



French Regulatory Requirements for the Occupational Radiation Protection in Severe Accident Situations and Post Accident Recovery

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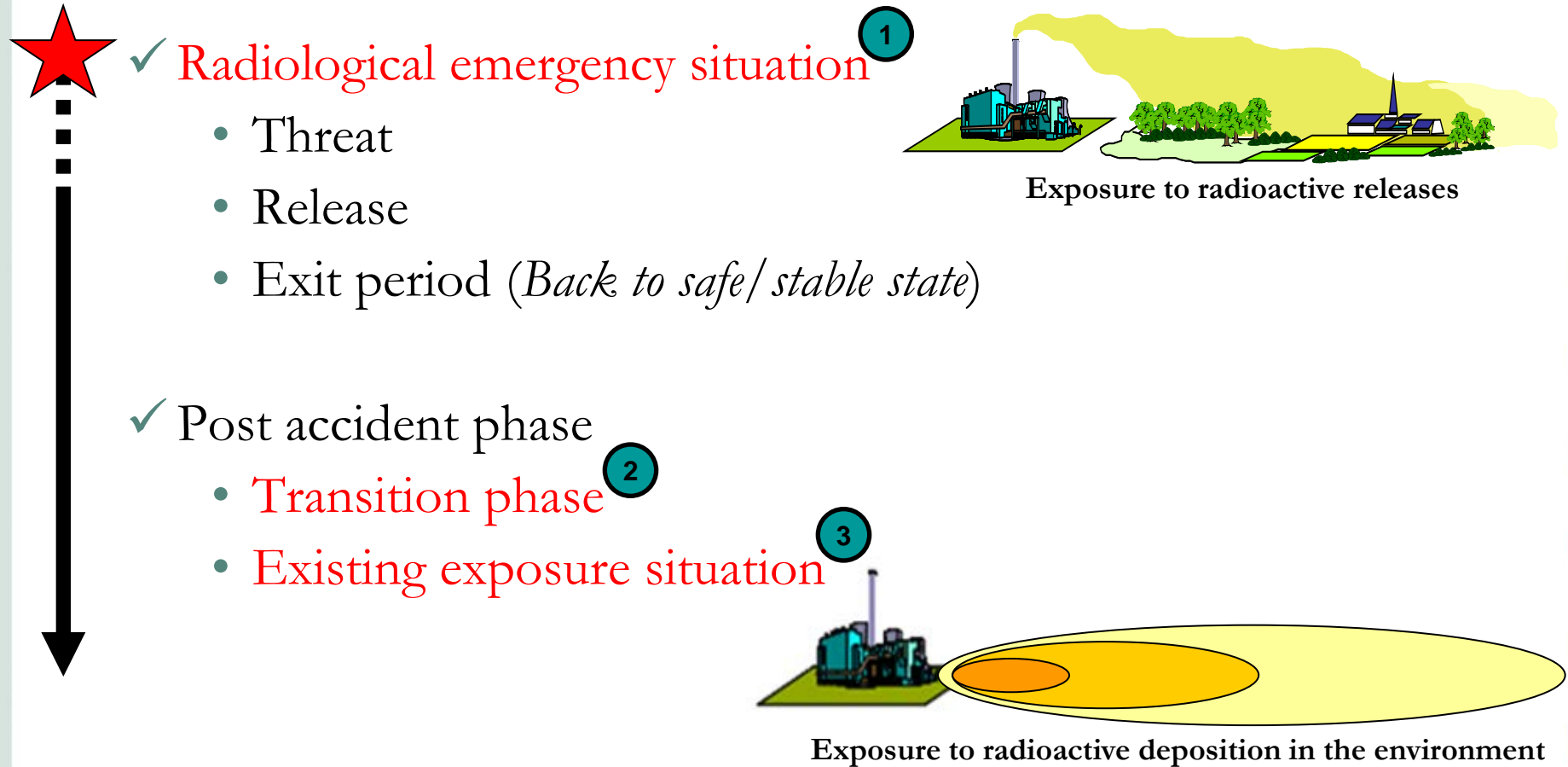


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General summary :

- Overview of RP requirements for persons involved in different situations :
 - ✓ Radiological emergency situation
 - ✓ Post-accident phase
- The way forward for some changes in RP regulatory requirements

Severe Accident Situations and Post Accident Recovery

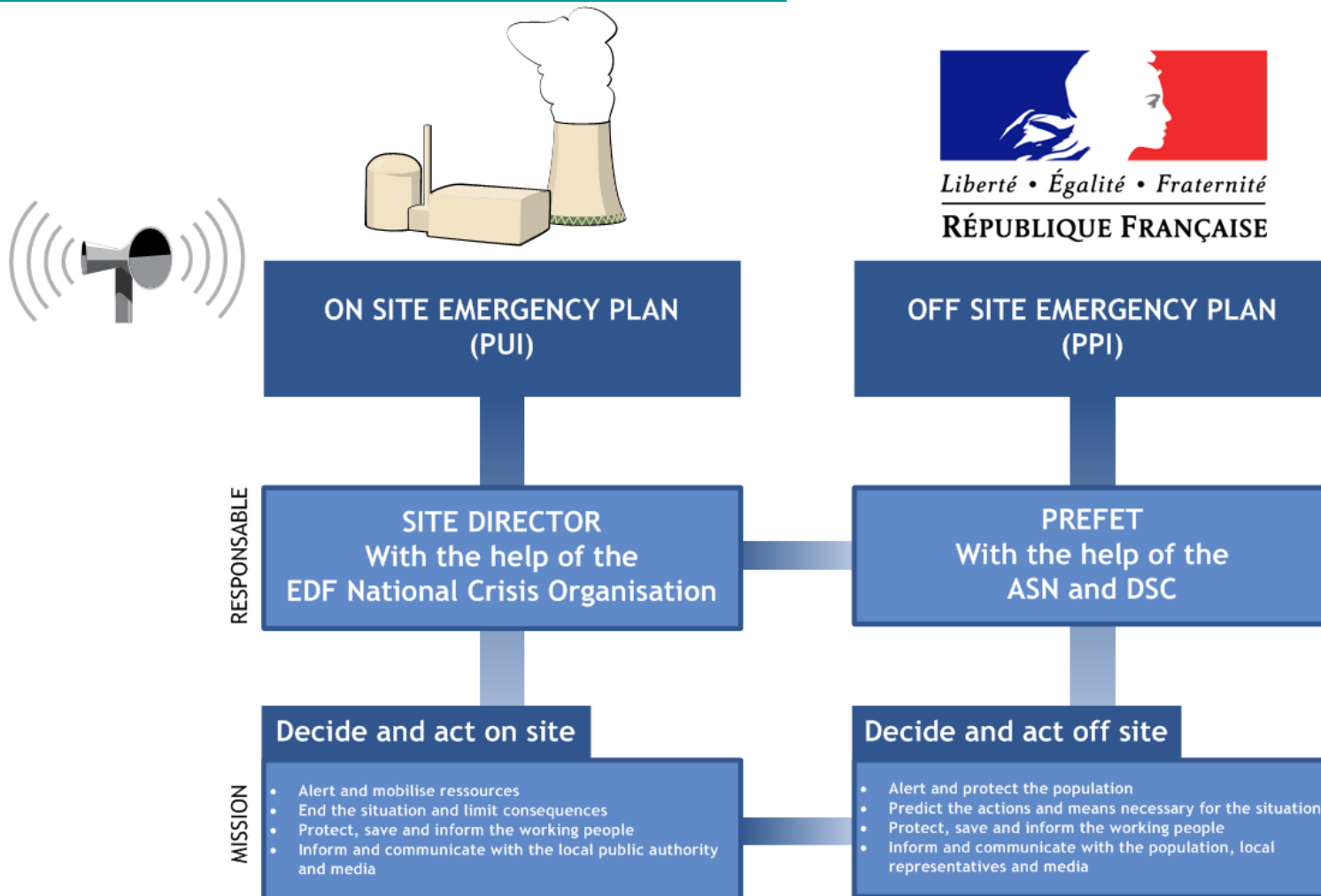


1 Radiological emergency situation

- ✓ when an event risks leading to an **emission of radioactive materials** or a **level of radioactivity likely to harm public health**, in particular with reference to the limits and response levels defined.
- ✓ may be the consequence of :
 - an incident or an accident occurring during a nuclear activity, including the transport of radioactive substances,
 - a malicious act,
 - any contamination of the environment detected by the environmental radioactivity measurement network or brought to the attention of the competent authority.

1 Radiological emergency situation

On/off site organization



1 Radiological emergency situation

Persons involved

- ✓ Workers (under ionizing radiation) of the concerned company and other persons and teams called “intervention personnel” (specialized firemen, first aid, ...).
- ✓ Radiation protection provisions for workers and for intervention personnel complement one another because they cover persons with a **different status** :
 - workers under the responsibility of an employer
 - and persons acting within the framework of agreements with the public authorities or requisitions.

1 Radiological emergency situation

Persons involved

**Labour
Code**



Worker (volunteer)
exposed to ionizing radiations

Dose limit :
20 mSv (12 roll. month)
or **reference levels** below



Intervention personnel Group 1
(special technical, medical and health
intervention teams, readied in advance)

Individual reference levels :
100 mSv (missions)
up to **300 mSv** (protecting people)
can be exceeded to save human lives
(by volunteer informed)*

**Public Health
Code**



Intervention personnel Group 2
(intervening as part of the tasks within
the scope of their competence)

Individual reference level :
10 mSv
can be exceeded to save human lives
(by volunteer informed)*

** Cumulative eff. dose < 1 Sv over the lifetime*

1 Radiological emergency situation

Persons involved

Labour Code



Worker ⇒ must satisfy all of the following conditions:

- classification as **category A** worker
- free of any **medical incapacity**
- **on a list drawn up in advance** for this purpose
- having received **appropriate information** on the risks and the precautions to take
- not having **received**, during the preceding 12 months, a dose > one of the limit values for exposures subject to special authorization

In addition, the worker must

- be a **volunteer**
- have **individual dosimetry** means appropriate for the situation

1 Radiological emergency situation

Persons involved

Public Health Code



Intervention personnel Group 1 ⇒ are possibly made up of :

- fire-fighters specialized in radiological risks, medical/technical emergency teams, specialized intervention teams from other operators, GIE Intra (robots, drones, ...), IRSN
- authorities can in the case of conventions/requisitions complement the 1st group using : **workers of the operators** or personnel of qualified companies

Intervention personnel Group 2 ⇒ are possibly made up of :

- the same persons as group 1 + fire-fighters, medical emergency teams, police teams and every useful services of the civil security, IRSN, hospitals
- authorities can in the case of conventions/requisitions complement the 2nd group using any useful person

1 Radiological emergency situation

Persons involved

Public Health Code



Intervention personnel Group 1 ⇨ are subject to/receive :

- radiological **monitoring**
- **medical fitness** check
- **training** in particular on the risk associated with exposure to ionizing radiation
- appropriate **equipment** with regard to the particular nature of the radiological risk when they participate in an intervention
- **personal protective** equipment and suitable **dosimetric** devices

Intervention personnel Group 2 ⇨ are given :

- appropriate **information** on the risk associated with exposure to ionizing radiation
- **personal protective** equipment and suitable **dosimetric** devices

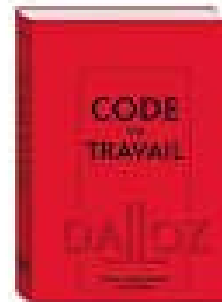
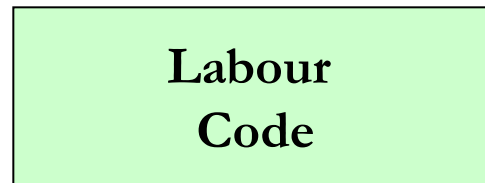
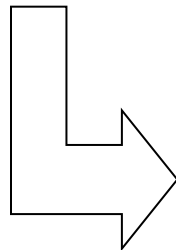
2 Transition phase

- ✓ In the French regulation, the **end of the emergency situation** and the **transition** from an emergency exposure situation to an existing exposure situation are not defined.
- ✓ The transition phase will have to be implemented in the French legal framework
 - to correspond to the European BSS,
 - to take into account that many different areas may be in a transition phase at different times (AIEA BSS draft).

3 Existing situation

RP requirements for persons involved

- ✓ Potential prolonged exposure situation
- ✓ Persons involved :
 - workers of the damaged NPP, assessment resources made available by the competent ministerial departments and the expert bodies, ...
 - in sustained exposure situations, if justified by the estimated doses, the persons involved benefit from the protection provided by the **regulation in force to workers** exposed to ionizing radiation.



The way forward for changes in RP Requirements

- ✓ ASN has to take into account two major sources of potential implementations of the occupational radiation protection during an emergency situation and a post accident phase :
 - **transposition of the Council Directive 2013/59/EURATOM** of 5 December 2013,
 - requirements following the **complementary safety assessments** of the nuclear power plants in the light of the accident that occurred on the nuclear power plant at Fukushima Daiichi.

■ Transposition of Council Directive 2013/59/EURATOM of 5 December 2013 :

for instance :

- ✓ this directive defined an "**emergency worker**" as any person having a defined role in an emergency and who might be exposed to radiation while taking action in response to the emergency,
 - ↳ *a working group joining ASN, the Ministry of Labour and the Directorate of civil protection will work on that specific topic,*
- ✓ as seen before, in the French regulation, the **end of the emergency situation** and the **transition** from emergency phase to the recovery phase are not mentioned and will have to be implemented in the French legal framework to correspond to the requirements of the directive.

■ Complementary safety assessments :

✓ ASN issued a range of major requirements :

- increased protection of the facilities against natural events,
- creation of a “**hardened safety core**” of particularly robust equipments and organizational measures designed to ensure control of basic safety functions in extreme situations,
 - ↳ *comprising operational dosimetry resources, individual protective equipments, iodine, RP measurement equipments..., for workers,*
- emergency response teams able to intervene on the facilities impacted within a few hours,
 - ↳ *The operator (EDF) gradually deploys its national "Nuclear rapid response force (FARN)" comprising specialist crews and equipment able to take over from the personnel on a site affected by an accident.*



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■ Complementary safety assessments :

- ✓ The work is still ongoing to better know how workers would be exposed during a severe accident (*for instance: evaluation of the exposures on the site and in the control room when opening the emergency filtered containment venting system used in the mitigation of severe accidents*)
- ✓ ASN made also sure that social, organizational and human factors were included. Its priorities:
 - maintaining and renewing **skills**, in particular at a time when one generation of workers is giving way to the next,
 - the conditions for **subcontracting** in normal and in **accident conditions**,
 - and the development of research on these subjects.



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Thank you

See also :

<http://www.french-nuclear-safety.fr>

<http://post-accidentel.asn.fr>