SAFETY LESSONS LEARNED, KNOWLEDGE SHARING

AND

TRANSFERT TO THE NEXT GENERATION

EDF EXPERIENCE OF SAFETY MANAGEMENT AND TRAINING

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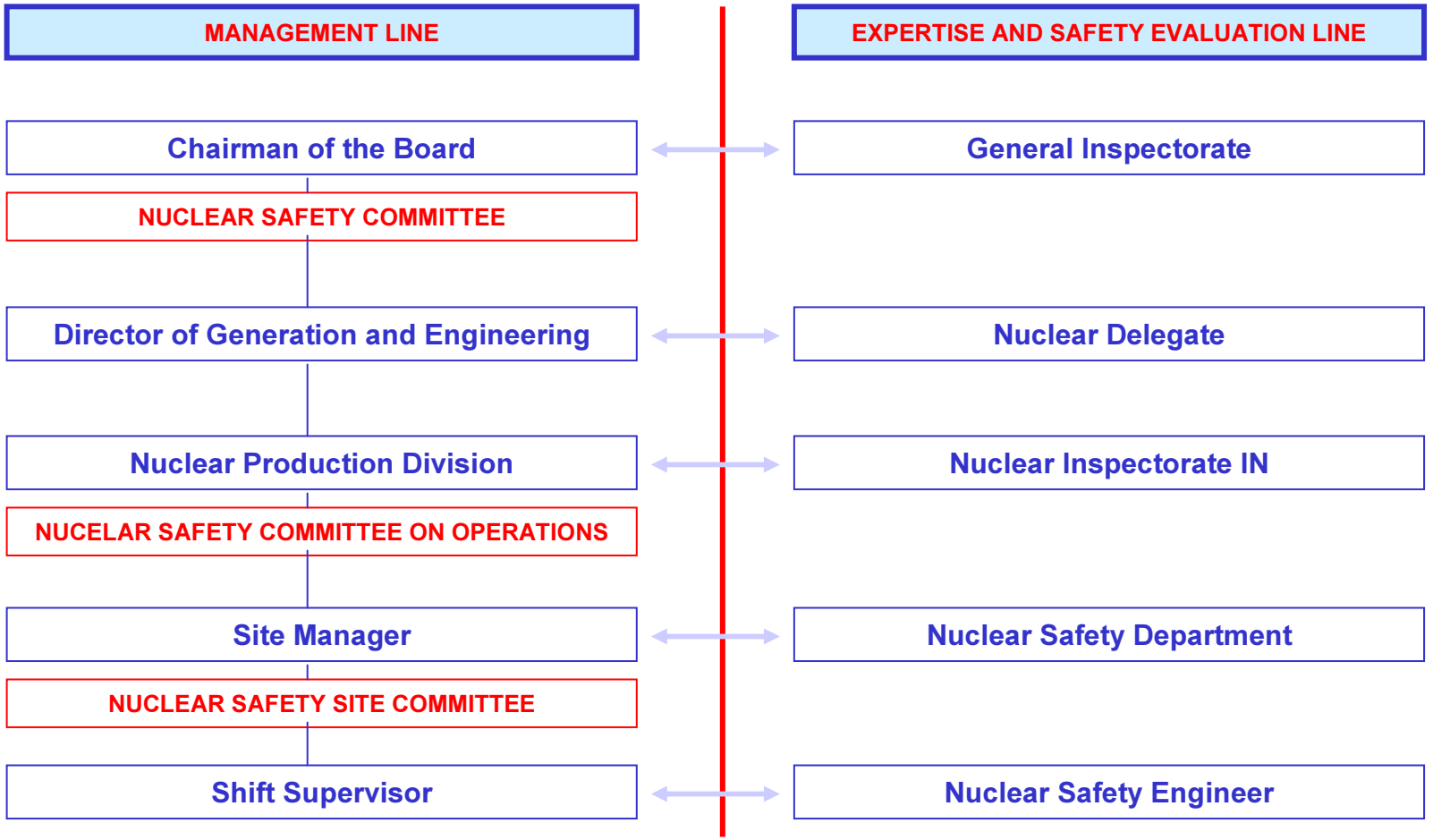
THE GENERAL ORGANIZATION OF SAFETY



INTERNAL CONTROLS AT EACH LEVEL

THE EXAMPLE OF IN

The nuclear inspectorate :

an independent team in EDF Nuclear Generation dedicated to Nuclear Safety

- **Control and Evaluation of Nuclear Safety, Radiation Protection, Environment on all EDF 19 NPP's and on National units.**
- **An internal independent Body for control and evaluation**
- **Conformity with Referentials**

Activities

✓ Overall Nuclear Safety Evaluation (**EGS in French**) according to an annual program approved by the Executive level of Nuclear Generation (about one EGS every 4 years on each site)

✓ Specific Evaluation on a case by case basis on specific topics: **ECS** (1 every 2 years on each site)

✓ Dedicated Evaluation in the occurrence of events (incidents, lack of Safety Culture, etc…) decided by the Executive Level of Nuclear Generation.

THE ORGANIZATION OF IN

- A team of 30 engineers (at the Headquarter) having a great experience of Nuclear Operation on Nuclear Power Plants

  Principle of staff turnover: « from NPP to IN and from IN to NPP »

- All competences are gathered in this organization: Operation, Radiation Protection, Maintenance, Fire Protection, Environment

- Turn over: every 4 – 5 years

IN: THE NUCLEAR INSPECTORATE

The Global Safety Assessment Process (1/2)

Areas:

1. Safety management
2. Operation
3. Maintenance
4. Technical support (Fuel management, Engineering, Experience feed back, Modifications)
5. Fire protection
6. Environment
7. Radiation protection
8. Housekeeping

And according to the plant:

9. Operation Training Center
10. Decommissioning

IN: THE NUCLEAR INSPECTORATE

The Global Safety Assessment Process (2/2)

The evaluation team: about 25 persons in a plant

- 1 Team Leader (IN)
- 9 area pilots (IN)
- 5 evaluators (IN)
- 10 peers (from other power plants)

The guidelines

- One guideline for each area
- Common for all the NPP
- Validated by corporate Nuclear Generation
- Contains Nuclear Safety Objectives which are conveyed in the prescriptions and ambitions
- Revised every two years

The Global Safety Assessment Process (1/2)

Ref.	Nuclear safety objective	Reference documents establishing target performance	
CC1	**Control room monitoring** is effective.	CC1 E1 CC1 E2 CC1 E3 CC1 E4 CC1 E5 CC1 E6 CC1 E7	Chapters III and VI of plant general operating rules (diagnosis of an abnormal event). IN 20 (Criteria for calling-up shift supervisor, shift manager, safety engineer) Alarm management policy (Ambition). On-site emergency plan mock-up (Ambition). DPN Q.A. manual: Modifications, temporary modifications (DMP). DI 07 (Management of operations documents). Chemical and radiochemical technical
Reference standard	**Result-oriented** performance criteria		
CC1 E4	CC1 Pr1	The control room is kept in a satisfactory condition. Access is controlled and restricted, regardless of plant status (outage, transient, etc.)	
CC1 E3	CC1 Pr2	All surveillance tools used in the control room are in working order.	
CC1 E1 and E7	CC1 Pr3	Control room operators (CRO's) monitor plant parameter changes, identify deviations from technical specifications, and use the documents required by the situation.	
CC1 E3	CC1 Pr4	Displayed alarms are justified and are dealt with in accordance with alarm management policy.	
CC1 E1	CC1 Pr5	Control room operators have an accurate knowledge of plant condition and current situations of unavailability. Unavailable equipment is identified.	
CC1 E2	CC1 Pr6	The criteria for calling-up staff defined in IN 20 are recognised and applied by CRO's..	
CC1 E5	CC1 Pr7	Safety-related keys are properly managed.	
CC1 E6	CC1 Pr8	Normal operating procedures and temporary operating instructions are adhered to.	

The Global Safety Assessment Process (2/2)

Preparation

- Pre-visit
- Analysis of indicators, plant information and data

On site evaluation

- One week during outage + two other weeks
- Regularly meetings to validate observations
- First day on plant = Housekeeping evaluation
- Last day = presentation of the main strengths and weaknesses to the plant staff

Analysis

- Four weeks to analyze observations and for writing reports

NUCLEAR SAFETY

EXTERNAL CONTROLS

National level - Nuclear Safety Authority (*ASN / DGSNR*)

- Defines safety objectives, approves satisfactory practices and ensures control over them.
- 5 Commissioners appointed by the President of the Republic, by the President of Senate and by the President of the National Assembly.
- Undertakes planned or unscheduled on-site inspections (approximately 300 annually).

International level

- Operational Safety Review Team (OSART) under IAEA auspices. One OSART every year hosted by one EDF NPP.
- Peer Reviews performed by the World Association of Nuclear Operators (WANO). A corporate Peer Review was also organized in 2003 and a follow up Peer Review recently performed in 2006. Between 3 and 5 Peer Reviews each year.

THE MANAGEMENT DEEPLY INVOLVED IN SAFETY

Most of the 6 following orientations of Nuclear Operations Division are directly or indirectly connected to safety.

1. To reach new safety improvements thanks to « human performance » methods and tools
2. To deliver on the technical and economical performance
3. To promote professional development for our employees
4. To adapt and to renew competences
5. To involve our contractors in performance on a Win-Win basis
6. To enhance benefits from “fleet effect”

THE MANAGEMENT DEEPLY INVOLVED IN SAFETY

Most of the Top Ten Project of the Nuclear Operations Division are linked to safety (1/2)

1. "To put the Human performance tools in practice"
   - 6 "Human Performance Tools": "Prejob Briefing", 'Stop one minute", "Secured Communication", Crossed Checking", "Self-Checking", "Debriefing".
   - A program linked to another to develop management presence on the field.
2. "To master the fire risk"
   - Operation and maintenance of Water Fire-Fighting systems have to be settled. Fire Detection systems have to be significantly improved. Our cooperation with the local fire departments must be deepened.
3. "To reach a good level in house keeping"
   - Within 3 to 5 years, all our sites should have reached a good level in housekeeping by comparison with the international standard (benchmarking).
4. "To increase availability"
5. "To reduce maintenance volumes"
   - Several levers such as "predictive" maintenance, "pilot equipment" approach, Optimisation of Steam Generator controls, etc…

THE MANAGEMENT DEEPLY INVOLVED IN SAFETY

Most of the Top Ten Project of the Nuclear Operations Division are linked to safety (2/2)

6. "To adapt and renew competences"
   - From now to 2015, huge retirement (for example: 3500 retirements from 2006 to 2010 which represents 15% of our staff).
     This project is linked to the actions of our contractors on the same field.

7. "To standardise methods and practices"
   - Our nuclear fleet is standardised, but our operation documentation and practices are different from a site to another.

8. "To integrate the technico-economical optimisation into the on-site practices"
   - The goal is to implement a methodical every year resources optimisation based on comparisons between sites and operation feedback.

9. "To strengthen the partnership with contractors"
   - About 17000 non EDF workers work on our sites. Our objective is to implement sustainable and improvement relationship with our contractors.

10. "To build a new nuclear Management Information System"
    - We have to face the obsolescence of our system.

TRAINING POLICY AND MANAGEMENT OF SKILLS

THE PRINCIPLES

Managers have the first responsibility of developing the skills of their labor force

- They define the skills necessary to perform their activities and to get their authorization.
- They assess the skills and detect needs especially by observing professional practices.
- They decide the professionalisation mode (training and field learning).
- They define the limits of the authorized activities as a function of their proven skills (progressive authorization).
- They manage the renewal of skills in their entity (anticipation of leaving people).

A dedicated internal and independent from local sites organization (UFPI)

is in charge of specialized training

- Training of managers.
- Training of maintenance workers.
- Training of operators mostly on full scope simulators.

THE DEVELOPMENT OF SKILLS (1/2)

Training means are adapted to operation needs

1. Each nuclear site is equipped with a full scope simulator (135 million of Euros between 2000 and 2004).

   A national committee chaired by the Top Management of Nuclear Operations Division defines necessary evolutions to maintain simulators in accordance with the simulated nuclear units.

2. An important training center is located close to Bugey nuclear site. It is specialized for maintenance training.

A local skill development organization

is settled in each nuclear power plant to answer to manager needs

- A service belonging to UFPI is located on each nuclear site.
- UFPI provides national and local training courses (to answer to local specific needs).

THE DEVELOPMENT OF SKILLS (2/2)

The relationship between UFPI and DPN (Nuclear Operations Division)

at national and local level is defined in a partnership agreement

1. **DPN has the responsibility of skill management:**
   - identification of needs to improve performances
   - choice of professionalisation mode
   - training quality requirement
   - assessment of efficiency of training
2. **UFPI is the unique entity in charge of training for "heart" specialized skills:**
   - realizes the training actions
   - guaranties the quality
   - optimizes the training resources
   - manages the training workforce…
3. **Exchanges are organized between UFPI and DPN staff. The volume of training is defined in a 3 year middle term plan.**

UFPI services are assessed by the Nuclear Inspectorate with the same periodicity than the nuclear power plants, according to a dedicated assessment guideline.

TRAINING POLICY

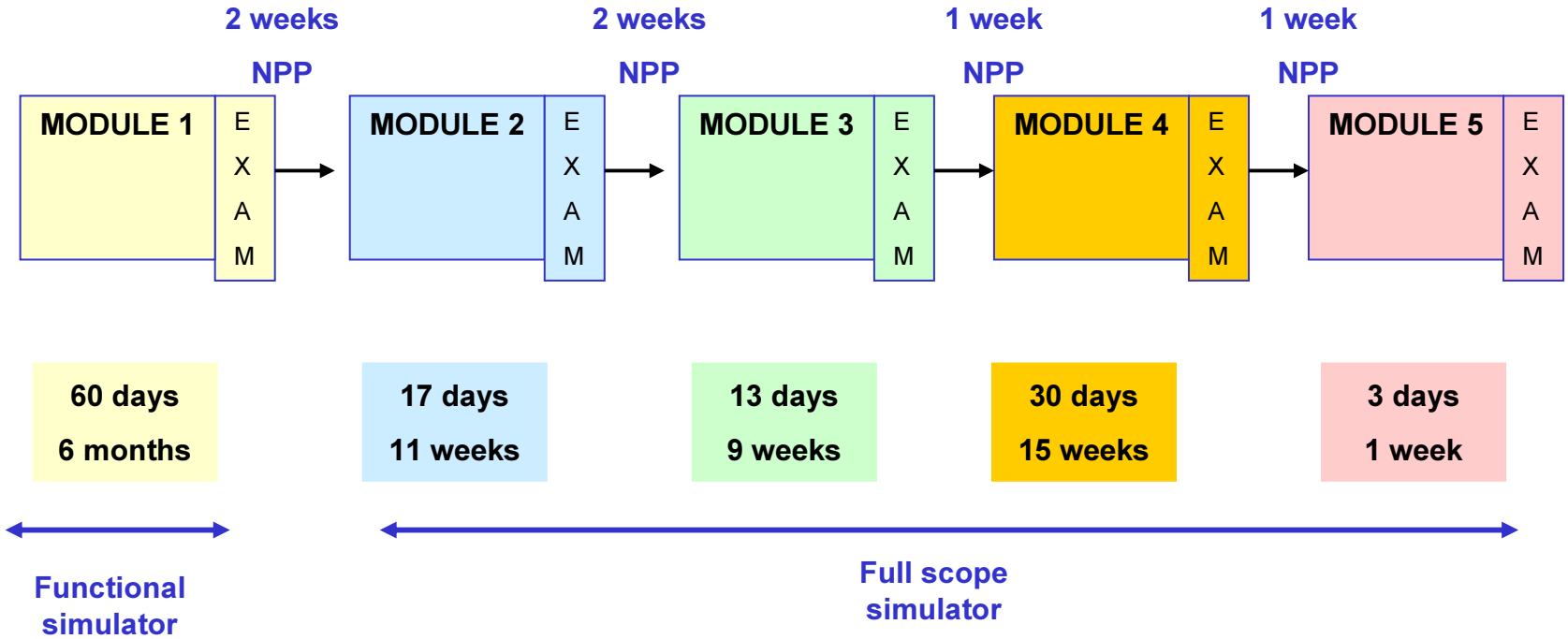
- The staff of Nuclear Operations Division benefits from 1400.000 hours of training (for 19.500 persons) which represents an individual value of 72 training hours/person.
- 90% of the training effort is dedicated to specific “heart of job” actions (operations, safety, radioprotection…).
- For safety, the priorities are:
  1. to reinforce the safety fundamentals: knowledge of safety requirements (to be able to explain and utilize them, especially the technical specifications), mastering of reactivity during criticality and fuel handling, fire protection culture.
  2. to reinforce the skills of crisis teams.
- For radioprotection, the priorities are
  - ✓ the development of field experience
  - ✓ good understanding of rules
  - ✓ ability to realize risk analyses.

Safety training modules designed for EDF NPP's personnel

- focus on the operation area -

ONE EXAMPLE (1/2)

INITIAL TRAINING CURSUS DESIGNED FOR FUTURE MAIN CONTROL ROOM OPERATORS



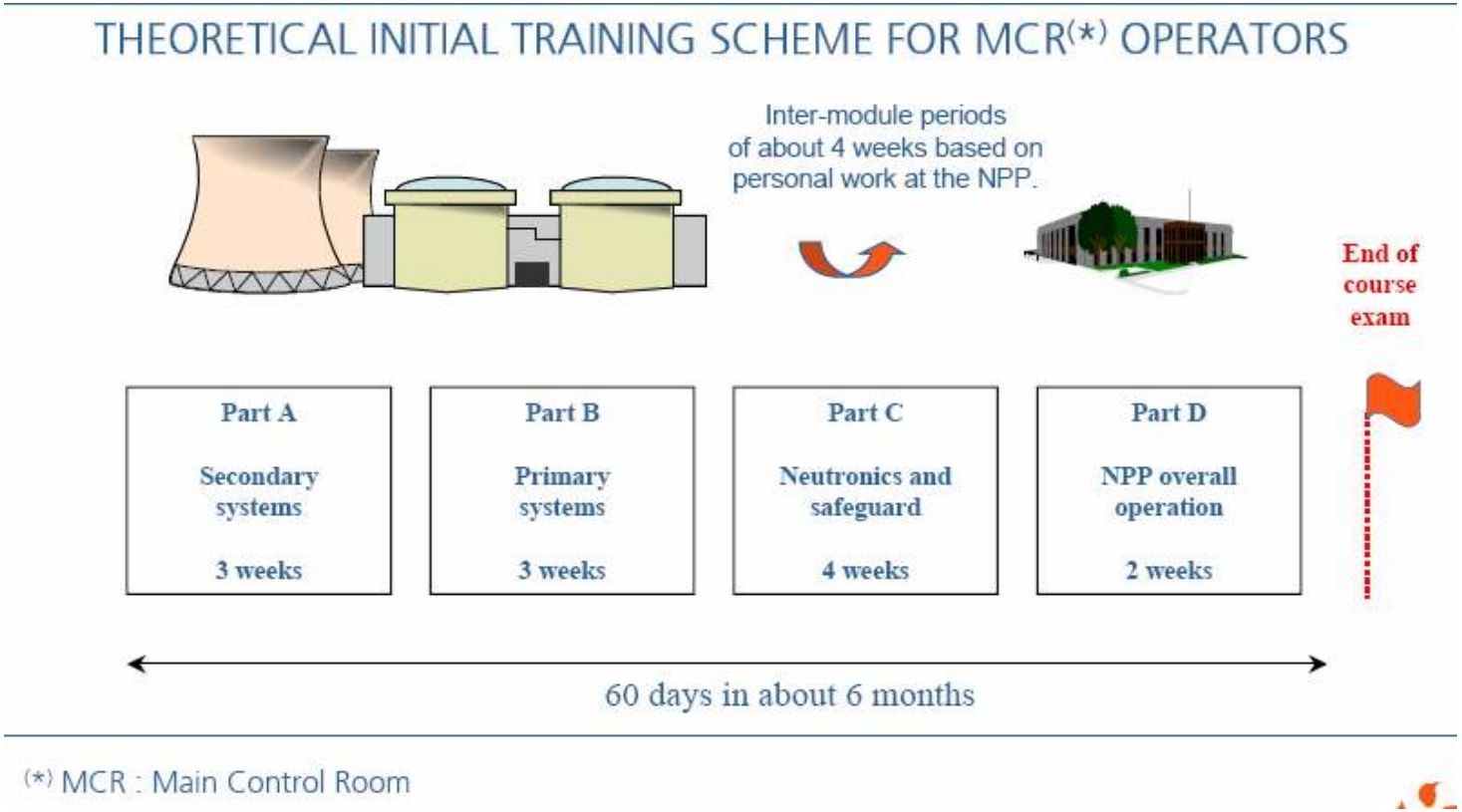
Total duration of this training cursus < 2 years

Total: 6 months + 42 weeks

Safety training modules designed for EDF NPP's personnel

- focus on the operation area -

ONE EXAMPLE (2/2)



In each part, theory plus training on functional simulator or test reactor

CONCLUSIONS

- Safety is a main priority for EDF.
- From Top Management to field operators, all EDF staff is involved in safety.
- The major part of management processes includes safety directly or indirectly.
- The training effort is a major component to improve safety culture: a dedicated organization is in charge of this task.