Sous-Direction
chargée de la Protection,
de la Sauvegarde et de l'Environnement
Division Sauvegarde et Environnement
Département Etudes et Réglementation

CSG SAFETY REGULATIONS
SPECIFIC RULES
GROUND INSTALLATIONS
VOLUME 2 - PART 1

Le Directeur
du Centre Spatial Guyanais

P. MOSKWA

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INFORMATION SHEET

Title :

CSG SAFETY REGULATIONS
SPECIFIC RULES
GROUND INSTALLATIONS
VOLUME 2 - PART 1

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The CSG Safety Regulations contain the rules applicable on the BLA to protect persons, property and the environment against potentially hazardous systems from the design stage through operations. Volume 2 - Part 1 contains the specific rules to be applied to ground installations.

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VOLUME 2 : Specific Rules

PART 1 : Ground Installations

PART 2 : Spacecraft

PART 3 : Automatic Launchers and Test Specimens

PART 4 : Inter-sites

PART 5 : Manned Flights

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1 - INTRODUCTION

1.1 OBJECT OF THE DOCUMENT

The present document forms part of Volume Two of the Safety Regulations of the Guiana Space Centre.

It defines and brings together the principles and rules applicable to the design and operation of ground installations (actual ground installations and ground support equipment).

For this purpose, it defines on the safety level.

- the general principles;
- the design rules;
- the operational rules;
- the principles of submission;

to be complied with for these installations.

The present Part supplements the requirements and rules set out in Volume 1 of the Safety Regulations, for the specific case of ground installations and ground support equipment.

1.2 APPLICABILITY OF DOCUMENT

The present Part, associated with Volume 1, is applicable to all work relating to the ground installations located on the Ariane launch base in French Guiana (BLA).

The specific application rules for the firms located on the BLA which retain responsibility for their internal safety are defined in Volume 2, Part 4, "Inter-sites".

In the event of any divergence of interpretation, the present document shall take precedence over Volume 1 for the specific subjects it deals with.

It shall therefore be referred to in all contracts, agreements or submissions dealing with a project relating to these fields.

Accordingly :

- It covers the entire life of the installations with respect to design, manufacturing and operating rules;

- It applies to all those taking part in manufacturing of the installation in question, but also to its users and to those responsible for maintenance in working order or for any alterations made to the installation.

Any non-conformance with these regulations shall be submitted for analysis to the Guiana Space Centre Range Safety (cf. section 3.7.3 of Volume 1).

Where studies are required in completely new fields which might not be covered by the present regulations, additional requirements may be expressed by Range Safety after study.

1.3 REFERENCE DOCUMENTS

The list of reference documents is given in Appendix 1.

1.4 TERMINOLOGY - ABBREVIATIONS

1.4.1 TERMINOLOGY

The terminology adopted in this document complies with the terminology used in the legislative and regulatory texts applicable in this field. To facilitate reading of the present document, the definitions of certain terms are specified in Appendix 2.

1.4.2 ABBREVIATIONS

The meaning of the abbreviations used in this document is given in Appendix 3.

2 GENERAL PRINCIPLES

2.1 PHILOSOPHY OF THE SAFETY PROCEDURE

Industrial establishments representing hazards for their vicinity and the environment are subject in France to legislation relating to classified installations for environmental protection (reference in Appendix 1, documents A2 and A5).

The Guiana Space Centre and the industrial establishments located on the Ariane Launch Base are classified under these regulations.

To comply with the legislation and provide protection for persons, property and the environment, Range safety has established procedures, rules and methods meeting the principles set out below.

All ground installations exploited on the classified site of the BLA shall undergo studies to :

- check the installation's compliance with the industrial safety and environmental protection rules;
- evaluate the risks represented by the installation;
- define preventive measures in order to prevent incidents or accidents;
- evaluate the consequences of foreseeable incidents or accidents for persons, property and the environment;
- define measures contributing to minimise the consequences of an accident or incident;
- define measures with a view to organising rescue operations and controlling the consequences of an accident;
- compile the file needed to obtain from the Public Authorities the operation authorisation.

For each potentially hazardous installation a file shall be established for configuration control and to check that the rules in force are complied with over a period of time.

For any change in these installations having an impact on security, safety and environment, a new submission shall be prepared to obtain the approval of Range Safety before starting any work, in accordance with a procedure identical to that adopted for a new installation.

2.2 RESPONSIBILITIES

2.2.1 RESPONSIBILITIES OF THE INSTALLATION OPERATOR

The installation operator shall be responsible for

- the application of and compliance with the legislation relating to classified installations and the rules set out in the present document;
- the configuration of his installation and its maintenance in working order.

2.2.2 RESPONSIBILITIES OF THE OUTSIDE CONTRACTOR

The responsibilities of the outside contractor are defined in the Code of work.

In the framework of its own activities, the outside contractor shall be responsible for defining the operating procedures and specifying the number of operators required for potentially hazardous operations.

2.2.3 RESPONSIBILITIES OF RANGE SAFETY

2.2.3.1 During the submission procedure

Range Safety shall check that the safety level of the installations complies with the safety objectives laid down.

It shall evaluate the risks represented by the installations.

It shall check the compatibility between the activities operated on the installations of a firm for which it performs the safety function and the activities of the other firms located on the BLA. It shall work out and distribute the requisite co-ordination rules (see Volume 2, Part 4, "Inter-sites").

It shall analyse and present to the Public Authorities the files required to obtain the administrative permits needed for operation of the installations. At the request of the operating company, it shall approve or draw up these files. Its liability in this field is involved only for those documents drawn up or approved by it.

2.2.3.2 During operational use

Range Safety shall check, on behalf of each Head of Establishment in charge, that the installations and ground support equipment operated on those sites for which it performs the safety function are maintained in working order and meet the safety objectives and requirements at all times.

It shall carry out the studies relating to planned changes on installations and ground support equipment.

It shall approve the procedures for potentially hazardous operations.

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3 DESIGN RULES

3.1 GENERAL

Depending on their intended use and the operations performed on them, ground installations have various specific features which will have consequences for their design.

Such installations shall comply with French regulations, for which the main reference texts are mentioned in Appendix 1.

3.2 APPLICATION OF THE REQUIREMENTS OF VOLUME 1

The application of the safety principles laid down by Volume 1 leads, in the case of the ground installations, to the following measures in particular :

- procedures, remote controls and automatic controls making it possible to limit the personnel exposed to hazards;
- safety barriers, disabling devices at the disposal of Range Safety, and status displays or reports on disabling devices, making it possible to check the configuration;
- systems reliability and compliance with safety factors meeting the dependability specifications and the safety objectives.

3.3 PARTICULAR DESIGN RULES

3.3.1 ELECTRICAL SYSTEMS

Depending on the buildings concerned, electrical installations shall be designed to ensure protection of the personnel and to prevent causing any fire or unplanned power up.

The rules for preventing electrical hazards are sufficiently conventional so as not to require detailed description in the present document (see reference texts in Appendix 1, C).

a) In pyrotechnic buildings or installations, the electrical circuits shall be designed so that those devices which do not contribute to safety or to maintaining the safe condition of the installations may be de-energised, independent of the other circuits, outside of working times.

b) The emergency stoppage systems for the electric power supplies (categories 1, 2 and 3) of the various buildings shall be easily accessible.

c) The electrical installations shall be designed so that they cannot aggress sensitive equipment and so as to be protected from external aggression (crushing during handling operations, in particular).

d) In the event of electrical transients, the lighting inside the room in which a potentially hazardous operation is being performed shall be maintained at an adequate level to ensure the safety of the operation.

e) The connectors of potentially hazardous electrical circuits shall be designed in such a way that their connection is unambiguous (mechanical guidance, connector fool-proofing).

f) Damage to a connection (connector crushing or contact between two adjacent pins) shall not result in any severe or catastrophic event.

g) Potentially hazardous electrical circuits shall include :
- three barriers [1] when the consequences of the associated hazard can be catastrophic ; a safety disabling device is required : it shall be located on one of these barriers.
- two barriers [1] when the consequences of the associated hazard can be severe.

h) A power failure in the circuits of a disabling device shall not cause any change of state.

i) The safety disabling devices may not be overridden.

j) Following an enable given by Range Safety and execution of the command by the operator, cancellation of the enable shall have no effect on the system in question.

k) It shall not be possible for a potentially hazardous electrical circuit to be activated following an action on any other circuit or under the influence of external events (static electricity, radiated fields, failure of another circuit, etc.).

l) The conductors of potentially hazardous electrical circuits shall not run through the same cables or ducts as those used for other circuits.

m) They shall have specific connectors and sockets which may in no case be common with those of other circuits.

n) In those installations in which static electricity may represent a severe or catastrophic risk, provision shall be made for the dissipation of static charges.

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[1] The device inserted in the potentially hazardous circuit to control the electric power, may be likened to a barrier.

3.3.2 ALARM AND SAFETY SYSTEMS

Alarm and safety systems shall be designed so that any system failure is indicated.

They shall undergo dependability studies.

3.3.3 FLUID SYSTEMS

3.3.3.1 Definitions

a) A system containing one or more potentially hazardous fluids is classified as a "Potentially hazardous system" (see Appendix 2).

b) A system containing one or more pressurised fluids, which complies with French regulations concerning pressure vessels, shall not be considered a potentially hazardous system unless at least one of the fluids is a potentially hazardous fluid.

3.3.3.2 General rules

a) Fixed or mobile pressure vessels shall comply with French standards and regulations.

b) Fixed pressure vessels of foreign origin can be accepted for use on the BLA only after obtaining an authorisation for use issued by the Public Authorities.

c) Mobile or semi-mobile vessels of foreign origin can be accepted for use on the BLA only after being processed in accordance with volume 1, section 1.3.

d) Circuits subject to the regulations (due to the presence of pressure) must be designed so that detachable connections incorporate mechanical foolproof devices (coupling, length).

e) The lubricants used must be compatible with the fluids concerned.

f) "Potentially hazardous systems" must be subject to the "safety submission" process in any case where a risk of injury to personnel exists.

g) The circuits shall be designed so that :

- circuits containing breathable air may not be polluted,
- mixing of incompatible fluids is impossible

For this purpose, mobile connectors and coupling shall be made mechanically fool-proof (couplings, lengths).

3.3.3.3 Specific rules for potentially hazardous fluid systems

a) Fluid circuits shall be designed so as to prevent any fluid retention apart from components whose function involves retention (filters, steam traps, etc.).

b) The components of potentially hazardous fluid circuits shall be made fool-proof (couplings, length) whenever there is a risk of incorrect assembly or when the component is specific to a given fluid.

c) Remote-controlled circuits containing potentially hazardous fluids shall incorporate valves which automatically go to the safe position (either open or closed) in the event of power failure (electrical, hydraulic, pneumatic, etc.).

d) Fluid circuits which are liable to damage electrical equipment (cryogenic, corrosive, flammable) shall be designed so that any leak which does occur will not be likely to damage electrical control and monitoring lines to the extent of generating a hazard of severe or catastrophic consequences.

e) Tanks storing potentially hazardous fluids shall be provided with distribution circuit cutoff valves that can be operated in maximum pressure and flow conditions.

f) For mobile equipment (KARTS, etc.), bleeders for valves and pressurisation devices for toxic or flammable fluids must be incorporated, and connected to fixed equipment bleeder systems.

3.3.4 PYROTECHNIC SYSTEMS

Installations designed to receive pyrotechnic equipment shall comply with the pyrotechnic safety decree (references in Appendix 1, G.2).

3.3.5 RULES CONCERNING ENVIRONMENT-RELATED AGGRESSION

3.3.5.1 Explosive atmospheres

Ground installations on the BLA shall be designed to create only hazardous areas n°2 or, for the un-toxic fluids only, hazardous area n°1 if necessary (see the definition in Volume 1 appendix 2 : explosive atmosphere). Electric equipment operated in these areas shall comply with the following characteristics:

- Fixed ground equipment

  The fixed electric equipment shall be constituted by devices in compliance, as a minimum, with the specifications for operation in a hazardous area n°1 :

  * hydrogen (H_2) : IICT1,
  * méthylhydrazin (MMH) : IIBT4,
  * hydrazin and blend "UH25" : IIBT3.

  If not, in the hazardous areas n°2, electric equipment shall be in compliance with the engineering rules of a standard applicable to industrial electric equipment which, in regular operating, doesn't generate electric arcs or sparks or hot surfaces of a temperature equal to, or higher than the auto-igniting temperature of the used product vapours (hydrazin : 270°C - méthylhydrazin : 194°C - UH25 : 235°C - hydrogen : 560°C).

- Mobile equipment and electric automotive trucks

  To operate in an explosion hazardous area, equipment shall comply with the same design rules as fixed ground equipment.

3.3.5.2 Confined atmospheres

Any room in which there is a risk of confined atmosphere shall be equipped with a fixed system for oxygen detection with an alarm.

3.3.5.3 Ionising radiation

The applicable rules are described in detail in the texts mentioned in the references (Appendix 1, B). They are supplemented by the following dispositions :

a) The submission for ionising-radiation devices shall be presented as soon as possible to Range Safety. The CSG will have six months to reply.

b) The effective dose for exposed workers is limited to 100mSv on a period of 5 consecutive years, conditionally the effective dose don't exceed 50 mSv for any of these years. Some categories of workers are submitted to other limits : particular situations are detailed in the documents in reference (appendix 1.B).

3.3.5.4 Lightning

Installations classified as subject to authorization (under environment protection regulation) as well as non classified installations where lightning may be a potential hazard with catastrophic or severe consequences must be protected against the effects of direct or indirect lightning strokes in compliance with regulations in force and good works practice (see document mentioned in appendix 1, E).

Any modification to an existing installation must be designed so as not to deteriorate the existing protection system and must comply with the regulations concerning lightning protection.

External lightning protection systems (IEPF) (direct effects of a lightning stroke) must give preference to protection using a meshed cage or by stretched wires when the system to protect is large or of a complex geometry.

The meshed cage must preferably be made of conductive parts of the building.

The internal lightning protection system (IIPF) (indirect effects of a lightning stroke) consist of equipotential bonding networks to which all electrical groundings, all conductive parts of the construction or electrical or non-electrical equipment are connected.

The IEPF and the IIPF are connected to the meshed grounding network consisting of an interconnected buried ring network and various ground electrodes connected to the buried ring network.

The protection devices shall undergo routine maintenance and verification operations, or after any confirmed lightning stroke, or suspected lightning stroke.

3.3.5.5 Acoustic vibrations

The installations shall be designed so as to comply with the noise levels mentioned in section 4.6.7.

3.3.6 MECHANICAL AND ELECTROMECHANICAL SYSTEMS

Mechanical and electromechanical systems used during potentially hazardous operations shall undergo a study to evaluate the consequences of their failure. They shall comply with the safety objectives assigned to them. Depending on the case, they shall comply with the single failure or double failure principle, using barriers if necessary.

Deployment, separation, handling and hoisting systems shall be designed carefully from the viewpoint of potential and kinetic energy.

The maintenance of mechanical and electromechanical systems shall be designed and the repair and maintenance procedures established so as to ensure the durable performance of equipment used for potentially hazardous operations.

4 OPERATIONAL RULES

4.1 HEALTH AND INDUSTRIAL SAFETY RULES

The general rules are contained in an instruction file worked out by Range Safety and submitted to each site manager.

The particular rules applying to a given building shall be displayed there.

The rules specific to a given operation appear in the corresponding operating procedure.

The health and industrial safety rules shall be applied under the control of the operation managers.

4.2 GENERAL RULES

a. Any potentially hazardous operation shall be performed in accordance with the corresponding procedure approved by Range Safety in phase 3 of the submission procedure.

b. Whenever, during an operation, a potentially hazardous operation not provided for in the operation plan has to be performed, a procedure shall be drawn up by the person in charge, then submitted to Range Safety for approval before starting any work.

c. For all potentially hazardous operations, it shall be possible, from certain key points, to restore the system to safe condition (depressurisation, drainage of propellants or toxic products, etc.).

The operators shall have corresponding emergency procedures and safing procedures, before starting any operation.

d. All potentially hazardous operations shall be performed by a team of qualified specialists having the requisite capabilities to perform their functions. They shall have received the general safety training and the specific training relating to the site.

Nevertheless, in the case of operating a potentially hazardous system, an operator team of two persons, or more if justified is required (see Vol. 1, § 4.2.2.5). The number and functions of the team members shall be shown on the operation procedure sheet.

e. The type, place and starting and ending time of any potentially hazardous operation shall be indicated to the Safety representative.

On a site on which a potentially hazardous operation is being performed, clear signs shall indicate this fact to persons not involved in the operation.

f. Any operation taking place in a potentially hazardous area shall be subject to the approval of Range Safety. It must be possible for any operator to know about the activation of risk zones.

g. In the event of any change to a potentially hazardous installation, equipment or operating procedure by comparison with what was approved, the safety submission procedure shall be reopened.

h. Any incident having consequences for security, safety and environment shall be immediately brought to the notice of Range Safety.

4.3 ELECTRICAL SYSTEMS

The usual accident prevention rules applied during operations on electrical systems shall be complied with. They are described in detail in the texts mentioned in the references.

In those operations in which static electricity may represent a potential hazard with catastrophic or severe consequences, the fixed or mobile conductive parts (whether metallic or non metallic), comprised in the installations and equipment involved in these operations, must be interconnected by equipotential bonding and grounded.

Bonding must be checked electrically.

The recommended maximum value for electrical bonding and grounding resistance is 10 Ω for metallic components and 10^6 Ω for non-metallic conductive parts.

4.4 FLUID SYSTEMS

4.4.1. General rules

a) Before any start-up after a repair or maintenance operation, pressurised fluid systems shall undergo any test provided for by the regulations and a representative leak test.

b) When, exceptionally, it is planned to replace the system hydrostatic test with a gas test, a submission to Range Safety and a waiver application shall be required.

c) The pressurisation and depressurisation rates shall not create any uncontrollable potentially hazardous situations (temperature gradient, surge, etc.).

d) Components or equipment of fluid systems to be checked prior to each campaign shall be listed in the "Revalidation Plan".

e) Relative pressure (expressed in mbar) applied to equipment on which manual intervention (disassembly, repair, tightening or slackening of couplings, etc.) occurs, must be such that the product of said pressure by the surface area of the section of the orifice opened (expressed in cm^2) is less than 1000.

The safety of operators must be ensured by the number of barriers left in place and, where necessary, by individual protection appropriate for potentially hazardous fluid.

4.4.2 Specific rules for potentially hazardous fluid systems

a) In the case of an operation involving a toxic fluid, toxicity measurements shall be taken before, during and after the operation.

b) During the transfer of potentially hazardous propellants or fluids, suitable protective clothing must be worn.

c) Before any work or interventions requiring the opening up of parts that have contained toxic propellants, the system shall be drained and personnel shall be protected if the elements have not been decontaminated.

d) Any person entering a toxic risk zone shall be equipped with appropriate individual breathing equipment enabling him or her to exit from the hazardous area.

e) For any intentional discharge of liquid or gaseous effluents involving a hazard for persons, property or the environment, the approval of Range Safety shall be obtained and the work shall be performed in accordance with an approved procedure.

f) All conductive parts whether metallic or non-metallic, fixed or mobile, of tanks, transfer circuits or associated devices (valves, filters, etc.) must be interconnected by equipotential bonding and grounded before and during filling or draining it with propellant.

4.5 PYROTECHNIC SYSTEMS

a. Prior notification shall be given of any arrival of pyrotechnic equipment on the BLA. The safety data sheet for new equipment shall specify the proposed pyrotechnic classification and the test results (impact, temperature, etc.).

b. The rules applicable to pyrotechnic systems are described in detail in the pyrotechnic safety texts mentioned in the references (Appendix 1, G).

4.6 RULES CONCERNING ENVIRONMENT-RELATED AGGRESSION

4.6.1 CONFINED ATMOSPHERES

a. Before personnel enters a confined atmosphere, the oxygen level shall be checked.

b. Personnel required to enter a confined atmosphere shall become acquainted with and apply the particular safety instructions stipulating the required conduct to avoid the risk of asphyxiation.

c. Any work in a confined atmosphere requires the presence of a detector monitoring the atmosphere continuously. The oxygen detector shall be provided with a low level alarm set to 19% and a high level alarm set to 23% (percentages by volume).

d. All personnel shall have at their disposal a breathing mask or airtight clothing supplied with breathable air.

e. Toxicity measurements shall be performed if necessary.

4.6.2 TOXIC ATMOSPHERES

a. Devices for detecting toxic substances shall be set so that the alarms are triggered when the concentration of toxic substance in the atmosphere of the workplace is equal to 90% of the Limit Exposure Value (VLE).

b. Personnel required to enter an atmosphere which is liable to be toxic shall become acquainted with and apply the instructions laid down to prevent the risk of inhalation of toxic substances.

c. Any work in an area where there exists a risk of toxic atmosphere requires the presence of a detector monitoring the atmosphere continuously. The detector shall be provided with an alarm.

d. All personnel shall have at their disposal a breathing mask or airtight clothing supplied with breathable air.

e. Specific safety instructions shall be worked out case by case in the operating procedures.

4.6.3 IONISING RADIATION

The applicable rules are described in detail in the texts mentioned in the references (Appendix 1, B). These rules are supplemented by the following provisions :

a. Range Safety shall be informed of any source of ionising radiation before it is introduced onto the BLA.

b. Devices containing radioactive substances shall be systematically submitted by the owner to the CIREA (French commission on artificial radio-elements) for artificial radio-elements, or to the OPRI (French commission for natural radio-elements).

c. Radioactive sources shall be stored in rooms approved by Range Safety. Access to these rooms shall be prohibited:

- to unqualified personnel;
- outside authorised periods of use.

d. When using radioactive sources or ionising generators where the CSG is in charge of the safety function, the following measures shall be taken :

- Installation of the access control facilities required by Range Safety. The number of persons taking part in the operations shall be as small as possible, although not less than two.

- Wearing of the dosimetric badge and where applicable individual means of protection required by Range Safety.

- Use of sources of ionising radiation in accordance with procedures approved by the CSG.

e. Operations involving the use of sources of ionising radiation may be carried out only by authorised personnel who have passed a medical inspection entitling them to perform such work. This medical inspection may be passed in French Guiana, but the personnel concerned may produce a fitness certificate from their country of origin, provided that its period of validity covers the date of the operations.

4.6.4 NON-IONISING RADIATION

For frequencies from 10kHz to 300 GHz, zones must be defined according to the category of persons, characteristics of the electromagnetic broadcast and the duration of the broadcasting. These zones are computed in conformance to the standard C 18-610 (ENV 50166-2) referenced in appendix 1, B-7.

4.6.5 LASER RADIATION

The laser radiation devices used in industry are not covered by French regulations. However, they must be classified in accordance with the categories of French Standard NF EN 60 825-1, cf. appendix 1, B-4).

Their use on the sites where the CSG is in charge of the safety function, shall be subject to the following rules :

a. The use of lasers shall be subject to the approval of Range Safety, which will confirm the device's class.

b. They shall be used in a room or a place reserved for that application, enclosed or bounded, and with entrances posted with a danger warning panel (French Standard NF X 08-003). A special signal shall warn of the existence of emission.

c. The entrances and openings to these rooms shall not be in the axis of direct or derived radiation. The ground shall be free of obstacles.

d. The causes of accidental reflection and diffusion of laser beams shall be eliminated (polished surfaces, non-matt paints or coatings).

e. The path of foreseeable potentially hazardous radiation (normal or abnormal) shall if possible be completely caged in by suitable screens.

When the beam is not completely enclosed, its path shall be determined, together with its normal or accidental deviations, reflections or diffusion.

f. During emission, it must not be possible to change the orientation of a laser emitter or the optical elements placed in the beam.

g. Potentially hazardous laser radiation shall be absorbed at its termination. The points of beam arrival shall be protected from reflections (energy absorbers or traps) and shall not contain easily flammable materials.

h. The control of class 3 and 4 lasers will require the use of a control key, which will be removed when the device is not in use, and will be kept by an authorised person.

i. Class 3 and 4 lasers shall have an emergency stoppage control.

j. Access to areas in which laser radiation is potentially hazardous shall be restricted to authorised persons.

k. The persons present shall not carry any reflecting objects.

l. The alignment and adjustment operations required prior to powerful laser emissions shall be carried out, insofar as possible, with reduced power.

4.6.6 LIGHTNING AND ELECTRICAL STORMS

Systems where lightning may be a potential hazard with catastrophic or severe consequences must be protected against the effects of direct or indirect lightning strokes in compliance with the regulations in force and good works practice (see documents mentioned in appendix 1, E).

An active lightning protection system (detection and lightning warning) providing a lightning forecast compatible with the time required to restore the involved system to a safe configuration, as defined in the procedure, must be implemented for operations involving a potential hazard with catastrophic or severe consequences:

- outside any installation

- inside any installation during docking (or undocking) operations involving articles, if the grounding of these articles to be docked (or to be undocked) is not possible (for exemple : hooking (or unhooking) of an article to hoisting equipment).

4.6.7 ACOUSTIC VIBRATIONS

The noise levels to be considered for personnel protection are as follows :

Potentially hazardous levels for short exposure :

- at 120 dBA : loss of discrimination, hearing discomfort;

- at 140 dBA : pains;

- at 160 dBA : irreparable damage to the hearing system.

Acceptable levels :

- a level of 90 dBA can be sustained for 8 hours per day with effective protection;
- a level below 80 dBA sustained for 8 hours per day generates no irreparable side effects.

Effective personnel protection shall be provided to limit the noise to :

- 80 dBA for continuous work (8 hours per day);
- 85 dBA for occasional work.

For a localised shock, the level perceived shall be less than 140 dBA.

The bench testing procedures shall allow compliance with these limitations.

4.6.8 HANDLING OPERATIONS AND HOISTING DEVICES

The accessories used to support the load form part of the hoisting and handling equipment and shall undergo the same tests and inspections.

a. Handling and hoisting equipment shall be operated only by authorised and qualified personnel which has received appropriate training on the BLA.

b. This equipment and its accessories shall be checked annually by an approved organisation and the results shall be made available to Range Safety.

4.6.9 EXPLOSIVE ATMOSPHERES

It is forbidden to operate unprotected electric equipment in an explosion hazardous area.

Electric equipment (fixed ground equipment, mobile equipment, electric trucks) must not be operated in an explosion hazardous area, when not in conformance with the rules set out in § 3.3.5.1 hereabove.

The electric equipment (mobile equipment, electric automotive trucks) which are not in conformance with the rules set out in § 3.3.5.1 hereabove, shall be subjected to a safety submission to define its operating conditions.

Furthermore, a possible admittance in an explosion hazardous area of an equipment potentially being a heat source, is subordinated to a safety submission to define its operating conditions.

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5 SUBMISSION PRINCIPLES

5.1 GENERAL

For any creation or change of installation or change in the intended use of an installation, on the sites exploited on the BLA, a submission procedure shall be followed.

During the examination of a change of installation, the operating company shall evaluate the impact of the change on security, safety and environment and make the results known to CSG Range Safety, which will specify whether it is necessary to open a submission procedure.

5.2 RESPONSIBILITIES

CSG Range Safety may in no case substitute for the official departments for the issue of authorisations covered by regulatory measures.

The design manager shall supply to CSG Range Safety the documents and information making up or allowing establishment of the submission file.

CSG Range Safety shall be responsible for checking that the installation complies with the applicable regulations and that it meets the safety objectives.

The submission procedure relating to the ground installations and their ground support equipment breaks down into four phases:

- Phase 0 - Feasibility;

- Phase 1 - Design;

- Phase 2 - Manufacturing;

- Phase 3 - Operation.

As of the start of phase 0, Range Safety will open, for the planned installation, a safety file the contents of which are given in Appendix 4. This file will be supplemented and enriched as the phases progress.

5.3 PHASE 0 - FEASIBILITY

The design manager shall present a file allowing an assessment of the dangers and constraints of the installation and of its use by the personnel.

This file shall contain :

- a statement of the needs used as a basis for sizing, including within the framework of measures of conservation; the needs shall highlight :

  . potentially hazardous products used;
  . the maximum quantities of each product in the installation;

- the description, even brief, of the operating procedures and the planned technical solutions; this shall show:

  . the type of operations performed in the installation;
  . any associated material resources used;
  . the constraints involved in the operations.

These documents are included in the safety file and provide the assumptions for the preliminary risk study on which depend :

- the layout possibilities;

- the applicable regulatory measures;

- the safety specifications.

The preliminary study, depending on the case, shall be performed by Range Safety or, after agreement between Range Safety and the design manager, by an expert or a group of outside experts.

The conclusions of this study shall be communicated to the design manager in the form of data sheets classified by "Safety" topics, the list of which appears in Appendix 5, and a note specifying the applicable administrative obligations.

5.4 PHASE 1 - DESIGN

The prime contractor shall provide a technical description of the installation and its equipment containing the data required to compile the administrative files and complying with the specifications and comments expressed at the end of phase 0.

Range Safety will check that allowance has been made for the specifications and the applicable regulatory texts which are listed in Appendix 1.

It will perform or have performed justifying studies :

- environmental impact studies;
- analyses of hazard represented by the installation;
- manual concerning compliance with rules relating to health, safety and work conditions;
- safety studies for installations representing major risks (installations covered by the European Seveso directive).

The context and detailed contents of these various documents are described in 5.7 "Documents to be drawn up".

The operating procedures defined in phase 0 shall be sufficiently detailed so that operational constraints such as "zone evacuation", "incompatibility of operations", "limitation on the number of persons present", etc., may be analysed and, if possible, rendered more precise by Range Safety.

All the files shall be forwarded to the Public Authorities.

Phase 1 shall be closed only after these files have been accepted and the building permit received.

5.5 PHASE 2 - MANUFACTURING

Range Safety has the power to :

- make site inspections;
- check and confirm the compatibility of the operational deployment plan and operating procedures with the installations;
- take part in acceptance tests and operational qualification tests on safety systems.

The manufacturing manager shall supply to Range Safety the reports on regulatory and compulsory inspections before start-up of the installations and ground support equipment.

Phase 2 shall be closed when Range Safety has given its approval on completion of technical acceptance of the installation and when the "Direction Départementale de l'Equipement" (DDE) has issued the certificate of compliance.

5.6 PHASE 3 - OPERATION

The opening of this phase is not tied to the closing of or progress on the three previous phases. On the contrary, it shall be started as soon as possible, once the installation definition and its operating procedures for validation and operation are sufficiently well known.

When the consequences of the potentially hazardous operations may concern a site on which the safety function is under the responsibility of the CSG or Inter-sites, the operating company shall supply a file identifying those potentially hazardous operations and proposing the appropriate safety measures.

The contents of these documents shall make it possible to assess the hazards involved in the operations on the site and, for this purpose, they shall be drawn up to include :

- the operation specifications;

- the operating procedures.

Range Safety will analyse these documents and then have the operating company draw up the safety instructions relating to the site and to the operations which take place there.

The closing of phase 3 is materialised by :

- distribution of the documents :

  . operation specifications;
  . operating procedures;
  . safety instructions;

  in accordance with the regulatory provisions;

- receipt of the prefectural order authorising operation of the installation concerned.

A collection of industrial safety instructions shall be submitted to the Site Manager.

The use of ground equipment shall be studied systematically during the "launch vehicle operation" submissions.

When phases 2 and 3 are closed, Range Safety shall forward the contents of the safety file to the operating company and give its opinion concerning operational start-up of the installation.

At closure of the submission a closure report shall be established jointly by Range Safety, the design manager and the operating company.

The safety file includes the submission file reference documents. It shall be archived at Range Safety.

5.7 DOCUMENTS TO BE DRAWN UP

5.7.1 REQUEST FOR OPERATION AUTHORIZATION

The documents needed for a request for authorisation under the legislation on classified installations are described in detail in Appendix 6.

5.7.2 HAZARD ANALYSIS

Hazard analysis is defined by Decree No. 77-1133 of 21.09.77 (cf. appendix 1, A 4).

It describes the hazards that can be presented by the installation in case of accident and justifies measures likely to reduce their probability and effects.

This study shall deal with the various points mentioned below :

- specific identification of hazard sources and foreseeable accident scenarios, taking into account the environment of the installation both as an interest to be protected and as a potential aggressor. The aggressions to be taken into account can be classified under the following categories, the list of which is not exhaustive :

  . thermal aggression;
  . mechanical aggression (falls and impacts, punch marks and splinters);
  . electrical aggression;
  . chemical aggression;
  . pyrotechnic aggression;
  . aggression by radiation (magnetic, ionising or optical);
  . aggression by natural phenomena: earthquakes, floods, lightning, etc.

- study of the consequences of foreseeable accidents;

- justification of the measures taken to prevent the occurrence of these accidents and to limit their effects;

- justification of private control resources, showing personnel resources and their training, available in case of accident;

- working out of the basic data which must be included in the establishment's "Emergency Operation Plan" (POI).

A guide for drawing up of the hazard analysis study is proposed in Appendix 7.

This hazard analysis shall be updated regularly under the responsibility of the operating company.

For establishments presenting major potential risks, the Prefectural Authority may request that a critical analysis of the hazard analysis study be performed by an independent outside organisation.

The two documents :

- hazard analysis;

- critical analysis;

together form the safety study of the installation which shall be updated regularly.

5.7.3 STUDY OF IMPACT ON THE ENVIRONMENT

A study of the project's impact on the environment shall mandatorily be enclosed with the file requesting an operation authorisation.

This study shall highlight the foreseeable effects on the environment of the installation's existence and operation.

It shall describe in detail the origin, the extent and the nature of the disadvantages liable to result from the operation of the establishment. To this purpose, it shall indicate the provisions planned for groundwater protection, purification and removal of wastewater, gaseous emissions and waste elimination.

A guide for an impact study is given in Appendix 8.

5.7.4 MANUAL RELATING TO PERSONNEL HEALTH AND SAFETY

A manual concerning compliance of the planned installation with the legislative and regulatory provisions relating to personnel health and safety, shall be supplied with the request for authorisation to operate a classified installation.

5.7.5 RISK STUDY FOR PYROTECHNIC INSTALLATIONS

All installations or parts of installations in which explosible materials or items are manufactured, loaded, placed in cartridges, preserved, packed, worked on, studied, tested or destroyed are pyrotechnic installations which as such are subject to the specific pyrotechnic texts mentioned in Appendix 1, G.

By virtue of these texts, the Establishment Director shall have worked out for each new installation, for each operation on new explosible products or processes, or whenever a change in these factors is planned, a risk study making it possible to :

- detect any possibilities of pyrotechnic accidents and establish, in each case, the nature and severity of the risks incurred by the employees of the establishment;

- determine the measures to be taken to prevent accidents and limit their consequences.

A single file meeting all the provisions provided for by the risk study and the hazard analysis shall be established.

After consulting the Health, Safety and Work Conditions Committee (CHSCT), the Establishment Director shall submit this file for approval to the Directeur Départemental du Travail et de l'Emploi (DDTE) who shall consult with the Inspecteur de l'Armement pour les Poudres et Explosifs (IPE).

A guide for a pyrotechnic risk study is proposed in Appendix 9.

5.7.6 EMERGENCY OPERATION PLAN

The emergency operation plan is a document whose establishment is provided for by law.

Taking into account the potential risks presented by the activities taking place on the site, it shall define:

- the organisation measures;

- the intervention methods;

- the requisite resources;

to be employed by the operating company, in case of accident, to protect the site personnel, the surrounding populations and the environment.

The measures to be taken aim, on the one hand, at limiting the consequences of the accident (placing the installations in a safe condition which is as little degraded as possible and applying the initial intervention measures) and, on the other hand, at alerting the emergency departments of the public authorities.

The main fields dealt with by the Emergency Operation Plan are as follows :

- knowledge and assessment of the risks;
- estimation of the equipment and personnel requirements to intervene in the various accident situations which may occur;
- knowledge and assessment of emergency facilities;
- the methods of operation of these facilities.

5.7.7 PARTICULAR INTERVENTION PLAN

The Particular Intervention Plan (PPI) aims basically at ensuring the safety of the populations and environmental protection when an accident results in, or is liable to result in, hazards going beyond the bounds of the establishment.

Its preparation and triggering are under the authority of the Commissaire de la République, with the technical assistance of the operating company concerned.

This plan includes basically :

- the alert and emergency organisation plan;
- the application instructions;
- measures for informing the populations and the media.

5.8 SUMMARY TABLES

The two tables below schematically represent :

- the various phases of submission for a classified ground installation;
- the routing of the administrative file relating to a ground installation.

5.8.1 - SUMMARY TABLE OF THE VARIOUS PHASES OF SAFETY SUBMISSION FOR A CLASSIFIED GROUND INSTALLATION

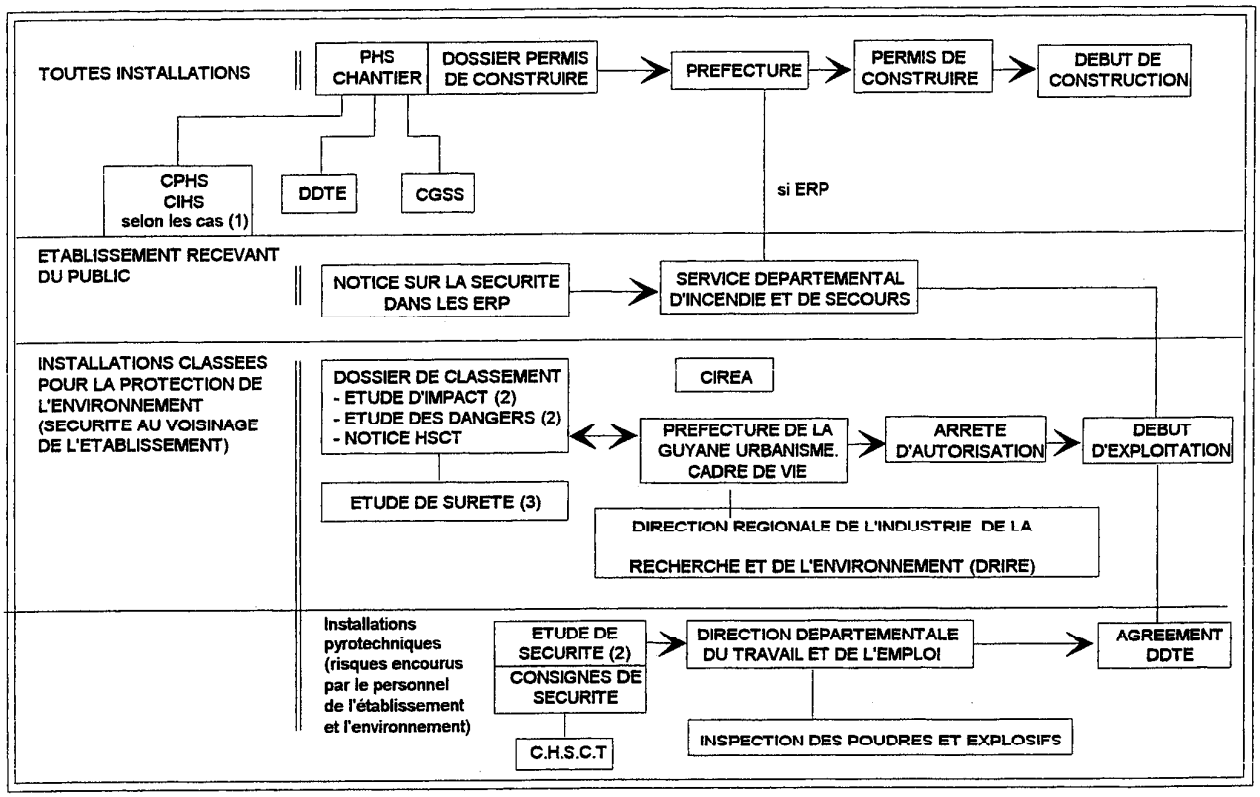
	Operator's Documents	Design Manager's Documents	Safety Documents	Public Authorities Interfaces	Downstream obligations
PRELIMINARY DESIGN	Manual on the nature & volume of activities		Preliminary risk study		
		RDP Preliminary design review	Opening of sheets by safety topic		CSG approval of layout
STUDIES	Hazard study (1) Impact study Health & Industrial safety manual	Description and technical plan for compilation of the classification file	(3) Hazard study (1) Impact study Health & Industrial safety manual	Building permit Statement or (2) prefectoral authorisation	
		RCD Critical design review	Closure of sheets containing major reservations		CSG approval for start of works
MANUFAC-TURING		Documents (tests, definition drawing, technical manual, ...) on particular points intended to remove safety reservations		Report on mandatory inspections prior to start up Conformance certificate	
		CRE Test Review commission	Closure of sheets containing minor reservations		Acceptance
OPERATION PREPARATION	Operation procedure	Operation specifications Safety instructions	Safety instructions (3)	Operating authorisation order (2) DDTE authorisation (pyrotechnics, radiation)	Safety file CSG approval for start of operation

(1) Hazard study
or safety study (installations covered by the Seveso directive)
or risk study for pyrotechnic installations.

(2) Under the regulations on classified installations.

(3) For installations whose safety is the responsibility of CSG.

5.8.2 - ROUTING OF TIIE ADMINISTRATIVE FILE RELATING TO A GROUND INSTALLATION



(1) : cf. decrees dated 9 june and 19 august 1977.
(2) : These documents are included in the same file.
(3) : when the installation is submitted to the SEVESO standard.

ANNEXES

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APPENDIX 1

REFERENCE DOCUMENTS

APPENDIX 2

TERMINOLOGY

APPENDIX 3

ABREVIATIONS

See the corresponding appendices in Volume 1.

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APPENDIX 4

CONTENTS OF THE SAFETY FILE

Phase 0: Opening of submissions - Preliminary design

- Submission sheets
- Statement of needs, operating procedures
- Preliminary safety study
- Safety specifications for phase 1

Phase 1 : Studies

- Submission sheets
- Technical specifications and assembly drawings

1 - Infrastructure
2 - Fluids
3 - Energy
4 - Air conditioning
5 - Control and monitoring
6 - Central control room - Operational facilities
7 - Transportation, handling and hoisting facilities
8 - Equipment and tooling

- File requesting authorisation under the regulations on classified installations :

. Impact study
. Hazard analysis or Safety study (for the installations covered by the European Seves Directive) or Risk study (for pyrotechnic installations)
. HSCT Manual
. Replies by the authorities

Phase 2 : Manufacturing

- Submission sheets
- Reports on regulatory and compulsory inspections (energy, hoisting devices, gas pressure vessels)

Phase 3 : Operation preparation

- Submission sheets
- Operation specification
- List of operating procedures
- List of applicable procedures
- Safety instructions

Chronological list of documents exchanged

APPENDIX 5

LIST OF GROUND INSTALLATION

SAFETY TOPICS

A. Layout of buildings and static protection systems with respect to the hazards presented by explosive or flammable materials

B. Control and discharge of toxic, pollutant or asphyxiating products

C. Gas or steam pressure vessels

D. Non-ionising radiation

E. Ionising radiation

F. Hoisting, handling and transportation devices

G. Fire protection and prevention

H. Protection against static electricity

I. Lightning protection

K. Protection against hazards of electrical origin (energy, weak current)

L. Limitation on the use of materials taking into account the products used in the installation and liable to cause a reaction

M. Alarm systems (centralisation and broadcasting), Communication systems (central control room, TV, telephone, sound system)

N. Entrances, exits, fences, posted signs

O. Health and work conditions

P. Cryotechnic products

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APPENDIX 6

DOCUMENTS REQUIRED FOR A REQUEST FOR AUTHORIZATION UNDER THE LEGISLATION ON CLASSIFIED INSTALLATIONS

Reference : Decree of 21 September 1977 adopted for the application of the Act of 19 July 1976 relating to classified installations for environmental protection (excerpt from articles 2 and 3).

Request for authorisation : to be drawn up in 7 copies

1. Physical person : name, first names, home
   Legal entity : company name, legal form, address, status of the signatory
2. Location of the future installation
3. Nature and volume of activities, corresponding headings in the nomenclature
4. Manufacturing processes, materials used, products manufactured
5. Justification of filing of the application for a building permit (if necessary), within ten days

Additional documents : to be drawn up in 7 copies

1. Map to scale 1:25000 giving the layout of the planned installation

2. Map to scale 1:2500 of the surrounds of the installation up to a distance at least equal to 1/10th of the posting radius, and not less than 100 metres

   Shall be shown all buildings with their assigned use, railway mines, public roads, water points, canals, watercourses

3. Map to scale 1:200 indicating the planned provisions for the installation and, up to 35 m from the installations, the assigned use of the neighbouring buildings and land and the routes of existing sewers

4. Impact study highlighting :

- the foreseeable effects of the installation on its environment :

  . acoustic level of equipment
  . conditions of water supply and use;
  . provisions made for protection of groundwater, purification and removal of wastewater and gaseous discharges, and the elimination of operating wastes and residues

- the measures planned to eliminate, limit and offset the disadvantages of the installation

5. Study showing :

- the hazards that may be presented by the installation in case of accident

- the emergency facilities available on request in the event of a catastrophe

6. Manual concerning the compliance of the planned installation with the legislative and regulatory provisions relating to personnel health and safety

APPENDIX 7

GUIDE FOR HAZARD ANALYSIS

1 - DESCRIPTION OF THE INSTALLATION, PROCESS AND OPERATION

In order that the hazard sources may be correctly inventoried, it seems useful to group, at the head of the study, a description as complete and uniform as possible of the installations.

This description shall allow a coherent examination of the potential hazards. However, if aspects of this description are already sufficiently presented from this viewpoint in another part of the file, such as the impact study for example, that document may be simply referred to.

Description :

- layout, access
- detailed description of the installation, organisation of workshops, organisation of supervisory staff
- other installations which are similar or use similar products or processes, accidents caused by such installations
- use of production
- choice of process selected

Operation of the installation :

- circulation of materials
- chemical reactions
  - . normal reactions in steady-state or transient conditions
  - . spurious reactions
  - . kinetics of those reactions
  - . material balance
  - . operating conditions

- organisation of workshops or sub-systems
- control charts
- utilities

Products employed or stored: raw materials, semi-finished products, finished products, wastes:

- size of stocks and flows
- product sheets
- presence of impurities
- storage conditions

Dangerous structural components:

In particular waste heaps, barriers, retention ponds, and large settling ponds

2 - DESCRIPTION OF THE ENVIRONMENT

The hazard analysis requires that the installation be examined in its environment and accordingly described from two viewpoints :

- the environment as an interest to be protected
- the environment as a possible hazard factor

This description shall be complete and coherent. However, other documents of the file may be referred to if certain aspects are sufficiently described therein.

Natural conditions :

In particular in that they are liable to cause or aggravate accidents :

- climate, wind or rain conditions
- hydrography
- topography

Dangerous proximity :

- other installations
- traffic lanes or transportation installations

Interests to be protected :

- housing, points of human concentration
- water points, tapping points
- communication or transportation lanes
- other activities
- noteworthy sites

3 - RISKS OF ACCIDENT

The above descriptions allow identification of possible accidents.

Each accident can be characterised by its nature (fire, explosion, etc.) and its immediate cause (products, chemical reactions, etc.).

The two lists below, according to the nature or the immediate cause, although they are not exhaustive, allow systematic troubleshooting for possible accidents and their classification if need be.

After identifying possible accidents, it will, in some cases, be useful to evaluate their probability of occurrence. This assessment may be based on feedback from similar installations (statistics, when available) or else be based on the methods of risk assessment developed in the specific industrial activity in question.

3.1 - CLASSIFICATION OF ACCIDENTS ACCORDING TO THEIR NATURE

- fire
- explosion
- mechanical effects :
  - . falls and impacts
  - . collapses or failures
  - . splintering

- distribution of potentially hazardous or toxic products
- floods

Rough estimate of the probabilities of the most undesirable events (or combinations of such events).

3.2 - CLASSIFICATION OF ACCIDENTS BY THEIR IMMEDIATE CAUSE

The cause may, for example, be equipment failure, human error or external aggression such as :

- products :
  - . reactivity of products with one another
  - . reactivity of products with the infrastructure materials
  - . accidental dispersal of product
  - . aggression on storage units
  - . etc.
- chemical reactions :
  - . change of operating conditions, drift, runaway, stifling, etc.
  - . appearance of abnormal chemical products
- other activities :
  - . specific activity representing hazards in a workshop
  - . routine activity
  - . exceptional activity
  - . circulation in the factory
- accidents related to structural work :
  - . building construction characteristics;
  - . other structural work: waste heaps, terraces, dams, retention ponds or tanks, etc.
- environment :
  - . traffic lanes or transportation installations
  - . other installations
  - . natural phenomena : storms, lightning, earthquakes, etc.
  - . malevolence

Estimate of the form that may be taken by accidents due to the above causes. Rough estimate of the probability of occurrence of an accident.

4 - POSSIBLE CONSEQUENCES FOR THE ENVIRONMENT

Taking into account the accidents listed in 3., evaluate the extent of the effects to be feared for each accident. Allow for the environment as described in 2., and in particular :

- natural conditions :

. aggravation, attenuation of the hazard;
. preferential displacement of the hazard;

- the environment to be protected.

Depending on the type of installation and the hazards associated with it, it may be useful to classify by order of importance the various possible accident scenarios by comparing their probability of occurrence evaluated in 3., with the severity of their consequences.

5 - JUSTIFICATION FOR THE MEASURES ADOPTED

Taking into account the conclusions of section 4. above :

- justification for the process, improvements adopted
- justification for the particular measurements taken, for example :

. nature of construction works and work control
. isolation of units, internal compartmenting
. storage volume
. operating instructions
. personnel qualification, training and maintenance in good condition
. establishment of passive/active safety devices
. programme of equipment maintenance
. routine examinations
. periods of operation interruption taking into account particular hazards

- precautions against intrusion and malevolence
- conclusions concerning the safety of the installation

6 - INTERVENTION MEANS AND METHODS IN CASE OF ACCIDENT

Particular measures :

- establishment listed by the Fire Departments, establishment connected to the Prefecture
- appendix to the ORSECTOX plan, the hydrocarbons plan, etc., update programme

Means :

- specific private means or means by agreement with other establishments :
  - . presence, distance
  - . skills and qualification
  - . equipment
- public means (same questions as above, in particular, distance and equipment)
- other means, in particular special intervention means, distance, availability
- special equipment :
  - . stocks of emulsifiers
  - . stocks of neutralising agents.

Alert processing :

- emergency alert
- alert in the vicinity

Intervention plans :

- emergency operation plan
- particular intervention plan

APPENDIX 8

GUIDE FOR AN IMPACT STUDY:
CLASSIFIED INSTALLATIONS FOR ENVIRONMENTAL PROTECTION

1. CHARACTERIZATION OF THE PROJECT

1.1 - CONTENTS OF A PROJECT FOR WHICH AN AUTHORIZATION REQUEST FILE IS PREPARED

- nature of the planned project (extension or new construction)
- integration into the industrial, energy, (inter)national and local context (opportunity of the investment, choice of site, etc.)
- economic and social consequences

1.2 - BRIEF DESCRIPTION OF PLANNED ACTIVITIES

- nature and volume of planned activities
- manufacturing method(s)
- production conditions (continuous/intermittent, seasonal, etc.)
- synthetic statement of the "materials balance" showing the main incoming and outgoing flows (raw materials, energy, fluids, semi-finished and finished products, etc.)

2. INVENTORY AND QUANTIFIED CHARACTERIZATION OF VARIOUS POLLUTION SOURCES AND NUISANCES; MEASURES TAKEN TO PREVENT OR REDUCE THEM

2.1 - PRELIMINARY REMARKS

2.1.1 - INTERFERENCE WITH A PRE-EXISTING POLLUTION CLEAN-UP SCHEDULE

In the case of an extension to an existing establishment, and if that establishment has a pollution clean-up schedule, the latter shall be clearly indicated and the nuisance assessment shall correspond to two levels: BEFORE and AFTER execution of the schedule (branch contract for example).

2.1.2 - PERFORMANCE OF POLLUTION CLEAN-UP DEVICES REFERENCE TO THE USE OF VARIANTS

For each pollution-control device specific information shall mandatorily be provided concerning the performance that can be expected of it (performance guaranteed by the contractor and/or estimated effective throughput). In this respect and for cases which justify it, it is preferable to refer to similar systems employed in other local or foreign installations (exemplary systems in particular), with a view to assessing the proposed solution in relation to the present state-of-the-art.

2.1.3 - COST OF ENVIRONMENTAL PROTECTION MEASURES

For each "external" measure (i.e., the environmental protection benefit of which is not specifically tied to the spin-off effects of technological evolution of the manufacturing process) a cost assessment, however brief, shall be made.

2.1.4 - INSPECTION CONDITIONS

Special attention shall be paid to the conditions of inspection of pollutant discharges.

For all planned inspections, the following information shall be specified :

- nature of inspection
  - . systematic localised analyses;
  - . campaigns of sampling and routine analyses or spot analyses at the request of classified installation inspection departments;
- contents of the inspection
  - . specification of indicators;
- frequency of inspections
  - . continuous measurements, or daily, weekly, monthly, half-yearly, annual, etc.;
- designation of the operator
  - . petitioner or outside organisation;

- equipment used
- brief description where applicable;
- observations concerning the validity of the inspection or the reliability of the means used.

2.1.5 - POLLUTION GENERATED DURING THE WORKS

On large projects, in particular those including major civil engineering works, mention shall be made of pollution generated by the construction of the structures (traffic, noise, dust, etc.).

2.2 - WATER POLLUTION

2.2.1 - STATEMENT OF WATER NEEDS

- qualitative expression : use of the water
  - . industrial water (process);
  - . cooling water;
  - . domestic water.
- quantitative statement of needs :
  - . flow rates required in each category;
- origin of the supply :
  - . distribution company;
  - . takeoff from the natural surface environment (sea, lake, pond, watercourse, etc.);
  - . takeoff from the natural subsoil environment (aquifer, deep well, etc.);

Specify, for each item, the quantity of takeoffs (m3/year and m3/day).

2.2.2 - INVENTORIED LIQUID DISCHARGES

2.2.2.1 - Identification of raw effluents

- clean waters : rainwater collected on clean area;
- doubtful waters : cooling waters coming from an open circuit;
- polluted waters : process waters, cooling-circuit drainage waters, rainwater collected on unclean areas, etc.;

For each source inventoried under the last two categories, make sure to :

- specify the flow rates in question (calculated or estimated);
- identify precisely the pollutant contents of the effluents;
- quantify, by concentration and charge, the pollution generated :
  . decantable solid charge (suspended solids);
  . dissolved organic charge (DCO) possibly supplemented by VB05;
  . particular pollutant charge (toxic in particular).

2.2.2.2 - Measures taken to prevent or reduce such pollution

- internal measures :
  . choice of manufacturing process;
  . reduction of the flow rates in question;
- external measures :
  . pre-treatment;
  . treatment (individual or collective).

Indicate the performance of the treatment systems.

2.2.2.3 - Characteristics of net effluents Residual pollution

- discharge locations;
- effluent flows :
  . mean flows;
  . peak flows (where applicable);
  . rate and duration of discharges;
- temperature and acidity (pH) of discharges;

For waters coming from cooling circuits, the following details shall be provided :

. thermal level of discharges;
. chemical content of discharges (preservation of circulation structures);

- quantification of discharges by concentration and charge (residual pollution) :
  - . suspended solids;
  - . DCO (possibly DBO5);
  - . toxic (heavy metals in particular).

The indication of the hourly or daily charge can be supplemented by the specific pollutant charge per unit of product manufactured (branch contract, for example).

2.2.2.4 - Quality control of discharges

- contents of inspections;
- frequency of analyses;
- equipment and methods used.

2.2.3 - ACCIDENTAL POLLUTION

2.2.3.1 - Identification of the risks of accidental pollution

- potential sources (storage units, ponds, miscellaneous leaks, etc.);
- qualitative identification (product in question);

environment concerned (aquifer, watercourse, sea, etc.).

2.2.3.2 -MEASURES TAKEN TO PREVENT THE RISKS OF ACCIDENTAL POLLUTION OR TO CONFINE ACCIDENTAL DISCHARGES

- safety of storage units (retention ponds);
- operating dependability of vessels, ponds or reactors (leaks, overflows, etc.);
- collection of leaked substances;
- transport of accidental discharges to a treatment unit (where applicable).

2.2.3.3 - Detection and inspection facilities

- brief description and use of the equipment;
- detection procedures.

2.3 - AIR POLLUTION

2.3.1 - CANALISED EMISSIONS

2.3.1.1 - Identification of raw emissions

For each source inventoried, specify the air flows in question (calculated or estimated).

2.3.1.2 - Quality control of emissions (in the installation)

- contents of inspections;
- frequency of analyses;
- equipment and methods used.

2.3.2 - UNCANALIZED EMISSIONS - ACCIDENTAL ATMOSPHERIC POLLUTION

2.3.2.1 - Identification or estimate of such emissions

- occasional uncanalized emissions (vents, valves, etc.);
- diffuse emissions (leaks) or transient emissions (takeoffs, handling operations, etc.);
- risks of accidental emissions :
  . potential origins (reactors, etc.);
  . qualitative identification (type of pollutant in question).

2.3.2.2 - Measures taken to reduce uncanalised emissions or to prevent the risks of accidental pollution

2.3.2.3 - Means of detection and inspection in the installation

- brief description and use of the equipment;
- inspection conditions.

2.4 - POLLUTION BY WASTES

2.4.1 - IDENTIFICATION OF SOURCES OF WASTES

- typology of the various wastes generated (industrial, household, etc.);
  . physical nature (solids, liquids, pastes);
  . chemical nature (in particular, toxic or not);
  . incinerable or not;

- production conditions (workshop, reaction, etc.);
- quantities produced;
- storage conditions on the spot.

2.4.2 - CONDITIONS OF WASTE DESTRUCTION

- destruction :
  . *internal :*

    Indicate, where applicable, any secondary pollution generated by internal destruction systems (incineration in particular).

  . *external :*

    Specify the transport conditions, the addressee, and the conditions of destruction: controlled discharge, incineration plant, physico-chemical treatment system, etc.

- processing :
  . *internal :* recycling, reclaiming;
  . *external :* use as raw material by another industrial sector, recovery of materials, etc.

2.5 - NOISE NUISANCES

2.5.1 - IDENTIFICATION OF NOISE EMISSIONS

- localised emissions (workshops, installations, etc.);
- ambient emissions :
  - . road traffic;
  - . railway traffic.

  Indicate an order of magnitude for incoming and outgoing flows (road vehicles, rail convoys, etc.).

2.5.2 - MEASURES TAKEN TO REDUCE OR PREVENT NOISE EMISSIONS

- internal measures : choice of process, operating techniques;
- external measures : covers, sound insulation, noise-abatement walls, etc.;

Indicate the performance of the devices adopted to counter noise.

2.5.3 - RESIDUAL NOISE NUISANCES

- residual noise level of installations identified as noisy and covered by particular measures;
- resultant ambient noise level for the site (on the boundary of the site, at the level of the first houses).

2.5.4 - CONTROL OF NOISE EMISSIONS (ON THE SITE AND AT THE SITE BOUNDARY)

- brief description and use of the equipment;
- planned control procedures.

2.6 - OPERATING SAFETY (ACCIDENTAL RISKS)

This chapter will be confined to a brief outline of possible problems, since operating safety considerations are dealt with more specifically within the framework of the "safety" instruction provided for under article 3 (paragraph 5) of the decree of 21 September 1977.

However, it is recommended to include, in the impact study, a summary of the matters dealt with in the instructions mentioned above.

By way of example :

- research on and examination of limiting conditions of operation (reaction cascading, secondary reactions, etc.) and description of the means set up to limit the risks;

- evaluation of areas which may be considered as unsuitable for building purposes due to the noise levels, the danger of fire or explosion, etc.

3 - DESCRIPTION OF THE INITIAL CONDITION OF THE SITE

3.1 - DESCRIPTION OF THE SITE ENVIRONMENT AND PRESENTATION

This is the environment in its broadest sense: housing zone, crops, watercourses, etc., suitability and use made of the land.

3.2 - QUALIFICATION AND QUANTIFICATION OF RECEIVING WATERCOURSES

Indicate in particular the pollution and nuisances existing prior to the project.

This description will be based on the expected effects of the project corresponding to the chief pollution and nuisance sources described in Chapter 2.

- water :

. hydrology;
. hydrodynamics;
. water quality, possibly reference to a quality objective for surface waters;
. quality of groundwater : nature of the underlying land, local geological features, existence of an aquifer, quality, suitability, use, etc.;

- air :

. local atmospheric pollution indicator;
. quality of ambient air;
. local meteorological factors: climate, wind conditions (wind rose if possible), possibility of temperature reversals, local meteorological features, etc.;

- noise :

. ambient noise level;
. local features.

In the case of extension of an existing unit, the file shall also include a study of the pre-existing pollution already generated by the operation of the establishment in question.

It shall therefore give all the data for evaluation of the various types of nuisances.

4 - ASSESSMENT OF THE PROJECT'S CONSEQUENCES FOR THE ENVIRONMENT

This assessment shall be based on prior selection of the nuisances requiring in-depth treatment. This selection will depend on the extent of the impact of the various nuisances described in Chapter 2.

The impact of the nuisances thus highlighted will be examined according to the fragility and sensitivity of the environments concerned (Chapter 3).

4.1 - STUDY OF THE CONDITIONS OF POLLUTION AND NUISANCE TRANSFER TO AND DISSEMINATION IN THE ENVIRONMENT

- simulation approach;
- statistical approach;
- analogue approach;
- experimental approach;
- reference to installations having similar characteristics.

These latter, more pragmatic approaches shall whenever possible be preferred to evaluations by calculation.

If calculations are nevertheless used (calculation of gaseous diffusion, calculation of hydrodynamic dilution, calculation of acoustic power radiation, etc.), they shall insofar as possible be supplemented by references to existing situations, even approximate.

4.2 - ASSESSMENT OF THE PROJECT'S CONSEQUENCES FOR LIVING ENVIRONMENTS AND SPECIES

- environment in general :

consequences for :
. population (health and quality of the life);
. animal species (livestock in particular);
. vegetation and crops;
. fauna and flora;

- water :

consequences for :
. hydrology;
. hydrodynamics;
. quality of surface and ground waters (physico-chemical consequences);
. aquatic fauna and flora (biological consequences);

- air :

consequences for :
. local climate;
. quality of the ambient air;

- noise :

physiological consequences.

For major projects, a specific study shall be made for the period of works (see B 1.5).

Where applicable, the provisions adopted for controlling the effects on the environment (water, air, noise, vegetation, animal species, etc.) of nuisances justifying special monitoring shall be mentioned; for example:

- network for measurement of certain atmospheric pollutants;
- dust fall-out measurement stations;
- stations for water quality control in watercourses (downstream of the discharge point), or quality control of the environment concerned;
- systematic sampling of vegetation, on certain animal species, etc.;
- control of the noise level outside the planned site.

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APPENDIX 9

GUIDE FOR A PYROTECHNIC SAFETY STUDY

1 - SCOPE OF STUDY

1.1 - PURPOSE OF THE DOCUMENT

1.2 - ACTIVITY OF THE INSTALLATION

1.3 - DETAILS CONCERNING NEW FEATURES OF THE STUDY

1.4 - REFERENCE DOCUMENTATION

- Decree 79-846 and appended texts

- Specific bibliographic references

1.5 - ESTIMATE OF ACTIVITY

1.6 - FIELDS COVERED BY THE STUDY

The risk study shall *a priori* cover work at the work stations, the procurement, removal and transportation of products, personnel circulation, the treatment and removal of wastes, equipment maintenance and repair operations, etc.

2 - DESCRIPTION OF THE INSTALLATION

2.1 - LOCATION

- Establishment, zone of activity, pyrotechnic enclosure, etc.

- Enclose a ground plan

2.2 - CONSTRUCTION TECHNIQUE

- Type of structure, framework, walls, roofing, structure, barricades, etc..
- Materials used and particular properties
- All strength calculations (thrust, thermal flow, internal overpressure, etc.) may be mentioned and, if need be, enclosed.

2.3 - DESCRIPTION, ARRANGEMENT OF ROOMS, OPERATION

- Describe each of the rooms, specifying its dimensions, activities, the presence of personnel (permanent, short-duration or occasional).
- Drawings of the rooms showing the work stations, personnel, dangerous products (storage, transfers, etc.) and entrances and exits shall be enclosed.

2.4 - SECURITY, GUARDING

2.5 - CLEANLINESS, AIR CONDITIONING

2.6 - COMMUNICATION FACILITIES

- Telephone links, intercoms, VHF link, television, etc.

2.7 - SAFETY EQUIPMENT

- Detectors of toxic vapours, fumes, etc., stationary or mobile
- Grounding network, antistatic equipment, etc.
- Reinforced walls, stationary or mobile screens, gratings, masks, etc.
- Operation monitoring by camera

2.8 - FIRE PROTECTION

- Fixed and mobile extinguishers, spray systems, etc.
- In-house organisation and facilities of the establishment
- Additional outside facilities

2.9 - LIGHTNING PROTECTION

2.10 - INTERNAL NETWORKS

- Distribution networks for electric power, lighting, etc.
- Distribution networks for gas and fluids

2.11 - HOISTING, HANDLING AND TRANSPORT FACILITIES

2.12 - FEATURES

3 - DESCRIPTION OF THE ACTIVITY OF THE INSTALLATION

3.1 - GENERAL

3.2 - DESCRIPTION OF WORK STATIONS

- In this section, each potentially hazardous operation shall be described, specifying in particular :
  - . its exact location;
  - . its duration;
  - . personnel required, full-time and occasional;
  - . materials and equipment;
  - . the dangerous products employed (active materials, solvents, toxic and flammable products, etc.);
  - . the various work phases;
  - . handling and packing installations.
- At this stage, the safety measures adopted, both preventive and limitative, can be described.

- It is recommended to present this description by means of summary tables; diagrams are useful for describing complex operations and the transfer of dangerous products.

3.3 - DESCRIPTION OF DANGEROUS PRODUCTS AND SYSTEMS

- Dangerous products and systems should be described as they appear during their passage through the installation in question, taking care to highlight the various components and any safety devices.

- By dangerous products should be understood all pyrotechnic products but also all those products which, due to their nature, can have an influence on safety at the level of the work station (flammable, unstable or toxic products). The "product data sheets", "toxicological data sheets" and "safety data sheets" shall be searched for and enclosed.

- By potentially hazardous system shall be understood all systems containing dangerous products or which are potentially hazardous by nature due to the fact that they contain certain quantities of energy (pressure tanks, etc.).

- Some information concerning the mode of operation and use can be interesting.

4 - DESCRIPTION OF THE INSTALLATION ENVIRONMENT

- A detailed study shall be made of the installation environment so as to present all seats of activity which in the remainder of the study will be considered as exposing and exposed seats.

- This environment is characterised by :

  . all pyrotechnic work locations such as storage units, workshops, parking areas, destruction areas, test facilities, etc.;
  . circuits for dangerous products, explosible and flammable materials, etc.;
  . traffic lanes outside the establishment, buildings and installations outside the establishment.

- The various installations shall be classified in compliance with Article 15 of the Order, with a precise specification of any features.

5 - ANALYSIS OF THE INSTALLATION AS AN EXPOSED SEAT

- The purpose of the study is to evaluate the risks generated by the environment for the installation and to check that these risks are acceptable under the terms of Article 16 of the Order.

- All hazardous areas generated by the surrounding installations should therefore be recorded, then, knowing the degrees of probability adopted, the requirements of Article 16 of the Order shall be complied with. Remember that it is the most penalising Zi / Pj pair for each exposing seat that should be taken into account.

- In the case of traffic lanes and when explosible materials are transported in packages authorised for transportation, the study shall ensure that the provisions of Article 68 of the Decree concerning the distance for non-transmission to the exposed installation are complied with.

- The analysis shall either conclude that the layout of the exposed installation is in compliance, or else describe the corrective measures such as the installation of barricades, protective roofs, reduction of the test pressure of exposing seats, inhibition of simultaneous operation, traffic control, etc.

6 - STUDY OF THE INSTALLATION CONSIDERED AS EXPOSING SEAT FOR ITSELF AND FOR ITS ENVIRONMENT

6.1 - ASSESSMENT OF THE REACTIONS OF DANGEROUS PRODUCTS

- This assessment shall be carried out on an absolute basis, i.e., assuming that aggressions of a sufficient level are present at the work stations to activate the product.

- In these circumstances, all theoretical or experimental data will be useful to determine as closely as possible the potentially hazardous reactions such as release of heat, self-propulsion, explosion characterised by emission of shock waves or ejection of splinters, etc.

6.2 - RESEARCH ON POSSIBLE AGGRESSIONS

- For each dangerous product, research shall be performed on the various aggressions to which it may be subjected during its presence at the station, due to:

  . operations on the product itself such as manipulations, handling, operation, etc.;
  . other products present at the station, in the other installation stations and the environment;
  . other sources such as static electricity, lightning and electromagnetic radiation, etc.

- Allowance can already be made for protection systems in place which may limit or eliminate certain aggressions; justifications are essential.

- It may also be interesting to use knowledge available concerning the products' sensitivity to certain aggressions and make a comparison between sensitivities and aggression levels. This makes it possible to determine whether or not an aggression is liable to activate the product in the specific conditions of the work station.

6.3 - ESTIMATION OF THE PROBABILITIES OF ACCIDENT

- The degrees of probability of accident are determined on the basis of the recommendations and provisions of Chapter D of the circular of 8 May 1981.

- Remember that degree "P1" applies in practice only to the sleeping storage of products in specified normal conditions and to transportation of the products in their container approved for transportation.

- Particular conditions applying to the operation, design or configuration of the products or systems can justify a modification to the degrees provided for by the circular.

6.4 - Determination of hazardous areas

- It is not always easy to determine hazardous areas, especially since they must be as realistic as possible.

- In the simplest case, namely for products whose reactions are well known and whose allocation to a risk division is indisputable, the application of the formulas of Article 11 of the Order of 26 September 1980 is the only valid method.

- In the most complex cases, namely when the products have very particular reactions or when the formulas in the Order are not applicable, specific data must be used such as test results, bibliographic data, theoretical studies, etc. The recommendations of the circular of 8 May 1981 relating to the characteristics of hazardous areas can be usefully applied.

- Once the "theoretical" hazardous areas have been evaluated, allowance must be made for internal and external layouts and particular configurations liable to modify their nature (chapter C3 of the circular), in order to determine the "real" hazardous areas.

6.5 - INTERNAL SAFETY ANALYSIS OF THE INSTALLATION

- This section describes the risk study confined to the work stations themselves.

- Each work station shall be considered as an "a0" seat in the meaning of Article 15 of the Order. Inter-station transfers of dangerous products are to be included in this study.

  The analysis shall conclude concerning the compliance of the work-station layouts, namely their compliance with the acceptable safety level in the meaning of Article 16 of the Order (number of persons and duration of exposure).

- If non-conformance are detected, it is essential to repeat the analysis and either modify the layouts of the various work stations, or else take specific measures to reduce the possible effects and/or probabilities of occurrence, so as to reach an acceptable situation.

6.6 - ANALYSIS OF THE INSTALLATION AS AN EXPOSING SEAT

- The layout analysis shall be carried out to compare the real layout of each exposed seat and the authorised layouts according to the hazardous areas and the probabilities of occurrence.

- Finally, the analysis shall conclude as to the layout compliance. In the event of non-conformance, it is essential to repeat the study and describe the specific compensatory measures to render the layout acceptable : the chief possible methods are to change the isolation distances and install specific protection systems to limit the effects on the outside.

7 - MEASURES TAKEN TO LIMIT THE RISKS OF ACCIDENT

- The aim of such measures is to try and reduce the probabilities of occurrence of the undesirable events.

- In the case of internal risks, related directly to the operations, the actions can be undertaken on the level of system design, levels of aggression or the operations themselves.

- In the case of risks coming from the environment, measures can be provided for on the level of installation design and external protection (strong roofing, grating on the ceiling, etc.). This should be dealt with in the chapter on "Analysis as an exposed seat".

8 - MEASURES TAKEN TO LIMIT THE EFFECTS OF AN ACCIDENT

- When, nevertheless, there is still a risk of occurrence of undesirable events, it is essential to limit the undesirable effects insofar as possible.

- Possible measures at the work station are as follows :

  . limitation of the quantities of products capable of reacting simultaneously, especially taking into account the possibilities of transmission and propagation of effects (Appendix 1 of the circular);
  . special protection devices for the operators themselves (clothing, masks, etc.);
  . screens, remote controls, etc., so as to protect the operator at his work station;
  . screens to isolate the work station and protect the neighbouring stations.

- With respect to the installation as an exposing seat, the chief possible methods are to change the isolation distances and install specific protection systems such as barricades, reinforced walls and roofing to limit the transmission of the effects to the outside environment.

9 - ANALYSIS OF COMPLIANCE WITH DECREE 79-846

- This analysis summarises the results of the various analyses and describes in particular, where applicable, all measures taken to attain an acceptable safety level.

- It is then essential to check the total compliance of the installation with respect to Decree 79-846, article by article.

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