

GUIDE

to the declaration procedure and coding system for criteria concerning significant events* related to safety, radiation protection or the environment, applicable to basic nuclear installations and the transport of radioactive materials.

I- Preamble

Notification of incidents to the administrative authority:

Basic nuclear installations are subject to obligations as regards the declaration of incidents to the administrative authority. The first specific measures to be implemented were safety-related, and similar obligations have progressively been imposed in the fields of radiation and environmental protection.

Article 5, paragraph III of Decree no. 63-1228 of 11 December 1963 states that "without prejudice to the application of the measures provided for in applicable regulations, all nuclear or non-nuclear accidents or incidents entailing or likely to entail significant consequences for the safety of the installations mentioned in the present decree are to be immediately declared by the operator to the ministry of industry, the ministry in charge of the prevention of major technological risks, and the health ministry".

There are obligations as regards informing the administrative authority of incidents or accidents in other fields:

- For radiation protection, in application of article L. 1333-3 of the Public Health Code, stating that "all persons in charge of one of the activities mentioned in article L. 1333-1 [of the Public Health Code] shall be responsible for immediately notifying the administrative authority of any incident or accident that may affect human health through exposure to ionising radiation".
- For environmental protection, in application of the texts implementing Decree no. 95-540 of 4 May 1995 regarding liquid and gaseous effluent discharges and water sampling in basic nuclear installations, and as per the Interministerial Decree of 31 December 1999 setting out the general technical regulations to prevent and limit the nuisances and external risks associated with the operation of basic nuclear installations.

Radioactive material transport operators are subject to similar declaration obligations under the provisions of orders concerning the various transport modes (road, rail, air, sea), namely the modified Order of 1 June 2001 on the transport of hazardous goods by air (ADR Order), the modified Order of 5 June 2001 on the transport of hazardous goods by rail (RID Order), the modified Order of 5 December 2002 on the transport of hazardous goods via internal navigation routes (ADNR Order), the modified Order of 23 November 1987 on the safety of ships (RSN Order - attached regulation, division 411), the modified Order of 12 May 1997 on the technical conditions for aircraft operation by public airlines (OPS1 Order), and the modified Order of 18 July 2000 regulating the transport and handling of hazardous materials in maritime ports.

It is essential to distinguish three main concepts in the declaration procedure when filing an incident with the administrative authority:

- Notifying the administrative authority of a violation of a regulatory provision.
- Notifying the administrative authority of an incident situation for which the intervention of the public authorities may be requested so as to limit the consequences of the incident. This concept concerns the emergency response organisation to be initiated in the event of an incident triggering an on-site or off-site emergency plan. It is covered by interministerial directives regarding the action of public authorities in response to a radiological emergency and does not concern the present guide.

- Notifying the administrative authority of *significant events** regarding defence in depth (these obligations are mainly derived from the provisions of international conventions ratified by France, and from applicable regulatory texts: article 9 v of the Joint Convention of 5 September 1997 on the safety of spent fuel and on the safety of radioactive waste management, article 19 vi of the Convention on nuclear safety approved by Law no. 95-865 of 2 August 1995, article 12 of the Order of 10 August 1984 regarding the quality of the design, construction and operation of basic nuclear installations, and the above-mentioned procedural orders).

The third of these concepts is the subject of the present guide. Its main principles are recalled below for clarification.

Defence in depth and experience feedback:

Basic nuclear installation safety includes all the technical and organisational measures taken at all stages of the design, construction, operation, shutdown and dismantling of nuclear installations to ensure normal operation, prevent accidents and limit their consequences.

Transport safety¹ is guaranteed by three main factors:

- Primarily, robustness of the package design,
- Reliability of transport as well as certain special equipment in vehicles,
- Efficiency of intervention in case of accident.

Nuclear installation and transport safety is assessed with regard to a general framework, referred to as 'defence in depth', based on the following principle: *Despite the theoretical suitability of the measures taken to prevent errors, incidents and accidents, it is postulated that such events occur, and means to respond to them and reduce their impact to acceptable levels are studied and implemented.* The defence-in-depth principle comprises 5 levels:

1. Prevention of operational anomalies, deviations and system failures (system design, definition of operating range and of organisation),
2. Maintaining the installation or package within the authorised operating limits through monitoring and detection of (operational) deviations,
3. Control of accidents within the design basis (means of action to respond in foreseen cases),
4. Preventing the degradation of accident conditions and limiting the impact of severe accidents,
5. Limiting the impact of major accidents on populations (preparation for emergency management).

Defence in depth level 2 imposes the implementation of a reliable and adequate system for detecting operational anomalies and deviations. This system must ensure early detection of all deviations from the normal operating range.

The safety of a basic nuclear installation and of the transport of radioactive materials must be continuously improved. Situations where events are detected with no attempt to prevent them are inadmissible. The events detected for an installation, a transport operation or other similar operations must be analysed so as to:

- Prevent an event already observed from repeating itself, by implementing appropriate corrective measures,
- Prevent the occurrence of a serious situation, by analysing the potential consequences of events leading to more severe incidents,
- Promote good practices to improve safety.

The analysis of the events thus detected and the implementation of the modifications and corrective measures identified in the analysis constitute what is referred to as "experience feedback". Experience feedback is a fundamental aspect of the defence in depth principle within the general framework of nuclear installation and transport safety.

¹ Transport includes all operations and conditions associated with the conveyance of radioactive materials, such the design, manufacture, maintenance and repair of the packaging, and the preparation, consignment, loading, carriage, temporary storage in transit, unloading and receipt at the final destination of radioactive material packages.

The hierarchical classification of events must ensure priority treatment for those most significant. Events deemed priority on the basis of predefined criteria are referred to as *significant events**

These anomaly detection and experience feedback principles can be transposed from the safety field to the fields of radiation and environmental protection.

The purpose of this guide is to define the measures applicable to operators and carriers as regards procedures for declaring events relevant to nuclear installation and transport safety, radiation protection or environmental protection. Under no circumstances does it replace the specific obligations resulting from the application of the Labour Code, the Public Health Code, the Environmental Protection Code, discharge authorisation certificates, provisions applicable to specific installations, modal regulations such as those mentioned above applicable to the transport of radioactive materials, or other regulations.

Similarly, this guide does not consider events, namely malicious acts, in terms of their impact on safety. Events that may affect the protection of nuclear materials or nuclear installations are covered by additional declaration procedures specifically concerning safety and defined by decision of the senior official for defence at the ministry of industry.

The procedures described in the present guide are applied without prejudice to the implementation of measures planned for emergency situations, to ensure nuclear safety. Event triggering an emergency plan (PUI, PPI, PSS TMR, etc.) are treated in priority as per the procedures defined in the emergency plan.

II- General provisions

The declaration procedure for *significant events** serves the following purposes:

- Sharing experience feedback through a detailed analysis and subsequent report
- Allowing the authorities to:
 - Analyse the precursory nature and severity of an event, independently of the analysis conducted by the operator,
 - Contribute to the detection and identification of precursor incidents,
 - Verify that the operator has correctly taken into account the experience feedback from other operators,
 - Verify the efficient execution of event detection and analysis tasks and the correct determination of corrective measures by the operator, for all events detected,
 - Inform the public of events occurring in nuclear installations or during transport of radioactive materials.

For this purpose, the nuclear safety authority defines criteria for declaring events deemed significant, as described in the present guide, to the public authorities. Given the different fields likely to be impacted, the nuclear safety authority distinguishes events in terms of the following:

- Safety criteria associated with the prevention of nuclear accidents and the limitation of their consequences,
- Radiation protection criteria associated with the observance of radiation protection rules for workers and the public, as defined in the Labour Code and the Public Health Code,
- Environmental protection criteria associated with the observance of environmental protection rules as defined in the Environmental Charter, the Environmental Protection Code and the Public Health Code.

These criteria may concern BNIs or the transport of radioactive materials.

Other events not falling within the scope of these declaration criteria are identified by the operator or carrier for subsequent analysis of experience feedback. These events, referred to as *interesting events**, are events whose immediate importance does not justify an individual analysis but whose repetitive character may be indicative of a problem calling for a detailed analysis. Information concerning these events is available to BNI inspectors and the IRSN upon request of the nuclear safety authority. The operator defines its own criteria to identify *interesting events** for each field considered (safety, radiation protection and environmental protection).

In the case of radioactive materials transport, the application of this *interesting event** concept does not release the operator from its obligation to notify the administrative authority of low-incidence deviations from regulatory requirements resulting in no degradation of safety functions. By 'regulatory requirements' we mean the orders concerning each transport mode (road, rail, river, maritime, air), package models or material approval certificates, shipment approval certificates, and special arrangements.

An event occurring in a BNI and possibly affecting more than one of the fields considered is covered by a unique declaration and report explicitly stating the fields impacted. This declaration and report are communicated to the authorities specified in section VIII below within the deadlines indicated in section VI.

In accordance with the principle of first responsibility of the operator (for BNIs) or consignor (for transport), these define special rules allowing them to identify specific conditions for the determination of events and propose declaration criteria for situations likely to be encountered in their installations or activities.

III- Declaration criteria for *significant events**

The declaration criteria for *significant events** concerning safety, radiation protection and environmental protection for BNIs are presented in appendices 5 to 8, and those concerning the transport of radioactive materials are presented in appendix 9.

IV- *Significant events concerning the transport of radioactive materials**

Without prejudice to the application of modal regulations for the transport of radioactive materials, *significant events** affecting said transport are covered by a declaration issued to the nuclear safety authority by the consignor or duly authorised organiser.

This declaration procedure applies to transport modes and operations as defined in the modal decrees. It does not apply to transport activities strictly within the nuclear site.

V – Generic events

A *significant event** may affect or be likely to affect (due to its nature or cause) other installations or transport activities with physical and organisational similarities. It may consist of a design, maintenance, operation or fabrication anomaly. If the analysis shows that a *significant event** displays a generic character, it is declared as such by the central services of the operator or carrier (if they exist – if not, by the operator or carrier). This declaration specifies the installations or activities concerned. The declaration is updated whenever a new event associated with the generic event is discovered.

VI- Declaration deadlines

The terms "declaration without delay" and "immediate declaration" appearing in the Environmental Code, the Public Health Code and the texts implementing Decree no. 95-540 call for operational precision to harmonise the declaration procedures and deadlines. The operator or carrier concerned, first responsible for the safety of its activities, evaluates the urgency of the declaration with respect to the demonstrated or potential severity of the event and the speed of reaction necessary to prevent a deterioration of the situation or limit the consequences of the accident, including due to an erroneous interpretation by the public. A delay of 2 working days further to the detection of the event is tolerated, except in the case of a demonstrated emergency situation. For a generic anomaly declared by the central services, this delay is extended to one week as from the date on which the anomaly is characterised.

VII- Common procedures for notifying the nuclear safety authority of *significant events**

When notifying the administrative authority of a situation possibly requiring its intervention, the *responsible entity** immediately informs the recipients indicated below of *significant events** occurring in a basic nuclear installation or during the transport of radioactive materials, such as events causing death, external exposure, contamination or serious injuries, events with health-related consequences, the loss or theft of a radioactive source, and the detection of significant contamination of persons or equipment at the site entrance leading to discharges outside the site, triggering an emergency plan or requiring the intervention of external emergency teams. Events for which the *responsible entity** deems it necessary to quickly notify the nuclear safety authority, namely those possibly leading to erroneous interpretation by the public or the media, shall also be declared without delay.

The nuclear safety authority shall also be notified without delay of any information communicated to the press regarding *significant events**, as well as important information communicated to prefects or foreign authorities.

The following provisions are applicable to all *significant events**:

1. For any *significant event** corresponding to the criteria defined in appendices 5 to 9, the *responsible entity** transmits a photocopy of the event declaration to the recipients indicated below. For an event identified by the central services, the declaration is also transmitted to all DSNRs concerned. The declaration is updated whenever necessary, particularly in case of changes in the corresponding list of installations or transport operations. The information to be transmitted in the photocopy of the declaration is presented in appendices 1 (BNI) and 2 (transport), along with a template of the declaration. This template allows the nuclear safety authority to ensure homogeneous processing of declarations with a view to completing the above-mentioned tasks. Nevertheless, in order to ensure a proper understanding of the facts and risks involved, the operator may adapt the form of these documents by introducing specific information and more detailed explanations. Should the operator use a form different from that proposed in appendix 1, all the information presented therein shall be integrated.
2. The declaration must reach the recipients, even in case of absence of the initial results of the investigations conducted to determine the circumstances of the event.
3. The declaration shall include an INES classification proposal for events declared as regards safety and/or radiation protection. In case of disagreement, the nuclear safety authority shall inform the declarer of the INES classification level adopted. A notification may be issued to the public, depending on the INES level. When an event is classified in more than one field, the INES level adopted is the highest level obtained for all fields.
4. In the event of a disagreement regarding the declaration field or criterion proposed, the nuclear safety authority shall notify the declarer of the field and criterion deemed applicable and adopted for the statistical exploitation of significant events. Moreover, it may request the separate treatment of events initially considered as related.
5. For all *significant events**, the declarer shall transmit a *significant event** report within two months further to the declaration. This report, for which templates are provided in appendices 3 (BNI) and 4 (transport), shall be communicated by mail to the recipients indicated below and shall include an updated declaration.

The definitive character of the report transmitted shall be specified. The report shall be updated whenever necessary.

VIII- Recipients of *significant event** declarations and reports

*Significant event** declarations and reports are to be sent to the following addresses, independently of the notification obligations possibly derived from regulatory texts:

1. Event concerning a BNI	
DGSNR 6 place du Colonel Bourgoïn 75572 Paris Cedex 12 Fax: 01 40 19 86 24	IRSN BP 17 92262 Fontenay-aux-Roses Cedex Fax: 01 58 35 71 52
DGSNR – Sub-directorate concerned 10 route du Panorama BP 83 92266 Fontenay-aux-Roses Cedex SD1: 01 43 19 70 27 SD2: 01 43 19 70 89 SD3: 01 43 19 71 66	DGSNR – Operational directorate concerned DEI: 01 39 76 78 18 DRPH: 01 46 54 46 10 DSR: 01 42 53 91 24 DSU: 01 58 35 79 73
Territorially competent DSNR	For a generic event concerning a BNI, the declaration is also transmitted to all DSNRs supervising the installations concerned by the event.
2. Event concerning the transport of radioactive materials	
DGSNR – 4 th sub-directorate 6 place du Colonel Bourgoïn 75572 Paris Cedex 12 Fax: 01 40 19 86 24	IRSN BP 17 92262 Fontenay-aux-Roses Cedex Fax: 01 58 35 71 52
DGSNR – 1 st sub-directorate 10 route du Panorama BP 83 92266 Fontenay-aux-Roses Cedex Fax: 01 43 19 70 27	IRSN - DSU: 01 58 35 79 73 IRSN – DEI: 01 39 76 78 18 (in case of environmental consequences) IRSN – DRPH: 01 46 54 46 10 (in case of health-related consequences)
Territorially competent DSNR (for the region where the consignor is established)	DRIRE for the region where the event occurred

IX- Notifying the public

Subsequent to a recommendation issued by the High Council for Nuclear Safety and Information, the International Nuclear Event Scale (INES) was adopted in France by the nuclear safety authority in April 1994 for all BNIs under its supervision. Its scope of application was extended to the transport of radioactive and fissile materials for civil use as of the 1st of October 1999, and to radiation protection (on an experimental basis) as of the 1st of January 2005.

The INES covers all events occurring in basic nuclear installations (BNIs) and those concerning the transport of radioactive materials. It consists of a nuclear event severity scale based partly on objective criteria and partly on subjective criteria. It is intended to facilitate the media and public's perception of the importance of an event (deviation, anomaly, incident or accident). It does not constitute an assessment tool and may not, under any circumstance whatsoever, serve as a basis for international comparisons. In particular, there is no one-to-one relation between the number of non-severe events declared and the probability of occurrence of a severe accident in a nuclear installation or during transport.

*Significant events** concerning nuclear installations and the transport of radioactive materials are classified by the nuclear safety authority according to 8 levels (0 to 7), depending on their importance. *Significant events** corresponding to levels 2 and 3 are qualified as incidents, and those corresponding to upper levels (4 to 7) are qualified as accidents.

The *significant event** declaration includes an INES classification proposal submitted to the approval of the nuclear safety authority, which is solely responsible for the final classification decision. The INES enables the nuclear safety authority to classify all the events and select those with sufficient importance to be covered by a notification. All *significant events** corresponding to level 1 and higher are systematically covered by a notification published in the internet site of the nuclear safety authority. In addition, *significant events** corresponding to level 2 and higher are reported to journalists through press releases and telephone contacts. *Significant events** corresponding to level 0 are not systematically made public by the nuclear safety authority. They are published if they present a particular media interest.

In addition, the nuclear safety authority notifies the IAEA* of level 2 events, and also level 1 events in case of loss of a package shipped by a French consignor.

There is no systematic association between the INES classification and the significance of an event. The present guide does not cover INES application procedures.

X- Number of *significant events**

Since a *significant event** may be classified in more than one field, the sum of events per classification field may exceed the number of *significant events**. The nuclear safety authority informs the public of the number of *significant events** on an annual basis.

XI- Application procedures

The present guide cancels and replaces, as from January 1st 2006, all prior provisions fixed by the nuclear safety authority and all prior specific protocols between an operator and the nuclear safety authority concerning the declaration and coding of *significant events**. Nevertheless, it may be specified locally within the scope of new specific protocols between the nuclear safety authority and the operator.

Paris, 21 October 2005

Director General for Nuclear Safety and Radiation Protection

André-Claude LACOSTE

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Consequences for humans: <input type="checkbox"/> Radiation contamination	<input type="checkbox"/> Medical evacuation <input type="checkbox"/> Chemical contamination	<input type="checkbox"/> Wounds <input type="checkbox"/> Microbiological contamination
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Actual impact:

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Potential impact (based on realistic scenario):

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Immediate corrective measures:

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Actions taken to prevent the reoccurrence of the event:

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.....

Final condition of the installation and equipment concerned:

.....

.....

.....

Event classification proposal

<input type="checkbox"/> In terms of safety	<input type="checkbox"/> In terms of radiation protection
Basic classification proposed:	Basic classification proposed:
Classification elements: Unexpected initiator:	Possible additional factor:
Safety function concerned:
Availability of safety function:
Possible additional factor:
INES classification proposed:	INES classification proposed:

External communication

Is an external communication considered for this event? Yes No

If yes, by whom?	To whom?	When?
.....

Person in charge to be contacted for additional information

Name:	Surname:	Function:
Tel.:	Fax:	E-mail:

Validation by the facility manager or representative

Name:	Surname:	Function:
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Signature:

APPENDIX 2: SIGNIFICANT EVENT DECLARATION FORM FOR RADIOACTIVE MATERIAL TRANSPORT

The declaration must include at least the following information:

- Date and location of the event
- Contact information for the consignor, recipient, commissioner and carrier
- Transport mode
- Location of detection of the event
- Radioactive material type, activity and UN number
- Package type
- Transport Index (TI) and Criticality Safety Index (CSI), if applicable
- Availability status of safety functions
- Description of the event
- Presumed causes of the event
- Consequences for packages
- Immediate corrective actions
- Contact information for the event management supervisor
- INES classification proposal

It is preferable to use the form below.

**SIGNIFICANT EVENT DECLARATION FORM
FOR RADIOACTIVE MATERIAL TRANSPORT**

Reference: **Date:** **Index:**

Date:		Location:		Département:	
Consignor:			Carrier:		
Recipient:			Commissioner:		
Transport mode		Event detection			
<input type="checkbox"/> Road <input type="checkbox"/> Rail <input type="checkbox"/> Air <input type="checkbox"/> Maritime		<input type="checkbox"/> During loading <input type="checkbox"/> In transit <input type="checkbox"/> On handling trolley <input type="checkbox"/> On hoisting equipment			
		<input type="checkbox"/> On quay <input type="checkbox"/> In warehouse <input type="checkbox"/> Other (please specify)			
Product	UN no.	Activity	TI	CSI	Package type
Off-site consequences:		Potential dose exposure of the most exposed individual:			
Discharge (A ₁ or A ₂):		Estimated dose rate in contact with package:			
		Presence of contamination: <input type="checkbox"/> Yes <input type="checkbox"/> No			
		Degradation of defence in depth:			
Availability status of safety functions					
Safety functions	Containment	Cooling	Radiation protection	Protection from criticality risks	
Availability status					
Presumed causes of the event					
Consequences for packages					
Immediate corrective actions					
Event management supervisor					
Name:			E-mail:		
Tel.:			Fax:		
Classification proposal					
<input type="checkbox"/> Declaration criterion adopted: _____			<input type="checkbox"/> INES level proposed: _____		

APPENDIX 3: SIGNIFICANT EVENT REPORT FOR A BNI

Standard template for the significant event report

Include the significant event declaration (latest index no.)

Reference: **Date:** **Index:**

Summary information		
Brief summary of the event and the lessons learned:		
Generic and/or precursory aspects of the event:		
Analysis status:	Is the report definitive? <input type="checkbox"/> Yes <input type="checkbox"/> No	Revision schedule:
General information		
Identification of the event:		
General:	BNI no.: Site:	
	Reactor, plant or laboratory:	
	Building, workshop or unit:	
	Date and time of the event:	
	Specific name and location of the unit concerned:	
	INES classification of the event:	
External communication (press, internet, etc.):		
Reference number of report available in electronic format:		
Context of the event:	Status or operating regime of the units concerned in the installation:	
	Status of safety equipment and functions:	
	Possible additional information:	
	Activities (namely human activities) in progress during the event:	
	Human resources present:	
	Other external factors:	
Detection of the event:		

Analysis of the event		
Chronology of facts:		
Analysis of causes	Identification of causes:	
	Failure analysis:	
	Analysis of inappropriate actions:	
	Analysis of deviations from the safety reference system:	
	Existence of recurrent causes, namely as regards human and organisational factors:	
Actual impact	Description of consequences for the installation:	Unavailability further to the event:
	Radiation consequences for personnel:	
	Consequences for the environment:	
Potential impact (safety, radiation protection, environment)	Lines of defence requested and available during the event:	
	Identification of potential aggravations of the event:	
	Possible aggravating factor or scenario:	
	Consequences of selected scenarios:	
Synthesis and analysis of possible precursory aspects:		
Analysis of the consequences of inappropriate actions	
Elements justifying the INES classification	
Corrective measures		
Corrective measures to ensure installation compliance with the safety reference system	Details of actions taken:	Planned actions and schedules:
Corrective measures to prevent the reoccurrence of the event	Details of actions taken:	Planned actions to modify the installation or to improve procedures, and corresponding schedules:

Experience feedback	
Analysis of the potentially generic character of the event	From other units of the installation:
	From other units of the site:
	From other units of the operator:
Specific actions resulting from these analyses:	
Actions to exchange experiences with other operators:	

Methodological guidelines for completing the significant event report

The report includes the information set out in the text implementing the Order of 10 August 1984 concerning quality:

- precise description of the event,
- analysis of the origin of the event, and identification of potential lessons learned for the activity concerned (or other activities, if applicable),
- assessment of the potential nocivity of the event,
- analysis of causes and deviations, particularly as regards the adequacy and application of the general measures taken in accordance with the 'quality' Order of 10 August 1984 and, if necessary, reassessment of the qualification of corresponding technical and human resources,
- analysis of consequences and inappropriate actions,
- measures taken to prevent the reoccurrence of the event, namely the definition and justification of additional monitoring and repair operations, modifications of operating conditions, and additional monitoring systems possibly required during operation of the installation,
- possible commitments.

The information expected in the report is clarified below.

▪ **Context of the event**

- Status or operating regime of the units concerned in the installation: Production levels, periodic maintenance shutdown or random shutdown, modifications, etc. The functions of the units concerned must be briefly recalled.
- Status of safety equipment and functions: Particularly equipment participating in the lines of defence agressed or requested during the event (qualifications, observations and verifications during the period preceding the event). The roles of the various equipment and functions must be briefly recalled.
- Possible additional information: Environmental conditions, site activities and external elements possibly impacting the scenario for the event.
- Activities (namely human activities) in progress during the event: Human activities in progress during the event must be characterised by specifying their content, the actors concerned, and all factors influencing these activities.
- Human resources present: Operating teams, maintenance teams, service teams, etc.
- Other external factors: Any factors that could have favoured the occurrence of the event or led to its aggravation must be identified.

▪ **Chronology of facts**

The chronology must factually identify the scenario according to which human activities and phenomena are sequenced and articulated up to the occurrence of the undesired event. In particular, it must specify all changes, deviations and resumption delays for parameter values mentioned in the general operating rules or technical provisions.

It details the events and difficulties encountered, and the manner in which these difficulties are handled by personnel and equipment. It must include the following:

- operating contingencies observed,
- automatic equipment actions,
- human activities: Elements required to understand the difficulties encountered, including all activities at fault as regards equipment, documentation, interactions among actors and main decisions taken.

The method used to reconstitute the human factors involved may be indicated in the introduction of this section.

The description must not comprise irrelevant value judgements or interpretations. It must only cover what effectively happened (no 'non-facts'). The chronology must systematically indicate the dates and times of the various events mentioned and must be illustrated by drawings and diagrams facilitating comprehension.

▪ **Analysis of causes**

- **Identification of causes:** Event analysis using a 'fault tree' type method to graphically represent causal logical relations among error factors, errors committed and technical faults encountered. Each fact mentioned will give rise to the following types of questions: "What led to this situation?", "Is this necessary?", "Is this sufficient?". Regarding human errors, those related to interactions with tools and systems are to be distinguished from those associated with documentation and those occurring further to interactions among actors or as a result of the analyses conducted or decisions taken.
- **Failure analysis:** It mainly covers equipment or functional failures.
- **Analysis of inappropriate actions:** It must enable the identification of the origin of inappropriate actions. It is broken down into 2 steps:
 - analysis of the nature of the inappropriate actions (omitted actions or inadequate actions), including the goals or objectives sought by the actors when executing them (e.g., search for increased efficiency, optimisation of resources, protection of equipment, anticipation of or recovery from contingencies, search for a compromise, interrogative attitude, search for increased rapidity, management of activity priorities, etc.),
 - analysis of the origin of inappropriate actions, or factors leading to their occurrence (e.g., incomplete rule, work overload, non-ergonomic tool, faulty identification, new agent in a given team, inadequate definition of tasks, insufficient personnel, etc.).
- **Analysis of deviations from the safety reference system:** These deviations may concern the equipment, tasks of actors, operating methods, operating documents or organisational procedures. Special emphasis is placed on analysing the robustness of lines of defence corresponding to regulations, reference systems and operating, maintenance or servicing procedures. Any deviations must be covered by a causal analysis aimed at establishing the relevance of the corrective measures proposed.
- **Existence of recurrent causes, namely as regards human and organisational factors:** The goal here is to identify similar technical, human or organisational failures already identified during previous events occurring in other installations of the site.

▪ **Consequences for the installation**

- **Unavailability further to the event:** Duration and characterisation of unavailability of safety functions and main functions of the installation or unit concerned.
- **Radiation consequences for personnel:** Radiation sources or radionuclides involved, exposure conditions, internal and external doses.

▪ **Potential impact (safety, radiation protection, environment)**

- **Lines of defence requested and available during the event:** Identification of the lines of defence requested or available during the event (in response to harmful developments of the event), and assessment of their robustness.
- **Identification of potential aggravations of the event:** This analysis may be conducted by first modifying the context of the initial event in an unfavourable manner, particularly by eliminating favourable conditions or random actions limiting the actual impact of the event, and then searching for one or more realistic scenarios taking into account a single additional event.

- Possible aggravating factor or scenario: To be chosen in accordance with the event execution logic.
- Synthesis and analysis of possible precursory aspects: Conclusions regarding the precursory character of the event.
- **Corrective measures**
 - Corrective measures to ensure installation compliance with the safety reference system: In particular, specify all operations performed in an active environment (duration, dosimetric consequences, etc.).
 - Corrective measures to prevent the reoccurrence of the event:
 - Details of actions taken: For example, reinforcement of inspections, and temporary measures if applicable.
 - Planned actions to modify the installation or to improve procedures: Descriptions and planned schedules for modifications of equipment, procedures, etc.
- **Experience feedback**
 - Analysis of the potentially generic character of the event: Analysis of the transposal to other units of the installation, other installations, etc.
 - Specific actions resulting from these analyses: Preventive inspections, verifications, etc.
 - Actions to exchange experiences with other operators: If applicable, actions planned or completed to exchange experiences with other operators or sites equipped with installations, units or systems potentially concerned.

**APPENDIX 4: SIGNIFICANT EVENT REPORT FOR
RADIOACTIVE MATERIAL TRANSPORT**

No. _____ of _____

Date: Location:
<i>Département:</i>
Identification of the event:
.....
.....
.....
.....
.....
.....
.....
.....

<u>Carrier</u>
Name
Company
Address
.....
Tel.
Fax
E-mail

Person to be contacted for additional information
Name
Company
Address
.....
Tel.
Fax
E-mail

1. INFORMATION REGARDING CONSIGNMENT

Consignor:

.....

Departure site:

.....

Recipient:

.....

Arrival site:

.....

Commissioner:

.....

2. DATE AND LOCATION OF THE EVENT

Year: Month: Day: Time:

Location: *Département:*

3. TRANSPORT MODE

<p>Rail</p> <p><input type="checkbox"/> Passenger train</p> <p><input type="checkbox"/> Freight train</p> <p>Position of wagon behind the locomotive:</p> <p>Number of wagons involved:</p> <p>Number of wagons in the train:</p> <p>Wagon number (optional):</p> <p><input type="checkbox"/> In station</p> <p><input type="checkbox"/> In sorting station or train formation station</p> <p><input type="checkbox"/> Unloading site</p> <p><input type="checkbox"/> Loading site</p> <p><input type="checkbox"/> Transfer site</p> <p><input type="checkbox"/> On rail</p> <p>Name of line:</p> <p>.....</p> <p>Kilometres:</p>	<p>Road</p> <p><input type="checkbox"/> Automobile</p> <p><input type="checkbox"/> Van < 1.5 t</p> <p><input type="checkbox"/> Truck > 1.5 t</p> <p><input type="checkbox"/> Truck with trailer</p> <p><input type="checkbox"/> Truck with semi-trailer</p> <p><input type="checkbox"/> In suburban area</p> <p><input type="checkbox"/> Loading site</p> <p><input type="checkbox"/> Unloading site</p> <p><input type="checkbox"/> Transfer site</p> <p>License plate number (optional):</p>
<p>Maritime</p> <p><input type="checkbox"/> River</p> <p><input type="checkbox"/> Non-INF ship</p> <p><input type="checkbox"/> INF ship</p> <p><input type="checkbox"/> In port</p> <p><input type="checkbox"/> In quay</p>	<p>Air</p> <p><input type="checkbox"/> Small plane < 5.6 t</p> <p><input type="checkbox"/> Passenger plane > 5.6 t</p> <p><input type="checkbox"/> Cargo plane > 5.6 t</p> <p><input type="checkbox"/> Takeoff</p> <p><input type="checkbox"/> Landing</p> <p><input type="checkbox"/> Ground roll</p> <p><input type="checkbox"/> Boarding</p> <p><input type="checkbox"/> Cruise</p> <p>Package outside of means of transport</p> <p><input type="checkbox"/> In warehouse</p> <p><input type="checkbox"/> On hoisting equipment</p> <p><input type="checkbox"/> On quay</p> <p><input type="checkbox"/> On handling trolley</p> <p><input type="checkbox"/> Loading in progress</p> <p><input type="checkbox"/> Unloading in progress</p> <p><input type="checkbox"/> Other</p> <p>Please specify:</p>

4. TOPOGRAPHY

- | | |
|--|---|
| <input type="checkbox"/> Slope/inclination | <input type="checkbox"/> Bridge/low passage/underground passage |
| <input type="checkbox"/> Tunnel | <input type="checkbox"/> Intersection |

5. SPECIFIC METEOROLOGICAL CONDITIONS

- | | |
|--------------------------------|-----------------------------------|
| <input type="checkbox"/> Rain | <input type="checkbox"/> Snow |
| <input type="checkbox"/> Fog | <input type="checkbox"/> Ice |
| <input type="checkbox"/> Storm | <input type="checkbox"/> Blizzard |
- Temperature: °C

6. DESCRIPTION OF THE EVENT

- Derailment/Ran off road
- Collision
- Tip-over/Overturn
- Fire
- Explosion
- Loss
- Technical defect

Estimated velocity of means of transport containing radioactive material, at time of accident:

..... km/h

In case of collision, estimated velocity of second means of transport involved, at time of accident: km/h

In case of fall, height of fall: m

In case of fire, duration of fire:
(specify unit of time)

Presumed time of start of fire:

In case of sinking, water depth: m

If punctured, diameter of puncture: cm

Object responsible for puncture:

Release of material:

Abnormal radiation with respect to regulatory threshold values:

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Brief description of the event:

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8. HAZARDOUS GOODS INVOLVED

UN no. (1)	Class	Packaging group	Estimated quantity of product lost (kg or l) (2)	Means of retention (3)	Material of means of retention	Type of defect in means of retention (4)

<p>(1) Technical name also to be indicated in the case of hazardous goods falling under a collective category to which special provision 274 applies.</p> <p>(2) For class 7, indicate the corresponding values in accordance with the criteria stipulated in section 1.8.5.3.</p>	<p>(3) Indicate the appropriate number</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">1 Packaging</td> <td style="width: 50%;">9 Battery wagon</td> </tr> <tr> <td>2 GRV</td> <td>10 Battery vehicle</td> </tr> <tr> <td>3 Large packaging</td> <td>11 Wagon with tanks</td> </tr> <tr> <td>4 Small container</td> <td>12 Removable cistern</td> </tr> <tr> <td>5 Wagon</td> <td>13 Large container</td> </tr> <tr> <td>6 Vehicle</td> <td>14 Cistern container</td> </tr> <tr> <td>7 Cistern wagon</td> <td>15 CGEM</td> </tr> <tr> <td>8 Cistern vehicle</td> <td>16 Mobile cistern</td> </tr> </table>	1 Packaging	9 Battery wagon	2 GRV	10 Battery vehicle	3 Large packaging	11 Wagon with tanks	4 Small container	12 Removable cistern	5 Wagon	13 Large container	6 Vehicle	14 Cistern container	7 Cistern wagon	15 CGEM	8 Cistern vehicle	16 Mobile cistern
1 Packaging	9 Battery wagon																
2 GRV	10 Battery vehicle																
3 Large packaging	11 Wagon with tanks																
4 Small container	12 Removable cistern																
5 Wagon	13 Large container																
6 Vehicle	14 Cistern container																
7 Cistern wagon	15 CGEM																
8 Cistern vehicle	16 Mobile cistern																
<p>(4) Indicate the appropriate number</p>	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">1 Loss</td> <td style="width: 50%;">3 Explosion</td> </tr> <tr> <td>2 Fire</td> <td>4 Structural defect</td> </tr> </table>	1 Loss	3 Explosion	2 Fire	4 Structural defect												
1 Loss	3 Explosion																
2 Fire	4 Structural defect																

9. INFORMATION CONCERNING THE PACKAGES INVOLVED (complete this section for EACH PACKAGE)

<p>Number of packages in the consignment:</p> <p>Isotopes:.....</p> <p>.....</p> <p>.....</p>	<p><u>Material:</u></p> <p><input type="checkbox"/> Non-fissile</p> <p><input type="checkbox"/> Fissile</p> <p><input type="checkbox"/> Fissile-excepted</p>	<p><u>Material classification:</u></p> <p><input type="checkbox"/> LSA I</p> <p><input type="checkbox"/> LSA II</p> <p><input type="checkbox"/> LSA III</p> <p><input type="checkbox"/> SCO I</p> <p><input type="checkbox"/> SCO II</p> <p><input type="checkbox"/> Other (please specify):</p> <p>.....</p>																										
<p><u>Form of material:</u></p> <p><input type="checkbox"/> Solid</p> <p><input type="checkbox"/> Powder</p> <p><input type="checkbox"/> Liquid</p> <p><input type="checkbox"/> Gas</p> <p><input type="checkbox"/> Special form</p> <p><input type="checkbox"/> LD</p> <p>Exclusive consignment?</p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p> <p>Inspection operations required:</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Unknown</p>	<p><u>Material type:</u></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;"><input type="checkbox"/> Empty packaging</td> <td style="width: 33%;"><input type="checkbox"/> Fissile material</td> </tr> <tr> <td><input type="checkbox"/> High level waste</td> <td><input type="checkbox"/> Plutonium oxide</td> </tr> <tr> <td><input type="checkbox"/> Medium level waste</td> <td><input type="checkbox"/> Residues</td> </tr> <tr> <td><input type="checkbox"/> Low level waste</td> <td><input type="checkbox"/> Radioelements</td> </tr> <tr> <td><input type="checkbox"/> Unspecified waste</td> <td><input type="checkbox"/> Mineral concentrate</td> </tr> <tr> <td><input type="checkbox"/> Sources in non-special form</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Sources in special form</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Fuel materials</td> <td></td> </tr> <tr> <td><input type="checkbox"/> New fuel for research reactor</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Irradiated fuel for research reactor</td> <td></td> </tr> <tr> <td><input type="checkbox"/> New fuel for power reactor</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Irradiated fuel for power reactor</td> <td></td> </tr> <tr> <td colspan="2"><input type="checkbox"/> Other (please specify):</td> </tr> </table>		<input type="checkbox"/> Empty packaging	<input type="checkbox"/> Fissile material	<input type="checkbox"/> High level waste	<input type="checkbox"/> Plutonium oxide	<input type="checkbox"/> Medium level waste	<input type="checkbox"/> Residues	<input type="checkbox"/> Low level waste	<input type="checkbox"/> Radioelements	<input type="checkbox"/> Unspecified waste	<input type="checkbox"/> Mineral concentrate	<input type="checkbox"/> Sources in non-special form		<input type="checkbox"/> Sources in special form		<input type="checkbox"/> Fuel materials		<input type="checkbox"/> New fuel for research reactor		<input type="checkbox"/> Irradiated fuel for research reactor		<input type="checkbox"/> New fuel for power reactor		<input type="checkbox"/> Irradiated fuel for power reactor		<input type="checkbox"/> Other (please specify):	
<input type="checkbox"/> Empty packaging	<input type="checkbox"/> Fissile material																											
<input type="checkbox"/> High level waste	<input type="checkbox"/> Plutonium oxide																											
<input type="checkbox"/> Medium level waste	<input type="checkbox"/> Residues																											
<input type="checkbox"/> Low level waste	<input type="checkbox"/> Radioelements																											
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<input type="checkbox"/> New fuel for power reactor																												
<input type="checkbox"/> Irradiated fuel for power reactor																												
<input type="checkbox"/> Other (please specify):																												

Uranium enrichment:

- | | |
|-----------------------------------|---|
| <input type="checkbox"/> Depleted | <input type="checkbox"/> $5 < x < 20\%$ |
| <input type="checkbox"/> Natural | <input type="checkbox"/> $> 20\%$ |
| <input type="checkbox"/> $< 5\%$ | <input type="checkbox"/> Not applicable |

PRODUCT	ACTIVITY of material in package (Bq)	MASS of material in package (kg)	TOTAL ACTIVITY of material in means of transport (Bq)	TOTAL MASS of material in means of transport (kg)	VOLUME contained in package (L)

Package type

- Bulk material
- Excepted package
- Industrial 1
- Industrial 2
- Industrial 3
- Industrial 2 F
- Industrial 3 F
- Type A
- Type A F
- Type B (U)
- Type B (U) F
- Type B (M)
- Type B (M) F
- Type C
- Type C F
- Other

Please specify:

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Classification and reference of approval certificate:

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Package name:

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Package label:

- I White
- II Yellow
- III Yellow

Transport index:

-
- Not applicable
 - Unknown

Criticality safety index:

-
- Not applicable
 - Unknown

9. DESCRIPTION OF ALARM CIRCUIT

Description of reporting circuit:

Time of alarm activation at consignor facility (hour, minutes):

Time of alarm activation at carrier facility (hour, minutes):

Time of alarm activation at recipient facility (hour, minutes):

Time of alarm activation at each emergency service (hour, minutes):

Means mobilised by the consignor (human resources, equipment):

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Operations conducted:

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Identification of intervening entity:

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Comments:

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10. CONSERVATION MEASURES TAKEN

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11. CONSEQUENCES OF THE EVENT

Bodily damage associated with hazardous goods:

- Fatalities (number:)
- Wounded (number:)

Bodily damage of different types:

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Damage to equipment or the environment:

- Estimated amount of damage < 50 000 €
- Estimated amount of damage > 50 000 €

Loss of product:

- Yes No
- Imminent risk of loss of product

Intervention of authorities:

- Yes
- Evacuation of persons for at least three months due to the presence of hazardous goods
- Closure of circulation routes for at least three months due to the presence of hazardous goods
- No

Damage to means of transport:

- Intact
- Slightly damaged
- Severely damaged
- Destroyed
- Left without having to be towed
- Had to be towed
- Burnt
- Other
- Please specify:

Damage to package:

- Intact
- Wet
- Affected on the surface
- Perforated
- Partially crushed
- Severely crushed
- Dislocated
- Burnt
- Partial loss of leaktightness
- Total loss of leaktightness
- Partial loss of containment
- Total loss of containment
- Loss of criticality control

Radiation inspections: Indicate the radiation inspections conducted (smear, irradiation), for which organisation, and the results obtained:

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12. ACTIONS TAKEN OR IN PROGRESS TO RETURN TO NORMAL SITUATION

Specify the handling procedures for packages having suffered accidents (temporary storage location, transport means and overpacking used for their removal, destination, etc.)

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13. ACTIONS TAKEN TO PREVENT REOCCURRENCE

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14. COMMUNICATION OF THE EVENT

Has there been an official announcement to the media?

Yes No

If yes, by whom:

.....

.....

When:

.....

.....

APPENDIX 5: DECLARATION CRITERIA FOR SIGNIFICANT EVENTS RELATED TO THE SAFETY OF NON-PWR BNIs

Criterion 1 - Event of nuclear or non-nuclear origin leading to death or severe injury requiring the evacuation of wounded to a hospital, when such death or wounds are due to the failure of equipment associated with the procedure.

Details:

The following case falls under this category:

- Burn by steam

Criterion 2 - Manual or automatic, inadvertent or non-inadvertent activation of a protection and/or safeguard system, with the exception of intentional activations resulting from planned actions to maintain an important safety function.

Details:

The following cases fall under this category:

- Random event requiring the activation of a *protection or safeguard system**, a passive system, an active system or human resources, with the exception of the activation of planned actions to maintain an important safety function.
- For a research reactor, the manual or automatic, inadvertent or non-inadvertent activation of the automatic shutdown function, regardless of reactor status, with the exception of intentional activations resulting from planned actions.

Criterion 3 - Event leading to the breach of one or more safety limits as defined in the safety reference system or the decree authorising construction of the installation.

Details:

The following cases fall under this category:

- non-compliance with the installation authorisation decree,
- non-compliance with the safety reference system, i.e., technical provisions and sections of general operating rules (GOR*) concerning safety, criticality, radiation protection and periodic testing,
- removal of a beam seal from a particle accelerator without prior authorisation,
- accessing a prohibited area by occulting the associated security devices.

Criterion 4 - Internal or external hazard to installations, i.e., occurrence of an external phenomenon of natural origin or related to human activity, occurrence of a fire, internal flooding or any other phenomenon likely to have a significant impact or affect the availability of equipment participating in an important safety function.

Details:

The following cases fall under this category:

- Natural external phenomenon with known consequences, e.g., flooding affecting the perimeter of the site, significant meteorological event, detritus, forest fire, etc.
- External hazard associated with human activity, e.g., explosion felt in the area, aircraft crash within the perimeter or near the site, hydrocarbon layers, etc.
- Internal hazard, e.g., fire, explosion, etc.
- Head loss in a sensitive internal area of a building (pit bottom, containment chamber) or areas outside the building.

Criterion 5 - Malicious attempt or act likely to affect the safety of the installation.

Criterion 6 - Event that affects or may affect the integrity of hazardous material containment.

Details:

This criterion concerns radioactive material containment.

The following cases fall under this category:

- Loss of containment barrier integrity, i.e., actual loss (leak, dispersion of material, clad or pipe breach, etc.) or potential loss (corrosion, physical shocks on equipment, degradation of containment barrier, fuel element drop, handling incident affecting a hazardous material container, etc.).
- Loss or disturbance of a building ventilation system, or process leading to the inversion of a negative pressure cascade for a duration exceeding the unavailability criteria specified in the GOR.
- Loss of highly hazardous HF fluid.

Criterion 7 - Event causing or likely to cause multiple failures, i.e., equipment unavailability resulting from the same failure or affecting all the channels of a redundant system (or equipment of the same type participating in one or more safety functions for the installation).

Details:

This criterion concerns events that have caused or could have caused 'common mode' failures (i.e., failures due to common causes). Hazards are declared under criterion 4.

The following cases fall under this category:

- common mode failures due to system interactions or the immediate environmental conditions of systems and components (fire, flooding, temperature or radiation conditions, etc.),
- fault propagation in electrical panels,
- safety system damage due to a common mode failure causing multiple failures.

Criterion 8 - Fault, degradation or failure affecting a safety function, with significant actual or potential impact, detected during operation or shutdown.

Details:

This particularly concerns events affecting one of the barriers, one of the systems associated with the barriers, or emergency protection systems (such as electrical power supplies).

The following cases fall under this category:

- loss of radiation protection,
- failure of containment and retention systems protecting the natural environment against pollution by radioactive materials, possibly resulting in significant pollution if the systems had been activated,
- any significant fault affecting the filter systems (damage, loss of performance level specified in the GOR, etc.),
- non-compliance with specific conditions for the entry or use of a product in buildings containing equipment participating in important safety functions,
- total loss of external power supply accompanied by faulty operation (or non-operation) of emergency systems,
- any operation, activity or modification that has affected the integrity, availability or reliability of containment equipment, without analysis or exhaustive acknowledgement of analysis results,
- non-compensated loss of fire/explosion detection systems or fixed extinguisher systems in a nuclear building or room containing an important safety function, for a duration exceeding the maximum unavailability time allowed in the GOR,
- latent anomaly of a system ensuring an important safety function, not detected by periodic maintenance and possibly leading to an operating condition that has not been taken into account or is not covered by the existing design conditions and provisions,
- event that could have resulted in the unavailability of a system ensuring an important safety function, the activation of a *safeguard system** or the non-compliance with GOR under different installation conditions.

Criterion 9 - Event affecting a safety function and not corresponding to the above-mentioned criteria, which may be the precursor to an accident or which may exhibit a repetitive character whose cause has not been identified.

Criterion 10 - Any other event that could affect the safety of the installation and deemed significant by the operator or nuclear safety authority.

Details:

The following case falls under this category:

- flagrant disregard of quality assurance principles, particularly when this could have led to significant impact, e.g., absence or non-compliance with fire permit or fire sectorisation, absence of suitable intervention and fire fighting capabilities in the installations at risk.

APPENDIX 6: DECLARATION CRITERIA FOR SIGNIFICANT EVENTS RELATED TO PWR SAFETY

Criterion 1 - Automatic shutdown of reactor, i.e., manual or automatic, inadvertent or non-inadvertent activation of the automatic shutdown function, regardless of reactor status, with the exception of intentional activations resulting from planned actions.

Details:

The following cases fall under this category:

- automatic shutdowns of the reactor due to activation of turbine generator protection systems,
- successive automatic shutdowns, regardless of reactor status (such shutdowns may be described in the same declaration and significant event report, provided that this is approved by the nuclear safety authority).

Criterion 2 - Activation of one of the safeguard systems, i.e., manual or automatic, inadvertent or non-inadvertent activation of a safeguard system, with the exception of intentional activations resulting from planned actions.

Details:

Events resulting in the activation of a *safeguard system** and the subsequent automatic shutdown of the reactor are declared under criterion 1.

The following case falls under this category:

- event leading to the activation of one of the safeguard systems, regardless of origin, reactor power level or reactor status.

Criterion 3 - Non-compliance with technical operating specifications (*TOS), or occurrence of an event that could have led to such non-compliance under different installation conditions, i.e.:**

- any non-compliance with one or more permanent conditions defined in the TOS,
- any non-compliance with TOS dispensation conditions,
- any case where time limits are exceeded and no emergency status has been stipulated,
- any unavailability due to conditions not provided for in the general operating rules (GOR), not previously identified, or previously identified but not handled as per the recommendations of the TOS.

Details:

The declaration procedure for events leading to group 1 unavailability is described in appendix 6.A.

The following cases fall under this category:

- non-compliance with safety limits and conditions for derogation from the TOS, i.e., non-compliance with permanent conditions for which there is no safe shutdown state or time limit (out-of-range pressure, temperature, etc.), non-compliance with limit conditions defined in the TOS, non-compliance with the operating procedure and safe shutdown time associated with group 1 unavailability, non-compliance with compensatory measures associated with documents modifying the TOS, etc.;
- any non-compliance with the repair time associated with group 2 events;
- in the event of expiration of the periodic test period, all equipment identified as unavailable or whose availability is no longer guaranteed by the periodic test (if, after performing the periodic test, the equipment is identified as available, the event must be declared under criterion 10);
- any anomaly or malfunction not detected by periodic tests, concerning equipment important for safety (*IFS**) in the systems specified in the TOS;

- any anomaly or malfunction of IFS equipment under reactor conditions where the availability of this equipment is not required:
 - if the anomaly or malfunction apparently existed under reactor conditions requiring said availability, and
 - if the repair time would have exceeded the shortest safe shutdown time stipulated in the TOS for said availability;
- any non-compensated loss of fire/explosion detection systems or fixed extinguisher systems in the corresponding facilities, for a duration exceeding the maximum unavailability time allowed in the GOR.

Criterion 4 - Internal or external hazard, i.e., occurrence of an external phenomenon of natural origin or related to human activity, or occurrence of a fire, internal flooding or any other phenomenon likely to affect the availability of equipment important for safety.

Details:

The following cases fall under this category:

- natural external phenomenon with known consequences, e.g., flooding affecting the perimeter of the site, lightning, detritus, algae, etc.,
- external hazard associated with human activity, e.g., explosion felt in the area, aircraft crash within the perimeter or near the site, hydrocarbon layers, etc.,
- internal hazard, e.g., fire, explosion, etc.

Criterion 5 - Malicious attempt or act likely to affect the safety of the installation.

Criterion 6 - Switch to safe shutdown state as per the technical operating specifications (TOS) or the emergency operating procedures in case of unpredictable installation behaviour.

Details:

The following case falls under this category:

- any equipment faults (including equipment unavailability detected during periodic tests) causing a changeover to safe shutdown state.

Criterion 7 - Event causing or likely to cause multiple failures, i.e., equipment unavailability resulting from the same failure or affecting all the channels of a redundant system (or equipment of the same type in various safety systems).

Details:

Hazards are declared under criterion 4.

The following cases fall under this category:

- common mode failures due to system interactions or the immediate environmental conditions of systems and components (fire, flooding, temperature or radiation conditions, etc.);
- fault propagation in electrical panels.

Criterion 8 - Event or anomaly specific to the main primary system, secondary primary system or connected pressure equipment, resulting or likely to result in an operating condition not taken into account in the design or not covered by existing operating instructions.

Details:

This criterion specifically concerns regulated pressure equipment in systems important for safety (main primary system, secondary primary system and connected systems).

The following cases fall under this category:

- detection of a fault considered significant after characterisation, due to the occurrence of an in-service degradation phenomenon in a zone considered as insensitive to the phenomenon (ref.: maintenance doctrine),
- detection of a fault considered significant after characterisation, due to the occurrence of an in-service degradation phenomenon in a component other than a test component or considered as a precursor,
- in-service detection of a crack due to manufacturing and having new characteristics as regards its location (first detection in the corresponding zone), importance (size) or generalisation (repeated detection of a crack previously considered as punctual),
- mechanical material characteristics non-compliant with the design rules,
- geometric parameter non-compliant with the design rules,
- opening of a valve by overpressure exceeding the design pressure,
- transient more severe than those classified under the second category in the design rules,
- the number of occurrences specified in the situation file for the main primary system (MPS) or secondary primary system (SPS) has been exceeded,
- MPS or SPS leaks (this criterion does not concern the following: collected leaks, internal leaks in valve components, non-collected leaks due to seals, leaks in primary pumps, and leaks in steam generator tubes),
- non-execution of an inspection planned within the scope of the complete inspection procedure for the MPS or SPS.

Criterion 9 - Anomaly concerning the design, in-plant manufacture, on-site assembly or operation of the installation, involving equipment and functional systems other than those covered by criterion 8 and leading or likely to lead to an operating condition not taken into account or covered by the design conditions or existing operating instructions.

Details:

This concerns an anomaly characterised as representing a significant non-compliance with the safety reference system. It is detected during an inspection or verification process, or further to a particular event.

The following cases fall under this category:

- deviation regarding earthquake resistance,
- deviation regarding qualification for accident conditions,
- operating condition or dimensional load not taken into account in the design (e.g., known risk of explosion),
- non-compliant materials, dimensional deviations or specific indications (crack, corrosion) not allowing compliance with the design rules,
- detection of a fault considered significant after characterisation, due to the occurrence of an in-service degradation phenomenon in a component other than a test component or considered as a precursor.

As a general rule, these anomalies are characterised (to define their nocivity and impact on safety) and subsequently associated with a *significant event** based on the result of the characterisation.

Criterion 10 - Any other event that could affect the safety of the installation and considered significant by the operator or nuclear safety authority.

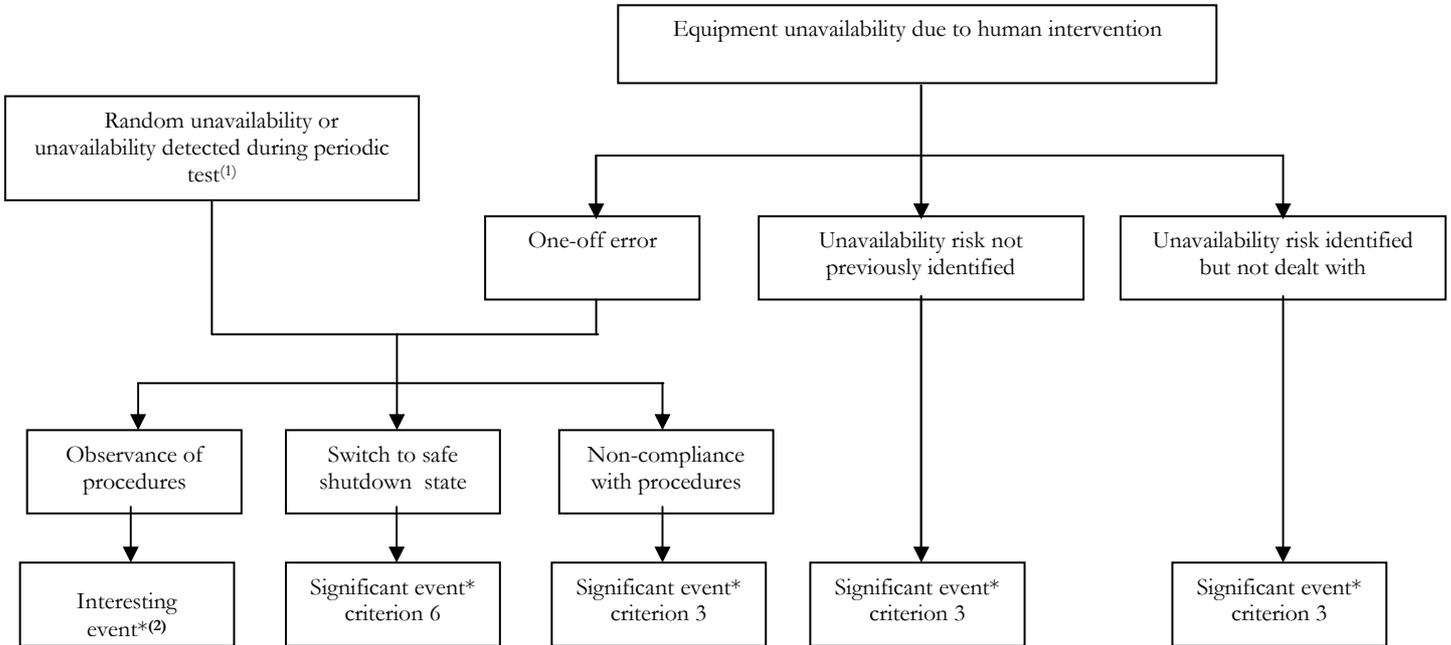
Details:

The following case falls under this category:

- flagrant disregard of quality assurance principles, particularly when this could have led to significant impact, e.g., absence or non-compliance with fire permit or fire sectorisation, absence of suitable intervention and fire fighting capabilities in the installations at risk.

APPENDIX 6.A: SIGNIFICANT EVENTS DECLARED FURTHER TO EVENTS RESULTING IN GROUP 1 UNAVAILABILITY AND NON-COMPLIANCE WITH TOS*

1) Random event and group 1 unavailability

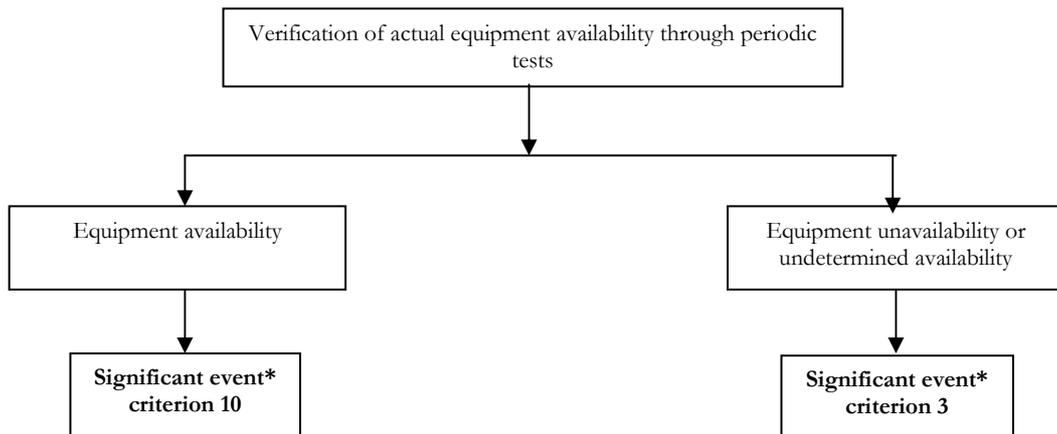


⁽¹⁾ Unavailability detected during periodic tests must be declared in the following cases:

- if the periodic test is considered insufficient
- if the periodic test is considered as satisfactory with reservations, and these reservations cannot be removed as per section IX of the general operating rules

⁽²⁾ *Interesting events** concerning safety may be declared as *significant events** after analysis.

2) Unavailability due to expiration of the periodic test period (including tolerance)



APPENDIX 7: DECLARATION CRITERIA FOR SIGNIFICANT EVENTS CONCERNING RADIATION PROTECTION FOR BASIC NUCLEAR INSTALLATIONS

Criterion 1 - Cases where a regulatory annual individual dose limit has been exceeded, or an unexpected situation possibly leading to a situation of this type under representative and feasible conditions, regardless of exposure type.

Details:

This criterion includes the case of bodily contamination.

It corresponds to the exposure limits as per article R. 231-76 of the Labour Code. Emergency and exceptional exposure limits as per article R. 231-79 of the Labour Code are excluded.

In the case of an unexpected situation that could lead to a case where the dose limit is exceeded under feasible and realistic conditions, this criterion is only applied if the corresponding study demonstrates that the dose limit could be exceeded.

Regarding internal exposure, given the time required to conduct radiotoxicology analyses, this criterion shall be applied once it has been established that the dose limit has been exceeded.

Criterion 2 - Unexpected situation leading to a case where the regulatory annual individual dose has been exceeded by one-fourth of the dose limit, during a single instance of exposure, regardless of the exposure type.

Details:

This criterion includes the case of bodily contamination.

After analysis, this corresponds to one-fourth of the exposure limits stipulated in article R. 231-76 of the Labour Code (effective or equivalent dose).

Regarding internal exposure, given the time required to conduct radiotoxicology analyses, this criterion shall be applied once it has been established that the dose limit has been exceeded.

Criterion 3 - Any significant deviation concerning radiation cleanliness.

Details:

'Significant' threshold values shall be fixed and justified by the various operators in their general operating rules or radiation protection reference systems.

The following cases fall under this category:

- dispersion of contamination in a controlled area (with the exception of areas previously arranged for dismantling or clean-up operations),
- presence of a significant contamination point outside the controlled area,
- detection of significant contamination of a person/clothing/object/vehicle (after leaving the controlled area, at the site exit).

Criterion 4 - Any activity (operation, work, modification, inspection, etc.) comprising an important radiation risk, conducted without a formalised radiation protection analysis (justification, optimisation, limitation) or without exhaustive acknowledgement of the analysis results.

Details:

This corresponds to an activity performed without justification (assuming this is possible) and/or without optimisation.

An activity 'comprising an important radiation risk' is to be interpreted as an activity likely to expose a person to more than one-fourth of the regulatory annual individual dose limit or 20 man.mSv (sum of the individual dose equivalents for each person exposed).

'Optimisation' is to be interpreted not only as a forecast dosimetric analysis as per R. 231-75 of the Labour Code, but also as the assessment of intervention scenarios taking into account probable contingencies, adequacy of individual protection equipment, and training of operators to perform the activity.

The following case falls under this category:

- event associated with gamma radiography.

Criterion 5 - Malicious attempt or act that may affect the protection of workers or the public against ionising radiation.

Details:

The following cases fall under this category:

- intentional exposure of another person's dosimeter,
- intentional placement of a radioactive source in a location accessible to the public or not planned for that purpose.

Criterion 6 - Abnormal situation affecting a sealed or non-sealed source the activity of which exceeds the exemption thresholds.

Details:

The following cases fall under this category:

- any significant deviation concerning the management or use of sources (sealed source seal defect, use for unplanned purposes or in unauthorised areas, etc.),
- loss, theft, or discovery in a location not planned for this purpose,
- fire, or partial or total destruction of the room containing the source,
- non-compliance with source removal procedures.

Criterion 7 - Deficient sign-posting or non-compliance with technical conditions for access or presence in specially regulated or prohibited areas (orange and red areas).

Details:

'Sign-posting' is to be interpreted as the delimitation of areas as per articles R. 231-81, R. 231-82 and R. 231-83 of the Labour Code. Article R. 1333-8 of the Public Health Code, concerning exposure of the public or non-exposed workers, is also to be taken into account.

This delimitation is based on inspections. While awaiting the publication of an order corresponding to article R. 231-81 of the Labour Code, the delimitation of specially regulated or prohibited areas is based on the Order of 7 July 1977. These areas include the exclusion areas established for the on-site use of systems containing radioactive sources or emitting x-rays.

These conditions are defined in the procedures established as per regulations, namely as per articles R. 231-81, R. 231-82 et R. 231-83 of the Labour Code, their implementing orders, and the Order of May 1998 specifying the list of activities that cannot be performed by certain employees.

The following cases fall under this category:

- access of temporary workers or workers with fixed-term contracts to controlled areas where the dose rate exceeds 2 mSv/h,
- absence of authorisation from the radiation protection department allowing personnel to enter a controlled area where the dose rate exceeds 2 mSv/h.

The following cases are not considered as *significant events**, but they must be handled as *interesting events** by the operator:

- absence of nominal recording of access to a specially regulated area (orange or red),
- case where sign-posting for the area complies with applicable regulations, but the numerical value of the dose rate is not indicated (in this case, the operator shall ensure that the deadlines set for taking into account any modifications are reasonable).

Criterion 8 - Non-compensated failure of radiation monitoring systems ensuring the protection of personnel engaged in activities comprising an important radiation risk.

Details:

'Non-compensated failure' is to be interpreted as the complete absence of indication of dose or activity level.

Criterion 9 - Expiration of the inspection period for a radiation monitoring system, i.e.,
- by more than one month in the case of a permanent collective monitoring system (regulatory inspection frequency of 1 month),
- by more than three months for other systems (regulatory inspection frequency of 12 to 16 months as per GOR* or radiation protection reference system).

Details:

This criterion applies when such expiration has not been anticipated and compensated by appropriate means.

The inspection frequency of 12 to 16 months is stipulated on a temporary basis while awaiting a specific regulation.

Criterion 10 - Any other event that may affect radiation protection and considered significant by the operator or nuclear safety authority.

Details:

The following case falls under this category:

- use of another person's dosimeter.

APPENDIX 8: DECLARATION CRITERIA FOR SIGNIFICANT EVENTS CONCERNING ENVIRONMENTAL PROTECTION, APPLICABLE TO BASIC NUCLEAR INSTALLATIONS

Details:

In the present appendix, the term 'significant impact' is to be interpreted as follows:

- perceivable degradation of the quality of the receiving medium (physico-chemical characteristics, radiation characteristics, state of biotopes, etc.)
- creation of a factor detrimental to another user of the medium.

Criterion 1 - Circumvention of normal discharge practices resulting in significant impact; release of amounts known to exceed one of the discharge limits defined for the medium as determined by an order authorising extraction and discharge of radioactive substances from the installation; or unauthorised discharge of a radioactive substance.

Details:

'Unauthorised discharge of radioactive substances' is to be interpreted as the identification of such substances in a quantity exceeding the detection limit for unauthorised or prohibited substances. The detection limit taken into account must be compatible with that obtained through the application of standards, international recommendations or, failing those, good industrial practice.

Non-compliance with discharge conventions must also be declared under criteria 1, 2 or 3.

Criterion 2 - Circumvention of normal discharge practices resulting in significant impact; release of amounts known to exceed one of the discharge limits defined for the medium as determined by an order authorising extraction and discharge of chemical substances from the installation; or significant discharge of an unauthorised chemical substance (not including substances causing depletion of the ozone layer).

Details:

'Significant discharge of unauthorised chemical substances' is to be interpreted as the identification of such substances in a quantity leading to significant impact.

The emission of a significant quantity of substances causing depletion of the ozone layer is covered by criterion 6.

Amounts known to exceed discharge limits are not declared in the case where continuous self-monitoring of discharges is ensured and less than 10% of the series of measurement results exceeds the authorised maximum values, while remaining within a limit of twice these values. This 10% is measured on the basis of 24 hours of effective operation for gaseous discharges, and on a monthly basis for liquid discharges. In the case where monitoring is ensured by taking spot checks, a single measurement that exceeds the limit by less than 10% of the daily flow shall not be considered significant.

Criterion 3 - An amount known to exceed one of the discharge or concentration limits defined by health regulations or in an order authorising extraction and discharge of microbiological substances from the installation.

Details:

An amount known to exceed limits may require several measurements to confirm this finding.

Exceeding discharge limits in more than one field (radioactive, chemical or microbiological), requires that each of the criteria involved must be specified in the *significant event** declaration.

Criterion 4 - Non-compliance with an operational requirement stipulated by an order authorising extraction and discharges from the installation, which could lead to a significant impact on the environment.

Details:

The following cases fall under this category:

- cases listed in the Order of 26 November 1999 setting out the general technical requirements relative to limits and procedures for extraction and discharges subject to authorisation and carried out by basic nuclear installations,
- non-compliance with discharge conditions,
- non-compensated fault resulting in loss of monitoring.

Criterion 5 - Malicious attempt or act likely to affect the environment.

Criterion 6 - Non-compliance with provisions of the Order of 31 December 1999, or technical requirements concerning equipment or installations classified for environmental protection, which could lead to a significant impact on the environment (not including deviations from orders or studies concerning discharges).

Details:

Accidental discharges or spills of toxic, radioactive, inflammable, corrosive or explosive products, or more generally products likely to have a significant impact on the environment, are considered as circumventions of normal discharge practices and shall be treated within the scope of criteria 1 and 2.

The following cases fall under this category:

- events likely to endanger the interests specified in article 1 of the interministerial Order of 31 December 1999 setting out the general technical regulations established to prevent and limit the detrimental effects and external risks associated with the operation of basic nuclear installations, i.e., events whose development in the absence of effective operation of an additional barrier could have affected reference group values exceeding the following:
 - threshold for the implementation of public protection measures in the case of a radiological emergency,
 - threshold for irreversible chemical effects,
 - threshold for irreversible thermal effects,
 - threshold for irreversible overpressure effects,
- emission of a significant amount of substances that deplete the ozone layer;
- non-compliance with regulatory noise limits (noise emergence and noise with marked tone), except for the occasional opening of a valve;
- total functional loss of containment and retention systems designed to protect the natural environment from pollution by radioactive, chemical or biological substances, which could have resulted in significant pollution if these systems had been activated;
- open-air incineration of waste.

Criterion 7 - Non-compliance with the waste studies for a site or installation, leading to the elimination of nuclear waste through a conventional channel or the reassessment of the conventional character of a given zone.

Details:

The following cases fall under this category:

- non-compliance with procedure for declassification from nuclear waste to conventional waste;
- significant deviation from nuclear waste disposal procedures;
- discovery of nuclear waste among reputedly conventional waste;
- open-air shredding of nuclear waste.

Criterion 8 - Discovery of a site significantly polluted by chemical or radioactive substances.

Details:

The following case falls under this category:

- discovery of abnormal contamination of a water table detected from the background noise.

Criterion 9 - Any other event likely to affect the protection of the environment and considered significant by the operator or nuclear safety authority.

APPENDIX 9: DECLARATION CRITERIA FOR SIGNIFICANT EVENTS CONCERNING RADIOACTIVE MATERIAL TRANSPORT

Criterion 1 - Theft or loss of a package of radioactive material during transport.

Details:

The following case falls under this category:

- a known theft resulting in the disappearance of radioactive material.

Criterion 2 - Shipping a package to a consignee not fit to receive it.

Details:

The following cases fall under this category:

- unknown consignees,
- installations not authorised to receive a package of this type.

Criterion 3 - Accidental discovery of a package containing radioactive materials that has not been declared as lost.

Criterion 4 - Any event that could lead to wrong or malicious interpretations by the media or public, regardless of how serious the event is.

Criterion 5 - Malicious attempt or act that may affect transport safety.

Details:

The following case falls under this category:

- attempted theft.

Criterion 6 - Hazard due to natural phenomena or human activities, effectively or potentially impacting transport safety.

Details:

The following case falls under this category:

- road accidents (with no fatalities or serious wounds).

Criterion 7 - Event of nuclear or non-nuclear origin leading to death or severe wounds requiring the evacuation of wounded to a hospital, when the cause of the casualties is directly related to transport safety.

Criterion 8 - Fault, degradation or failure affecting a safety function, which had or could have had a significant impact.

Criterion 9 - Event affecting one or more barriers interposed between radioactive materials and persons, possibly resulting in the dispersion of these substances or a significant exposure of persons to ionising radiation (as per the limits fixed by regulations).

Criterion 10 - Non-compliance with regulatory requirements for radioactive material transport, possibly leading to significant impact.

Details:

By 'regulatory requirements' we mean the orders concerning each transport mode (road, rail, river, maritime, air), package model or material approval certificates, or shipment approval certificates.

Cases of contamination and non-compliance with radiation intensity limits are covered by criterion 12.

Criterion 11 - Event, even minor, affecting a safety function and exhibiting a repetitive character whose cause has not been identified or which may be a precursor to other incidents.

Criterion 12 - Non-compliance with a regulatory limit concerning radiation intensity or contamination.

Details:

The following cases fall under this category:

- exceeding regulatory limits anywhere on the outer surface of the packages,
- exceeding regulatory limits anywhere on the inside or outside surface of the overpack, container or transport means.

Criterion 13 - Any other event likely to affect transport safety and considered significant by the operator or nuclear safety authority.

GLOSSARY

- **IAEA:** International Atomic Energy Agency
- **ASN:** French Nuclear Safety Authority
- **FCO:** Final cessation of operation
- **DSM:** Dismantling
- **DGSNR:** French General Directorate for Nuclear Safety and Radiation Protection
- **DSNR:** French Nuclear Safety and Radiation Protection Division
- **Responsible entity:** Entity responsible for declaring and reporting a significant event, i.e., BNI operator or transport consignor.
- **Interesting event:** Event whose immediate importance does not justify an individual analysis but whose repetitive character may be indicative of a problem calling for a detailed analysis.
- **Significant event:** Event considered as falling under one of the declaration criteria defined in the present guide.
- **BNI:** Basic Nuclear Installation
- **INES:** International Nuclear Event Scale
- **IFS:** Important for safety
- **IRSN:** Institute for Radiation Protection and Nuclear Safety
- **FSD:** Final shutdown
- **PPI:** Offsite emergency plan
- **PSS-TMR:** Special emergency plans for radioactive material transport
- **PUI:** On-site emergency plan
- **PWR:** Pressurised Water Reactor
- **GOR:** General Operating Rules
- **TOS:** Technical operating specifications (i.e., operating limits of an installation, as defined in the safety studies)
- **Protection and/or safeguard system:** System not participating in the normal operation of an installation, automatically activated and requiring human intervention only after a period long enough to allow for calm diagnosis. Such systems are required for defence in depth level 3.