VI. Indian nuclear forces

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As of January 2024 India was estimated to have a growing stockpile of about 172 nuclear weapons—a small increase from the previous year (see table 7.7, end of section). These weapons were assigned to a maturing nuclear triad of aircraft, land-based missiles and nuclear-powered ballistic missile submarines (SSBNs). It has long been assumed that India stores its nuclear warheads separately from its deployed launchers during peacetime. However, the country's recent moves towards placing missiles in canisters and conducting sea-based deterrence patrols suggest that India could be shifting in the direction of mating some of its warheads with their launchers in peacetime.

The warhead estimate is based on calculations of India's inventory of weapon-grade plutonium (see section X of this chapter), the estimated number of operational nuclear-capable delivery systems, India's nuclear doctrine, publicly available information on the Indian nuclear arsenal, and private conversations with defence officials.[1] The Indian government has provided little public information about the size of its nuclear forces, other than conducting occasional parade displays and announcing missile flight tests.

This section starts by outlining the role played by nuclear weapons in Indian military doctrine. It then details India's holdings of nuclear weapons—its aircraft and air-delivered weapons and its land- and sea-based missiles.

The role of nuclear weapons in Indian military doctrine

The limited ranges of India's initial nuclear systems meant that, until the early 2010s, their only credible role was to deter Pakistan. However, with the development since then of longer-range missiles capable of targeting all of China, in recent years it appears that India has placed increased emphasis on deterring China.

While India has adhered to a nuclear no-first-use (NFU) policy since 1999, this pledge was qualified by a 2003 caveat (reaffirmed in 2018) that India could also use nuclear forces to retaliate against attacks by non-nuclear

[1] Kristensen, H. M. and Korda, M., 'Estimating world nuclear forces: An overview and assessment of sources', SIPRI Commentary, 14 June 2021.

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weapons of mass destruction (WMD).[2] Debate about India's commitment to the NFU policy has increased with indications since 2018 that some parts of India's nuclear arsenal are being kept at a higher state of readiness, including possible mating of a portion of India's warheads and launchers.[3] This raises questions about whether India might be transitioning towards a limited counterforce nuclear posture to target an adversary's nuclear weapons earlier in a crisis, even before they could be used.[4]

Similar to Pakistan (see section VII of this chapter), India has long maintained a policy of not using or threatening to use nuclear weapons against non-nuclear-armed states.[5] But given India's 2003 statement about potential use of nuclear weapons against non-nuclear WMD attacks, the conditions for this pledge are uncertain.

Aircraft and air-delivered weapons

India has several types of combat aircraft with performance characteristics that potentially make them suitable as nuclear-delivery platforms, including the Mirage 2000H, Jaguar IS and Rafale. However, there is scarcely any official information about a nuclear role for these aircraft, with one exception: a detailed source describes how the Mirage 2000H was converted for a nuclear strike role in the 1990s.[6] SIPRI estimates that approximately 48 nuclear gravity bombs were assigned to Indian aircraft as of January 2024.

Land-based missiles

The Indian Army's Strategic Forces Command operates five types of mobile nuclear-capable ballistic missile: the short-range Prithvi-II and Agni-I; the medium-range Agni-II; and the intermediate-range Agni-III and Agni-IV.

[2] Indian Ministry of External Affairs, 'The Cabinet Committee on Security reviews [o]perationalization of India's nuclear doctrine', Press release, 4 Jan. 2003; Indian Ministry of External Affairs, 'Draft report of National Security Advisory Board on Indian nuclear doctrine', 17 Aug. 1999; and Indian Prime Minister's Office, 'Prime Minister felicitates crew of INS Arihant on completion of nuclear triad', Press release, 5 Nov. 2018.

[3] For further detail see Kristensen, H. M. and Korda, M., 'Indian nuclear forces', *SIPRI Yearbook 2021*.

[4] Clary, C. and Narang, V., 'India's counterforce temptations: Strategic dilemmas, doctrine, and capabilities', *International Security*, vol. 43, no. 3 (winter 2018/19); Kaushal, S. et al., 'India's nuclear doctrine: The Agni-P and the stability–instability paradox', Royal United Services Institute (RUSI), 8 July 2021; and Rajagopalan, R., *India and Counterforce: A Question of Evidence*, ORF Occasional Paper no. 247 (Observer Research Foundation: New Delhi, May 2020).

[5] See e.g. Indian Ministry of External Affairs, 'The Cabinet Committee on Security reviews [o]perationalization of India's nuclear doctrine' (note 2); and Indian Ministry of External Affairs, 'India statement delivered by Secretary (West) at the annual high level meeting on "International Day for The Total Elimination of Nuclear Weapons"', 27 Sep. 2023, accessible via Internet Archive.

[6] Kampani, G., 'New Delhi's long nuclear journey: How secrecy and institutional roadblocks delayed India's weaponization', *International Security*, vol. 38, no. 4 (spring 2014), pp. 94, 97–98. For further detail see Kristensen, H. M. and Korda, M., 'Indian nuclear forces', *SIPRI Yearbook 2022*, pp. 393–94.

SIPRI estimates that India had around 80 operational missiles as of January 2024. At least three new land-based ballistic missiles were in development: the medium-range Agni-P and the intermediate-range Agni-V were nearing operational deployment, while a variant with intercontinental range, the Agni-VI, was in the design stage.[7] In 2023 unconfirmed reports emerged suggesting that India could reconfigure some of its nuclear medium-range ballistic missiles to give them conventional strike roles. However, in the absence of additional information it remains unclear whether this will happen.[8]

In 2023 India conducted test launches of older missiles and a critical test for one of its new developmental missiles. In June 2023 the Agni-P completed its first 'pre-induction' flight test (and fourth test of the system overall), thus 'pav[ing] the way for induction of the system into the Armed Forces', according to the Indian Ministry of Defence (MOD).[9] However, it is likely that India will undertake additional tests of the system before the Agni-P becomes operational.

The Agni-P is described by the Indian MOD as a 'next-generation' nuclear-capable ballistic missile. It reportedly incorporates technology developed specifically for the Agni-V programme, including an advanced navigation system and a new mobile canisterized launch system, which will reduce the time required to place the missiles on alert in a crisis.[10] The warhead for the solid-fuelled Agni-P can reportedly manoeuvre during re-entry, which could allow the missile to evade future missile defences of states in the region (e.g. China and Pakistan). An unidentified government source initially denied that the Agni-P was intended to replace older Agni missiles.[11]

In 2023 India also conducted test launches of the Prithvi-II and the Agni-I, both of which were described by the Indian MOD as 'proven systems'.[12]

India is developing a land-based version of the short-range K-15 submarine-launched ballistic missile (SLBM), known as the Shaurya.[13] However,

[7] Vikas, S. V., 'Why India may not test Agni 6 even if DRDO is ready with technology', OneIndia, 10 July 2019.

[8] Dubey, A. K., 'After Pralay, defence forces may opt for medium-range ballistic missiles in conventional roles for rocket force', ANI, 5 Nov. 2023.

[9] Indian Ministry of Defence, '"Agni Prime" ballistic missile successfully flight-tested by DRDO off Odisha coast', Press release, 8 June 2023.

[10] Indian Ministry of Defence, 'DRDO successfully flight tests new generation Agni P ballistic missile', Press release, 28 June 2021; and Rout, H. K., 'India test fires new generation nuclear capable Agni-Prime missile off Odisha coast', *New Indian Express*, 28 June 2021.

[11] Philip, S. A., 'Agni Prime is the new missile in India's nuclear arsenal. This is why it's special', ThePrint, 30 June 2021; and Zhen, L., 'India's latest Agni-P missile no great threat to China: Experts', *South China Morning Post*, 1 July 2021.

[12] Indian Ministry of Defence, 'Successful training launch of short-range ballistic missile, Prithvi-II, carried out off Odisha coast', Press release, 10 Jan. 2023; and Indian Ministry of Defence, 'Successful training launch of Agni-1 ballistic missile', Press release, 1 June 2023.

[13] See e.g. Press Trust of India, 'India successfully test-fires nuclear capable hypersonic missile Shaurya', *Hindustan Times*, 3 Oct. 2020; and Gupta, S., 'Govt okays induction of nuke-capable Shaurya missile amid Ladakh standoff', *Hindustan Times*, 6 Oct. 2020.

because of the high level of uncertainty about the status of the Shaurya, it is not included in SIPRI's estimate for January 2024.[14]

India is believed to be developing the technology to deliver multiple independently targetable re-entry vehicles (MIRVs), but as of January 2024 the status of the programme remained unclear. The technology has reportedly been tested on the Agni-P and could potentially be used on the intermediate-range Agni-V as well as the intercontinental Agni-VI that is currently in development.[15] The Agni-VI is controversial because its expected range may extend well beyond India's possible regional targets in Pakistan and China. In 2023 there were reports that a scientist, who had previously worked at the Indian Defence Research and Development Organisation (DRDO), had claimed that the Agni-VI's indigenously designed launcher had completed a successful test. However, the claim—which was revealed during the scientist's trial on charges of espionage—should be treated with caution because it is highly likely that the system remains several years away from deployment.[16]

Sea-based missiles

With the aim of creating an assured second-strike capability, India has continued to develop the naval component of its nascent nuclear triad and to build a fleet of four to six SSBNs.[17] The first of these SSBNs, INS *Arihant*, completed what the Indian government described as its first 'deterrence patrol' in 2018—although it seems unlikely that the missiles carried on the SSBN were armed with nuclear warheads.[18] A second SSBN, INS *Arighat*, was launched in November 2017 and underwent advanced sea trials in 2021–22, but its commissioning into the Indian Navy has been delayed and is now expected sometime in 2024.[19] Satellite imagery indicates that each submarine has been equipped with a four-tube vertical-launch system and each could carry up to 12 two-stage, short-range K-15 SLBMs (which may have been renamed the B-05).[20] SIPRI estimates that 12 nuclear warheads have been delivered for potential deployment by INS *Arihant* and another 12 have been produced for INS *Arighat*.

[14] For further detail see Kristensen and Korda (note 6), p. 395.

[15] Rout, H. K., 'India to conduct first user trial of Agni-V missile', *New Indian Express*, 13 Sep. 2021.

[16] Inamdar, N., 'Honey-trapped DRDO scientist shared details of India's missile, drone programmes', *Hindustan Times*, 8 July 2023.

[17] Davenport, K., 'Indian submarine completes first patrol', *Arms Control Today*, vol. 48, no. 10 (Dec. 2018).

[18] Peri, D., 'Now, India has a nuclear triad', *The Hindu*, 18 Oct. 2016; Indian Prime Minister's Office (note 2); Davenport (note 17); and Joshi, Y., 'Angels and dangles: Arihant and the dilemma of India's undersea nuclear weapons', War on the Rocks, 14 Jan. 2019.

[19] Gupta, S., 'Aircraft carrier INS Vikramaditya is back on high seas', *Hindustan Times*, 19 Feb. 2023.

[20] Indian Defence Research and Development Organisation (DRDO), 'MSS—Achievements', 6 Sep. 2019.

At least two additional Arihant-class submarines are planned: India's third SSBN, currently known by its S4 developmental name, was reportedly launched in November 2021, and a fourth is under construction for possible launch in 2024.[21] These submarines are believed to be significantly larger than the first two, with satellite imagery indicating that they are approximately 20 metres longer.[22] They will reportedly have eight launch tubes able to hold up to 24 K-15 missiles or 8 K-4 missiles.[23] A next generation of SSBNs, known as S5, is reportedly also in the design stage.[24] The K-4 missile is in development but probably remains several years away from being operational. Two potential test launches of the K-4 in 2022 were apparently disrupted by the presence of Chinese spy ships but no known tests of the missile took place in 2023—although India did test launch a K-15 SLBM in July 2023.[25]

India's first naval nuclear weapon, the short-range Dhanush missile, is a version of the dual-capable Prithvi-II that can be launched from two Sukanya-class offshore patrol vessels.[26] Given the slow speed and high degree of vulnerability of the Sukanya-class vessels, the system will probably be retired when the SSBN programme with longer-range missiles matures.

[21] Chris Biggers (@CSBiggers), Twitter, 28 Dec. 2021, <https://twitter.com/CSBiggers/status/1476048094580117509>; Unnithan, S., 'A peek into India's top secret and costliest defence project, nuclear submarines', *India Today*, 10 Dec. 2017; and Bhattacharjee, S., 'Third Arihant class submarine quietly launched in November', *The Hindu*, 4 Jan. 2022.

[22] Sutton, H. I., 'Indian Navy's third ballistic missile submarine doubles missile armament', Covert Shores, 29 Dec. 2021.

[23] Bhattacharjee (note 21). See also Kristensen and Korda (note 6), p. 397.

[24] See e.g. Sterk, R., 'India levels up in nuclear submarines', Defense and Security Monitor, 1 May 2023.

[25] 'Chinese spy ships may complicate India's missile test plans in Indian Ocean for the second month in a row', *Swarajya*, 7 Dec. 2022; and 'DRDO test fires short range B-05LV missile from Kalam Island', *Pragativadi*, 2 July 2023.

[26] 'Nuke-capable Dhanush and Prithvi-II launched', *New Indian Express*, 12 Mar. 2011; and Indian Ministry of Defence (MOD), *Annual Report 2018–19* (MOD: New Delhi, 2019), p. 100.

Table 7.7. Indian nuclear forces, January 2024

All figures are approximate and some are based on assessments by the authors.

Type/designation	No. of launchers	Year first deployed	Range (km)[a]	Warheads x yield[b]	No. of warheads[c]
Aircraft[d]	*84*				*48*
Mirage 2000H	32	1985	1 850	1 x 12 kt bomb	32
Jaguar IS	16	1981	1 600	1 x 12 kt bomb	16
Rafale	36	2022	2 000	..	–
Land-based missiles	*80*				*80*
Prithvi-II	24	2003	250[e]	1 x 12 kt	24
Agni-I	16	2007	>700	1 x 10–40 kt	16
Agni-II	16	2011	>2 000	1 x 10–40 kt	16
Agni-III	16	2018	>3 200	1 x 10–40 kt	16
Agni-IV	8	2022	>3 500	1 x 10–40 kt	8
Agni-V	..	[2024]	>5 000	1 x 10–40 kt	..
Agni-VI	–	[2027]	>6 000	1 x 10–40 kt [possible MIRV]	–
Agni-P	–	[2025]	1 000–2 000	[1 x 10–40 kt]	–
Sea-based missiles	*3/14*[f]				*16*
Dhanush	2	2013	400	1 x 12 kt	4[g]
K-15 (B-05)[h]	12[i]	2018	700	1 x 12 kt	12
K-4	–[j]	[2025]	3 500	1 x 10–40 kt	–
Other stored warheads[k]					[*28*]
Total stockpile	**178**				**172**[k]

.. = not available or not applicable; – = nil or a negligible value; [ ] = uncertain SIPRI estimate; kt = kiloton; MIRV = multiple independently targetable re-entry vehicle.

[a] For aircraft, the listed range is for illustrative purposes only; actual mission range will vary according to flight profile, weapon payload and in-flight refuelling.

[b] The yields of India's nuclear warheads are not known. The 1998 nuclear tests demonstrated yields of up to 12 kt. Since then, it is possible that boosted warheads have been introduced with a higher yield, perhaps up to 40 kt. There is no open-source evidence that India has developed 2-stage thermonuclear warheads.

[c] Aircraft and several missile types are dual-capable—that is, they can be armed with either conventional or nuclear warheads. This estimate counts an average of 1 nuclear warhead per launcher. All estimates are approximate.

[d] The Rafale is listed as a potential future nuclear delivery platform. It seems likely that it would probably initially replace the Jaguar in that role. However, in the absence of official or authoritative sources, SIPRI has not attributed nuclear weapons to Rafale aircraft in its estimate for Jan. 2024. Other aircraft that could potentially have a secondary nuclear role include the Su-30MKI.

[e] The Prithvi-II's range is often reported as 350 kilometres. However, the United States Air Force's National Air and Space Intelligence Center sets the range at 250 km.

[f] The first figure is the number of operational vessels—2 ships and 1 nuclear-powered ballistic missile submarine (SSBN); the second is the maximum number of missiles that they can carry. India has launched 3 SSBNs, but only 1—INS *Arihant*—was believed to be operational as of Jan. 2024, and it was believed to have only a limited operational capability. The second SSBN—INS *Arighat*—has conducted sea trials and might become fully operational in 2024. The third, known as S4, was reportedly launched in Nov. 2021 but, as of Jan. 2024, its status remained unclear.

[g] Each Sukanya-class patrol ship equipped with Dhanush missiles was thought to have possibly 1 reload.

[h] The K-15 may have been renamed the B-05. Some sources have referred to the K-15 missile as 'Sagarika', which was the name of the missile-development project, rather than the missile itself.

[i] Each of India's first 2 SSBNs has 4 missile tubes, each of which can carry 3 K-15 submarine-launched ballistic missiles (SLBMs), for a total of 12 missiles per SSBN. Only 1 SSBN was believed to be operational as of Jan. 2024 (see note f).

[j] Each of the 8 missile tubes on India's third and fourth SSBNs will be able to carry 3 K-15 SLBMs or 1 K-4 SLBM once the latter missile becomes operational.

[k] In addition to the *c.* 144 warheads estimated to be assigned to operational forces, SIPRI estimates that *c.* 28 warheads might have been produced for missiles nearing operational status, including the Agni-V and Agni-P (*c.* 16 warheads) and the K-15 (*c.* 12 warheads for INS *Arighat*), for a total estimated stockpile of *c.* 172 warheads. India's warhead stockpile is expected to continue to increase.

Sources: Indian Ministry of Defence, annual reports and press releases; International Institute for Strategic Studies, *The Military Balance*, various years; US Air Force (USAF), National Air and Space Intelligence Center, *Ballistic and Cruise Missile Threat*, various years; Indian news media reports; *Bulletin of the Atomic Scientists*, 'Nuclear notebook', various issues; and authors' estimates.