



EDF'S EYE LENS DOSES STUDY

METHODOLOGY, RESULTS AND STRATEGY CHOSEN FOR INTERVENTIONS IN AN INDUSTRIAL ENVIRONMENT

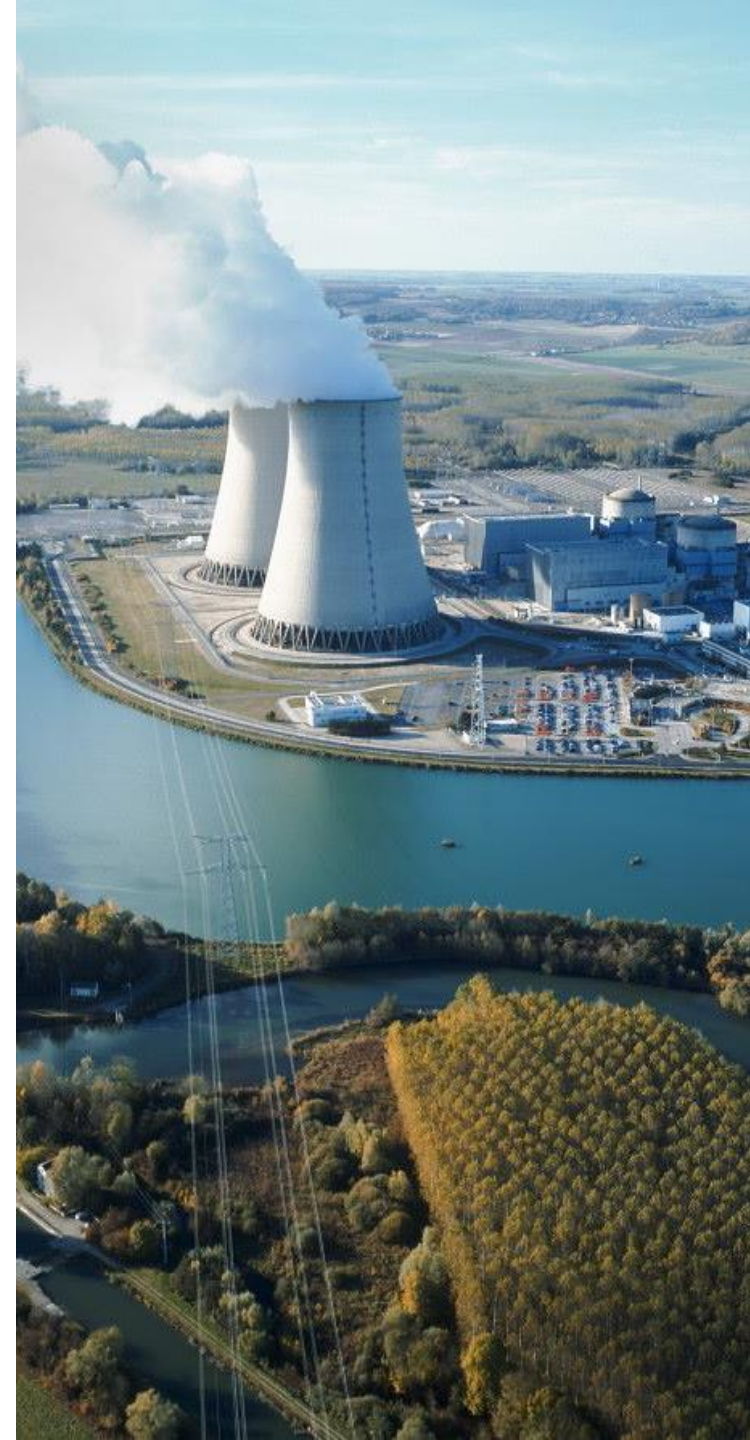
ISOE Symposium

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SUMMARY

1. CONTEXT AND METHODOLOGY OF THIS STUDY
2. GENERAL STATISTICS AND EXAMPLE FOR PLUMBER / PIPEFITTER
3. RESULTS AND EDF'S STRATEGY
4. CONCLUSIONS

STUDY CONTEXT

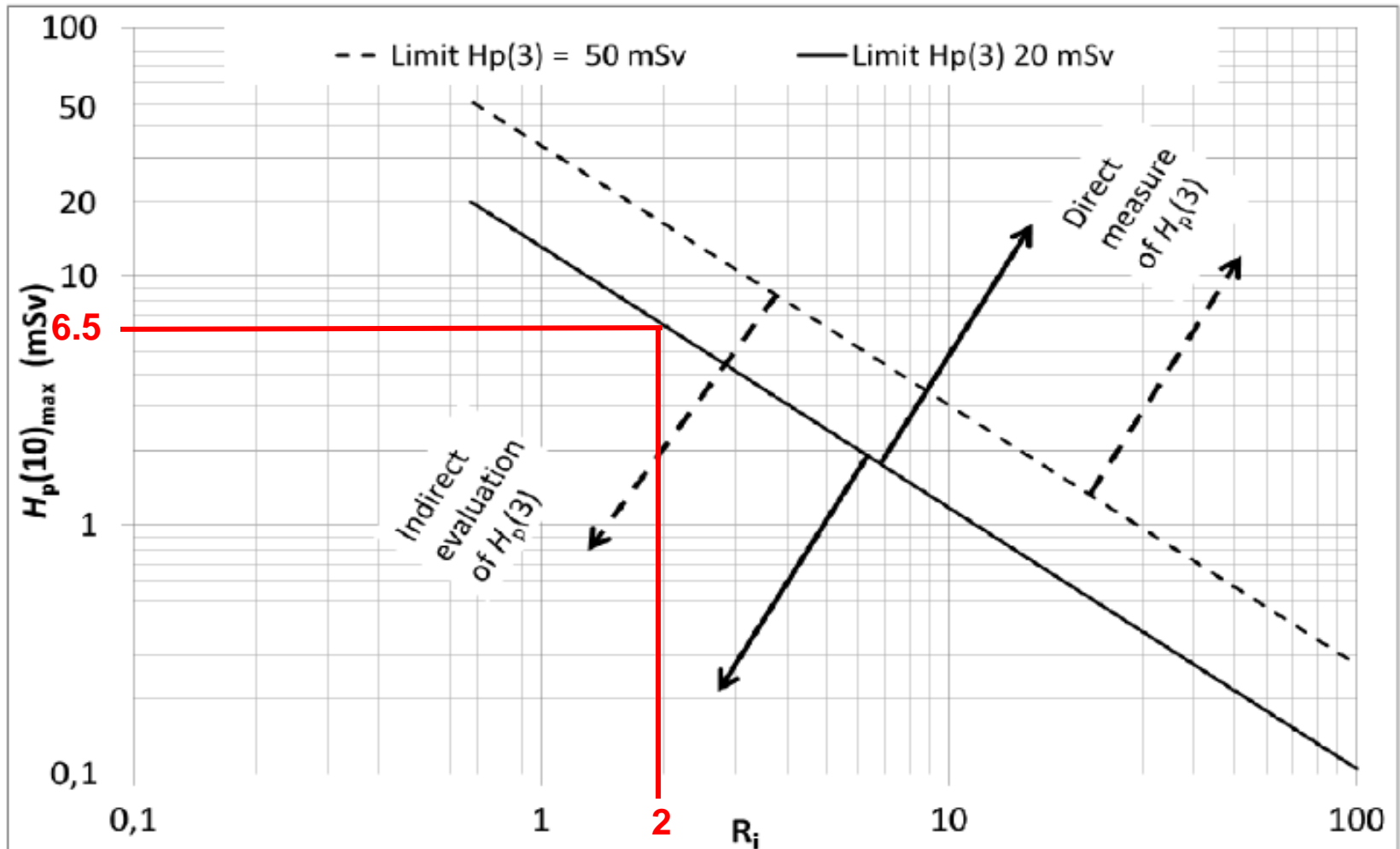
- ❑ Lowering of annual regulatory limit for eye lens dose from 150 mSv to 20 mSv.
- ❑ Current EDF/DPN repository :
 - Monitoring of eye lens dose only if ratio Eye lens dose [Hp(3)] / Whole body dose [Hp(10)] > 7.5. Otherwise, monitoring only the whole body dose is sufficient to ensure that eye lens dose remains below 150 mSv over 12 months
 - According to this criteria, there is no activities carried out by EDF employees with a risk of overexposure to eye lens.
- ❑ New regulations applied to our actual methodology would lead to a **wrong** classification of a large number of activities in « Eye lens overexposure risk » category. That is why this study was carried out on potentially impacted by eye lens overexposure professions and professions with high whole body dosimetry.

A new methodology has to be found and validated !

METHODOLOGY OF THIS STUDY

- ❑ Selection of EDF employees made up of workers carrying out activities known to be dosing in controlled areas (monthly dose read on the passive whole-body gamma dosimeter greater than 100 μSv)
- ❑ A sample of 5 to 15 people per Business Line, on several EDF sites (Dampierre, Flamanville and Gravelines NPP's) and at different levels were selected for this study
- ❑ Eight professions have been targeted:
 - Operations Department : Field operator
 - Logistics/waste Department : Waste handlers
 - Mechanical Service : Plumber/Pipefitter and Boilermaker
 - Risk Prevention Department : Radiation protection technicians
 - Mutualized Outage Team : Controlled area technicians, Reactor building Coordinators
- ❑ Monthly monitoring of Hp(10) et Hp(3) during a year.

METHODOLOGY OF THIS STUDY



Monitoring of eye lens doses in radiation protection, J.-M. Bordy (LNE-LNHB). Radioprotection 50(3), 177-185 (2015)

METHODOLOGY OF THIS STUDY



Whole body dosimeter $\text{Al}_2\text{O}_3:\text{C}$



Eye lens dosimeter $\text{LiF}:\text{Mg},\text{Ti}$



- Landauer sent to EDF all technical information about these dosimeters
- We sent a guide to employees involved in this study to secure wearing method

Dosimeters	Extended relative uncertainties
Hp(10) - InLight	21,0%
Hp(3) - Vision	37,2%

For more details about technical information please contact Landauer

GENERAL STATISTICS

- Dosimeters **ordered** : **980**
- Dosimeters **worn** : **526**
- Dosimeters **not returned** and **with wearing problem** : **66** (12,5%) et **5** (1%)
- Dosimeters **non-exploitable data** [Hp(10) and Hp(3) inf. SR*] : **184** (35%)
- Dosimeters **non-exploitable data** [Hp(3) inf. SR*] : **82** (15,5%)
- Dosimeters **exploitable data** : **189** (36%)

**SR : Analysis Threshold*

STATISTICS BY PROFESSIONS

Profession codes	1	2	4	5	6	7	8	TOTAL
dosimeters worn	26	78	26	133	29	117	101	526
dosimeters not returned	6	7	7	23	7	6	6	66
non-exploitable data (+++)	2	18	3	22	4	15	14	82
non-exploitable data (++)	10	16	15	44	6	45	42	184
Exploitable data	8	33	1	44	12	51	38	189

1 : OD – Field operators 4 : MS - Boilermaker 6 : RPD – RP technicians 8 : MOT – Reactor building Coord.
 2 : LWD – Waste handlers 5 : MS – Plumber/Pipefitter 7 : MOT - Controlled area technicians

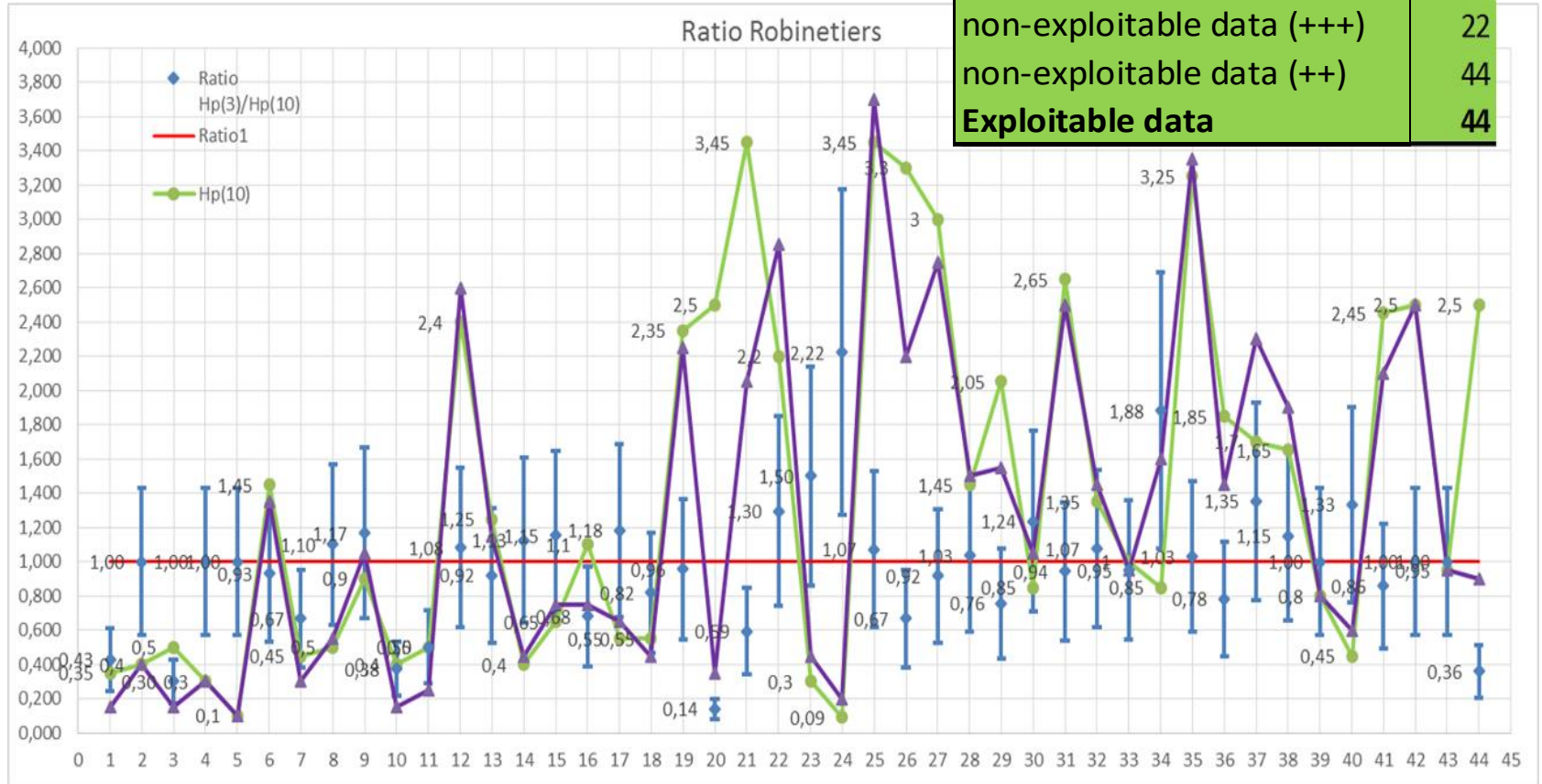
Profession codes	1	2	4	5	6	7	8
dosimeters worn	23,1%	9,0%	26,9%	17,3%	24,1%	5,1%	5,9%
dosimeters not returned	7,7%	23,1%	11,5%	16,5%	13,8%	12,8%	13,9%
non-exploitable data (+++)	33,5%	20,5%	57,7%	33,1%	20,7%	38,5%	41,6%
non-exploitable data (++)	30,8%	42,3%	3,8%	33,1%	41,4%	43,6%	37,6%



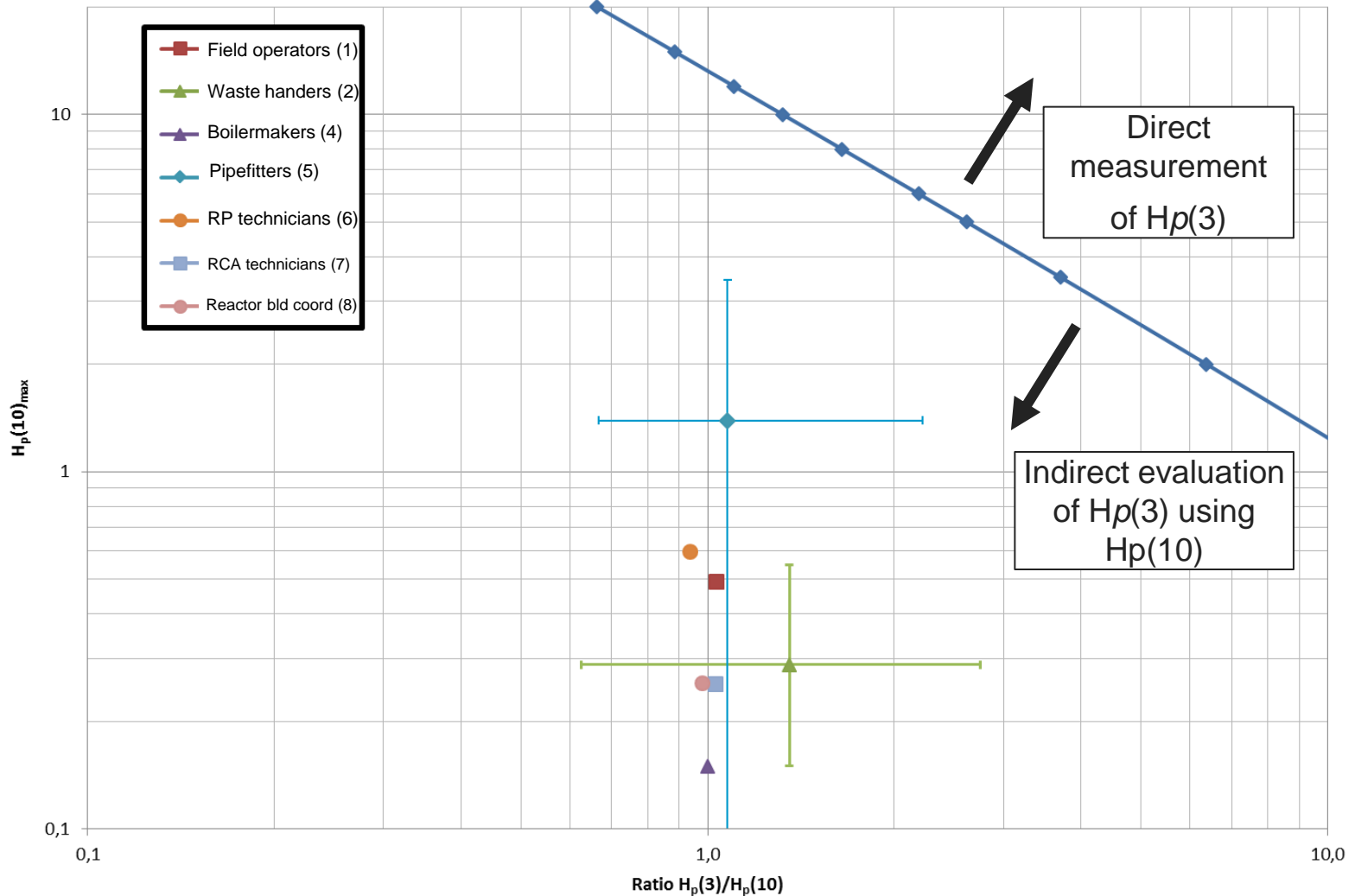
EXAMPLE OF PLUMBERS / PIPEFITTERS

Average Ratio Hp(3)/Hp(10)	Average Hp(10) (mSv)
1,077	1,392

Profession codes	5
dosimeters worn	133
dosimeters not returned	23
non-exploitable data (+++)	22
non-exploitable data (++)	44
Exploitable data	44



GENERAL RESULTS FOR ALL PROFESSIONS TARGETED



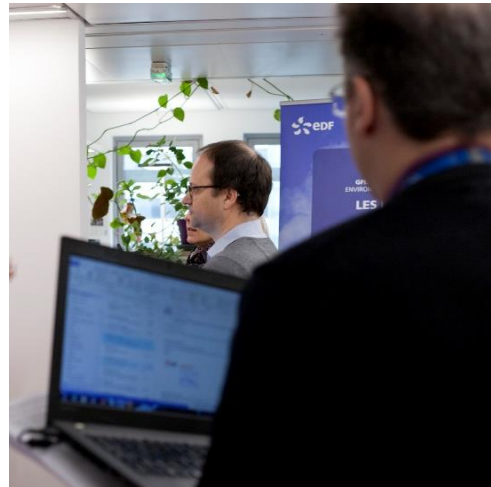
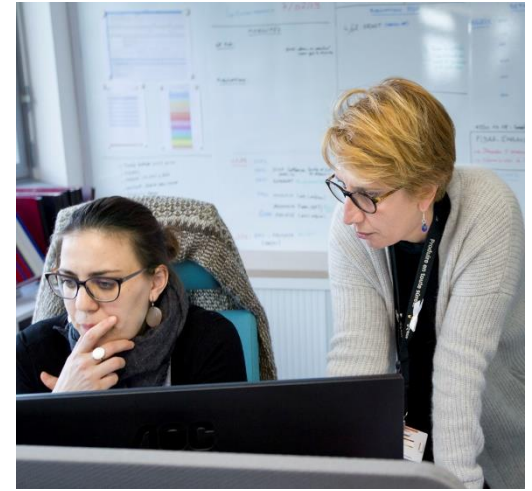
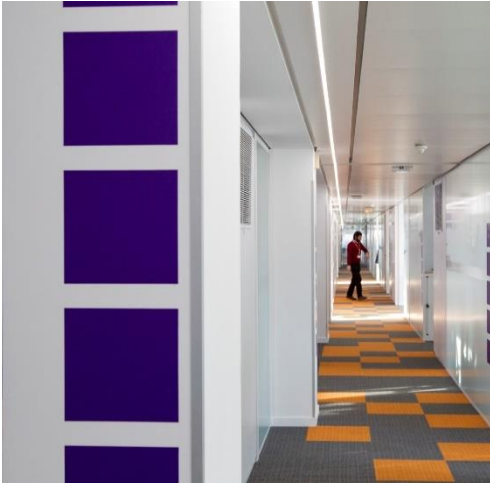
Professions	Field operators	Waste handlers	Boilermakers	Plumbers Pipefitters	RP tech.	RCA tech.	Building reactor coordinators
Average $H_p(3)/H_p(10)$ ratio	1,032	1,277	1,000	1,077	0,935	1,026	0,977
Average $H_p(10)$	0,493	0,293	0,150	1,392	0,600	0,256	0,257

EDF'S STRATEGY

Professions	Dosimetry monitoring proposed	Comments
Field operators	<p style="text-align: center;">Indirect evaluation of Hp(3) (except for specific cases)</p>	<p style="text-align: center;">Average Hp(3)/Hp(10) ratio under 1.2 ⇔ According to LNHB methodology, wearing eye lens dosimeter will be necessary only if workers got a whole body dosimetry [Hp(10)] above 12 mSv over 12 months</p>
Boilermakers		
Pipefitters		
RP tech.		
RCA tech.		
Building Reactor Coord.		
Waste handlers		<p style="text-align: center;">Average Hp(3)/Hp(10) ratio up to 1.2 - Ratio of 1.3 validated ⇔ wearing eye lens dosimeter will be necessary only if workers got a whole body dosimetry [Hp(10)] above 10 mSv over 12 months</p>

CONCLUSIONS

- ❑ Study of whole body dosimetry by profession shows that we have **no EDF employees** concerned by the wearing of Hp(3) dosimeter.
- ❑ However, if threshold limit on Hp(10) is subject to be exceeded, eye lens dosimeter will have to be worn and dosimetry results will be registered in our IT system (DOSIAP). Use of Hp(3) dosimeter will start directly if estimated dosimetry shows that employees will exceed limits.
- ❑ In these cases, Hp(3) dosimeter will be worn during a year. Results will be analyzed at the end of this period. The use of Hp(3) dosimeter may be stopped.
- ❑ Only Hp(3) measurement will be integrated in our IT system (studies of workplaces and potential employees above Hp(10) limits).



Thanks