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(GOV/2021/43)

# 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,<sup>1</sup> 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

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<sup>1</sup> On 8 May 2018, the then 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/>.

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 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,<sup>2</sup> 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.<sup>3</sup>

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 [of] the Islamic Republic of Iran has issued an order to stop some of Iran’s measures under the JCPOA from today”.<sup>4</sup>

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”.<sup>5</sup>

6. On 29 January 2021, Iran informed the Agency that, according to a new law passed by Iran’s Parliament,<sup>6</sup> Iran would take certain measures related to the JCPOA, including stopping Agency inspections beyond the Safeguards Agreement.

7. On 11 February 2021, the Director General informed Iran that stopping or limiting the Agency’s verification and monitoring activities would have a serious impact on the Agency’s ability to report on the implementation of Iran’s commitments and undermine the critical confidence in the peaceful nature of Iran’s nuclear programme. He added that without the measures currently provided by the Additional Protocol and the JCPOA being implemented, the Agency may be unable to continue to provide factual reports on Iran’s nuclear programme or to recover the knowledge necessary to resume such a verification role in future. The Director General stated his willingness to discuss the possibility of a viable framework which would allow the Agency to continue its current verification role and to provide factual and impartial reports, which are essential to all parties, and that such a framework would have to be compatible with the obligations of the Government of Iran under the laws of Iran.<sup>7</sup>

8. On 15 February 2021, Iran informed the Agency that Iran “will stop the implementation of voluntary transparency measures as envisaged in the JCPOA, as of February 23, 2021”, as follows:

- “Provisions of the Additional Protocol to the CSA;
- Modified code 3.1 of the subsidiary arrangements to Iran’s Safeguards Agreement;
- Use of modern technologies and long term presence of IAEA;
- Transparency measures related to uranium ore concentrate (UOC);

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<sup>2</sup> Reproduced in INFCIRC/907 and INFCIRC/907/Add.1.

<sup>3</sup> GOV/2017/10, para. 3.

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

<sup>5</sup> <http://irangov.ir/detail/332945>.

<sup>6</sup> INFCIRC/953.

<sup>7</sup> GOV/2021/10, para. 7.

- Transparency measures related to enrichment;
- Access pursuant to provisions of the JCPOA;
- Monitoring and Verification of the implementation of the voluntary measures;
- Transparency measures related to centrifuge component manufacturing.”<sup>8</sup>

9. On 16 February 2021, the Director General, *inter alia*, reminded Iran that implementation of modified Code 3.1 is a legal obligation for Iran under the Subsidiary Arrangements to its Safeguards Agreement which cannot be modified unilaterally and that there is no mechanism in that Agreement for the suspension of implementation of provisions agreed to in the Subsidiary Arrangements.<sup>9</sup>

10. On 21 February 2021, in a Joint Statement by the then Vice-President of Iran and Head of the Atomic Energy Organization of Iran, H.E. Ali Akbar Salehi and the Director General, the Agency and Iran reached a temporary bilateral technical understanding,<sup>10</sup> compatible with Iranian law, whereby the Agency would continue with its necessary verification and monitoring activities for up to three months, as set out in a technical annex. Iran and the Agency further agreed, *inter alia*, to keep the technical understanding under regular review to ensure it continued to achieve its purposes and that Iran would continue to implement fully and without limitation its Safeguards Agreement with the Agency as before.

11. On 24 May 2021, the Director General and the then Vice-President Salehi agreed that: (i) the information collected by the Agency monitoring equipment covered by the technical understanding would continue to be stored for a further period of one month up to 24 June 2021; and (ii) the equipment would continue to operate and be able to collect and store further data for this period, as provided for in the Joint Statement, dated 21 February 2021.<sup>11</sup> This agreement was to enable the Agency to recover and re-establish the necessary continuity of knowledge.

12. In a letter dated 28 May 2021, Iran informed the Agency that, whereas the technical understanding expired on 24 May 2021, Iran decided not to extend the technical understanding, but it decided not to erase the recorded data and keep them for a period of up to one month. In a letter to Iran, dated 3 June 2021, the Director General recalled that the continued retention and recording of data needed to be preserved in its entirety and that without this information it would not be possible for the Agency to re-establish the continuity of knowledge required to conduct the necessary verification and monitoring as before 23 February 2021.

13. In a letter to Iran, dated 17 June 2021, the Director General indicated that the agreement between Iran and the Agency reached on 24 May 2021 would expire on 24 June 2021 and stated that it was essential for the Agency to understand Iran’s position regarding the possible continued collection, recording and retention of data by Agency monitoring and surveillance equipment, and the maintenance and retention of related records, after 24 June 2021.<sup>12</sup> The Director General also indicated that, given the nature of the bilateral understanding, any decision on its continuity or expiration should be agreed by Iran and the Agency before its implementation.

14. Iran did not reply to the Director General’s letter or indicate whether it intended to maintain the agreement (referred to in paragraph 11 above), which would ensure continuity of operation of Agency monitoring and surveillance equipment and of storage of the information collected, as provided for in

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<sup>8</sup> GOV/INF/2021/13.

<sup>9</sup> GOV/2021/10, para. 10.

<sup>10</sup> GOV/2021/10, Annex I.

<sup>11</sup> GOV/INF/2021/31, para. 4.

<sup>12</sup> GOV/INF/2021/32, para. 4.

the aforementioned statement of 21 February 2021 and its technical annex.<sup>13</sup> In a letter to Iran, dated 29 June 2021, the Director General indicated, inter alia, that Iran was expected to communicate with the Agency about its position regarding the agreement of 24 May 2021 and that the failure to continue implementing this agreement undermines the Agency's capability to maintain continuity of knowledge and to recover the information collected and recorded by its equipment which is necessary to resume its verification and monitoring of Iran's nuclear-related commitments in future.

15. While no further official communication from Iran was received by the Agency as to whether the agreement of 24 May 2021 continued beyond 24 June 2021, the Agency received informal indications from the relevant authorities in Iran that its monitoring and surveillance equipment covered by the technical understanding continued to operate and the information that was collected continued to be stored after 24 June 2021.

16. In a letter dated 9 July 2021, the Agency requested Iran to enable the Agency to verify the status of its four surveillance cameras previously installed in the centrifuge component manufacturing workshop at the TESA Karaj complex, but which Iran stated it had removed following an incident at that location on 23 June 2021. As Iran did not reply to this letter, the Agency reiterated its request in a letter to Iran dated 12 August 2021 and, inter alia, indicated that it was essential that Agency surveillance cameras were reinstalled and operational before the manufacturing of centrifuge rotor tubes and bellows resumed at that location.

17. In a letter to Iran, dated 16 August 2021, the Director General indicated that, according to the Agency's standard safeguards practice, Agency monitoring and surveillance equipment which does not regularly transmit data to Agency Headquarters in Vienna cannot be left for more than three months without being serviced. He also indicated that, with respect to the Agency's monitoring and surveillance equipment subject to the agreement of 24 May 2021, this period would come to an end around 24 August 2021. In order to maintain the integrity of the Agency's monitoring and surveillance equipment in Iran and the data it collects, the Agency required access to all relevant locations in Iran during the period 21–29 August 2021 in order to service the equipment and replace the storage media, which is kept under Agency seal.

18. In a letter dated 30 August 2021, Iran informed the Agency that "the Agency surveillance cameras which had been installed in the centrifuge component manufacturing workshop at the TESA Karaj complex are available for visual observation of Agency's inspectors at AEOI". In a letter dated 3 September 2021, the Agency requested that Iran grant access to Agency inspectors at the AEOI site on 4 September 2021 to assess the status of these cameras, to retrieve the data storage media, and to keep these storage media in the custody of Iran under Agency seal.

19. On 4 September 2021, the Agency was provided with access to four of the surveillance cameras which had previously been installed in the centrifuge component manufacturing workshop at the TESA Karaj complex. The Agency observed that one of the cameras had been destroyed, one of the cameras had been severely damaged and the other two cameras appeared intact. The data storage media were recovered from three of the cameras and placed under Agency seal without further examination. However, the data storage medium and the recording unit from the destroyed camera were not present among the remnants of that camera shown to the Agency. In a letter to Iran, dated 6 September 2021, the Agency requested Iran to locate the storage medium and the recording unit, and to provide additional information as to the reasons for their absence. Until the Agency is able to access the storage media from the other three cameras, which have been placed under Agency seal, it will not be in a position to determine whether the data from the storage media is recoverable. As of today, the Agency is not in a position to recover continuity of knowledge over the activities recorded by these cameras. The Agency

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<sup>13</sup> GOV/INF/2021/32, para. 6.

has not been able to install replacement cameras at the centrifuge component manufacturing workshop at the TESA Karaj complex.

20. As of the date of this report, the Agency has not received information from Iran as to the status of the remainder of its monitoring and surveillance equipment in Iran pertinent to the technical understanding. Indeed, Iran has failed to engage with the Agency at all on this matter for a number of months. Iran's failure to continue implementing the agreement of 24 May 2021 is preventing the Agency from servicing the equipment and replacing the storage media. This is seriously compromising the Agency's technical capability to maintain continuity of knowledge, which is necessary for the Agency to resume its verification and monitoring of Iran's nuclear-related commitments in the future.

21. In light of the above, the Agency's confidence that it can maintain continuity of knowledge at remaining facilities and locations in Iran pertinent to the technical understanding, which was already declining prior to 24 August 2021, has significantly further declined since that date. The situation needs to be rectified by Iran without delay. According to the Agency's standard safeguards practice, communication between Iran and the Agency on this matter is indispensable.

22. 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 2021, extrabudgetary funding is necessary for €4.0 million of the €9.2 million.<sup>14</sup> As of 26 August 2021, €7.44 million of extrabudgetary funding had been pledged to meet the cost of JCPOA-related activities for 2021 and beyond.<sup>15,16</sup>

## **C. JCPOA Verification and Monitoring Activities**

23. 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,<sup>17</sup> consistent with the Agency's standard safeguards practices, and in an impartial and objective manner.<sup>18,19</sup> Since 23 February 2021, however, the Agency's verification and monitoring activities in relation to the JCPOA have been seriously undermined as a result of Iran's decision to stop the implementation of its nuclear-related commitments under the JCPOA, including the Additional Protocol (see paragraph 8 above and Annex I). The Agency reports the following for the period since the issuance of the Director General's previous quarterly report<sup>20</sup> and four subsequent updates (see Annex II).

### **C.1. Activities Related to Heavy Water and Reprocessing**

24. During a design information verification (DIV) on 24 August 2021, the Agency observed that

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<sup>14</sup> 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).

<sup>15</sup> This funding meets the cost of JCPOA-related activities until early November 2022.

<sup>16</sup> The cost implications for the Agency of Iran not implementing the Additional Protocol and its nuclear-related commitments under the JCPOA since 23 February 2021 will be assessed in due course.

<sup>17</sup> Including the clarifications referred to in para. 3 of this report.

<sup>18</sup> GOV/2016/8, para. 6.

<sup>19</sup> Note by the Secretariat, 2016/Note 5.

<sup>20</sup> GOV/2021/28.

Iran has not pursued the construction of the Arak heavy water research reactor (IR-40 Reactor) based on its original design.<sup>21,22,23,24</sup> 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).<sup>25</sup>

25. 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),<sup>26</sup> nor allowed the Agency to monitor the quantities of Iran's heavy water stocks and the amount of heavy water produced at the HWPP. Based on the informal indications referred to above (paragraph 15), the Agency assumed that the heavy water monitoring system continued to operate beyond 24 June 2021. However, since 25 May 2021, the Agency has been unable to confirm its operation and to exchange the storage media for the data and recordings collected (para. 15).<sup>27</sup>

26. 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).<sup>28</sup>

## C.2. Activities Related to Enrichment and Fuel

27. Iran has continued the enrichment of UF<sub>6</sub> at the Fuel Enrichment Plant (FEP) and the Pilot Fuel Enrichment Plant (PFEP) at Natanz,<sup>29</sup> and at the Fordow Fuel Enrichment Plant (FFEP) at Fordow.<sup>30</sup> As previously reported, Iran has been enriching UF<sub>6</sub> up to 5% U-235 since 8 July 2019<sup>31</sup> (para. 28), has been enriching UF<sub>6</sub> up to 20% U-235 since 4 January 2021,<sup>32</sup> and has been enriching UF<sub>6</sub> up to 60% U-235 since 17 April 2021.<sup>33</sup> Iran has continued to conduct certain enrichment activities that are not in

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<sup>21</sup> 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)).

<sup>22</sup> As indicated previously (GOV/2017/24, footnote 10), Iran has changed the name of the facility to the Khondab Heavy Water Research Reactor.

<sup>23</sup> On 16 February 2021, the Agency verified that Iran had completed the installation of the refuelling machine (see GOV/2021/10, footnote 17). Iran had indicated previously that this machine was constructed based on the original design and was planned to be adapted to the new design of the reactor (see GOV/2020/41, footnote 17).

<sup>24</sup> On 24 August 2021, the Agency observed that routine activities were taking place, including: lining of the spent fuel pond; construction work on the air lock; adjustment of the cooling system pipework; installation of internal fittings and auxiliary systems.

<sup>25</sup> 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.

<sup>26</sup> 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).

<sup>27</sup> Based on its analysis of commercially available satellite imagery, the Agency assesses that the HWPP has continued to operate during the reporting period.

<sup>28</sup> In an updated DIQ for the MIX facility, dated 9 May 2021, Iran informed the Agency of its plan to extract caesium from irradiated targets (GOV/2021/28, footnote 25).

<sup>29</sup> GOV/INF/2019/12, para. 4.

<sup>30</sup> 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).

<sup>31</sup> GOV/INF/2019/9, para. 3.

<sup>32</sup> GOV/INF/2021/2, para. 5.

<sup>33</sup> GOV/INF/2021/26, para. 3. According to Iran, fluctuations of the enrichment levels of UF<sub>6</sub> 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).

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).<sup>34</sup>

28. 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). Moreover, since 25 May 2021, the Agency has not had been able to confirm its operation and exchange the storage media for the data and recordings collected.

29. Since 23 February 2021, while the Agency has had regular access to FEP, PFEP and FFEP, it has not been able to perform daily access upon request (paras 51 and 71). In addition, following an incident at FEP on 11 April 2021, due to safety and security concerns, Iran prevented the Agency from accessing the area between the cascades at FEP for a limited period.

### **C.2.1. FEP**

30. As previously reported, Iran intends to install 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<sup>35</sup> – in addition to the 30 cascades of IR-1 centrifuges provided for under the JCPOA (para. 27).

31. On 25 August 2021, the Agency verified that 30 cascades of IR-1 centrifuges,<sup>36</sup> six cascades of IR-2m centrifuges and two cascades of IR-4 centrifuges, were installed to enrich natural UF<sub>6</sub> up to 5% U-235 at FEP. The Agency also verified that installation of the remaining four cascades of IR-4 centrifuges, the six cascades of IR-1 centrifuges and the single cascade of IR-6 centrifuges, had yet to begin.

32. Between the beginning of June 2021 and the end of July 2021, Iran alternated the use of either natural UF<sub>6</sub> or UF<sub>6</sub> enriched up to 2% U-235 at FEP as feed to produce UF<sub>6</sub> enriched up to 5% U-235. The rate of production of UF<sub>6</sub> enriched up to 5% U-235 was higher during those periods when the feed material was UF<sub>6</sub> enriched up to 2% U-235 compared to those periods when the feed material was natural UF<sub>6</sub>. On 25 August 2021, the Agency verified that 29 IR-1 cascades, five IR-2m cascades and two IR-4 cascades were being fed with natural UF<sub>6</sub> at FEP.

33. 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 (see Section C.3 below) for the replacement of damaged or failed IR-1 centrifuges installed at FEP (para. 29.1). Moreover, since 25 May 2021, the Agency has not been able to confirm the operation and of its equipment or exchange the storage media for the data and recordings collected.

### **C.2.2. PFEP**

34. 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).<sup>37</sup> As previously reported,<sup>38</sup> the Agency verified that Iran has completed installation of sub-headers for 18 cascades for R&D activities in this new, segregated area of PFEP. On

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<sup>34</sup> GOV/INF/2019/10, GOV/INF/2019/12, GOV/INF/2019/16, GOV/INF/2020/10 and Section C.3 of this report.

<sup>35</sup> 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.

<sup>36</sup> The 5060 IR-1 centrifuges installed in 30 cascades remained in the configurations in the operating units at the time the JCPOA was agreed, as provided for in the JCPOA (para. 27).

<sup>37</sup> GOV/INF/2020/15, para. 2.

<sup>38</sup> GOV/2021/10, para. 22.

28 August 2021, the Agency verified that there had been no further progress in the installation of the infrastructure for these 18 cascades during this reporting period.

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

- **R&D lines 1, 4 and 6:** As previously reported,<sup>39</sup> on 17 April 2021, the Agency verified that Iran had begun the production of UF<sub>6</sub> enriched up to 60% U-235. On 21 April 2021 and again on 10 May 2021,<sup>40</sup> the Agency verified that Iran had changed the mode of production of UF<sub>6</sub> enriched up to 60% U-235. As previously reported,<sup>41</sup> on 14 August 2021, the Agency verified that Iran had implemented modifications to “the operating lines” for a new mode of production of UF<sub>6</sub> enriched up to 60% U-235. On 28 August 2021, the Agency verified that Iran was feeding UF<sub>6</sub> enriched up to 5% U-235 into the two cascades in R&D production lines 4 and 6, comprising 153 IR-4 and 164 IR-6 centrifuges, respectively, to produce UF<sub>6</sub> enriched up to 60% U-235 using the new mode of production.<sup>42</sup>
- **R&D lines 2 and 3:** On 28 August 2021, the Agency verified that Iran was continuing to accumulate uranium enriched up to 2% U-235 from R&D lines 2 and 3 through feeding natural UF<sub>6</sub> into cascades of up to: nine IR-4 centrifuges; five IR-5 centrifuges; four IR-6 centrifuges, ten IR-6 centrifuges and 19 IR-6 centrifuges; three IR-6s centrifuges; and ten IR-s centrifuges. The following single centrifuges were being tested with natural UF<sub>6</sub> but not accumulating enriched uranium: one IR-1 centrifuge; one IR-4 centrifuge; two IR-5 centrifuges; one IR-6 centrifuge; two 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 28 August 2021, the Agency verified that Iran was feeding natural UF<sub>6</sub> into an intermediate cascade of 18 IR-1 centrifuges and an intermediate cascade of 32 IR-2m centrifuges in R&D line 5 to produce uranium enriched up to 2% U-235.

### C.2.3. FFEP

36. As previously reported, Iran began to enrich UF<sub>6</sub> (para. 45) in one wing (Unit 2) of the facility in November 2019<sup>43</sup> and, since January 2020, has been using a total of six cascades, containing up to 1044 IR-1 centrifuges, to enrich UF<sub>6</sub> (para. 46). In January 2021, Iran reconfigured these six cascades as three sets of two interconnected cascades and began feeding UF<sub>6</sub> enriched up to 5% U-235 into the process to start the production of UF<sub>6</sub> enriched up to 20% U-235.<sup>44</sup> Iran then informed the Agency that it planned to use eight cascades to enrich uranium in Unit 2 at FFEP as follows:<sup>45</sup> two cascades of IR-6 centrifuges would be fed with natural UF<sub>6</sub> to produce UF<sub>6</sub> enriched up to 5% U-235 to directly feed the three sets of two interconnected cascades of IR-1 centrifuges to produce UF<sub>6</sub> enriched up to 20% U-235.

37. In a letter dated 27 July 2021, Iran informed the Agency that it intended to make “some modifications on the configuration” of the two IR-6 cascades. On 31 July 2021, the Agency examined the updated design information questionnaire (DIQ) for FFEP, which describes the new configuration of the two IR-6 cascades that will either be fed with natural UF<sub>6</sub> to produce UF<sub>6</sub> enriched up to 5%

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<sup>39</sup> GOV/INF/2021/26, para. 3.

<sup>40</sup> GOV/INF/2021/28, para. 3 and GOV/INF/2021/29, para. 3.

<sup>41</sup> GOV/INF/2021/40, para. 4.

<sup>42</sup> Using the mode of production described in GOV/INF/2021/22, para. 4.

<sup>43</sup> GOV/2019/55, para. 15.

<sup>44</sup> GOV/INF/2021/2, para. 5.

<sup>45</sup> GOV/INF/2021/9, para. 3.

U-235 or with UF<sub>6</sub> enriched up to 5% U-235 to produce UF<sub>6</sub> enriched up to 20% U-235. The modification to the sub-headers of the two IR-6 cascades, once completed, will enable Iran to change the configuration of the cascades more easily. On 31 July 2021, the Agency verified that Iran had begun installing new sub-headers on one of the IR-6 cascades.

38. On 29 August 2021, 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;<sup>46</sup> one IR-1 centrifuge was installed in a single position;<sup>47</sup> the aforementioned installation of new sub-headers on one of the planned cascades of IR-6 centrifuges was almost complete; and ten IR-6 centrifuges were installed in the other planned cascade of IR-6 centrifuges where no new sub-headers had yet been installed.

#### C.2.4. FPPF

39. As previously reported, in December 2020, Iran informed the Agency that it would start R&D activities on the production of uranium metal using natural uranium at the Fuel Plate Fabrication Plant (FPPF) at Esfahan, before moving to produce uranium metal enriched up to 20% U-235 for fuel for the TRR (paras 24 and 26).<sup>48</sup> Iran also informed the Agency that uranium metal would be produced at the second stage of a three-stage process. On 2 February 2021, the Agency verified that Iran had started the production of uranium metal in a laboratory experiment at FPPF using natural UF<sub>4</sub> transferred from the Uranium Conversion Facility (UCF) at Esfahan.<sup>49</sup>

40. As previously reported, on 18 May 2021, the Agency verified that, in laboratory experiments conducted at FPPF, 2.42 kg of natural uranium metal had been produced from 3.1 kg of natural uranium in the form of UF<sub>4</sub> transferred from UCF. From the 2.42 kg of natural uranium metal, 0.85 kg were used to produce 0.54 kg of uranium in the form of uranium silicide, from which two uranium silicide fuel plates were manufactured. The Agency also verified that installation of the equipment for the first stage of the process, i.e. production of UF<sub>4</sub> from UF<sub>6</sub>, was ongoing.

41. Since the previous quarterly report, Iran has continued to conduct laboratory experiments on the production of uranium metal using natural and depleted uranium. On 29 August 2021, the Agency verified that the installation of the equipment for the first stage of the process, i.e. production of UF<sub>4</sub> from UF<sub>6</sub>, was almost complete.

42. As previously reported,<sup>50</sup> on 23 June 2021, Iran informed the Agency that it intended to transfer UF<sub>6</sub> enriched up to 20% U-235 from Natanz to FPPF for the purpose of producing fuel assemblies<sup>51</sup> for the TRR. On 29 August 2021, the Agency verified that Iran had produced seven standard fuel assemblies for the TRR, two of which had already been transferred to the TRR. One of the two fuel assemblies transferred to the TRR included 12 fuel plates made from the partially fabricated fuel plates from the second shipment from another Member State (para. 60).

43. On 28 June 2021, Iran informed the Agency about a four-step process by which it intended to produce new TRR fuel, which included, inter alia, the use of uranium metal enriched up to 20% U-235.<sup>52</sup> On 6 July 2021, Iran informed the Agency that the UO<sub>2</sub> enriched up to 20% U-235 (from step two of

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<sup>46</sup> GOV/2021/10, para. 26.

<sup>47</sup> 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).

<sup>48</sup> GOV/INF/2021/3, para. 5.

<sup>49</sup> GOV/INF/2021/11, para. 4.

<sup>50</sup> GOV/INF/2021/36, para. 4.

<sup>51</sup> A standard fuel assembly comprises 19 fuel plates and a control fuel assembly comprises 14 fuel plates.

<sup>52</sup> GOV/INF/2021/36, para. 5.

the four-step process) would be transferred to the R&D laboratory of FPPF, where it would be converted to UF<sub>4</sub> and then to uranium metal (in step three of the four-step process).<sup>53,54</sup>

44. As previously reported,<sup>55</sup> on 14 August 2021, the Agency verified at the R&D laboratory at FPPF that Iran had used 257 g of uranium enriched up to 20% U-235 in the form of UF<sub>4</sub> to produce 200 g of uranium metal enriched up to 20% U-235. On 29 August 2021, the Agency verified that this uranium metal had been used to produce uranium silicide and that the uranium silicide enriched up to 20% U-235 produced was not suitable for making a fuel plate for the new TRR fuel (step four of the four-step process described above).

45. As previously reported,<sup>56</sup> on 7 April 2021, the Agency verified at FPPF that Iran had dissolved six unirradiated, scrap fuel plates for the TRR containing 0.43 kg of uranium enriched up to 20% U-235, from which a uranyl nitrate solution was extracted and converted into ammonium uranyl carbonate (AUC) (paras 58 and 60).<sup>57</sup> On 15 May 2021, the Agency verified that Iran had dissolved an additional unirradiated, scrap fuel plate for the TRR containing 0.08 kg of uranium enriched up to 20% U-235, from which a uranyl nitrate solution was extracted. This uranyl nitrate solution, along with the aforementioned AUC, was converted into U<sub>3</sub>O<sub>8</sub> powder. According to Iran, this U<sub>3</sub>O<sub>8</sub> powder was to be used to produce enriched uranium targets for irradiation at the TRR for the production of molybdenum at the MIX facility. On 18 April 2021, the Agency verified 28 targets containing uranium enriched up to 20% U-235, of which 26 had been shipped to the MIX facility. On 18 May 2021, the Agency verified an additional 22 targets containing uranium enriched up to 20% U-235. The Agency also verified that the total of 50 targets contained 330 g of uranium enriched up to 20% U-235.<sup>58</sup> Since then, ten additional targets, containing 75 g of uranium enriched up to 20% U-235, have been produced and shipped to the MIX facility. On 24 August 2021, the Agency verified that all 60 targets made of uranium enriched up to 20% U-235 remained in storage at the MIX facility in Tehran.

### C.2.5. UCF

46. As previously reported, on 1 April 2021, Iran provided the Agency with an updated DIQ for UCF in which Iran informed the Agency that it was starting to install equipment for the production of uranium metal. On 23 May 2021, the Agency verified that installation of the equipment had been completed and that it was ready to operate with either natural or depleted uranium, although nuclear material had yet to be introduced into the production area. During the DIV on 23 August 2021, the Agency observed that no nuclear material had been introduced into the production area.

### C.2.6. TRR

47. On 22 August 2021, 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.<sup>59</sup> The Agency also verified that the two TRR fuel elements received from FPPF on 7 August 2021 (see Section C.2.4 above), had not yet been irradiated.

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<sup>53</sup> GOV/INF/2021/36, para. 9.

<sup>54</sup> JCPOA, 'Annex I – Nuclear-related measures', paras 24 and 26.

<sup>55</sup> GOV/INF/2021/39, para. 3.

<sup>56</sup> GOV/INF/2021/21, paras 2 and 3.

<sup>57</sup> See also the decision of the Joint Commission of 6 January 2016 (INFCIRC/907).

<sup>58</sup> The 50 targets were produced using the U<sub>3</sub>O<sub>8</sub> enriched up to 20% U-235 recovered from the plates dissolved as referred to in paras 29 and 30 of this report.

<sup>59</sup> 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).

### C.3. Centrifuge Manufacturing, Mechanical Testing and Component Inventory

48. 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). Moreover, since 25 May 2021, the Agency has not been able to confirm the operation of the equipment and exchange the storage media for the data and recordings collected. 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.

49. 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 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). Since 23 February 2021, 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).

50. 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 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.<sup>60,61</sup>

### C.4. Enriched Uranium Stockpile

51. As previously reported, since 1 July 2019, the Agency has verified that Iran's total enriched uranium stockpile has exceeded 300 kg of UF<sub>6</sub> enriched up to 3.67% U-235 (or the equivalent in different chemical forms) (para. 56).<sup>62</sup> The quantity of 300 kg of UF<sub>6</sub> corresponds to 202.8 kg of uranium.<sup>63</sup>

52. Since the previous report the following changes to the inventory of uranium enriched up to 2% U-235, enriched up to 5% U-235, enriched up to 20% U-235 and enriched up to 60% U-235, as declared by Iran and verified by the Agency at the enrichment facilities, were as follows:

- **FEP:** Iran has estimated<sup>64</sup> that from 22 May 2021 to 27 August 2021, 2090.0 kg of UF<sub>6</sub> enriched up to 2% U-235 were fed into the cascades at FEP,<sup>65</sup> and that 746.9 kg of UF<sub>6</sub> enriched up to

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<sup>60</sup> GOV/INF/2019/12, para. 6.

<sup>61</sup> Decision of the Joint Commission of 14 January 2016 (INFCIRC/907).

<sup>62</sup> GOV/INF/2019/8, paras 2 and 3.

<sup>63</sup> Considering the standard atomic weight of uranium and fluorine.

<sup>64</sup> Since 23 February 2021, as the Agency has only been able to verify Iran's production of enriched UF<sub>6</sub> 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.

<sup>65</sup> Iran estimated that 170.3 kg of UF<sub>6</sub> enriched up to 2% U-235 was dumped (i.e. not used for the enrichment of UF<sub>6</sub> 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 natural uranium. This amount is not included in the inventory of low enriched uranium at FEP.

5% U-235 were produced from both natural UF<sub>6</sub> and UF<sub>6</sub> enriched up to 2% U-235 (see paragraph 32 above).<sup>66</sup>

- **FFEP:** Iran has estimated that from 22 May 2021 to 29 August 2021, 444.3 kg of UF<sub>6</sub> enriched up to 5% U-235 were fed into cascades at FFEP,<sup>67</sup> and that 61.5 kg of UF<sub>6</sub> enriched up to 20% U-235 were produced,<sup>68</sup> and that 348.5 kg of UF<sub>6</sub> enriched up to 2% U-235 were accumulated as tails.
- **PFEP:** Iran has estimated that from 22 May 2021 to 29 August 2021: 109.6 kg of UF<sub>6</sub> enriched up to 2% U-235 were produced in R&D lines 2, 3 and 5; 427.2 kg of UF<sub>6</sub> enriched up to 5% U-235 were fed into cascades installed in R&D production lines 1, 4 and 6 and that 92.6 kg of UF<sub>6</sub> enriched up to 5% U-235 were produced in production line 1, 19.2 kg of UF<sub>6</sub> enriched up to 20% U-235 were produced in R&D production line 4, and 11.3 kg of UF<sub>6</sub> enriched up to 60% U-235 were produced in R&D production lines 4 and 6,<sup>69</sup> and that 307.1 kg of UF<sub>6</sub> enriched up to 2% U-235 were accumulated as tails from R&D production line 1.<sup>70,71</sup>

53. Since the previous report, Iran has processed at FFPF 33.0 kg of uranium in the form of UF<sub>6</sub> enriched up to 20% U-235, received from Natanz. On 24 August 2021, the Agency verified that the inventory of uranium enriched up to 20% U-235 in forms other than UF<sub>6</sub> was of 34.9 kg of uranium<sup>72</sup> and consisted of: 10.6 kg of uranium in the form of fuel assemblies, 23.6 kg of uranium in the form of intermediate products,<sup>73</sup> and 0.7 kg of uranium in the form of liquid and solid scrap.

54. 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.<sup>74</sup> Based on the information in the previous paragraphs, the Agency has estimated that, as of 30 August 2021, Iran's total enriched uranium stockpile was 2441.3 kg. This figure represents a decrease of 799.7 kg since the previous quarterly report, which is due to the use of uranium enriched up to 2% U-235 to produce uranium enriched up to 5% U-235. The estimated stockpile comprised 2372.9 kg of uranium in the form of UF<sub>6</sub>; 34.5 kg of uranium in the form of uranium oxide and other intermediate products; 21.1 kg of uranium in fuel assemblies and rods; and 12.8 kg of uranium in liquid and solid scrap.

55. The estimated total enriched uranium stockpile in the form of UF<sub>6</sub> of 2372.9 kg comprises:

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<sup>66</sup> Out of the overall production of UF<sub>6</sub> enriched up to 5% U-235 at FEP since 16 February, the Agency has verified 418.8 kg of UF<sub>6</sub>.

<sup>67</sup> Iran estimated that 34.3 kg of UF<sub>6</sub> enriched up to 5% U-235 were dumped (i.e. not used for the enrichment of UF<sub>6</sub> 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.

<sup>68</sup> Out of the overall production of UF<sub>6</sub> enriched up to 20% U-235 at FFEP since 16 February, the Agency verified 97.0 kg of UF<sub>6</sub>.

<sup>69</sup> Out of the overall production at PFEP using lines 1, 4 and 6, since 14 April 2021, the Agency verified that the following amounts were produced: 40.7 kg of UF<sub>6</sub> enriched up to 5% U-235, 25.1 kg of UF<sub>6</sub> enriched up to 20% U-235 and 12.9 kg of UF<sub>6</sub> enriched up to 60% U-235.

<sup>70</sup> Iran estimated that the 307.1 kg of UF<sub>6</sub> accumulated as tails from R&D line 1 have an approximate enrichment of 1% U-235. This UF<sub>6</sub> and the 44.7 kg of UF<sub>6</sub> previously accumulated as tails from line 1 (GOV/2021/28, footnote 58) are included in the uranium stockpile enriched up to 2% U-235.

<sup>71</sup> The figures for lines 1, 4 and 6 are based on a combination of operator estimates and Agency verification. Full verification and material balance will be carried out at the next physical inventory verification (PIV).

<sup>72</sup> Including 1.9 kg of uranium enriched up to 20% U-235 remaining from the previous shipment to Iran from a Member State.

<sup>73</sup> Including the uranium enriched up to 20% U-235 used in the experiments of the uranium metal production for the new TRR fuel.

<sup>74</sup> 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.

503.8 kg of uranium enriched up to 2% U-235 (-864.1 kg since the previous quarterly report); 1774.8 kg of uranium enriched up to 5% U-235 (+1.6 kg); 84.3 kg<sup>75</sup> of uranium enriched up to 20% U-235 (+21.5 kg); and 10.0 kg of uranium enriched up to 60% U-235 (+7.6 kg).

## **D. Transparency Measures**

56. 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). 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).

57. Since 23 February 2021, the Agency has not 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). The Agency has not had access to the data and recordings collected by its surveillance equipment installed to monitor the production of UOC. Moreover, since 25 May 2021, the Agency has not had access to its equipment to confirm its operation and exchange the storage media for the data and recordings collected. Iran has 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).

## **E. Other Relevant Information**

58. Since 23 February 2021, Iran has no longer provisionally applied the Additional Protocol to its Safeguards Agreement in accordance with Article 17(b) of the Additional Protocol (para. 64). Iran has not provided updated declarations and the Agency has not been able to conduct any complementary access under the Additional Protocol to any sites and locations in Iran during this reporting period. In addition, Iran has not implemented modified Code 3.1 of the Subsidiary Arrangements to Iran's Safeguards Agreement during this reporting period (para. 65). Subsequently, Iran informed the Agency that it does not have a plan to construct a new nuclear facility in the near future and that it was ready to work with the Agency to find a mutually acceptable solution to address the issue of modified Code 3.1. Other matters previously addressed in this section relating to Iran's implementation of its Safeguards Agreement and Additional Protocol<sup>76</sup> are addressed in GOV/2021/42.

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).

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<sup>75</sup> Since the previous quarterly report, 54.5 kg of uranium in the form of UF<sub>6</sub> enriched up to 20% U-235 were produced and 33.0 kg of uranium in the form of UF<sub>6</sub> enriched up to 20% U-235 were transferred to FFPF for manufacturing TRR fuel and for R&D activities on new TRR fuel.

<sup>76</sup> GOV/2020/51, paras 33-35.

## **F. Summary**

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

62. The Director General reiterates that Iran's failure to respond to the Agency's requests for access to its monitoring equipment is seriously compromising the Agency's technical capability to maintain continuity of knowledge, which is necessary for the Agency to resume its verification and monitoring of Iran's nuclear-related commitments in the future. The Agency's confidence that it can maintain continuity of knowledge is declining over time and has now significantly further declined. This confidence will continue to decline unless the situation is immediately rectified by Iran.

63. The Director General indicated that he was available to travel to Iran to meet members of the new administration to discuss these matters with a view to resolving them without delay. The Director General hopes that through a direct, cooperative and productive dialogue with the new Government of the Islamic Republic of Iran these urgent matters can be addressed.

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

ANNEX I

**Impact on Agency verification and monitoring resulting from Iran stopping implementation of its nuclear-related commitments as envisaged in the JCPOA<sup>77</sup>**

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

<sup>77</sup> Implementation of modified Code 3.1 is a legal obligation and is not reflected in the table.

ANNEX II

**Four updates since the Director General's previous Quarterly Report**

GOV/INF	Date	Content
2021/32	25 June 2021	No agreement on continued operation of the Agency's equipment to collect and store data
2021/36	6 July 2021	Activities related to production of uranium metal for TRR fuel and other activities related to production of TRR fuel
2021/39	16 August 2021	Iran produces 200g of uranium metal enriched up to 20% U-235
2021/40	17 August 2021	Iran changes operating mode for production of 60% UF <sub>6</sub> production at PFEP