Global Inventory of Separated Plutonium

(Detailed Descriptions By Country)

(Data: End of 2022)

Russia | US | France | China | UK | Israel

Pakinstan | India | North Korea | Japan | Germany | Other Non-nuclear Weapon Countries

Country	Military Use (ton)	Non-military Use (ton)
Russia	**88.0**	**104.5**
	The production of plutonium for military use was conducted at three sites (Mayak [formerly Chelyabinsk-65], Tomsk-7, and Krasnoyarsk-26). Production at Mayak began in 1948, and all production reactors were shut down in 2010. Reprocessing was also carried out at the same sites, but the Mayak facility was closed in 1987, and the Tomsk and Krasnoyarsk facilities in 2010 and 2012, respectively. Russia currently holds 88 tons of stockpile, of which 8 tons could still be used for military purposes.	Russia continues reprocessing. 64.5 tons are recovered from reactors for civilian use. According to figures made public on August 3, 2023(INFCIRC/549/Add.9/25), Russia has 58.3 tons of plutonium at reprocessing facilities (the rated reprocessing capacity at the RT-1 facility is 440 tons/year but the actual amount being reprocessed is around 100 tons to 130 tons/year). In addition, Russia holds a further 4.6 tons at nuclear reactors, 1.1 tons of MOX fuel, and an additional 0.5 tons. The capacity of the RT-1 reprocessing facility was expanded between 2014 and 2015 to 500 tons/year. Furthermore, the new Pilot Demonstration Center for SNF reprocessing became operational in 2015, and it is possible to increase its reprocessing capacity up to a further 250 tons/year. In addition, Russia stores 40 tons of “excess” plutonium (25 tons covered by the Plutonium Management and Disposition Agreement [PMDA] with the US and 15 tons of weapons-grade plutonium recovered from the combined heat and power reactor). Russia has pledged not to divert this excess plutonium to military use, and the US regularly monitors it.
US	**38.2**	**49.2**
	The US had closed all its plutonium production reactors by 1987. In 1994 it disclosed the past production volume and the stockpile. In 2012, it announced that the aggregate amount produced in the past was 111.7 tons, the used/disposed amount was 14 tons, the inventory difference was 2.4 tons, and as of September 2009 the stockpile was 95.4 tons. Subsequently, considering that 0.2 tons were disposed at a waste isolation pilot plant (WIPP), 0.1 tons	The US currently has no separated plutonium from spent fuel in civilian nuclear reactors. The US has 4.6 tons of MOX fuel etc., 3 tons from the Savannah River National Laboratory, and 0.4 tons received from overseas. The total is 8 tons. Of this, just 3 tons are subject to safeguards. It also has 41.4 tons of “excess” weapon plutonium. It was planned that the bulk of this would be used as MOX fuel but the program was suspended and how it will be disposed of in

	dissipated through radiation decay, 0.4 tons were received from overseas for research reactors, and 7.8 tons were irradiated, the total stockpile is 87.6 tons. According to the figures announced in INFCIRC/549 Add.6/25 (the latest of which were as of September 15, 2023) the amount for non-military use is 49.4 tons. Therefore, the remaining amount for military use is 38.2 tons.	the future remains undecided. According to the figures announced in INFCIRC/549/Add.6/25 (the latest of which were as of September 15, 2023) the total amount for non-military use is 49.4 tons.
France	**6.0**	**91.9**
	The production of plutonium for military use began in 1956 and was halted by 1992. Three production reactors (G1, G2, and G3) were located in Marcoule, all of which are graphite gas reactors. In addition, the fast reactor Phenix, which reached criticality in 1973, produced 340kg of plutonium for military use. Two tritium-producing reactors were also in operation in Marcoule. These nuclear reactors produced between 0.7 to 0.8 tons of weapons-grade plutonium, and were all closed down in December 2009. The previously produced amounts have not been made public but are thought to be 6-8 tons. One ton was used in nuclear testing so the current stockpile is between 5-7 tons.	The amount of plutonium for civilian use is 91.9 tons. The stockpile figures are published on September 7, 2023(INFCIRC/549/Add.5/27). France operates large-scale civilian reprocessing plants (1,700ton U/year). The plants have reprocessed fuel on behalf of Germany and Japan. Plutonium is now being recycled in light water reactors. France also stores 15 tons of reprocessed plutonium belonging to other nations.
China	**2.9**	**0.04**
	China had plutonium production reactors at two sites（Yumen, Guangyuan）, but it appears that production was terminated in or around 1989 (IPFM 2022). The total produced was 2.6-3.8 tons, of which 0.36 tons were used in nuclear tests (including production loss) and the current total stands at 2.3-3.5 tons.	Since 2010 a civilian reprocessing plant (50-60 tons U/year) has been in operation. The published amount of its plutonium stockpile is 40.9 kg (as of the end of 2016(INFCIRC549 a7-16), announced on October 18, 2017; there have been no announcements since 2017). China is currently constructing two reprocessing plants each with annual capacities of up to 200 tons per year.
UK	**3.2**	**116.4**
	The production bases of military use plutonium are concentrated at Sellafield. Sellafield is the site for six production reactors, (two at the Windscale Piles and four at the Calder Hall reactors) and reprocessing plants. The two Windscale Piles (air-cooled graphite-moderated reactors) were closed down following a graphite fire in 1957. The Calder Hall reactors produced military use plutonium until 1989. Small amounts of plutonium were exchanged with the US. The UK announced in April 18, 1995 that it had stopped the production of nuclear fissile material for nuclear explosives. It was announced in 1998 that the nation possesses 7.6 tons. The 4.1 tons of reactor-grade plutonium at the Sellafield reprocessing plant and 0.3 tons of weapons-grade plutonium were regarded as "excess" for weapons purposes. Thus the amount for nuclear weapons therefore stands at 3.2 tons.	The stockpile figure is as published on November 16, 2023 (INFCIRCa8-26) and includes 4.4 tons of excess weapons plutonium. The UK also stores 24.1 tons of plutonium belonging to other nations of which 21.757 tons is owned by Japan. The UK is now not subject to EURATOM safeguards having exited the EU. The overseas-owned plutonium it has is subject to IAEA safeguards. The UK operated two reprocessing plants at Sellafield, but the THORP plant was closed in 2018 and the B-205 plant that reprocessed spent nuclear fuel from Magnox reactors was also closed in 2022.

Israel	**0.85**	
	The estimated stockpile as of the end of 2022 was 0.75 tons to 0.95 tons. Production is currently underway at the Dimona nuclear facility.	
Pakistan	**0.5**	
	Pakistan's reprocessing plant is capable of producing 20-40 tons of plutonium per year. Currently the nation is constructing a reprocessing plant with a capability of 2.5 times this. Pakistan's current stockpile is estimated at 0.5 tons.	
India	**9.9**	**0.4**
	The production of plutonium for military use is still carried out at two research reactors （CIRUS[40MWt], Dhruva[100MWt]) at the Bhabha Atomic Research Centre (BARC). In addition, a new 100 MWt reactor is planned for construction in Visakhapatnam, Production is currently underway and the amount for weapons use is 0.54–0.86 tons. Furthermore, India possesses between 3.9 tons to 14.5 tons of reactor-grade plutonium that has been separated from heavy water reactor fuel and earmarked for potential strategic use in the future. This plutonium is not under safeguards, and while at present it will not be directly switched to military use, it is thought to be a strategic stockpile for weapons production in the future. And it is possible that two tons of it have already been processed into fuel to be used in the future for manufacturing weapons or as a fuel in weapons-grade plutonium-producing fast breeder reactors.	The plutonium has been extracted from heavy water reactors operating under the IAEA safeguards agreement. There are plans to construct a reprocessing plant to make fuel for fast reactors in the future.
North Korea	**0.04**	
	North Korea reported to China in June 2008 that it possessed 31-37kg. According to the estimates of Kang et al. (2021), the estimated stockpile is between 24kg and 41kg. The 2023 International Panel of Fissile Materials (IPFM) estimate is 40kg.	
Japan		**45.1**
		Japan's total plutonium stockpile is 45.1 tons. Japan has 9.3 tons in Japan, and 35.9 tons overseas (21.8 tons in the UK and 14.1 tons in France) (published on August 14, 2023(INFCIRC/549/Add.1/26), domestically announced by the Japan Atomic Energy Commission (AEC) on July 18, 2023). The large-scale Rokkasho Reprocessing Plant with the capacity to reprocess 800 tons of spent fuel per year is expected to be completed in 2024.
Germany		**0.0**
		The amount of separated plutonium in Germany is zero.

		The stockpile figures are published as of August 31, 2023(INFCIRC/549/Add.2/26). Inventory stored in other countries is not disclosed.
Other Non-nuclear Weapon Countries *		**2.5**
Total	**150**	**410**

* The amount of 2.3 tons are stored in the UK and 0.2 tons in France, but the amount held by each country is unknown (Podvig [2023]).

*Owned by Switzerland (published on January 25, 2023 (2kg,infcirc549a4-27)), Spain, Netherlands, Germany, Belgium, all of which are stored in foreign countries (IPFM2023).

The stockpile of fissile materials includes estimated ones with different isotopic composition and with large uncertainties, and thus total quantities are expressed in rounded numbers.

Chinese inventory was as of the end of 2016, and no data has been published since then.