

IV. French nuclear forces

PHILLIP PATTON SCHELL AND HANS M. KRISTENSEN

France's nuclear arsenal consists of approximately 300 warheads for delivery by submarine-launched ballistic missiles (SLBMs) and air-launched cruise missiles (see table 11.5).¹ President François Hollande stated in February 2015 that the stockpile included 300 warheads for 48 SLBMs and 54 cruise missiles.² Four Triomphant class nuclear-powered ballistic missile submarines (SSBNs) form the backbone of France's nuclear deterrent, complemented by nuclear-capable land- and sea-based combat aircraft.

France maintains one SSBN on patrol at all times. While the second and third SSBNs can be put to sea rapidly, the fourth would take longer because of the cycle of extensive overhaul and maintenance. France is currently upgrading its SSBNs with the new M51 SLBM, replacing the ageing M45 missile. The overhaul of the four submarines is expected to be completed by 2019.³ As of early 2015, two submarines were each equipped with 16 M51.1 SLBMs. The second two submarines will be equipped with the M51.2 SLBM, an improved version of the M51.1. The work to overhaul the first of these two submarines began in summer 2013. It is expected to return to service in 2016.⁴ The M51.2 is designed to carry the new Tête Nucléaire Océanique (TNO, Oceanic Nuclear Warhead) with a reported yield of up to 150 kilotons.⁵ France is also developing the M51.3, a future version of the M51 SLBM.⁶

¹ For an in-depth review of French nuclear forces see Patton, T., Podvig, P. and Schell P., *A New START Model for Transparency in Nuclear Disarmament: Individual Country Reports* (United Nations Institute for Disarmament Research: Geneva, 2013), pp. 17–23.

² Hollande, F., French President, Speech during visit to the Strategic Air Forces, Istres, 25 Feb. 2015, p. 9, <<http://basedoc.diplomatie.gouv.fr/vues/Kiosque/FranceDiplomatie/kiosque.php?fichier=baen2015-02-25.html>>.

³ French Senate, *Avis Présenté au Nom de la Commission des Affaires Étrangères, de la Défense et des Forces Armées (1) sur le Projet de Loi de Finances pour 2014* [Opinions submitted on behalf of the Committee on Foreign Affairs, Defence and Armed Forces (1) on the finance bill for 2014], vol. 8, *Défense: Equipement des Forces* [Defence: equipping the forces], no. 158 (French Senate: Paris, 21 Nov. 2013), pp. 51–52; and Lennox, D. (ed.), *Jane's Strategic Weapon Systems*, no. 54 (IHS Global Ltd: Coulsdon, 2011), p. 51.

⁴ 'Le SNLE Le Triomphant en refonte' [The SSBN Le Triomphant being overhauled], *Mer et Marine*, 20 Sep. 2013, <<http://www.meretmarine.com/fr/content/le-snle-le-triomphant-en-refonte>>.

⁵ French Senate (note 3); and Lennox (note 3), p. 50.

⁶ Loi relative à la programmation militaire pour les années 2014 à 2019 [Law on military planning for the years 2014 to 2019], French Law no. 2013-1168 of 18 Dec. 2013, <<http://www.legifrance.gouv.fr/affichTexte.do;?cidTexte=JORFTEXT000028338825>> (in French).

Table 11.5. French nuclear forces, January 2015

Type	No. deployed	Year first deployed	Range (km) ^a	Warheads x yield	No. of warheads
<i>Land-based aircraft</i>					
Mirage 2000N	~20	1988	2 750	(1 x up to 300 kt) TNA	~20
Rafale F3	~20	2010–11	2 000	(1 x up to 300 kt) TNA	~20
<i>Carrier-based aircraft</i>					
Rafale MF3	~10	2010–11	2 000	1 x up to 300 kt TNA	~10
<i>Submarine-launched ballistic missiles^b</i>					
M45	16	1996	4 000 ^c	up to 6 x 100 kt TN-75	80 ^d
M51.1	32	2010–11	>6 000	up to 6 x 100 kt TN-75	160 ^d
M51.2	–	(2016)	>6 000	up to 6 x 150 kt TNO	–
M51.3	–	(2020)	>(6 000)	(up to 6 x 150 kt) TNO	–
Total					~290^e

() = uncertain figure; – = zero; kt = kiloton; TNA = Tête Nucléaire Aéroportée (Airborne Nuclear Warhead); TNO = Tête Nucléaire Océanique (Oceanic Nuclear Warhead).

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

^b France transitioned to a posture of four SSBNs in the mid-1990s, which means having enough SLBMs to equip three operational SSBNs while the fourth is being overhauled.

^c Although often rumoured to have a range of 6000 km, the range of the M45 is listed as only 4000 km in a 2001 report by the French National Assembly's National Defence Commission. The French Navy lists the range as >5000 km.

^d Although the SLBMs have the capability to carry up to 6 warheads, the then President of France, Jacques Chirac, declared in 2006 that 'the number of warheads has been reduced on some of the missiles in our submarines' to improve targeting flexibility against regional powers.

^e France does not have a reserve but may have a small inventory of spare warheads for a total stockpile of c. 300 warheads.

Sources: Hollande, F., French President, Speech during visit to the Strategic Air Forces, Istres, 25 Feb. 2015; Sarkozy, N., French President, Speech on defence and national security, Porte de Versailles, Paris, 17 June 2008; Sarkozy, N., French President, 'Presentation of SSBM "Le Terrible"', Speech, Cherbourg, 21 Mar. 2008; Chirac, J., French President, Speech during visit to the Strategic Forces, Landivisiau–L'Île Longue, Brest, 19 Jan. 2006; French Ministry of Defence, various publications, <<http://www.defense.gouv.fr/>>; French National Assembly, various defence bills; Norris, R. S. et al., *Nuclear Weapons Databook*, vol. 5, *British, French, and Chinese Nuclear Weapons* (Westview: Boulder, CO, 1994), p. 10; *Air Actualités*, various issues; *Aviation Week & Space Technology*, various issues; 'Nuclear notebook', *Bulletin of the Atomic Scientists*, various issues; and authors' estimates.

Government documents indicate that France is beginning preliminary development work on a third-generation SSBN. The goal is to have an operational successor SSBN to the Triomphant class by 2030.⁷

⁷ French Law (note 6); and 'La modernisation des forces nucléaires françaises' [The modernization of French nuclear forces], Mer et Marine, 5 Aug. 2013, <<http://www.meretmarine.com/fr/content/la-modernisation-des-forces-nucleaires-francaises>>.

The airborne component of the French nuclear forces consists of two types of land-based (Mirage 2000N and Rafale F3) and one type of sea-based (Rafale MF3) combat aircraft. The Mirage 2000Ns are scheduled to be replaced by Rafale B aircraft in 2019. The aircraft are equipped with the Air-Sol Moyenne Portée-Améliorée (ASMP-A, Medium-Range Air-to-Surface-Improved) missile. A mid-life refurbishment programme for the ASMP-A is scheduled to begin in 2022.⁸ The missiles are armed with the Tête Nucléaire Aéroportée (TNA, Airborne Nuclear Warhead), which has a reported yield of up to 300 kilotons.

⁸ French Senate (note 3), p. 52.