

8. Nuclear arms control and non-proliferation

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I. Introduction

In 2007 the nuclear programmes of two states, Iran and North Korea, remained at the centre of international controversies about the proliferation of nuclear weapons. The International Atomic Energy Agency (IAEA) made some progress towards resolving issues related to the history of Iran's sensitive nuclear fuel cycle activities, including uranium enrichment, that had called into question the peaceful nature of those activities. At the same time, Iran continued to refuse to comply with United Nations Security Council resolutions demanding that it suspend its enrichment programme. In East Asia, there was a breakthrough in the multilateral negotiations on the fate of the nuclear programme of the Democratic People's Republic of Korea (DPRK, or North Korea), which in February 2007 agreed to an Action Plan for disabling and eventually eliminating its nuclear infrastructure. Elsewhere, controversy continued over the Indian–United States Civil Nuclear Cooperation Initiative (CNCI) and its proposed exemption of India from US and multilateral nuclear supplier restrictions. In Geneva there were renewed but ultimately unsuccessful efforts at the Conference on Disarmament (CD) to open negotiations on a global fissile material cut-off treaty (FMCT).

This chapter reviews the main developments in nuclear arms control and non-proliferation in 2007. Section II describes developments related to Iran's nuclear programme and summarizes the IAEA's findings about the country's past and current nuclear activities. Section III describes the diplomatic deal reached in the Six-Party Talks in which North Korea pledged to give up its nuclear infrastructure in return for economic and security benefits. Section IV examines the controversy over the Indian–US nuclear deal, focusing on the obstacles to its implementation. Section V summarizes the efforts at the CD to resolve the impasse that has blocked for more than a decade the opening of negotiations on an FMCT. Section VI summarizes international initiatives aimed at enhancing nuclear security and the safe disposal of surplus fissile material, while section VII presents the conclusions.

Appendix 8A provides tables of data on the nuclear forces or capabilities of the USA, Russia, the United Kingdom, France, China, India, Pakistan, Israel and North Korea. Appendix 8B provides details of global inventories of fissile material. Appendix 8C surveys the main ballistic missile defence programmes under development in the USA. Appendix 8D describes the techniques used in nuclear forensics analysis and their application in verifying treaty compliance.

II. Iran and nuclear proliferation concerns

In 2007 the international controversy over the scope and nature of Iran's nuclear programme intensified as Iran proceeded apace with its uranium enrichment activities. The controversy emerged at the end of 2002 and centred on findings by the IAEA that Iran had failed, over a period of two decades, to declare important nuclear activities in contravention of its comprehensive safeguards agreement with the agency mandated by the 1968 Treaty on the Non-Proliferation of Nuclear Weapons (Non-Proliferation Treaty, NPT).¹ It was heightened by revelations, in 2004, that Iran had procured nuclear technology and equipment through the smuggling network organized by Pakistan's chief nuclear engineer, Abdul Qadeer Khan.² Iran maintains that its nuclear programme is intended solely for peaceful purposes and that any safeguards violations were inadvertent and minor in nature. However, in Europe, the USA and elsewhere, there is concern that Iran is attempting to put into place, under the cover of a civilian nuclear energy programme, the sensitive fuel cycle facilities needed to produce plutonium and highly enriched uranium (HEU) for nuclear weapons. Since October 2003, three European Union (EU) member states—France, Germany and the UK, the 'E3'—have taken the lead in attempting to resolve the controversy through negotiations with Iran. These negotiations have also involved the participation of the High Representative for the EU's Common Foreign and Security Policy, Javier Solana.³

Iran's defiance of UN Security Council resolutions

The year 2007 opened with Iran continuing to defy UN Security Council resolutions 1696 and 1737, which demand that Iran immediately suspend all uranium enrichment-related and plutonium reprocessing activities.⁴ Resolution 1737 imposed a limited set of economic and political sanctions on Iran under Article 41 of Chapter VII of the UN Charter.⁵ Iran had promptly rejected that resolution as 'invalid' and 'illegal' and vowed to review its cooperation with the IAEA.⁶

¹ Iran acceded to the NPT as a non-nuclear weapon state on 2 Feb. 1970. Its comprehensive safeguards agreement with the International Atomic Energy Agency (INFCIRC/214) entered into force on 15 May 1974. For a summary of the NPT see annex A in this volume.

² On the Khan network see International Institute for Strategic Studies (IISS), *Nuclear Black Markets: Pakistan, A. Q. Khan and the Rise of Proliferation Networks*, IISS Strategic Dossier (Routledge: Abingdon, 2007).

³ For European and Iranian views on the nuclear issue see Kile, S. N. (ed.), *Europe and Iran: Perspectives on Non-proliferation*, SIPRI Research Report no. 21 (Oxford University Press: Oxford, 2005).

⁴ On the UN Security Council's deliberations on the Iranian nuclear issue see Kile, S. N., 'Nuclear arms control and non-proliferation', *SIPRI Yearbook 2007: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 2003), pp. 488–93.

⁵ UN Security Council Resolution 1737, 23 Dec. 2006. The UN documents cited here are available from <<http://documents.un.org/>>.

⁶ 'UN votes for Iran nuclear sanctions', Al Jazeera, 23 Dec. 2006, <<http://english.aljazeera.net/NR/exeres/A742D5DB-379A-4A0F-8DFA-40213800A37C.htm>>. In Jan. 2007 Iran reportedly sought to deny visas to IAEA inspectors who were citizens of countries that voted in favour of Resolution 1737.

In February 2007 the IAEA Director General, Mohamed ElBaradei, reported to the IAEA Board of Governors that Iran had not suspended its enrichment or other sensitive nuclear fuel cycle activities.⁷ He noted that the Atomic Energy Organization of Iran (AEOI) had installed additional P-1 gas centrifuges at both the Pilot Fuel Enrichment Plant (PFEP) and the Fuel Enrichment Plant (FEP) near Natanz. Iranian technicians at the PFEP continued to operate single centrifuges as well as 10-, 24- and 164-machine cascades, into which uranium hexafluoride (UF₆) was being fed 'intermittently'.⁸ Iran had informed the IAEA that it would install additional centrifuge cascades at the FEP and planned to feed UF₆ into the cascades already in place there. The report also noted that Iran had increased the production of UF₆ at the Uranium Conversion Facility (UCF) in Esfahan. In addition, it continued to build a 40-mega-watt-thermal (MW(t)) heavy water-moderated IR-40 reactor near Arak.⁹ Following the report, the IAEA Board voted to partially or completely suspend 22 of the agency's 55 technical cooperation projects with Iran.¹⁰

On 24 March 2007 the UN Security Council unanimously adopted Resolution 1747, which tightened the sanctions on Iran and reaffirmed that it must 'comply without further delay' with the steps required by the IAEA Board of Governors, including a full and sustained suspension of all enrichment-related and reprocessing activities as well as the ratification and implementation of the Additional Protocol.¹¹ The Security Council asked the IAEA Director General to issue a new report within 60 days. It promised to suspend the sanctions 'if and for so long as Iran suspends all enrichment-related and reprocessing activities, including research and development, as verified by the IAEA, to allow for negotiations in good faith'.¹²

Iranian officials sharply criticized Resolution 1747 as overstepping the Security Council's legal authority and warned that the country would curtail

'Iran bars 38 IAEA inspectors from entering country for nuke check', RIA Novosti, 22 Jan. 2007, <<http://en.rian.ru/world/20070122/59499341.html>>.

⁷ IAEA, Board of Governors, 'Implementation of the NPT safeguards agreement and relevant provisions of Security Council Resolution 1737 (2006) in the Islamic Republic of Iran', Report by the Director General, GOV/2007/8, 22 Feb. 2007, pp. 1, 5. Most of the IAEA documents and publications cited here are available from the IAEA's website, <<http://www.iaea.org/>>.

⁸ Uranium hexafluoride is the feedstock used in most uranium enrichment processes, including gas centrifuges. See Krass, A. et al., SIPRI, *Uranium Enrichment and Nuclear Weapon Proliferation* (Taylor & Francis: London, 1983), <http://books.sipri.org/product_info?c_product_id=286>.

⁹ IAEA (note 7), p. 1. This type of reactor is well suited for producing weapon-grade plutonium. When completed in 2010, it is estimated that the reactor will be able to produce spent fuel with enough plutonium for c. 2 weapons each year.

¹⁰ 'IAEA cuts technical aid to Iran', Radio Free Europe/Radio Liberty, 8 Mar. 2007, <<http://www.rferl.org/featuresarticle/2007/3/66AACED3-C509-4233-AC46-EE1E61911F8B.html>>. See also Boureston, J. and Lacey, J., 'Nuclear technical cooperation: a right or privilege?', *Arms Control Today*, vol. 37, no. 7 (Sep. 2007).

¹¹ UN Security Council Resolution 1747, 24 Mar. 2007. For a description of the sanctions, see chapter 11 in this volume, section II. In Dec. 2003 Iran signed an Additional Protocol to its comprehensive safeguards agreement with the IAEA granting agency inspectors enhanced powers to investigate possible undeclared nuclear activities. In Feb. 2006 Iran announced that it would no longer act in accordance with the provisions of the protocol, which had yet to be ratified by the Majlis (parliament), in protest of the IAEA Board of Governors' decision to report the Iranian nuclear file to the UN Security Council.

¹² UN Security Council Resolution 1747 (note 11).

cooperation with the IAEA in the face of Security Council-imposed sanctions.¹³ The Iranian Foreign Minister, Manouchehr Mottaki, complained that the Security Council was 'being abused to take an unlawful, unnecessary and unjustifiable action' against Iran's peaceful nuclear programme, which 'presents no threat to international peace and security and falls, therefore, outside the Council's Charter-based mandate'.¹⁴

On 29 March Iran informed the IAEA that it had suspended implementation of the modified text of its Subsidiary Arrangements General Part, Code 3.1, concerning the early provision of design information and would instead implement the original text, agreed in 1976, which required Iran to submit design information for new facilities 'not later than 180 days before the facility is scheduled to receive nuclear material for the first time'.¹⁵ Iran also informed the IAEA that it would no longer allow agency inspectors to verify the design information for the IR-40 reactor that had been provided by Iran pursuant to the modified Code 3.1.¹⁶

The Iranian decision was challenged on both legal and political grounds. The IAEA stated that there was no mechanism in Iran's safeguards agreement (INFCIRC/214) for the unilateral suspension of provisions agreed to in subsidiary arrangements and that the agency's right to verify design information provided to it was a 'continuing right' which was not dependent on the stage of construction of a facility.¹⁷ The USA complained that the move further undermined confidence in the Iranian leadership's intentions and raised 'serious concern' about 'the possibility of Iran building new and sensitive nuclear facilities in secret and only informing the IAEA just before operations begin'.¹⁸

Diplomatic impasse over new sanctions

On 25 April 2007 Solana met Ali Larijani, Secretary of Iran's Supreme National Security Council, to discuss modalities for resuming negotiations on

¹³ Islamic Republic News Agency, 'Leader warns of consequences of illegal actions against Iran', 22 Mar. 2007, <<http://www2.ima.ir/en/news/view/line-17/070322533091859.htm>>.

¹⁴ Quoted in UN Security Council, 'Security Council toughens sanctions against Iran, adds arms embargo with unanimous adoption of Resolution 1747 (2007)', Press release, 24 Mar. 2007, <<http://www.un.org/News/Press/docs/2007/sc8980.doc.htm>>.

¹⁵ Iran's response is reported in IAEA, 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/2007/22, 23 May 2007, p. 3. The modified text of Code 3.1, agreed between Iran and the IAEA in Feb. 2003 after the existence of the Natanz enrichment plants had been revealed, required Iran to provide the IAEA with design information for new nuclear facilities 'as soon as the decision to construct, or to authorize construction, of such a facility has been taken, whichever is earlier'. On the declaration requirements see appendix 8D, section III.

¹⁶ IAEA (note 15). Iran argued that under the 1976 version of Code 3.1, to which it had 'reverted', the verification of such information was not justified, given the preliminary construction stage of the facility.

¹⁷ IAEA (note 15).

¹⁸ US Mission to International Organizations in Vienna, 'Iran's denials of design information and verification: more cause for international concern', June 2007, <http://vienna.usmission.gov/_unviec/speeches_and_related_documents/Anti-Narcotics-Trafficking-Programs-and-Initiatives/1698.php>.

the nuclear issue.¹⁹ The meeting had been preceded by the decision of the Council of the European Union to impose additional sanctions on Iran going beyond those mandated in resolutions 1737 and 1747, including a total arms embargo.²⁰ Solana reportedly proposed a 'double suspension', whereby Iran would agree to halt its uranium enrichment activities and the EU and the Security Council would suspend their sanctions, pending the negotiation of a long-term settlement.²¹ However, the talks ended inconclusively. The Iranian President, Mahmoud Ahmadinejad, rejected the 'double suspension' idea, insisting that Iran would not halt what were legitimate nuclear activities.²²

Iran's defiance of resolutions 1737 and 1747 led to protracted discussions between China, France, Germany, Russia, the UK and the USA (the 'P5 + 1 states') about how to induce or compel the Iranian leadership to comply with the Security Council's demands. The discussions took place against the background of ElBaradei's May report to the IAEA Board, which stated that Iran had increased its enrichment activities and continued work on the IR-40 reactor in defiance of the resolutions.²³ During a press conference prior to the report's release, ElBaradei had sparked a controversy by stating that 'from a proliferation perspective, the fact of the matter is that one of the purposes of suspension'—to prevent the Iranians from mastering centrifuge technology—had been 'overtaken by events' in Iran.²⁴

While there was a general consensus that the Security Council had to take action to enforce its authority, disagreements persisted over the measures to be included in any new resolution. The E3 and the USA urged the Security Council to impose additional sanctions on Iran. However, they also reiterated the offer of the package of political and economic incentives that was offered by the P5 + 1 in June 2006.²⁵ In contrast, China and Russia continued to resist US-led calls for a third round of sanctions, arguing that diplomacy should be given more time to work. On 20 June the Russian Foreign Minister, Sergei Lavrov, stated that a new Security Council resolution would be 'adopted only after the [IAEA] Director General reports that the possibility of resolving some of the remaining issues has been exhausted'.²⁶ Lavrov emphasized that the nuclear controversy should be resolved in the framework of IAEA–Iranian cooperation.

¹⁹ Islamic Republic News Agency, 'Iran welcomes correct, precise talks: Larijani', 25 Apr. 2007, <<http://www.globalsecurity.org/wmd/library/news/iran/2007/iran-070425-irna02.htm>>.

²⁰ Council Common Position 2007/246/CFSP of 23 April 2007 amending Common Position 2007/140/CFSP concerning restrictive measures against Iran, *Official Journal of the European Union*, L106 (24 Apr. 2007), pp. 67–75.

²¹ Weitz, R., 'European Union–Iranian negotiations: what's next?', *WMD Insights*, May 2007.

²² Hafezi, P., 'Ahmadinejad says Iran won't back down in atom row', Reuters, 23 Apr. 2007, <<http://uk.reuters.com/article/oilRpt/idUKDAH34040120070423>>.

²³ IAEA (note 15), pp. 2, 4.

²⁴ Heinrich, M., 'World should adapt to Iran atom advances: ElBaradei', Reuters, 15 May 2007, <<http://www.reuters.com/article/worldNews/idUSL1544636620070515>>.

²⁵ Kerr, P., 'U.S. allies await Iran's response to nuclear offer', *Arms Control Today*, vol. 36, no. 6 (July/Aug. 2006).

²⁶ 'Lavrov sets condition for new UN move', Reuters, 20 June 2007, <<http://www.reuters.com/article/topNews/idUSL2092290920070620>>.

In October 2007 the USA announced a comprehensive package of sanctions aimed at curtailing international commercial and banking activities in Iran. It also designated the Islamic Revolutionary Guard Corps as a proliferator of weapons of mass destruction (WMD), thereby making it subject to wide-ranging sanctions.²⁷ The announcement came as the US Administration continued to press the European Union to adopt rules to prevent EU companies from trading with or investing in Iran, similar to the restrictions already codified in US legislation.²⁸ The newly elected French President, Nicolas Sarkozy, shifted France's position towards the tougher approach advocated by the USA, warning that Iran's nuclear ambitions would otherwise lead to 'an Iranian bomb or the bombing of Iran'.²⁹ However, Germany and other EU member states with significant trade ties to Iran remained reluctant to impose unilateral sanctions against it.³⁰ They were supported by some smaller member states which were concerned that unilateral EU sanctions would undermine the role of the Security Council.

Russia continued to be generally supportive of Iran, where it was completing construction of a 1000-megawatt-electric (MW(e)) light-water nuclear power reactor near Bushehr, on the Gulf coast. Russia had previously insisted—over US objections—that any Security Council sanctions resolution include an exemption for the Bushehr nuclear power plant project. On 16 December 2007 Russia delivered to Iran the first shipment of nuclear fuel for the reactor at Bushehr.³¹ Iran and Russia had reached agreement the previous week on a schedule to finish building the plant after years of delays, which Russian officials attributed to Iran's payment arrears in the \$1 billion deal.³² The fuel was to be delivered in several batches, with the whole operation scheduled to take two months.³³ The main Russian contractor, Atomstroyexport, stated that the plant would be ready to operate no sooner than six months after all the fuel rods for the reactor had been delivered.³⁴ US Administration officials reportedly complained that the delivery agreement, coming shortly after the release of a new US intelligence estimate on Iran's nuclear

²⁷ Wright, R., 'U.S. to impose new sanctions targeting Iran's military', *Washington Post*, 25 Oct. 2007. In addition, the USA designated the Revolutionary Guards' Quds Force as a terrorist organization.

²⁸ MacAskill, E., 'US steps up effort to stop EU firms trading with Iran', *The Guardian*, 20 July 2007.

²⁹ Samuel, H., 'Nicolas Sarkozy warns of Iran's nuclear crisis', *Daily Telegraph*, 31 Aug. 2007; and 'France fails to sell EU sanctions against Iran', Global Security Newswire, 16 Oct. 2007, <http://www.nti.org/d_newswire/issues/2007_10_16.html>.

³⁰ 'Berlin says US and France guilty of hypocrisy', *Der Spiegel*, 24 Sep. 2007. In 2006 Germany was the largest exporter to Iran, with total exports exceeding €4.1 billion (\$5.1 billion). Jones, G., 'Germany's pivotal role in the Iranian nuclear standoff', *Proliferation Analysis*, Carnegie Endowment for International Peace, 20 Nov. 2007, <<http://www.carnegieendowment.org/npp/publications/index.cfm?fa=view&id=19720>>.

³¹ 'Russia ships nuclear fuel to Iran', BBC News, 17 Dec. 2007 <<http://news.bbc.co.uk/2/7147463.stm>>.

³² 'Bushehr nuclear plant launch delayed over new crisis in Russia-Iran relations', *Pravda*, 27 July 2007.

³³ 'Bushehr received second N-fuel batch from Russia', Nuclear.ru, 28 Dec. 2007, <http://www.nuclear.ru/eng/press/nuclear_power/2108595>.

³⁴ Cooper, H., 'Iran receives nuclear fuel in blow to U.S.', *New York Times*, 18 Dec. 2007.

programme (see below), would encourage Iranian intransigence at the Security Council.³⁵

Following the first shipment, Lavrov, the Russian Foreign Minister, said that there was no longer any economic rationale for Iran to proceed with its uranium enrichment programme now that Russia was delivering the fuel for the Bushehr reactor.³⁶ However, according to Gholamreza Aghazadeh, the head of the AEOI, Iran needed to produce fuel at Natanz for a 360-MW(e) indigenous power plant to be built at Darkhovin, in south-western Khuzestan province.³⁷ The AEOI has begun construction work on the Darkhovin plant, but it is not expected to be completed for a decade.³⁸

The IAEA–Iranian work plan

On 21 August 2007 Iran and the IAEA finalized a work plan for answering all outstanding safeguards compliance issues in Iran. The plan was prepared following a series of discussions in Tehran led by ElBaradei and Iran's chief nuclear negotiator, Ali Larijani.³⁹ It set out the modalities and a timeline for the IAEA and Iran to resolve all remaining issues related to the IAEA's investigation into Iran's past nuclear activities. The IAEA agreed to submit in writing all of its questions by 15 September 2007 and Iran agreed to provide the 'required clarifications and information' by specified dates.⁴⁰

The timeline called for the IAEA and Iran to conclude and close, in an agreed order, the files on six outstanding issues. The IAEA stated that there were 'no other remaining issues and ambiguities regarding Iran's past nuclear program and activities'.⁴¹ The first of these issues, which had to do with the dates of undeclared plutonium separation experiments carried out by Iran, was declared closed on 20 August, when the IAEA confirmed that earlier statements made by Iran were consistent with the agency's findings.⁴² To resolve the other issues, the IAEA agreed to submit to Iran its questions about: (a) the origins of enriched uranium particles discovered in environmental samples

³⁵ Daragahi, B. and Stack, M., 'Russian nuclear fuel lands in Iran', *Los Angeles Times*, 18 Dec. 2007.

³⁶ 'Russia sees no need for Iran to continue with uranium enrichment', RIA Novosti, 26 Dec. 2007, <<http://en.rian.ru/russia/20071226/94168822.html>>.

³⁷ Cooper (note 34). The location is sometimes referred to by other nearby place names, including Ahvaz, Darkhouin, Esteghlal and Karun.

³⁸ 'Iran's first home-made nuclear power plant to be operational in 9 years', Xinhua, 24 Dec. 2007, <http://news.xinhuanet.com/english/2007-12/25/content_7306339.htm>; and 'Iran starts second atomic power plant: report', Reuters, 8 Feb. 2008, <<http://www.reuters.com/article/topNews/idUSL0812863720080208>>.

³⁹ Communication dated 27 August 2007 from the Permanent Mission of the Islamic Republic of Iran to the Agency concerning the text of the Understandings of the Islamic Republic of Iran and the IAEA on the Modalities of Resolution of the Outstanding Issues, available in IAEA, INFCIRC/711, 27 Aug. 2007.

⁴⁰ INFCIRC/711 (note 39), p. 6. See also Squassoni, S. and Gerami, N., 'Iran's plan for nuclear compliance', Carnegie Endowment for International Peace, 6 Sep. 2007 <http://www.carnegieendowment.org/files/iran_timeline4.pdf>.

⁴¹ INFCIRC/711 (note 39), p. 6.

⁴² INFCIRC/711 (note 39), p. 2.

taken at a 'technical university in Iran';⁴³ (b) Iranian statements about the procurement of P-1 and P-2 centrifuge design information, components and related equipment through a network of foreign intermediaries, and the scope and timelines of Iran's centrifuge research and development (R&D) activities;⁴⁴ (c) a document, discovered in Iran by IAEA inspectors in 2005, that described 'procedures for the reduction of [UF₆] to uranium metal in small quantities, and for the casting of enriched and depleted uranium metal into hemispheres';⁴⁵ (d) the purpose of Iran's experiments involving the isotope polonium-210; and (e) certain Iranian activities at the Gchine uranium mine. The IAEA also agreed to provide Iran with documentation it had been given by the USA pertaining to the so-called Green Salt Project, which allegedly involved work on the conversion of uranium dioxide into uranium tetrafluoride ('green salt'), and tests related to high explosives and the design of a missile re-entry vehicle. Iran continued to dismiss these allegations as baseless and politically motivated but agreed to review this evidence as a goodwill gesture.⁴⁶

In addition to the work plan, Iran agreed to cooperate with the IAEA on preparing a safeguards approach and a facility attachment for the FEP at Natanz, which subsequently entered into force on 30 September 2007.⁴⁷ Iran also agreed to allow the IAEA to resume on-site inspections of the IR-40 reactor under construction near Arak, which Iran had halted in response to the Security Council's adoption of Resolution 1747.

The announcement of the work plan was received unenthusiastically in the USA and many EU countries, where it was portrayed as a capitulation to Iranian pressure.⁴⁸ It led to a wave of criticism directed against EIBaradei for allegedly having exceeded his statutory authority as IAEA Director General by independently negotiating a political deal with Iran.⁴⁹ While accepting the work plan's goals, Western diplomats expressed dismay that it had ignored the Security Council's demands that Iran immediately suspend its enrichment pro-

⁴³ On the contamination issue see IAEA, Board of Governors, 'Implementation of the NPT safeguards agreement in the Islamic Republic of Iran', Report by the Director General, GOV/2004/83, Vienna, 15 Nov. 2004, pp. 8–10.

⁴⁴ For a description of Iran's centrifuge enrichment programmes see International Institute for Strategic Studies (IISS), *Iran's Strategic Weapons Programme: A Net Assessment* (Routledge: Abingdon, 2005), pp. 45–56.

⁴⁵ The work plan did not set a time frame for resolving this issue. The existence of the document has been a matter of international concern, since the uranium metal hemispheres could be used to form the core of an implosion-type nuclear weapon.

⁴⁶ INFCIRC/711 (note 39), p. 7.

⁴⁷ The safeguards approach outlines the types of inspection mechanisms that may be used at Natanz. The facility attachment specifies how these mechanisms are to be implemented. IAEA, Board of Governors, 'Implementation of the NPT safeguards agreement and relevant provisions of Security Council resolutions 1737 (2006) and 1747 (2007) in the Islamic Republic of Iran', Report by the Director General, GOV/2007/58, 15 Nov. 2007, p. 6.

⁴⁸ Heinrich, M., 'Developing states rap "interference" in Iran deal', Reuters, 11 Sep. 2007, <<http://www.reuters.com/article/worldNews/idUSL1154089720070911>>. On 11 Sep. 2007 an EU statement to the IAEA Board 'took note' of the work plan but stopped short of endorsing it or expressing approval.

⁴⁹ See e.g. 'Rogue regulator', *Washington Post*, 5 Sep. 2007.

gramme and re-implement the Additional Protocol.⁵⁰ Diplomats and leading non-governmental experts also expressed concern about the sequential nature of the plan, in particular the possibility that Iran could use it to buy time to continue its enrichment activities by delaying the resolution of outstanding questions.⁵¹ They pointed out that the work plan's language seemed to violate a fundamental safeguards principle in that it precluded the IAEA or its member states from raising these issues again, even if new information were to emerge, once the files on them had been closed.⁵²

Impasse in E3–EU–Iranian negotiations

As the positions of Iran and the USA on the suspension issue hardened in the summer of 2007, the E3 reportedly began to consider proposals for a compromise deal that would involve a less-than-complete suspension by Iran of its enrichment programme.⁵³ On 23 October 2007 Solana met in Rome with Iran's new chief nuclear negotiator, Saeed Jalili, who had succeeded Larijani following the latter's resignation several days earlier.⁵⁴ Solana put forward a 'double freeze' proposal, under which the UN Security Council would stop consideration of further sanctions if Iran agreed, as a confidence-building measure, to temporarily halt the expansion of its enrichment programme.⁵⁵ This would be followed by a full suspension of Iran's enrichment programme and the simultaneous suspension of the existing sanctions. The diplomatic sequence envisioned by Solana's proposal was a departure from previous E3 proposals, which had stated that negotiations could begin only after Iran completely suspended all uranium enrichment activities. It appeared to reflect a new European approach that accepted the reality of Iran's enrichment capability but sought to constrain it as much as possible. However, Jalili ruled out making any concession on Iran's enrichment programme. A joint statement issued by the E3 following the meeting complained that 'Iran made no gesture of goodwill in Rome, refusing both the double freeze and the double suspen-

⁵⁰ Webb, G., 'Iran-IAEA nuclear plan receives qualified Western support', Global Security Newswire, 12 Sep. 2007, <http://www.nti.org/d_newswire/issues/2007/9/12/4f722640-1feb-401d-bcc9-2d876f8433fe.html>.

⁵¹ Albright, D. and Shire, J., 'A flawed IAEA-Iran agreement on resolving outstanding issues', ISIS Report on Iran, 28 Aug. 2007, <<http://www.isis-online.org/publications/iran/flawedagreement.pdf>>.

⁵² Albright and Shire (note 51).

⁵³ 'Key U.S. allies exploring compromise enrichment suspension deal with Iran', *International Herald Tribune*, 22 June 2007.

⁵⁴ The appointment of Jalili, a close supporter of President Ahmadinejad, was interpreted by some observers as reflecting Ahmadinejad's increased influence in foreign policy decision making within the Iranian leadership. See Posch, W., 'Only personal? The Larijani crisis revisited', Policy Brief no. 3, Centre for Iranian Studies, Durham University, <http://www.dur.ac.uk/resources/iranian.studies/larijani_final01.pdf>.

⁵⁵ Walker, S., 'Iran and EU face tough nuclear talks', Reuters, 29 Nov. 2007, <<http://www.reuters.com/article/worldNews/idUSL2735773820071129>>.

sion'.⁵⁶ On 30 November Solana and Jalili met for another round of talks that ended inconclusively.⁵⁷

The IAEA Director General's assessment of Iran's nuclear programme

On 15 November ElBaradei issued the latest in a series of reports to the IAEA Board that painted a mixed picture of the agency's progress in clarifying Iran's past and current nuclear activities. The report was generally positive about Iran's cooperation with the IAEA in implementing the August 2007 work plan, stating that Iran 'has provided sufficient access to individuals and has responded in a timely manner to questions and provided clarifications and amplifications on issues raised in the context of the work plan'.⁵⁸ As a result, the IAEA had been able to conclude that Iran's answers about the histories of the P-1 and P-2 centrifuge programmes were consistent with the agency's findings about those programmes. The report noted that the IAEA had submitted to Iran its questions about the other outstanding issues, in accordance with the work plan, and was awaiting Iran's answers and clarifications. More generally, the report stated that Iran had provided safeguards inspectors with access to declared nuclear materials, and provided the required material accountancy reports, to enable the agency to verify that none of the declared nuclear materials inside Iran had been diverted to prohibited activities.⁵⁹ Iran's ambassador to the IAEA, Ali-Asghar Soltanieh, hailed the findings as evidence that Iran had shown 'good will in clearing up ambiguities in its peaceful nuclear activities' and argued that the IAEA Board no longer had any justification for referring Iran's nuclear file to the Security Council.⁶⁰

At the same time, ElBaradei's report stated that Iran's cooperation in answering the IAEA's questions had been 'reactive rather than proactive' and emphasized that 'Iran's active cooperation and full transparency are indispensable for full and prompt implementation of the work plan'.⁶¹ Moreover, it cautioned that the IAEA was still not in a position to provide credible assurances about the absence of undeclared nuclear materials or activities in the country. The report noted that 'since early 2006, the Agency has not received the type of information that Iran had previously been providing, pursuant to the Additional Protocol', which meant that the IAEA's knowledge about Iran's current nuclear programme was 'diminishing'.⁶²

The US Administration seized on the latter findings to renew its push for new sanctions against Iran.⁶³ Gregory Schulte, the US ambassador to the

⁵⁶ Quoted in Walker (note 55).

⁵⁷ 'Iran rejects EU "disappointment"', BBC News, 1 Dec. 2007, <<http://news.bbc.co.uk/2/7122440.stm>>.

⁵⁸ IAEA (note 47), p. 8.

⁵⁹ IAEA (note 47), p. 8.

⁶⁰ 'Iran showed goodwill in clearing up ambiguities', *Tehran Times*, 24 Nov. 2007, pp. 1, 15.

⁶¹ IAEA (note 47), p. 8.

⁶² IAEA (note 47), p. 9.

⁶³ Wright, R., 'US to seek new sanctions against Iran', *Washington Post*, 16 Nov. 2007.

IAEA, said that the report showed that Iran's cooperation with the IAEA remained 'selective and incomplete' and that Iran had not met 'the world's expectation of full disclosure'.⁶⁴ In addition, the E3 and the USA argued that ElBaradei's report did not alter the fundamental issue at the centre of the dispute, namely, Iran's non-compliance with two legally binding Security Council resolutions.

ElBaradei reported that Iran had not suspended its enrichment-related activities, including R&D work on the P-2 centrifuge design, and was continuing the operation of the PFEP and FEP.⁶⁵ Iran had achieved its stated objective of installing a complete centrifuge 'module', consisting of 18 164-centrifuge cascades (or 2952 centrifuges), at the FEP.⁶⁶ This in effect made the FEP a pilot plant, since Iran had installed the 18-cascade module there before demonstrating that it could operate the single cascade at the PFEP.⁶⁷

The report also noted that Iran had introduced UF₆ into all of the cascades, but that the UF₆ feed rate had 'remained below the expected quantity for a facility of this design'.⁶⁸ The feed rate had risen incrementally in the period 13 August–3 November 2007, when the number of operating cascades increased from 12 to 18.⁶⁹ According to one estimate, the FEP produced an average of 22 kilograms of fuel-grade low-enriched uranium per month during this period.⁷⁰ This amount was well below the full potential of the module and was an indication that Iran still faced technical problems in operating a large number of cascades at the same time in parallel. ElBaradei's report noted that IAEA inspectors had not observed preparations at the FEP for installing centrifuges or centrifuge pipe work outside the original 18-cascade module.⁷¹ This suggested that Iran may have decided to temporarily stop at the single module, although it remained committed to the goal of a 54 000-centrifuge plant. A key question for many analysts was whether Iran had halted installation work because it lacked the capacity to manufacture significantly more

⁶⁴ Schulte, G., US Permanent Representative to the United Nations and International Organizations in Vienna, 'Failing the test of full disclosure', 15 Nov. 2007, <http://vienna.usmission.gov/_unvie/speeches_and_related_documents/Iran/1723.php>.

⁶⁵ IAEA (note 47), p. 8. Iran was also continuing construction of the IR-40 reactor near Arak.

⁶⁶ IAEA (note 47), p. 6. This marked a tenfold increase in the number of centrifuges compared with Nov. 2006.

⁶⁷ International Institute for Strategic Studies, 'Nuclear Iran: how close is it?', *IISS Strategic Comments*, vol. 13, no. 7 (Sep. 2007), p. 2. President Ahmadinejad was widely believed to have made a political decision to put as many centrifuges in place as possible in order to improve Iran's diplomatic bargaining position.

⁶⁸ IAEA (note 47), p. 6.

⁶⁹ IAEA (note 47), p. 6. During this period, Iran consumed 550 kg of UF₆, nearly as much as the 690 kg consumed during the period Feb.–Aug. 2007.

⁷⁰ Albright, D. and Shire, J., 'November IAEA report: centrifuge file not closed; Natanz enrichment expands', ISIS Issue Brief, 15 Nov. 2007, <<http://www.isis-online.org/publications/iran/ISISIssueBriefIran15Nov2007.pdf>>.

⁷¹ IAEA (note 47), p. 6.

than the 3000 centrifuges already in place or had done so for political and diplomatic reasons.⁷²

The US National Intelligence Estimate on Iran

On 3 December 2007 the US Director of National Intelligence, Mike McConnell, released an unclassified summary of a new National Intelligence Estimate (NIE) of Iran's nuclear intentions and capabilities. The NIE, which reflected the consensus views of 16 US intelligence agencies, concluded 'with high confidence' that Iran had halted its nuclear weapon programme four years earlier, in the autumn of 2003, and had not resumed work on nuclear weapons as of mid-2007.⁷³ The conclusion was reportedly based on Iranian military communications intercepted by the USA, among other sources.⁷⁴ It marked a major departure from the previous NIE on Iran, completed in May 2005, which had concluded that Iran had a clandestine programme under way to develop nuclear weapons. The new estimate stated that Iran's decision to halt its nuclear weapon programme suggested that it was 'less determined to develop nuclear weapons than we have been judging since 2005'. It also concluded 'with high confidence that the halt was directed primarily in response to increasing international scrutiny and pressure resulting from the exposure of Iran's previously undeclared nuclear work', which in turn suggested that 'Iran may be more vulnerable to influence' than had been previously judged.⁷⁵

The 2007 NIE acknowledged that the US intelligence community did not know whether Iran intended to develop nuclear weapons but implied that it was pursuing the option to do so in the future. The report noted that 'Iranian entities' were continuing 'to develop a range of technical capabilities that could be applied to producing nuclear weapons', if a decision to do so were made. However, it was unclear whether the Iranian leadership was 'willing to maintain the halt of its nuclear weapon program indefinitely' or whether it would or already had 'set specific criteria that will prompt it to restart the program'. The report also warned that 'convincing the Iranian leadership to forgo the eventual development of nuclear weapons' would be difficult 'given the linkage many within the leadership probably see between nuclear weapons development and Iran's key national security and foreign policy objectives'.⁷⁶

The new NIE did not substantially revise recent assessments made by US intelligence agencies about when Iran might be able to produce a nuclear weapon. It judged 'with moderate confidence' that the earliest date that Iran

⁷² Fitzpatrick, M., 'Can Iran's nuclear capability be kept latent?', *Survival*, vol. 49, no. 1 (spring 2007), pp. 50–51; and Albright, D. and Shirer, J., 'A witch's brew? Evaluating Iran's uranium-enrichment progress', *Arms Control Today*, vol. 37, no. 9 (Nov. 2007).

⁷³ See 'key judgments' in US Director of National Intelligence, 'National Intelligence Estimate—Iran: nuclear intentions and capabilities', Nov. 2007, <http://www.dni.gov/press_releases/20071203_release.pdf>, p. 8.

⁷⁴ Linzer, D. and Warrick, J., 'U.S. finds that Iran halted nuclear arms bid in 2003', *Washington Post*, 4 Dec. 2007.

⁷⁵ US Director of National Intelligence (note 73), p. 5.

⁷⁶ US Director of National Intelligence (note 73), p. 6.

would be ‘technically capable’ of producing enough HEU for a nuclear weapon was 2009. However, Iran was more likely to achieve this capability in 2010–15, or possibly later, in light of the ongoing technical problems in its enrichment programme.⁷⁷

The release of the 2007 NIE elicited mixed international reactions. Some governments disputed its main conclusion. In a rare public rift with the USA on intelligence matters, Israeli officials cited ‘clear and solid intelligence’ that Iran was continuing to develop nuclear weapons.⁷⁸ In contrast, the Russian Foreign Minister, Lavrov, said there was no proof that Iran ever had a nuclear weapon programme. He praised the Iranian leadership for its readiness to cooperate with the IAEA in resolving the outstanding questions about its past nuclear activities.⁷⁹ Iranian President Ahmadinejad hailed the report as a ‘victory’ for Iran and claimed that it undermined the legal basis for the UN Security Council’s consideration of the nuclear file.⁸⁰

The release of the updated NIE immediately changed the political dynamics of the debate in Europe and the USA about how to address concerns about Iran’s nuclear programme. In the USA the report’s finding that Iran was not currently pursuing a dedicated nuclear weapon programme was widely seen as having undercut political support for US military action against Iran. In October 2007 President George W. Bush had warned that a nuclear-armed Iran could lead to ‘World War III’, a comment that fuelled speculation that the USA was prepared to take military action against Iranian nuclear facilities and other targets if diplomatic efforts proved fruitless.⁸¹ The NIE’s conclusions were also seen as complicating efforts by the USA and some European countries at the UN Security Council to impose a further round of sanctions on Iran. Chinese and Russian officials said that the report raised questions about the need for a new Security Council resolution imposing additional sanctions.⁸²

III. North Korea’s nuclear programme and the Six-Party Talks

In 2007 some progress was made towards resolving the international confrontation over North Korea’s nuclear weapon programme. The dispute arose in 2002, when a series of tit-for-tat moves by North Korea and the USA resulted in the collapse of the 1994 Agreed Framework and the expulsion of IAEA

⁷⁷ US Director of National Intelligence (note 73), pp. 6, 8. The NIE assessed that ‘Iran would probably use covert facilities—rather than its declared nuclear sites—for the production of highly enriched uranium for a weapon’.

⁷⁸ Mitnik, J., ‘Israel challenges report on nukes’, *Washington Times*, 5 Dec. 2007.

⁷⁹ Associated Press, ‘Lavrov: “No proof Iran had nuke program”’, *Jerusalem Post*, 5 Dec. 2007.

⁸⁰ Dareini, A. A., ‘Ahmadinejad: report a “victory”’, *Washington Times*, 5 Dec. 2007.

⁸¹ Spetalnick, M., ‘Bush: threat of World War III if Iran goes nuclear’, Reuters, 17 Oct. 2007, <<http://www.reuters.com/article/newsOne/idUSN1732974320071017>>.

⁸² Sciolino, E., ‘Europeans see murkier case for sanctions’, *New York Times*, 4 Dec. 2007; ‘China questions UN Iran sanctions’, BBC News, 5 Dec. 2007, <<http://news.bbc.co.uk/2/128183.stm>>; and Dareini (note 80).

monitors from North Korea.⁸³ This was followed in 2003 by North Korea's formal withdrawal from the NPT.⁸⁴ On 9 October 2006 North Korea further raised the stakes when it carried out an underground nuclear test explosion.⁸⁵ The test led the UN Security Council to unanimously adopt Resolution 1718, demanding that North Korea verifiably abandon all WMD and ballistic missile programmes.⁸⁶ It also required all UN member states to take a variety of measures to restrict certain conventional weapon systems and dual-use goods and materials from entering North Korea.⁸⁷

Progress in the Six-Party Talks

The year 2007 opened with uncertain prospects for progress in the Six-Party Talks between China, Japan, North Korea, the Republic of Korea (ROK, or South Korea), Russia and the USA. The talks began in August 2003 and aimed at resolving the diplomatic impasse over North Korea's nuclear programme.⁸⁸ On 19 September 2005 they achieved an apparent breakthrough when the parties reached agreement on a Joint Statement on principles guiding future talks aimed at the 'verifiable denuclearization of the Korean Peninsula in a peaceful manner'.⁸⁹ Immediately after the Joint Statement was issued, however, the two main antagonists—North Korea and the USA—presented conflicting versions of what had actually been agreed, especially with regard to the sequencing of a possible deal on dismantling North Korea's nuclear infrastructure.⁹⁰ The prospects for resolving the disagreement were complicated by the USA's imposition, in September 2005, of new restrictions on North Korea's trading and financial activities. The US Administration claimed that the measures were motivated by North Korean money laundering activities unrelated to the nuclear issue. The move prompted North Korea to stage a year-long boycott of the Six-Party Talks. It returned to the talks, reportedly under Chinese pressure, in December 2006 but insisted that the USA had to remove the financial sanctions before it would consider a new US denuclearization proposal.⁹¹

⁸³ On the breakdown of the North Korean–US Agreed Framework see Kile, S. N., 'Nuclear arms control, non-proliferation and missile defence', *SIPRI Yearbook 2003: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 2003), pp. 578–92.

⁸⁴ North Korea acceded to the NPT as a non-nuclear weapon state party on 12 Dec. 1985. Its withdrawal from the treaty took effect on 10 Apr. 2003. North Korea's comprehensive safeguards agreement with the IAEA (INFCIRC/403) was considered also to have lapsed on that date.

⁸⁵ On the test and the methods used to determine whether a nuclear explosion had occurred see Fedchenko, V. and Ferm Helgren, R., 'Nuclear explosions, 1945–2006', *SIPRI Yearbook 2007* (note 4), pp. 552–53; and appendix 8D, section III.

⁸⁶ UN Security Council Resolution 1718, 14 Oct. 2006.

⁸⁷ See Anthony, I. and Bauer, S., 'Controls on security-related international transfers', *SIPRI Yearbook 2007* (note 4), pp. 658–63.

⁸⁸ Zissis, C., 'The Six-Party Talks on North Korea's nuclear program', *Backgrounder*, US Council on Foreign Relations, updated 4 Dec. 2007, <<http://www.cfr.org/publication/13593>>.

⁸⁹ US Department of State, Office of the Spokesman, 'Joint Statement of the Fourth Round of the Six-Party Talks', Washington, DC, 19 Sep. 2005, <<http://www.state.gov/t/pa/prs/ps/2005/53490.htm>>.

⁹⁰ See Kile, S. N., 'Nuclear arms control and non-proliferation', *SIPRI Yearbook 2006: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 2003), pp. 632–33.

⁹¹ Kerr, P. 'No progress at North Korea talks', *Arms Control Today*, vol. 37, no. 1 (Jan./Feb. 2007).

In January 2007 North Korea and the USA resumed direct contact, fuelling speculation that a thaw in their relations could pave the way for progress in the Six-Party Talks. Officials from the US Treasury Department met with North Korean foreign trade representatives to discuss a partial lifting of the US financial sanctions that would unfreeze North Korean assets held in the Banco Delta Asia in Macao.⁹² In addition, the US Assistant Secretary of State for East Asian and Pacific Affairs, Christopher R. Hill, and the North Korean Vice Minister of Foreign Affairs, Kim Gye Gwan, held talks during which North Korea reportedly showed a greater willingness to resume discussions about shutting down its nuclear programme in exchange for economic and energy assistance.⁹³ The talks were held against the background of warnings from UN and other aid agencies of growing food and energy shortages in North Korea.⁹⁴

The February 2007 Action Plan

On 13 February 2007 the fifth round of the Six-Party Talks ended with agreement on an Action Plan containing a series of steps for beginning the implementation of the September 2005 Joint Statement.⁹⁵ During a 60-day 'initial actions period', North Korea pledged to shut down and seal the 5-MW(e) graphite-moderated research reactor and reprocessing facility located at Yongbyon, 'for the purpose of eventual abandonment'.⁹⁶ IAEA inspectors would conduct the 'necessary monitoring and verifications' of the shutdown. North Korea also agreed to provide the other parties with a list of all its nuclear programmes, 'including plutonium extracted from used fuel rods', that were to be 'abandoned' pursuant to the Joint Statement.

In return, the other parties agreed to provide emergency energy assistance to North Korea equivalent to 50 000 tonnes of heavy fuel oil (HFO).⁹⁷ The Action Plan had stipulated that this assistance would begin to be delivered during the initial 60-day period, but US officials insisted that North Korea must shut down its nuclear facilities before receiving it.⁹⁸ The Action Plan also specified that North Korea and the USA would start bilateral talks aimed at

⁹² Associated Press, 'Glaser to meet with N.Korean officials', *Washington Post*, 28 Jan. 2007.

⁹³ Lee, J., 'N.K. shows flexibility at talks', *Korea Herald*, 9 Feb. 2007.

⁹⁴ 'Food aid key to N Korea talks', BBC News, 7 Feb. 2007, <<http://news.bbc.co.uk/2/6338941.stm>>; and Fifield, A., 'Ailing power grid puts Nkoreans in the dark', *Financial Times*, 13 Feb. 2007, p. 3.

⁹⁵ The first round of the Six-Party Talks was held on 27–29 Aug. 2003; the second round on 25–28 Feb. 2004; the third round on 23–26 June 2004; the fourth round on 26 July–7 Aug. and 13–19 Sep. 2005; and the fifth round on 9–11 Nov. 2005, 18–22 Dec. 2006 and 8–13 Feb. 2007. In 2007 a sixth round was held on 19–22 Mar., 18–20 July and 27–30 Sep. 2007. Chinese Ministry of Foreign Affairs, 'Initial actions for the implementation of the Joint Statement', 13 Feb. 2007, <<http://www.fmprc.gov.cn/eng/zxxx/t297463.htm>>.

⁹⁶ Chinese Ministry of Foreign Affairs (note 95). The first draft reportedly stipulated that North Korea abandon its nuclear weapons as part of the initial phase—a demand that North Korean negotiators rejected. 'Negotiators watered down North Korea nuclear stand', Global Security Newswire, 26 Feb. 2007, <http://www.nti.org/d_newswire/issues/2007_2_26.html>.

⁹⁷ Chinese Ministry of Foreign Affairs (note 95).

⁹⁸ Yardley, J. and Sanger, D., 'Nuclear talks on North Korea hit roadblock', *New York Times*, 12 Feb. 2007. South Korea agreed to provide the energy assistance.

resolving pending bilateral issues and moving towards full diplomatic relations.⁹⁹ It also established five working groups, which were to begin meeting within 30 days, to 'discuss and formulate specific plans' for implementing the 2005 Joint Statement. The six parties agreed to reconvene the following month to hear reports from the working groups and to discuss 'actions for the next phase'.¹⁰⁰

The Action Plan described the second, follow-on phase in general terms. North Korea would provide a 'complete and correct declaration' of all of its nuclear programmes and 'disable' all existing nuclear facilities.¹⁰¹ In return, the other parties would provide 'economic, energy and humanitarian assistance up to the equivalent' of 1 million tonnes of heavy fuel oil, including the initial shipment equivalent to 50 000 tonnes of HFO.¹⁰² The modalities of this assistance were to be determined 'through consultations and appropriate assessments' of the working group on economic and energy cooperation.

While the Action Plan was hailed as a breakthrough, a number of key issues were unresolved. It did not specify the methods by which North Korea's nuclear facilities at Yongbyon were to be disabled or how these measures would be verified.¹⁰³ The plan also did not specify whether North Korea would 'abandon' its existing stocks of separated plutonium and nuclear weapons as well as its nuclear facilities.

In addition, the Action Plan did not address the controversial issue of North Korea's suspected work on uranium enrichment.¹⁰⁴ It was US allegations in October 2002 that North Korea had a secret centrifuge uranium enrichment programme under way, in contravention of the Agreed Framework, which led directly to the breakdown of the deal. These were based in part on evidence that the nuclear smuggling network centred around the Pakistani nuclear scientist A. Q. Khan had given centrifuge designs and a small number of complete P-1 centrifuges to North Korea.¹⁰⁵ However, in early 2007 the US intelli-

⁹⁹ Chinese Ministry of Foreign Affairs (note 95). The USA undertook to begin the process of removing the designation of North Korea as a state sponsor of terrorism and ending trade sanctions imposed under the US 1917 Trading with the Enemy Act.

¹⁰⁰ Chinese Ministry of Foreign Affairs (note 95). The working groups addressed: (a) denuclearization of the Korean peninsula, (b) normalization of North Korean-US relations, (c) normalization of North Korean-Japanese relations, (d) economic and energy cooperation, and (e) a North East Asia peace and security mechanism.

¹⁰¹ According to 2 non-governmental experts, 'disablement' has come to mean 'a deliberate, mutually agreed action or set of actions taken to make it relatively more difficult and time-consuming to restart a facility after it is shut down', while terms are being worked out for its eventual dismantlement. Albright, D. and Brannan, P., 'Disabling DPRK nuclear facilities', Working paper, United States Institute of Peace, 23 Oct. 2007, <http://www.usip.org/pubs/working_papers/wp5_dprk.pdf>.

¹⁰² Chinese Ministry of Foreign Affairs (note 95). Japan refused to contribute to the assistance to North Korea until North Korea fully accounted for the Japanese citizens it had admitted abducting in the 1970s.

¹⁰³ Klingner, B., 'North Korea: worrisome gaps in Six-Party Talks' joint statement', Web Memo no. 1655, Heritage Foundation, 4 Oct. 2007, <<http://www.heritage.org/Research/AsiaandthePacific/wm1655.cfm>>.

¹⁰⁴ Pinkston, D. and Spector, L., 'Six-parties adopt steps for North Korean denuclearization but uranium enrichment controversy looms as major obstacle', *WMD Insights*, Apr. 2007.

¹⁰⁵ International Institute for Strategic Studies (note 2), pp. 72-76.

gence community publicly backed away from claims that North Korea was developing a significant uranium enrichment capability.¹⁰⁶

Implementation of the Action Plan

The implementation of the initial phase of the Action Plan, which was to be completed within 60 days of the announcement of the agreement, immediately fell behind schedule due primarily to procedural obstacles connected with the repatriation of North Korean funds frozen in the Banco Delta Asia. North Korea refused to begin shutting down its nuclear facilities until it had received all of the estimated \$25 million in the account.¹⁰⁷

Following a Russian-mediated deal to complete the money transfer, the implementation of the Action Plan got under way in the summer of 2007. During a visit to North Korea on 14–17 July 2007 IAEA inspectors verified that North Korea had shut down the 5-MW(e) research reactor, the radiochemical laboratory and the nuclear fuel fabrication plant at the Yongbyon complex.¹⁰⁸ They also confirmed that no new construction had been carried out at the 50-MW(e) reactor at Yongbyon and the 200-MW(e) reactor at Taechon, both of which remained unfinished. In addition to verifying the shutdown of the Yongbyon facilities, the inspectors installed seals and surveillance equipment to allow the IAEA to remotely monitor the status of the complex. The IAEA and North Korea had agreed on the modalities for new monitoring and containment measures during a visit to Pyongyang by an agency team on 26–29 June 2007.¹⁰⁹

Disablement of North Korean nuclear facilities

On 3 October 2007 the six parties issued a statement on ‘second-phase actions’ in which North Korea agreed to disable the nuclear facilities at Yongbyon and provide a ‘complete and correct declaration of all of its nuclear programs’ by 31 December 2007.¹¹⁰ The parties established an expert group to recommend specific disablement measures that would be ‘safe, verifiable, and consistent with international standards’. The USA was asked to lead the disablement activities and provide the initial funding for them.¹¹¹

¹⁰⁶ Kerr, P., ‘Doubts rise on North Korea’s uranium-enrichment program’, *Arms Control Today*, vol. 37, no. 3 (Apr. 2007); and Gumbel, A., ‘CIA blunder “prompted Korean nuclear race”’, *Independent on Sunday*, 2 Mar. 2007.

¹⁰⁷ ‘N. Korea nuclear deadline in doubt’, BBC News, 4 Apr. 2007, <<http://news.bbc.co.uk/2/6525145.stm>>.

¹⁰⁸ IAEA, Board of Governors and General Conference, ‘Application of safeguards in the Democratic People’s Republic of Korea (DPRK)’, Report by the Director General, GOV/2007/45–GC(51)/19, 17 Aug. 2007.

¹⁰⁹ IAEA, Board of Governors, ‘Monitoring and verification in the Democratic People’s Republic of Korea’, Report by the Director General, GOV/2007/36, 3 July 2007.

¹¹⁰ Chinese Ministry of Foreign Affairs, ‘Second-phase actions for the implementation of the Joint Statement’, 3 Oct. 2007, <<http://wcm.fmprc.gov.cn/ce/cgsf/eng/xw/t369084.htm>>.

¹¹¹ Chinese Ministry of Foreign Affairs (note 110).

A US Government team arrived in Pyongyang in mid-October 2007 to continue discussions on a disablement plan with North Korean technical experts. A key issue in the discussions had been how reversible the proposed disablement measures would be. North Korea favoured non-destructive measures, such as the physical deactivation of facilities, that could be reversed in a matter of weeks or a few months. In contrast, US Assistant Secretary of State Hill indicated that US experts favoured more destructive measures that would require at least 12 months to reverse.¹¹² Some non-governmental analysts cautioned that the disablement steps needed to be carefully chosen, since more destructive measure could damage North Korean components needed for future verification activities, in particular verifying the correctness and completeness of North Korea's declaration of its fissile material stocks.¹¹³

The two sides eventually agreed on a disablement plan that reportedly included 10 separate steps to disable the three facilities at Yongbyon and the process began in early November 2007. The first step towards disabling the 5-MW(e) reactor at Yongbyon, removing all 8000 irradiated fuel rods and transferring them to an adjacent storage pond for cooling, proved to be more time-consuming than expected because the storage pond was contaminated with radioactive debris and had a water chemistry that was unsuited for long-term storage.¹¹⁴ It was not immediately clear what the other steps would involve, since the two sides agreed not to disclose them until after they had been carried out.¹¹⁵

On 1 December 2007 US President Bush wrote a personal letter to North Korea's leader, Kim Jong Il. US commentators noted that the collegial tone of the letter differed dramatically from Bush's previous comments about Kim.¹¹⁶ Bush reportedly held out the prospect of normalized relations with the USA if North Korea fully disclosed its nuclear programmes and began to eliminate them.¹¹⁷ He emphasized that it was essential for North Korea to declare the number of warheads it had built as well as the amount of weapon-grade fissile material it had produced. Bush also called for North Korea to disclose any nuclear material, equipment or expertise that it may have transferred to other countries.

The latter issue had taken on new importance following revelations about an Israeli air strike inside Syria on 6 September 2007.¹¹⁸ Israeli and US officials revealed few details but stated that the air strike was conducted against a

¹¹² US State Department, 'On-the-record briefing: Assistant Secretary of State for East Asian and Pacific Affairs and Head of the U.S. Delegation to the Six-Party Talks Christopher R. Hill', Washington, DC, 3 Oct. 2007, <<http://www.state.gov/p/eap/rls/rm/2007/93234.htm>>.

¹¹³ Albright and Brannan (note 101), p. 19.

¹¹⁴ Crail, P., 'Disablement begins but process unclear', *Arms Control Today*, vol. 37 no. 10 (Dec. 2007); and Lewis, J., 'It's all about water chemistry', *Arms Control Wonk*, 14 Jan. 2008, <<http://www.armscontrolwonk.com/1767/its-all-about-water-chemistry>>.

¹¹⁵ Crail (note 114).

¹¹⁶ 'Bush's secret letter to Kim', *Washington Post*, 7 Dec. 2007.

¹¹⁷ Cooper, H., 'A new Bush tack on North Korea', *New York Times*, 6 Dec. 2007.

¹¹⁸ Israel admits air strike on Syria', BBC News, 2 Oct. 2007, <<http://news.bbc.co.uk/2/7024287.stm>>. See also Hersch, S., 'A strike in the dark', *New Yorker*, 11 Feb. 2008.

partly constructed undeclared nuclear reactor, located at a site near the Euphrates River and allegedly modelled on the 5-MW(e) graphite-moderated reactor that North Korea had used to produce plutonium for nuclear weapons.¹¹⁹ Syria confirmed Israel's air attack but denied that it had struck a nuclear plant or had killed North Korean personnel at the site.¹²⁰ North Korea denied reports that it had secret nuclear cooperation with Syria and strongly condemned the attack.¹²¹

North Korean failure to meet deadline

The year 2007 ended with North Korea missing the 31 December deadline to disable all of its nuclear facilities at Yongbyon. The delay in disabling the 5-MW(e) reactor had been expected because of the safety concerns about discharging the irradiated fuel rods.¹²² However, the US State Department reported that North Korea had also slowed the pace of disablement work.¹²³ A foreign ministry spokesman confirmed that North Korea had been forced to 'adjust the tempo of the disablement of some nuclear facilities', as an 'action-for-action' response to delays in the delivery of heavy fuel oil and energy-related equipment to North Korea. He added that the unloading of the spent fuel rods would be completed in 'about 100 days'.¹²⁴

North Korea also failed to submit to the other parties a comprehensive declaration of its nuclear programmes by the year-end deadline. According to the foreign ministry spokesman, North Korea had 'worked out a report on the nuclear declaration' in November 2007 and 'notified the US side of its contents', but the USA insisted on 'further consultations'.¹²⁵ The main sticking point was that North Korea continued to deny that it had a clandestine uranium enrichment programme.¹²⁶ This denial was apparently contradicted when US scientists discovered traces of enriched uranium on smelted aluminium tubing provided by North Korea.¹²⁷ North Korea acknowledged that it had imported

¹¹⁹ 'Report: IDF raid seized nuclear material before Syria air strike', *Haaretz*, 23 Sep. 2007; and Sanger, D. and Mazzetti, M., 'Israel struck Syrian nuclear project, analysts say', *New York Times*, 14 Oct. 2007.

¹²⁰ 'Syria says Israeli air raid aimed at justifying attack', Agence France-Presse, 29 Sep. 2007, <<http://afp.google.com/article/ALeqM5hd8yNVwB0Z6ZOjoi1YKbiWlremw>>.

¹²¹ Korean Central News Agency, 'Israel condemned for intrusion into Syria's territorial air', 11 Sep. 2007, <<http://www.kcna.co.jp/item/2007/200709/news09/12.htm>>; and Korean Central News Agency, 'Rumor about "secret nuclear cooperation" between DPRK and Syria dismissed', 18 Sep. 2007, <<http://www.kcna.co.jp/item/2007/200709/news09/19.htm>>.

¹²² Mohammed, A. and Plemming, S., 'North Korea resists Dec 31 declaration deadline', Reuters, 20 Dec. 2007, <<http://www.alertnet.org/thenews/newsdesk/N20203654.htm>>.

¹²³ Casey, T., Deputy Spokesman, US State Department, 'North Korea declaration', Press statement, Washington, DC, 30 Dec. 2007, <<http://www.state.gov/r/pa/prs/ps/2007/dec/98147.htm>>.

¹²⁴ Korean Central News Agency, 'DPRK Foreign Ministry spokesman on issue of implementation of October 3 agreement', 4 Jan 2008, <<http://www.kcna.co.jp/item/2008/200801/news01/05.htm>>. The spokesman also claimed that the USA had not honoured its promise to remove North Korea from the US list of state sponsors of terrorism.

¹²⁵ Korean Central News Agency (note 124).

¹²⁶ 'North Korea again denies uranium enrichment program', *Yonhap*, 27 Dec. 2007.

¹²⁷ Kessler, G., 'Uranium traces found on N. Korean tubes', *Washington Post*, 21 Dec. 2007.

tonnes of high-strength aluminium tubes from Russia in June 2002 but stated that the tubes had nothing to do with uranium enrichment.¹²⁸ In addition to the dispute over alleged uranium enrichment activities, North Korea reportedly intended to declare that it had 30 kg of separated plutonium, considerably less than the US estimate of more than 50 kg.¹²⁹

The governments of Japan, South Korea and the USA expressed disappointment that North Korea had missed the deadline. However, US State Department officials counselled patience and stressed a comprehensive and accurate declaration was more important than one delivered on time.¹³⁰

IV. The Indian–US Civil Nuclear Cooperation Initiative

In 2007 India and the USA took steps to implement the Civil Nuclear Cooperation Initiative that was launched in July 2005.¹³¹ The CNCI's goal is the resumption of 'full civil nuclear cooperation' between India and the USA. This represents a reversal of three decades of US non-proliferation policy, which had been aimed at preventing India from obtaining nuclear fuel and advanced reactors from the USA and other suppliers following India's nuclear test explosion in 1974.¹³² The US Administration argued that the growing strategic importance of India, and its rapidly improving relations with the USA, warranted making a one-time exception to nuclear non-proliferation rules and regulatory arrangements.¹³³ However, the proposed deal has been criticized in the USA for implicitly endorsing, if not actually assisting, the further growth of India's nuclear arsenal and undermining US non-proliferation objectives. It has been widely criticized in India for constraining the country's military nuclear programme and compromising its sovereignty.

In December 2006 the US Congress approved legislation, the Henry J. Hyde US–India Peaceful Atomic Energy Cooperation Act (after the bill's chief sponsor in the House of Representatives), amending the Atomic Energy Act of 1954 by creating an India-specific exemption from certain provisions of the act.¹³⁴ The amendment was a prerequisite for US negotiators to be able to con-

¹²⁸ Korean Central News Agency (note 124); and Kessler (note 127).

¹²⁹ Choe, S., 'North Korea may miss nuclear deadline', *International Herald Tribune*, 20 Dec. 2007.

¹³⁰ 'NKorea says it declared nuclear programmes', *Agence France-Presse*, 4 Jan. 2008; and Choe (note 129).

¹³¹ The White House, 'Joint statement between US President George W. Bush and Indian Prime Minister Manmohan Singh', News release, Washington, DC, 18 July 2005, <<http://www.whitehouse.gov/news/releases/2005/07/20050718-6.html>>. On the origins of the CNCI see Ahlström, C., 'Legal aspects of the Indian–US Civil Nuclear Cooperation Initiative', *SIPRI Yearbook 2006* (note 90), pp. 669–85.

¹³² The Indian nuclear explosive device was widely believed to have used US and other foreign-supplied nuclear technology provided for peaceful purposes. For a comprehensive history of India's nuclear programme see Perkovich, G., *India's Nuclear Bomb: The Impact on Global Proliferation* (University of California Press: Berkeley, Calif., 1999).

¹³³ See e.g. Burns, N., 'America's strategic opportunity with India', *Foreign Affairs*, vol. 86, no. 6 (Nov./Dec. 2007).

¹³⁴ The Henry J. Hyde United States–India Peaceful Atomic Energy Act of 2006, US public law 109-401, was signed into law on 18 Dec. 2006. Its text is available at <<http://thomas.loc.gov/cgi-bin/bdquery/z?d109:HR05682>>. See also Kile (note 4), pp. 498–501.

clude with India a so-called 123 agreement that would specify the terms governing the resumption of trade in nuclear material and technology envisioned in the CNCI.¹³⁵ The Hyde Act imposed a number of conditions aimed at ensuring that a 123 agreement with India complied with the Atomic Energy Act and related legislation.¹³⁶

The agreement negotiated by the Indian and US governments must be approved by the US Congress before it can enter into force. However, the Hyde Act stipulates that before the Congress would formally consider a 123 agreement, two additional steps had to be completed. First, the IAEA and India had to negotiate, and the IAEA Board of Governors had to approve, a safeguards agreement covering India's civil nuclear reactors.¹³⁷ Second, the Nuclear Suppliers Group (NSG) needs to reach a consensus agreement to exempt India from the rule, adopted by the NSG in 1992, that prohibits nuclear exports to states that have not concluded a comprehensive safeguards agreement (INFCIRC/153) with the IAEA covering all of their nuclear facilities.¹³⁸ In the NSG, the proposed deal has been supported by France, Russia and the UK, in addition to the USA.¹³⁹ At the same time, the idea of making an exemption for India has been sharply criticized by several NSG participants, notably Ireland and Sweden. The NSG, which operates on the basis of the consensus principle, reportedly decided not to take up the US request until India has completed the parallel negotiations on the 123 agreement with the USA and on a new safeguards agreement with the IAEA.¹⁴⁰

These requirements complicated the prospects for rapidly implementing the CNCI, even if all the substantive issues raised in India and the USA were to be resolved in a 123 agreement. Many supporters and opponents of the deal believed that its chances for success were linked to an expedited timetable. The increasing focus on presidential politics in the USA in 2008 was widely seen as making congressional action on a 123 agreement less likely later in the year and the deal might not survive the change in US administrations.¹⁴¹

¹³⁵ McGoldrick, F., Bengelsdorf, H. and Scheinman, L., 'The U.S.–India nuclear deal: taking stock', *Arms Control Today*, vol. 35, no. 8 (Oct. 2005). Section 123 of the 1954 Atomic Energy Act (42 USC 2153) requires the US Government to conclude an agreement containing a number of binding conditions and assurances, including full-scope safeguards, as a prerequisite for any significant peaceful nuclear cooperation with any state not legally recognized under the NPT as a nuclear weapon state.

¹³⁶ See Kile (note 4), pp. 498–501.

¹³⁷ In Mar. 2006 India and the USA agreed on a plan for separating India's nuclear programme into civilian and military components. India designated 14 of its 22 nuclear reactors as being civilian. Kile (note 4), pp. 496–97.

¹³⁸ For discussion of the NSG's structure and activities see Anthony, I., Ahlström, C. and Fedchenko, V., *Reforming Nuclear Export Controls: The Future of the Nuclear Suppliers Group*, SIPRI Research Report no. 22 (Oxford University Press: Oxford, 2007). For a list of the 45 participants in the NSG see annex B in this volume.

¹³⁹ 'China not to oppose nuclear deal: US', *Dawn*, 20 Dec. 2006.

¹⁴⁰ Hibbs, M., 'More delays loom over NSG trade sanctions and India', *Nuclear Fuel*, vol. 32, no. 1 (1 Jan. 2007), pp. 11–12.

¹⁴¹ Horner, D., 'Singh's pullback sparks speculation on prospects of US–India nuclear deal', *Nuclear Fuel*, vol. 32, no. 22 (22 Oct. 2007), pp. 1, 9–10.

The Indian–US 123 agreement

On 27 July 2007 India and the USA announced that they had concluded a draft 123 agreement, following more than a year of negotiations, to establish a framework for civil nuclear cooperation between them, including fuel assurances, technology transfers and safeguards arrangements.¹⁴² In response to concerns raised in both countries about these issues, the two governments sought to highlight how the agreement promoted their respective interests.¹⁴³ These efforts led some critics to warn that the parties appeared to have different interpretations of several key provisions of the 123 agreement that invited future disputes in Indian–US relations.¹⁴⁴ Other critics charged that the US Administration’s eagerness to move ahead with the deal had led it to capitulate to Indian demands on most points of contention and to conclude an agreement that disregarded conditions established by the Hyde Act which India had deemed to be ‘deal-killers’.¹⁴⁵

The key provisions of the proposed US–India 123 agreement reflected the outcome of negotiations on four main points of contention.¹⁴⁶

Cessation and termination in the event of an Indian nuclear test. At the insistence of the Indian Government, the text did not explicitly provide for the right of the USA to halt nuclear cooperation and require India to return US-supplied material, components and equipment if India were to conduct a nuclear explosive test.¹⁴⁷ The agreement does provide, in generic terms in Article 14(2), for the right of termination and for the so-called right of return. It stipulates that the party seeking termination has to give one year’s notice to the other party, but that before doing so both would ‘consider carefully’ whether the circumstances leading to termination resulted from a changed security environment or ‘as a response to similar actions by other States which could impact national security’—an apparent reference to a nuclear test by Pakistan. This suggested to some observers that in some circumstances, for

¹⁴² ‘India and US confirm nuclear pact’, BBC News, 27 July 2007, <<http://news.bbc.co.uk/2/6919552.stm>>.

¹⁴³ See US Department of State, Office of the Spokesman, ‘U.S.–India Civil Nuclear Cooperation Initiative: bilateral agreement on peaceful nuclear cooperation’, Fact sheet, Washington, DC, 27 July 2007, <<http://www.state.gov/r/pa/prs/ps/2007/89552.htm>>; and Indian Ministry of External Affairs, ‘Fact sheet on the India–US civil nuclear energy co-operation: conclusion of the “123” Agreement’, New Delhi, 27 July 2007, <<http://www.meaindia.nic.in/pressrelease/2007/07/27pr01.htm>>.

¹⁴⁴ Krepon, M. and Stolar, A., ‘The US–India 123 Agreement: from bad to worse’, Henry L. Stimson Center, 23 Aug. 2007, <<http://www.stimson.org/print.cfm?SN=SA200708221446>>.

¹⁴⁵ See ‘Courses of action for Congress and the Nuclear Suppliers Group: a conversation with the Hon. Edward J. Markey on nuclear cooperation between the United States and India’, Council on Foreign Relations, Washington, DC, 13 Sep. 2007, <http://www.cfr.org/publication/14213/courses_of_action_for_congress_and_the_nuclear_suppliers_group.html>.

¹⁴⁶ Agreement for cooperation between the Government of India and the Government of the United States of America concerning peaceful uses of nuclear energy, 3 Aug. 2007, <<http://www.state.gov/documents/organization/90157.pdf>>.

¹⁴⁷ Section 123a(4) of the 1954 Atomic Energy Act stipulates that any nuclear cooperation agreement between the USA and a foreign government must provide for a US right to require the return of nuclear material and equipment subject to the agreement, including any special fissionable material produced through their use, if the recipient country conducts a nuclear test.

example in response to a Pakistani test, India's resumption of nuclear testing would not necessarily be grounds for the USA to terminate nuclear cooperation with it or require the return of US-supplied equipment and material, as mandated by the Hyde Act.¹⁴⁸ In addition, the agreement sets out elsewhere in Article 14 a potentially onerous series of legal requirements, including agreements on compensation and safety issues, that had to be met before the right of return could be exercised.¹⁴⁹

Nuclear fuel supply guarantees for India. One of the Indian Government's paramount objectives in the negotiations on the 123 agreement was to guarantee the 'uninterrupted operation' of the country's civil nuclear reactors by obtaining lifetime fuel supply assurances for those reactors.¹⁵⁰ In Article 5(6)b of the proposed agreement, the USA undertakes to 'support an a Indian effort to develop a strategic reserve of nuclear fuel to guard against any disruption of supply over the lifetime of India's reactors'. It also pledges to help India find alternative sources of nuclear fuel in the event of a supply interruption by convening 'a group of friendly supplier countries such as Russia, France and the United Kingdom'. These guarantees were understood in India as having been offered unconditionally by the USA. In the USA, however, there was criticism that this provision appeared to contradict the Hyde Act, which specifies that the assurance of supply arrangements to which the USA had agreed covered only the disruption of fuel supplies 'due to market failures or similar reasons and not due to Indian actions, such as a nuclear explosive test'.¹⁵¹

Safeguards. In Article 5(6)c India pledges to place its civilian nuclear facilities under 'India-specific safeguards in perpetuity' and to negotiate an 'appropriate safeguards agreement to this end with the IAEA'.¹⁵² The safeguards agreement would presumably cover the 14 nuclear reactors designated by India as being 'civilian'.¹⁵³ At the same time, India reserves the right to take 'corrective measures' to ensure the 'uninterrupted operation of its civilian nuclear reactors'. While the agreement did not define what was meant by 'India-specific or 'corrective measures', many observers suggested that India

¹⁴⁸ Kimball, D. and McGoldrick, F., 'U.S.–Indian nuclear agreement: a bad deal gets worse', *Arms Control Today*, vol. 37, no. 6 (Aug. 2007). Section 104(a) of the Hyde Act stipulates that, in the event of an Indian nuclear test, US nuclear cooperation be terminated and India would be required to return all US-origin equipment and materials that it may have received under the deal as well as any material produced by India with these items.

¹⁴⁹ Varadarajan, S., 'Insulating India's reactors from fuel disruption reality check', *The Hindu*, 8 Aug. 2007.

¹⁵⁰ Varadarajan, S., 'Lifetime fuel guarantee remains a sticking point in "123" talks with U.S.', *The Hindu*, 13 Dec. 2006. Some Indian officials cited as a precedent the Kudankulam reactor deal with Russia, in which India had received sovereign and unqualified Russian guarantees for the lifetime supply of fuel for the reactors being imported from Russia.

¹⁵¹ Kimball and McGoldrick (note 148).

¹⁵² On 21 Nov. 2007 the IAEA Director General, ElBaradei, and the Chairman of the Indian Atomic Energy Commission (AEC), Anil Kakodkar, met to initiate consultations on an India-specific safeguards agreement. IAEA, 'IAEA–India to launch consultations for India-specific safeguards agreement', Press release 2007/21, 21 Nov. 2007, <<http://www.iaea.org/NewsCenter/PressReleases/2007/pm200721.html>>.

¹⁵³ This number includes 6 foreign-supplied power reactors which India had already agreed would be subject to IAEA facility-specific (INFCIRC/66) safeguards.

was seeking a safeguards arrangement that would allow for the suspension of 'permanent' safeguards in the event that foreign fuel supplies were interrupted.¹⁵⁴

Reprocessing by India of US-origin spent fuel. The proposed agreement grants India long-term consent to reprocess US-origin spent nuclear fuel. This marks a significant departure from the long-standing US policy to deny other countries advance reprocessing rights: in the past the USA had only given programmatic consent to the European Atomic Energy Community (Euratom) and Japan as part of their 123 agreements.¹⁵⁵ As part of the agreement India will have to construct a new reprocessing facility under IAEA safeguards to handle US-origin spent fuel. In addition, the two governments must agree on 'arrangements and procedures' under which any Indian reprocessing of US-origin spent fuel could occur.

The agreement also provides the option for the two countries to conclude future arrangements to trade reprocessing and enrichment technologies. The Hyde Act limits such transfers to scenarios involving a multinational facility in an IAEA-approved project or a facility involved in a multinational project to develop a proliferation-resistant fuel cycle.

Political opposition in India

The announcement of the 123 agreement led to renewed opposition to the nuclear deal at both ends of the Indian political spectrum. The leader of the Hindu nationalist Bharatiya Janata Party (BJP), India's main opposition party, called for a renegotiation of the agreement, arguing that it would constrain India's nuclear testing option and would lead to 'strategic subservience to the USA'.¹⁵⁶ More crucially, four communist parties (known as the Left parties), which were not a part of the governing coalition but which supported it in the parliament, threatened to withdraw their support for the United Progressive Alliance (UPA)-led government if the latter proceeded with the nuclear deal—a move that would raise the possibility of early elections. The Left parties said they were 'unable to accept' the 123 agreement in the context of the 'burgeoning strategic alliance' with the USA, and asked the government not to implement it, pending a parliamentary review.¹⁵⁷ The largest of these parties, the Communist Party of India (Marxist), adopted a resolution on 23 August warning that that the agreement would 'bind India into a strategic alliance with the United States with long-term consequences' for the country's independent foreign policy and called for the government to reconsider the deal.¹⁵⁸

In October the Left parties' opposition appeared to have effectively killed the nuclear deal, after the Indian Prime Minister, Manmohan Singh,

¹⁵⁴ Kimball and McGoldrick (note 148); and Varadarajan (note 150).

¹⁵⁵ The consent for reprocessing in Europe and Japan preceded the US policy of restriction on reprocessing in nuclear agreements that were put into law by the 1978 Nuclear Non-proliferation Act.

¹⁵⁶ George, V., 'Renegotiate 123: Advani gives in to pressure from party', *Indian Express*, 31 Aug. 2007.

¹⁵⁷ 'Left "unable to accept" 123 agreement', *The Hindu*, 8 Aug. 2007.

¹⁵⁸ 'CPI(M) Central Committee resolution on nuclear deal', *The Hindu*, 23 Aug. 2007.

announced that he would not risk a no-confidence vote by initiating talks with the IAEA on a safeguards agreement.¹⁵⁹ However, on 17 November the four Left parties provisionally agreed to let the government begin talks with the IAEA Secretariat. They stipulated that any draft safeguards agreement would not be signed by either the IAEA or India before being presented to the UPA–Left Committee on India–US Civil Nuclear Cooperation.¹⁶⁰ This committee, which had been established in September by the leaders of the Left parties and the UPA to find a way out of the political impasse over the nuclear deal, would consider the ‘impact of the provisions of the Hyde Act and the 123 agreement on the IAEA Safeguards Agreement’ and take this into account before ‘finalizing its findings’. Some Indian observers believed that the most likely outcome was that the safeguards agreement would be allowed to die in the committee in order to sustain the minority UPA-led government.¹⁶¹

V. The fissile material cut-off treaty

In 2007 the 65-member Conference on Disarmament failed for the eleventh consecutive year to open negotiations on a ‘non-discriminatory, multilateral and effectively verifiable treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices’, as called for by the mandate adopted by the CD in 1995 (the so-called Shannon mandate).¹⁶² The CD’s first session in 2007 was marked by renewed efforts to break the impasse over the work programme, following on the progress made in 2006.¹⁶³ On 23 March the P6 (the ambassadors of South Africa, Sri Lanka, Spain, Sweden, Switzerland and Syria, who served as the six presidents of the CD sessions in 2007) put forward a draft decision document proposing that the CD agree to appoint, ‘without prejudice to future work and negotiations on its agenda items’, four ‘coordinators’ who would ‘preside over’ negotiations on a fissile material production ban as well as three other issues on the CD’s agenda.¹⁶⁴ The P6 proposal called for the commencement of negotiations on an FMCT without addressing the contentious question of whether the ban should apply only to the future production of fissile material for weapon purposes or should also prevent existing stocks of such material from being used to manufacture new weapons. It also avoided addressing the question of whether the proposed treaty should contain a formal verification regime, which was opposed by the

¹⁵⁹ Page, J., ‘Phone call derails controversial deal to attract India into nuclear fold’, *The Times*, 16 Oct. 2007.

¹⁶⁰ Kumar, V., ‘Government can go to IAEA’, *The Hindu*, 17 Nov. 2007.

¹⁶¹ Kumar (note 160).

¹⁶² Conference on Disarmament, Report of Ambassador Gerald E. Shannon of Canada on consultations on the most appropriate arrangement to negotiate a treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices, CD/1299, 24 Mar. 1995, <<http://www.reachingcriticalwill.org/political/cd/shannon.html>>. For a brief description and list of members of the CD see annex B in this volume.

¹⁶³ See Kile (note 4), pp. 509–10.

¹⁶⁴ Conference on Disarmament, Presidential Draft Decision, CD/2007/L.1, 23 Mar. 2007; and ‘CD edges closer to a work programme’, *Disarmament Diplomacy*, no. 84 (spring 2007).

USA.¹⁶⁵ Instead, by calling for negotiations ‘without any preconditions’, the P6 proposal suggested that the disputes over verification and the scope of the treaty should be settled in the course of the negotiations.¹⁶⁶

The P6 proposal appeared to enjoy widespread support in the CD but failed to produce a breakthrough. India and other Group of 21 (G21) non-aligned states expressed a number of substantive and procedural concerns about it but stated that they would not block its adoption by consensus.¹⁶⁷ However, China, Iran and Pakistan raised objections to the proposal which the P6 were unable to accommodate in a complementary statement.¹⁶⁸ The main objection of all three countries was that any negotiations on a treaty banning the production of fissile material for military purposes had to be conducted explicitly under the 1995 Shannon mandate. They emphasized that this mandate had clearly provided for a formal verification mechanism. Pakistan and Iran also insisted that the negotiating mandate for the scope of the treaty ban should go beyond mandating stopping fissile material production and should cover existing stocks.¹⁶⁹ China’s unwillingness to embrace the P6 proposal was consistent with its general lack of enthusiasm for concluding a ban, at least in the near term, on producing fissile material for weapon purposes.¹⁷⁰

VI. International cooperation to improve nuclear security¹⁷¹

In 2007 investment in international non-proliferation and disarmament assistance (INDA) programmes, primarily in Russia, remained at roughly the same level as in previous years.¹⁷² The most important INDA initiative, the Group of

¹⁶⁵ The Bush Administration had concluded in 2004 that an FMCT was not ‘effectively verifiable’, as called for in the 1995 mandate and therefore should not include a formal verification mechanism. US Department of State, ‘US proposal to the Conference on Disarmament’, Remarks by Jackie W. Sanders, Permanent Representative to the Conference on Disarmament and Special Representative of the President for the Nonproliferation of Nuclear Weapons, Geneva, 29 July 2004, <<http://www.state.gov/t/ac/rls/rm/2004/34929.htm>>.

¹⁶⁶ Meyer, P., ‘Is there any fizz left in the fissban? Prospects for a fissile material cut-off treaty’, *Arms Control Today*, vol. 37, no. 10 (Dec. 2007).

¹⁶⁷ Conference on Disarmament, ‘Presidential report to the Conference on Disarmament on part III of the 2007 session’, CD/1828*, 30 Aug. 2007, p. 2; and Varadarajan, S., ‘Fissile material ban talks inch towards consensus’, *The Hindu*, 2 July 2007.

¹⁶⁸ Conference on Disarmament, ‘Complementary presidential statement reflecting an understanding of the Conference on the implementation of CD/2007/L.1**’, CD/2007/CRP5*, 29 June 2007.

¹⁶⁹ Statement by Ambassador Seyed Mohammad Kazem Sajjadpour, Iran’s Permanent Representative at the Conference on Disarmament, Geneva, 21 June 2007, <<http://www.reachingcriticalwill.org/political/cd/speeches07/2session/June21Iran.html>>; and Statement by Ambassador Masood Khan, Pakistan’s Permanent Representative at the Conference on Disarmament, Geneva, 13 Sep. 2007, <<http://www.reachingcriticalwill.org/political/cd/speeches07/3session/Sept13Pakistan.pdf>>.

¹⁷⁰ See e.g. Meyer (note 166).

¹⁷¹ Vitaly Fedchenko, SIPRI Researcher, wrote this section of the chapter with contributions from Ekaterina Khudina, SIPRI Intern. See also Feiveson, H. et al., ‘Fissile materials: global stocks, production and elimination’, *SIPRI Yearbook 2007* (note 4), pp. 558–76; Fedchenko, V., ‘Multilateral control of the nuclear fuel cycle’, *SIPRI Yearbook 2006* (note 90), pp. 686–705; and chapter 9 in this volume, section V.

¹⁷² The major INDA donor, the USA, budgeted \$1.91 billion for financial year (FY) 2008, slightly more than the \$1.86 billion it budgeted in FY 2007. Project on Managing the Atom, Interactive Threat Reduction Budget database, <http://www.nti.org/e_research/cnwm/charts/cnm_funding_interactive.asp>.

Eight (G8) Global Partnership against the Spread of Weapons and Materials of Mass Destruction, reached the halfway point of its agreed 10-year duration.¹⁷³ At the 2007 annual G8 summit meeting, held at Heligendamm, Germany, the member states reaffirmed their commitment under the Global Partnership to raise up to \$20 billion by 2012 to support priority projects.¹⁷⁴ They reported having made significant progress over the previous five years in the destruction of chemical weapons, dismantlement of nuclear submarines, employment of former weapon scientists and the physical protection of nuclear materials.¹⁷⁵ The least successful Global Partnership priority area was identified as the permanent disposition of fissile materials, in particular plutonium.

Russian–US cooperation on the disposition of nuclear materials

After the end of the cold war the disposition of weapon-grade plutonium and HEU became a high priority for both Russia and the USA, with both countries holding stocks of these materials in excess of their defence requirements. The disposition of 500 tonnes of HEU from Russian nuclear weapons was effectively addressed by the 1993 Russian–US HEU purchase agreement.¹⁷⁶ As of 30 September 2007, 315 tonnes of HEU (equal to approximately 12 615 nuclear warheads) had been blended down into 9200 tonnes of low-enriched uranium for use as nuclear reactor fuel.¹⁷⁷

The disposition of excess weapon-grade plutonium has been more problematic. In 2000 Russia and the USA signed a Plutonium Management and Disposition Agreement (PMDA), in which the two countries agreed to each eliminate 34 tonnes of surplus weapon-grade plutonium.¹⁷⁸ Under the PMDA, the parties could use two methods for disposing of the plutonium: converting it to

¹⁷³ The G8 Global Partnership was established at the 2002 G8 Summit in Kananaskis, Canada, to support cooperative projects, initially in Russia, aimed at addressing non-proliferation, disarmament, counterterrorism and nuclear safety issues. G8 Kananaskis Summit 2002, 'The G8 Global Partnership against the Spread of Weapons and Materials of Mass Destruction', 27 June 2002, <<http://www.g8.gc.ca/2002Kananaskis/globpart-en.asp>>. See also Anthony, I. and Fedchenko, V., 'International non-proliferation and disarmament assistance', *SIPRI Yearbook 2005: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 2005), pp. 675–98.

¹⁷⁴ The Global Partnership programme identified 4 main priorities: the destruction of chemical weapons, the dismantlement of decommissioned nuclear submarines, the permanent disposition of fissile materials, and the employment of former weapon scientists in non-military activities.

¹⁷⁵ G8 Heiligendamm Summit 2007, 'Report on the G8 Global Partnership' and annex A, 'Consolidated report data', 8 June 2007, <<http://www.g-8.de/Webs/G8/EN/G8Summit/SummitDocuments/summit-documents.html>>.

¹⁷⁶ The Agreement between the Government of the United States of America and the Government of the Russian Federation concerning the Disposition of Highly Enriched Uranium from Nuclear Weapons was signed on 18 Feb. 1993. The text of the agreement is available at <<http://www.nti.org/db/nisprofs/russia/fulltext/heudeal/heufull.htm>>. See also Timbie, J., 'Energy from bombs: problems and solutions in the implementation of a high-priority nonproliferation project', *Science and Global Security*, vol. 12, no. 3 (2004), pp. 165–92.

¹⁷⁷ United States Enrichment Corporation, 'US–Russian Megatons to Megawatts Program status report', 30 Sep. 2007, <http://www.usec.com/v2001_02/HTML/megatons_howitworks.asp>.

¹⁷⁸ The Agreement between the Government of the United States of America and the Government of the Russian Federation concerning the Management and Disposition of Plutonium Designated as No Longer Required for Defense Purposes and Related Cooperation was signed on 1 Sep. 2000. The text of the agreement is available at <<http://www.state.gov/documents/organization/18557.pdf>>.

mixed oxide (MOX) fuel for use in nuclear power reactors; or immobilizing it and putting it in long-term storage in a manner that precluded its use in nuclear weapons. Russia chose the MOX fuel option.¹⁷⁹ The USA initially intended to pursue both options but, after reviewing US non-proliferation policies in 2001, the Bush Administration deemed this to be too costly and outlined a plan to convert almost all of the USA's surplus plutonium to MOX fuel.¹⁸⁰ The US Department of Energy started construction of the MOX Fuel Fabrication Facility at the Savannah River Site near Aiken, South Carolina, on 1 August 2007.¹⁸¹

Initially, the PMDA envisaged disposing of the plutonium within 20 years (at a rate of at least 2 tonnes per year), beginning no later than 31 December 2007. However, the disposal programme did not start in 2007 because of disputes over two issues. The first had to do with the liability protection of individuals employed by the USA for project implementation and claims for damages caused by their actions.¹⁸² This was resolved when a new liability agreement was signed as a protocol to the PMDA on 15 September 2006.¹⁸³

The second dispute related to Russia's plans to irradiate the MOX fuel in so-called fast reactors, rather than the light-water reactors (LWRs) envisaged in the PMDA. Russia's view has been that its plutonium stockpiles should be used to produce energy as part of its long-term strategy to create a closed nuclear fuel cycle based on fast-neutron breeder reactors.¹⁸⁴ Russia thus has been reluctant to use LWRs for plutonium disposition, suggesting instead that MOX fuel be irradiated in its current BOR-60 and BN-600 fast reactors and the planned BN-800 fast reactor. The USA, a major donor to plutonium disposal efforts in Russia, has opposed this option on the grounds that it is more expensive (the projected cost of the BN-800 reactor is \$1.3 billion) and less proliferation-resistant.

In March 2007 the head of the Russian Federal Atomic Energy Agency (Rosatom), Sergei Kirienko, proposed a new approach to plutonium disposal that would abandon the irradiation of MOX fuel in LWRs in favour of the use of three fast reactors. In addition, Russia would not request US funding for

¹⁷⁹ Russia has an estimated stockpile of c. 145 tonnes of separated weapon-grade plutonium. See appendix 8B.

¹⁸⁰ Wolf, A., US Congress, Congressional Research Service (CRS), *Nonproliferation and Threat Reduction Assistance: U.S. Programs in the Former Soviet Union*, CRS Report for Congress RL31957 (CRS: Washington, DC, 28 Nov. 2007), pp. 43–44.

¹⁸¹ US Department of Energy, National Nuclear Security Administration, 'NNSA starts construction on MOX fuel fabrication facility in South Carolina', Press release, Washington, DC, 1 Aug. 2007, <<http://nnsa.energy.gov/news/1016.htm>>.

¹⁸² On the liability issue see Kile (note 90), p. 635.

¹⁸³ US Department of Energy, 'U.S. and Russia sign liability protocol', Press release, Washington, DC, 15 Sep. 2006, <<http://www.energy.gov/print/4160.htm>>.

¹⁸⁴ A closed nuclear fuel cycle is one in which spent nuclear fuel is reprocessed after irradiation in a reactor in order to recover uranium or plutonium for refabrication back into nuclear fuel. The fuel cycle can be 'closed' in various ways, e.g. by using plutonium in a fast breeder reactor, as Russia plans to do. Fast reactors are generally designed to use plutonium fuels and may be set up to operate in 'breeder' or 'burner' modes. In breeder mode, a fast reactor produces, through the transmutation of uranium-238, more plutonium than it consumes. In burner mode, the reactor consumes plutonium by converting it into short-lived isotopes.

construction of the BN-800 reactor.¹⁸⁵ On 19 November 2007 Kirienko and the US Secretary of Energy, Samuel W. Bodman, signed a joint statement outlining and endorsing the proposed plan: Rosatom will dispose of plutonium by irradiating the MOX fuel in the BN-600 and BN-800 reactors as soon as all technical modifications and the construction of necessary facilities are finished.¹⁸⁶ The reactors will be able to dispose of at least 1.5 tonnes of plutonium annually. Plutonium disposal in the BN-600 will begin ‘in the 2012 timeframe’, with disposal in the BN-800 starting ‘soon thereafter’. US officials emphasized that, in the PMDA framework, the two reactors would operate as burners rather than breeders and would not create new stocks of separated plutonium.¹⁸⁷

VII. Conclusions

In 2007 the nuclear programmes of Iran and North Korea remained at the forefront of international concerns about the proliferation of nuclear weapons. In the case of Iran, the urgency of these concerns was diminished somewhat by the US intelligence community’s conclusion that Iran had halted its clandestine nuclear weapon programme in 2003 and had not resumed weaponization research and development activities as of mid-2007. This conclusion effectively undercut political support for the US Administration to take military action against Iran’s nuclear facilities. At the same time, it underscored that there is a pressing need to rewrite non-proliferation rules to address what many believe is an inherent structural weakness in the NPT: namely, that non-nuclear weapon states can covertly develop a nuclear weapon capability by putting in place, under the cover of a civil nuclear energy programme, the fuel cycle facilities needed to produce weapon-usable nuclear material.

In this context, the Iranian and North Korean cases have led to calls for the adoption of a permanent ban on the construction of new nationally controlled facilities for producing fissile material. The ban would be accompanied by the establishment of nuclear fuel banks, of the type currently envisioned by the IAEA, and other fuel supply assurances. In the view of many non-proliferation specialists, the long-term goal should be to establish multinational or international arrangements for controlling the nuclear fuel cycle activities of greatest proliferation concern—uranium enrichment and plutonium reprocessing—as well as spent fuel management and waste disposal. Although the latter is by no means a new idea, it is one for which the time is increasingly ripe in terms of strengthening and extending the nuclear non-proliferation regime.

¹⁸⁵ MacLachlan, A., ‘Russia, US could take decisive step in plutonium disposition program’, *Nuclear Fuel*, 21 May 2007, pp. 1, 5–6. In 2006 the Russian Government resumed financing construction of the BN-800 reactor from the federal budget. ‘Correction: nuclear power future lies in fast neutron reactors—Kiriyenko’, RIA Novosti, 14 Dec. 2005, <<http://en.rian.ru/russia/20051214/42490704.html>>.

¹⁸⁶ US Department of Energy, ‘US and Russia sign plan for Russian plutonium disposition’, Press release, 19 Nov. 2007, <<http://www.energy.gov/nationalsecurity/5742.htm>>. The US Department of Energy will contribute \$400 million for this work.

¹⁸⁷ Horner, D., ‘US officials provide details on plutonium disposition pact with Russia’, *Nuclear Fuel*, 17 Dec. 2007, pp. 1, 17–18.