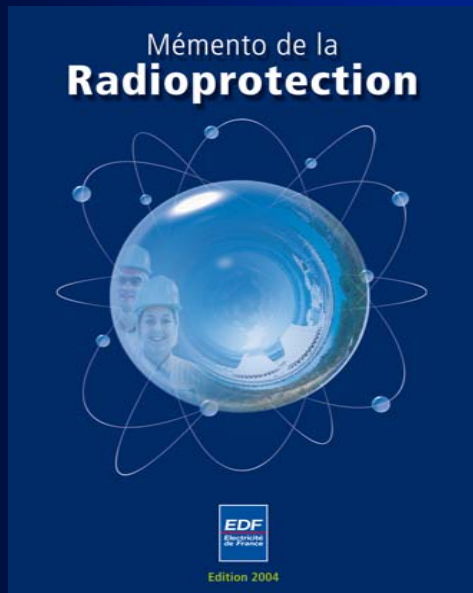


World Nuclear Association Annual Symposium  
7-9 September 2005 - London

**Ever Progressing in Safety Culture:  
Nuclear and Radiation Safety for Nuclear Workers**

Yves Garcier



# Ever progressing in safety culture: nuclear and radiation safety for nuclear workers

Yves GARCIER M.D

Vice President Radiation Protection

EDF Nuclear Operations Division

# Table of contents

- **Nature of the risk**
- **Design safety**
- **Operating safety**
- **Safety and radiological protection culture**
  - ↳ Purpose
  - ↳ Training tool
  - ↳ Use and intended audience
- **Nuclear contractors**
- **Internal and external inspections**
- **Preparation for a potential emergency**
- **Transparency**

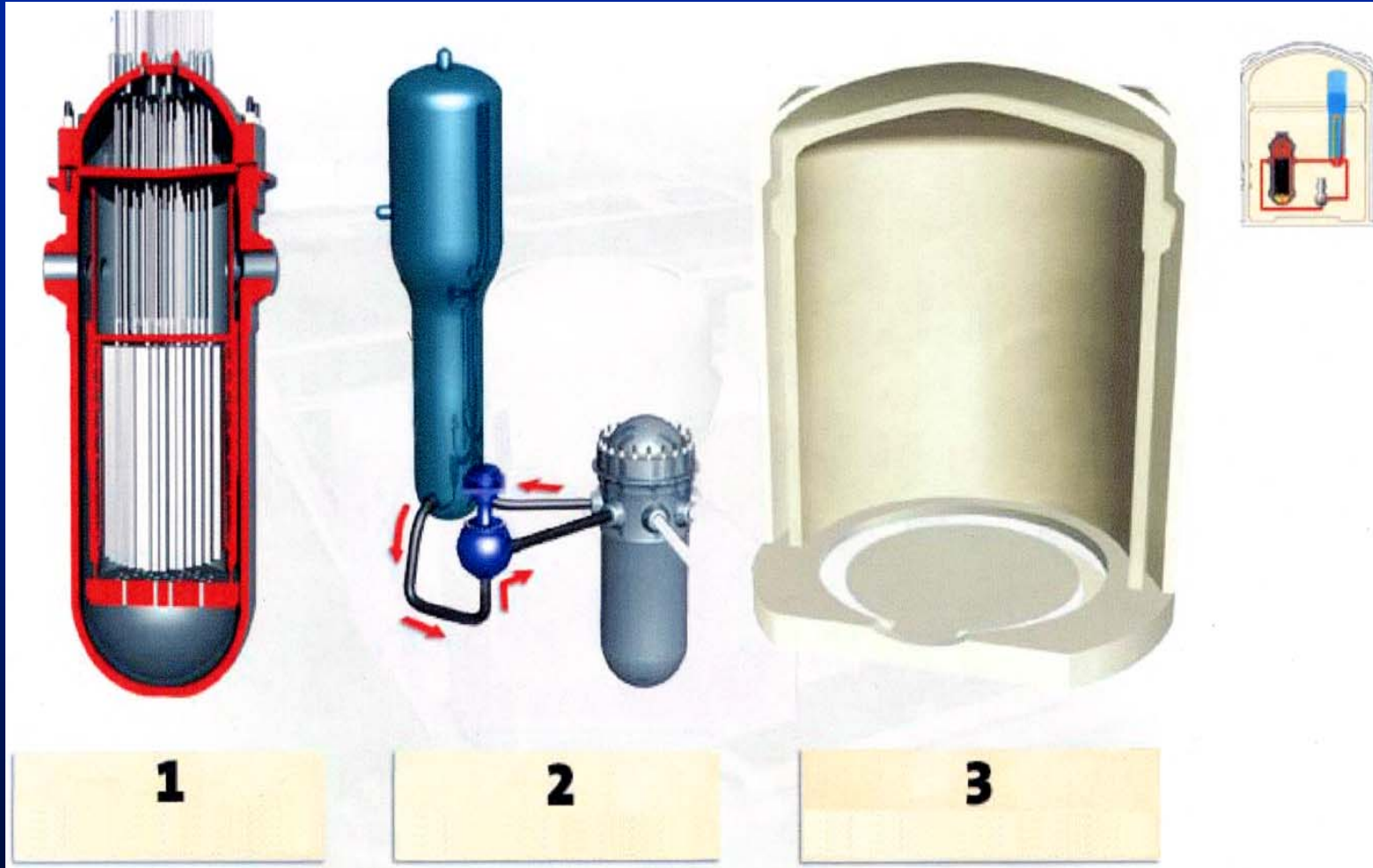
# Nature of the risk

- *"Nuclear safety is all the technical, organisational and human measures aimed at preventing and minimising the dispersal of radioactive products employed in the design, operation and dismantling of a nuclear facility".*
- The risks considered are linked to:
  - the inherent operation of the facility
  - internal hazards
  - external hazards

# Design safety

- **Relies on the concept of defence in depth (redundancy, diversification, protection and backup systems, three barriers).**
- **Re-assessed throughout the life of the plan, during each ten-yearly inspection, incorporating experience feedback and progress in awareness of the risks.**
- **A deterministic approach to risk, backed up by a probabilistic approach.**

# THE 3 CONSECUTIVE BARRIERS



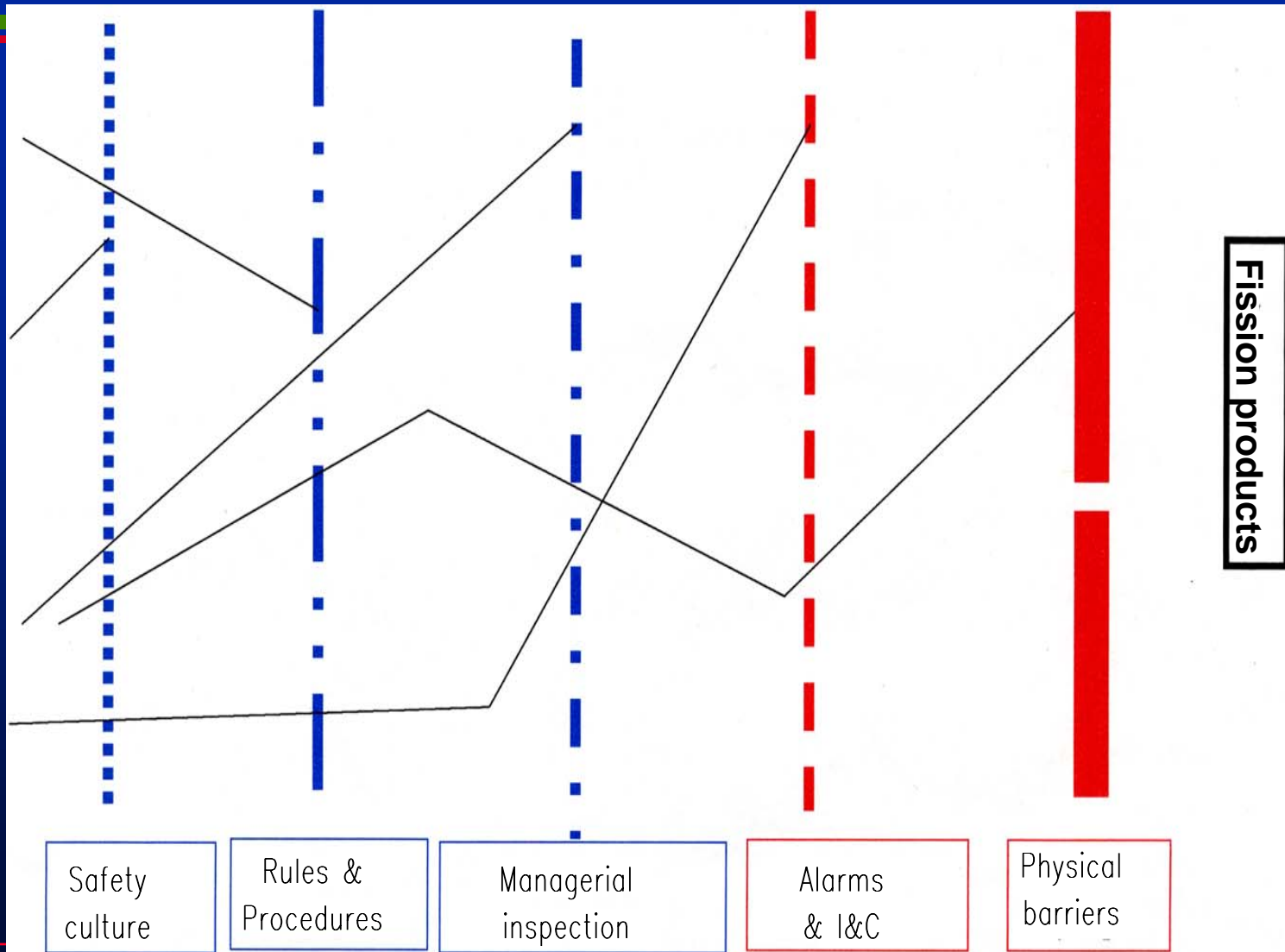
Fuel cladding

Primary system

Containments

# Accident Prevention

Unexpected events and scheduled maintenance



# The Safety Culture

- ***"A prudent and questioning attitude, rigorous procedures, good communication"***.
- **Management must be exemplary, explaining requirements on a day to day basis and ensuring compliance.**
- **Levers and methods for strengthening this culture:**
  - Safety Management Guide and RP guide,
  - risk analysis,
  - self-diagnostic, self-assessment,
  - principles of operational communication
  - Safety - Radiation protection - Availability - Environment observatories
- **Experimentation with efficient and effective working practices observed abroad (pre-job briefing, detection and analysis of minor deviations, etc.)**

# Purpose of the RP guide

- **The document clarifies RP-related aspects that people need to know about when working in radiologically controlled areas,**
- **Provides additional information that explains the logic behind RP expectations.**
- **Pools experience gleaned by EDF in the area of radiation protection**
- **Does not replace RP policy documents or plant-specific instructions**

# The purpose of the RP guideline is to

■

- Provide all personnel working in radiologically controlled areas on nuclear power plants with adequate information on RP rules, the logic behind them and their implementation,
- Instruct beginners on how to manage risks in radiologically controlled areas.
- Enhance the reader's knowledge of radiation protection in order to avoid error
- Supplement
  - RP training software
  - Training actions

# A training tool

- **The document sets out radiation protection rules in a simple manner that facilitates the learning process,**
- **It places these rules within the context of an overall RP programme encompassing all stages from design up to decommissioning, and illustrates them with examples taken from a typical working day,**
- **It explains the importance of work practices in achieving good RP results,**
- **It brings together all crafts and workers,**
- **It is intended as a tool for promoting RP culture while serving as a common reference for all EDF employees and contractors and fostering dialogue on the subject of radiation protection.**

# Use

- To be used for the reader's specific needs, by referring to the relevant chapters,
- Text on right-hand page; Illustrations, tables, graphs and boxes on left-hand page,
- Text printed in red appears in the index, which refers the reader to the page providing definitions,
- At the end of each chapter, a set of questions is provided in order to test comprehension (answers are given on the same page)

# Intended audience

## **Plant manager, senior management team and department managers:**

- Should be familiar with all chapters and seek advice from the site physician as regards biological effects produced by ionising radiation

# Intended audience

**To all personnel working in or going into radiologically controlled areas:**

↪ From plant managers to beginners...

↪ From RP1-qualified staff to RP experts...

# Intended audience

## Radiation protection specialists:

- ↪ Must be able to explain and comment on all technical chapters
- ↪ Must achieve a high score in the quiz...
- ↪ Must assist all workers if needed

# Intended audience

## Medical teams:

- ↪ Must read the chapter on biological effects produced by ionising radiation and be able to explain them to workers during training sessions
- ↪ Sections relating to plant operation will provide them with a more in-depth knowledge of the field

# Intended audience

## Operations and maintenance staff:

- ↪ Will acquire a better understanding of risks associated with ionising radiation, be able to take the necessary precautions and prepare for their jobs more efficiently
- ↪ Will have a better grasp of what is meant by dose optimisation and contamination control at source

# Intended audience

## Plant modification teams and decommissioning personnel:

- Will find information to help them compile their modification packages and enhance their RP culture

# Operating safety

- **A set of human and organisational lines of defence, recognising that an error is always possible.**
- **Quality-based management placing man at the heart of progress:**
  - the company's safety policy, making safety and radiation protection the highest priorities,
  - a safety management guide based on EFQM principles,
  - compliance with particularly complete reference systems, primarily the regulations,
  - processes conducted with particular thoroughness, including detection of deviations and experience feedback,
  - responsibility and initiative at all levels,
  - a skills development system, in particular making use of sophisticated training resources,
  - internal inspection plans, including a safety inspection outside the managerial line,
  - recognition of efforts made and good suggestions.

# Internal inspection

- **Inspection at each level of responsibility**
- **Monitoring of performance indicators, including safety, radiation protection**
- **An annual safety and radiation protection report, for each plant**
- **A periodic and in-depth assessment of safety and radiation protection in each plant (3 weeks, 30 inspectors, a reference system of more than 100 items)**
- **Peer reviews and OSARTs**
- **Audits**
- **A process to check compliance with central level decisions**

# External inspection

- **A highly transparent process for declaring events, even if there is no importance for safety or radiation protection (more than 400 per year), associated with an international severity scale (INES).**
- **More than 350 inspections per year by the Safety and Radiation protection authority**
- **An average throughput of 700 questions per year, at national level alone.**
- **A recently strengthened process of making and monitoring commitments, associated with authorisations, decisions and formal notices from the ASN.**

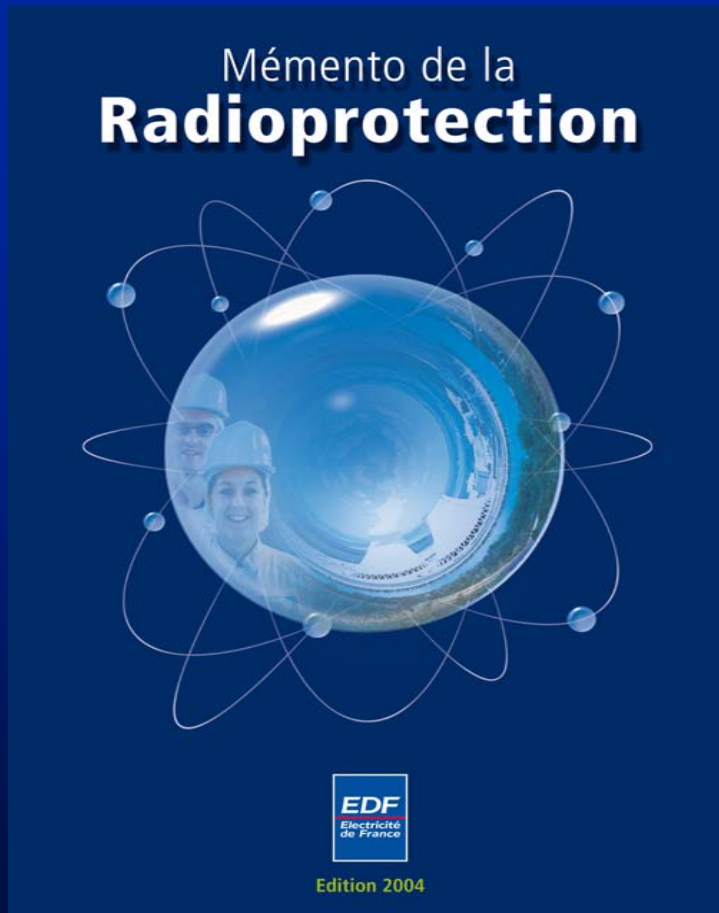
# Preparation for a potential emergency

- **An on-site emergency plan (PUI) for each Site and a National Emergency Response organisation.**
- **Operating teams trained on a simulator in accident conditions operation with support from experts.**
- **A proactive, forward-looking approach to population protection measures.**
- **Frequent drills:**
  - simple mobilisation
  - local training (with the Prefect's office and local emergency services)
  - national (with the NERO, Prefect's office and ASN) based on a technical scenario run on the simulator and with media pressure.
- **A Nuclear Risks Support mission located at the DDSC (Ministry for the Interior) with significant back-up from EDF.**

# Transparency

- **An absolute necessity, and an integral part of EDF's safety and radiation protection policy.**
- **Implementation both nationally (web site, reports, releases) and locally (communication of significant events and moments, publication of environmental measurements, close ties with elected representatives, media, the medical and educational professions, and active participation in the local information committees (CLI)).**

# Enjoy your read!



Send your comments and suggestions to the following address:

*yves.garcier@edf.fr*