

VIII. Israeli nuclear forces

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As of January 2021, Israel was estimated to have an inventory of around 90 nuclear warheads (see table 10.9), the same number as in January 2020. Israel continues to maintain its long-standing policy of nuclear opacity: it neither officially confirms nor denies that it possesses nuclear weapons.¹ Due to Israel's unique lack of transparency, there is significant uncertainty about the size of its nuclear arsenal and associated warhead capabilities. The estimate here is largely based on calculations of Israel's inventory of weapon-grade plutonium and the number of operational nuclear-capable delivery systems. The locations of the storage sites for the warheads, which are thought to be stored partially unassembled, are unknown.

The role of nuclear weapons in Israeli military doctrine

For decades, the Israeli Government has repeated that Israel 'won't be the first to introduce nuclear weapons into the Middle East'.² However, the government's interpretation of 'introducing' nuclear weapons appears to have significant caveats, in order to accommodate the high likelihood that Israel in reality possesses a significant nuclear stockpile. Israeli policy-makers have previously suggested that 'introducing' nuclear weapons would necessarily require Israel to test, publicly declare or actually use its nuclear capability, which, according to available open-access sources, it has not yet done.³ Another caveat may be that the warheads are not fully assembled under normal circumstances.

It is unclear what circumstances would prompt Israel to 'introduce' nuclear weapons into the region under its own narrow definition. It is believed that one such scenario would involve a crisis that poses an existential threat to the State of Israel.

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).

² E.g. Netanyahu, B., Interview, *Piers Morgan Tonight*, CNN, 17 Mar. 2011.

³ US Department of Defense, Office of the Assistant Secretary of Defense, 'Negotiations with Israel—F-4 and advanced weapons', Memorandum of Conversation, 12 Nov. 1968, via National Security Archive; and Kissinger, H., 'Israeli nuclear program', Memorandum for the President, 19 July 1969, via National Security Archive. For a summary and discussion of available evidence that Israel may have participated in a nuclear test in 1979 see Cohen, A. and Burr, W., 'Revisiting the 1979 VELA mystery: A report on a critical oral history conference', Wilson Center, History and Public Policy Program, Sources and Methods Blog, 31 Aug. 2020.

Table 10.9. Israeli nuclear forces, January 2021

Type/designation	Range (km) ^a	Payload (kg)	Status	No. of warheads
<i>Aircraft^b</i>				30
F-16I	1 600	5 400	A small number (1–2 squadrons) of Israel's F-16s is believed to be equipped for nuclear weapon delivery (2 bombs per aircraft).	30
<i>Land-based missiles^c</i>				50
Jericho II	1 500– 1 800	750– 1 000	First deployed in 1990. Being replaced by the Jericho III.	25
Jericho III	>4 000	1 000– 1 300	Became operational in 2011–15 and is gradually replacing the Jericho II.	25
<i>Sea-based missiles</i>				10
..	Unconfirmed reports suggest that Dolphin- and Dolphin 2-class diesel-electric submarines have been equipped with nuclear-armed SLCMs.	10
Total inventory				90^d

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

^a Aircraft range is for illustrative purposes only; actual range will vary according to flight profile, weapon loading and in-flight refuelling.

^b It is possible that some of Israel's F-15 aircraft may also serve a nuclear strike role.

^c The Jericho III is gradually replacing the Jericho II, if it has not happened already. A longer-range version of the Jericho ballistic missile with a new rocket motor may be under development.

^d SIPRI's estimate is that Israel has c. 90 nuclear warheads that are stored partially assembled. There is significant uncertainty about the size and capabilities of Israel's nuclear arsenal.

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*, various years; *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.

Military fissile material production

Declassified government documents (mostly from 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, Southern Israel.⁴ This heavy-

⁴ 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); and Burr, W. and Cohen, A., 'Duplicity and self-deception: Israel, the United States, and the Dimona inspections, 1964–65', Briefing Book no. 732, National Security Archive, 10 Nov. 2020.

water reactor, which was commissioned in 1963, is not under International Atomic Energy Agency (IAEA) safeguards. There is little publicly available information about its operating history and power capacity (see section X).⁵

Having produced enough plutonium for Israel to produce some weapons, IRR-2 may now be operated primarily to produce the tritium needed to boost those weapons.⁶ Shutdown of the ageing reactor was scheduled for 2003 but has been postponed until at least 2023. The Israel Atomic Energy Commission is reportedly examining ways to extend its service life until the 2040s.⁷ Meanwhile, satellite imagery shows that significant construction started at the Negev Nuclear Research Center in late 2018 or early 2019, although the purpose of the construction remains unknown.⁸

Aircraft and air-delivered weapons

Approximately 30 of Israel's nuclear weapons are estimated to be gravity bombs for delivery by F-16I aircraft. Given that the Israeli Air Force refers to its F-15I aircraft as 'strategic', it is possible that some of these aircraft could also play a nuclear role.⁹ Nuclear gravity bombs would probably be stored at underground facilities near one or two air force bases, which would contain nuclear-certified aircraft with specially trained crews and unique deployment procedures.

Land-based missiles

Up to 50 warheads are thought to be assigned for delivery by land-based Jericho ballistic missiles. These are believed to be based, along with their mobile transporter-erector-launchers (TELs), in caves at a base near Zekharia, about 25 kilometres west of Jerusalem.¹⁰ The Israeli Government has never publicly confirmed that it possesses the Jericho missiles.

Israel is upgrading its arsenal from the solid-fuelled, two-stage Jericho II medium-range ballistic missile to the Jericho III intermediate-range ballistic missile. The newer and more capable Jericho III is a three-stage missile

⁵ Glaser, A. and Miller, M., 'Estimating plutonium production at Israel's Dimona reactor', 52nd Annual Meeting of the Institute of Nuclear Materials Management (INMM), 17–21 July 2011.

⁶ 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', 18 May 2020.

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

⁸ International Panel on Fissile Materials (IPFM), 'Significant new construction at the Dimona site', IPFM Blog, 18 Feb. 2021.

⁹ Israeli Air Force, 'The F-15I as the IAF's Strategic Aircraft', Defense-Aerospace.com, 19 Jan. 2016.

¹⁰ O'Halloran, J. C. (ed.), 'Jericho missiles', *IHS Jane's Weapons: Strategic, 2015–16* (IHS Jane's: Coudsdon, 2015), p. 53.

with a longer range, exceeding 4000 km. It first became operational in 2011 and might now have replaced the Jericho II.¹¹ 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.¹²

On 6 December 2019 the Israeli Ministry of Defense (MOD) announced that it had conducted a test launch of an unspecified rocket propulsion system from a military base in central Israel.¹³ It did not identify which missile or military base was used for the test. According to unconfirmed reports, the base was the Palmachim Airbase, which is located on Israel's Mediterranean coast and is used as a test launch site for Jericho missiles.¹⁴ The launch led to renewed speculation that Israel might be developing a new Jericho IV missile.¹⁵ On 31 January 2020 the MOD again acknowledged the test of an unspecified rocket propulsion system, also from a base in central Israel.¹⁶

Sea-based missiles

Israel operates five German-built Dolphin- and Dolphin 2-class diesel-electric submarines. A sixth boat is being fitted out.¹⁷ Plans to buy three more have been put on hold due to investigations into allegations of corruption.¹⁸ 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 nuclear strike capability.¹⁹ In line with Israel's policy of nuclear opacity, Israeli officials have declined to comment publicly on the reports. If they are true, the naval arsenal might include about 10 cruise missile warheads, assuming two warheads per submarine.

¹¹ ed. O'Halloran (note 10).

¹² Ben David, A., 'Israel tests Jericho III missile', *Aviation Week & Space Technology*, 22 July 2013.

¹³ 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.

¹⁴ Trevithick, J., 'Did Israel just conduct a ballistic missile test from a base on its Mediterranean coast?', *The Drive*, 6 Dec. 2019.

¹⁵ Ahronheim, A., 'IDF tests rocket propulsion system', *Jerusalem Post*, 7 Dec. 2019.

¹⁶ Israeli Ministry of Defense (@Israel_MOD), 'The Israel Ministry of Defense has completed a test of a rocket propulsion system from a military base in central Israel. The test launch was scheduled in advance and carried out as planned.', Twitter, 31 Jan. 2020.

¹⁷ 'Israel changes name of sixth Dolphin submarine', *Naval Today*, 11 Jan. 2019.

¹⁸ Bandel, N., 'Gantz agrees to pause commission of inquiry into submarine affair after request by Attorney General', *Haaretz*, 29 Nov. 2020.

¹⁹ See e.g. Cohen (note 4), 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.