



Lessons learned and implications for further harmonisation in Europe from a regulatory perspective

France nuclear safety authority (ASN) views

NKS Seminar on the Fukushima accident and perspectives for Nordic reactor safety and emergency preparedness

Finlandshuset, Snickarbacken 4, Stockholm, Sweden,
January 8-9, 2013

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Former chairman of ASN





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- French Nuclear Safety Authority (ASN)

- Post-Fukushima actions at French and European levels
 - Process and timeline
 - Main conclusions and resulting actions

- Conclusion and challenges





French nuclear safety authority (ASN)

➤ **An independent body** (similar to US-NRC)

➤ **5 full-time commissioners, including a chairman**

- 6 years term
- Since November 13, 2012, Pierre-Franck Chevet is the new chairman

➤ **Core duties**

- Regulations
- Inspection
- Information

➤ **ASN benefits from the expertise of a major TSO : IRSN**

➤ **Regulation of a wide range of activities and installations, including**

- 58 operating nuclear reactors
 - Sandarized fleet
 - Generate ~80% of French electricity
 - One operator (EDF)
- EPR reactor under construction
- All French installations involved in the fuel cycle, from enrichment to reprocessing

➤ **Some key figures**

- More than 450 staff, with about half of them in the 11 regional divisions.
- More than 800 inspections per year on nuclear installations and transport of radioactive material.





Post Fukushima actions at French and European levels (1/2)

Immediately after the accident, ASN launched:

- A campaign of **targeted inspections**
- **“Stress tests” (i.e. complementary safety assessment)**
 - Respond to a request from the French Prime Minister (23rd March 2011) and from the European Council (24th and 25th March 2011)
 - Are a **complementary approach to the continuous improvement process** of safety pursuant to the law and overseen by ASN (periodic safety reviews (PSR) and integration of operating experience feedback)
 - Cover **French nuclear installations** (~120), including EPR reactor under construction, with priority given to the most important ones (NPPs, La Hague fuel reprocessing plant...)
- Stress tests aims at checking the **robustness of plants to beyond-design Fukushima-related situations**: extreme natural events, loss of safety systems (heat sink, electrical power), severe accident situations.
 - Stress tests specifications were drafted by WENRA, formally established by ENSREG (official group of EU nuclear regulators) and served for the stress tests of all European NPPs.
 - In addition, French stress tests also address human factors





Post Fukushima actions at French and European levels (2/2)

5th May 2011

ASN's resolutions to require licensees to perform stress tests according to **detailed stress test specifications**

15th September 2011

Licensee's report submitted

3rd January 2012

ASN conclusions: formal report and ASN's opinion about stress tests

Jan. – Apr. 2012

European peer review

26th June 2012

• **ASN issued legally binding requirements** (licence conditions) to EDF on improvements to be implemented:

- 19 site specific resolutions with about **40 licence conditions in each of them**
- Compliance deadlines : from 2012 to 2018. Improvements are expected as soon as possible, without waiting the next periodic safety review (EU peer review recommendation)

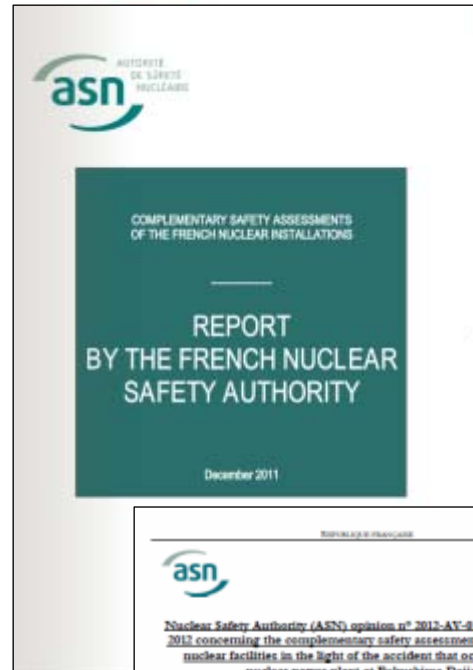
• Letter signed by ASN's DG with **41 additional requests to EDF**





Conclusions in France (1/3)

No immediate shutdown but...



ASN's position : ***“the facilities examined offer a safety level that is sufficient for ASN not to request the immediate shutdown of any of them [...]. At the same time, ASN considers that continued operation of the facilities requires that their robustness to extreme situations be increased beyond the existing safety margins, as soon as possible.”***
(3 January 2012)

- EDF made proposals to enhance its NPP's safety
- For some other nuclear installations, some shutdowns were already decided





Conclusions in France (2/3) Confirming PSR benefits

➤ Importance of the **periodic safety review (PSR)** process and significant operating experience feedback

- Seismic improvements
 - 2001 Basic Safety Rule
- Wide ranging set of hazards considered for flooding risk assessment
 - 1999 Blayais NPP event
- Severe accident measures implemented on all the sites

➤ Importance of **maintaining skills and competences** in the organizations

❑ PSR process is in addition to routine safety assessment

❑ 2 steps in the PSR process:

1) Extensive compliance check with the (latest) applicable licensing basis

2) Safety re-evaluation: revisiting licensing basis (especially design basis) taking into account current (i.e. latest) safety standards, to identify the reasonably practicable improvements to be implemented and to upgrade the licensing basis

Conclusions in France (3/3)

Improvements expected



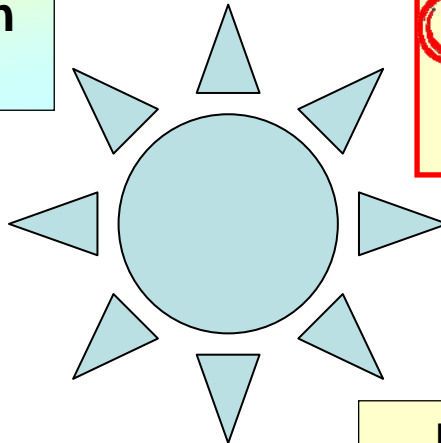
Need for a « **hardened safety core** »
(technical and organizational measures)

which remains operational under conditions considered in the stress tests

Strengthening of the **deviation processing system**

Organizational & human Factors are essential to nuclear safety

- Renewal of the licensee workforces and skills
- Organisation of the use of subcontracting
- Research on these topics



Establish a **Nuclear rapid response force** for NPPs (specialist crew and equipment within 24 h to the site)

Reinforced measures to reduce the risk of dewatering of the spent **fuel stored in pools**

Feasibility studies to **protect the groundwater and surface waters** in case of severe accident

Targeted **strengthening of the regulatory safety requirements/guidance**

- Conformity of the facilities
- Earthquake, Flooding
- Risks linked to other industrial activities



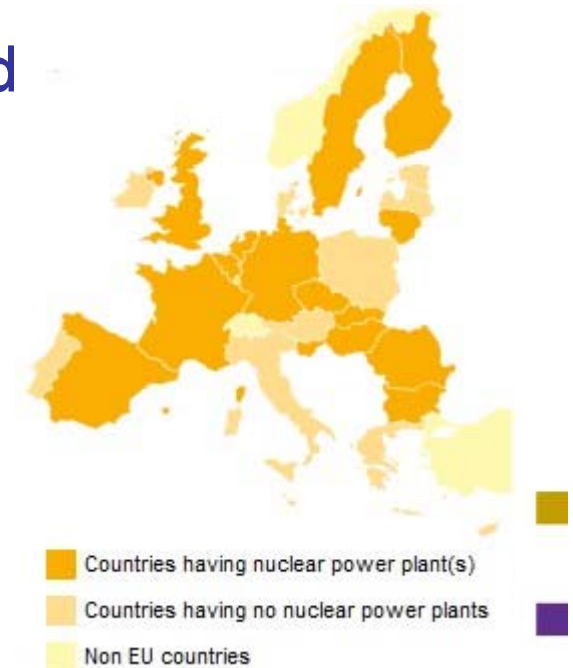
Conclusions in Europe (1/3) European peer review

➤ European stress test process (limited NPPs) involved

- **Countries with NPPs:** 15 EU countries + Switzerland + Ukraine
- **5 EU countries without NPPs**
- **European Commission and observers** (IAEA, USA, Canada, Japan, UAE, Croatia)

➤ Peer review :

- 80 experts from all over Europe for 4 months
- **First-of-a-kind opportunity to share results and compare practices between European countries**
- This peer review delivered **clear conclusions** to the stress test process of European NPPs, which were endorsed by ENSREG (the official group of nuclear regulators) and the European Commission



Conclusions in Europe (2/3)

European level recommendations

<http://www.ensreg.eu/EU-Stress-Tests/EU-level-Reports>

- **Periodic safety review (PSR)** are extremely beneficial to the continuous improvement of safety
 - Necessity to re-evaluate natural hazards at least every 10 years
- Need for European guidance on **assessment of natural hazards and margins**
 - WENRA task group to be established
- Need to **strengthen the robustness of NPPs to beyond design situations**, as a way to prevent accidents resulting from unforeseen/extreme natural hazards and to limit their consequences
 - Bunkered equipment,
 - Mobile equipment and off-site rescue teams to assist a crippled site...
- Need to maintain **containment integrity**
 - Urgent implementation of recognized measures (H2 explosion prevention...), for NPPs where they are not yet implemented





Conclusions in Europe (3/3)

- **Full understanding of the TEPCO Fukushima accident will be a long term process extending over several years, possibly a decade.**

- **One of the important results of the public interaction is a strong demand for a European initiative on off-site emergency preparedness.**
 - This subject was not part of the mandate of the peer review.
 - Crisis management preparedness and post-accidental planning ⇒ work at both national and international levels, both for the licensees and the emergency response organizations





Conclusion & challenges (1/4)

➤ Following up the stress tests

- France:
 - Completing the stress test for nuclear installations that were not in priority 1
 - **Checking implementation** of the new licence conditions
 - Review and revision of **regulatory requirements/guidance** related to natural hazards (earthquake and flooding) and risks linked to other industrial activities located in the vicinity of nuclear installations
 - **Human and organizational factors** aspects (ASN established a specific Committee on Social, Organisational and Human factors, involving licensees and stakeholders),
 - **Avoiding stress tests being a one-shot exercise**
 - Continuing work on **post accident management issues** (CODIRPA)
- EU stress test: Follow up action plan to be defined (by end of 2012) and peer-reviewed by ENSREG





Conclusion & challenges (2/4)

- The accident at Fukushima confirmed that, **despite all the precautions that are taken for safety, an accident is always possible.**
- It now appears clearly, and has been endorsed in the conclusions of the extraordinary meeting of the Contracting Parties to the CNS, that “*nuclear power plants should be designed, constructed and operated with the objectives of preventing accidents and, should an accident occur, mitigating its effects and **avoiding off-site contamination.*** The Contracting Parties also noted that regulatory authorities should ensure that these objectives are applied in order to identify and implement appropriate safety improvements at existing plants.”





Conclusion & challenges (3/4)

- This objective now needs to be actually implemented.
 - For new NPPs
 - It is consistent with WENRA safety objectives for new NPPs (November 2010)
 - For existing NPPs. **PSR of the existing reactors should be guided by this objective of avoiding off-site contamination:** improvements should be implemented on the plants and those which cannot meet the expectations should be shut down.





Conclusion & challenges (4/4)

- The actual improvement of safety according to these principles relies, in part, on the action of the **regulators**, for example by having the licensing basis updated.
 - ↪ The independence, the transparency and the rigorous action of the regulators are a necessary key to this process.
 - ↪ By helping the IAEA in updating its safety standards

- But first of all, the **licensees**, which have the primary responsibility for safety, must take their share and be active in the process of improvement.
 - ↪ This is to be done at an **individual level**, but also at a **collective level**, through organizations such as WNA, WANO or Reactor Owner groups.







Conclusions in France

Hardened safety core

- **3 objectives, for the situations studied in the stress tests**
 1. prevent or mitigate the progress of an accident with fuel melt,
 2. mitigate large-scale radioactive releases,
 3. enable the licensee to perform its emergency management duties.

- **Limited number of strengthened equipment including**
 - ✓ an **additional ultimate electricity generating set** for each reactor;
 - ✓ a **diverse emergency cool-down water supply** for each reactor;
 - ✓ **new emergency management premises**, offering greater resistance to hazards and remaining accessible and habitable at all times and during long-duration emergencies
 - ✓ **mobile devices** and **means of communication** essential to emergency management
 - ✓ technical and environmental **instrumentation**

- **SSCs included in the hardened safety core shall be maintained in a functional state, in particular for the extreme situations studied in the stress tests. SSCs shall be designed with significant fixed margins in relation to the requirements currently applicable.**
 - Composed of independent and diversified SSCs in relation to the existing ones to avoid CCF. The licensee shall justify the use of undiversified or existing SSCs.

① File submitted by EDF (June 2012), currently under assessment by ASN and IRSN



Conclusions in France “Nuclear rapid response force”

➤ For the nuclear power plants, ASN required the progressive creation of the "Nuclear rapid response force" (FARN) proposed by EDF.

- The FARN is a national response system including **specialist crew and equipment**, able to take over from the personnel of a site affected by an accident and deploy additional emergency response resources **in less than 24 hours**.

- ① EDF submitted its specific organization regarding the nuclear rapid response force in June 2012
- ① Gradual creation until end of 2014





Lessons learned and implications for further harmonisation in Europe from a regulatory perspective

Some personal thoughts on difficult nuclear safety issues

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1. Design of new reactors to be built
2. Draft national regulations
3. Installations raising particularly difficult safety issues 
4. Nuclear Safety Authorities in a difficult situation 


5. Exchanges of personnel and witnessed inspections: 





Difficult nuclear safety issues

1. Design of new reactors to be built

- How do we envisage the implementation of the WENRA statement (November 2010) on safety objectives for new NPP ? The question must be dealt with for the countries whose Safety Authorities are members of WENRA and which intend to build new NPP : UK, Romania, Poland, Lithuania, etc.. with a list of possible designs coming from Europe, USA, Canada, Russia, Japan, South Korea, China, etc.. Moreover the question can also be raised about countries at the borders of Europe : Russia, Turkey.





Difficult nuclear safety issues

2. Draft national regulations

- How do we envisage to help and assist WENRA members preparing a new set of national nuclear safety regulations?

3. Installations raising particularly difficult safety issues:

- Do we envisage to help and cooperate with the national Safety Authority in charge of the monitoring of these installations in a collective way or on an individual basis?





Difficult nuclear safety issues

4. Nuclear Safety Authorities in a difficult situation:

- Do we envisage to do something, and what, if one of the national Safety Authorities which are members of WENRA happens to be in a difficult legal, political, technical or practical (for instance lack of resources) situation?

5. Exchanges of personnel and witnessed inspections:

- Are we ready to develop such practises in a systematic and permanent way ?





Heads of the European Radiological
protection Competent Authorities

Working group “Emergencies” (WGE)

Presentation by Patrick Majerus (LU)

Chairman of the WG

WG-Emergencies

Introduction

- The 7th HERCA Board of Heads meeting in Brussels on 30 June 2011, decided the creation of a new Working Group Emergencies (WGE).
- The WGE shall first develop a working strategy and an action plan following the approved mandate.
- Two Parts: “distant accidents” and accidents originating in HERCA member counties.
- The goal is to propose practical, operational solutions for a more harmonized approach.

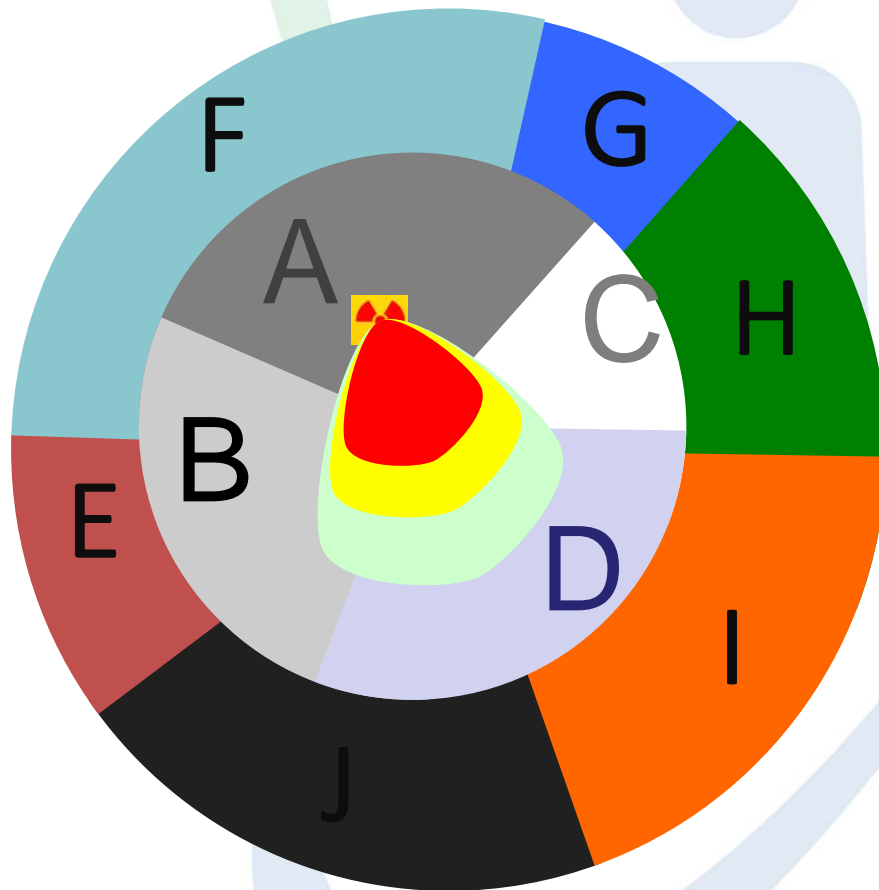
Approach

Harmonize identified difference = bottom up approach

However: Harmonization of intervention levels did not succeed in the past because of various reasons (scientific evidence, regional particularities, legal constraints, political sensitivities, and “*we are very much in favor of harmonization as long as you adapt our values*”)

Another approach (vision) – Top Down

Consider



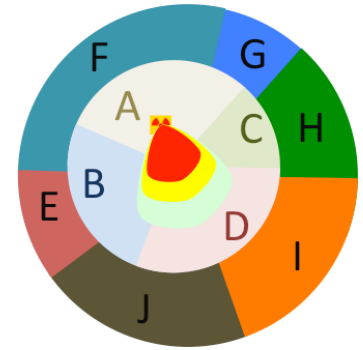
Accident in country A

Some are immediately affected (A, B, C, D).

Some are not immediately affected (E, F, G, H, I, J)

Top down approach

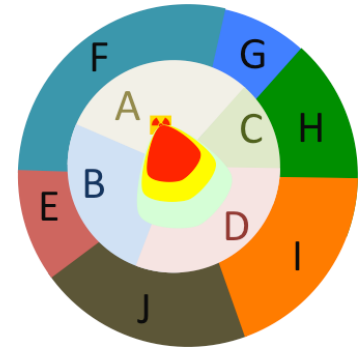
Assessment provided by country A



- Country A provides an assessment with recommendations for counter measures that cover all directly affected territories.
- This assessment and its frequent updates is made available to all countries (B-J). (via situation report)
- Countries trust the assessment of country A
- Country A establishes privileged contacts with countries B, C and D.

Top down approach

Gaining trust

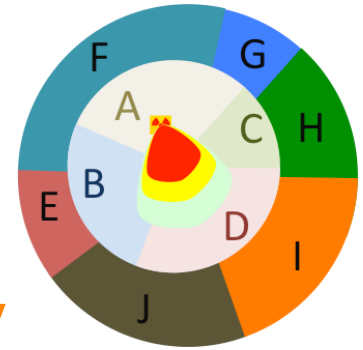


- Countries A to J establish mechanisms for a common assessment (identification of key players + operational mechanisms for cooperation).
- This common assessment will be used as “second opinion” (included into situation report).
- In case of an accident in A, the assessment should work without country A as key player.

Top down approach

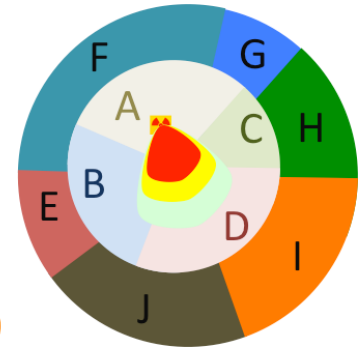
Implementation during an emergency coordination!

- Intensive local and/or regional coordination/consultation mechanisms between countries A-D for deciding countermeasures in a harmonized way. Following the recommendation of country A should be the privileged scenario.
- Ad-hoc coordination/consultations between Countries A-J in case of important differences of the assessments (audio-conference).



Top down approach

Prerequisites (certainly not complete)



- Countries A-J need intervention levels for orientation with large freedom of variable application (further approaching those values is still encouraged, but not the immediate goal).
- Countries A-J need to be ready to trust and align decisions.
- Decision takers need to understand what is at stake:
“Explain to a handful of political leaders why you trusted someone else although you have own competence or explain to 400 Million Europeans why they were not protected in the same way”