



Regulatory requirements about reporting radiological events

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Regulatory requirements about reporting radiological events

▪ Legal framework in France :

- ✓ French regulation does not specify different criteria for nomination of the events.
- ✓ However, there are three rules defining **significant events**, i.e. the ones which must be declared to the nuclear safety authority :
 - The so called “TSN law” (which applied to all **NPP responsible persons**) specifies in the article 54 that once there is an event (nuclear or not), “**having or risking to be of significant consequences** on the safety of the plant or the transport, or that endangers with significant exposure to ionizing radiation, to persons, or to goods or to the environment”, the licensee must declare the event to the Nuclear Safety Authority (ASN) without delay.
 - The public health code (enforceable to all **responsible persons of the nuclear activity**) in its article L. 1333-3 specifies that “once a responsible person of nuclear activity is faced to an **event** on the activity on which he is authorised, he must declare without delay the event to the Nuclear Safety Authority (ASN)”.
 - The Labour code defines measures related to working environment and in particular radiation protection, that each **employer** shall apply (as mentioned in the R. 4451-1). It emphasizes the obligation for the employer to declare every **significant event** which has led or being likely to carry out the overtaking of one of the limited values (according to the R. 4451-99 of the Labour code).



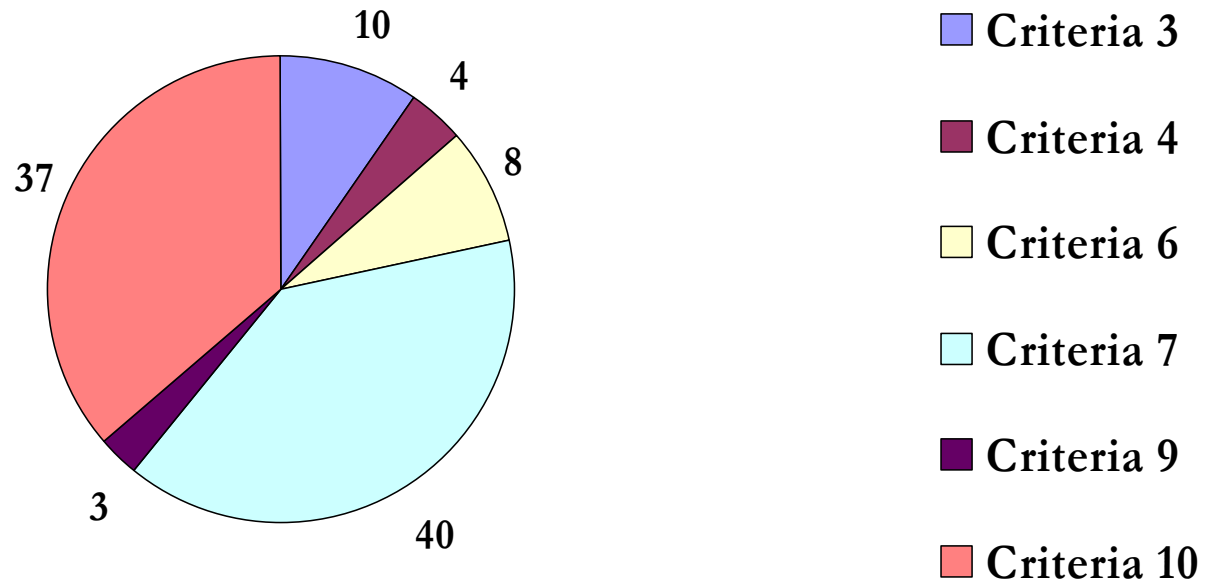
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- After having consulted operators, ASN published guidelines (in oct. 2005) defining the notification criteria related to significant events (SE) in nuclear basic installations (including NPPs) :
 - ✓ One section of this guide is dedicated to radiological event (RSE), with 10 different notification criteria :
 - Criteria 1 : Exceeding or risk of exceeding of the annual dose limit
 - Criteria 2 : Exceeding one fourth of the annual dose limit
 - Criteria 3 : Events linked with radioactive contamination
 - Criteria 4 : Job realized without a proper radiation protection pre-analysis (taking into account ALARA principle), or without fully respecting the measures of this pre-analysis
 - Criteria 5 : Malicious acts affecting occupational radiation protection
 - Criteria 6 : Any unexpected situation involving radioactive source
 - Criteria 7 : Failing signalization or disrespect of technical conditions for access or stay in a classified area.
 - Criteria 8 : Failing detection and/or monitoring systems, that no more guarantee occupational radiation protection
 - Criteria 9 : Exceeding periodicity of control of monitoring systems
 - Criteria 10 : Other events concerning radiological event
 - ✓ This guide, and the criteria it defines, will be soon reviewed.



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- NPPs' case : 102 RSE declared in 2009 (107 in 2008)



■ NPPs' case - French operator (EDF) :

- ✓ In order to obtain the feedback experience, Edf has produced an internal prescriptive notice (DI 100), according with the ASN's guide, to give practical prescriptions to declare significant events (SE)
- ✓ Some criteria called interesting events (IE) are also defined in this prescriptive notice with a lower level (most of the time, they are not declared)

■ SE – Example of EDF's practical prescriptions to fit criteria 3 (events linked with radioactive contamination) :

- ✓ When any unforeseen contamination, if not detected, could have led to a value of 1 annual limit on intake (ALI)
- ✓ When a contamination is detected to a value over 10 MBq (^{60}Co éq.) in any point of the ground surface of the site, outside controlled area
- ✓ When a contamination is detected to a value over 10 kBq (^{60}Co éq.) at the exit of the NPP (by workers contamination detectors C3 for example, see after)



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- IE : EDF's complementary practical prescriptions to fit its internal experience feedback (declaration of those events is not compulsory in the prescriptions of EDF)
- Example of IE linked to SE criteria 3 :
 - ✓ When a contamination is detected to a value ***between 100 kBq and 10 MBq*** (⁶⁰Co éq.) in any point of the ground surface of the site, outside controlled area
 - ✓ When a contamination is detected to a value ***between 800 Bq and 10 kBq*** (⁶⁰Co éq.) at the exit of the NPP (by workers contamination detectors)



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- **The guide defined by the ASN does not classify events in ascending significance order**
 - ✓ However, an event declared under criteria 2 (exceeding one fourth of the annual dose limit) shows an immediate and notable effect on the person (for example in the case of an event declared at criteria 7).
- **When an event is declared to ASN, it is considered to be significant and its significance (importance) will be deduced from INES levels**
- **Events classified higher than one are reported to IAEA**



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■ Declaration :

- ✓ Legal framework for radiological events - criteria 1 to 10 -

Obligations :

- of declaration,
 - for the employer to lead an analysis of the significant events to avoid their repetition (Labour code- Article R. 4455-7).
- ✓ Guidance - Licensee has to :
 - declare the event within 2 days
 - send a report to ASN within the two following months. The next updated versions of this report, particularly the final report which takes into account the implementation of preventive and corrective actions, are sent to ASN without delay.



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■ Information of the public :

- ✓ one of the assignments of ASN is to inform the public
- ✓ ASN puts on its website notices related to all events higher or equal to INES level 1 (as well as some events of interest of INES level 0 or non classified events (for instance, environmental events))
- ✓ for events higher or equal to INES level 2, ASN gives additional information to the Prime Minister and to the Ministers of Industry, Health, Environment and Labour
- ✓ the licensee issues press release(s) when events may be covered by the media



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■ Feedback experience : legal framework

- ✓ Regulation do not foresee explicitly the implementation of a feedback experience process.
- ✓ General requirements in the Labour code and the order of the 10th of august of 1984 request the licensee to establish organizational measures to ensure incident and accident prevention. Licensee shall provide promptly a detailed analysis of any important event.
- ✓ Some regulation drafts (work-in-process at ASN) integrate those requirements in a more detailed way.

■ Feedback experience : Practically, in case of event, the licensee establishes and keeps up to date a report including the following elements :

- ✓ an analysis of technical, human and organizational causes of the event;
- ✓ an analysis of the real and potential consequences on the installation safety;
- ✓ the lessons learned as well as the preventive and corrective actions defined and the schedule for their implementation.



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■ Feedback experience and ASN :

- ✓ ASN and IRSN (the ASN's main technical support organization) analyze the most significant events and ensure that operation experience feedback is correctly shared.
- ✓ EDF runs a database (Saphir) which collects all the significant events. ASN and IRSN have also some dedicated databases collecting RP events.

■ The operational experience feedback is dealt through different meetings or inspections :

- ✓ On a quarterly basis : meetings of ASN and IRSN with the licensee
- ✓ Yearly : ASN evaluates the whole RP policy of the licensee and has a meeting with the licensee to present its conclusions ; ASN and IRSN take this review into account when they write their annual reports.
- ✓ Every 3 years : the permanent group of experts analyses the experience feedback process of the licensee ; an ASN's letter presents its review of the RP system of the licensee for the past 3 years.
- ✓ In case a specific significant event occurs, for example, when there is a suspicion of an event of level 2 on the INES scale, ASN lead an inspection on-site.



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FOR INSTANCE, RSE in Chinon B4, on April 23, 2010

▪ EVENT DESCRIPTION:

- ✓ Accidental exposure of an employee of KELLAL company, an EDF subcontractor. This worker was exposed during cleaning operations of the fuel pool located in the fuel building of Chinon NPP reactor 4 when he found a high radioactive small metal piece (piece diameter of approx 18 mm).
 - ✓ Prior to fuel assembly unload, part of the fuel pool is drained and decontaminated. After decontamination, the worker, wearing a leak-tight protection suit, stepped in to control the absence of foreign pieces at the bottom of the pool. During this operation, the worker picked up with his hand a piece generating high levels of radiation. When his operational dosimeter triggered, the worker let the piece at the bottom of the pool and all workers left the workplace.
 - ✓ In France, for workers potentially exposed to ionizing radiation during their work, the annual regulatory dose limits are 20 mSv for whole body and 500 mSv for the body extremities. At EDF request, the French Institute for Radiation Protection and Nuclear Safety (IRSN) and the French Atomic Energy Commission (CEA) made the internal and external dose assessments. The assessments showed that one of the worker's hands was exposed to a maximum dose of 750 mSv and that the effective dose (whole body) is less than 2 mSv.
 - ✓ ASN carried out an inspection on site on 3 May 2010 to verify the measures implemented by EDF to secure the workplace, to initiate the worker medical follow-up and to assess the incident root causes.
- The over-exposed worker did not show deterministic effects.

■ Rating justification

- ✓ Rating made using the 2008 INES manual edition (page 21) :
 - Impact on the environment : none
 - Impact on radiological barriers and controls at facilities : none
 - Impact on persons : relevant → Exposure of one worker in excess of statutory annual dose limits

■ Final rating

- ✓ This exposure was due to an inadequate risk analysis and to the lack of procedures to manage the presence of foreign pieces at the bottom of the pool.
- ✓ EDF and KELLAL proposed to ASN to rate this event at level 2 on INES scale and ASN confirmed this proposal.

■ Notification criteria

- ✓ 2 declarations, criteria 1 (exceeding of the annual dose limit), INES 2 :
 - One by the NPP Operator, according to the TSN law (art.54)
 - One by the subcontractor (as an employer), according to the Labour code (R. 4451-99)



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- **Inappropriate actions identified by the ASN inspectors (inspection on may 3, 2010) :**
 - ✓ Operator's organisation did not provide any explanation of the context of the event needed to lead an analysis.
 - ✓ Operator's organisation did not succeed in looking after the over-exposed worker without delay.
 - ✓ Operator's organisation did not provide to extract data from the individual monitoring worn by the over-exposed worker.
 - ✓ The radiological area mapping was not updated before the event although a inappropriate radiological area mapping wad detected some days before at the same place and was declared to ASN as an RSE.
 - ✓ Radiological area mapping performed by the operator can not give the real workplace's dose rates (doe rate measures are performed from the top of the pool with a Teletector®, operator don't go into the pool to measure the workplace's dose rate)
 - ✓ Risk assessment performed at the preparation phase did not identified the exposure risk from foreign material although some of them were found before.
 - ✓ The operator did not react to this event with efficiency, especially, stakeholders were not informed in appropriate delay (workers representative members, workers medicine, Labour inspector, ASN...)
 - ✓ Internal surveillance (bending) failed to identify inappropriate radiation protection actions during the intervention.

- Conclusions were send by a letter to the operator and published on ASN's website www.asn.fr



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- **Correctives actions defined by the operator with his subcontractor :**
 - ✓ Organize the actions of surveillance to be exercised on the activity of decontamination.
 - ✓ Set up a break point for transmission of the radiological area mapping realized by the subcontractor to the operator.
 - ✓ Compare the Y-year and Y-1 year radiological area mapping.
 - ✓ Develop the operating mode "Surveillance of extremity and lens exposures" to integrate the management of the risk of extremities exposures from the preparation phase. Specify in particular the notion of high dose rate to the contact on an unexpected radioactive object (contact dose rate : 50mSv/h).
 - ✓ Define the behaviours of operators when dealing with an unexpected exposure.
 - ✓ Implement a radiological area mapping procedure appropriate to the specific area of the reactor pools that allows to guarantee that the operator's mapping gives the real dose rate conditions of the workplace.
 - ✓ Do an additional analysis with the support of the HF consultant of the organization to be set up to manage the radiological incidents.
 - ✓ Amendment of the operating mode "Management of the individual dosimeter when an alarm on dose rate criteria occurs" : Set up the IT application of management of the individual dosimeter in way to freeze the data recorded by the individual dosimeter in order to analyze them.

- Unfortunately, three months later, the same type of event occurred into the water-box of the steam generator, four workers were exposed, the doses were less than the quarter of the annual regulatory dose limit...



■ To conclude,

- ✓ Passed events show that experience feedback is very important in preventing exposure's risks,
- ✓ There is a strong need to share this experience feedback of passed events,
- ✓ Experience feedback has also to be reminded regularly to prevent events to happen again (training session, RP culture...)



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Thank you

Contamination :

Automatic control of workers (general organization on sites) :

✓ 3 level of detection portals :

- C1 : gamma detection portal :

*Before accessing to the
“hot” changing room*



- C2 : beta detection portal (in association with a small objects controller) :

*Before accessing to the
“cold” changing room
(leaving the controlled area)*



- C3 : gamma detection portal :

At the site's exit

(as transport detection portals)

*C3 is settled to detect a contamination
of 3 kBq (⁶⁰Co éq.) with a probability of 97,5 %*

