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**ADVANCE IN THE IMPLEMENTATION OF THE FRENCH SPACE  
LAW ON SPACE OPERATIONS IN THE LAUNCHER FIELD**

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ABSTRACT

This publication provides a presentation of the main objectives of the new French Law on spatial operations, and gives an overview of the institutional and legal framework implemented in accordance with the law. The law, adopted in June 2008, institutes a clarified legal regime for launch operations, clarifies the responsibilities of operators and the limit associated with these responsibilities, institutes a new regime of authorizations. The aim of the authorization regime is to check that activities are performed with a good control of risks towards humans beings, human health, properties and environment ( on ground, and exo-atmospheric), in agreement with international treaties adopted by France in these topics.

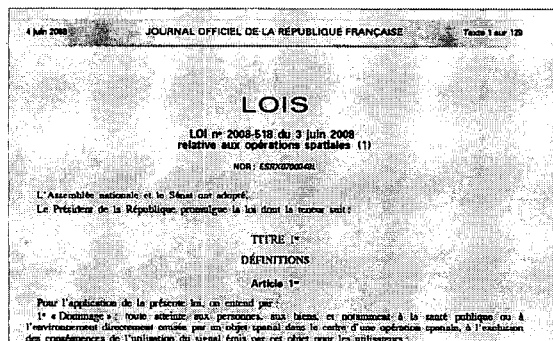
In the field of launchers, the presentation will show how the logic of control of risk gained and matured on thirty years of Ariane's activities has led to propose a Technical Regulation, applicable for launcher activities. A brief presentation of the advancement of the Technical Regulation will be made. This law will lead to reinforce the reliability of European launchers.

REFERENCE

French Space Operations Act June 3rd 2008 - n°2008-518.

Decree no. 2009-643 on the authorizations issued in accordance with French Act no. 2008-518 of 3rd June 2008 relative to space operations.

Decree no. 2009-644 amending decree no. 84-510 of 28th June 1984 relating to the Centre National d'Etudes Spatiales (French space agency).



## 1- INTRODUCTION

France adopted a domestic legislation on Space operations on June 3rd 2009. This paper reminds the International, European and National legal context that lead to this new framework, describes the law making process engaged since late 90's, and then presents such French Act scope and main features, including its Technical Regulation guidelines. However, this paper focuses only on space launching activities performed under French Governmental Responsibility or Liability.

In few words, the general purpose of this French Space Operation Act (hereafter FSOA) is to set up a coherent national regime of authorization and control of Space operations under the French jurisdiction or for which the French Government bears international liability either under UN Treaties principles (namely the 1967 Outer Space Treaty, the 1972 Liability Convention and the 1976 Registration Convention) or in accordance with its European commitments with the ESA organization and its Members States.

## 2 – THE FSOA'S INTERNATIONAL, EUROPEAN AND DOMESTIC LEGAL SOURCES

### 2.1 - UN International treaties

France as any State Party of the 1967 Outer Space Treaty is bound by obligations specified in articles VI and VIII to authorize and to control national space activities carried out by its national non-governmental entities (private companies) and to exercise its full jurisdiction and control on its registered Space Objects.

In addition, as a “Launching State” on the basis of the 1972 Liability Convention, France potentially bears at the first level, i.e. toward victims, the full burden of indemnification for damage that could be caused to third parties:

- on ground or Air Space, by a French private space Launch Service Provider (Arianespace, Starsem...), or;
- by any launch service provider operating from the French territory or jurisdiction (especially from the

Guiana Space Center, the European Launch Base, under French territory) or;

- by any French satellite operator that procures a launch service from a foreign country or to a foreign company (example: Eutelsat having one's satellite launched from Russia or by Sea Launch...);

French Government's liability can also be retained, without any time limit, for damage, in orbit or on earth reentry, caused by a foreign satellite having being launched under French responsibility without having being registered by their appropriate State.

All these UN's commitments (the 1967 Outer Space Treaty, the 1972 Liability Convention and the 1976 Registration Convention...), as regularly signed, ratified and published in the “Journal officiel de la République française”, have had being directly enforceable under French jurisdiction, without any other formality. The rising issue then was not so much the lack of any domestic Space legislation in France than the necessity to provide common and predictable implementing measures for any new activity.

### 2.2 - The existing European and domestic legal framework for launching services from Guiana Space Center since 1976

Le Guyana Space Center (GSC), is a French launch base, set up in the mid 60's, to follow up national launcher programs (the “Diamant” family of third stage, liquid propellant space launcher, inaugurated in 1965) when leaving its first launching facilities in Algeria (independent State in 1962).

By the same time, GSC was declared open to international and European cooperation by De Gaulle President (official speech, in Cayenne on 1964, March 21 st). In 1965, GSC was proposed by CNES for use to the European Launcher Development Organization (ELDO), an ESA former organization, which was developing the “Europa II Launcher” program, (whose first launches were tested from Woomera Launch base - Australia). This first European launcher program was finally stopped in 1972 after a serial of launching failure which leads to the dissolution of ELDO.

Such decision was taken the 31<sup>st</sup> of July 1973 during the VI<sup>o</sup> European Space Conference altogether with the dissolution of the European Satellite Research Organization (ESRO), the creation of the European Space Agency (effective in 1975), and the Ariane program development whose management was specially delegated to CNES (Ariane Arrangement signed on 21 September 1973).

In such context, the French Government and the European Space Agency signed an agreement relating to CSG on 1976 May 5<sup>th</sup>.

Under this framework agreement:

- ESA recognize the French government has delegated to CNES, the French Space Agency, its responsibilities over the general safety, security and base management at the GSC;
- France and ESA set up sharing indemnification rules for damages caused by launchers operated from CSG under which: ESA will be liable for a damage caused by its own launchers programs (Ariane 1 development, before its qualification flight) or by its defecting satellites – France for other damage (in particular after 1980, for damage caused by Ariane launch during its future Production Phase).
- France and ESA shared the financial burden of the launch base maintenance costs on a 1/3 – 2/3 basis.

Another inter-governmental treaty was signed on 14 January 1980 by the European government participating to the Ariane production phase (which comprises the manufacturing, the marketing and the launching of the launcher...) to specify the liability regime of Ariane to be operated by the private operator Arianespace. This agreement, named “Ariane Production Declaration”, reaffirms the full and exclusive liability of the French government as a Launching State under the UN 1972 Liability Convention. Arianespace on its side is required to reimburse the French government its indemnifications within a ceiling of 60 M€. ESA on its side is entrusted by the European State Participants to conclude a convention with Arianespace to implement this Declaration.

Eutelsat organization, a former intergovernmental organization for satellite telecommunication (construed on the same model as former Intelsat) has been governed by its international public statute before its privatization in 2001. Responsibility and compensation for third party liability caused by its activities are borne by its Member States.

By the end of 90's, the privatization of these operators having their main office and center of activities in France and the perspectives to open GSC to other launchers than Ariane (namely Soyuz) will conduct on studies on the opportunity to propose a national legislation for space activities.

### 3- THE FRENCH SPACE OPERATION ACT LAW MAKING ON PROCESS

First discussions started in 1999 between French and Russian officials on the opportunity to open the GSC to other launcher than Ariane (in particular Soyuz from Russia). Its leads to a special intergovernmental agreement signed on November 2003 between both Prime ministers.

In parallel, a first appraisal report “on the evolution of Space Law in France” was issued by the Ministry of Research (in charge of space affairs) in 2003. Such

study was based on a work carried out over eighteen months by four groups respectively specialized in the launch services, Earth observation by satellite, Space radio communication and navigation by satellite and ownership and securities on Space objects. These four groups have mobilised, the contribution of over one hundred experts or representatives of the main ministries or public and private organism concerned by Space activities, in France and abroad. The minister, Claudie Haignere then concluded on the necessity to setting up a legal regime specific to space activities. She also reaffirmed its will to preserve a strong role for CNES in such context.

Few months later, the Prime minister officially seized the Council of State in order to conduct thorough consultations and legal studies on this field. The Council published a positive report appending a first draft of a Space Act project in 2006.

After a three month period for Governmental instruction process, the first official draft was issued by the end of April 2007.

The text was firstly submitted to the French Senate which discussed and adopted it after few amendments on 16 January 2008<sup>1</sup>. Secondly it was discussed and amended by the National Assembly on 9 April 2008<sup>2</sup>

The French Space Operation Act (SOA) was finally adopted by French Senate on 22nd May 2008<sup>3</sup> after a thorough Parliamentary consultation process.

It was the enacted by French President on June 3rd 2008 and published in the «French Republic Official Journal » on June 4<sup>th</sup>.

The two implementing decrees, one specifying the authorisation and control regime for Space activities the other on CNES responsibilities, were enacted by the Government on June 9th 2009 and published in the «French Republic Official Journal » on June 10<sup>th</sup>.

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<sup>1</sup> Projet de loi N° 297 (2006-2007) rapport de M. Henri Revol, au nom de la Commission des affaires économiques, n° 161 (2006-2007)

<sup>2</sup> Projet de loi adopté par le Sénat, n° 614 rapport de M. Pierre Lasbordes, au nom de la Commission des affaires économiques, n° 775.

<sup>3</sup> Projet de loi N° 272 (2007-2008), rapport de M. Henri Revol, au nom de la Commission des affaires économiques, n° 328.

## 4 Operation Act SOA Main features

### 4.1 Concerned activities : definition – perimeter

Although SOA affects all space operations, this paper is only dedicated to the launch activities. In orbit control and earth return is also concerned by this law but will not be treated in this paper.

A certain number of definitions are given in the SOA. These definitions help to define the perimeter of application of the Space Operation Act :

- Definition of “Space operation” (SOA art 1) : « any activity consisting in launching or attempting to launch an object in outer space, or of ensuring the command of a space object during its journey in outer space, including the Moon and other Celestial Bodies, as well as during its return on Earth ».
- Definition of the « operator » (art 1.): “any entity carrying out, under its responsibility and in an independent way, a space operation (i.e. Arianespace, Eutelsat)”. Not a subcontractor under operator’s authority.

Definition of “Launching Phase” and “Phase of Command” in art. 1.4 and 1.5.

- “Launching phase”: the period of time which, as part of a space operation, starts at the moment when the launching operations become irreversible and which, without prejudice to provisions contained, if necessary, in the authorization granted pursuant to the present act, ends when the object to be put in outer space is separated from its launch vehicle.
- “Command phase”: the period of time starting as part of a space operation at the moment when the object to be put in outer space is separated from its launch vehicle and ending when the first of the following events occurs :
  - when the final maneuvers for de-orbiting and the passivation activities have been completed;
  - when the operator has lost control over the space object ;
  - the return to Earth or the full disintegration of the space object into the atmosphere.

In this act, there is no specific reference to: human flights - activities in the Moon and other Celestial Bodies.

## 4.2 SOA authorization and control regime

4.2.1 General principles : Authorizations are granted by the research ministry in charge of Outer Space Affairs (art. 1 Authorization Decree) after completion of the following process :

- An administrative review by the ministry in charge of outer space affairs so that the ministry shall assess moral, financial and professional guarantees of the operator.
- A technical review of the Space system definition and procedures to be carried out by the applicant, in order to check the compliance with the technical regulation issued by the ministry in charge of outer space affairs. The technical assessment related to the operation is delegated to CNES (article 4). Exemptions of technical assessment (see art. 4.4 for foreign operations) may be granted by the ministry.

Operations carried out by CNES in the scope of a “public mission” (Governmental programs, Science, development of space systems...), are not subjected to this authorization process. Nonetheless CNES apply the technical regulation, and check its application through internal procedures on a voluntary basis. It makes sure also that none of its activities could interfere or rise any conflicts of interest with its responsibilities on FSAO implementation.

### 4.2.2 Specific regime

Two specific regimes are covered by the SOA :

- Launch from a foreign country :
  - Foreign Launch services purchased by a French satellite operator (vs. application of domestic legislation or technical regulations, see art. 4.4 SOA).

For an authorization application related to an operation to be carried out from the territory of a foreign State or from means or facilities falling under the jurisdiction of a foreign State, the Ministry in charge of outer space affairs may exempt the applicant from all or any part of the compliance assessment with the technical regulations when the national (national operators contracts, liability ceilings) and international commitments (UN treaties, bilateral agreements...) of that State, as well as its legislation and internal practices, provide sufficient guarantees regarding the safety of persons and property and the protection of public health and the environment, and regarding liability matters.

- Development phase :

A non mandatory “consultation regime” which is prior to and independent from the SOA formal authorization procedure is possible. This consultation enables CNES to certify systems or sub-systems under development at given milestones. Such certification issued by CNES may be used by the operator as enforceable document the authorization procedure to facilitate the granting of the overall authorization.

#### 4.2.3 Authorization / licenses

Simple authorization : every space operation is subject to authorization. In order to simplify the authorization procedures several type of licenses have been introduced.

Licenses certifying for a determined time period that a space operator satisfies moral, financial and professional guarantees may be granted by the administrative authority competent for issuing authorizations.

Licenses may also attest the compliance of the systems and procedures referred to the SOA with the technical regulations set forth. These license will lighten the file associated with a dedicated launch operation, by treating the recurrent part of it, covering the definition of the system. The license will not be worth authorization for launch operations. A complementary justification file covering all the aspects specific of the mission and the model used is required, for any launch operation.

#### 4.2.4 “Prescriptions” associated to authorization

Authorizations are granted on the basis of technical information available at the moment of the application. Technical key points will assessed after the granting of the authorization through specific “prescriptions”

The authorizations granted pursuant to the present act may include “prescriptions” set forth for the safety of persons and property, protection of public health and the environment, in particular in order to limit risks related to space debris.

Concerning the launching of the space object, the administrative authority, or the agents acting on its authority and empowered by it to this end, may at any moment give instructions and require any measures they consider necessary for the safety of persons and property, the protection of public health and the environment.

Such prescriptions shall mention in particular the conditions under which the agents commissioned

pursuant to article 7 of the SOA may control the preparation of the space operations (article 7 Draft Authorization Decree).

#### 4.2.5 Control

An “a posteriori” control regime based on specific prescriptions contained in the authorization/license is set up. State’s agents (including authorized CNES agents) are allowed to carry out the required controls in order to ensure that the operators comply with the obligations set forth in the aforementioned prescriptions :

- Visit and inspection of the buildings, offices and facilities from which the operations are undertaken, including the space object ;
- Requirement of any useful document or file
- Controls during the carrying out of the operation ;
- Technical administrative investigation in case of serious incident, or in case of an accident ;
- Measures considered as necessary to guarantee the safety of people and property, the protection of public health and the environment :
  - The ministry in charge of outer space affairs may take any emergency measures concerning the launching or and the on orbit command of a space object for the protection of people, goods, public health and the environment ;
  - Mission delegated to CNES President (Article 8 and article 21 SOA) ;
  - These measures can be prescribed before the carrying out of the operation (on ground) or during the carrying out of the operation.
- Sanctions
  - Possibility to withdraw or to suspend the authorizations in case of violation of the obligations established by the space legislation or of international treaties binding the French Government, or if some operations threaten the National Defense (article 9) ;
  - Penalties : administrative fines (up to 200.000€), namely :
    - Proceeding without authorization to the launching or the commanding of a space object ;
    - Proceeding to the launching or the commanding of a space object in breach of an administrative measure or court decision ordering its ceasing or suspension.

#### 4.3 Technical regulation

4.3.1 Purpose : The technical regulation is set forth, in particular for the safety of persons and property, the protection of public health and the environment.

4.3.2 Organization CNES is entitled by the SOA to assist the Government in the definition of the technical regulations relating to space operations;

The work on the technical regulation is ongoing. The work has been performed internally in CNES in a first phase, a second phase of large consultation of all concerned entities is ongoing (ministers, operators, insurers, industry, ESA).

4.3.3 Planning The technical regulation should be achieved by October 2009.

It shall be submitted to the European Commission pursuant to the information procedure related to the technical norms and regulations (Directive 98/34 CE June 22, 1998).

It should be enacted by the end of 2009.

4.3.4 Origin The technical regulation is based on the current practices of CNES in safeguards topics contained in the 'safeguards doctrine of CNES', and the 'code of conduct on debris mitigation'. These practices are very similar to the current best practices among international space community.

These safeguards practices applied on the European launcher for more than three decades, has led to no victim in or after flight operations, even in the context of some lost operations among which some were lost in the vicinity of the Guyana space port.

Benchmarking of other technical regulations has been performed either with other countries practices in space, or with other fields dealing with risky operations. This benchmarking process has helped to reinforce the approach.

4.3.5 Contain of the technical regulation

Although the technical regulation is not yet finished, its contain should cover the following topic, as some discussion are still on-going this list is not complete and subject to evolution :

- Glossary ;
- Good Practices Guide : a Good Practices Guide (GPG) is issued. The GPG gives an explanation of the Technical Regulation, and ways to fulfill the obligations of the Technical Regulation. This GPG is based on norms or guides proposed by the profession. The use of the GPG is in no way compulsory.
- Technical files to be prepared by the applicant:
  - The general notification of compliance with the technical regulations ;
  - The internal standards and quality management provisions applicable to the space operation to be conducted ;

- The danger analysis, including surveys of hazards and risk control plans, taken by the applicant to guarantee the safety of people and property and to protect public health and the environment ;
- The environmental impact studies and measures designed to avoid, reduce or offset the harmful effects on the environment, including ;
- The risk prevention plan relating to risks caused by the fall-back of the space object or fragments thereof ;
- the prevention plan relating to environmental damage, as defined in article L.161-1 of the environment code ;
- the space debris limitation plan ;
- the collision prevention plan ;
- as applicable, the nuclear safety plan ;
- as applicable, the planet protection plan ;
- The risk control measures planned during the performance of the space operation ;
- The emergency measures planned.
- Organization requirements in order to grant the management of risks.
- Technical requirements
  - Requirements concerning the ability for the system to perform its mission ;
  - Quantitative requirements as regard the risk of victim associated with the operation ;
  - Requirement concerning the fall of elements on land and ground ;
  - Requirements concerning the non creation of wreck ;
  - Requirement concerning the neutralization capacities ;
  - Space debris mitigations rules.

4.4 Specific regime for operation from CSG (Guyana Space Port)

The President of the Centre National d'Etudes Spatiales shall exercise on behalf of the State the special Police for the safe exploitation of the facilities of the Guiana Space Centre, within a perimeter defined by the competent administrative authority. As such, it

shall be in charge of a general mission of “safeguard” consisting in controlling the technical risks related to the preparation and carrying out of the launches from the Guiana Space Centre in order to ensure the safety of persons, property, public health and the environment, on the ground and during the flight, and it shall set out to this end the specific regulations applicable within the limits of the perimeter defined above.

Under the authority of the Government representative in the *Département* of Guiana, the President of the Centre National d’Etudes Spatiales shall coordinate the implementation by companies and other entities settled in the perimeter defined in part I. above of measures taken in order to ensure the security of the facilities and of the activities undertaken therein, and shall verify that those companies and agencies fulfil their obligations in this respect.

The President of the Centre National d’Etudes Spatiales may take for any space operation, by delegation of the administrative authority mentioned in Article 8 of the Act n° 2008-518 dated June 3<sup>rd</sup> relating to space operations, the necessary measures provided for in the same article to ensure the safety of persons and property, as well as the protection of public health and the environment”.

The president of the Centre National d’Etudes Spatiales shall be responsible for the special policing of the Guyana Space Centre.

To that end, he shall formulate the safeguard actions applicable to the facilities located within the perimeter of the Guyana Space Centre, in particular as regards the activities of designing, preparing, producing, storing and transporting space objects and their constitutive parts, as well as the tests and operations performed within the perimeter or out of the Guyana Space Centre.

The specific regulation applicable to the Guyana Space Port covers in particular risks during preparation before take-off, specific rules during flight imposed by the Space Guyana Configurations, specific procedures to deal with risk imposed by the space port.

The specific regulation applicable to the Guyana Space Port and the Technical Regulation are complementary regulation that must be considered together. CNES will organize its work in order to give coherent advices as regards both regulations.

#### 4.5 Operators rights and liability in connection with the FSOA authorization regime

##### 4.5.1 Impact of the Space Operations Act on the allocation of risks and liabilities between the French Government, the operators and the participants to a space operation or to the manufacturers of a space object

The burden of liability is concentrated on the sole Operator for damages caused by its space activities to

third parties (when the French jurisdiction is competent). The following solutions are retained:

- Absolute liability for damages on ground and in Air Space (idem 1972 Convention)
- Liability on a fault basis for damages caused in outer space (idem UN 1972 Convention)
- Limitation of liability: except in the case of a willful misconduct, such liability ends when all the obligations set out in the authorization or the license are fulfilled, or at the latest one year after the date on which these obligations should have been fulfilled. The Government shall be liable in the operator’s place for damages occurring after this period

This concentration of the liability on the operator along with the enforced cross waiver of liability provisions shall prevent the contractors and subcontractors from being sued by third parties and thus limit their need of an insurance coverage.

The Liability allocation rational between the French Government and the operators is that the Operators should be finally liable for indemnification of a given damage to the same extent, wherever the claim comes from .

When the Operator is sued and condemned by a domestic court : the State guarantee is granted to the operator for damages caused to third parties by authorized space operations carried out on the French or European territory (except in case of willful misconduct) during the launching phase or during the command phase according to the terms of the Fiscal Act (art. 15) :

–For damages caused during the Launching Phase: above approx. 60 M€ (according SOA between 50 and 70 M€: in fact 60 for Ariane, Vega and Soyuz M€ due to the Launchers Exploitation Declaration)

–For damages caused on Earth or in the airspace during the Command Phase: above an amount comprised between 50 and 70 M€ (to be determined by the authorization)

–This guaranty can also benefit to contractors, subcontractors, customers or insurers for damages caused during the launching phase if there are sued directly by the victim, instead of the Operator.

When the French Government is sued under UN Space treaties (1972 Convention...), it may make a claim for compensation towards the Space Operator, whose liability shall be limited to a fixed ceiling equivalent to the aforementioned amounts (art. 14)

##### 4.5.2 Cross waiver of liability (Art. 20 SOA)

The principle is the non validity of claims between the participants to an authorized space operation among their Participants (other than third parties): i.e. Launch service Operator, Launch base Operator, manufactures, sub contractors...

This provision shall be self-enforceable and mandatory between the participants. The sole legal exception is when it is otherwise provided for in a contract between participants to the on-orbit command of a satellite.

#### 4.5.3 « Hold harmless » provision

When the insurance or the governmental guarantee have been used to indemnify a third party, one of the persons having taken part in the space Operation or in the manufacturing of the space object cannot be held liable by another of these persons (exception: wilful misconduct).

#### 4.5.4 Insurance issues: Impact of the SOA

The operator is obliged to get an insurance coverage for damages to third parties below the amount from which the Governmental guarantee is granted or to get equivalent financial guarantees (art. 6). This shall benefit namely to the Government, ESA, the operator and the persons having taken part in the space operation or in the production of the space object

However, the cost of the insurance coverage for all operators will be limited thanks to the Governmental guarantee granted in the SOA here above.

#### 4.5.5 Insurance issues

The Authorization Decree (adopted June 10 2009) specified the Insurance conditions, the equivalent financial guarantees (a written commitment from a credit institution or an insurance company, a joint and several guarantor, a first-demand guarantee, or liquid assets).

The Minister is also authorized to exempt the operator from this obligation :

- for a limited period of time, if it is impossible, given the situation of the insurance market, to be covered by

an insurance policy or to furnish one of the financial guarantees

- where the planned operation includes the station-keeping of a satellite on the geostationary orbit for a determined length of time

In both cases the operator shall prove solvency.

## 5 - CONCLUSION

The French Space Operation Act (SOA) introduces an authorization regime allowing a balanced regime for private operators between the constraints resulting from safety and liability requirements (derived from UN Treaties) and benefits brought by the establishment of a strong legal framework and by the State Guarantee.

The work on the technical regulations associated to the act is in progress :

- It is based on the current best practices among international space community, and so it introduces very few new technical requirements.
- It shall be submitted to the European Commission pursuant to the information procedure related to the technical norms and regulations (Directive 98/34 CE June 22, 1998).
- It should be achieved by December 2009.

The SOA full implementation is expected on 9 December 2010 (it shall be applicable when the first of following events occurs: 1 year after the entry into force of the technical regulations: 18 months after the entry into force of the authorization decree of June 2009).