 17), the Agency has verified that Iran has installed a main component of the refuelling machine. Iran indicated that this machine was constructed based on the original design and is planned to be adapted to the new design of the reactor.

¹⁸ Unless otherwise indicated, the paragraph references in parentheses throughout Sections C and D of this report correspond to the paragraphs of 'Annex I – Nuclear-related measures' of the JCPOA.

¹⁹ HWPP is a facility for the production of heavy water which, according to the design information provided by Iran to the Agency on 25 January 2016, has a nominal capacity of 16 tonnes of nuclear-grade heavy water per year and an actual capacity of "about 20 tonnes" of nuclear-grade heavy water per year. Iran informed the Agency, in a letter dated 18 June 2017, that the "maximum annual capacity of the Heavy Water Production Plant (HWPP) is 20 Tons".

²⁰ On 20 October 2020, the Agency confirmed that in this reporting period, 3.0 metric tonnes of heavy water had been produced. In the same period, 2.2 metric tonnes of heavy water had been shipped out of Iran and Iran had used 1.3 metric tonnes of heavy water for research and development (R&D) activities related to the production of deuterated compounds for medical applications. As of the same date, the Agency verified that Iran had not purified any of the contaminated heavy water which had resulted from the production of deuterated compounds. All of the activities described in this footnote were conducted under continuous monitoring by the Agency.

²¹ Including hot cells at TRR and the MIX facility and shielded cells, referred to in the decision of the Joint Commission of 14 January 2016 (INFCIRC/907).

C.2. Activities Related to Enrichment and Fuel

12. Iran has continued the enrichment of UF₆ at the Fuel Enrichment Plant (FEP) and the Pilot Fuel Enrichment Plant (PFEP) (see Section C.3 of this report) at Natanz,²² and at the Fordow Fuel Enrichment Plant (FFEP) at Fordow.²³ As previously reported,²⁴ on 8 July 2019, the Agency verified that Iran had begun enriching UF₆ above 3.67% U-235 (para. 28). Since that date, Iran has been enriching uranium up to 4.5% U-235. Iran has also continued to conduct certain enrichment activities that are not in line with its long-term enrichment and R&D enrichment plan, as provided to the Agency on 16 January 2016 (para. 52).²⁵

13. As previously reported,²⁶ Iran has informed the Agency that the operator of PFEP “intends to transfer and displace 3 production cascades (No 4, 5 and 6)” of IR-4, IR-2m and IR-6 centrifuges from PFEP to FEP.²⁷ On 2 September 2020, the Agency verified that Iran had installed the headers and sub-headers of one unit at FEP where these three cascades were to be installed.²⁸ On 11 October 2020, the Agency verified that Iran had installed the cascade of IR-2m centrifuges and, on 9 November 2020, verified that this cascade was connected to the feed and withdrawal stations, but was not being fed with UF₆. On the same date, the Agency also verified that Iran had begun installing the cascade of IR-4 centrifuges but had not begun installing the cascade of IR-6 centrifuges. On 29 October 2020, Iran provided the Agency with an updated design information questionnaire (DIQ) for FEP.

14. As of 9 November 2020, Iran had continued to use no more than 5060 IR-1 centrifuges installed in 30 cascades, which remained in the configurations in the operating units at the time the JCPOA was agreed (para. 27) for enrichment of UF₆ at FEP. During this reporting period, Iran has withdrawn 20 IR-1 centrifuges from those held in storage²⁹ for the replacement of damaged or failed IR-1 centrifuges installed at FEP (para. 29.1).

15. As previously reported,³⁰ Iran has informed the Agency that the operator of PFEP plans to “transfer a part of” PFEP to “building A1000”, which houses the production hall at FEP, “with the aim that eventually all of the enrichment R&D activities will be concentrated in this area” (paras 27 and 40). In a letter dated 27 October 2020, Iran provided additional information to the Agency regarding the timeline for the “transformation” of this area and acknowledged that before “introducing any nuclear material in this new area, the safeguards relevant measures have to be agreed with IAEA”.

²² GOV/INF/2019/12.

²³ 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).

²⁴ GOV/INF/2019/9.

²⁵ See GOV/INF/2019/10, GOV/INF/2019/12, GOV/INF/2019/16, GOV/INF/2020/10 and Section C.3 of this report.

²⁶ GOV/INF/2020/10.

²⁷ Since the previous report, Iran informed the Agency that it had decided to transfer the existing cascades at PFEP to FEP, rather than install cascades at FEP equivalent to those installed at PFEP (GOV/2020/41, para. 14).

²⁸ GOV/2020/41, para. 14.

²⁹ Para. 18 of this report.

³⁰ GOV/INF/2020/15.

16. At PFEP, as previously reported,³¹ Iran has modified the header connections so that the product and the tails are collected separately from the cascades in five R&D lines (Nos 2, 3, 4, 5 and 6)³² (paras 32 and 42), all of which have been used for enrichment of UF₆ (see Section C.3 of this report).

17. At FFEP, Iran has been conducting uranium enrichment (para. 45) in one wing (Unit 2) of the facility since November 2019.³³ Since January 2020, Iran has been using a total of six cascades, containing 1044 IR-1 centrifuges, to enrich UF₆ (para. 46). On 4 November 2020, the Agency verified that in the remaining space of Unit 2, 12 IR-1 centrifuges were installed in a layout of 16 IR-1 centrifuge positions³⁴ and one IR-1 centrifuge was installed in a single position,³⁵ for the purpose of conducting “initial research and R&D activities related to stable isotope production”.³⁶ In summary, the Agency has verified that 1057 IR-1 centrifuges are installed in Unit 2 of FFEP (para. 46).

18. All centrifuges and associated infrastructure in storage have remained under continuous Agency monitoring (paras 29, 47, 48 and 70). The Agency has continued to have regular access to relevant buildings at Natanz, including all of FEP and PFEP, and performed daily access upon Agency request (para. 71). The Agency has also continued to have regular access to FFEP, including daily access upon Agency request (para. 51).

19. On 18 October 2020, the Agency verified that all irradiated TRR fuel elements in Iran have a measured dose rate of no less than 1 rem/hour (at one metre in air).

20. Iran has not operated any of its declared facilities for the purpose of re-converting fuel plates or scrap into UF₆, nor has it informed the Agency that it has built any new facilities for such a purpose (para. 58).

C.3. Centrifuge Research and Development, Manufacturing and Inventory

21. As previously reported,³⁷ in November 2019, Iran further updated the DIQ for PFEP, in which it included the list of all centrifuge types at PFEP.³⁸

22. On 10 November 2020, the Agency verified that Iran was continuing to accumulate enriched uranium from R&D lines 2 and 3 (paras 32–42) through feeding UF₆ into cascades of up to: nine IR-4 centrifuges; eight IR-5 centrifuges; six IR-6 centrifuges and another cascade of 20 IR-6 centrifuges; 10 IR-6s centrifuges; and 10 IR-s centrifuges. The following single centrifuges were being tested with UF₆ but not accumulating enriched uranium: one IR-1 centrifuge; four IR-2m centrifuges; one IR-4 centrifuge; two IR-5 centrifuges; two IR-6s centrifuges; one IR-8 centrifuge; one IR-8B centrifuge; one IR-s centrifuge; and one IR-9 centrifuge. On 27 September 2020, the Agency verified that Iran had dismantled the cascade of IR-2m centrifuges in R&D line 5 (see paragraph 13 above). On 10 November 2020, the Agency verified that Iran was continuing to accumulate enriched uranium from R&D lines 4 and 6 (paras 32–42) through feeding UF₆ into a cascade of 152 IR-4 centrifuges and a

³¹ GOV/INF/2019/10, para. 4.

³² As previously reported, in R&D line 1 Iran had rendered inoperable a cascade of IR-1 centrifuges by, inter alia, removing the rotors, injecting epoxy resin into the pipework and removing the electrical systems from all of the centrifuges (see GOV/INF/2016/1, ‘Centrifuge Research and Development (15.4)’, para. ix).

³³ GOV/2019/55, para. 15.

³⁴ GOV/2017/48, footnote 20.

³⁵ 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.

³⁶ GOV/2016/46, para. 12.

³⁷ GOV/2019/55, para. 21.

³⁸ IR-1, IR-2m, IR-3, IR-4, IR-5, IR-6, IR-6m, IR-6s, IR-6sm, IR-7, IR-8, IR-8s, IR-8B, IR-s and IR-9.

cascade of 110 IR-6 centrifuges, respectively.³⁹

23. As previously reported,⁴⁰ Iran has informed the Agency that R&D line 1 will be used for testing IR-5 and IR-6s centrifuges in a full cascade of up to 172 centrifuges or two intermediate cascades of 84 centrifuges each (para. 41). On 31 October 2020, the Agency verified that Iran had not begun installing the sub-headers necessary for the installation of IR-5 and IR-6s centrifuges in R&D line 1.

24. On 18 October 2020, the Agency verified that Iran had conducted mechanical testing of three IR-4 centrifuges simultaneously for 42 days at the Tehran Research Centre (para. 40). As of 20 October 2020, Iran had not started using a new location, beyond those specified in the JCPOA, for mechanical testing of centrifuges.⁴¹

25. Iran has provided declarations to the Agency of its production and inventory of centrifuge rotor tubes and bellows and permitted the Agency to verify the items in the inventory (para. 80.1). The Agency has conducted continuous monitoring, including through the use of containment and surveillance measures, and verified that the declared equipment has been used for the production of rotor tubes and bellows to manufacture centrifuges not only for the activities specified in the JCPOA but also for activities beyond those specified in the JCPOA, such as the installation of the cascades described in paragraphs 22 and 23 above (para. 80.2). Iran has not produced any IR-1 centrifuges to replace those that have been damaged or failed (para. 62).

26. All declared rotor tubes, bellows and rotor assemblies have been under continuous monitoring by the Agency, including those rotor tubes and bellows manufactured since Implementation Day (para. 70). On 20 October 2020, the Agency verified that Iran was continuing to manufacture centrifuge rotor tubes using carbon fibre that was not subject to continuous Agency containment and surveillance measures.^{42,43} The rotor tubes and bellows manufacturing process remains under continuous monitoring by the Agency.

C.4. Enriched Uranium Stockpile

27. As previously reported,⁴⁴ on 1 July 2019, the Agency verified that Iran's total enriched uranium stockpile had exceeded 300 kg of UF₆ enriched up to 3.67% U-235 (or the equivalent in different chemical forms) (para. 56). The quantity of 300 kg of UF₆ corresponds to 202.8 kg of uranium.⁴⁵

28. As of 2 November 2020, the Agency verified that, based on the JCPOA and decisions of the Joint Commission,⁴⁶ Iran's total enriched uranium stockpile, comprising enriched uranium produced at FEP, PFEP and FFEP⁴⁷ was 2442.9 kg (+337.5 kg since the previous quarterly report). The stockpile comprised 2408.5 kg of uranium in the form of UF₆; 15.5 kg of uranium in the form of uranium oxides and their intermediate products; 8.2 kg of uranium in fuel assemblies and rods; and 10.7 kg of uranium

³⁹ GOV/INF/2019/12.

⁴⁰ GOV/2020/26, para. 23.

⁴¹ GOV/2019/55, para. 24.

⁴² GOV/INF/2019/12, para. 6.

⁴³ Decision of the Joint Commission of 14 January 2016 (INFCIRC/907).

⁴⁴ GOV/INF/2019/8.

⁴⁵ Considering the standard atomic weight of uranium and fluorine.

⁴⁶ Decisions of the Joint Commission of 6 January 2016 and 18 December 2016 (INFCIRC/907), and 10 January 2017 (INFCIRC/907/Add.1).

⁴⁷ 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).

in liquid and solid scrap.

29. The total enriched uranium stockpile comprises 215.1 kg of uranium enriched up to 3.67% U-235⁴⁸, produced prior to 8 July 2019, and 2227.8 kg of uranium enriched up to 4.5% U-235, produced since 8 July 2019. The latter, which is entirely in the form of UF₆, includes 692.7 kg of uranium enriched up to 2% U-235 produced in R&D lines 2 and 3 at PFEP.

D. Transparency Measures

30. Iran has continued to permit the Agency to use on-line enrichment monitors and electronic seals which communicate their status within nuclear sites to Agency inspectors, and to facilitate the automated collection of Agency measurement recordings registered by installed measurement devices (para. 67.1). Iran has issued 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).

31. Iran has continued to permit the Agency to monitor – through measures agreed with Iran, including containment and surveillance measures – that all uranium ore concentrate (UOC) produced in Iran or obtained from any other source is transferred to the Uranium Conversion Facility (UCF) at Esfahan (para. 68). Iran also provided the Agency with all information necessary to enable the Agency to verify the production of UOC and the inventory of UOC produced in Iran or obtained from any other source (para. 69).

E. Other Relevant Information

32. Iran continues to provisionally apply the Additional Protocol to its Safeguards Agreement in accordance with Article 17(b) of the Additional Protocol, pending its entry into force. The Agency has continued to evaluate Iran's declarations under the Additional Protocol, and has conducted complementary accesses under the Additional Protocol to all the sites and locations in Iran which it needed to visit. Timely and proactive cooperation by Iran in providing complementary access facilitates implementation of the Additional Protocol and enhances confidence.

33. As previously reported,⁴⁹ in February 2019, the Agency detected natural uranium particles of anthropogenic origin at a location in Iran not declared to the Agency. Based on subsequent information provided by Iran, the Agency took environmental samples at two declared nuclear facilities in Iran.⁵⁰ The Agency's assessment of the analyses of these samples was that some findings were not inconsistent with information provided by Iran, but that there were a number of other findings for which further clarifications and information needed to be provided and questions needed to be answered by Iran.⁵¹ These other findings included the presence, at the location in Iran not declared to the Agency, of isotopically altered particles⁵² of low enriched uranium, with a detectable presence of U-236, and of

⁴⁸ The difference compared to the corresponding figure contained in GOV/2020/5, para. 28 is due to further processing of some of the nuclear material by Iran.

⁴⁹ GOV/2019/55, para. 29.

⁵⁰ GOV/2020/41, para. 32.

⁵¹ GOV/2020/41, para. 33.

⁵² These particles had been identified as a result of the Agency's further analysis of the samples it took in February 2019 and which was conveyed to Iran for the first time in an Agency letter to Iran, dated 2 September 2020.

slightly depleted uranium.⁵³

34. On 21 October 2020, Iran provided the Agency with additional information and explanations. In relation to the low enriched uranium particles, Iran said that “the evidence of such contamination is under investigation”.

35. The Agency considered Iran’s response to be unsatisfactory because it was not technically credible and, therefore, sought further clarifications and information from Iran. The Agency also noted the amount of time that had elapsed in addressing these issues. On 5 November 2020, Iran provided the Agency with some more information related to its explanations. In a letter dated 9 November 2020, following an assessment of this new information, the Agency informed Iran that it continues to consider Iran’s response to be not technically credible. A full and prompt explanation from Iran regarding the presence of uranium particles of anthropogenic origin, including isotopically altered particles, at a location in Iran not declared to the Agency, is needed.

36. The Agency’s verification and monitoring of Iran’s other JCPOA nuclear-related commitments continues, including those set out in Sections D, E, S and T of Annex I of the JCPOA.

37. During this reporting period, the Agency attended one meeting of the Procurement Working Group of the Joint Commission (JCPOA, Annex IV – Joint Commission, para. 6.4.6).

F. Summary

38. The Agency continues to verify the non-diversion of declared nuclear material at the nuclear facilities and locations outside facilities where nuclear material is customarily used (LOFs) declared by Iran under its Safeguards Agreement. The presence of multiple uranium particles of anthropogenic origin, including isotopically altered particles, at a location not declared to the Agency still needs to be fully and promptly explained by Iran to allay any possible concerns about the correctness and completeness of its safeguards declarations. Evaluations regarding the absence of undeclared nuclear material and activities for Iran are ongoing.

39. Since Implementation Day, the Agency has been verifying and monitoring the implementation by Iran of its nuclear-related commitments under the JCPOA.

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

⁵³ The Agency noted in its letter that the compositions of these isotopically altered particles are similar to particles found in Iran in the past, originating from imported centrifuge components (see GOV/2008/4, para. 11).