

# France

Date of first nuclear explosion- 13 February 1960

## 1. Amount, Location, and Operational Plan of Nuclear Weapons

Delivery System	No. de- ployed	Range (km)	Yield (kt)	Warheads in stockpile
<i>Carrier-based aircraft/Missile</i>				
Super Étendard/ASMP	24	650	300	10
<i>Land-based aircraft/Missile</i>				
Mirage 2000N/ASMP	60	2,750	300	50
<i>SLBMs</i>				
M45	48	6,000	100	288
Total				348

France's nuclear force consists mainly of its four nuclear-powered ballistic missile submarines (SSBNs), three of which are deployed with sets of 16 submarine-launched ballistic missiles (SLBMs), with a capacity of 6 warheads each. The fourth and final Triomphant Class SSBN, Le Terrible, will replace L'Inflexible in 2010 with the M51 SLBM. France maintains approximately 60 air-to-surface supersonic missiles (ASMP) carried by fighter/bomber aircraft. France is also the only country to continue to deploy nuclear weapons on aircraft carriers, and the *Charles de Gaulle* carries a squadron of Super Étendards, thought to carry about 10 ASMPs.

<http://first.sipri.org/>; and Robert S. Norris and Hans M. Kristensen, "French Nuclear Forces 2005" from *NRDC: Nuclear Notebook*, in *Bulletin of the Atomic Scientists*, July/August 2005, volume 61(4), pp 73-75.

### Nuclear Weapon Deployment/Storage Sites

Luxeuil les Bains- Mirage 2000 aircraft base and nuclear weapons storage site

Istres- Mirage 2000 aircraft base and nuclear weapons storage site

Landivisiau- Super Étendard aircraft

L'Ile Longue: SSBN bases

Toulon: *Charles de Gaulle* homeport naval base and nuclear weapons storage site

Robert S. Norris and Hans M. Kristensen, "French Nuclear Forces 2005" from *NRDC: Nuclear Notebook*, in *Bulletin of the Atomic Scientists*, July/August 2005, volume 61(4), pp 73-75.

<http://abolition2000europe.org/index.php?op=ViewArticle&articleId=108&blogId=1>

### The Role of Nuclear Weapons in National Security Strategy

Nuclear deterrence remains a central component of French national defense, as outlined in the 1994 White Paper on Defense, Appended report 2003-2008 Military programme, "Arms control, disarmament, and non-proliferation: French policy." [http://www.defense.gouv.fr/actualites/dossier/d54/sommaire\\_ang.html](http://www.defense.gouv.fr/actualites/dossier/d54/sommaire_ang.html)

Speaking at the Ile Longue nuclear submarine base in Brittany on 19 January, 2006, President Jacques Chirac said France was willing to use nuclear weapons as "a firm and appropriate response from us" to an attack on France's "vital interests". Chirac explicitly asserted that France has reconfigured its nuclear forces in preparation for a tactical nuclear strike against any country that it concludes has sponsored an act of terrorism against France, or has used weapons of mass destruction against France.

President Chirac also outlined the role of nuclear weapons in French national security in a speech before L'Institut des Hautes Études de la Défense Nationale, École Militaire, Paris, 8 June 2001, including the following excerpt:

“Nuclear deterrence is first of all a major factor of international stability. It is due to this deterrence that Europe has been preserved for more than fifty years from the ravages it had known in the course of the 20th century. Demanding restraint, calling for reason, the credible nuclear threat commands the peace... Our nuclear forces are not directed against any country, and we have always refused that the nuclear weapon be considered as a battle weapon used in a military strategy... At the very time when considerable arsenals still exist and others are being developed in various parts of the world, this guarantee remains fundamental...What I am affirming before you is that France, while remaining faithful to its concept of non-use, has and will conserve the means of maintaining the credibility of its deterrence in face of all new threats...”

## 2. Compliance with Article VI of NPT

### **Nuclear Weapons Modernization/Vertical Proliferation**

France is planning to develop and deploy new nuclear weapons for use through 2040, and shows no signs of planning to give up its arsenal. In February 1996, French President Jacques Chirac announced plans to consolidate French nuclear forces and develop a new generation of nuclear weapons. France presented a five-year military strategy in 2002, adopted in 2003, that essentially extends these plans. France has a highly advanced program to develop the capability to design and manufacture modified or new nuclear weapons without explosive nuclear testing. Notably, with the Laser Megajoule scheduled to be fully operational in 2011, France and the United States are the only states seeking to induce miniature thermonuclear explosions in contained vessels in giant laser facilities.

### **Weapons Systems Modernization**

#### *Submarine Upgrades*

France is building its fourth Triomphant-class nuclear-powered ballistic missile submarine (SSBN) now. It is scheduled for deployment in 2010. France is also developing two new missiles, the M51.1 and M51.2, scheduled for 2010 and 2015 deployment respectively, to replace the M45s. Although France had planned to equip this new missile with an entirely new warhead, it decided to use an upgraded Tête Nucléaire Oceanique (TNO).

#### *Bomber Upgrades*

France is developing a longer-range version of its air-to-surface missiles, or Air-Sol-Moyenne Portée (ASMP), the ASMP-A. The ASMP-A will be equipped with a new warhead, the Tête Nucléaire Aeroportée (TNA). France is also developing a new multi-purpose fighter-bomber, the Rafale, which will have both conventional and nuclear missions. The nuclear-equipped squadron (a configuration called the F-3) is scheduled to be deployed in 2008. France eventually intends to replace all its Mirage aircraft with the Rafale, and has already ordered 243 aircraft for the airforce and 60 for the navy.

### **Nuclear Weapons Reductions**

France undertook major reductions and terminations in 1991-1992 and in 1996-1997.

#### **The 1991 and 1992 measures include:**

- abandonment of the strategic surface-to-surface S45 missile program, which had been intended to replace the S3D missiles on the Plateau d'Albion;
- early withdrawal of the Pluton short-range surface-to-surface missiles;
- dismantling of the AN52 nuclear bombs carried by Jaguar and Mirage III aircraft;
- reduction in the SSBNs in service from 6 to 5, and a longer production timetable for new generation SSBNs;
- a cut in the Hadès short-range surface-to-surface missile program from 120 to 130 units; &
- the decision to store rather than deploy this weapons system.

#### **The 1996 measures include:**

- limiting SSBNs maintained in the operational cycle to 4;
- withdrawing the Mirage IV strategic aircraft from nuclear missions; and

- withdrawing from service the surface-to-surface component on the Plateau d'Albion, the closure of this site and the final withdrawal of the Hadès weapon system, followed by the dismantling of its missiles.

France is now the only nuclear weapon state to have totally eliminated its formerly deployed surface-to-surface nuclear weapon systems.

Since the end of the Cold War, the total number of delivery vehicles has been cut by over half.

#### **Reducing the nuclear budget:**

- the share of the defense budget allocated to nuclear expenditure has been reduced by 58% since 1990; and
- the defense budget share in 2005 is 20.7% of the defense equipment budget.

<http://www.mvtpaix.org>

#### **The cessation of all nuclear testing and the dismantling of the installations of the Pacific test site:**

- following the unilateral moratorium on nuclear tests decided in April 1992 and after a final series of tests, France, on 29 January 1996, announced the cessation of all nuclear testing; &
- the complete dismantling of the testing facilities in the Pacific has been announced as early of 22 February 1996 and completed by the end of July 1998.

France is the only nuclear weapon state to have closed down and dismantled its nuclear testing facilities.

### **3. Location and Capability of Nuclear Facilities**

#### **Power Reactors**

Operational: 59  
Shut down: 11  
Decommissioned: 0  
Planned: 0

<http://www.iaea.or.at/programmes/a2/>

#### **Research Reactors**

Operational: 14  
Shut down: 12  
Decommissioned: 5  
Planned: 1

<http://www.iaea.or.at/worldatom/trdb/>

#### **Other nuclear facilities**

CEA laser-based uranium enrichment research (SILVA)  
AREVA NC\* MOX fuel fabrication plant, Cadarache (Bouches-du-Rhône)  
MELOX MOX fuel fabrication plant, Marcoule (Gard)  
AREVA NC/SICN nuclear fuel fabrication plant, Veurey-Voroize (Isère)  
FBFC nuclear fuel fabrication plant, Romans-sur-Isère (Drôme)  
AREVA NC EURODIF enrichment plant, Tricastin (Drôme)  
AREVA NC EURODIF George Besse II centrifuge enrichment plant project, Tricastin (Drôme)  
Comurhex uranium conversion plant, Malvési (Aude)  
Comurhex uranium conversion plant, Pierrelatte (Drôme)  
AREVA NC Pierrelatte TU5 conversion facility (Drôme)  
AREVA NC nuclear spent fuel reprocessing facilities (La Hague)  
Nuclear weapon research or production site (Limeil)  
Megajoule Laser LMJ, Centre d'Etudes Scientifiques et Techniques d'Aquitaine (Le Barp)  
Nuclear weapon computer simulation testing facility, Ile-de-France Center (Bruyères-le-Châtel)  
Sub-critical testing facility (Moronvilliers)

<http://www.antenna.nl/wise/uranium/epfr.html>

\*In spring 2006, COGEMA changed its name to AREVA NC.

At Marcoule, the production of plutonium has been halted but tritium production continues. The clean-

up of the site requires the elimination of the stock of waste produced by the nuclear fuel reprocessing plant. <http://www.globalsecurity.org/wmd/world/france/marcoule.htm>

#### 4. Fissile Material Holdings

France suspended weapons-grade plutonium production in 1992 (Marcoule) and HEU production in 1996 (Pierrelatte uranium enrichment plant), the first State to do so.

##### Military Stocks of Fissile Material

Plutonium: 5 tons

HEU: 29 tons

<http://first.sipri.org/>; [http://www.isis-online.org/global\\_stocks/military\\_excess\\_heu.html](http://www.isis-online.org/global_stocks/military_excess_heu.html)

**Declared Excess:** 0

**Unseparated Civil Plutonium:** 183 tons

**Separated Civil Plutonium:** 80.1 tons: (48.1 tons nationally-owned, 32 tons foreign-owned)

Estimated by 2010: 48 tons nationally-owned

Estimated by 2015: 46 tons nationally-owned

Estimated by 2020: 43 tons nationally-owned

[http://www.isis-online.org/global\\_stocks/end2003/plutonium\\_watch2005.pdf](http://www.isis-online.org/global_stocks/end2003/plutonium_watch2005.pdf)

[http://www.isis-online.org/global\\_stocks/plutonium\\_watch2004.html](http://www.isis-online.org/global_stocks/plutonium_watch2004.html)

By significantly increasing the fraction of fresh plutonium put into MOX fuel, France will have a large separated plutonium stock well into the future.

[http://www.isis-online.org/global\\_stocks/separated\\_civil\\_pu.html](http://www.isis-online.org/global_stocks/separated_civil_pu.html)

**Civil HEU:** 4.0-5.3 tons

[http://www.isis-online.org/global\\_stocks/end2003/civil\\_heu\\_watch2005.pdf](http://www.isis-online.org/global_stocks/end2003/civil_heu_watch2005.pdf)

##### Waste Management

*Low- and Medium-level waste:* Since 1992, the Centre de l'Aube Disposal Facility is currently France's site for LLW disposal. From 1969 to 1994, France used the Manche Disposal Facility to store LLM and MLW, but it is now full.

*High-level waste:* Spent nuclear fuel is kept for one year on site in specially constructed storage pools. Following storage, spent nuclear fuel is transported to the La Hague and Marcoule reprocessing plants and stored in pools for two to three years. High-level reprocessed waste is vitrified (solidified) and stored at La Hague for several decades, where it awaits final geologic disposal.

The French Waste Management Research Act of December 1991 authorized 15-year studies of three management options for HLW, including separation and/or transmutation, long-term storage, and geologic disposal. A site at Bure (Meuse) under consideration for deep geologic disposal in clay is currently being studied. The French were also searching for a granite site to research, but strong opposition from all 15 candidate sites in the West of France forced the government to suspend the search in mid-2006.

<http://www.ocrwm.doe.gov/factsheets/doeymp0411.shtml>

[http://www.francenuc.org/en\\_chn/waste\\_disp\\_e.htm](http://www.francenuc.org/en_chn/waste_disp_e.htm)

#### 5. Nuclear Activities

##### Nuclear Research Centers

BIOCLIM - Modelling Sequential Biosphere Systems under Climate Change for Radioactive Waste Disposal

BRGM - Bureau de recherches géologiques et minières

CEA  
CEA - Cadarache  
CEA - Direction des Sciences de la Matière  
CEA - DIST  
CEA - Technologies Avancées  
CECAM - Centre Européen de Calcul Atomique et Moléculaire  
CENBG - Centre d'études nucléaires de Bordeaux Gradignan  
CEPN - Centre d'étude sur l'Evaluation de la Protection dans le domaine Nucleaire  
CESEN - Cercle d'étude sur l'énergie nucléaire  
CNE - Commission nationale d'évaluation  
CNRS - Centre National de la Recherche Scientifique  
CRPG - Centre de Recherches Petrographiques et Geochimiques  
EDF Research Division  
ESRF - European Synchrotron Radiation Facility  
EVARISTE - Etude et Valorisation des Activités de Recherche et d'Innovation Scientifique et Technique pour les Entreprises  
GANIL - Grand Accélérateur National d'Ions Lourds  
GdR FORPRO - Groupement de Recherches FORMations géologiques PROfondes  
Grenoble Hybrid Reactors Group  
ILL - Institute Laue-Langevin  
INERIS - Institut National de l'Environnement Industriel et des Risques  
L'Institut de Physique Nucléaire d'Orsay  
LLB - Laboratoire Léon Brillouin  
LURE - Laboratoire Français de rayonnement synchrotron  
La Recherche  
<http://www.radwaste.org/research.htm>

### **Nuclear Cooperation**

*Bulgaria:* Agreement on nuclear power and safety.

*China:* France has had nine different nuclear cooperation agreements with China from 1978 to 1994, including on nuclear energy, nuclear safety, nuclear power supply and nuclear technology for "peaceful purposes". <http://www.nti.org/db/china/nca.htm>

*Germany:* France is cooperating with Germany on a program converting Russian weapon-grade plutonium into MOX\* fuel for civilian plants. <http://www.globalsecurity.org/wmd/world/france/nuke.htm>

*India:* (February 2006) France and India signed an agreement to pursue nuclear cooperation "for peaceful purposes", but a more detailed agreement will not be possible until after the results of the pending US-India nuclear agreement. In the meantime, France will surely be supporting India's pursuit of access to nuclear fuel and civilian technology.

*Libya:* (March 2006) Agreement on cooperation in civilian nuclear technologies.  
[http://www.armscontrol.org/act/2006\\_04/francelibya.asp](http://www.armscontrol.org/act/2006_04/francelibya.asp)

*Pakistan:* Cooperation in nuclear technology for agriculture, medicine, the environment, industry, and radiation protection.

*Russia:* France is participating in dismantling Russian nuclear weapons by providing machine tools, radiological equipment, containers, and a storage building, contributing 70 million Euro to the project. France is cooperating with Germany on a program converting weapon-grade plutonium into MOX\* fuel for civilian plants. <http://www.globalsecurity.org/wmd/world/france/nuke.htm>

*Ukraine*: Cooperation in nuclear fuel cycle and waste treatment techniques.

*US*: Agreement (24 August 2004) to provide DOE access to the PHENIX fast spectrum test reactor.

*Vietnam*: Agreement (26 May 2004) to cooperate on the construction of a nuclear power plant by 2020.

<http://www.world-nuclear.org/info/inf38.html>

## 6. International Non-proliferation Efforts

France is also a participant in the G8 Global Partnership against the spread of weapons and materials of mass destruction, launched in Kananaskis, Canada 2002.

### Treaties Signed and Ratified

African Nuclear-Weapon-Free Zone Treaty (Treaty of Pelindaba) Protocols I, with reservations, II & III, 31 July 1997

Antarctic Treaty, 16 September 1960

APM Convention, 23 July 1998

Biological and Toxin Weapons Convention, 27 September 1984

Certain Conventional Weapons Convention, 4 March 1988

Comprehensive Nuclear Test-Ban Treaty, 6 April 1998

Convention on the Physical Protection of Nuclear Material, 6 September 1991

Chemical Weapons Convention, 2 March 1995

Nuclear Non-Proliferation Treaty, 3 August 1992

Outer Space Treaty, 5 August 1970

South Pacific Nuclear Free Zone Treaty (Treaty of Rarotonga) Protocols 1 & 3, 20 September 1996

Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (Treaty of Tlatelolco) Protocols I & II, with reservations, 24 August 1992 & 22 March 1974, respectively

France ratified the IAEA Additional Protocol on 10 April 2004.

### Multilateral Groups

Australia Group

Conference on Disarmament

Hague Code of Conduct against Ballistic Missile Proliferation

International Atomic Energy Agency

Missile Technology Control Regime

Nuclear Suppliers Group

Proliferation Security Initiative

Wassenaar Arrangement

Zangger Committee

<http://first.sipri.org/>

## 7. Positions Taken in International Fora on Various Issues of Nuclear Disarmament

*Nuclear Deterrence*: “Since the end of the Cold War, French deterrence doctrine has gone through several stages of its formulation without any changes in its foundations: the "White Book" of 1994, the President of the Republic's speech of August 1995, that of the 8th of June 2001 at the IHEDN, and lastly, the 19th January 2006 speech... The President of the Republic recalled that the fundamental principles of deterrence have not changed. The calling of French deterrence is to secure the vital interests of France against any threat, irrespective of where it may come from and what form it may take. In the framework of this concept, French nuclear weapons are not weapons to be used in a battle. Our concept remains the same; in no case shall there be question of using nuclear means with military aims in a conflict.” - **Statement by Ambassador François Rivasseau to the Conference on Disarmament, 7**

**February 2006.** [http://www.reachingcriticalwill.org/political/cd/speeches06/7FebFrance\\_Eng.pdf](http://www.reachingcriticalwill.org/political/cd/speeches06/7FebFrance_Eng.pdf)

*Nuclear Disarmament:* "I would remind you that France has always underlined the considerable imbalance between the strategic nuclear forces of Russia and the United States and its own, but that, should that imbalance be altered following successive reductions, it might envisage drawing the consequences of this." - **Statement by Ambassador François Rivasseau to the 2005 NPT Review Conference New York, 19 May 2005.** <http://www.reachingcriticalwill.org/legal/npt/RevCon05/MCI/France19.pdf>

*Article VI Implementation:* In implementing its commitments concretely, France is guided in particular by the programme of action decided at the time of the NPT's indefinite extension in 1995. That programme's three points were: conclusion of the CTBT, negotiation of the Fissile Material Cutoff Treaty (FMCT), and a determination to press forward systematically and progressively towards the reduction of nuclear weapons globally and to work for general and complete disarmament." - **Statement by Ambassador François Rivasseau to the 2005 NPT Review Conference New York, 19 May 2005.** <http://www.reachingcriticalwill.org/legal/npt/RevCon05/MCI/France19.pdf>

*Security Assurances:* "Must I also recall that France reaffirmed and specified in 1995 the security guarantees to non-nuclear weapon States that are parties to the NPT? The French delegation, as well as that of other nuclear powers, provides in particular negative security guaranteed to these States. As we had then said, this does naturally in no way affect our right, natural, of legitimate defense, as recalled in article 51 of the United Nations Charter." - **Statement by Ambassador François Rivasseau to the Conference on Disarmament, 7 February 2006.** [http://www.reachingcriticalwill.org/political/cd/speeches06/7FebFrance\\_Eng.pdf](http://www.reachingcriticalwill.org/political/cd/speeches06/7FebFrance_Eng.pdf)

*Non-compliance:* "The Security Council has a central role in addressing cases of proliferation in the last resort and to give an opinion on their implications for the maintenance of international peace and security. It would be useful for the Conference to call for the strengthening of ties between the Council and the IAEA... Failure to fulfill non-proliferation obligations will inevitably have repercussions on the conduct of nuclear cooperation. France recommends that from now on such cooperation be suspended until suitable corrective measures are implemented by the State concerned under the IAEA's control." - **Statement by Ambassador François Rivasseau to the 2005 NPT Review Conference, New York, 5 May 2005.** <http://www.un.org/events/npt2005/statements/npt05france.pdf>

*Export Controls:* "[T]he role played by the Zangger committee in the implementation of the provisions of article III-2 is to be welcomed. This Committee could in fact undertake some initiatives with a view to universalizing the general principles governing export control. However, the rules for controlling exports must be adapted and strictly consistent with all the obligations imposed by the Treaty. It is this constant goal concern that guides France in the actions it undertakes among the Nuclear Suppliers Group..." - **Statement by Ambassador Patrick Villemur to the 2005 NPT Review Conference, Main Committee II, New York, 20 May 2005.** <http://www.reachingcriticalwill.org/legal/npt/RevCon05/MCII/france20.pdf>

*Article IV:* "Though my country recognises the inalienable right of States--enshrined in article IV of the NPT--to benefit from the development of nuclear energy for peaceful ends and from international cooperation in this field, it nevertheless considers that this right can only be legitimately exercised through the scrupulous respect of the provisions of articles I and II and the safeguard provisions contained in article III of the Treaty, this being a fundamental condition for installing a climate of confidence. On the other hand, the right to nuclear energy may only be exercised if a State is pursuing, in compliance with the principle of good faith, "peaceful purposes". - **Statement by Ambassador Patrick Villemur to the 2005 NPT Review Conference, Main Committee III, New York, 19 May 2005.** <http://www.reachingcriticalwill.org/legal/npt/RevCon05/MCIII/France.pdf>

*Fuel cycle:* "France, together with other States, is seeking to promote the adoption of the additional protocol as a condition for supplying and exporting the most sensitive technologies and products

relating to the fuel cycle. - **Statement by Ambassador Patrick Villemur to the 2005 NPT Review Conference, Main Committee III, New York, 19 May 2005.** <http://www.reachingcriticalwill.org/legal/npt/RevCon05/MCIII/France.pdf>

*Universality:* "[D]o I need to remind you of the importance of the issue of the NPT's universality? ... It is desirable that we should, as of now and through dialogue, bring India, Israel and Pakistan to com as close as possible to international standards for non-proliferation and export controls." - **Statement by Ambassador François Rivasseau to the 2005 NPT Review Conference, New York, 5 May 2005.** <http://www.un.org/events/npt2005/statements/npt05france.pdf>