

## **OUTSIDE THE NUCLEAR NONPROLIFERATION TREATY: THE NUCLEAR WEAPONS PROGRAMS OF ISRAEL, INDIA, AND PAKISTAN**

The Nuclear Nonproliferation Treaty (NPT) of 1970 constitutes the centerpiece of the nuclear nonproliferation regime. The treaty enjoys widespread support, with 187 state parties. Yet four states remain outside its purview. Three of these states, Israel, India, and Pakistan, all known or widely believed to possess both nuclear weapons and ballistic missile technology, will be discussed in this paper. The fourth, North Korea, which has the material necessary to manufacture a nuclear weapon and has proclaimed that it has a “nuclear deterrent,” is discussed in a separate paper in this publication.<sup>1</sup>

### **ISRAEL**

Israel’s nuclear program, shrouded in secrecy and ambiguity, is difficult to assess. Nevertheless, Israel is believed to possess anywhere from 100 to 200 nuclear weapons, potentially including hydrogen bombs.<sup>2</sup> The Dimona Reactor, at the Negev Nuclear Research center in southern Israel, produces the plutonium that is believed to be the main fissile material in Israel’s nuclear weapons.

The Israeli weapons program started in the late 1950’s in order to deter aggression from Israel’s neighbors in the Middle East. In the beginning, France assisted Israel in reactor design and construction for the reactor facility at Negev.<sup>3</sup> Operating under extreme secrecy, the facility’s true purpose was disguised until 1960 when Prime Minister David Ben-Gurion announced that Negev was a nuclear research center for “peaceful purposes” – the Dimona reactor went online four years later.<sup>4</sup> Israel allowed the United States to inspect the Dimona reactor each year from 1965 through 1969. However, it is not clear what was discovered.<sup>5</sup> A 1968 Central Intelligence Agency report concluded that Israel had already produced an atomic bomb.<sup>6</sup> Israel’s clandestine nuclear activities were further substantiated in 1986 when Mordechai Vanunu, a nuclear technician at Negev, leaked detailed information regarding Israeli nuclear weapons to the *London Times*.<sup>7</sup> Vanunu was captured by the Israeli secret police in Rome shortly after the *Times* story and sentenced to 18 years in prison for treason and espionage.<sup>8</sup>

Since weapons production began in the 1960’s, Israel has never conducted a confirmed nuclear test. On September 22, 1979, however, a U.S. satellite detected the unique signature of a 2-to-4 kiloton nuclear explosion in the atmosphere off the southern coast of Africa.<sup>9</sup> The intense cooperation between the South African and Israeli nuclear programs at that time led many experts to speculate that this was a joint test.<sup>10</sup>

Israeli missile program began in the early 1960’s and has produced both ballistic and cruise missiles capable of carrying nuclear warheads. Israel’s first missile, the Jericho I, was acquired in the 1960’s from France and has a range of 500 to 750 kilometers.<sup>11</sup> Further development led to the Jericho II with an increased payload capacity and greater range—1,500 to 3,500 km.<sup>12</sup> At least 50 Jericho I’s and II’s each are deployed on mobile launchers.<sup>13</sup> Israel may also have the capability to deploy the *Shavit*, a rocket in the Israel space program that uses

technology from the Jericho II, as a ballistic missile.<sup>14</sup> Experts believe that, if deployed as a missile, the *Shavit* could deliver a payload up to 4,800 kilometers away, a launch radius that includes the entire Middle East, all of Europe, and a large portion of the former Soviet Union.<sup>15</sup>

In addition to ballistic missiles, Israel maintains an arsenal of nuclear-capable cruise missiles. Its Popeye and Popeye II missiles are launched from aircraft and have a reported range of 200 to 350 kilometers.<sup>16</sup> Israel has denied developing a submarine-launched cruise missile (SLCM) with a range of 1,500 kilometers based on the Popeye II design.<sup>17</sup> The Israeli aircraft capable of launching nuclear weapons are the U.S.-manufactured F-16 Falcon and the F-15E Strike Eagle (known in Israel as the *Ra'am*).<sup>18</sup>

## INDIA

India's stock of weapon-grade plutonium ranges from 240-395 kilograms, enough for 40 to 90 simple fission bombs. According to the Indian officials, India is capable of producing weapons ranging in explosive force from "low yields to 200 kilotons, involving fission, boosted-fission, and two-stage thermonuclear designs."<sup>19</sup> At the Bhaba Atomic Research Center (BARC) outside of Bombay, two heavy-water reactors, CIRUS (Canadian-Indian Reactor, U. S.) and Dhruva, provide plutonium for the Indian nuclear weapons complex.<sup>20</sup>

The Indian nuclear program began with the opening of BARC on January 20, 1957. The CIRUS reactor there, based on a Canadian design, with the United States providing the heavy water, went online on July 10, 1960. The United States also trained Indian scientists in reprocessing plutonium.<sup>21</sup>

The death in 1964 of Prime Minister Jawaharlal Nehru, a staunch opponent of the weaponization of the Indian nuclear program, and China's first nuclear detonation that same year, spurred India toward the development of nuclear weapons. India rejected the NPT in 1967, arguing in favor of nuclear disarmament and complaining that the NPT legitimizes the nuclear stockpiles of China and the other nuclear weapons states rather than setting out milestones for complete nuclear disarmament.<sup>22</sup> In 1971, the United States sent the Seventh Fleet and the nuclear-armed U.S.S. Enterprise into the Bay of Bengal to 'assist' Pakistan during the third Indo-Pakistan War. Some attribute this "gunboat diplomacy" as the clinching factor in the Indian decision to test a nuclear device.<sup>23</sup>

The first Indian nuclear test, at the Pokharan Test Site in northwestern India on May 22, 1974, involved a device of 8-12 kilotons.<sup>24</sup> The United States and Canada immediately halted all nuclear cooperation with India but, in fear of pushing the nascent nuclear power towards closer relations with the Soviet Union, took no forceful actions to punish India.<sup>25</sup>

In order to ensure its nuclear self-sufficiency, India built the Dhruva reactor that started operation on August 8, 1985. India also maintains uranium-enrichment facilities for a nuclear submarine program, started in the late 1970's, that can produce up to 30 kilograms of weapon-grade uranium per year.<sup>26</sup>

India conducted five more nuclear tests during May 11-13, 1998. At the ensuing press conference, Prime Minister Atal Behari Vajpayee announced India's status as a nuclear weapons state.<sup>27</sup> The five tests involved a 12-kiloton device, a 43-kiloton thermonuclear device, and three smaller devices of varying yields.<sup>28</sup>

In 1983, India established its Integrated Guided Missile Development Program. The program involved two systems, the *Privthi* and the *Agni*, capable of carrying a nuclear payload. The *Privthi* missiles have a range of approximately 150-300 kilometers and were first tested in February 1988.<sup>29</sup> A sea-based version of the *Privthi* was ready for deployment in September 2002.<sup>30</sup> The *Agni* series has a range of 1,500 to 2,500 kilometers; and the *Agni* III, with a range of 3,000 to 4,000 kilometers, was slated for testing in March of 2004.<sup>31</sup>

Russia and India are rumored to be considering a deal by which India would receive a Russian aircraft carrier, 40 MiG-29K Fulcrum aircraft, and at least one Akula-11 class nuclear submarine.<sup>32</sup> Both the submarine and MiG-29 can carry nuclear armaments and would allow the Indian navy to become a major force in the South Pacific and Indian Oceans. The Indian air force has two aircraft currently capable of delivering nuclear weapons: the Russian manufactured MiG-27 Flogger (*Bahadur*) and the Anglo-French manufactured Jaguar IS/IB (*Shamsher*).<sup>33</sup>

## PAKISTAN

Pakistan's current stockpile of weapons-grade highly enriched uranium (HEU) is estimated at 580 to 800 kilograms, enough for 30–50 weapons.<sup>34</sup> Since 1998, when Pakistan commissioned a research reactor at Khushab, it has also had the capability to produce 10-15 kilograms of weapon-grade plutonium, about enough for two or three nuclear devices per year.<sup>35</sup> The A.Q. Khan Laboratories in Kahuta house enrichment facilities that produce HEU for Pakistan's nuclear arsenal.<sup>36</sup> The Khushab reactor, opened in 1998 with Chinese assistance, produces plutonium for lighter and more advanced weapons designs.<sup>37</sup>

After losing East Pakistan (now Bangladesh) in the 1971 war with India, then-Minister for Fuel, Power, and Natural Resources Zulfikar Ali Bhutto initiated the Pakistani nuclear weapons program. Bhutto's ascendance to power as Prime Minister from 1973-77, coupled with the successful 1974 Indian nuclear test, gave Pakistan's nuclear program additional prominence. The seminal moment, however, came in 1975 when Dr. Abdul Qadeer Khan returned to Pakistan after working in a URENCO enrichment plant in the Netherlands. Dr. A. Q. Khan brought with him expertise with uranium centrifuges and access to the vast network of technology suppliers throughout Europe.<sup>38</sup> Despite a stern warning in 1976 by Henry Kissinger that the United States would "make a horrible example" of Pakistan if it continued to pursue nuclear weapons and the French withdrawal of technical support, Pakistan reached the capability to manufacture a nuclear explosive by 1987.<sup>39</sup>

China, India's traditional rival, had provided Pakistan with military aid—including assistance to the Pakistani nuclear weapons program—in order to weaken its Southern neighbor. Chinese assistance began in the early 1980's with technical assistance, fissile material, and weapons designs and continued at least through the 1990's.<sup>40</sup> At current capacity, Pakistan can

produce 55 to 95 kilograms of HEU and 10 to 15 kilograms of plutonium annually, or roughly four to seven uranium bombs and one or two plutonium bombs annually.<sup>41</sup>

Presumably in response to the Indian nuclear tests two weeks earlier, Pakistan tested six nuclear devices, five on May 28, 1998, and one on May 30, at Balochistan, southwest Pakistan. The devices involved were three sub-kiloton detonations and three larger ones ranging from 12 to 40 kilotons.<sup>42</sup> At a press conference on May 28, Prime Minister Nawaz Sharif announced to the world that Pakistan had taken “a historic step for our security” and had to “stop India from nuclear domination.”<sup>43</sup>

The roots of Pakistan’s missile program lie in the Space and Upper Atmosphere Research Commission, which was initiated in 1961. Through its space program, Pakistan developed the ability to produce rocket fuel and instrumentation domestically.<sup>44</sup> In the early 1980’s, Pakistan began development of the *Hatf* I, II, and III systems. The *Hatf* I and II are currently operational, with a range of 80 – 100 kilometers and 300 kilometers, respectively. The *Hatf* III, which has a range of 600 to 800 kilometers, was successfully test fired in 2002.<sup>45</sup> As Indian missile technology advanced, Pakistan focused on matching its rival with comparable systems, and, with Chinese and North Korean assistance, improved its short-range systems. The *Shaheen* I, ranging 600-800 kilometers, entered service in March 2003.<sup>46</sup> The *Ghauri* I, based on the North Korean *Nodong* design, can cover 1,300-1,500 kilometers, and became operational in January 2003.<sup>47</sup> More advanced models of these existing designs, including the *Ghauri* III, with a range of up to 3,000 kilometers, are currently under development. In addition to indigenous missile production, Pakistan purchased 300-kilometer range M-11’s from China in the early 1990’s.

Pakistan’s Air Force fields approximately 32 nuclear capable F-16 Falcons and has repeatedly tried to purchase up to 28 more since early 1989.<sup>48</sup> However, the potential sale was blocked by the Pressler Amendment,<sup>49</sup> a 1994 law that prevents economic and military assistance to Pakistan unless “the President shall have certified in writing ...that Pakistan does not possess a nuclear explosive device and that the proposed United States assistance program will reduce significantly the risk that Pakistan will possess a nuclear explosive device.”<sup>50</sup> Under authority enacted in 1999 (known as “Brownback II”)<sup>51</sup> and in the wake of the September 11, 2001 attacks, President Bush waived the Pressler Amendment<sup>52</sup> on September 22, 2001.<sup>53</sup> However Pakistan apparently desires upgraded versions of the planes; and as of July 2004, the sales had not yet been consummated.

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<sup>1</sup> For a detailed analysis of North Korea’s weapons programs, see Issue Brief #17 – North Korea in this volume or available online at: <http://justice.policy.net/ntrc/bb108/>.

<sup>2</sup> This estimate is extrapolated from the plutonium production capacity of the Dimona reactor. Center for Nonproliferation Studies, Monterey Institute for International Studies, “Israel Overview,” Nuclear Threat Initiative website, accessed at: [http://www.nti.org/e\\_research/e1\\_israel\\_1.html](http://www.nti.org/e_research/e1_israel_1.html). Israel has maintained an official policy of ambiguity, neither confirming nor denying the existence of nuclear weapons program. In 1974, Israeli President Ephraim Katzir is reported to have said, “[I]t has always been our intention to develop a nuclear potential ... We now have that potential.” Wisconsin Project, “Israel’s Nuclear Weapons Capability: An Overview,” *The Risk Report* (July-August 1996), accessed at: <http://www.wisconsinproject.org/countries/israel/nuke.html>.

<sup>3</sup> “Israel’s Nuclear Programme,” *BBC News: World Edition*, December 22, 2003, accessed at: [http://news.bbc.co.uk/2/hi/middle\\_east/3340639.stm](http://news.bbc.co.uk/2/hi/middle_east/3340639.stm).

<sup>4</sup> “WMD Around the World: Nuclear Weapons,” Federation of American Scientists website, accessed at: <http://www.fas.org/nuke/guide/israel/nuke/>.

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<sup>5</sup> *Ibid.*

<sup>6</sup> “Israel’s Nuclear Weapons Capability: An Overview,” *The Risk Report*, July-August 1996, accessed at: <http://www.wisconsinproject.org/countries/israel/nuke.html>.

<sup>7</sup> Samuel H. Day, Jr., “Vanunu: Israel’s Embarrassment,” *Bulletin of Atomic Scientists* (June 1992), accessed at: [http://www.thebulletin.org/issues1/2004/mj04/048\\_009\\_013.pdf](http://www.thebulletin.org/issues1/2004/mj04/048_009_013.pdf).

<sup>8</sup> See Robert Fisk, “The Man Who Knew Too Much,” *The Independent* (London, March 23, 2004) pp. 2-3, accessed at: <http://www.counterpunch.org/fisk03262004.html>.

<sup>9</sup> Center for Nonproliferation Studies, Monterey Institute for International Studies, “South Africa Nuclear Profile: Nuclear Chronology 1979-1983,” Nuclear Threat Initiative website, accessed at: [http://www.nti.org/e\\_research/profiles/SAfrica/Nuclear/2149\\_3275.html](http://www.nti.org/e_research/profiles/SAfrica/Nuclear/2149_3275.html).

<sup>10</sup> Robert S. Norris, William M. Arkin, Hans M. Kristensen, and Joshua Handler, “Israeli Nuclear Forces, 2002,” *NRDC Nuclear Notebook*, September-October, 2002, accessed at: <http://www.thebulletin.org/issues/nukenotes/so02nukenote.pdf>.

<sup>11</sup> Center for Nonproliferation Studies, Monterey Institute for International Studies, “Weapons of Mass Destruction in the Middle East,” Nuclear Threat Initiative website, accessed at: [http://www.nti.org/e\\_research/e1\\_israel\\_1.html](http://www.nti.org/e_research/e1_israel_1.html).

<sup>12</sup> Center for Nonproliferation Studies, Monterey Institute for International Studies, *op. cit.*, note 2.

<sup>13</sup> Center for Defense Information, “Nuclear Weapons Database: Israel Nuclear Delivery Systems,” accessed at: <http://www.cdi.org/issues/nukef&f/database/isnukes.html#land>.

<sup>14</sup> Wisconsin Project on Nuclear Arms Control, “Israel: How Far Can its Missiles Fly?” *The Risk Report* (June 1995), accessed at: <http://www.wisconsinproject.org/countries/israel/howfar.html>.

<sup>15</sup> Center for Nonproliferation Studies, Monterey Institute for International Studies, *op. cit.*, note 2.

<sup>16</sup> Federation of American Scientists, “WMD Around the World: Popeye Turbo,” accessed at: <http://www.fas.org/nuke/guide/israel/missile/popeye-t.htm>.

<sup>17</sup> *Ibid.*

<sup>18</sup> Robert S. Norris, William M. Arkin, Hans M. Kristensen, and Joshua Handler, *op. cit.*, note 10.

<sup>19</sup> Center for Nonproliferation Studies, Monterey Institute for International Studies, “India Profile,” Nuclear Threat Initiative website, accessed at: [http://www.nti.org/e\\_research/profiles/India/index.html](http://www.nti.org/e_research/profiles/India/index.html).

<sup>20</sup> “Bhabha Atomic Research Center, Trombay,” Global Security.Org website, accessed at: <http://www.globalsecurity.org/wmd/world/india/trombay.htm>.

<sup>21</sup> The Associated Press, “Nuclear History in India, Pakistan,” *New York Times*, May 28, 1998, accessed at: <http://www.mtholyoke.edu/acad/intrel/nuchist.htm>.

<sup>22</sup> Indian Embassy (Washington), “Nuclear Nonproliferation,” accessed at:

[http://www.indianembassy.org/policy/CTBT/embassy\\_non\\_proliferation.htm](http://www.indianembassy.org/policy/CTBT/embassy_non_proliferation.htm).

<sup>23</sup> M.V. Ramana, “India’s Nuclear Program – from 1946 to 1998,” *INESAP Bulletin* (November 1998), accessed at: <http://www.inesap.org/bulletin16/bul16art02.htm>

<sup>24</sup> *Ibid.*

<sup>25</sup> The United States did employ sanctions and prohibited the sale of military technology to India, but these measures were short lived. After 1975, military sales were dealt with on a “case-by-case” basis; negotiations commenced but sales of anti-tank missiles and howitzers were never completed. On the nuclear front, the U.S. continued to supply nuclear fuel to the Tarapur nuclear plant after 1974. In 1978, Congress passed legislation prohibiting sales of nuclear technology to countries that did not agree to IAEA safeguard inspections. However, President Carter waived the prohibition in 1980 and allowed the export of 32 tons of fuel. For a more detailed summary, see Ravi Tomar, “Research Paper #20: India-US Relations in a Changing Strategic Environment,” Parliamentary Library of Australia (2001-02), p. 5, accessed at: <http://www.aph.gov.au/library/pubs/rp/2001-02/02rp20.pdf>.

<sup>26</sup> M.V. Ramana, *op. cit.*, note 23; and Center for Defense Information, “Fact Sheet: Building the Indian Bomb,” accessed at: <http://www.cdi.org/issues/testing/inbombfct.html>.

<sup>27</sup> Federation of American Scientists, “WMD Around the World: 17 Days in May: Chronology of the Indian Nuclear Weapons Tests,” accessed at: <http://www.fas.org/nuke/guide/india/nuke/chron.htm>.

<sup>28</sup> Center for Defense Information, *op. cit.*, note 26.

<sup>29</sup> M.V. Ramana, *op. cit.*, note 23.

<sup>30</sup> Center for Defense Information, *op. cit.*, note 26.

<sup>31</sup> General missile information is drawn from Center for Nonproliferation Studies, Monterey Institute for International Studies, *op. cit.*, note 19. Information regarding the impending *Agni III* test comes from: “3000 Km. Range *Agni III* to be Test Fired by March,” *Financial Times of India*, December 31, 2003.

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- <sup>32</sup> Phil Reeves, "Putin Brings Offer of Nuclear-Tipped Arms Deal to India," *The Independent*, December 5, 2002, accessed at: <http://www.pakdef.info/forum/archive/index.php/t-3138.html>; and Center for Nonproliferation Studies, Monterey Institute for International Studies "Russia to Lease Two Nuclear Submarines to India," accessed at: <http://cns.miis.edu/pubs/week/020218.htm>.
- <sup>33</sup> "Table of Indian Nuclear Forces, 2002," Natural Resources Defense Council, accessed at: <http://www.nrdc.org/nuclear/nudb/datab20.asp>.
- <sup>34</sup> Center for Nonproliferation Studies, Monterey Institute for International Studies, "Pakistan Profile," Nuclear Threat Initiative website, accessed at: [http://www.nti.org/e\\_research/profiles/Pakistan/index.html](http://www.nti.org/e_research/profiles/Pakistan/index.html).
- <sup>35</sup> *Ibid.*
- <sup>36</sup> Andrew Koch and Jennifer Topping, "Pakistan's Nuclear Weapons Program: A Status Report," *The Nonproliferation Review* (Spring-Summer 1997), p. 111, accessed at: <http://cns.miis.edu/pubs/npr/vol04/43/koctop43.pdf>.
- <sup>37</sup> S. Chandrasekharan, "Nuclear Stockpile of Pakistan: A Reality Check," South Asia Analysis Group, Paper 195 (May 2, 2001), accessed at: <http://www.saag.org/papers2/paper195.htm>.
- <sup>38</sup> Anthony H. Cordesman, "The Threat of Pakistani Nuclear Weapons," Center for Strategic and International Studies (November 8, 2001), p. 2, accessed at: [http://www.csis.org/burke/hd/reports/threat\\_pak\\_nukes.pdf](http://www.csis.org/burke/hd/reports/threat_pak_nukes.pdf).
- <sup>39</sup> Andrew Koch and Jennifer Topping, *op. cit.*, note 36; and Ayesha Khan, "Pakistan Joins the Club," *Bulletin of Atomic Scientists* (July-August 1998), accessed at: <http://www.thebulletin.org/issues/1998/ja98/ja98khan.html>.
- <sup>40</sup> Anthony H. Cordesman, *op. cit.*, note 35, p. 2.
- <sup>41</sup> The HEU production estimate comes from: Andrew Koch and Jennifer Topping, *op. cit.*, note 36, p. 3; the plutonium production figure comes from Center for Nonproliferation Studies, Monterey Institute for International Studies, *op. cit.*, note 34. Annual bomb production is based on an estimated requirement of 12 kilograms of HEU and 6 kilograms of Plutonium per bomb. See Matthew Bunn, Anthony Weir, and John P. Holdren, *Controlling Nuclear Warheads and Materials* (Project on Managing the Atom, Belfer Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University 2003), p. 13, n. 10, accessed at: [http://www.nti.org/e\\_research/cnwm/cnwm.pdf](http://www.nti.org/e_research/cnwm/cnwm.pdf).
- <sup>42</sup> Anthony H. Cordesman, *op. cit.*, note 38, p. 5.
- <sup>43</sup> Ayesha Khan, *op. cit.*, note 39. Center for Nonproliferation Studies, Monterey Institute of International Studies, "Chronology of Pakistani Nuclear Development," accessed at: <http://cns.miis.edu/research/india/paknucch.htm>.
- <sup>44</sup> Center for Nonproliferation Studies, Monterey Institute of International Studies, "Chronology of Pakistani Missile Development," accessed at: <http://cns.miis.edu/research/india/pakchron.htm>.
- <sup>45</sup> *Ibid.*; and Suphash Kapila, "Pakistan's Ballistic Missile Arsenal: Development and Acquisition Philosophy," South Asia Analysis Group, Paper 148 (September 26, 2000), accessed at: <http://www.saag.org/papers2/paper148.html>.
- <sup>46</sup> Shannon N. Kile, "Pakistani Nuclear Forces," *SIPRI Project on Nuclear Technology & Arms Control*; excerpt from: H. Kristensen and S. Kile, "World Nuclear Forces," *SIPRI Yearbook 2003: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 2003).
- <sup>47</sup> *Ibid.*
- <sup>48</sup> Center for Defense Information, "Nuclear Weapons Database: Pakistani Nuclear Delivery Systems," accessed at: <http://www.cdi.org/issues/nukef&f/database/panukes.html#f16>; and "Advani Says U.S. Unlikely to Release F-16's for Pakistan," *Agence France-Presse*, June 21, 2003.
- <sup>49</sup> Center for Defense Information, "Nuclear Weapons Database: Pakistani Nuclear Delivery Systems," accessed at: <http://www.cdi.org/issues/nukef&f/database/panukes.html#f16>; and "Advani Says U.S. Unlikely to Release F-16's for Pakistan," *Agence France-Presse*, June 21, 2003.
- <sup>50</sup> 22 U.S. Code §2375(e).
- <sup>51</sup> Section 9001 of the Department of Defense Appropriations Act, 2000 (Public Law 106-79).
- <sup>52</sup> 22 U.S. Code §2375(e).
- <sup>53</sup> Center for Defense Information, *op. cit.*, note 49.