



Management of Nuclear Emergency and Post-Accident Situations (Population Protection Measures)

Main changes in France (still in discussion)

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Management of long-term exposures after a nuclear or radiological accident :

- Planning of protective actions (at the preparedness step), particularly the actions to be implemented during the emergency phase ;
- Anticipating at the end of the early phase some protective actions to be extended during the transition period ;
- Involving stakeholders at the preparedness step and population at the start of transition period

Content

1. Emergency preparedness

2. Protective action during the emergency phase

3. Protective actions during the start of the post-accident phase

4. Conclusion

Regulation and Oversight

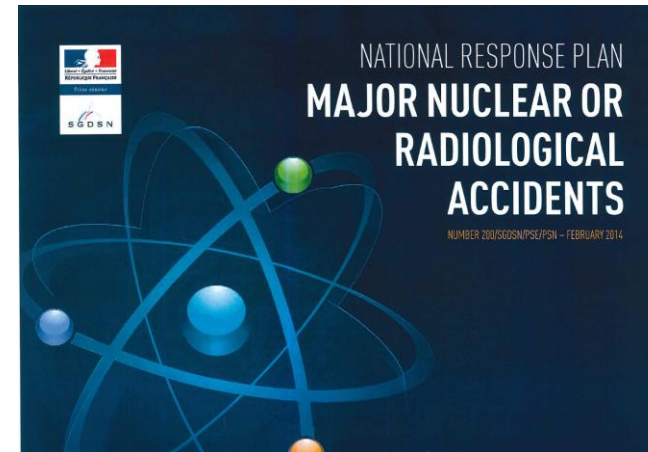
Contribute to emergency situation management:

- Check the appropriateness of the measures taken by the licensee
- Advise the Government, co-organise national emergency exercises
- Fulfil the function of competent authority at international conventions

Inform the public, including in emergency situations

The national response plan for major nuclear or radiological accidents (February 2014)

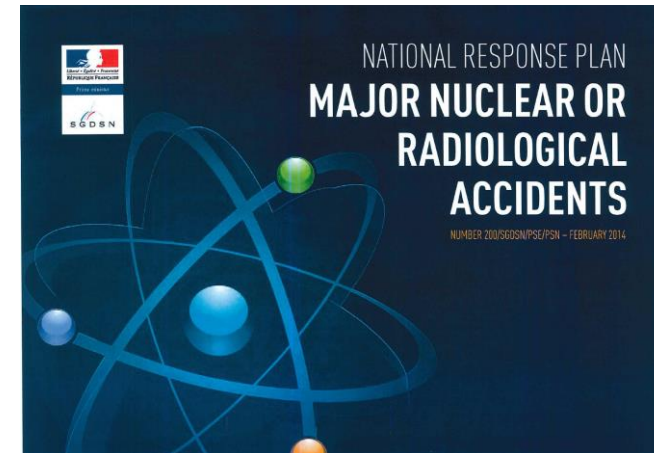
- The emergency organisation, the strategy and main measures, **during the emergency phase and at the start of the transition phase**
- A decision -support guide



About planning : 8 accidental situations

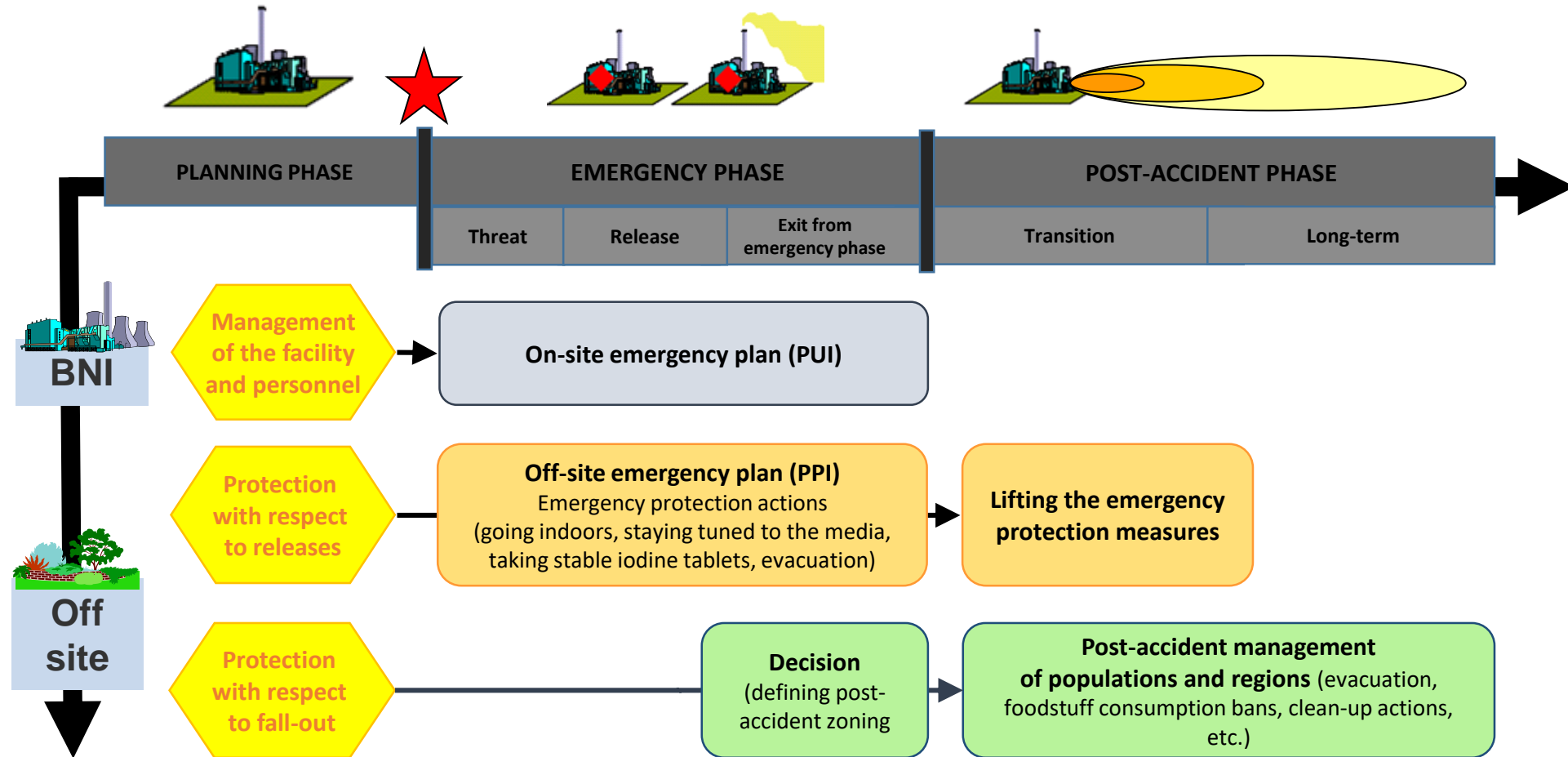
The French national response plan describes national crisis response organization for 8 situations:

- **Situation 0** : uncertainty
- **Situation 1** : immediate and short-lasting release
- **Situation 2** : immediate and long-lasting release
- **Situation 3** : delayed and long-lasting release
- **Situation 4** : transport accident with potential release
- **Situation 5** : accident abroad with potential significant consequences in France (protection of population could be necessary)
- **Situation 6** : accident occurring abroad without significant impact in France
- **Situation 7** : accident on sea with potential release



From emergency phase to post-accident phase

➤ Issues and management aids





The aims of emergency situation and post-accident management

1. Protect the populations against the dangers of ionising radiation
 - Low-dose situations: reduce the probability of developing pathologies such as cancers a few years or even a few decades after the event
2. Provide support to the populations affected by the accident
 - Treat the pathologies associated with the stress (accident) and the deterioration of economic and social conditions
3. Win back the economically and socially affected regions

4 principles

- Preparedness (off-site emergency plans)
- Justification
- Optimisation
- Shared construction and transparency



Contents

1. Emergency preparedness
2. **Protective actions during the emergency phase**
3. Protective actions during the start of the post-accident phase
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About planning at local level

Off site emergency plan – Plan Particulier d’Intervention (PPI)

- Derivation of the National Plan (pending)
- Established by the local Public Authority (Head of Departement – Prefect)
- Objectives
 - Protect the public and the environment
 - Define the local crisis organization
 - Set out the plan for monitoring the radiological environment
 - Indicate the site assistance for emergencies (injuries, fires)
 - Prepare the population, municipalities and media information

Planned protective actions

Immediate and short lasting releases	Reflex Phase	Sheltering on a 2 km radius area
Possible core melt, immediate and <u>long lasting releases</u>	Immediate Phase (up to 12 h)	Evacuation on a 5 km radius area
Other situation	Concerted Phase	Population protective actions based on projected doses and local context

French EP&R new developments

Protective actions and areas of implementation

About the major developments :

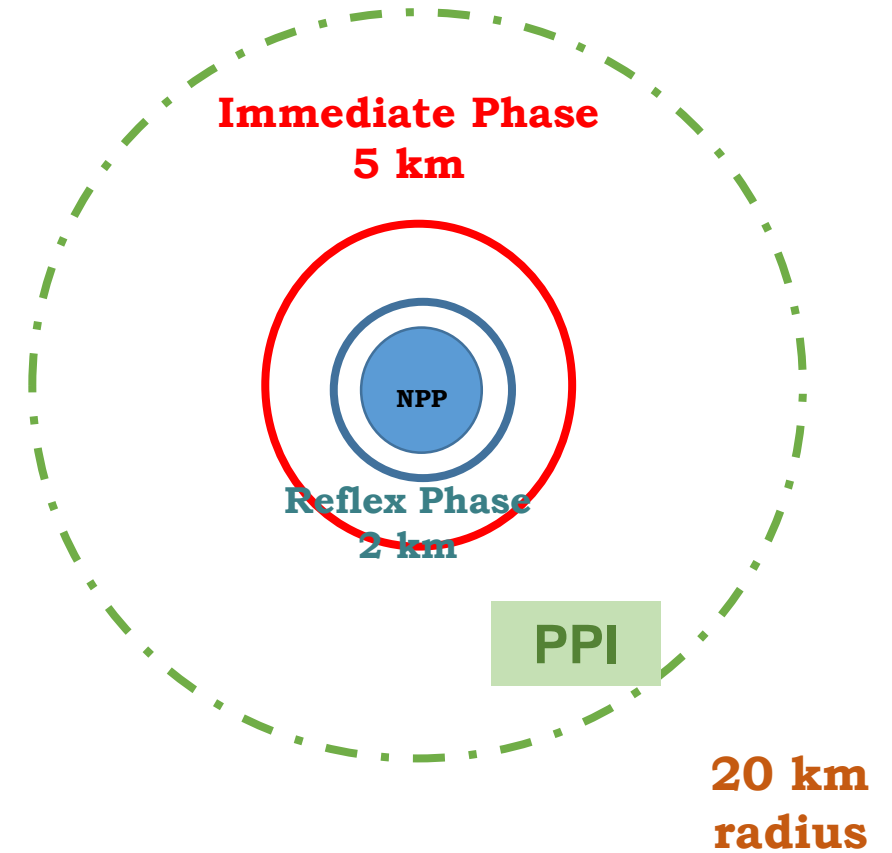
1. Immediate 5 km evacuation phase
2. Extension of the PPI radius

10 km

20km



Immediate and short lasting releases	Reflex Phase	Sheltering on a 2 km radius area (+ others)
Possible core melt, immediate and <u>long lasting releases</u>	Immediate Phase (up to 12 h)	Evacuation on a 5 km radius area (+ others)
Other situation	Concerted Phase	Population protective actions based on projected doses and local context



Population protection actions in an emergency situation (atmospheric release) RL = 100 mSv/y

Decision reference values (intervention level)

- Staying indoors: Effective Dose = 10 mSv/duration of releases
- Evacuation : Effective Dose = 50 mSv/duration of releases
- Taking iodine tablets: Thyroid Equivalent Dose = 50 mSv



Dose prévisionnelle à la thyroïde de 50 mSv



Iodine tablets pre-distribution : framework of the 2016 campaign

- A 10 km-radius around the 19 French NPP.
- 430,000 households, 70,000 companies and public buildings, 500 towns concerned.
- February 2016: personal letter from the authorities to invite persons living near NPPs to collect their boxes of iodine tablets from their pharmacy within 6 months.
- End of 2016: postal mailing of tablet boxes for those who haven't collected it.



Our communication guidelines :

- Redefine the position of iodine-taking among the other protective measures.
- Make the citizens aware of the nuclear risks.
- Make the citizens active in their own protection.

Mobilization of the local relays

- **20** information meetings dedicated to mayors
- **20** information meetings dedicated to health professionals
- A communication kit for the mayors, the pharmacists and the medical doctors involved.



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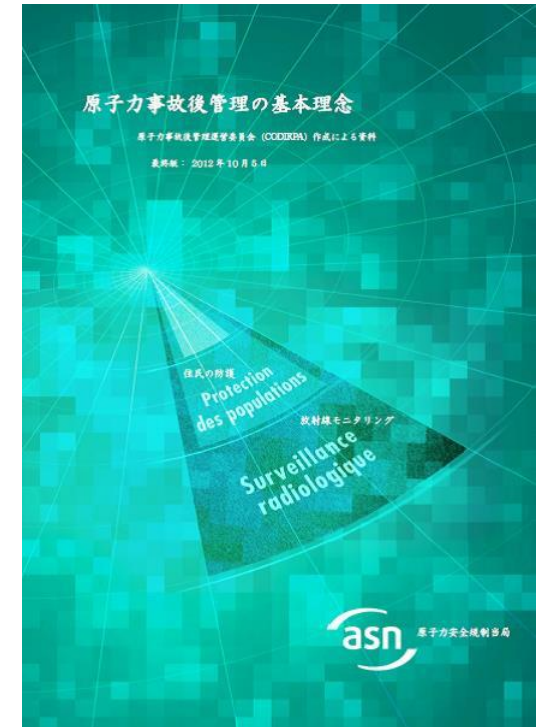


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The steering committee for post-accident phase management CODIRPA (2005-2018)

- Pluralistic structure: local and national authorities, institutional experts, licensees, elected officials, associations, etc.
- 12 thematic working groups (2005-2009): lifting requirement to stay indoors, foodstuffs, water, radiological measurements, waste, health, response teams, etc.
- 2 synthesis groups (2010-2012): transition and long-term

Publication of the doctrine (November 2012)



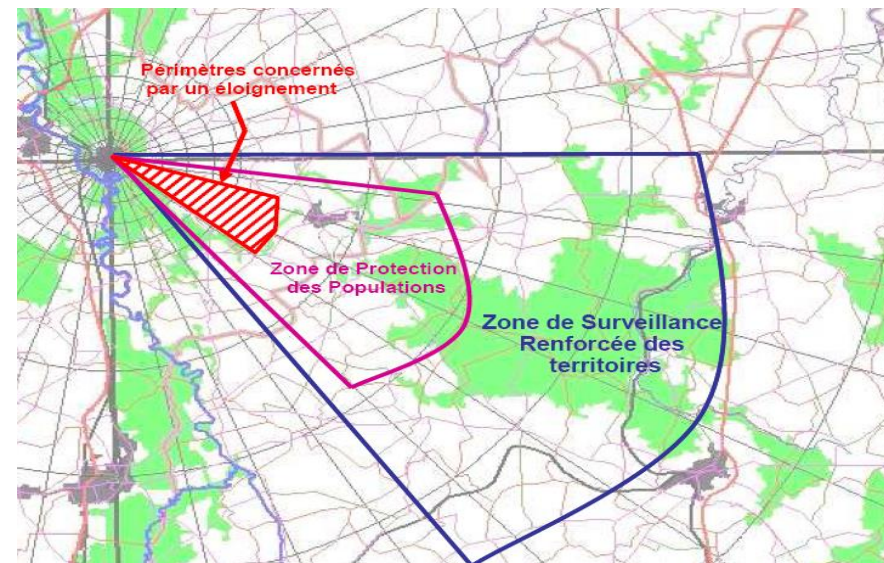
Updating of the doctrine (2018) :

- Fukushima accident feedback
- Development of new techniques of measurements (airborne means)
- Feedback from national nuclear exercises
- RL (Effective dose = 20 mSv/1st year, then 1 mSv/y)

Post-accident zoning

Doctrine 2012 (short-term releases): zoning set up immediately after the releases stop :

- Relocation zone (“exclusion” zone)
- Public protection zone (ZPP)
- Territorial surveillance zone (ZST)



Relocation zone : change in the criterion for the delineation of the perimeter ?

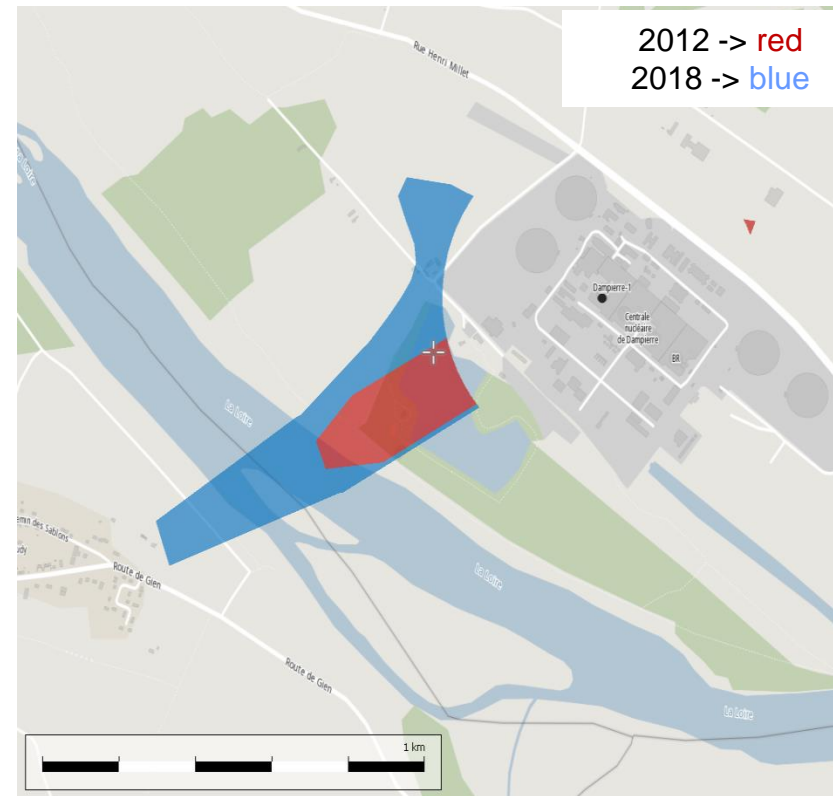
The people must, in principle, be removed for a long period

Indicator and guidance value (2012):

Estimated effective dose by external pathway
(other than ingestion) over the **1st month**
(emergency phase excluded):
10 mSv

Indicator and guidance value (2018):

Estimated effective dose **by external pathway**
(other than ingestion) over **12 months**
(emergency phase excluded): **20 mSv**





Abandoning the Priority Prevention Zone (ZPP) ?

**Dose criteria (effective dose for all exposure pathways during the 1st month : 10 mSv) :
no more relevant for the delineation of the perimeter**

Engaging actions with the objective to decrease the public exposure, and to be (middle term) under the RL (1 mSv/y)

Reducing exposure of the public (ALARA)

- to issue recommendations for good everyday living practices
- to reduce environmental contamination (contamination reduction plan, waste management)

Developing monitor exposures

- to characterise the environmental contamination, including drinking water monitoring
- to create radiation measuring centres (for persons, foodstuffs)
- to provide systems for self-measurement of radiation in foodstuffs (home-grown, gathered)
- to organise health and dosimetry monitoring of individuals

Informing

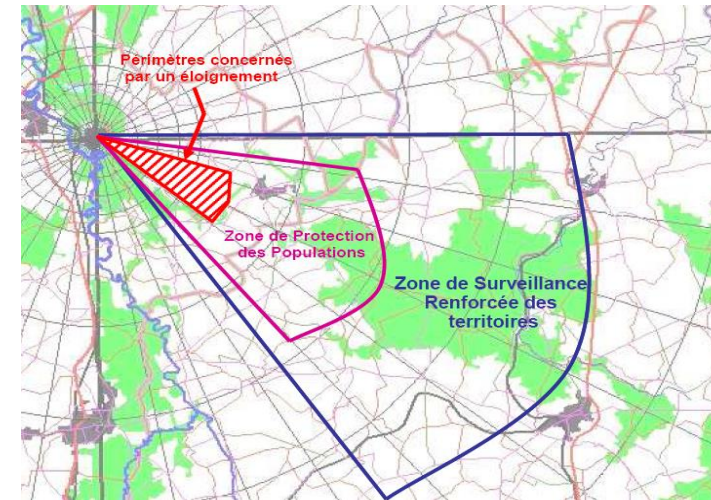
- The consumers (home-grown food, gathering, hunting, etc.)
- The enterprises: the risks associated with the use of contaminated materials, the selling of consumer goods (other than foodstuffs)

The Territorial Surveillance Zone (ZST)

2012: An immediate ban on the consumption of home-grown foodstuffs AND agricultural products and their sale, with subsequent clearance under control (monitoring)

Indicator and guidance value:

maximum distance for reaching the **European Maximum Permitted Levels (MPL)**



2018

- Abandoning of the ZST as defined in 2012
- At the end of the release :
 - Starting with a “conventional perimeter” (to be defined at the preparedness step) within which the consumption of home-grown foodstuffs is banned ;
 - To update progressively this perimeter, taking into account results of monitoring.

Defining progressively Agricultural Production Surveillance Zones by category (milk, leaf vegetables, etc.), on the basis of MPLs per sector, etc.



Conclusion (main changes)

- The implementation of post-accident zones could be gradual in the case of long-term releases (Doctrine 2012: immediate) and based on calculations and measurements (Doctrine 2012: modelling only)
- The relocation perimeter will be put in place according to an operational criterion (20 mSv/year excluding ingestion)
- Immediate ban on the consumption of home-grown foodstuffs based on a conventional perimeter (to be defined)
- Developing actions with the objective to decrease the public exposure, and to be (middle term) under the RL (1 mSv/y)



Thank you for your attention