Workshop

FS / SFRP

CERN Geneva/Prevessin,

February, 11-12, 2016

MINUTES

PARTICIPANTS

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Timetable

12:30	14:00	Arrival, Registration: CERN, Building 33		
14:15	15:00	Introduction, scope, goals		
15:00	16:00	RPO/RPE	Rn/NORM	Dismantling
16:00	16:30	*COFFEE BREAK*		
16:30	18:30	RPO/RPE	Rn/NORM	Dismantling
18:30	19:00	Status of the discussions		
20:00		*DINNER***		
9:00	10:30	RPO/RPE	Rn/NORM	Dismantling
10:30	11:00	*COFFEE BREAK*		
11:00	12:00	Presentation of the results		
12:00	13:00	Discussion of other issues (young members, communication…)		
13:00	14:30	*LUNCH**		

Groups

TOPIC	SFRP	FS (9)
RPO/RPE	Yann Billarand, Thierry Sarrazin, Peggy Matthieu	J. Vahlbruch, N. Stritt
Rn/NORM	ean-François Lecomte, Didier Gay	C. Murith, K. Flesch
Dismantling	Ludovic Vaillant, Jean-Luc Bonnet Chapatte	J. Feinhals, R. Stroude
Others	Thierry Schneider, Bernard Le Guen, Valérie Chambrette, Yann Billarand, Jean-François Lecomte,	C. Murith, K. Henrichs, S. Nagels

Results

Group Activities

The main results of the working groups are summarized in the following presentations (attachments 1a, b and c). The attachments 2a, 2b, 3a and 3b document the presentations which had been prepared in advance by the participants for the workshops.

All participants decided to stay in contact in order to continue the dialogues started during this meeting.

General Discussion

The secretaries of both societies presented the structures, activities and current challenges (see attachments 4a and b).

Proposals for further cooperation are:

Beyond this, there is a general interest to repeat this meeting within time intervals shorter than the previous one (2 or max. 3 years).

It has been decided to report on the meeting in the FS- and SFRP_journals and to exchange these reports.

The following were the proposals for an intensified cooperation:

- Joint editions of „RPCompact“
- Extend the exchange of students
- Joint membership at reduced prices
- Continuation of such a meeting with intensified discussions on special topics, e.g. on „non-ionizing radiation“
- Effort for mutual recognition of trainings/education in RP
- Develop relations between the editorial boards
- Organize international exchange : “AS Young Members Workshop”
- Organize a scientific congress

These proposals will be handed over to the boards of FS and SFRP; decisions will be communicated.

All participants thank the local organizers (CERN) for the support and hospitality.

Attachment 1a) Results of the Working Group on Radon and NORM

FS/SFRP workshop Radon/NORM

Results

Radon & NORM – current situation

- Regulation not yet consolidated
  - Radon: standards in dosimetry and measurement, mapping, reference levels, prevention and mitigation technics; **But**: no homogen strategies
  - NORM: planned vs. existing situation; **But**: no homogen strategies
- Strong Commitment with the new EU-BSS directive
  - Radon: 300 Bq/m³ or/and 6 mSv per year; national plans
  - NORM: management as planned exposure situation
- Diversity of practical approaches
  - From mandatory to incentive

Points of discussion

- Keeping specific **terminology** for artificial/ natural (waste vs. residues)?
- How to manage radon in dose assessment at **NORM workplaces**?
- Can we keep a **list for "work activities"** and a **list of producing "NORM residues"**?
- What means **justification for NORM** activities?
- How should the **graded approach** be implemented?
- What about the **exemption criteria for NORM**?

The role of FS & SFRP

- What do we expect: further actions?
- What does our membership expect from us?
- The further process:
  - Who can be involved?
  - How to reach a broader community?
  - How should it be organized (workshop with experts/stakeholders)?
- Papers, Documentation …?

Attachment 1b) Results of the Working Group on Dismantling

Workshop FS, SFRP, Geneva, February, 11-12, 2016

Working group dismantling
minutes of the meeting

Aspect	**D**	**CH**	**F**
waste minimization	no law for minimization of waste regulated by the market	law is existent	only design requirement
disposal facility	No space in disposal facility because there is no facility existent		available space gets short, extending the site is very difficult
clearance	de-minimis-concept (10 µSv) → clearance values		No decision threshold to differentiate between radioactive and non-radioactive waste no quantitative criteria
order of dismantling	no requirement for dismantling	ENSI regulations immediate dismantling	immediate and total dismantling when feasible - guidance close to a law (almost obligatory)
	during post operational phase the license for operating is still valid, so you can do things you were allowed to do during operation, e.g. decontamination of primary circuit, defueling etc.		waste pumping
defueling before dismantling	defueling before dismantling is currently in discussion	recommended	recommended
waste management	waste management is getting more and more the key position in dismantling (bottleneck)		
radioactive discharge	dose limit (300 µSv/a)		number of discharge is the limit
green field	clearance level for soil etc. (de-minimis-concept – 10 µSv/a)		no artificial activity (decision threshold)

Aspect	**D**	**CH**	**F**
Challenges in RP culture	• unexperienced (new) workers are used for dismantling • unexperienced (new) persons working for the authorities • knowledge transfer • industrial hazards ← → radiological hazards • do not waste the space for radioactive waste in the disposal facilities (waste minimization) • dismantling has strong dependence to disposal capacity		
changes regarding new BSS	increase of the amount of waste, if clearance levels are reduced		no changes are planned - establishing of clearance values is improbable
	preparing a radiation protection law	Revision of the RP ordinance limits decreasing, waste quantity is increasing new concepts shall open new ways of clearance (e.g. 10 years' buffer storage before declaring as radioactive waste)	radiation protection regulations will be revised
waste of medical/industrial facilities	decay storage until clearance levels		decay storage – no clearance levels waste zoning concept

Attachment 1c) Results of the Working Group on RPO/RPE

RPE/RPO

Main outcomes

1/ Switzerland, Germany, France have already a system adequate to manage E&T

2/ Similar approach within the 3 countries

3/ No great effort required to comply with the BSS. Some adjustments are under study to improve the system

4/ RPE : not a »superman ». The wording of BSS allows to « pool » activities

⟹ Switzerland, Germany, France have already defined groups and E&T associated

5/ Our radiation protection “skilled” people (german SSB, swiss SV, French PCR) are both RPE and RPO defined in the directive

6/ Graded approach: In what extent the outsourcing of RPE shall be allowed?

7/ Need to explore commonalties and differences noticed during the meeting into more details

8/ Recommendation: to go to trilateral agreement on a mutual recognition of E&T of “skilled people” for certain activities

Attachment 2a) Flesch: Radon/Norm

Questions on the topics ‘radon’ and ‘NORM’ with regard to the Directive 2013/59 Euratom (EU-BSS)

Workshop FS / SFRP (CERN, February 11-12, 2016)

Klaus Flesch
FS-working group „Natural radioactivity“

WIR STEHEN FÜR:

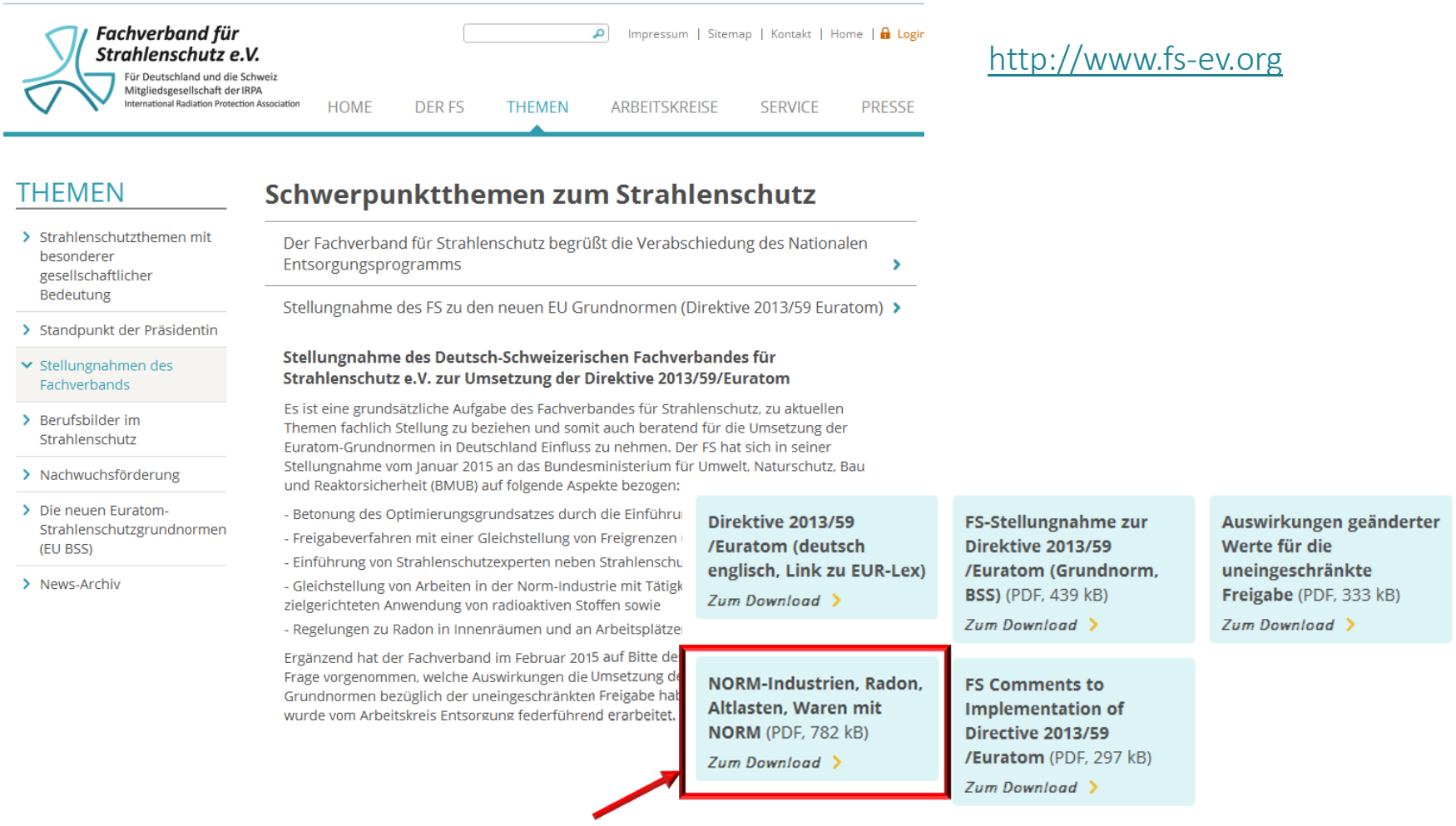
Sicherheit im Umgang mit Strahlung.

Fachverband für Strahlenschutz e.V.
Für Deutschland und die Schweiz
Mitgliedsgesellschaft der IRPA
International Radiation Protection Association

Position paper of the AKNAT

Vom 28. Januar 2015

- The paper was published in Jan. 2014



http://www.fs-ev.org

Fachverband für Strahlenschutz e.V.

Notes and questions of the AKNAT

Outline

- New terminology
- Radon at workplaces
- The list of industrial sectors involving NORM (Annex VI)
- The basic principle “justification” in planned situations with NORM
- Methodological process for NORM-industries applying the graded approach
- The general exemption criteria for NORM
- Dose limits for occupational exposure

New terminology

- In the EU-BSS applied: „radioactive material“ and „material“
- Practices with NORM based on practical experience may be problematic with regard to its disposal:
  - The general readiness for acceptance from radioactive waste that is released and disposed is decreased in the German population (example “Grumbach” in Saxony)
  - The classification of “waste from practices” and “residues from work activities” (industrial/mining processes) is accepted differently by the public.

- *Recommendation*
  The proven concept of the actual terminology (“residues”, “materials”) should be maintained.

Radon at workplaces

- The future specification: Work activities = Practices
- Special exposure pathway "Radon"
- In Article 35 EU BSS is required that for workplaces specified in Article 54(3) exposures (including radon) shall be kept under review.
- Question: How should radon be implemented in the estimation of the effective dose at work places?

- *Recommendations*
  - If the specific activity of NORM is higher than e.g. the exemption or clearance levels (Annex VII Table A part 2), then radon emanating from NORM should be calculated within the dose estimation for workplaces as an effective dose.
  - If the specific activity is below e.g. the exemption or clearance levels, then radon should be interpreted as an existing situation and the reference level of 300 Bq/m³ should be applied.

The list of industrial sectors involving NORM (Annex VI)

- The list has been expanded compared with the Annex XII of the German RPO, e.g.
  - Geothermal energy production,
  - Coal-fired power plants, maintenance of boilers,
  - Ground water filtration facilities,
  - Cement production, maintenance of clinker ovens.
- The German experience since 2001: the close specification has proven only in a limited way.
- Because there is a steady progress in the industrial processes, we observed special cases that are regulated differently in the German federal systems.

- *Recommendations*
  - The amount of radioactivity in NORM should be of prime importance if
    a) the activity concentrations exceed the values for exemption or clearance of NORM Annex VII Table A part 2), or
    b) exposure situations may arise that are of concern from a radiation protection point of view (e.g. > 6 mSv per year)
  - Specification of the industry sectors with regard to its processes that are relevant in terms of the radiation protection point of view (e.g. “Deep geothermal energy production” or the relevant materials in the ground water filtration facilities)

The basic principle “justification” in planned situations with NORM

- The implementation of the basic principle “justification” is clarified in Article 25 (1) for practices with NORM. Fro our point of view, all practices that are able to classified into the industry sectors in Annex VI are justified!
- But Article 19 (2):

  „Member States shall consider a review of existing classes or types of practices with regard to their justification whenever there is new and important evidence about their efficacy or potential consequences or new and important information about other techniques and technologies.“

  → What does this mean in practice?

- *Recommendation*
  - The basic decision about practices that are not justified should implemented with precise guidelines with regard to its “efficiency”, “potential effects” as well as to its “essential new information” compared to established industrial processes.

Methodological process for NORM-industries applying the graded approach

- Criteria: magnitude and likelihood of exposure due to practices
  - dependent of the effects from that expositions can be reduced by applying the graded approach or the safety of the facilities can be increased.
- Methodology for "exemption – registration – licensing" is not completely understood.

- *Recommendation*
  - Regulations should specified and established for applying "registration" and "licensing" procedures according to Article 27 (2)
  - Notification requirements of practices involving NORM should be focussed on an effective radiation protection with reducing effective doses.
  - Implementation of regulations in the context of limited exposures resulting from small amounts of NORM (some kg or tons)
    → activity concentrations > 1 Bq/g for radionuclides of the U-238- and the Th-232-series vs. exposures > 1 mSv per year at workplaces with NORM or at the disposal of NORM.

The general exemption criteria for NORM

- Annex VII Table A part 2 for :
  - U-238 ≤ 1 Bq/g,
  - Th-232 ≤ 1 Bq/g,
  - K-40 ≤ 10 Bq/g.

Example

$U - 238 = 0.8\ Bq/g$ and $Th - 232 = 0.8 \frac{Bq}{g} \Rightarrow > 1\text{mSv per year}$

- These values are not compatible with established models in Germany to determine the exposures of members of the public and of workers (e. g. Calculation Guide Mining)
  - ➢ Risk: possible conflict to enforce the requirements in the NORM industries
- Note to the value for exemption or clearance K-40: there is no well-founded practical experience

- *Comment*
  - *The existing requirements in the German RPO meet the demand that the effective dose for members of the public does not exceed the value of 1 mSv per year.*
  - C $(U - 238_{max}) + C\ (Th - 232_{max}) \leq C = 1$ Bq/g; dependent of the relevant exposure pathways $C \leq 0.5\ Bq/g$

Chemical compounds potassium a(K-40) > 10 Bq/g

Examples

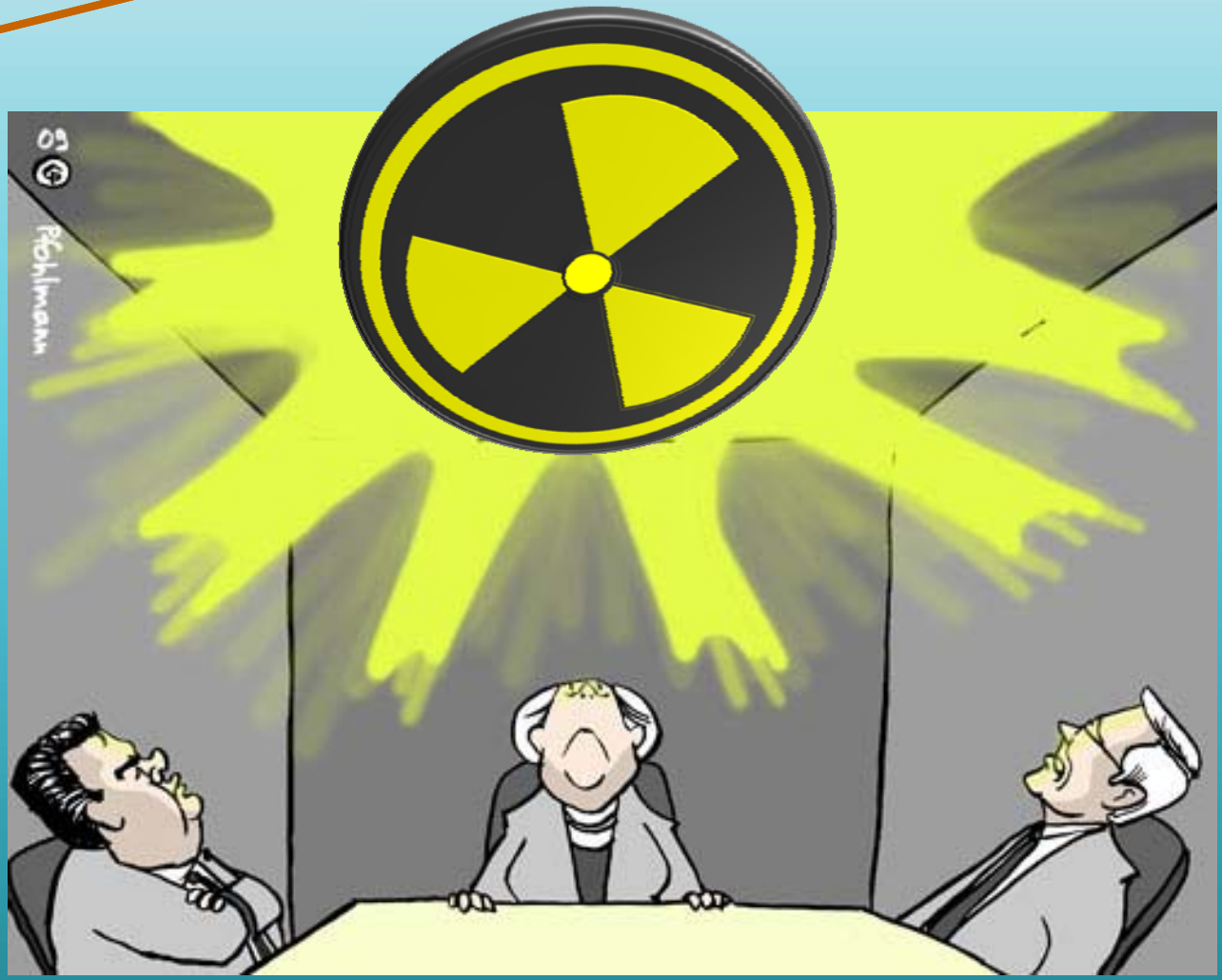
Formel	Name	Molar mass [g]	a [Bq/g]	Application (from Wikipedia)
K_2O	Potassium oxide	94.2	25.9	Rescue packages
KCl	Sylvite (Mineral)	74.6	16.4	fertilisers
KOH	Potassium hydroxide ("caustic pot ash")	56.1	21.7	Washing agents; micro system technology: Etching of Silicon; food industry (acidity regulator); glass industry, ….
K_2CO_3	Pot ash	138.2	17.7	Glass industry, paint manufacturing, additive in soft soaps
KF	Carobbiit (Mineral)	58.1	21.0	Chemical industry; Enamel production
KNO_3	Saltpetre	101.1	12.1	Pickling salt, Pyrotechnic articles
K_2SO_4	Potassium sulphate	174.2	14.0	Fertilizer, extinguishing powder, production of synthetic rubber, food additive (E515)
K_3PO_4	Potassium phosphate	212.3	17.2	Washing agents, food additive (E340)

Dose limits for occupational exposure

- Dose limit: 20 mSv per year
- Special circumstances or exposure situations:
  - Article 9 (2): … effective dose of up to 50 mSv may be authorised in a single year, provided that the average annual dose over any five consecutive years, including the years for which the limit has been exceeded, does not exceed 20 mSv.
  - The competent authority is able to specify requirements.

- *Need for clarification*
  - Are there any restrictions for NORM workplaces with regard to the defined averaging process?
  - Are there any international experience?

Thank you!



Atachment 2b) Lecomte: Radon/Norm

Radon & NORM

Issues raised by SFRP

Meeting FS/SFRP

Geneva

11-12 February 2016

Radon / National Plans

National Plan for Health and Environment (3rd Plan 2015-19

- Cancers and diseases linked with environment → Radon action plan
- Exposure, effects, lever action
- Research
- Information, communication and training in the territories

National Action Plan (2011-15; 2016-18)

- Measurement, remediation (local actions)
- Zoning
- Implementation of regulation (places open to the public)
- Establishment of regulation for dwellings, for new buildings
- Awareness development: guides, leaflets, campaigns
- Standards (dosimetry, quick measurement)
- Radon / Indoor air quality, energy saving
- Radon & mines; Radon & water
- Recording of data
- Risk assessment

Radon / Places

Places open to the public

- Regulation (1999, 2004)
- Schools, hospitals, thermal spas, jails
- Measurements, AL (400 Bq/m3), urgent action if > 1000 Bq/m3
- Rather a success

Workplaces

- Regulation (2008)
- Underground workplaces
- Measurement, RL (400 Bq/m3, 1000 Bq/m3), occupational exposure > RL
- Rather a failure

Dwellings

- More incentives than regulation
- Support to local actions: Franche-Comté, Pays-de-Loire, Limousin, Hte-Vienne
- Information, measurements (kits), support to remediation

Radon / Key points (1)

- **Identification of areas, building types, recording of data (measurements)**

- **Development of awareness, information, training**
  - Professionals: building, health…
  - Public: citizen, children
  - Locally, nationally
  - Inducement, prompting, obligation

- **Radon versus Air Quality & Energy Saving**
  - Policies merged in local actions

Radon / Key points (2)

Prevention

- Techniques, standards, durability

Mitigation

- From measurement to remediation
- Support and efficiency
- Local and professional capabilities

Very high levels

- Which level requires urgent action?
- Which action? (e.g. mining sites)

NORM / Key points

Scope

- List of activities
- Identification of concerned areas

Graded approach

- Planned exposure situation versus existing exposure situation
- Numerical criteria: concepts (RL, DC, DL), values
- Exemption and clearance
- Requirements compared to other practices (nuclear, medical)

Residues

- Reuse and recycling

Waste

Building materials

Attachment 3a) Dismantling (Stroude)

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Federal Department of Home Affairs FDHA
Federal Office of Public Health FOPH
Division of Radiological Protection

Dose minimisation in radioactive waste management.

Revision of the Swiss radiological protection ordinance

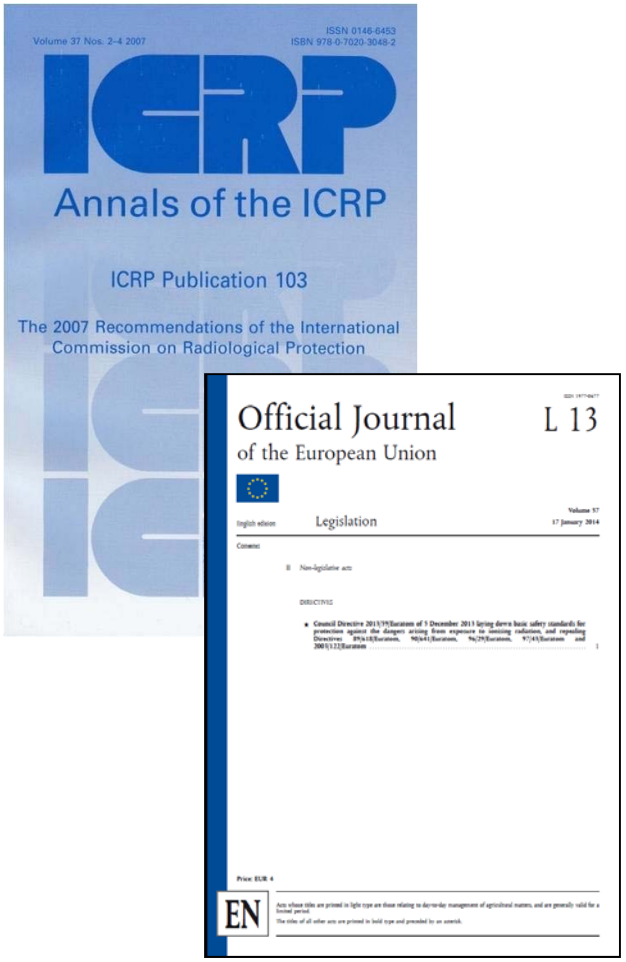
R. Stroude, Federal office of public health FOPH
Division of radiological protection

Overview

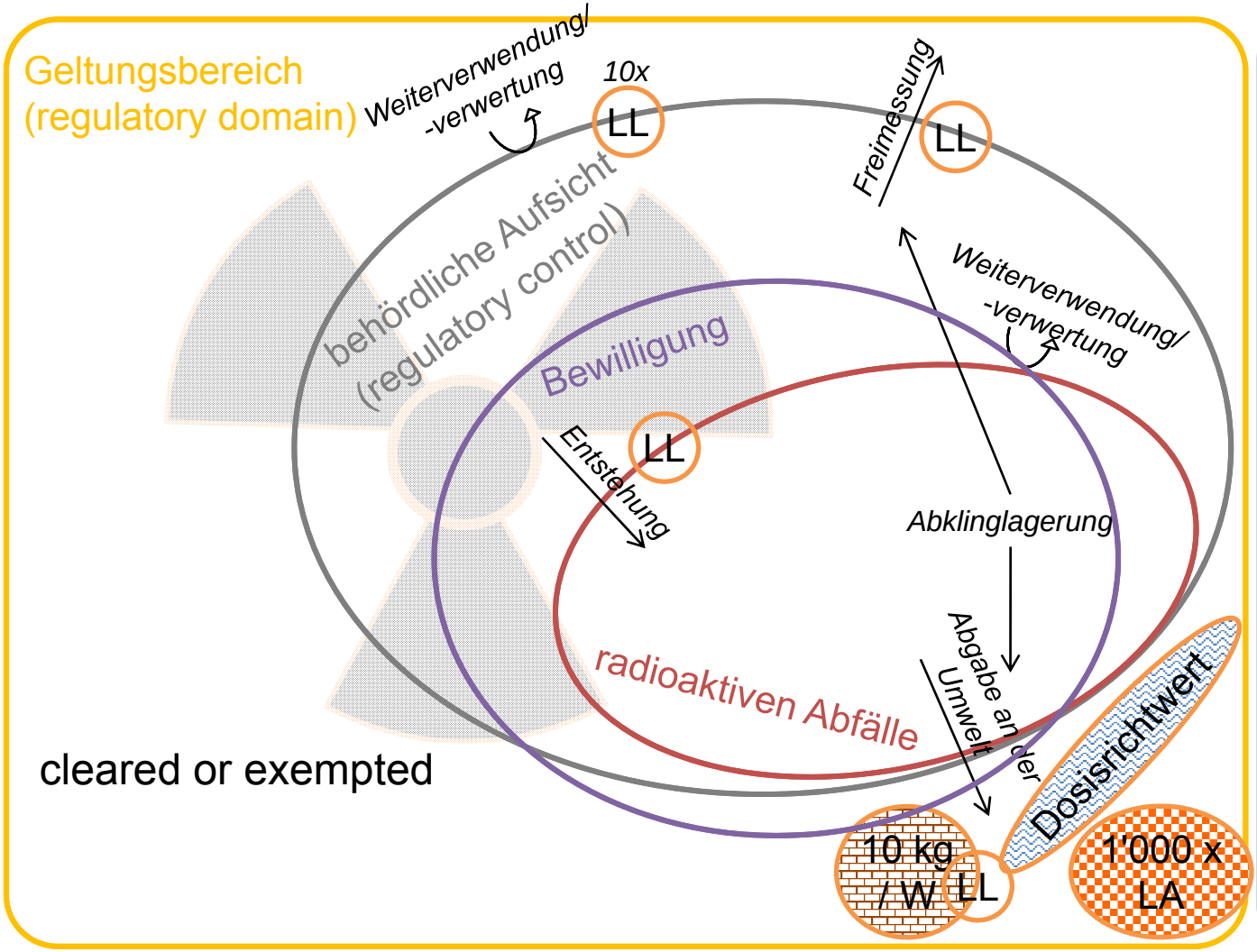
- Revision of the Swiss radiological protection ordinances
- Clearance
- Consequences for waste production
- Simplification/dose reduction
- Decay storage
- Conclusions

Why the revision

- Implementation of ICRP 103.
- Compatibility with Euratom BSS
- CH laws go first.
- Ordinance must be simple and usable.



The new system (based on BSS)



Excluded

Radionuklid im Körper

Cosmische Strahlung (ausser Flugpersonal)

Natürliche terrestrische Strahlung

The new clearance and exemption values

The new clearance and exemption values (LL – Bq/g)

Adoption of clearance values from IAEA Safety Guide RS-G-1.7 for the unconditional release of any amount of material (spec. activity defined for 257 nuclides).

Same values are used for the limit of regulatory control (Exemption).

"artificial" radionuclides

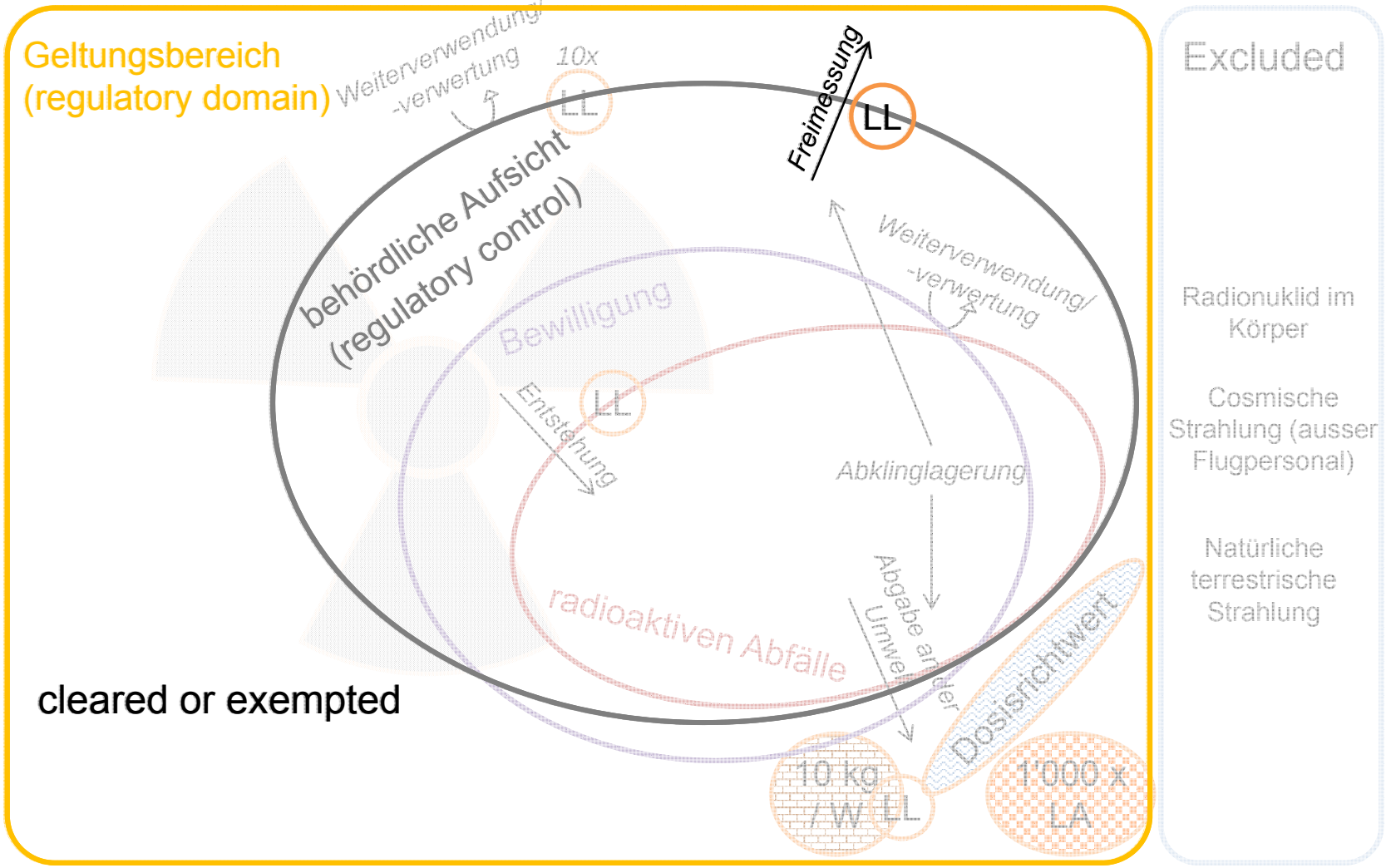
- 0,1 – 10.000 Bq/g, Based on scenarios

"natural" radionuclides

- 1 Bq/g for all nuclides of the U and Th decay chaines, 10 Bq/g for K-40, based on reference activities in NORM

Annex 3 radiological protection ordinance

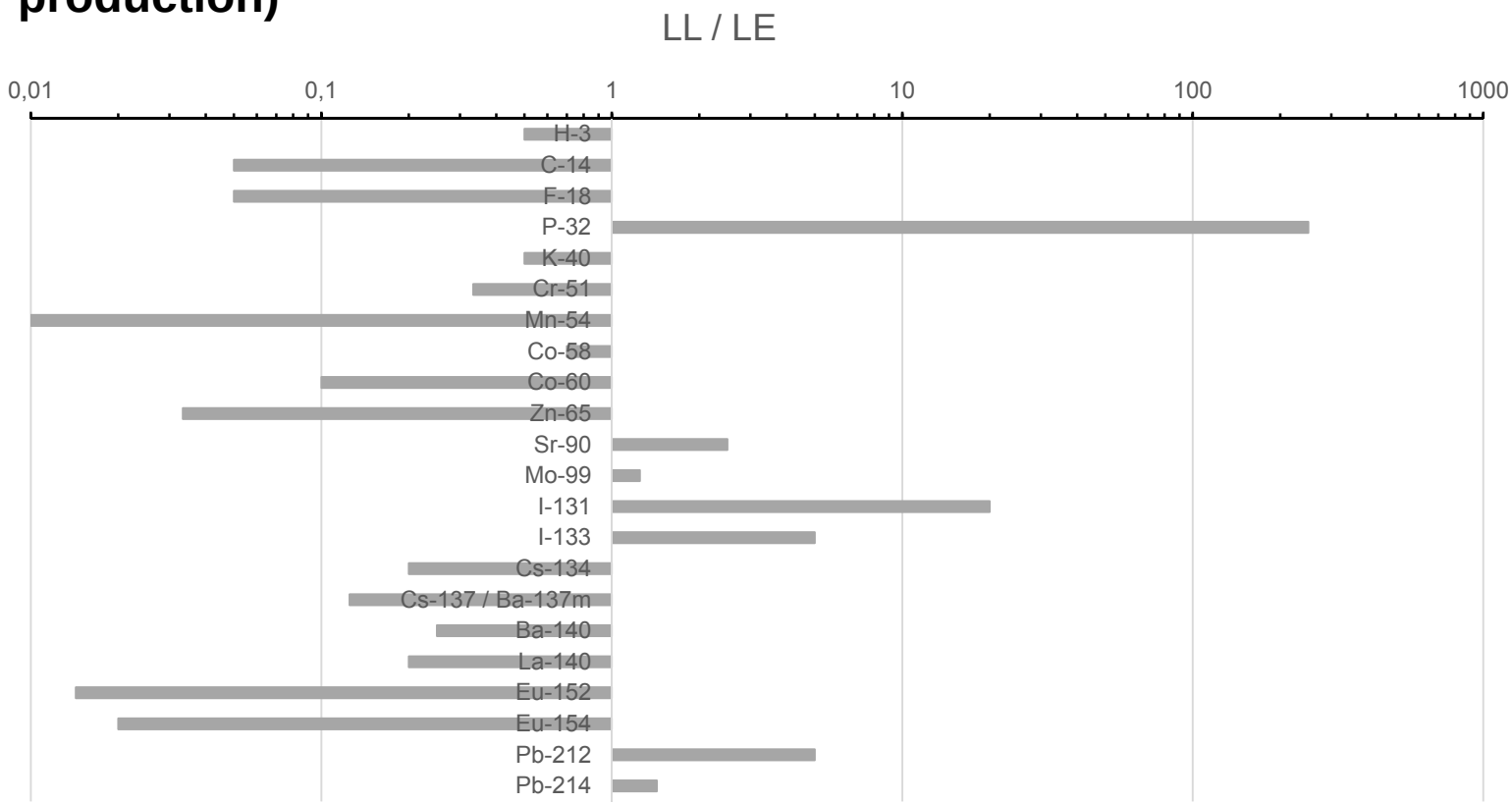
- Clearance/exemption values for ~800 radionuclides !
- Values were also calculated for natural radionuclides. For example Ra-226+: 0,03 Bq/g based on scenarios (10 µSv/a) is quite lower than 1 Bq/g.
- Calculated value for natural radionuclides only used when these were enriched for the use of their radioactivity.


Geltungsbereich
(regulatory domain)
Weiterverwendung/
-verwertung
10x
LL
Freimessung
LL
behördliche Aufsicht
(regulatory control)
Weiterverwendung/
-verwertung
Bewilligung
Entstehung
LL
Abklinglagerung
radioaktiven Abfälle
Abgabe an die
Umwelt
Dosisrichtwert
10 kg
/ W
LL
1'000 x
LA
cleared or exempted
Excluded
Radionuklid im
Körper
Cosmische
Strahlung (ausser
Flugpersonal)
Natürliche
terrestrische
Strahlung

Free release in practice
Clearance

- Wenn A<LL (&DR<0.1µSv/h) => unconditional clearance, responsibility authorisation holder.
- Surface contamination is only used if reuse or recycling with contamination possibility.
- Possibility for the use of balancing or simulations.
- Averaging mass and/or surface are somehow plastic.

Comparison LL vs LE (Consequence for radioactive waste production)



Consequences for radioactive waste production

Waste volume for geological repositories

Consequences for radioactive waste production

NPP – operation	11%
NPP – dismantling	112%
Research inst. - dismantling	58%

Percent increase of low level waste (SMA) for geological repositories with IAEA-clearance values in comparison with existing clearance values.

Quelle: Auswirkungen einer verlängerten Abklinglagerung auf die radioaktiven Abfälle, Bericht der Untergruppe "Abklinglager", Agneb, 2015 (http://www.bag.admin.ch/themen/strahlung/10468/10469/15422/index.html?lang=de)

Simplification of practice, dose reduction ?

Waste minimisation

- When no clearance is possible, a substance which has not a foreseen use in the **next ten years** is waste.
- Reuse of recycling is possible (active or inactive).
- Conditional clearance (reuse, recycling) is possible up to 10 x LL.

Waste discharges in the environment

- Liquids based on immissions limits
- Solids up to 10 kg with LL in responsibility of authorisation holder.
- Solids up to 100 x LL (1000 x LL for historical) with approval of regulatory authority.
- Incineration of H-3, C-14. Other nuclides with approval of regulatory authority.
- NORM based on 0.3 mSv/year criteria.

Decay storage as waste and dose minimisation technic

Consequences of decay storage

Decay storage time	0 a	30 a
NPP – operation	11%	1%
NPP – dismantling	112%	26%
Research inst. - dismantling	58%	91%

Percent increase of low level waste (SMA) for geological repositories with IAEA-clearance values in comparison with existing clearance values at the time considered.

Quelle: Auswirkungen einer verlängerten Abklinglagerung auf die radioaktiven Abfälle, Bericht der Untergruppe "Abklinglager", Agneb, 2015 (http://www.bag.admin.ch/themen/strahlung/10468/10469/15422/index.html?lang=de)

Consequences of decay storage

Decay storage time	0 a	30 a
NPP – operation	11%	0%
NPP – dismantling	112%	13%
Research inst. - dismantling	58%	17%

Percent increase of low level waste (SMA) for geological repositories with IAEA-clearance values in comparison with existing clearance values at beginning.

Quelle: Auswirkungen einer verlängerten Abklinglagerung auf die radioaktiven Abfälle, Bericht der Untergruppe "Abklinglager", Agneb, 2015 (http://www.bag.admin.ch/themen/strahlung/10468/10469/15422/index.html?lang=de)

Conclusions

- The revision brings compatibility with EU-right.
- It produces more waste and a higher measuring charge.
- Some simplifications of the process help to counterbalance this effect.
- Practice will show the real effect on the dose. This will highly depend on clearance and disposal strategies

Discussion

Attachment 3b) Dismantling (Masy)

DE LA RECHERCHE À L'INDUSTRIE

www.cea.fr

IMMEDIATE OR DEFERRED DISMANTLING : CEA's FEEDBACK

Summary

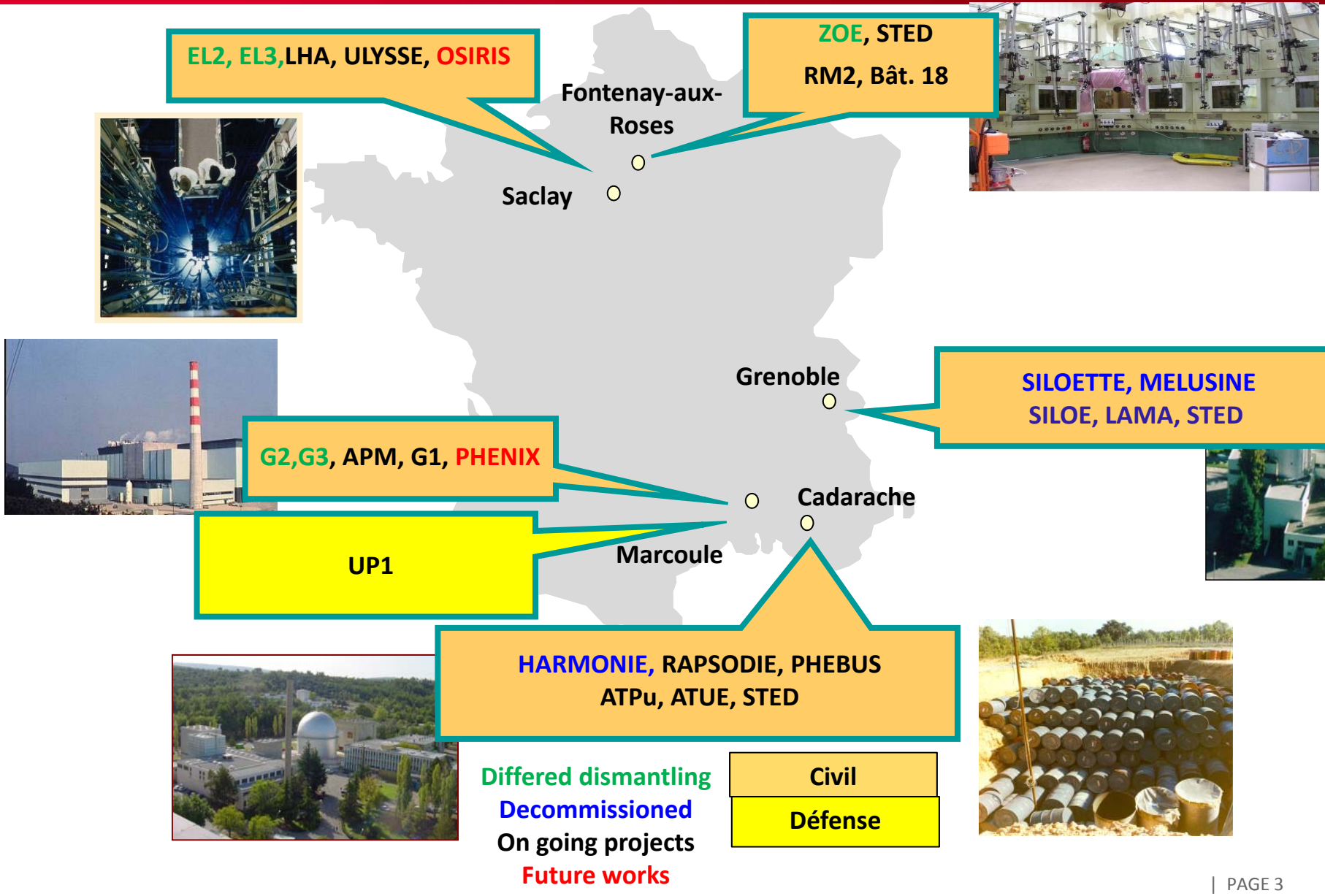
- *CEA's nuclear energy division : stakes, perimeter and strategy*
- *SILOE (CEA/Grenoble) : an example of Immediate dismantling strategy*
- *The issue of graphite wastes which may require a differed dismantling*

J-Claude MASY
CEA / Nuclear Energy Division
Head of Dismantling Program

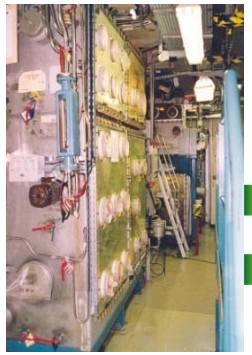
Summary

- **CEA's nuclear energy division : stakes, perimeter and strategy**
- *SILOE (CEA/Grenoble) : an example of Immediate dismantling strategy*
- *The issue of graphite wastes which may require a differed dismantling*

CEA'S NUCLEAR ENERGY DIVISION DD&R PERIMETER (DECOMMISSIONING/DISMANTLING & WASTE RECOVERY)



CEA's DD&R UNIQUENESS



- **Huge facilities variety :**
  - **Reactors :** pond, fast breeder, gas graphite, …
  - **Accelerators & irradiators,**
  - **Laboratories, workshops & plant**
  - **Waste treatment facilities (solid & liquid), storage facilities**
- **No scale nor «series effect»**
- **Different sizes :**
  - **Reactor : Ulysse INSTN -> Phénix (NPP)**
  - **LAMA -> building 18 FAR -> APM -> UP1**

- **R&D facilities,**
  - **Modifications traceability, history (not always known or registered)?**
  - **Various waste,…**
- **Chemical treatment, irradiated spend fuels:**
  - **Contamination level could be high :**

    (FAR, Marcoule APM & UP1,…)
- **Historical nuclear sites**

CEA DECOMMISSIONING: STAKES, OBJECTIVES, STRATEGY

CEA objective : carry out in safety and in respect of cost and delay all DD&R program.
Priorities :

- **Clean up and decommissioning of all nuclear facilities now surrounded by the cities : Centers of Grenoble & Fontenay aux Roses,**
- **Marcoule : dismantling of UP1 processing facility**
- **Respect end dates** (decrees & safety objectives)

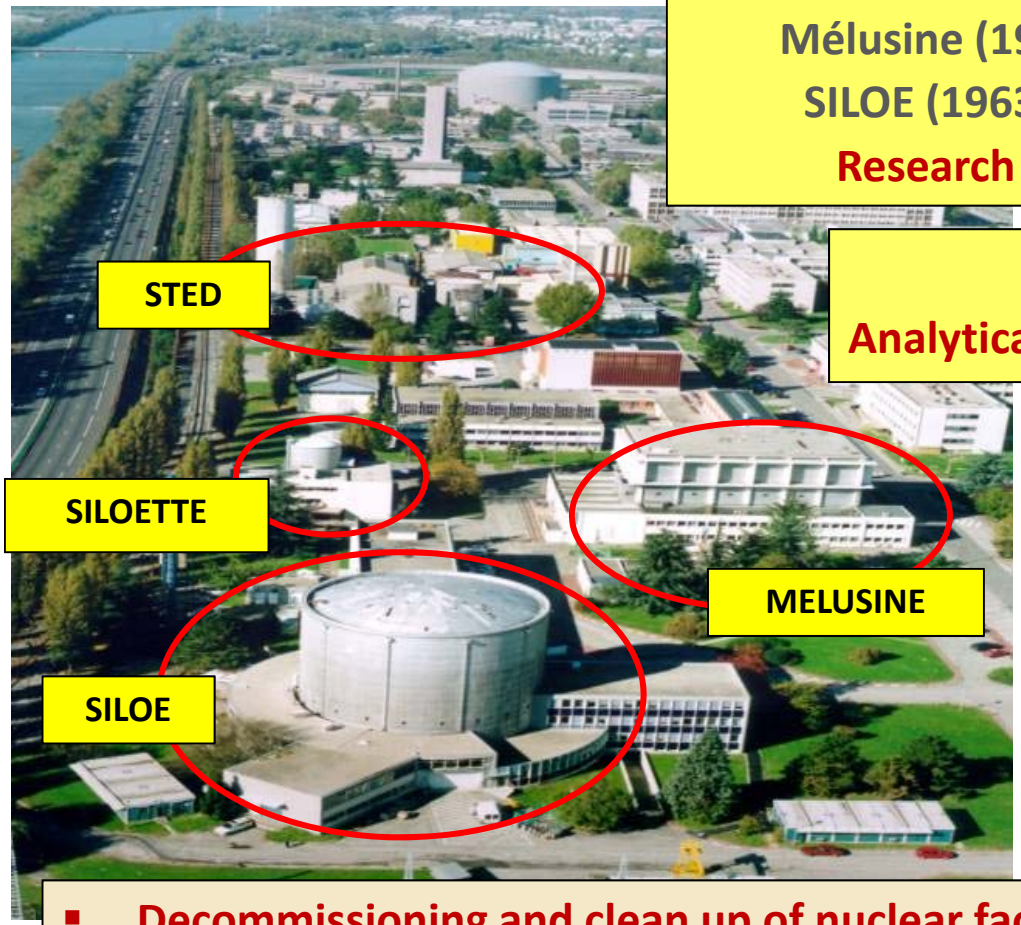
CEA's strategy (regulatory framework : nuclear laws 2006 TSN & wastes) :

- **Immediate and total dismantling when feasible**
- **End state : Removal of all dangerous material (in particular radioactive ones).**
  - **If impossible : decommissioning with constraints**
- **Technical and economical optimization pursuit**

Summary

- *CEA's nuclear energy division : stakes, perimeter and strategy*
- *SILOE (CEA/Grenoble) : an example of Immediate dismantling strategy*
- *The issue of graphite wastes which may require a differed dismantling*

SILOE AS AN EXAMPLE OF IMMEDIATE DISMANTLING



SILOETTE (1964 – 2002)
Mélusine (1958 – 1988)
SILOE (1963 – 1997) :
Research reactors

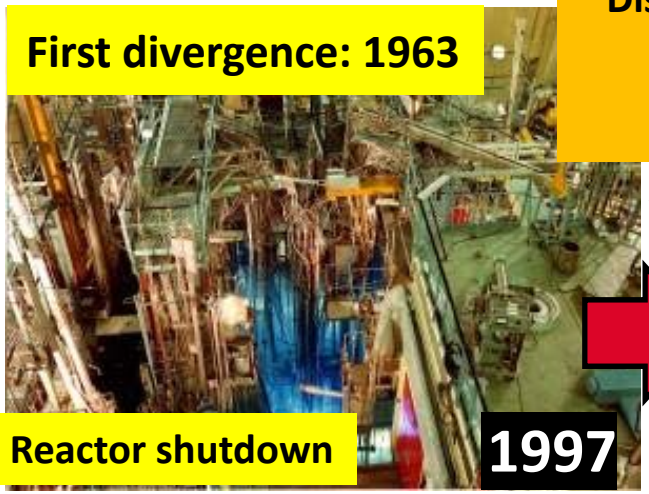
LAMA (1961-2002)
Analytical Lab for Active Material

Solid & liquid waste treatment facility (1964-2003)
11 nuclear buildings

- Decommissioning and clean up of nuclear facilities
- Transition from nuclear to research & technological activities
- Priority program
- State milestone « Government – CEA » : Nuclear dismantling finished end 2012

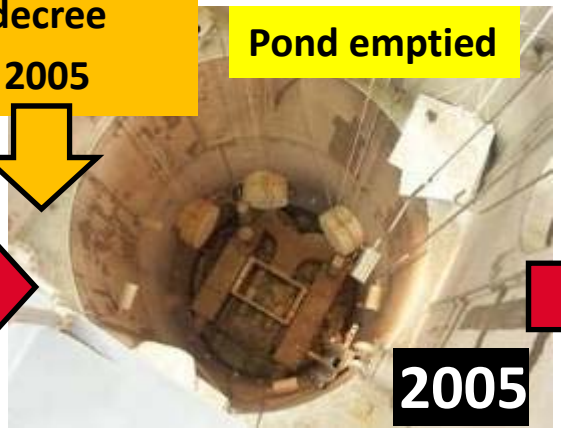
SILOE : MAIN STEPS

First divergence: 1963



Reactor shutdown

Dismantling decree 2005



Pond emptied

Pond liner removal remote operation

Activated parts cutting

Hall before demolition

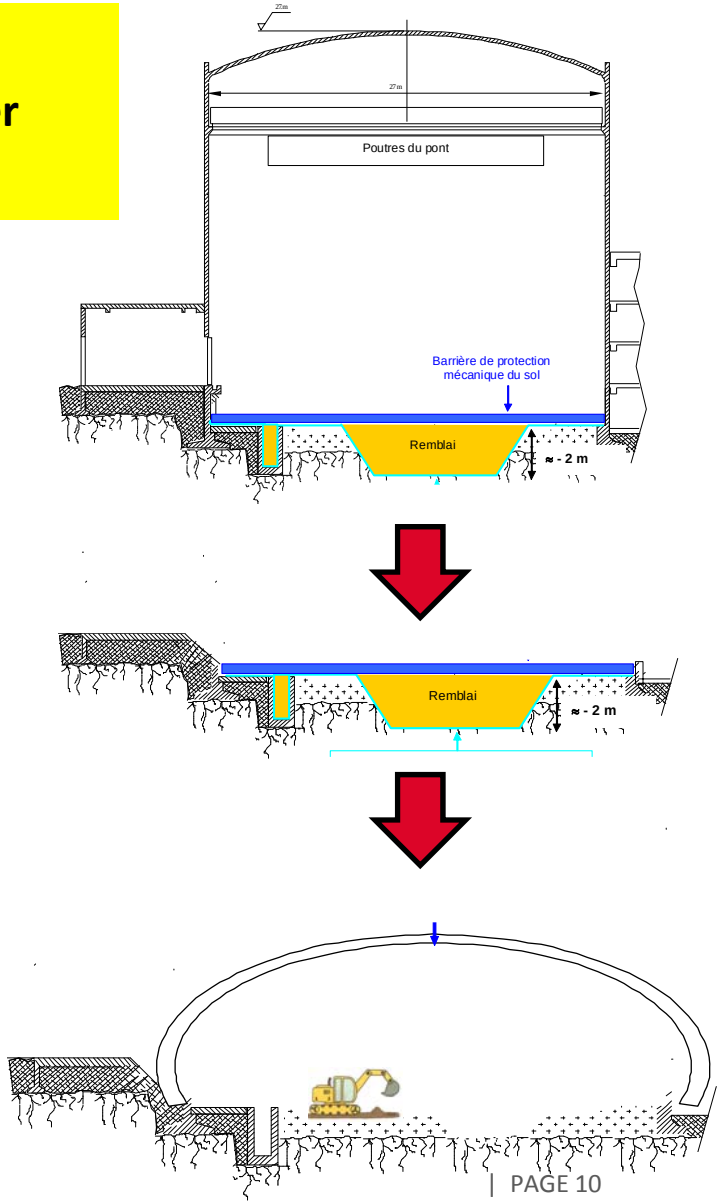
… Internal structures demolition

HALL VIEW AND RADIOLOGICAL CHECKS

SILOE : last step in 2012 & 2013 …

Reactor dome conventional demolition

Bottom part slightly contaminated will be demolished later under a dome tent to ensure containment



17/01/2013

22/01/2013

29/01/2013

31/01/2013

15/02/2013

SILOE : the last step in 2013 …

Basement demolition

- Operation 1963 -1997
- Dismantling decree 2005
- End of nuclear dismantling 2009
- Decommissioning *2015 -> 18 years after the reactor shutdown*

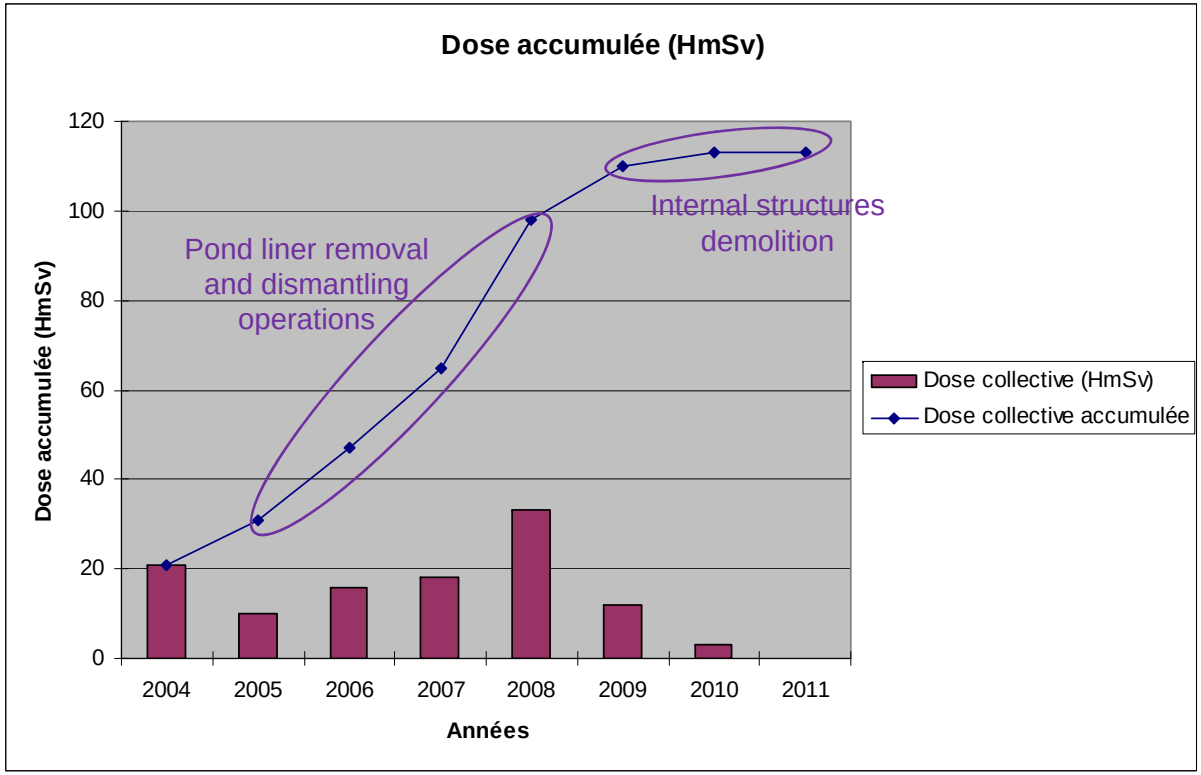
After demolition

DOSIMETRIC ASSESMENT

Phase	Collective dose (M.mSv)	Individual max. dose (mSv)	Average dose (mSv)
Dismantling + final clean-up	103	3,9	7 10-1
Operation	9,2	0,2	57 10-3
Final radiological checks	1,1 10^{-1}	5 10^{-3}	5 10-3
Total	**113**		

Dosimetry	Provisional dosimetry (M.mSv)	Real dosimetry (M.mSv)
Collective dose (M.µSv)	122,5	113
Individual max. dose (mSv)	21	3,9

DOSIMETRIC ASSESMENT



- **The real dosimetry for the remotely operated operations has been lower than the real dosimetry : the reason is the efficiency of the equipments which enable the operators to spend less time than forecasted**
- **The real dosimetry for the manually operated operations has been higher than expected because of the time spent by the workers for the workshop withdrawal and the dressing/undressing phases**

Summary

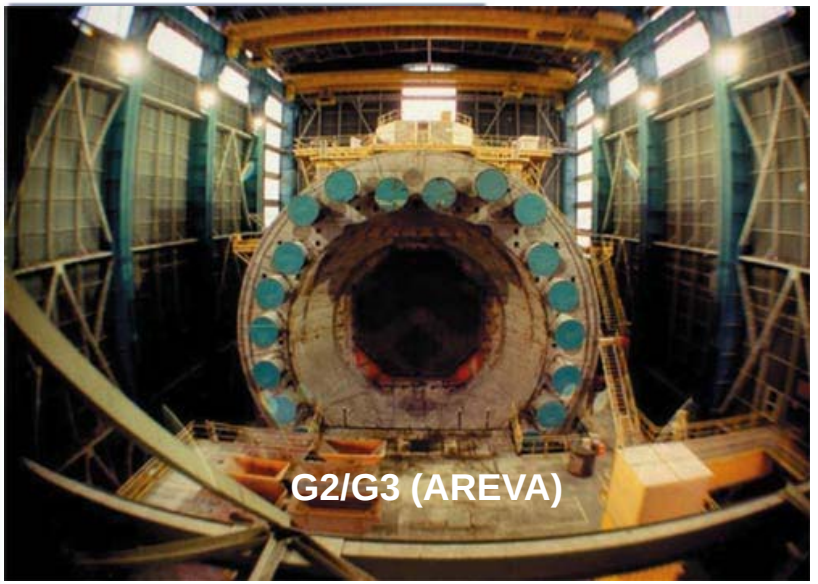
- *CEA's nuclear energy division : stakes, perimeter and strategy*
- *SILOE (CEA/Grenoble) : an example of Immediate dismantling strategy*
- *The issue of graphite wastes which may require a differed dismantling*

DIFERRED DISMANTLING : AVIABILITY OF THE GRAPHITE WASTE DISPOSAL

Aviability of the french graphite waste disposal

- The inventory of irradiated graphite waste in France is about 23 000 t produced by EDF and CEA (graphite gas reactors , heavy water reactors)
- Irradiated graphite contains relatively high concentrations of 14-C and 36-Cl, species which may have an impact on waste disposal due to the mobility of chloride and methane
- To day, R&D studies are made by ANDRA to qualify the operations of screening and treatment which can been carried out before their disposal ; the disposal won't be available before 2025

The CEA's stratégy has been to keep the graphite structures inside the reactors until the commissioning date of the french graphite waste disposal

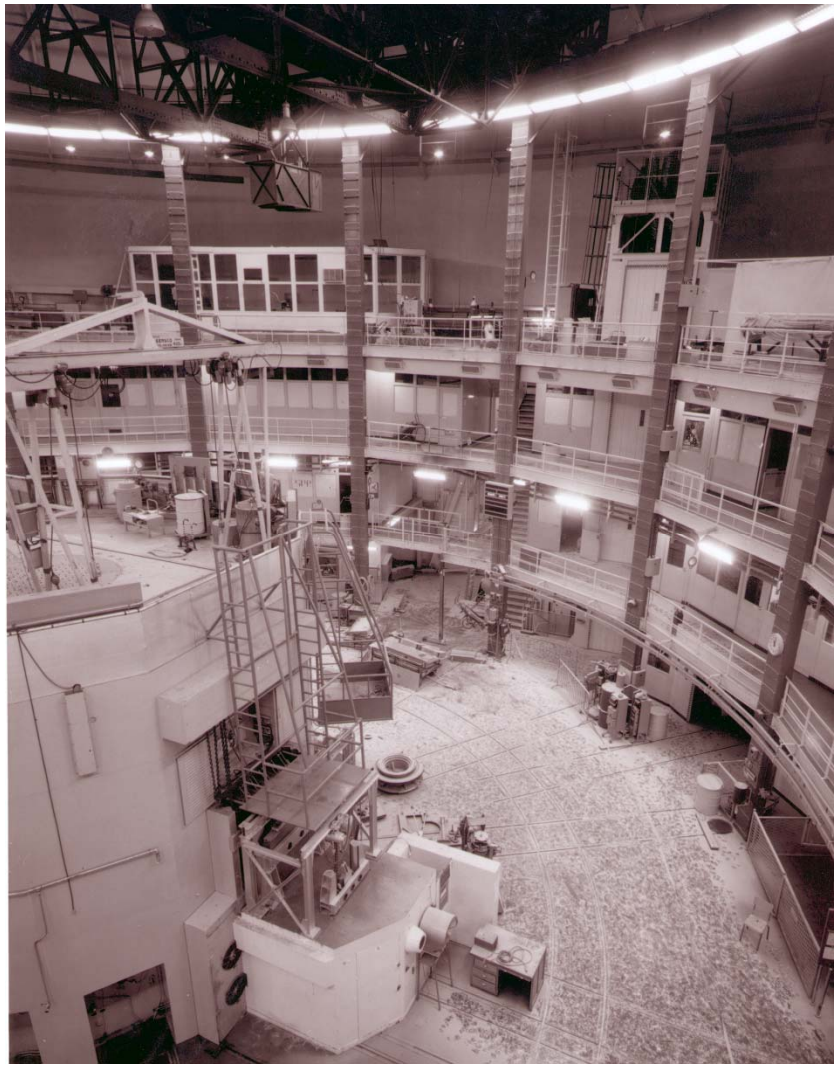


DIFERRED DISMANTLING : AVIABILITY OF THE GRAPHITE WASTE DISPOSAL

The Zoé reactor (EL-1) was the first French reactor (heavy water reactor).
It was built in 1947 in Fontenay-aux-roses under the leadership of Frédéric Joliot-Curie, who was at the time, director of the CEA.
Zoé went critical on 15 December 1948, reaching a power of 150 kW by 1953 and produced the first milligrams of French-produced plutonium.
The reactor was shut down in March 1976.

- In 1977 :
  - The heavy water tank has been emptied
  - The used fuel has been unloaded
  - The activated components and the reflectors in graphite has been let in the block reactor which has been confined
- Today Zoe is museum

DIFERRED DISMANTLING : AVIABILITY OF THE GRAPHITE WASTE DISPOSAL



EL-2, a natural uranium and heavy water reactor was the first pile in the world to be cooled by compressed gaz and, at the time it became critical, had the most powerful neutron flux of any european reactor
It was built in 1950 in Saclay.
EL-2 went critical on 1952.
The reactor was shut down in 1965.

- **In 1966 :**
  - **The used fuel has been unloaded**
  - **The activated components and the reflectors in graphite has been let in the block reactor which has been confined**

- **Others examples : EL3 in Saclay, G2 and G3 in Marcoule**

Thank you for your attention

Commissariat à l'énergie atomique et aux énergies alternatives
Centre de Saclay | 91191 Gif-sur-Yvette Cedex
T. +33 (0)1 64 50 10 00 | F. +33 (0)1 64 50 11 86

DEN
DADN

Etablissement public à caractère industriel et commercial | RCS Paris B 775 685 019

IMMEDIATE AND TOTAL DISMANTLING : A CHOICE OR A REQUIREMENT ?

- **To be able to choose the correct dismantling schedule, an analyse of the process has to be done by taking into account :**
  - **the final stage of decommissioning and planned re-use of the site or facilities,**
  - **the aviability of the data concerning the events which may have an impact on the dismantling scenario,**
  - **the physical and radiological initial state,**
  - **the management and the availability of the final waste disposal,**
  - **legal, social and economic considerations,**
  - **regulations concerning safety and radioprotection in operation.**
- **Among all these parameters two of them lead the CEA to choose the immediate dismantling strategy :**
  - **because of the large variety of its facilities, it is important for the CEA to study the dismantling scenario with the people who operated the facility,**
  - **the need to delay the dismantling operations to reduce the radiological inventory is not crucial for the CEA**
- **The only one parameter which led the CEA to delay the dismantling of three of its facilities is the unaviability of the graphite waste disposal**

IMMEDIATE AND TOTAL DISMANTLING : A CHOICE OR A REQUIREMENT ?

- **What is the position of the French government on the issue of immediate or deffered dismantling ?**
  - **the politic of the French Nuclear Authority concerning the dismantling and the decommissioning of Nuclear Basic Facilities has been published in 2009 ; it says :**

    "To day, the French Nuclear Authority advise the operators of the Basic Nuclear Facilities to commit themselves into immediate dismantling strategy"
  - **a decree published in 2012 give the general rules concerning the Basic Nuclear Facility ; concerning the issue of dismantling strategy, it says :**

    "The decommissioning plan justify the delay, as short as possible, between the definitive shutdown and the dismantling operations"
  - **The french government has plan to publish this summer a law on energetic transition in which the french politic concerning the immediate dismantling will be confirmed**

Attachment 3c) Dismantling (Feinhals)

Working Group Dismantling
FS-SFRP-Workshop at CERN, 11/12 Feb. 2016

Fachverband für Strahlenschutz e.V.

Content

1. Minimization of dose - Occupational radiation protection during dismantling activities
    a) influence of different strategies for dismantling on workers dose
    b) loss of safety during dismantling
2. Minimization of radioactive waste
    a) change of RW management at begin of decom activities
    b) characterization of waste during and after dismantling
    c) possibility of reutilization of radioactive materials in France, Germany and Switzerland – future ways for reutilization in the different countries
3. Minimization of dose versus minimization of waste

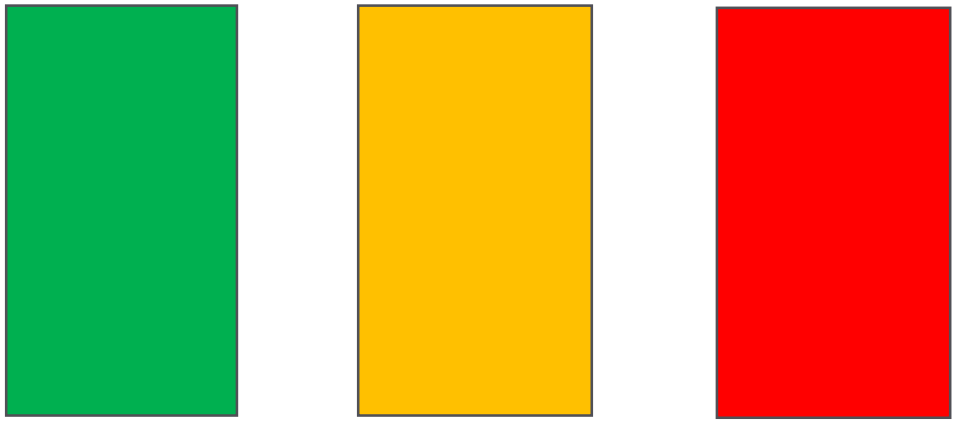
Dismantling strategies

Fachverband für Strahlenschutz e.V.

activity

low high

from low to high activity
to avoid cross contamination during dismantling

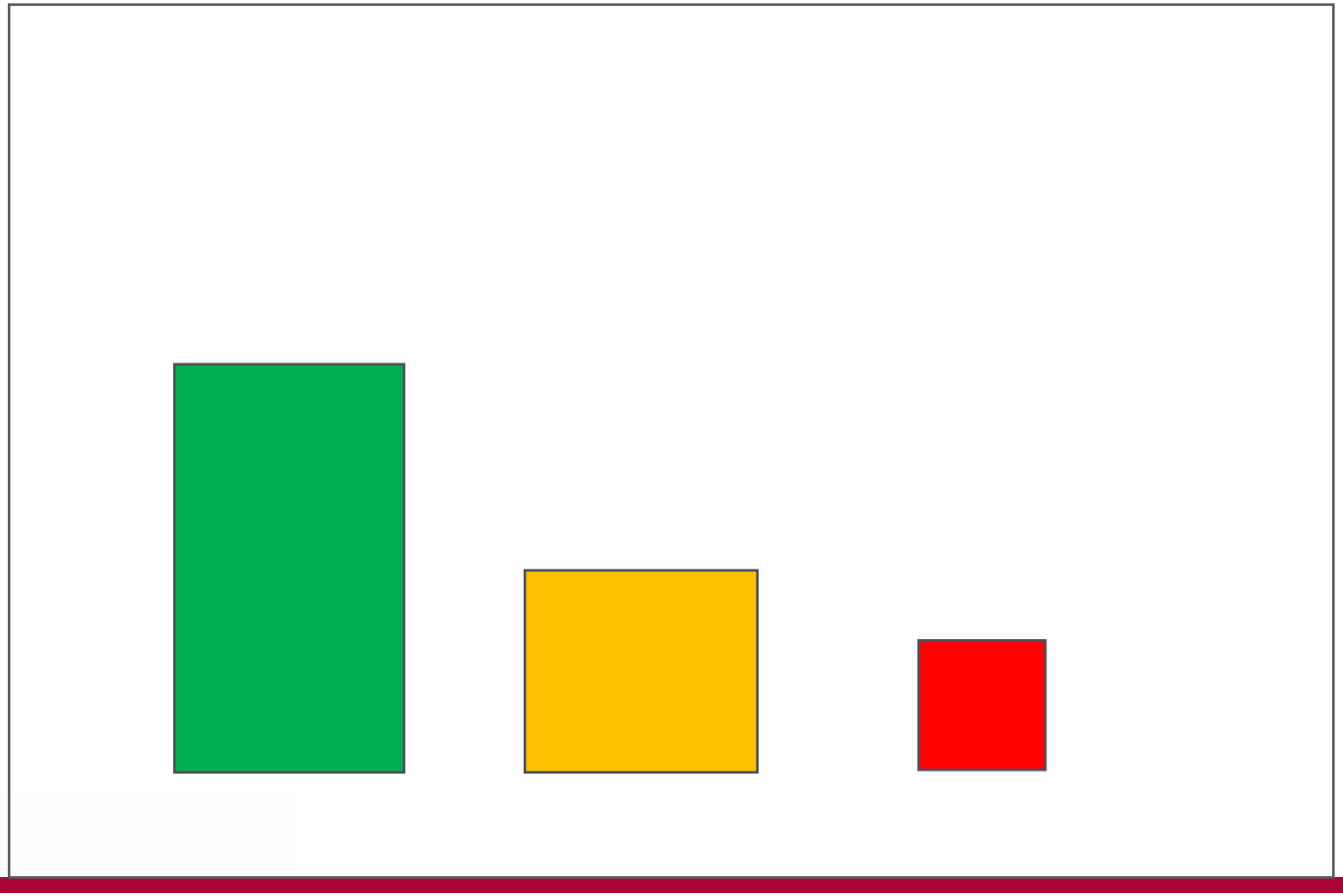


Dismantling strategies

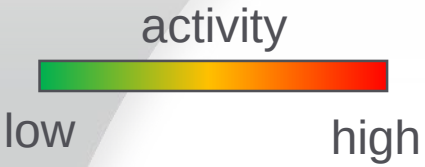
Fachverband für Strahlenschutz e.V.

activity

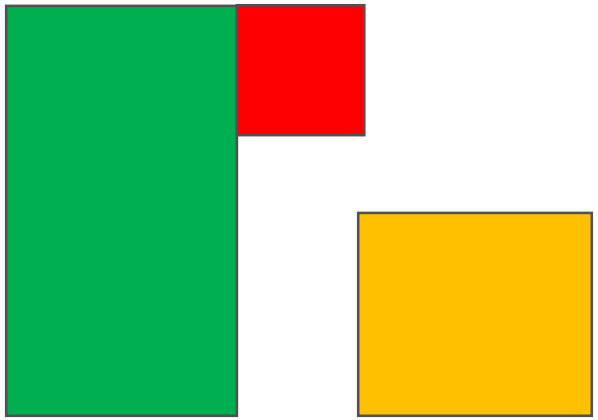
low high



Dismantling strategies



Remove of Hot Spots to reduce the dose of personnel



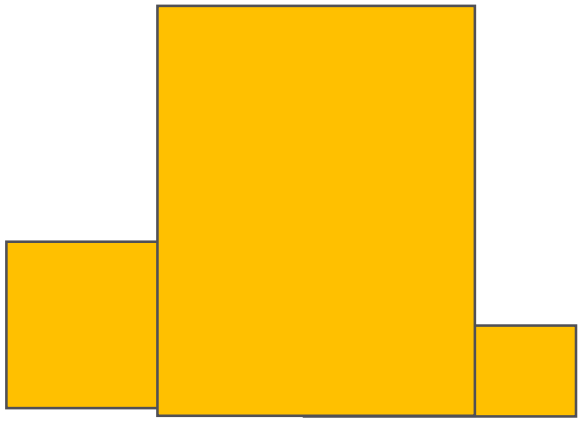
Dismantling strategies

Fachverband für Strahlenschutz e.V.

activity

low high

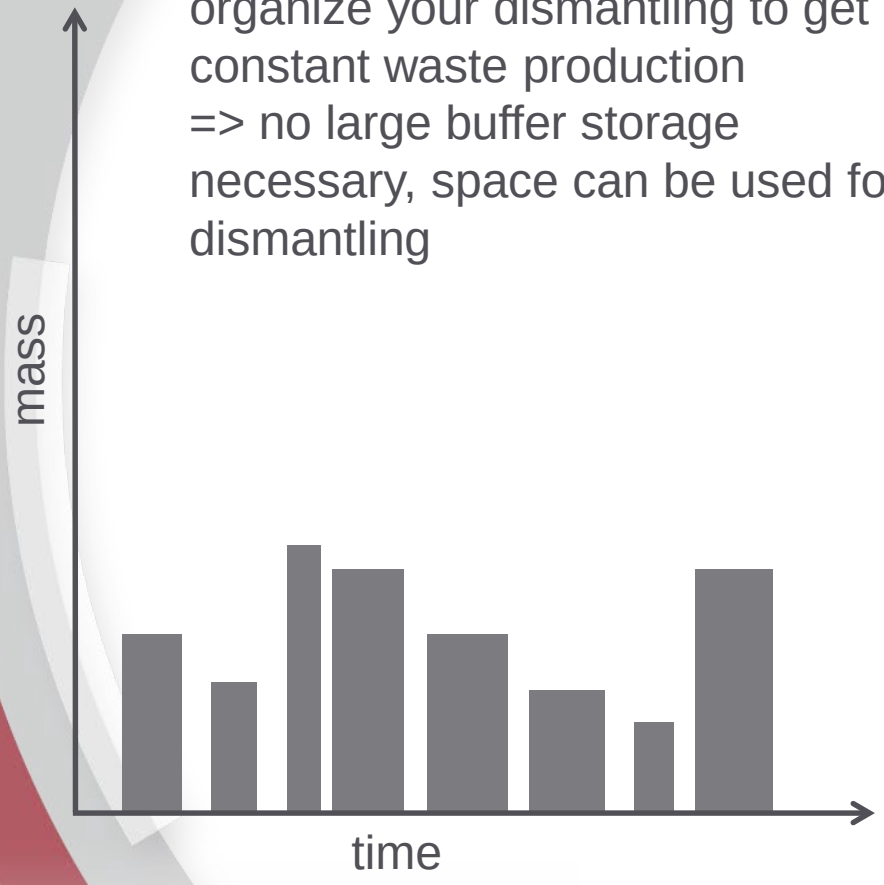
Remove large components to get more space
for further dismantling activities and RP measures

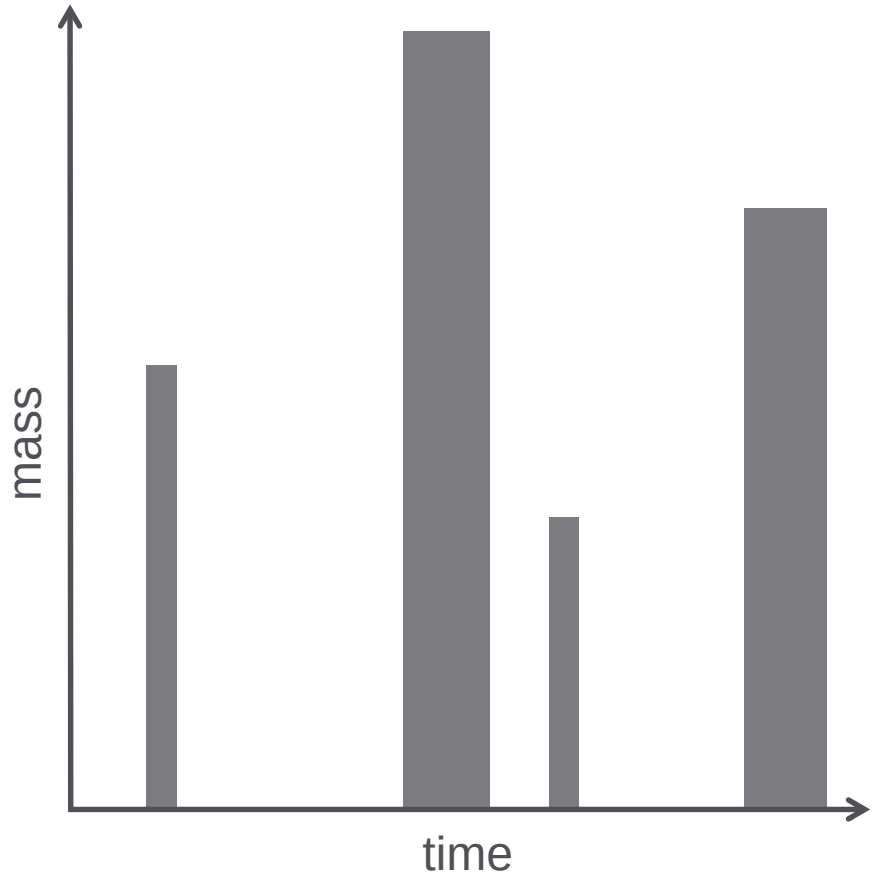


Dismantling strategies

Fachverband für Strahlenschutz e.V.

organize your dismantling to get a constant waste production
=> no large buffer storage necessary, space can be used for dismantling





Characterization

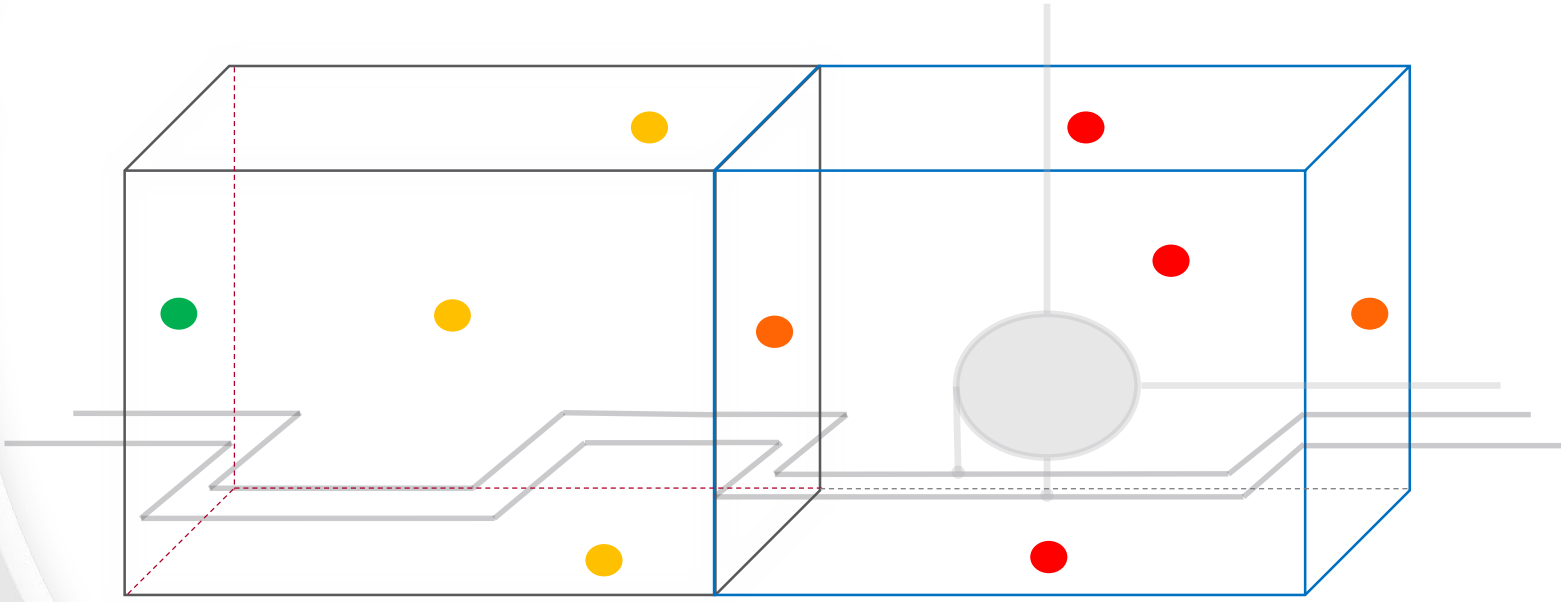
Fachverband für Strahlenschutz e.V.

activity

low high

each room

contamination and dose rate



Characterization

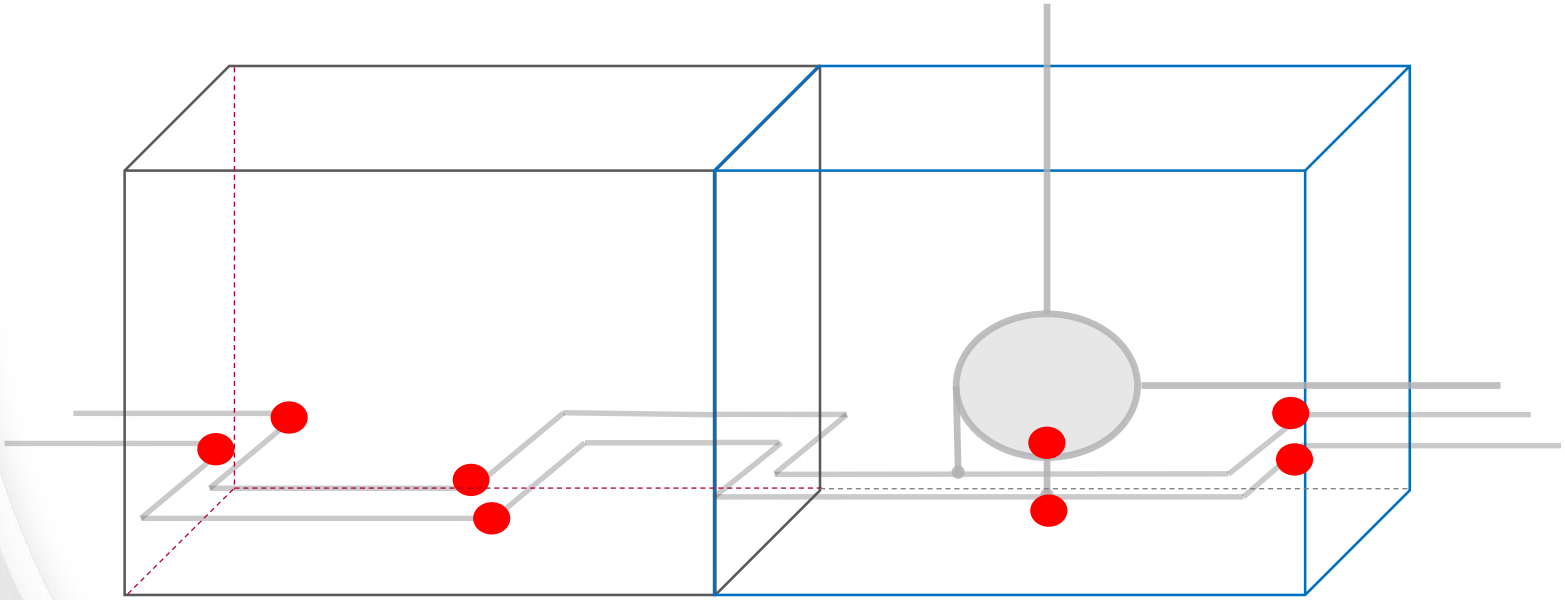
Fachverband für Strahlenschutz e.V.

activity

low high

each system

specific activity,
contamination
inside/outside

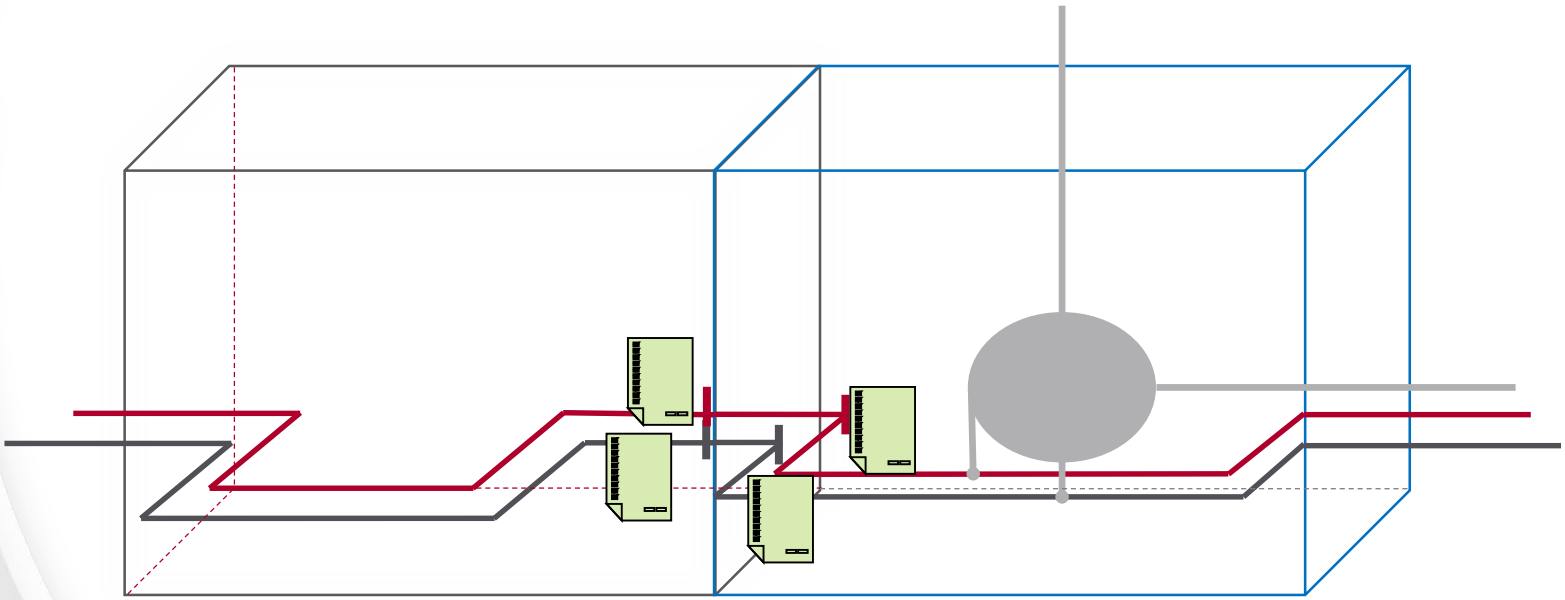


Dismantling strategies

room by room

Fachverband für Strahlenschutz e.V.

dismantling of a room only possible,
if all systems are ready for dismantling

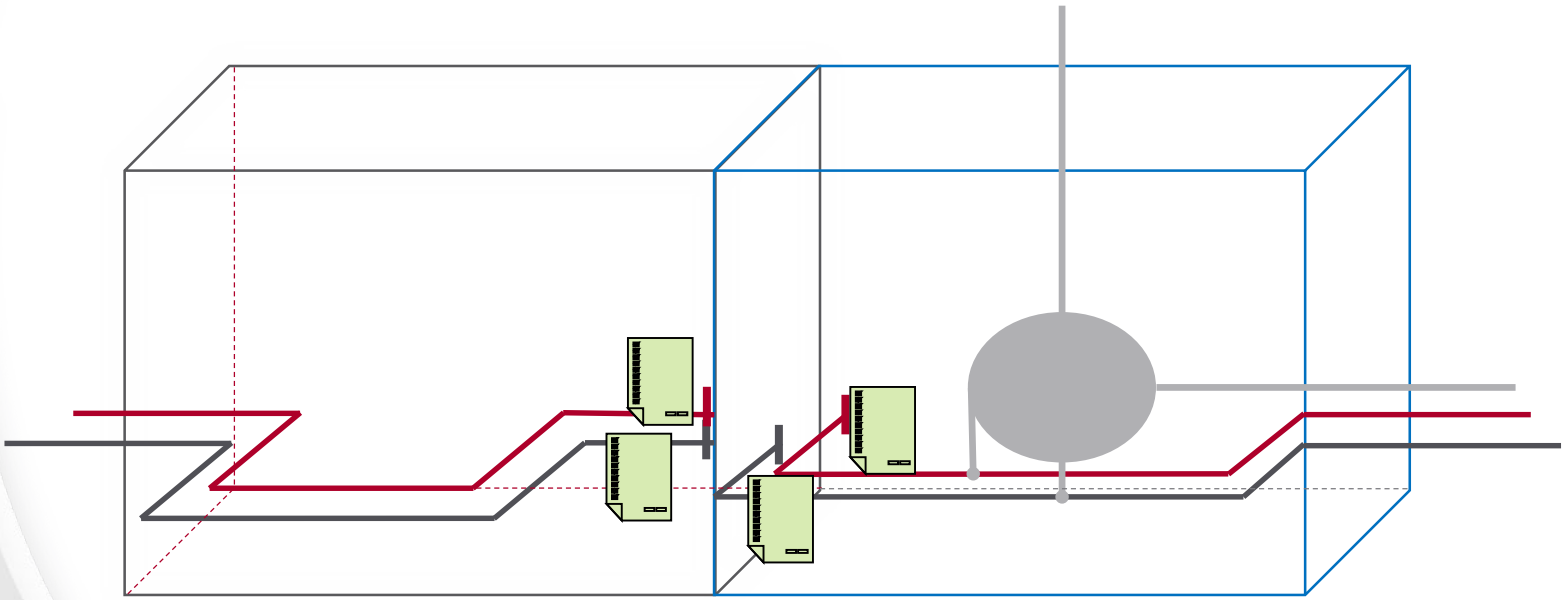


Dismantling strategies

room by room

Fachverband für Strahlenschutz e.V.

dismantling of a room only possible,
if all systems are ready for dismantling

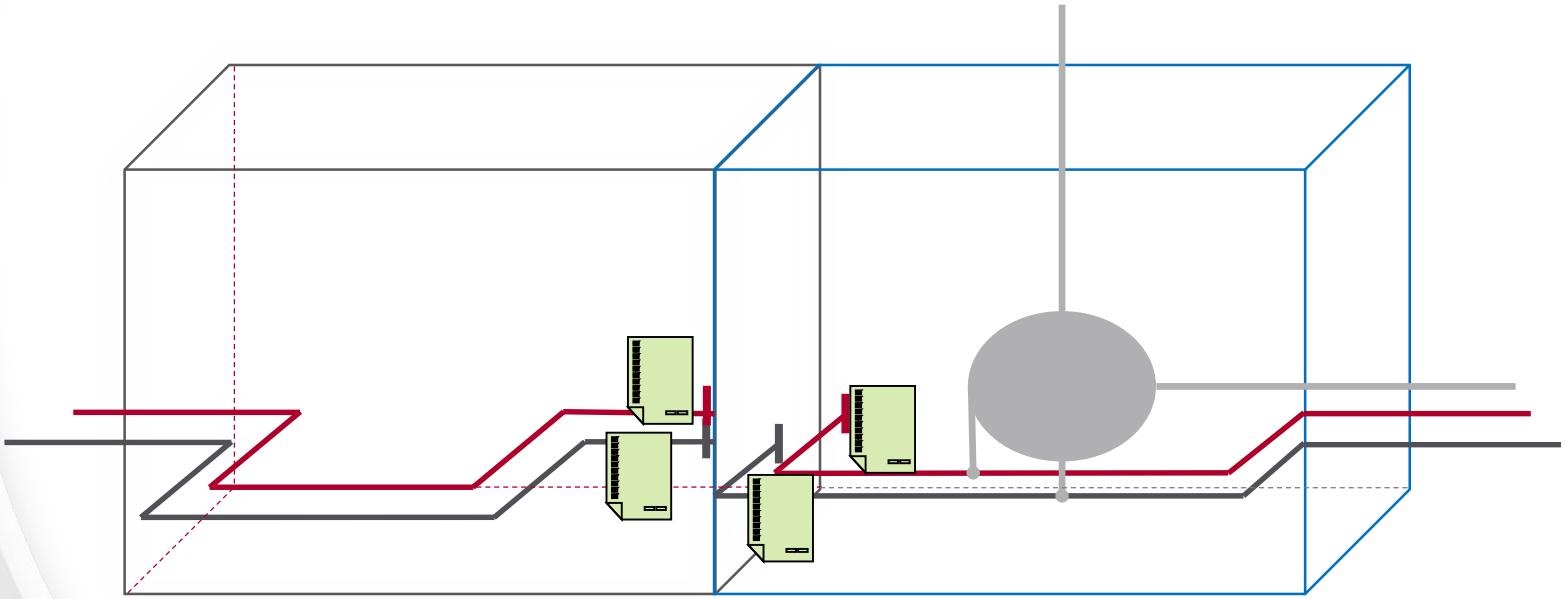


Dismantling strategies

system by system

Fachverband für Strahlenschutz e.V.

risk: dismantling of a running system by mistake
chance: to speed up the dismantling process



Attachment 4a) SFRS: Management of the Society

SOCIÉTÉ FRANÇAISE DE RADIOPROTECTION

SFRP
Société Française de Radioprotection

FS/SFRP WORKSHOP
Geneva, February, 11-12, 2016

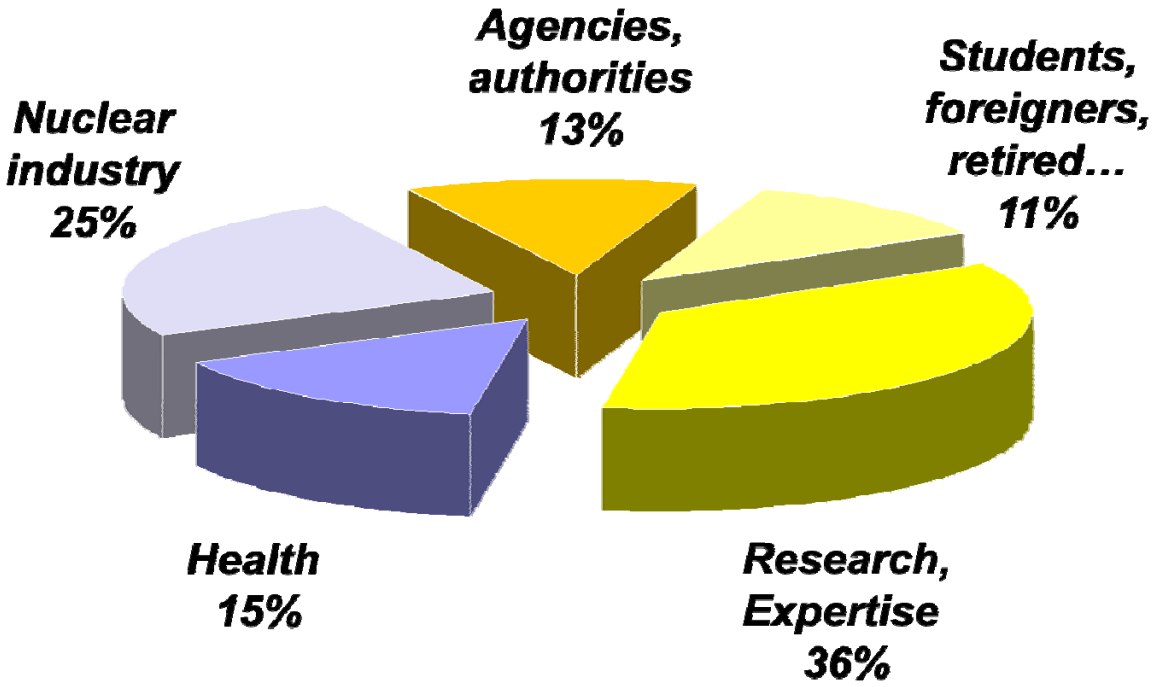
Management of societies

SFRP
Société Française de Radioprotection

SFRP was created in 1965

50 ANS DE LA SFRP
SFRP
Société Française de Radioprotection

1200 members



SFRP organisation

BOARD
21 elected members

Permanent secretary office

BUREAU
5 members with president

5 technical sections

- Research and health
- Technical protection
- Environment
- Radiation Protection Experts & Officers
- Non-ionising radiation

4 commissions

- Editorial Board of Radioprotection journal
- International Relations (CRI)
- Education and training
- Legal committe

2 clubs

- History
- Young professionnal

Some key figures

- **1200 members** : **200 persons actively** participate to technical sections or commissions

- **5 or 6 meetings/congresses per year** :
  - ➢ **1000 participants** per year

- Two important congresses each two years
  - National congress
  - RPO/RPE meeting

Financial budget

Resources	(euros)
Membership subscription	77 000
Meeting subscription	500 000
Advertising & Journal	52 000
Subsidy	130 000
Expenses	**(euros)**
Scientific meeting	250 000
Committee meeting	8 000
Journal	80 000
Website (in 2015)	35 000
Administrative expenses	350 000
IRPA fees	4 500
Awards	7 000

New challenges for SFRP

Develop **a dynamic Club of young members** :

- Extend the Young Scientific Award
- Develop SFRP activities for young members
- Improve RP knowledge of young members
- Give a new impetus to SFRP communication tools with young members help

Proposal for AS societies :

Organise international exchange : « AS Young Members Workshop »

New challenges for SFRP

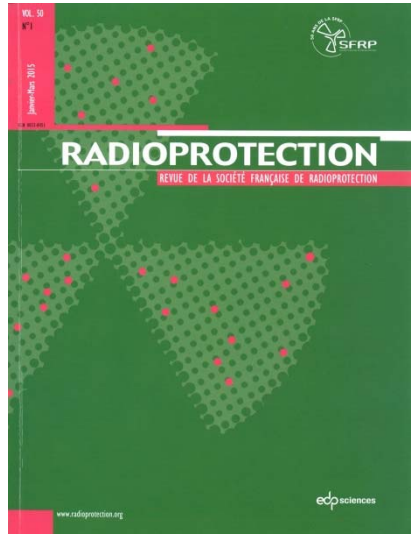
Build a new RP society for a modern world

- What does RP society offer with regard to media information ?
- Which management to attract new members ?
- Which professional network ?
- Which media tools ?

New challenges for SFRP

Extend international scope of

« Radioprotection journal »



- Many articles in English
- Interface and complementarity with others journals
- Develop relations between different editorial boards

New challenges for SFRP

- New topic !

Radiation Protection for patients

  - Attract new members in SFRP sections
  - Dedicated meetings

- Reinforce the expertise on **non-ionising radiation**
  - Many wrong messages circulate on media about this topic
  - French authorities requests SFRP assessement.

Thank you !

Attachment 4a) FS: Management of the Society

The FS at a glance

German-Swiss Radiation Protection Association

Fachverband für Strahlenschutz e.V. (FS)

WIR STEHEN FÜR:

Sicherheit im Umgang mit Strahlung.

Fachverband für Strahlenschutz e.V.

Für Deutschland und die Schweiz
Mitgliedsgesellschaft der IRPA
International Radiation Protection Association

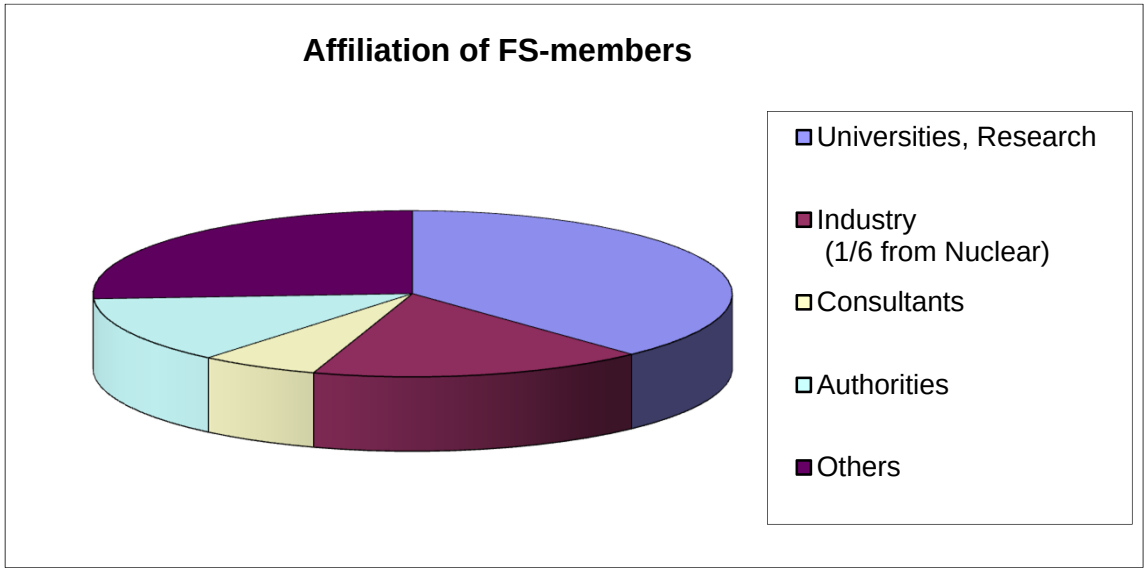
Membership in FS

Fachverband für Strahlenschutz e.V.

FS was founded in 1966, replacing an earlier branch of US HPS

At present about 1400 individual members, working in

- Research and development, production, administration
- Universities, industries, medical facilities
- Authorities, ministries, expert organizations



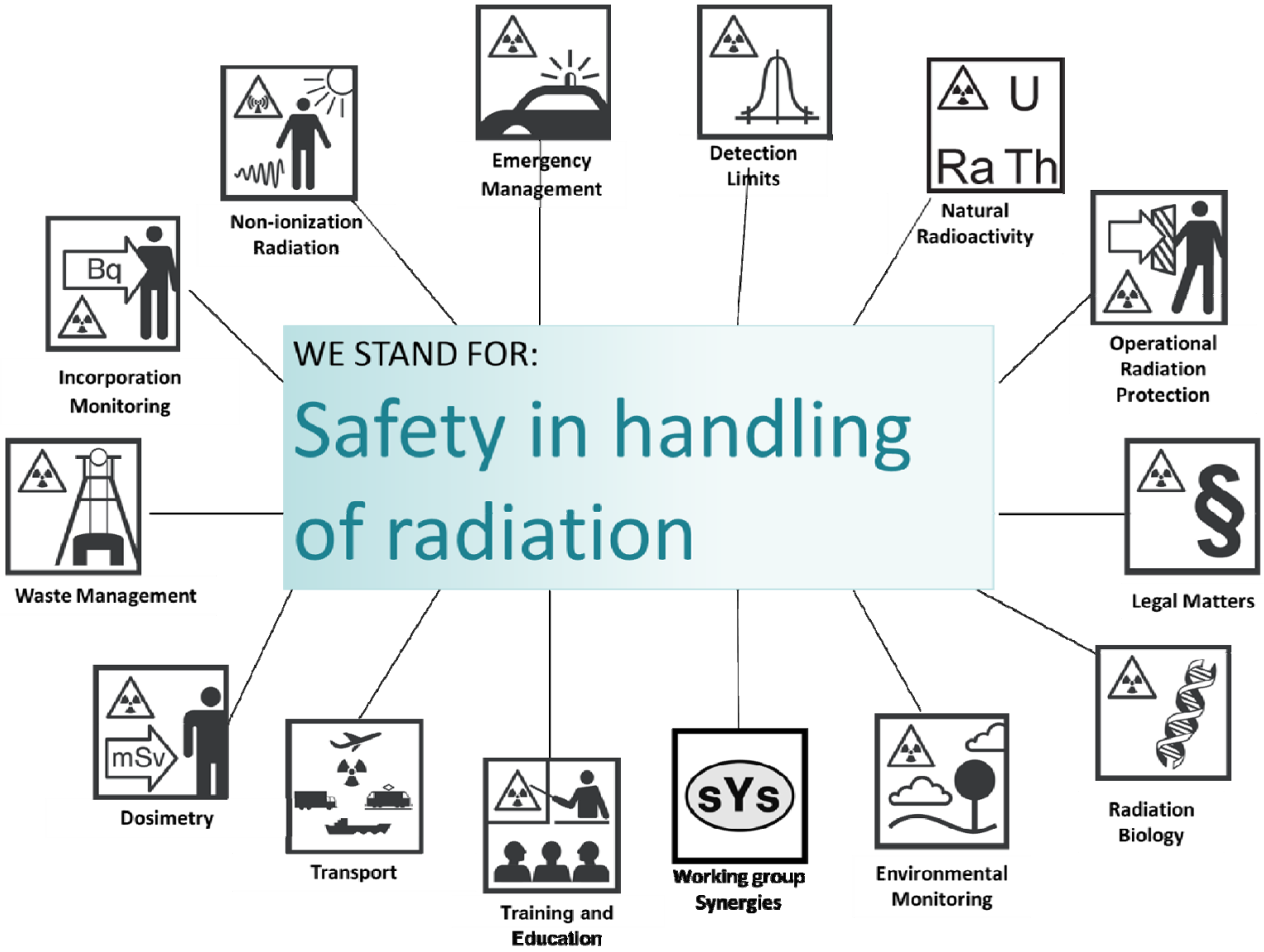
The FS offers

Fachverband für Strahlenschutz e.V.

- Exchange of experts knowledge and experiences
- Annual Congress, seminars and workshops
- Contacts to national / international organizations
- Collaboration in 13 + 1 expert groups on current issues
- Promotion of young generation in Radiation Protection

The FS and its expert groups

Fachverband für Strahlenschutz e.V.



The FS informs

Fachverband für Strahlenschutz e.V.

About new developments, techniques, legal aspects via

- Conference proceedings and work reports
- Internet homepage
- Periodical StrahlenschutzPRAXIS
- StrahlenschutzKOMPAKT

The FS informs (cont.)
StrahlenschutzKOMPAKT (example)

Fachverband für Strahlenschutz e.V.

Two pages of condensed information for the interested non-specialist

RADON

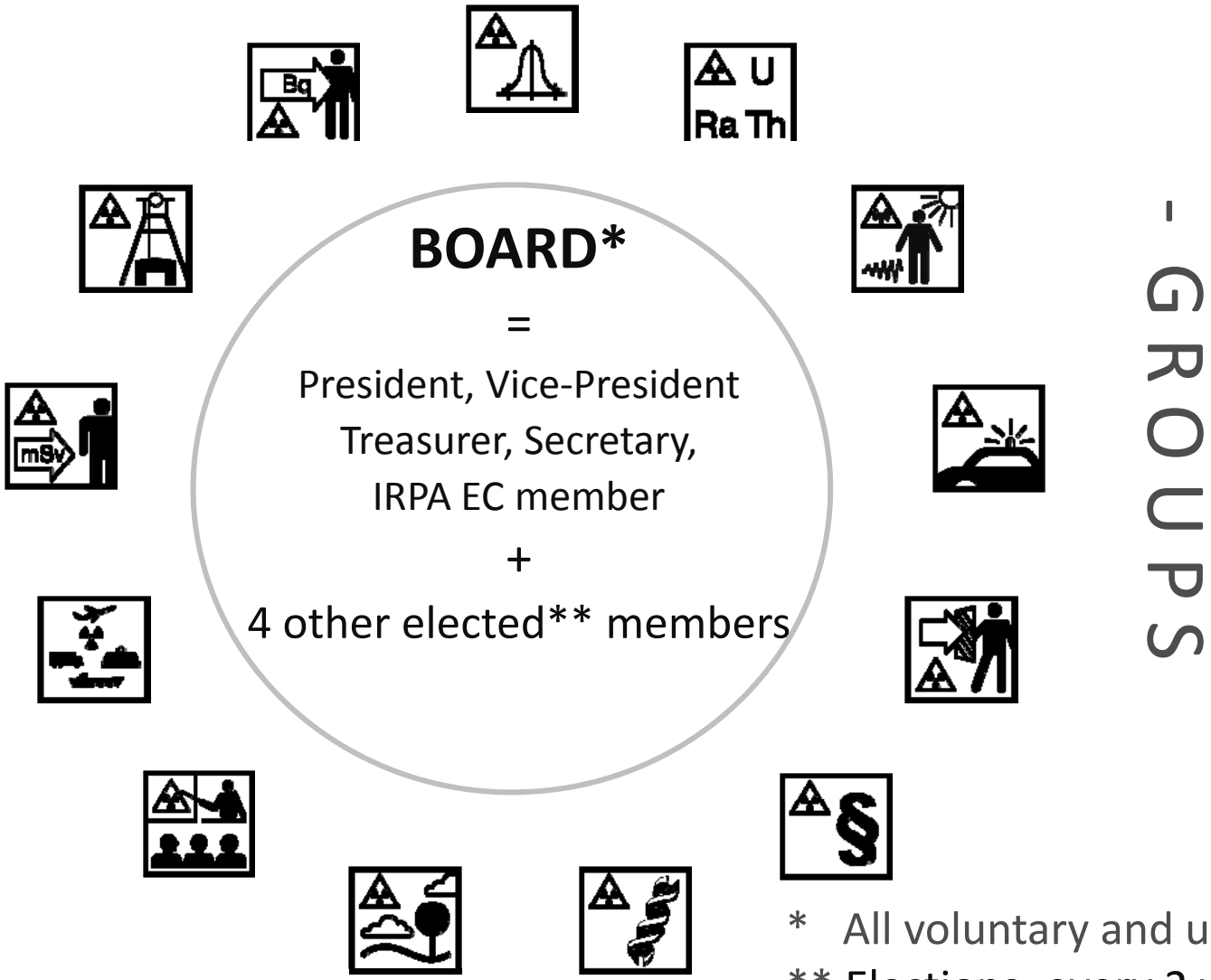
AIRTRAFFIC

DISPOSAL

FS Organisation

Fachverband für Strahlenschutz e.V.

EXPERT-



BOARD*

=

President, Vice-President
Treasurer, Secretary,
IRPA EC member

+

4 other elected** members

-GROUPS

* All voluntary and unpaid

** Elections: every 2 years

FS Budget

Fachverband für Strahlenschutz e.V.

Resources	(euros)
Membership subscription	121 000
Expenses	**(euros)**
Scientific meeting	10 000
Committee meeting	15 000
Journal	65 000
Website (in 2015)	5 000
Administrative expenses	5 000
Cooperation, IRPA fees	25 000
Awards, Promotion Young..	10 000

Expenses exceed income in order to reduce savings

Promotion of young people

Fachverband für Strahlenschutz e.V.

Three pillars:

- Pupils: support of school projects by money and advice, awards

  + Project with German Roentgen Museum (hands on experiments for schools)
  + Project with University Mainz „Virtual Reality experiment“

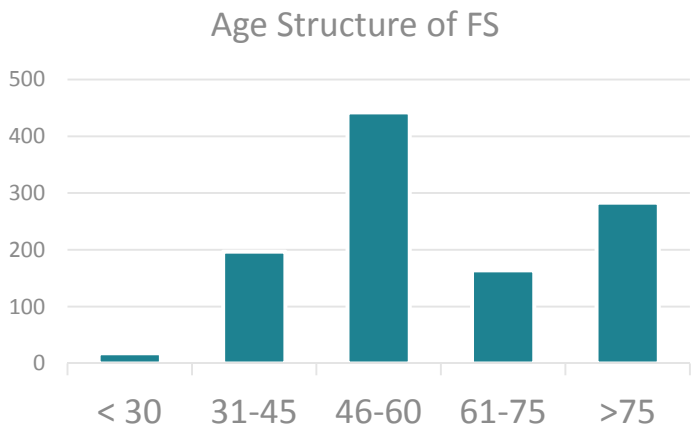
- Students: mentoring and financial support of foreign exchange (Austria, Italy, Japan, ..)

- Scientists: Rupprecht Maushart Award money, participation with IRPA congress + competition

NEA-IRPA: Stakeholder Dialogue Webinar "Experience and Lessons for Young and Old Experts and Researchers" –
See more at: http://www.fs-ev.org/startseite/#tab-container435

The FS faces challenges

- Permanently decreasing interest of industrial and public employers:
  reduced man power, more and more difficulties to recruit staff for expert groups, conferences ..
- Ban of nuclear power in Germany is expected to result in decreasing membership (although not yet observed)
- Integration of new group of medical experts (occupational health)
- larger medical/health societies dominate the field of RP for patients
- Need of international networking accompanied by restricted interest of membership
- Restricted attention of public and media for FS (not for the topics),
  high interest of members in an improved visibility of FS in the public
- Response to IRPA requests
- Adoption and implementation of EU-BSS (D, CH)



Cooperation SFRP / FS

Fachverband für Strahlenschutz e.V.

Ideas:

- Joint editions of „RPCompact“
- Extend the exchange of students
- Joint membership at reduced prices
- Continuation of such a meeting with intensified discussions on special topics
- Effort for mutual recognition of trainings/education in RP
- Develop relations between the editorial boards
- Working together on the topic „non-ionising radiation“
- Organise international exchange : “AS Young Members Workshop”
- Organise a scientific congress together

Fachverband für Strahlenschutz e.V.

www.fs-ev.org