

VIII. Israeli nuclear forces

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Israel continues to maintain its long-standing policy of nuclear opacity: it neither officially confirms nor denies that it possesses nuclear weapons.¹ Like India and Pakistan, Israel has never been a party to the 1968 Treaty on the Non-Proliferation of Nuclear Weapons (Non-Proliferation Treaty, NPT).²

Declassified government documents (from Israel and the United States) indicate that Israel began building a stockpile of nuclear weapons in the early 1960s, using plutonium produced by the Israel Research Reactor 2 (IRR-2) at the Negev Nuclear Research Center near Dimona.³ There is little publicly available information about the operating history and power capacity of the unsafeguarded IRR-2, which was commissioned in 1963.⁴ It may now be operated primarily to produce tritium.⁵ The ageing heavy water reactor, which was originally scheduled to be shut down in 2003, remains in operation despite the existence of a number of identified structural problems in its core.⁶ The reactor is due to be shut down in 2023, but the Israeli Atomic Energy Commission is reportedly examining ways to extend its service life until the 2040s.⁷

It is estimated that Israel has approximately 90 operational nuclear weapons (see table 10.9). The locations of the storage sites for the warheads, which are thought to be stored partially unassembled, are unknown. Approximately 30 of the weapons are believed to be gravity bombs for delivery by F-16I aircraft. It is possible that some of Israel's F-15 aircraft may also serve a nuclear strike role, but this is unconfirmed.

Up to 50 warheads are thought to be for delivery by land-based Jericho ballistic missiles. However, the Israeli Government has never publicly confirmed that it possesses the Jericho missiles.

Israel's arsenal probably still includes solid-fuelled, two-stage Jericho II medium-range ballistic missiles, which are believed to be based, along with

¹ On the role of this policy in Israel's national security decision making see Cohen, A., 'Israel', eds H. Born, B. Gill and H. Hänggi, SIPRI, *Governing the Bomb: Civilian Control and Democratic Accountability of Nuclear Weapons* (Oxford University Press: Oxford, 2010), pp. 152–70.

² For a summary and other details of the NPT see annex A, section I, in this volume.

³ For a history of Israel's nuclear weapon programme see Cohen, A., *The Worst-kept Secret: Israel's Bargain with the Bomb* (Columbia University Press: New York, 2010).

⁴ Glaser, A. and Miller, M., 'Estimating plutonium production at Israel's Dimona reactor', Science, Technology and Global Security Working Group, Massachusetts Institute of Technology, 2011.

⁵ Kelley, R. and Dewey, K., 'Assessing replacement options for Israel's ageing Dimona reactor', *Jane's Intelligence Review*, 20 Nov. 2018; and International Panel on Fissile Material (IPFM), 'Countries: Israel', 12 Feb. 2018.

⁶ Levinson, C., 'Israel's Dimona nuclear reactor plagued by 1,537 defects, scientists say', *Haaretz*, 16 Apr. 2016.

⁷ Bob, Y. J., 'Experts agree Dimona nuke reactor can exceed original life expectancy', *Jerusalem Post*, 12 July 2019.

Table 10.9. Israeli nuclear forces, January 2020

Type	Range (km) ^a	Payload (kg)	Status	No. of warheads
<i>Aircraft^b</i>				
F-16I	1 600	5 400	98 aircraft in the inventory; a small number (1–2 squadrons) is believed to be equipped for nuclear weapon delivery.	30
<i>Land-based ballistic missiles^c</i>				
Jericho II	1 500– 1 800	750– 1 000	c. 50 missiles; first deployed in 1990.	25
Jericho III ^d	>4 000	1 000– 1 300	Became operational in 2011–15 and is gradually replacing Jericho II.	25
<i>Cruise missiles</i>				
..	Unconfirmed reports suggest that Dolphin class diesel-electric submarines have been equipped with nuclear-armed SLCMs; Israeli officials have declined to comment publicly on the reports.	10
Total				90^e

.. = not available or not applicable; SLCM = sea-launched cruise missile.

^a Aircraft range is for illustrative purposes only; actual mission range will vary. Weapon payloads may have to be reduced in order to achieve maximum range.

^b It is assumed here that only the I-version of the F-16 is used in the nuclear role. It is possible that some of Israel's F-15 aircraft may also serve a nuclear strike role, but this is unconfirmed.

^c The Israeli Government has never publicly acknowledged that it possesses Jericho missiles.

^d A longer-range version of the missile with a new rocket motor may be under development.

^e SIPRI's estimate, which is approximate, is that Israel has c. 90 stored nuclear warheads. There is significant uncertainty about the size of Israel's nuclear arsenal and its warhead capabilities.

Sources: Cohen, A., *The Worst-kept Secret: Israel's Bargain with the Bomb* (Columbia University Press: New York, 2010); Cohen, A. and Burr, W., 'Israel crosses the threshold', *Bulletin of the Atomic Scientists*, vol. 62, no. 3 (May/June 2006); Cohen, A., *Israel and the Bomb* (Columbia University Press: New York, 1998); Albright, D., Berkhout, F. and Walker, W., SIPRI, *Plutonium and Highly Enriched Uranium 1996: World Inventories, Capabilities and Policies* (Oxford University Press: Oxford, 1997); International Institute for Strategic Studies, *The Military Balance 2019* (Routledge: London, 2019); *IHS Jane's Strategic Weapon Systems*, various issues; Fetter, S., 'Israeli ballistic missile capabilities', *Physics and Society*, vol. 19, no. 3 (July 1990); *Bulletin of the Atomic Scientists*, 'Nuclear notebook', various issues; and authors' estimates.

their mobile transporter-erector-launchers (TELs), in caves at a base near Zekharia, about 25 kilometres west of Jerusalem.⁸ Israel's Shavit space-launch vehicle, which carried a military satellite into orbit on its maiden flight in 1988, is based on the Jericho II.⁹

⁸ O'Halloran, J. (ed.), 'Jericho missiles', *IHS Jane's Weapons: Strategic, 2015–16* (IHS Jane's: Coudson, 2015), p. 53.

⁹ Graham, W., 'Israel launches Ofek spy satellite: Officials confirm malfunctions', *NASASpaceflight.com*, 13 Sep. 2016.

A three-stage Jericho III intermediate-range ballistic missile, with a range exceeding 4000 km, was declared operational in 2011 and might be replacing (or might possibly have already replaced) the Jericho II.¹⁰ In 2013 Israel tested a Jericho III missile, possibly designated the Jericho IIIA, with a new motor that some sources believe may give the missile an intercontinental range—that is, a range exceeding 5500 km.¹¹ On 6 December 2019 the Israeli Ministry of Defense announced that it had conducted a test launch of an unspecified rocket propulsion system from a military base in central Israel, but it did not identify the missile that was used.¹² According to unconfirmed reports, the base was the Palmachim Air Base, which is located on Israel's Mediterranean coast and used as a test launch site for Jericho missiles.¹³ The launch led to renewed speculation that Israel might be developing a new Jericho IV missile.¹⁴

Israel currently operates five German-built Dolphin and Dolphin-2 class diesel-electric submarines.¹⁵ There have been numerous unconfirmed reports that Israel has modified some or all of the submarines to carry indigenously produced nuclear-armed sea-launched cruise missiles (SLCMs), giving it a sea-based second-strike capability.¹⁶ Israeli officials have consistently declined to comment publicly on the reports. If they are true, the naval arsenal might include about 10 warheads, assuming a couple of warheads per submarine.

¹⁰ O'Halloran, ed. (note 8).

¹¹ Ben David, A., 'Israel tests Jericho III missile', *Aviation Week & Space Technology*, 22 July 2013.

¹² Gross, J. A., 'Defense ministry conducts missile test over central Israel', *Times of Israel*, 6 Dec. 2019; and Melman, Y., 'Why would Israel reportedly have missiles that reach beyond Iran', *Haaretz*, 11 Dec. 2019.

¹³ Trevithick, J., 'Did Israel just conduct a ballistic missile test from a base on its Mediterranean coast?', *The Drive*, 6 Dec. 2019.

¹⁴ Ahronheim, A., 'IDF tests rocket propulsion system', *Jerusalem Post*, 7 Dec. 2019.

¹⁵ Naval Today, 'Israel changes name of sixth Dolphin submarine', 11 Jan. 2019. A 6th submarine is scheduled to be delivered to Israel in 2020.

¹⁶ See e.g. Cohen (note 3), p. 83; Bergman, R. et al., 'Israel's deployment of nuclear missiles on subs from Germany', *Der Spiegel*, 4 June 2012; and Frantz, D., 'Israel's arsenal is point of contention', *Los Angeles Times*, 12 Oct. 2003.