

Justification, Optimization and Dose Limits: The 'recent' evolutions of National Regulations in European Countries

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- **EURATOM** : European Atomic Energy Community
 - Since 1959, has been issuing its own basic standards designed to protect workers and the public against the dangers resulting from ionising radiation.
 - These basic standards are contained in a Directive
 - **Euratom Standards are legally binding** since they have to be written into the law of each Member State.
 - Euratom standards provide "minimum" requirements of protection. Member states can adopt more restricting standards

- 1990 : Publication of ICRP 60 recommendations
- Council Directive **96/29/Euratom of 13 May 1996** laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation
Official Journal L 159 , 29/06/1996 P. 0001 - 0114
- To be integrated in the national laws and regulations of member states by May 2000.

- **Practices:** human activities that can increase the exposure of individuals to radiation (artificial sources or natural sources when radionuclides are processed for their radioactive properties)
- **Enhanced natural exposures:** occupational activities leading to a significant increase of natural exposure, which cannot be disregarded from the RP point of view
- **Interventions:** human activities that prevents or decrease the exposure of individuals from sources which are not part of practices (emergency situations following an accident, or lasting exposures situations)
- **Exclusions:** out of legal field

Directive 96/29/Euratom JUSTIFICATION / GENERAL PRINCIPLES

- **Wording:** *all new classes or types of practice resulting in exposure to ionizing radiation are justified in advance of being first adopted or first approved by their economic, social or other benefits in relation to the health detriment they may cause.*
- Revisions of practices is needed whenever new and important evidence about their efficacy or consequences is acquired
- Prohibition: deliberate addition of radioactive substances in the production of foodstuffs, toys, personal ornaments and cosmetics, nor the import or export of such goods

Directive 96/29/Euratom OPTIMIZATION / GENERAL PRINCIPLES

- **Wording:** *all exposures shall be kept as low as reasonably achievable, economic and social factors being taken into account.*
- Need for **prior evaluation** to identify the nature and magnitude of the radiological risk to exposed workers
- **Dose constraints:** restriction on the prospective doses to individuals which may result from a defined source, for use at the planning stage in radiation protection whenever optimization is involved
- *Dose constraints should be used, where appropriate, within the context of optimization of radiological protection.*

Directive 96/29/Euratom LIMITATION / GENERAL PRINCIPLES

- **Wording:** *the sum of the doses from all relevant practices shall not exceed the dose limits laid down for exposed workers, apprentices and students and members of the public.*
- Do not apply to :
 - medical exposures
 - interventions
- Specially authorized exposures

Directive 96/29/Euratom LIMITATION / GENERAL PRINCIPLES (1)

- Workers:
 - 100 mSv in a consecutive 5-year period –
 - Maximum 50 mSv in any single year

- Public:
 - 1 mSv in a year
 - In special circumstances, higher dose might be accepted provided that average over five consecutive years does not exceed 1 mSv per year

- Apprentices and students (16-18 years): 6 mSv/year

- Pregnant women:
 - Equivalent dose to the child to be born has to be as low as reasonably achievable
 - It has to be unlikely that this dose will exceed 1 mSv during at least the remainder of the pregnancy

- Other limits (equivalent dose)
 - Lens of eye:
 - 150 mSv/year (workers)
 - 50 mSv/year (apprentices-students)
 - 15 mSv/year (public)
 - Skin, extremities:
 - 500 mSv/year (workers)
 - 150 mSv/ year (apprentices-students)
 - 50 mSv/ year (public only skin)

European national regulations for dose limit

Occupational dose limits (effective dose)	Country
20 mSv in one single year	Germany, Italy, The Netherlands, Romania, Slovenia, United Kingdom
20 mSv/year per 12 rolling months	Belgium, France
100 mSv/5 years and 50 mSv per any single year	Bulgaria, Czech Republic, Finland, Hungary, Lithuania, Slovak Republic, Spain, Sweden, Switzerland

OPERATIONAL PROTECTION OF EXPOSED WORKERS (1)

- Prior evaluation to identify the nature and magnitude of radiological risk
- Classification of areas
- Classification of workers
- Monitoring of work places
- Individual monitoring and medical surveillance

OPERATIONAL PROTECTION OF EXPOSED WORKERS (2)

- Controlled and supervised areas : when doses can exceed 1 mSv/year or $1/10^{\circ}$ of workers limit

- Controlled areas:
 - Delineated ; access restricted to individuals having received specific instructions ; written procedures for their control; signs indicating nature of sources and type of area

- Supervised areas:
 - At a minimum, radiological surveillance of the working environment
 - If appropriate : signs indicating type of area, nature of sources and inherent risks; working instructions

OPERATIONAL PROTECTION OF EXPOSED WORKERS (3)

- Classification of workers :
 - Category A : workers liable to receive an effective dose greater than 6 mSv/year or equivalent dose greater than 3/10 of dose limits for the lens of the eye, skin and extremities
 - Category B : exposed workers not classified in category A.
- Information
 - Health risks involved in their work - RP procedures and precautions
 - Women : need to early declare pregnancy
- Training

French regulation for optimisation of radiation protection

- Decree related to occupational radiation protection (*Décret n° 2003-296 du 31 mars 2003 relatif à la protection des travailleurs contre les dangers des rayonnements ionisants*):
 - For each operation taking place in a controlled area,
 - **a provisional estimate of occupational collective and individual doses** shall be made, and
 - **collective and individual dose objectives for the operation shall be set at the lowest level possible** according to the available techniques and the nature of the operation to be undertaken.

New European basic safety standards under preparation

- Implementation of ICRP 103

- Integration of several directives into one (itinerant workers, medical field, control of sources, radon, ...)

- Distinction between:
 - Planned exposure situations
 - Existing exposure situations
 - Emergency exposure situations

New European basic safety standards under preparation (2)

- Justification, optimisation and limitation:
 - Reinforcement of optimisation, specially for existing exposure situations
 - Dose limit :
 - 20mSv in any single year
 - In special circumstances, 50 mSv can be authorized in any single year, provided that the average over 5 consecutive years does not exceed 20 mSv
 - Might have a change of dose limit for the lens of the eye

New European basic safety standards under preparation (3)

- New: ‘**Dose related tools for optimisation**’
 - Dose constraints for occupational and public exposure
 - Dose constraints for medical exposure (comforters and carers,...)
 - Reference levels for emergency and existing exposure situations

For occupational and public exposure:

- In the optimisation of protection (...), dose constraints shall be established, as appropriate, for workers and members of the public.
- For occupational exposures, the dose constraint shall be an **upper bound on the individual dose** to define the range of protection options considered in the process of optimisation,
- to be established as an **operational tool in cooperation between the employer and the undertaking under supervision of the competent authorities.**

New European basic safety standards under preparation (4)

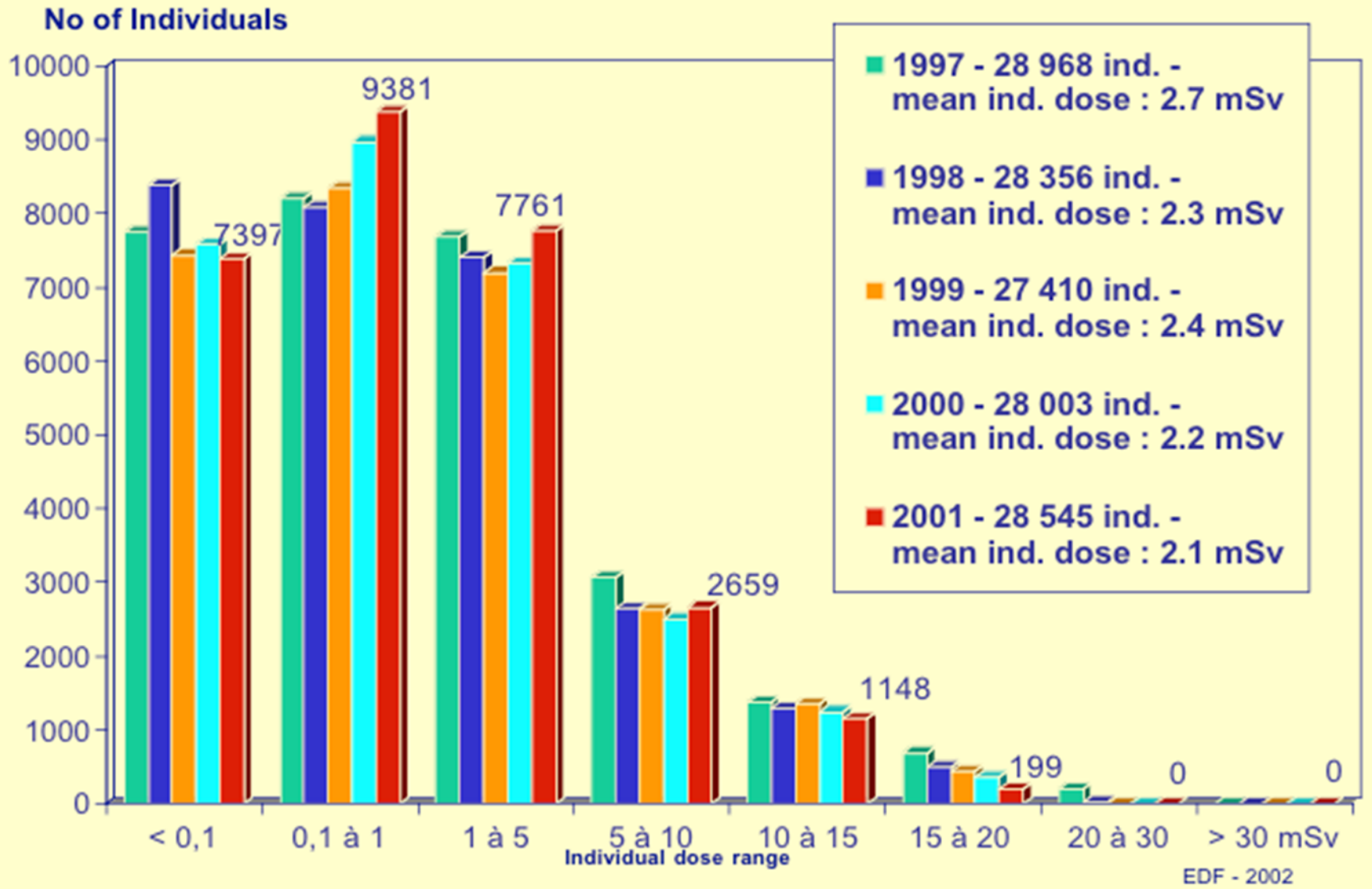
- **For public exposure**, the dose constraint shall be an upper bound on the individual dose that members of the public receive from the planned operation of a specified radiation source; **Competent authorities shall set constraints** in such a way as to also ensure compliance with the dose limit for the sum of doses to the same individual from all authorised practices;
- In general, dose constraints shall be established in terms of individual effective dose over a year or any other appropriate shorter time period;
- where appropriate dose constraints may apply to organ doses (in terms of equivalent doses), as a precautionary measure to allow for uncertainties on health detriment below the threshold for deterministic effects.

Some elements from the French EDF Fleet (1)

- Anticipation of implementation of the European Directive 96/29/Euratom started in 1992
 - In 1992: 1200 Workers > 20 mSv/year
 - Objective: No more worker > 20 mSv/year in 2000

- Specific project based mainly on
 - Setting ALARA Programmes in NPPS
 - A partnership between EDF and its contractors
 - Long term contracts, Improvement charter, education and training of workers, dose objectives
 - ALARA Project
 - Identification of most exposed workers (80% of the most exposed workers belong to 24 contractors)
 - Close work with these contractors
 - Elaboration of shared action plans

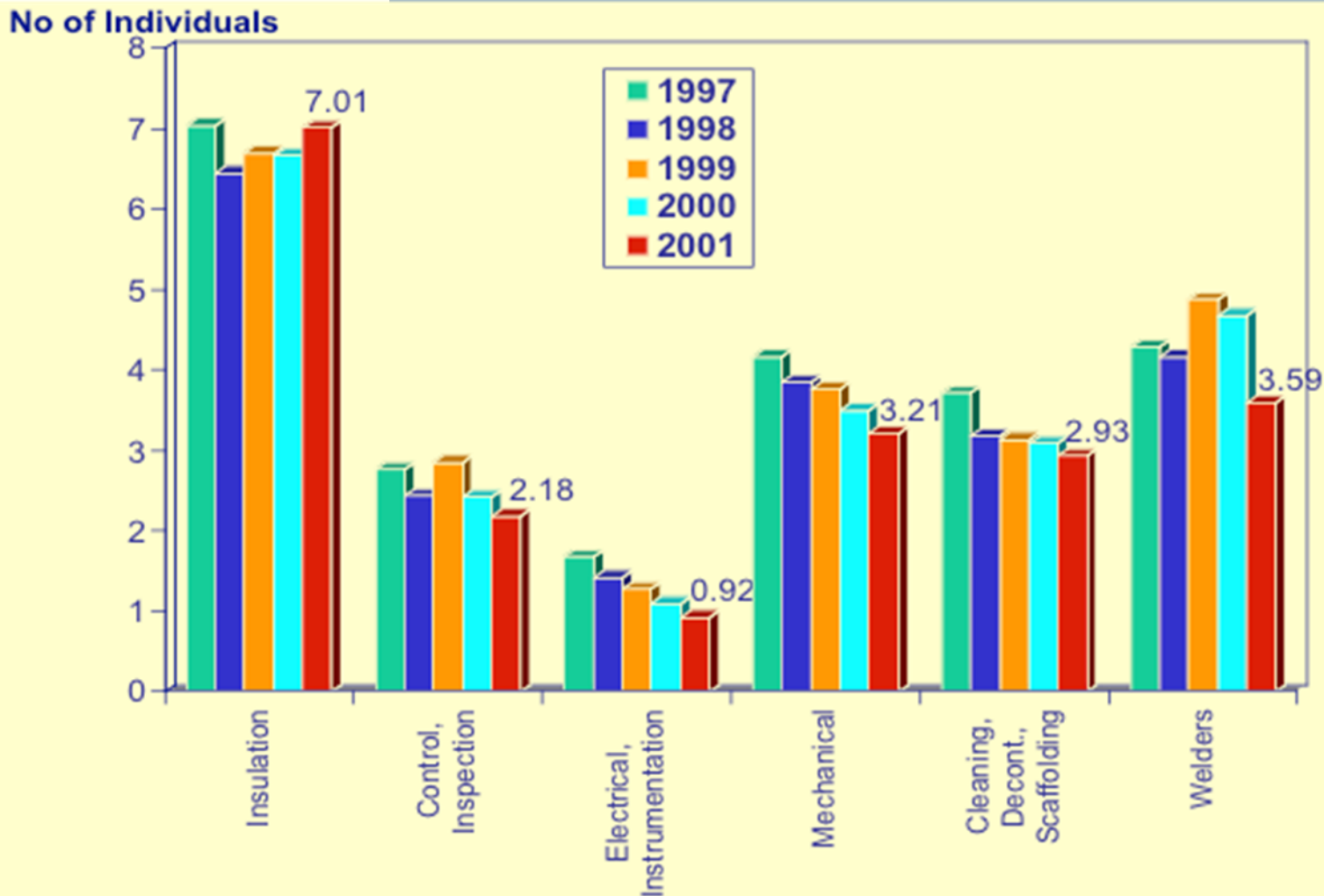
Some elements from the French EDF Fleet (2)



Source : IAEA Geneva Conference on Occupational RP - 2002

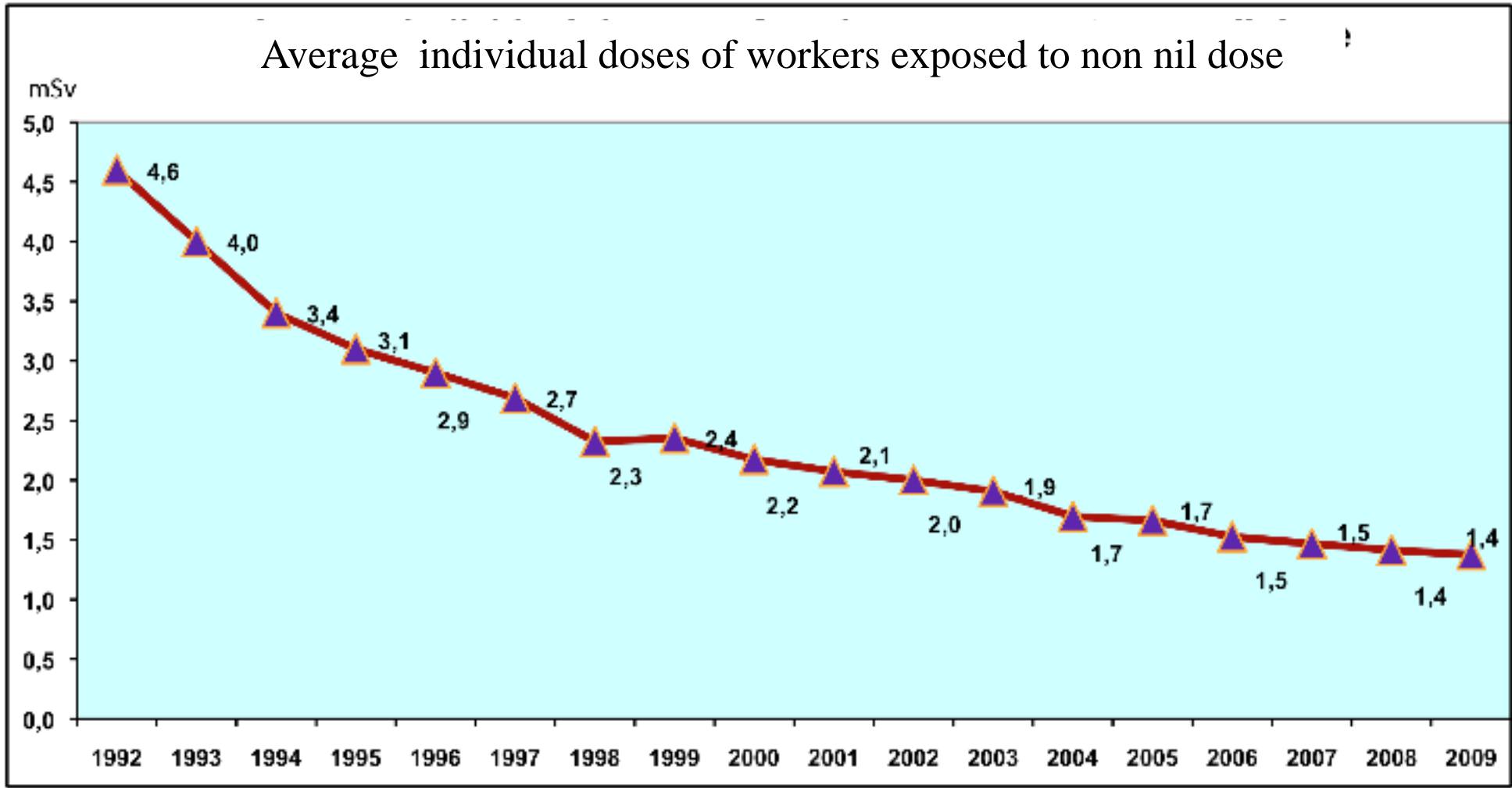
Some elements from the French EDF Fleet (3)

Distribution of individual doses per occupational category



EDF - 2002

Some elements from the French EDF Fleet (4)

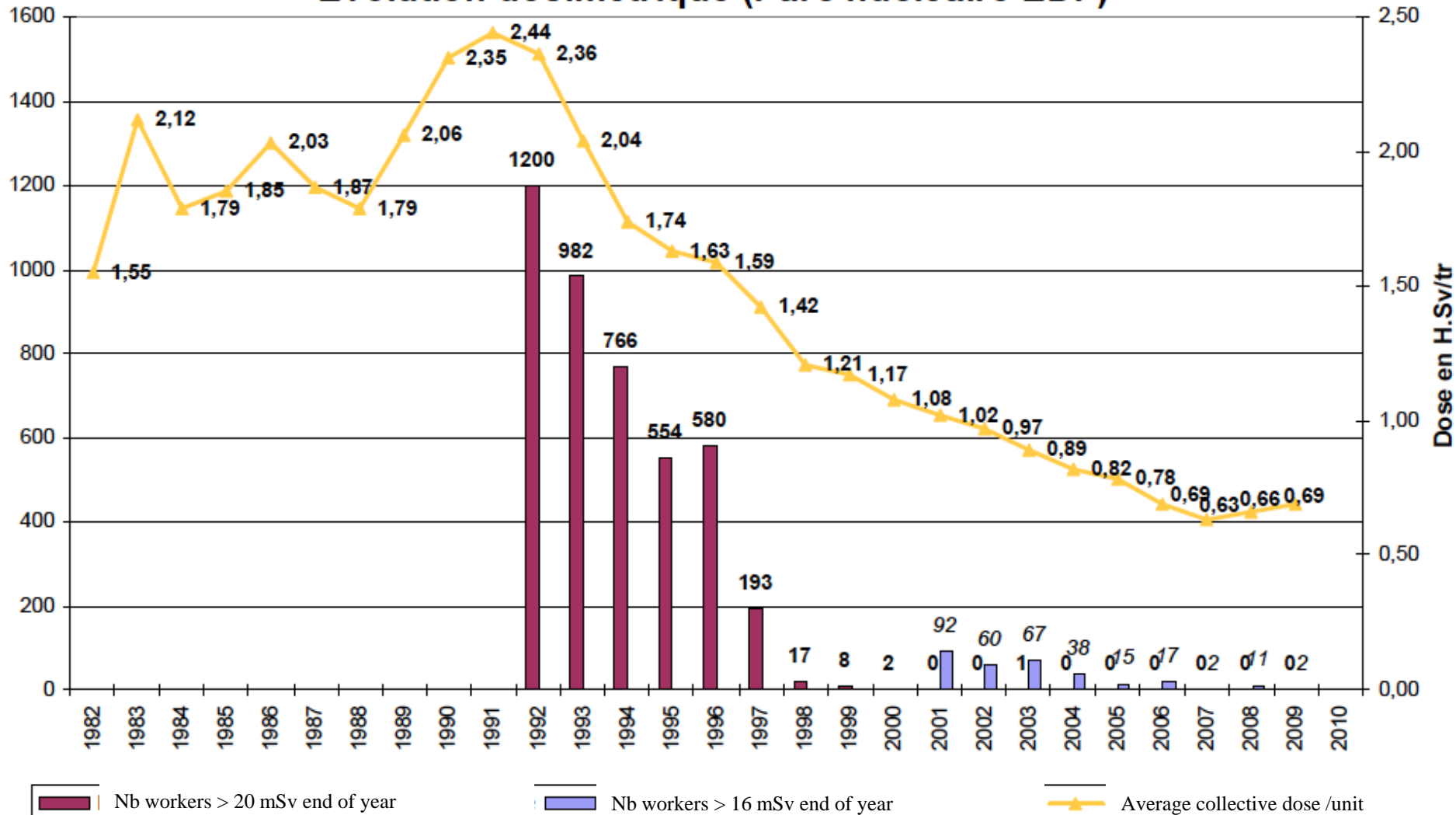


Source : EDF presentation to EPRI / NEI – April 2010

Some results for the French EDF Fleet (5)

Nb of workers

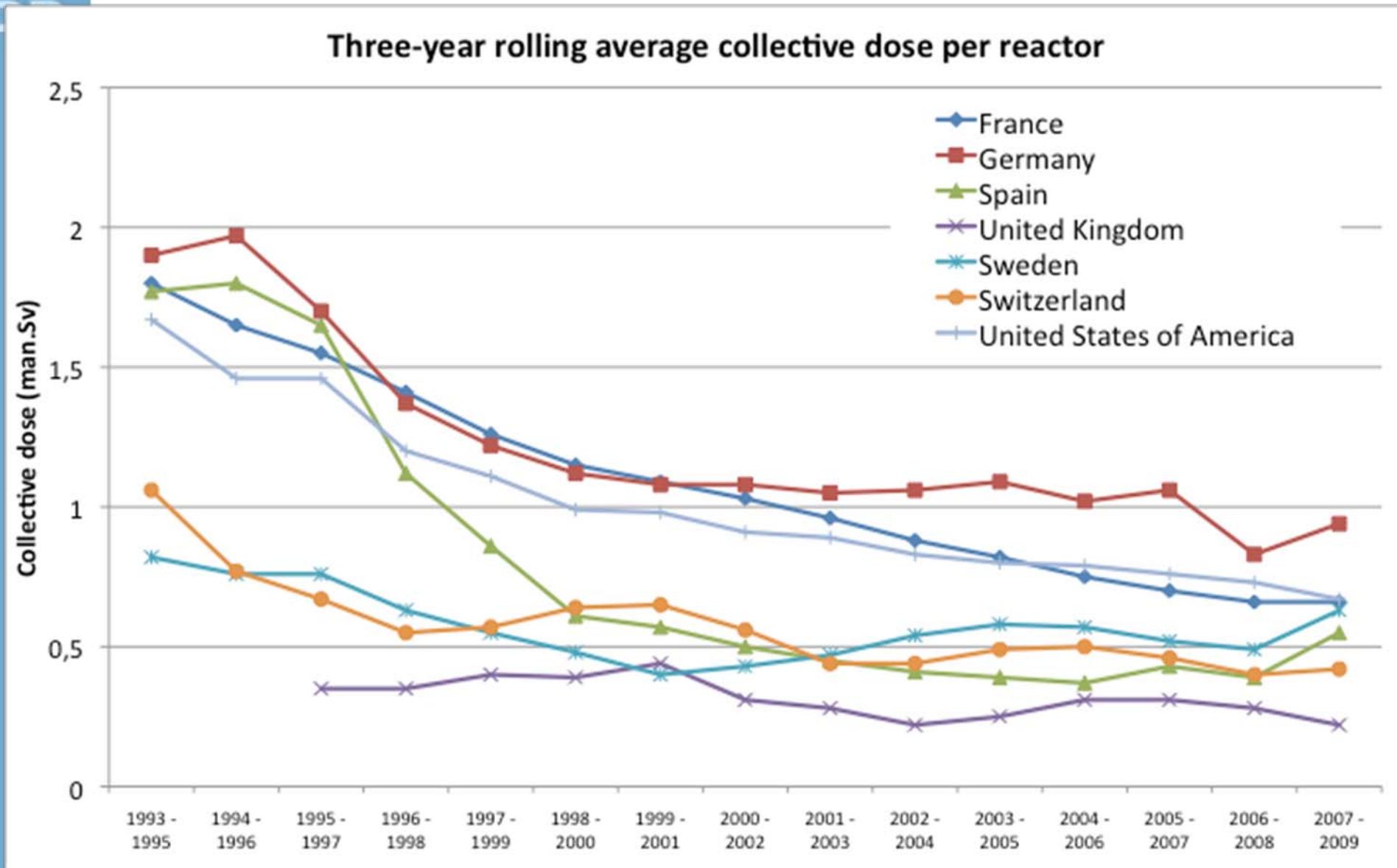
Evolution dosimétrique (Parc nucléaire EDF)



New ALARA Programme and objectives at EDF

- New dynamic on the ALARA Programmes (site and corporate level)
- Focus on individual doses
 - Reduction of 10% within 3 years of the individual dosimetry of the 5% of workers the most exposed
 - Special focus on workers > 10 mSv/12 months and >14 mSv/12 months (Around 400 workers in 2009)
 - Identification of the main contractors and jobs
 - Reactor Vessel
 - SG Primary and secondary side
 - National and local RP technical reviews of these jobs in collaboration with the contractors
 - Identification of proposals to reduce doses (organisation, decontamination, robotics, shieldings, processes,...)

European Dosimetric Results



Internat Links for more information

- European Union
<http://europa.eu/>
- European Commission / Energy Directorate / nuclear
<http://ec.europa.eu/energy/nuclear/>
- ISOE Web Site
<http://www.isoe-network.net>