

I. Resolving concerns about Iran's nuclear programme

TARIQ RAUF

Iran is party to the 1968 Treaty on the Non-Proliferation of Nuclear Weapons (Non-Proliferation Treaty, NPT), which it signed when the NPT opened for signature on 1 July 1968, depositing its instrument of ratification on 2 February 1970.¹ As a party to the NPT, Iran has legally committed itself to nuclear non-proliferation and agreed to submit all its nuclear materials and facilities to verification under a Safeguards Agreement concluded with the International Atomic Energy Agency (IAEA), which entered into force on 15 May 1974.² Under its NPT Safeguards Agreement, Iran has declared 18 nuclear facilities and 9 locations outside facilities (LOFs) where nuclear material is customarily used (see box 17.1).

After evidence of undeclared Iranian nuclear facilities was made public in 2002, states in the West raised concerns regarding Iran's nuclear ambitions, the scale of its uranium enrichment capabilities, and allegations of possible military activities in the nuclear field. These latter activities would not be in compliance with Iran's commitments under the NPT and its Safeguards Agreement. Between September 2003 and September 2012, the IAEA Board of Governors adopted 12 resolutions calling on Iran to remedy its non-compliance. These included a resolution adopted in 2005, which found that Iran's previously undeclared nuclear activities were not in compliance with its Safeguards Agreement.³ In addition, the IAEA called on Iran to implement transparency measures that extended beyond the formal requirements of its Safeguards Agreement. The key measures were: (a) the suspension of all enrichment-related, reprocessing and heavy water-related activities; and (b) cooperation with the IAEA—through, among other things, the implementation of an Additional Protocol to Iran's Safeguards Agreement—on all outstanding safeguards matters, including those that related to allegations of possible military dimensions (PMD) to Iran's nuclear programme, which were primarily based on intelligence information.⁴

The action taken by the IAEA was reinforced by the United Nations Security Council, which issued a statement and adopted six resolutions regarding

¹ Treaty on the Non-Proliferation of Nuclear Weapons (Non-Proliferation Treaty, NPT), opened for signature 1 July 1968, entered into force 5 Mar. 1970, INFCIRC/140, 22 Apr. 1970.

² International Atomic Energy Agency, 'The text of the agreement between Iran and the Agency for the application of safeguards in connection with the Treaty on the Non-Proliferation of Nuclear Weapons', INFCIRC/214, 13 Dec. 1974.

³ International Atomic Energy Agency, Board of Governors, 'Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran', Resolution, GOV/2005/77, 24 Sep. 2005.

⁴ For details of developments in earlier years see Rauf, T., 'Iran's nuclear programme and international concerns', *SIPRI Yearbook 2015*, p. 525; Kile, S. N., 'Iran and nuclear proliferation concerns', *SIPRI Yearbook 2014*, p. 357; and other relevant editions of the *SIPRI Yearbook*.

Box 17.1. List of Iran's declared nuclear facilities and locations outside facilities (LOFs) where nuclear material is customarily used

Tehran Tehran Research Reactor (TRR); Molybdenum, Iodine and Xenon Radioisotope Production (MIX) Facility; and Jabr Ibn Hayan Multipurpose Laboratories (JHL).

Esfahan Miniature Neutron Source Reactor (MNSR); Light Water Sub-Critical Reactor (LWSCR); Heavy Water Zero Power Reactor (HWZPR); Uranium Conversion Facility (UCF); Fuel Manufacturing Plant (FMP); Fuel Plate Fabrication Plant (FPFP); and Enriched UO₂ Powder Plant (EUPP).

Natanz Fuel Enrichment Plant (FEP); and Pilot Fuel Enrichment Plant (PFEP).

Fordow Fordow Fuel Enrichment Plant (FFEP).

Arak Iran Nuclear Research Reactor (IR-40 Reactor).

Karaj Karaj Waste Storage.

Bushehr Bushehr Nuclear Power Plant (BNPP)

Darkhovin 360 MW Nuclear Power Plant

Shiraz 10 MW Fars Research Reactor (FRR)

LOFs A total of 9, all situated within hospitals in various locations.

Source: International Atomic Energy Agency, Board of Governors, 'Implementation of the NPT Safeguards Agreement and relevant provisions of Security Council resolutions in the Islamic Republic of Iran', Report by the Director General, GOV/INF/2015/65, 18 Nov. 2015.

Iran's non-compliance between 2006 and 2010 under Chapter VII of the UN Charter. Among other things, the statement and resolutions made Iran's implementation of the IAEA's requirements mandatory and set out the restrictions and sanctions that would be imposed by the Security Council.

Following a period of deadlock that began in November 2011, a breakthrough was achieved in November 2013 when Iran and the IAEA agreed on a Framework for Cooperation designed to resolve all past and present issues. In addition, Iran and the E3/EU+3 (made up of France, Germany and the United Kingdom (E3), alongside the European Union (EU), and China, Russia and the United States (+3)) concluded a Joint Plan of Action (JPA) in November 2013 in an effort to reach a mutually agreed long-term comprehensive solution that would ensure Iran's nuclear programme would be dedicated exclusively to peaceful purposes.⁵ In 2015 Iran implemented the provisions of the Framework for Cooperation and the JPA, and the IAEA issued regular assessments of the implementation of the NPT Safeguards Agreement and the relevant provisions of UN Security Council resolutions on Iran.⁶

⁵ The members of the E3/EU+3 commenced negotiations with Iran in 2013 on a framework for a long-term comprehensive solution to ensure the exclusively peaceful nature of Iran's nuclear programme.

⁶ International Atomic Energy Agency, Board of Governors, 'Status of Iran's Nuclear Programme in relation to the Joint Plan of Action', Reports by the Director General: GOV/INF/2015/7, 20 Mar. 2015; GOV/INF/2015/8, 20 Apr. 2015; GOV/INF/2015/11, 30 June 2015; GOV/INF/2015/12, 1 July

The Joint Comprehensive Plan of Action

Iran and the E3/EU+3 agreed to the Joint Comprehensive Plan of Action (JCPOA) regarding Iran's nuclear programme in Vienna on 14 July 2015, which became known as 'Finalization Day' under the terms of the agreement (see box 17.2).⁷ The UN Security Council unanimously adopted Resolution 2231 on 20 July 2015.⁸ This resolution endorsed the JCPOA and its implementation, as appropriate, by all UN member states and international and regional organizations. UN member states are obliged under Article 25 of the UN Charter to accept and carry out the Security Council's decisions. In endorsing the JCPOA, the Security Council ended all the provisions of its previous resolutions on the Iranian nuclear programme.⁹ These provisions will be reimposed in the event of significant non-performance by Iran of its JCPOA commitments or contraventions of specific restrictions on the transfer of proliferation-sensitive goods.¹⁰

The JCPOA entered into force on Adoption Day, 18 October 2015, 90 days after the endorsement of the JCPOA by the Security Council. Implementation Day was scheduled to be the day the Security Council received a report from the IAEA confirming that Iran had implemented the nuclear-related actions specified in the JCPOA. Transition Day will be eight years following Adoption Day or on receipt by the Security Council of a report from the IAEA confirming that the IAEA has reached the broader conclusion that all nuclear material in Iran is in peaceful activities and there are no indications of undeclared nuclear materials and activities. Termination Day will occur 10 years after Adoption Day, provided that the provisions of the previous Security Council resolutions have not been reinstated in the interim. At that

2015; GOV/INF/2015/15, 20 July 2015; GOV/INF/17, 21 Sep. 2015; and GOV/INF/2015/19, 20 Oct. 2015. The documents cited here are available at the International Atomic Energy Agency website, <<http://www.iaea.org/>>.

⁷ International Atomic Energy Agency, Communication dated 24 July 2015 received from China, France, Germany, the Russian Federation, the United Kingdom, the United States of America (the E3/EU+3) and the Islamic Republic of Iran concerning the text of the Joint Comprehensive Plan of Action (JCPOA), INFCIRC/887, 31 July 2015. For the full text of the JCPOA see <http://eas.europa.eu/statements-eas/docs/iran_agreement/iran_joint-comprehensive-plan-of-action_en.pdf>.

⁸ UN Security Council Resolution 2231, 20 July 2015.

⁹ The UN Security Council resolutions were as follows: 1696, 31 July 2006; 1737, 23 Dec. 2006; 1747, 24 Mar. 2007; 1803, 3 Mar. 2008; 1835, 27 Sep. 2008; 1929, 9 June 2010; and 2224, 9 June 2015.

¹⁰ UN Security Council Resolution 2231 (OP.11) stipulates that within 30 days of receiving a notification by a JCPOA signatory state of an issue that that state believes constitutes significant non-performance of commitments under the JCPOA, the Security Council shall vote on a draft resolution to continue in effect the termination of the provisions of previous Security Council resolutions. Resolution 2231 (OP.11) further stipulates that if the Security Council does not adopt a resolution to continue in effect the termination of previous resolutions, then effective midnight Greenwich Mean Time (GMT) on the 30th day after the notification to the Security Council, all of the provisions of resolutions 1696, 31 July 2006; 1737, 23 Dec. 2006; 1747, 24 Mar. 2007; 1803, 3 Mar. 2008; 1835, 27 Sep. 2008; 1929, 9 June 2010; and 2224, 9 June 2015 shall apply in the same manner as they applied before the adoption of Resolution 2231.

Box 17.2. Key dates in the Joint Comprehensive Plan of Action implementation plan

Finalization Day (14 July 2015) Occurred when the JCPOA was successfully concluded and endorsed by the relevant parties. The United Nations Security Council endorsed the JCPOA in its Resolution 2231 on 20 July 2015.^a

Adoption Day (18 Oct. 2015) Took place 90 days after the endorsement of the JCPOA by the Security Council. On Adoption Day the relevant parties began preparations for lifting sanctions.

Implementation Day (16 Jan. 2016) The date on which, simultaneously with the International Atomic Energy Agency (IAEA) report verifying implementation by Iran of the nuclear-related measures, the European Union (EU), the United States and the UN take the actions described in Resolution 2231 on relaxing or lifting sanctions.

Cessation of Arms Embargo Day (18 Oct. 2020) The date, five years after Adoption Day, when all restrictions are lifted on the supply of major conventional arms and related components and services to and from Iran (with the exception of goods and technology that could contribute to the development of nuclear weapon delivery systems).^b

Transition Day (18 Oct. 2023) Will occur 8 years after Adoption Day or on the delivery of a report from the director general of the IAEA to the IAEA Board of Governors and the UN Security Council stating that all nuclear material in Iran remains in peaceful activities, the so-called Broader Conclusions, whichever occurs first. On that date, all remaining UN and EU sanctions related to the transfer of goods and technology that could contribute to the development of nuclear weapon delivery systems are due to be relaxed or lifted, and Iran will seek ratification of the Additional Protocol.

Termination Day (18 Oct. 2025) Will occur 10 years after Adoption Day, at which point any remaining UN and EU sanctions on arms and dual-use goods are due to be lifted 'and the UN Security Council would no longer be seized of the Iran nuclear issue'.

^a United Nations Security Council Resolution 2231, 20 July 2015.

^b This milestone does not have an official title in the agreement.

Source: The Joint Comprehensive Plan of Action (JCPOA), IAEA INFCIRC/887, 31 July 2015, <<https://www.iaea.org/sites/default/files/infcirc887.pdf>>.

point, all the provisions of Resolution 2231 shall be terminated and the Security Council will have concluded its consideration of the Iran nuclear issue.¹¹

In a joint statement issued in July 2015 the EU and Iran described the JCPOA as a main text and five technical annexes, which cover the following aspects 'nuclear, sanctions, civil nuclear energy cooperation, a joint commission, and implementation'. The statement also noted that the documents are detailed and specific 'because all sides wanted clarity so as to ensure the full and effective implementation of the agreement'.¹²

¹¹ JCPOA (note 7).

¹² European Union External Action Service (EEAS), Joint statement by EU High Representative Federica Mogherini and Iranian Foreign Minister Javad Zarif, Vienna, 14 July 2015.

Notable points agreed under the JCPOA

Under the JCPOA, Iran reaffirms that under no circumstances will it ever seek, develop or acquire any nuclear weapons. The JCPOA will result in the comprehensive lifting of all UN sanctions and all multilateral and national sanctions related to Iran's nuclear programme, including steps on access in areas of trade, technology, finance and energy. According to the preamble of the JCPOA:

All provisions and measures contained in this JCPOA are only for the purpose of its implementation between E3/EU+3 and Iran and should not be considered as setting precedents for any other state or for fundamental principles of international law and the rights and obligations under the NPT and other relevant instruments, as well as for internationally recognised principles and practices.

The E3/EU+3 and Iran have agreed to meet at the ministerial level every two years, or earlier if required, to review and assess progress and to adopt appropriate decisions by consensus.

Under the JCPOA, Iran voluntarily agreed to reduce its operating IR-1 centrifuges from nearly 20 000 machines to 6100, of which 5060 will remain operational. Excess centrifuges and related infrastructure at Natanz will be stored under continuous IAEA monitoring. Iran also agreed to limit enrichment of uranium to 3.67 per cent U-235 and to ship out all but 300 kilograms of its inventory of enriched uranium (UF₆), a level that will be maintained for 15 years. The Fordow enrichment plant will be converted into a nuclear technology centre with 1044 IR-1 centrifuges, which will be used for stable isotope production for a period of 15 years.¹³

Iran also agreed to redesign and rebuild a modernized heavy-water reactor at Arak based on an internationally agreed design, use UF₆ enriched to 3.67 per cent U-235 for fuel, and to remove and render dysfunctional the core of the 40 megawatt (MW) Arak reactor, which is currently under construction. Iran will not reprocess spent nuclear fuel or build any other heavy-water reactors for 15 years.

Iran further agreed to implement the Additional Protocol to its NPT Safeguards Agreement, and to fully implement modified code 3.1 of the subsidiary arrangements to its Safeguards Agreement on the early provision of design information of nuclear facilities. Iran agreed to allow the IAEA to monitor the implementation of the voluntary measures for their respective durations, as well as to implement transparency measures including (a) a long-term IAEA inspector presence in Iran; (b) the monitoring by the IAEA of uranium ore concentrate produced by Iran from all uranium ore concentrate plants for 25 years; (c) the containment and surveillance of centrifuge

¹³ White House, Office of the Press Secretary, 'Key excerpts of the Joint Comprehensive Plan of Action (JCPOA)', Press release, 14 July 2015.

rotors and bellows for 20 years; (d) the use of IAEA approved and certified modern technologies including online enrichment measurement and electronic seals; and (e) the use of a reliable mechanism to ensure speedy resolution of IAEA access concerns for 15 years. Iran also agreed not to engage in activities, including at the research and development level, that could contribute to the development of a nuclear explosive device including uranium or plutonium metallurgy activities.¹⁴

The JCPOA also established a Joint Commission, which held its first meeting on 19 October 2015 (the day after Adoption Day) at the level of Political Directors of the JCPOA participating countries. The meeting was chaired by the European Union External Action Service (EEAS) Deputy Secretary General for Political Affairs Helga Schmid.¹⁵ The Joint Commission will serve as a dispute resolution mechanism, approve nuclear-related procurements by Iran, oversee the Arak reactor conversion, and address concerns about non-compliance. The Joint Commission will convene four times a year. Decisions are to be made by consensus or, in the case of issues concerning IAEA access, by affirmative vote of five participating JCPOA states. It can be convened at seven days notice, or three days notice in the event the IAEA reports concerns related to monitoring and verification.

Dispute resolution under the JCPOA

With regard to dispute resolution, the JCPOA provides that the Joint Commission will have 15 days to resolve any compliance matters that arise, but this can be extended by consensus. Any participating state can refer an unresolved compliance matter to the foreign ministers of the participating states who will also have 15 days to resolve the matter. This time period can be extended by consensus. If the matter remains unresolved, it can be submitted to a three-member Advisory Board (one each appointed by the participants in the dispute and a third independent member). The Advisory Board must provide a non-binding opinion on the compliance matter within 15 days. If the compliance matter remains unresolved after the Advisory Board has issued its opinion, the Joint Commission will consider the opinion for no more than five days in order to resolve the matter. If the Joint Commission fails to resolve the matter to the satisfaction of the complainant participating state, and if the complainant participating state deems the issue to constitute significant non-performance, then that participating state could treat the unresolved matter as grounds to cease performing its commitments under the JCPOA in whole or in part and/or notify the Security Council that

¹⁴ White House (note 13).

¹⁵ European Union External Action Service (EEAS), 'Press release on the outcome of the first Joint Commission on the Joint Comprehensive Plan of Action on the Iranian nuclear programme', 19 Oct. 2015.

it believes that the matter constitutes significant non-performance. Following notification, the Security Council, in accordance with its procedures, shall vote on a resolution to continue with the lifting of sanctions. If such a resolution has not been adopted within 30 days of the notification, then the provisions of the old Security Council resolutions will be reimposed, unless the Security Council decides otherwise.¹⁶ The JCPOA notes that Iran has stated that if sanctions are reinstated in whole or in part, Iran would treat that as grounds to cease performing its commitments under the JCPOA in whole or in part.¹⁷

Under the JCPOA, the IAEA may request access to locations not included in Iran's declarations under its Safeguards Agreement for the sole purpose of verifying the absence of undeclared nuclear materials or activities, or activities inconsistent with the JCPOA, at such locations. If within 14 days of the IAEA request for access, the matter cannot be resolved then the Joint Commission would advise on the next steps by consensus or by a vote of five or more of its eight members. The process of consultation should not exceed seven days, and Iran must implement the required measures within three additional days.

The bumpy road to adoption and implementation of the JCPOA

In both Iran and the USA, hard-line opponents of the JCPOA failed to prevent its adoption and implementation. In Iran, concerns mainly focused on the rescission of sanctions and access to military sites. In the USA, critics in both houses of the US Congress stated that a better deal could have been possible with the continuation of sanctions and additional pressure, and that the JCPOA would leave Iran free to continue with its nuclear weapon ambitions following the ending of the various restrictions outlined in the JCPOA.

On 11 October 2015 Iran's Parliament, the Majlis, voted in favour of a preliminary motion on the general outlines of the JCPOA. There were 139 votes in favour, 100 against and 12 abstentions.¹⁸ On 13 October the Majlis formally approved the JCPOA by a vote of 161 in favour, 59 against and 13 abstentions.¹⁹ In giving its approval, the Majlis stipulated that all sanctions should be lifted.²⁰ The Guardian Council adopted a bill on 14 October that allowed for the implementation of the JCPOA under certain conditions, most notably that IAEA inspectors can visit military sites only with the approval of Iran's Supreme National Security Council and after the removal of all sanctions.²¹

¹⁶ JCPOA (note 7), para. 36.

¹⁷ JCPOA (note 7), para. 26.

¹⁸ 'Iranian Parliament ratifies outlines of JCPOA', *Tehran Times*, 12 Oct. 2015.

¹⁹ Fitch, A., 'Iran's Parliament approves nuclear deal', *Wall Street Journal*, 13 Oct. 2015.

²⁰ Wilkin, S. and Sharafedin, B., 'Iran Parliament approves nuclear deal bill in victory for Rouhani', Reuters, 13 Oct. 2015.

²¹ 'Iran's Guardian Council passes bill on implementation of JCPOA', Press TV, 14 Oct. 2015.

In the USA, the 60-day review period on the JCPOA mandated by the US Congress ended on 17 September 2015.²² The US Senate failed to muster the required 60 votes on an amendment to block the JCPOA.²³ On the same day, the US administration appointed Ambassador Stephen Mull as lead US coordinator for the implementation of the JCPOA.²⁴

Israel, Saudi Arabia and the United Arab Emirates (UAE) also opposed the JCPOA. All were dissatisfied with the effectiveness of the limitations placed on Iran's nuclear programme and concerned that the lifting of sanctions and freeing of Iranian financial assets would allow Iran to play a more influential regional role.

Israel was the most active and vociferous in its criticism and opposition. On 2 March 2015, against the wishes of the US administration, Israel's Prime Minister, Benjamin Netanyahu, was invited to address the US Congress, and controversially highlighted the threat posed in his view by Iran to the USA, the Gulf area and the Middle East.²⁵ The US administration signalled its displeasure by refusing to meet with Netanyahu.²⁶ Following agreement on the JCPOA on 14 July 2015, Netanyahu appealed to the US Congress on 19 July to oppose the agreement and to hold out for a better deal.²⁷ The US administration mounted a strong defence of the JCPOA by releasing documents and analyses, press statements and interviews, as well as statements by senior officials.²⁸

Saudi Arabia and the UAE were opposed to the JCPOA on the grounds that it would not put a stop to Iran's nuclear ambitions and would encourage greater intervention by Iran in regional affairs, adversely affecting the balance of power between Iran and the Arab states of the Gulf. In their view, Western recognition of Iran's regional influence would also be to the detriment of Saudi Arabia and the UAE.²⁹

Despite these concerns and criticisms, adoption and implementation of the JCPOA occurred as planned, and no problems had been reported as of the end of 2015.

²² Iran Nuclear Agreement Review Act of 2015, US Public Law 114-17, signed into law 22 May 2015.

²³ Barrett, T., 'Senate Republicans' last gasp Iran nuclear deal fails', CNN, 17 Sep. 2015.

²⁴ 'Stephen Mull named US coordinator on Iran nuclear deal', Reuters, 17 Sep. 2015.

²⁵ Baker, P., 'In Congress, Netanyahu faults "bad deal" on Iran nuclear program', *New York Times*, 3 Mar. 2015.

²⁶ 'With Iran deal through Congress, Netanyahu to meet Kerry, Obama', *Jerusalem Post*, 13 Sep. 2015.

²⁷ Reuters, 'Israel's Benjamin Netanyahu to US Congress: hold out for better Iran deal', NBC News, 19 July 2015.

²⁸ White House, 'The Iran nuclear deal: what you need to know', [n.d.]; US Department of State, 'Background briefing on the JCPOA implementation', Special Briefing, Washington, DC, 17 Sep. 2015; and US Department of Energy, Moniz, E., 'Science-based nuclear security and the Iran agreement', energy.gov, 31 Aug. 2015.

²⁹ 'Why Saudi Arabia and Israel oppose Iran nuclear deal', Al Jazeera, 14 Apr. 2015.

The IAEA and Iran

The implementation of NPT safeguards

The IAEA issued quarterly reports during 2015 on the implementation in Iran of the NPT Safeguards Agreement and the relevant provisions of the UN Security Council resolutions.³⁰ These reports also covered progress under the Joint Statement on a Framework for Cooperation, signed between Iran and the IAEA on 11 November 2013.³¹ An annex to the Framework for Cooperation contains a list of practical measures to be implemented by Iran as well as verification activities to be undertaken by the IAEA in a series of steps to resolve all present and past issues.

In each report to the IAEA Board of Governors in 2015, and in parallel to the Security Council, the IAEA reaffirmed its conclusion that although it had continued to verify the non-diversion of declared nuclear material at the nuclear facilities and LOFs declared by Iran under its Safeguards Agreement, the IAEA was not in a position to provide credible assurance on the absence of undeclared nuclear material and activities in Iran, and therefore could not conclude that all nuclear material in Iran was used solely for peaceful activities (see box 17.1).³² This latter ‘broader conclusion’ can only be reached for states with an additional protocol in force and for which the IAEA has carried out its safeguards assessment for the ‘state as a whole’.³³

The first three quarterly reports noted that although, contrary to the relevant resolutions of the IAEA Board of Governors and the Security Council, Iran had not suspended all of its uranium enrichment activities in the declared facilities at Natanz and Fordow, Iran had ceased the production of UF₆ enriched above 5 per cent U-235 on or before 20 January 2014.³⁴ In addition, it had processed through down-blending or conversion into uranium oxide all of its stock of UF₆ enriched up to 20 per cent U-235.³⁵ The

³⁰ International Atomic Energy Agency, Board of Governors, ‘Implementation of the NPT Safeguards Agreement and relevant provisions of Security Council resolutions in the Islamic Republic of Iran’, Reports by the Director General, GOV/INF/2015/15, 19 Feb. 2015; GOV/INF/2015/34, 29 May 2015; GOV/INF/2015/50, 27 Aug. 2015; and GOV/INF/2015/65, 18 Nov. 2015.

³¹ International Atomic Energy Agency, Board of Governors, ‘Joint Statement on a Framework for Cooperation’, Report by the Director General, GOV/INF/2013/14, 11 Nov. 2013.

³² International Atomic Energy Agency, GOV/INF/2015/65 (note 30).

³³ International Atomic Energy Agency, ‘Drawing safeguards conclusions’, [n.d.].

³⁴ Uranium, like other elements, occurs in several slightly differing forms known as ‘isotopes’ that differ from each other in the number of uncharged particles (neutrons) in the nucleus. Natural uranium (NU) as found in the Earth’s crust is largely a mixture of 2 isotopes: about 99.3% uranium-238 (U-238) and 0.7% uranium-235 (U-235). The isotope U-235 is important in the nuclear fuel cycle for both civilian and military uses. NU can be ‘enriched’ to about 5% U-235 to make nuclear fuel to produce electricity, and to above 90% U-235 to make nuclear weapons. World Nuclear Association, ‘What is Uranium? How does it work?’, Mar. 2014.

³⁵ The IAEA reported that up to the point at which Iran had stopped, it had produced 447.8 kg of UF₆ enriched up to 20% U-235; and that since Iran began enrichment at declared facilities it had produced 15 651.4 kg of UF₆ enriched up to 5% U-235. International Atomic Energy Agency, GOV/INF/2015/50 (note 30).

IAEA reported that all of the declared enrichment-related activities and all of the nuclear material and installed centrifuge cascades remained under IAEA safeguards. Iran explained to the IAEA that the purpose of producing low-enriched uranium (LEU) to 5 per cent U-235 was to make fuel for its nuclear facilities, and to 20 per cent U-235 was for the manufacture of fuel for research reactors to produce medical isotopes.

The IAEA reported that both the Fuel Enrichment Plant (FEP) and the Pilot Fuel Enrichment Plant (PFEP) at Natanz had operated as declared by Iran. As of 18 October 2015 (JCPOA Adoption Day), the FEP had 15 420 IR-1 centrifuges installed in 90 cascades, of which 54 cascades were being fed with natural UF₆. In addition, 1008 IR-2m centrifuges were installed in 6 cascades, but none had been fed with UF₆.³⁶ Since Adoption Day, Iran has commenced the removal of centrifuges and installed infrastructure at the FEP and is storing these under IAEA verification and monitoring. The IAEA concluded that the Fordow Fuel Enrichment Plant (FFEP), with 2710 installed IR-1 centrifuges, had also operated as declared by Iran, and that since Adoption Day Iran had started the removal of centrifuges and related infrastructure under IAEA monitoring and verification.

Pursuant to the practical measures agreed by Iran under the Framework for Cooperation, Iran continued to provide regular managed access to centrifuge assembly workshops, centrifuge rotor production workshops and storage facilities. Iran also provided an inventory of centrifuge rotor assemblies to be used to replace failed centrifuges. The IAEA confirmed that centrifuge rotor manufacturing and assembly were consistent with Iran's replacement programme for failed centrifuges as provided for under the JPA.³⁷

The IAEA reported that it had continued to monitor the use of hot cells at the Tehran Research Reactor (TRR) and the Molybdenum, Iodine and Xenon Radioisotope Production (MIX) Facility. It confirmed that there were no ongoing reprocessing-related activities with respect to the TRR, the MIX Facility and the other facilities to which the IAEA had access in Iran.³⁸

The IAEA reported that Iran has not installed any major components at the Iran Nuclear Research Reactor (IR-40 Reactor) at Arak or produced nuclear fuel assemblies for this reactor at the Fuel Manufacturing Plant (FMP) at Esfahan since the JPA took effect. According to the design information provided to the IAEA by Iran, the IR-40 Reactor was designed as a 40 MW heavy-water moderated research reactor to contain 150 fuel assemblies containing natural uranium in the form of uranium dioxide. The IR-40 Reactor remains under IAEA safeguards.³⁹

³⁶ International Atomic Energy Agency, GOV/INF/2015/50 (note 30).

³⁷ International Atomic Energy Agency, GOV/INF/2015/65 (note 30).

³⁸ International Atomic Energy Agency, GOV/INF/2015/65 (note 30).

³⁹ International Atomic Energy Agency, GOV/INF/2015/65 (note 30).

According to the IAEA, Iran provided managed access to the Heavy Water Production Plant (HWPP) at Arak, designed with the capacity to produce 16 tonnes of reactor-grade heavy water per year, which is not required to be under IAEA safeguards. Iran also provided the IAEA with mutually agreed relevant information regarding the HWPP.⁴⁰

The Road-map for the clarification of past and present outstanding issues regarding Iran's nuclear programme

In continuation of the Framework for Cooperation, the IAEA and Iran agreed a work plan in Vienna on 14 July 2015, referred to as the 'Road-map for the clarification of past and present outstanding issues regarding Iran's nuclear programme' (Road-map), as provided in the annex to the IAEA's report of November 2011.⁴¹

Under the Road-map, the two sides agreed on a 'separate arrangement', which was not made public, to address the remaining outstanding issues relating to Iran's nuclear programme as set out in the annex, that is, the PMD allegations levelled at Iran's nuclear programme. In this regard, Iran would provide its written explanations and supporting documents to the IAEA by 15 August 2015. After receiving these, the IAEA would review the information by 15 September 2015 and submit to Iran questions on any possible ambiguities in the information. After the submission of these questions, technical-expert meetings and technical measures (as agreed in the separate arrangement) and discussions would be organized in Tehran to remove all possible ambiguities. Furthermore, Iran and the IAEA agreed on a separate arrangement on the issue of the Parchin Military Complex (PMC), under which Iran would grant the IAEA managed access to the PMC to carry out environmental sampling at a location suspected to have a large explosives chamber. All of the above-mentioned activities would need to be completed by 15 October 2015. By 15 December 2015, the IAEA would provide, for action by the IAEA Board of Governors, a final assessment of the resolution of all past and present outstanding issues. A final wrap-up technical meeting between Iran and the IAEA would be organized before the issuance of the report.

The IAEA and Iran held their 'wrap-up technical meeting' in Vienna on 24 November 2015 and the IAEA issued its final assessment regarding PMD

⁴⁰ International Atomic Energy Agency, GOV/INF/2015/65 (note 30).

⁴¹ International Atomic Energy Agency, Board of Governors, 'Road-map for the clarification of past and present outstanding issues regarding Iran's nuclear programme', Report by the Director General, GOV/INF/2015/14, 14 July 2015; and International Atomic Energy Agency, GOV/INF/2015/65 (note 30). For the initial International Atomic Energy Agency report on possible military dimensions (PMD) see International Atomic Energy Agency, Board of Governors, 'Implementation of the NPT Safeguards Agreement and relevant provisions of Security Council resolutions in the Islamic Republic of Iran', Report by the Director General, GOV/2011/65, 8 Nov. 2011.

on 2 December 2015.⁴² Based on all the safeguards-relevant information available to the IAEA, it reported in its final assessment that all the activities in the Road-map were being implemented in accordance with the agreed schedule. It also provided the following assessments on each of the 12 areas of allegations of PMD:⁴³

1. Programme management structure: the IAEA assessed that an organizational structure was in place in Iran before the end of 2003, suitable for the coordination of a range of activities relevant to the development of a nuclear explosive device. In addition, although some activities took place after 2003, they were not part of a coordinated effort. Iran denied the existence of a coordinated programme aimed at the development of a nuclear explosive device but confirmed a significant proportion of the information available to the IAEA on the existence of organizational structures such as the Physics Research Centre.

2. Procurement activities: the IAEA noted that it had received no additional information since 2007 of instances of procurement or attempted procurement of items relevant to a nuclear explosive device, although Iran had confirmed attempted procurement of a high-speed camera for a conventional purpose and denied attempts to acquire high-speed switches.

3. Nuclear material acquisition: the IAEA reported that it had not found indications of an undeclared nuclear fuel cycle in Iran beyond the retrospectively declared Gchine uranium mine, which Iran declared to the IAEA in April 2004 and provided managed access to in 2014; and that no substantial amount of uranium could have been produced at the mine prior to 2006.

4. Nuclear components for an explosive device: the IAEA ‘found no indications of Iran having conducted activities which can be directly traced to the “uranium metal document” or to design information for a nuclear explosive device from the clandestine nuclear supply network’.⁴⁴

5. Detonator development: the IAEA assessed that exploding bridgewire (EBW) or fast-acting detonators developed by Iran had characteristics relevant to a nuclear explosive device but acknowledged that there was a growing use of such detonators for civilian and conventional purposes.

6. Initiation of high explosives and associated experiments: the IAEA assessed that explosives technology known as multipoint initiation (MPI)

⁴² International Atomic Energy Agency, Board of Governors, ‘Final assessment on past and present outstanding issues regarding Iran’s nuclear programme’, Report by the Director General, GOV/2015/68, 2 Dec. 2015.

⁴³ International Atomic Energy Agency, GOV/2015/68 (note 42). For a critical expert assessment see Rauf, T. and Kelley, R., ‘Assessing the IAEA “assessment” of “possible military dimensions” of Iran’s nuclear programme’, SIPRI (15 Dec. 2015); and Kelley, R., ‘IAEA: most PMD claims groundless’, LobeLog, 10 Dec. 2015.

⁴⁴ International Atomic Energy Agency, GOV/2015/68 (note 42), para. 35.

developed by Iran had characteristics relevant to a nuclear explosive device but also to a small number of alternative applications.

7. Hydrodynamic experiments: the IAEA reported on its visit to a building at the PMC that was alleged to house a large cylinder suitable for containment of dynamic compressive testing of a simulated core of a nuclear explosive device. The IAEA did not observe or find such a chamber or any associated equipment inside the building during its visit on 20 September 2015 but it did observe signs of internal refurbishment and a floor with an unusual cross-section.

8. Modelling and calculations: on information on computer modelling studies for nuclear explosive configurations based on implosion technology, the IAEA assessed that Iran had conducted computer modelling of a nuclear explosive device prior to 2004 and between 2005 and 2009, and noted the incomplete and fragmented nature of those calculations as well as the applicability of some hydrodynamic modelling to conventional military explosive devices.

9. Neutron initiator: regarding information on neutron initiation of an implosion-type nuclear explosive device, the IAEA noted that Iran had demonstrated its neutron research capabilities for general neutron generation, including relevant non-Iranian open source publications. Iran had also confirmed that research had been undertaken at an institution where plasma focus equipment was used to generate short neutron pulses and to develop and test suitable detectors, and had showed the neutron research capabilities at that institution to the IAEA.

10. Conducting tests: regarding information on tests of EBW detonator firing over a long distance between the firing point and a test device located down a deep shaft, the IAEA noted that it had no additional information since November 2011.

11. Integration into a missile delivery system: regarding information on integration of a spherical payload into the re-entry vehicle for the Shahab-3 ballistic missile, Iran showed the IAEA two operational workshops on 15 October 2015, and the IAEA reported that it had not received 'any other information on this area' since November 2011.⁴⁵

12. Fusing, arming and firing system: the IAEA reported that it had had no new information since November 2011 on technical options for the safety of the spherical payload of the Shahab-3 missile.

The overall assessment of the IAEA was that a range of activities relevant to the development of a nuclear explosive device were conducted in Iran prior to the end of 2003 as a coordinated effort, and that some activities took place after 2003. The IAEA also assessed that these activities did not advance

⁴⁵ International Atomic Energy Agency, GOV/2015/68 (note 42).

beyond feasibility and scientific studies, and the acquisition of certain relevant technical competences and capabilities. Moreover, the IAEA confirmed that it had found no credible indications of activities in Iran relevant to the development of a nuclear explosive device after 2009. Crucially with regard to Iran's NPT safeguards obligations, the IAEA found no credible indications of the diversion of nuclear material to PMD in connection with Iran's nuclear programme.

On 15 December 2015 the IAEA Board of Governors adopted a resolution by consensus welcoming the conclusions.⁴⁶ The IAEA Board of Governors' resolution welcomed the commitments undertaken by Iran in the JCPOA and affirmed in this regard that the IAEA's verification and monitoring of Iran's nuclear-related commitments as set out in the JCPOA should not be considered as setting a precedent for the IAEA's standard verification practices, and further affirmed that it shall not be interpreted so as to conflict with or alter in any way the IAEA's right and obligations to verify compliance by states with safeguards agreements and, where appropriate, additional protocols. This is echoed in UN Security Resolution 2231, which stated that all provisions in the JCPOA were only for the purpose of its implementation between the E3/EU+3 and Iran, and should not be considered as setting a precedent for any other state or for principles of international law and the rights and obligations under the NPT and other relevant instruments, as well as for internationally recognized principles and practices.⁴⁷ The Security Council included this stipulation from the JCPOA in order to forestall possible criticism from other states, which would not accept the JCPOA's additional monitoring and verification measures.

The IAEA Board of Governors' resolution of 15 December 2015 noted that all the activities in the Road-map had been discussed in accordance with the agreed schedule, and further that this closed the IAEA Board of Governors' consideration of this matter. However, the IAEA Board of Governors and the UN Security Council remain seized of the matter of the implementation of the JCPOA until 10 years after the JCPOA Adoption Day or until the date on which the IAEA reported that it had reached a broader conclusion that all nuclear material in Iran remained in peaceful activities, whichever was earlier.

⁴⁶ International Atomic Energy Agency, Board of Governors, 'Joint Comprehensive Plan of Action implementation and verification and monitoring in the Islamic Republic of Iran in light of United Nations Security Council Resolution 2231 (2015)', GOV/2015/72, Resolution adopted by the Board of Governors on 15 Dec. 2015.

⁴⁷ UN Security Council Resolution 2231 (note 8), para. 27.

The IAEA and Security Council Resolution 2231

The IAEA issued a report on 14 August 2015 on the implementation of Security Council Resolution 2231.⁴⁸ The IAEA noted that pursuant to the resolution the IAEA was required to: (a) undertake the necessary verification and monitoring of Iran's nuclear-related commitments for the full duration of commitments relating to uranium enrichment as set out in the JCPOA; (b) provide regular updates to the IAEA Board of Governors, and—as appropriate—in parallel to the Security Council, on Iran's implementation of its commitments on centrifuges and continuous monitoring as set out in the JCPOA; (c) report to the IAEA Board of Governors, and in parallel to the Security Council, at any time if the IAEA Director General has reasonable grounds to believe that there is an issue of concern directly affecting fulfilment of Iran's nuclear-related commitments as set out in the JCPOA; (d) report to the IAEA Board of Governors, and in parallel to the Security Council, as soon as the IAEA has verified that Iran has taken the actions specified in the JCPOA relating to uranium enrichment and heavy water; (e) report to the IAEA Board of Governors, and in parallel to the Security Council, as soon as the IAEA has reached the broader conclusion that all nuclear material in Iran remains in peaceful activities; and (f) consult and exchange information with the Joint Commission, where appropriate, as specified in the JCPOA.⁴⁹

The IAEA noted that its verification and monitoring of Iran's nuclear-related commitments as set out in the JCPOA would be without prejudice to Iran's Safeguards Agreement and Additional Protocol. The IAEA requested additional financial resources of around €2.5 million for 2015 and €9.2 million per year thereafter for the next 15 years for verification and monitoring of Iran's nuclear-related commitments as set out in the JCPOA.

Iran's ballistic missile programme

The JCPOA did not address Iran's ballistic missile programme, but Security Council Resolution 2231 calls on Iran not to undertake any activity related to ballistic missiles 'designed' to be capable of delivering nuclear weapons, until eight years after JCPOA Adoption Day or until the date on which the IAEA submits a report confirming the broader conclusion, whichever is the earlier.⁵⁰ Iran maintains an active ballistic missile and space launch pro-

⁴⁸ International Atomic Energy Agency, Board of Governors, 'Verification and Monitoring in the Islamic Republic of Iran in light of United Nations Security Council Resolution 2231 (2015)', Report by the Director General, GOV/INF/2015/53, 14 Aug. 2015.

⁴⁹ International Atomic Energy Agency, GOV/INF/2015/53 (note 48), para. 8.

⁵⁰ UN Security Council Resolution 1929, 9 June 2010, para. 9, requires that Iran shall not undertake any activity related to ballistic missiles capable of delivering nuclear weapons, including

gramme, with both liquid- and solid-fuelled launchers, and maintains that its ballistic missiles are not designed to carry nuclear weapons as it does not possess any such weapons. It has tested and deployed several types of ballistic missiles with different ranges and has successfully launched satellites into Earth orbit.⁵¹

UN Security Council Resolution 1929 of June 2010 prohibits Iran from carrying out tests of nuclear-capable ballistic missiles. However, Iran does not accept the validity of Security Council resolutions limiting its nuclear-capable missile programmes and carried out six test launches of intermediate-range ballistic missiles between late 2010 and November 2015. Iran test-fired ballistic missiles that the USA deemed to be in violation of Security Council Resolution 1929 on 10 October 2015 and again on 21 November 2015.⁵² There was also some discussion between members of the Security Council as to the impact of the tests on Security Council Resolution 2231. Russia maintained that Iran's missile tests were not in violation of that resolution as it does not specifically prohibit missile tests; Russia therefore opposed the imposition of sanctions on Iran.⁵³ At a meeting of the Security Council on 21 October 2015, France, Germany, the UK and the USA called on the Security Council's Sanctions Committee on Iran established under Security Council Resolution 1737 (1737 Iran Sanctions Committee) to investigate Iran's missile tests and consider them to be a serious violation of UN resolutions.⁵⁴ The chair of the 1737 Iran Sanctions Committee stated on 15 December 2015 that the 21 November missile launch by Iran was in violation of Security Council Resolution 1929. This finding was rejected by Russia.⁵⁵

launches using ballistic missile technology to test fire ballistic missiles. UN Security Council Resolution 2231 (note 8), Annex B: Statement, para. 3.

⁵¹ US National Air and Space Intelligence Center (NASIC), *Ballistic and Cruise Missile Threat*, NASIC-1031-0985-13 (NASIC: Wright-Patterson Air Force Base, 2013); and Clark, S., 'Iranian satellite successfully placed in orbit', *Spaceflight Now*, 2 Feb. 2016.

⁵² Power, S., US Permanent Representative to the United Nations, 'Remarks at a briefing by the chair of the UN Security Council's Iran Sanctions Committee', US Mission to the United Nations, New York, 15 Dec. 2015.

⁵³ Nichols, M. and Charbonneau, L., 'U.S. vows to push for U.N. action on Iran despite Russian opposition', *Reuters*, 14 Mar. 2016.

⁵⁴ 'West asks UN to investigate Iran ballistic missile test', *Al Jazeera*, 22 Oct. 2015. UN Security Council Resolution 1737, 23 Dec. 2006.

⁵⁵ 'Briefing by the chair of the 1737 Iran Sanctions Committee', *What's in Blue*, 15 Dec. 2015.