



Implementation of the new BSS in Switzerland

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Content

- Project revision of the Swiss legislation and BSS
- Scope and Clearance level
- Issue in medicine
- Training and education
- Radon
- Import/export of radioactive material
- Resume



Swiss legislation

- The Swiss legislation on radiation protection is in force since 1994. It is based on the recommendations of ICRP of 1990 (ICRP 60).
- The recommendations of ICRP 103 (2007) shall be implemented into Swiss legislation. An harmonization to the radiation protection concepts of the EU is aimed for, the Euratom Basic Safety Standards Directive (Draft and final version) served as a guideline for the revision of the Swiss radiation protection legislation.



Revision of radiation protection legislation

Scope

- Radiation Protection Ordinance
- 10 technical ordinances
- Lead by FOPH

Timeline of the project





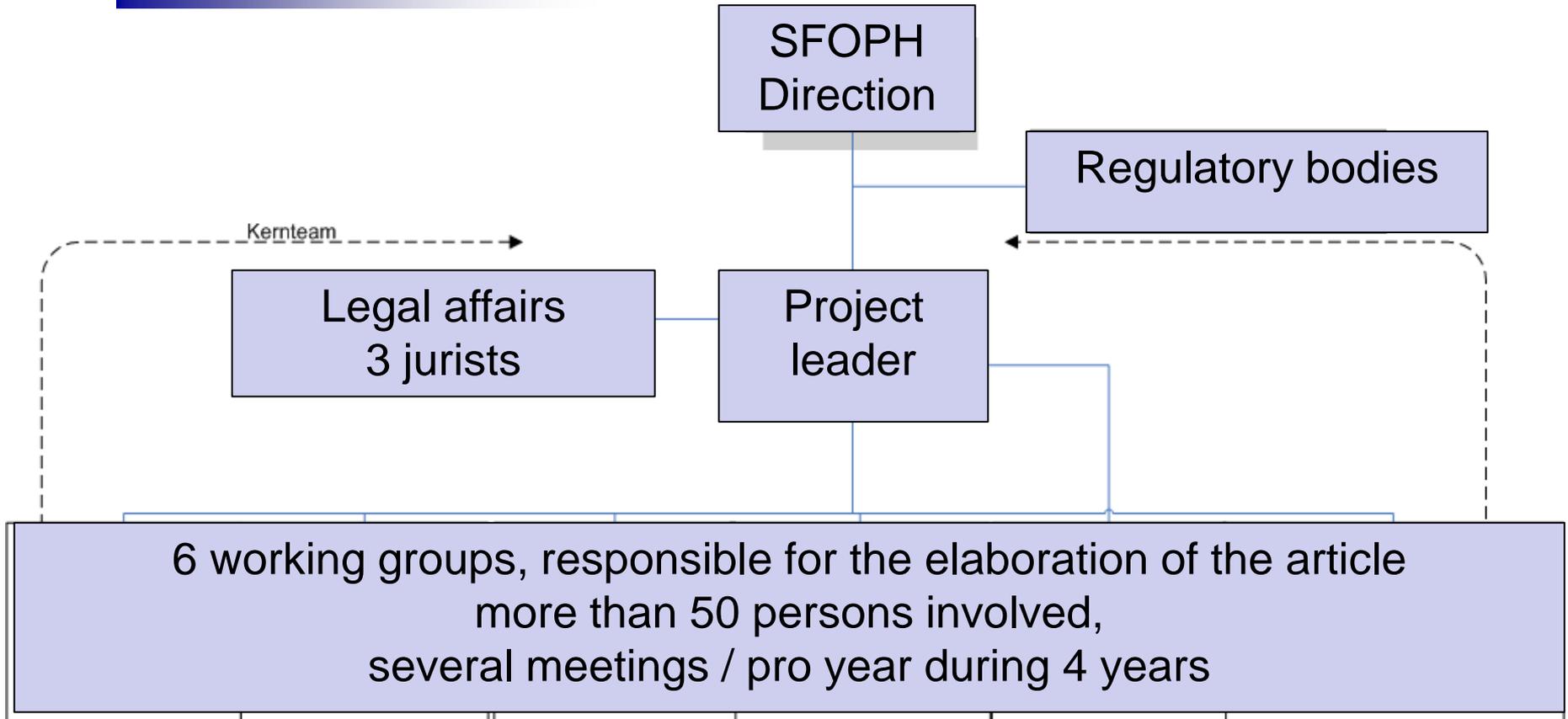
Revision of radiation protection legislation

Principles

- In accordance with Radiation Protection Law (no change)
- Transposition of ICRP 103
- Transposition of Euratom BSS
 - mandatory for:
reduction of trade barriers, material, workers (exchange)
- Keep it simple
- Keep established Swiss structures, good Swiss practices



Organisation of the project





General principle of radiation protection

- Justification
- Optimisation
- Dose limitation

- Graded approach (authorisation, survey)



Exposure situations and categories of exposure

Category/ Situation	Public	Occupational	Medical
Planned	Dose limit (Dose constraint)	Dose limit (Dose constraint)	DRL Dose constraint
Emergency	Reference level	Reference level	-----
Existing	Reference level	-----	-----



Dose limits

	Public	Occupational
Effective dose	1 mSv/a	20 mSv/a
Lens of the eye	15 mSv/a	20 mSv/a
Skin, extremities	50 mSv/a	500 mSv/a

New for Switzerland



Dose constraints

Tool for optimisation

Public

- Dose constraint for specific source defined in authorisation

Occupational

- Dose constraint for specific activities established during the work

Medicine

- no dose limits
- for carriers and comforters: 5 mSv per case
- volunteers in research projects: 5 / 20 mSv/a
- diagnostic reference levels for patients



Reference levels

	Public	Occupational / obligated persons
Emergency exposure situation	100 mSv/a	50 mSv/a 250 mSv/a
Existing exposure situation ref. level for radon	20 mSv/a 300 Bq/m ³	-----



Exposure situations and categories of exposure

- Transitions

Category / Situation	Public	Occupational	Medical
Planned	Dose limit (Dose constraint)	Dose limit (Dose constraint)	DRL Dose constraint
Emergency	Reference level	Reference level	-----
Existing	Reference level	-----	-----

Diagram annotations: A red arrow points from 'Planned' to 'Emergency'. A yellow arrow points from 'Planned' to 'Existing'. A yellow arrow points from 'Public' to 'Occupational' in the 'Planned' row. A red arrow points from 'Existing' to 'Occupational' in the 'Emergency' row.



Radon: from existing to planned

Existing exposure

- reference level for indoor radon in homes:
300 Bq/m³
- reference level at workplace
1000 Bq/m³

Planned exposure (occupational)

- from 170 kBqh/m³
- dose limit: 20 mSv/a

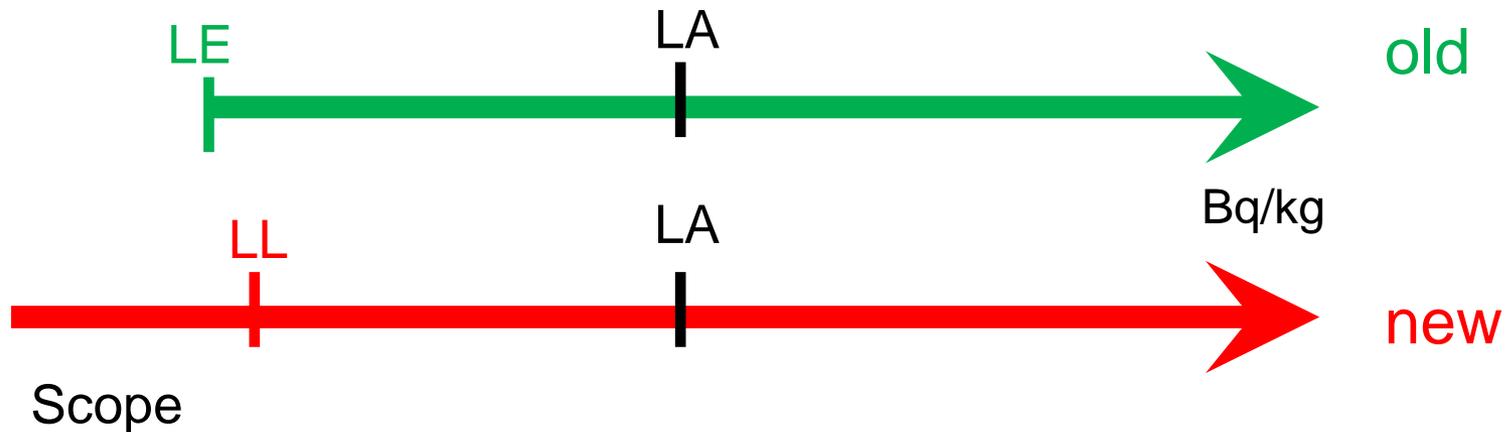


Scope – ionising radiation

- Ionising radiation $\lambda < 100$ nm, 12 eV
- regulated $\lambda < 0.25$ nm, 5 keV ?
- what about Extreme UV ?
- How to regulate ?
- How to measure? (Sv/h or W/m² ?)



Subject matter and scope, new concept



- Old: radioactive substance: not any more when under limit (LE)
- New: everything is radioactive but not subject to authority control
no limit to scope
- Clearance level LL – like Euratom BSS
- Autorisation / licence limite LA – keep Swiss value



Clearance level (LL)

Data sets

In view of the implementation of the new EU BSS into the Swiss legislation, we had to prepare the necessary data sets

Table A, Annex VII EU BSS

Activity concentration values for exemption or clearance of materials which can be applied by default to any amount and to any type of solid material



Clearance level (LL)

These values are only available for less than 300 radionuclides, whereas we need a complete set of data for 800 radionuclides in our legislation.

Therefore we have mandated “*Brenk Systemplanung / Consulting Engineers / Germany*” to do the necessary calculations for the 500 missing radionuclides.



Clearance level (LL)

Scenario	Description	Exposed individual	Relevant exposure pathway
WL	Worker on landfill or in other facility (other than foundry)	Worker	External exposure on landfill Inhalation on landfill Direct ingestion of contaminated material
WF	Worker in foundry	Worker	External exposure in foundry from equipment or scrap pile Inhalation in foundry Direct ingestion of contaminated material
WO	Other worker (e.g. truck driver)	Worker	External exposure from equipment or the load on the truck
RL-C	Resident near landfill or other facility	Child (1–2 a)	Inhalation near landfill or other facility Ingestion of contaminated foodstuffs grown on contaminated land
RL-A		Adult (>17 a)	Inhalation near landfill or other facility Ingestion of contaminated foodstuffs grown on contaminated land
RF	Resident near foundry	Child (1–2 a)	Inhalation near foundry



Clearance level (LL)

Scenario	Description	Exposed individual	Relevant exposure pathway
RH	Resident in house constructed of contaminated material	Adult (>17 a)	External exposure in house
RP	Resident near public place constructed with contaminated material	Child (1–2 a)	External exposure Inhalation of contaminated dust Direct ingestion of contaminated material
RW-C	Resident using water from private well or consuming fish from contaminated river	Child (1–2 a)	Ingestion of contaminated drinking water, fish and other foodstuffs
RW-A		Adult (>17 a)	

Criteria:

- realistic scenario \Leftrightarrow 10 μ Sv/a
- low probability scenario \Leftrightarrow 1 mSv/a
- worst case scenario



Results

Available documents

- Final report (in German) with the data for 800 radionuclides and details of the calculation
- Data set as excel-sheets

Quality control / validation

- The data of *Safety Guide RS-G-1.7* are correctly reproduced by the calculations
- Swiss FOPH – in collaboration with the Institute of Radiation Physics (IRA) – has validated the data.

Limitations

- The model has its limits, in particular for short lived nuclides; conventions are needed



Clearance levels (LL)

- IAEA BSS – Euratom BSS:
 - spec. activity for 257 nuclides (any amount)
 - abs. activity for 600 nuclides (moderate amount)

- CH (Radiation Protection Ordinance):
 - spec. activity for 800 nuclides (IAEA scenarios)
 - shortlived nuclides: $LL = \min (LE_{BSS_moderate}, LE_{Brenk})$

- NORM
 - according to Euratom BSS



Annex III, Radiation Protection Ordinance (LL)

Verordnung

814.501

Nuclide										e inh		LL		CS	
Radi nuklid	Halbwertszeit	Zerfallstyp/ Strahlung	S_{inh} Sv/Bq	S_{ext} Sv/Bq	h_{inh} (mSv/h)/ GBq in 1 min Abstand	h_{ext} (mSv/h)/GBq 10 Abstand	h_{ext} (mSv/h)/ GBq (kBq/cm ²)	LL Bq/g	LA Bq	Richtwerte		CS Bq/cm ²	Instabiles Tochternuklid		
1	2	3	4	5	6	7	8	9	10	11	12	13			
Fr-222	14.2 m	β^- / ph	2.10E-08	7.10E-10	0.001	1000	1.6	1.E+03 [2]	3.00E+05	4.00E+02	3		→ Ra-222 etc.		
Fr-223	22.00 m	β^- , α / ph	1.30E-09	2.30E-09	0.017	2000	1.8	1.E+02 [1]	5.00E+06	6.00E+03	3		→ Ra-223		
Ra-223	11.43 j	α / ph	5.70E-06	1.00E-07	0.024	600	0.5	1.E+01 [2]	1.00E+03	1.00E+00	3		→ Rn-219 → Po-215 → Pb-211		
Ra-224	3.66 j	α / ph	2.40E-06	6.50E-08	0.002	30	<0.1	1.E+00 [2]	3.00E+03	3.00E+00	3		→ Rn-220 etc.		
Ra-225	14.9 j	β^- / ph	4.80E-06	9.50E-08	0.007	1000	0.9	1.E+01	1.00E+03	2.00E+00	3		→ Ac-225		
Ra-226	1600 a	α / ph	2.20E-06	2.80E-07	0.001	50	<0.1	1.E-02 [2]	3.00E+03	4.00E+00	1		→ Rn-222		
Ra-226 (+ filles)					0.283	5000	5.2	1.E-02	xxxx	xxxx	1				
Ra-227	42.2 m	β^- / ph	2.10E-10	8.40E-11	0.038	2000	1.8	1.E+02 [1]	3.00E+07	4.00E+04	3		→ Ac-227		
Ra-228	5.75 a	β^- / ph	1.70E-06	6.70E-07	<0.001	<1	<0.1	1.E-01 [2]	4.00E+03	5.00E+00	0.3		→ Ac-228		
Ac-224	2.78 h	ec, α / ph	9.90E-08	7.00E-10	0.038	100	0.2	1.E+02 [1]	6.00E+04	8.00E+01	30		→ Ra-224, Fr-220 etc.		
Ac-225	10.0 j	α / ph	6.50E-06	2.40E-08	0.005	20	0.1	1.E+01 [2]	9.00E+02	1.00E+00	10		→ Fr-221 etc.		
Ac-226	29.37 h	β^- , ec, α / ph	1.00E-06	1.00E-08	0.024	1000	1.3	1.E+02 [2]	6.00E+03	8.00E+00	3		→ Th-226, Ra-226, Fr-222		
Ac-227	21.772 a	β^- , α / ph	6.30E-04	1.10E-06	<0.001	<1	<0.1	1.E-02 [2]	1.00E+01	1.00E-02	0.1		→ Th-227, Fr-223		
Ac-228	6.15 h	β^- / ph	2.90E-08	4.30E-10	0.145	2000	1.8	1.E+01 [1]	2.00E+05	3.00E+02	3		→ Th-228		
Th-226	30.57 m	α / ph	7.80E-08	3.60E-10	0.002	100	0.3	1.E+03 [1]	8.00E+04	1.00E+02	30		→ Ra-222 etc.		
Th-227	18.68 j	α / ph	7.60E-06	8.90E-09	0.023	200	0.2	1.E+01	8.00E+02	1.00E+00	10		→ Ra-223		
Th-228	1.9116 a	α / ph	3.20E-05	7.00E-08	0.002	3	<0.1	1.E-01 [2]	2.00E+02	3.00E-01	3		→ Ra-224		
Th-229	7.34 E3 a	α / ph	6.90E-05	4.80E-07	0.027	300	0.5	1.E-01 [2]	9.00E+01	1.00E-01	0.3		→ Ra-225		
Th-230	7.538 E4 a	α / ph	2.80E-05	2.10E-07	0.001	3	<0.1	1.E-01	2.00E+02	3.00E-01	1		→ Ra-226		
Th-231	25.52 h	β^- / ph	4.00E-10	3.40E-10	0.019	700	0.8	1.E+03	2.00E+07	2.00E+04	10		→ Pa-231		
Th-232	1.405 E10 a	α / ph	2.90E-05	2.20E-07	0.001	3	<0.1	1.E-01 [2]	2.00E+02	3.00E-01	1		→ Ra-228		
Th-234 / Pa-234m	24.10 i	β^- / ph	5.80E-09	3.40E-09	0.008	1000	1.9	1.E+02 [2]	1.00E+06	1.00E+03	3		→ Pa-234		
Th nat (+ filles)					0.355	6000	5.4				1				
Pa-227	38.3 m	α , ec / ph	9.70E-08	4.50E-10	0.007	5	<0.1	1.E+01 [1]	6.00E+04	9.00E+01	300		→ Ac-223		
Pa-228	22 h	ec, β^- , α / ph	5.10E-08	7.80E-10	0.168	400	0.9	1.E+01	1.00E+05	2.00E+02	10		→ Th-228, Ac-224		
Pa-230	17.4 j	ec, β^- , α / ph	5.70E-07	9.20E-10	0.108	200	0.3	1.E+01	1.00E+04	1.00E+01	30		→ Th-230, U-230, Ac-226		
Pa-231	3.276 E4 a	α / ph	8.90E-05	7.10E-07	0.020	40	0.1	1.E-02	7.00E+01	9.00E-02	0.3		→ Ac-227		

Anhang 4
siehe



Authorisation

- Licence
- Simplify licence (mainly dentist, small hospital)
- Specifically exempt („Typenbewilligung“)

According to the radioprotection law, the use of ionizing radiation to human is subject to authorisation, this stay the same (no change in the law)

New licences

- NORM-Industrie:
 - from 1.0 mSv for workplace
 - from 0.3 mSv in the environment
 - Radon workplace: from 170 kBqh / m³
- Manipulation or in contact with orphan sources



Environmental and population protection

- Immission limit for effluent air and water
 - Air: 0.3 mSv / y through inhalation und immersion
 - Water: consumption of 650 l give rise to a dose of 0.3 mSv
- Replacement of tolerance value for food
- No other protection of the environment (animal, etc.)



Building material

- **use of the activity concentration index (I) for the gamma radiation emitted by building materials** according to Euratom BSS
 - Building material with $I < 1$
No restrictions on the envisaged use of such materials
 - Building material with $I < 1$
should not give doses exceeding 1 mSv / y



Occupational exposure

New

- Introduction of category A and B worker
- NORM-Industry: from 1 mSv per year
- Radon in workplace: from 170 kBq/m³
- Flightpersonal: from 1 mSv per year

Modification

- Reglementation for pregnant women
- Reglementation for young persons



Dosimetry



NORM, Radon

- Ambient dosimetry – time of stay (dosimetry done by calculation)

Flight personal

- Flightroute, planification of schedule (dosimetry done by calculation)

Interventional medicine

- Double dosimetrie mandatory

Eye lense

- Use of double dosimetry (use of correction factor to take into account the geometry and wearing of glasses)

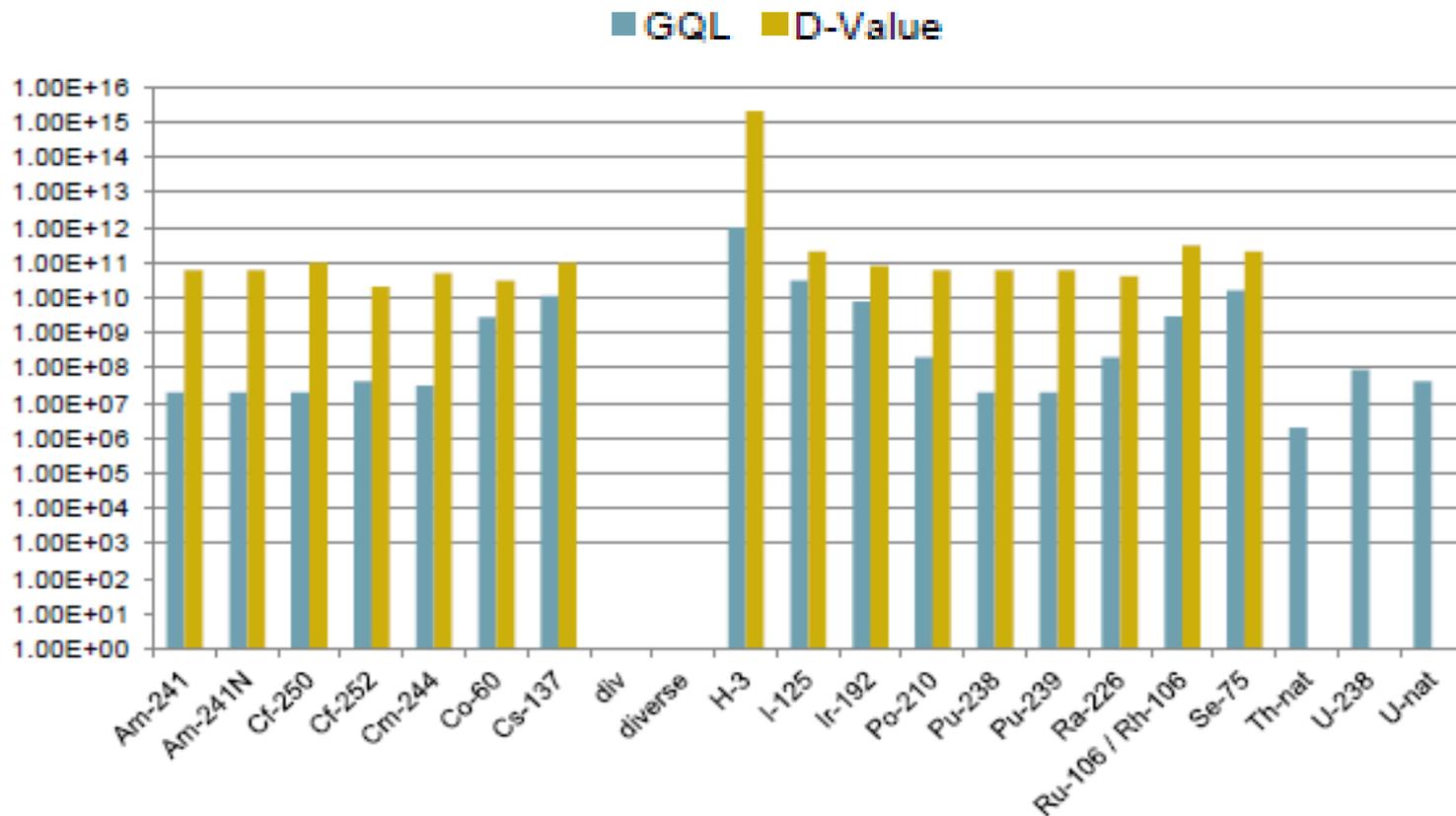
Hand

- Finger dosimetry mandatory (use of correction factor for finger tip dosis)



HASS sources, new value

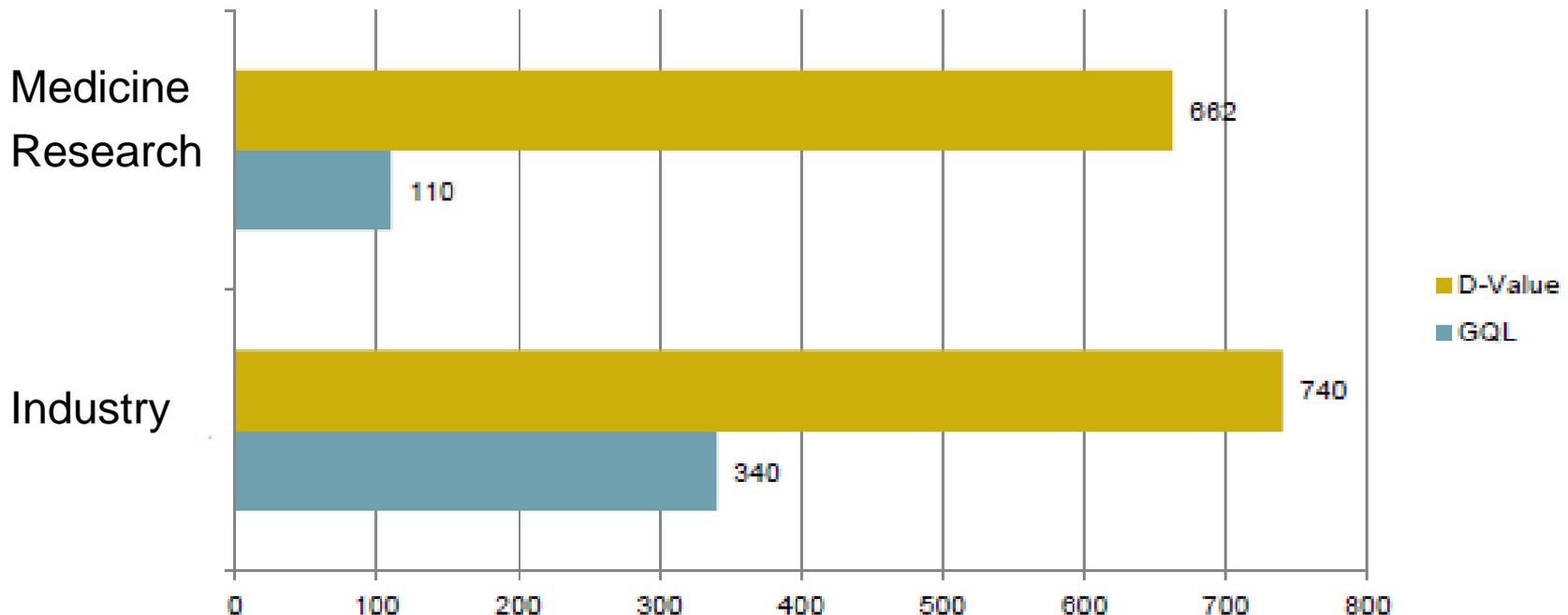
New D-value (BSS) are higher than the old Swiss (GQL) value for HASS





HASS sources, number of sources

A decrease of number sources which fall into categorie HASS with the New D-value (BSS),
factor 5 for the medicine and research field, factor 2 for industry field





Radioactive sources

- **HASS**
 - Definition according to Annex II Euratom BSS
 - Safety concept according to IAEA
 - Each HASS, Individual autorisation mandatory
 - exeption Ir-192, afterloading appliances
 - too many authorisations to be issued per year



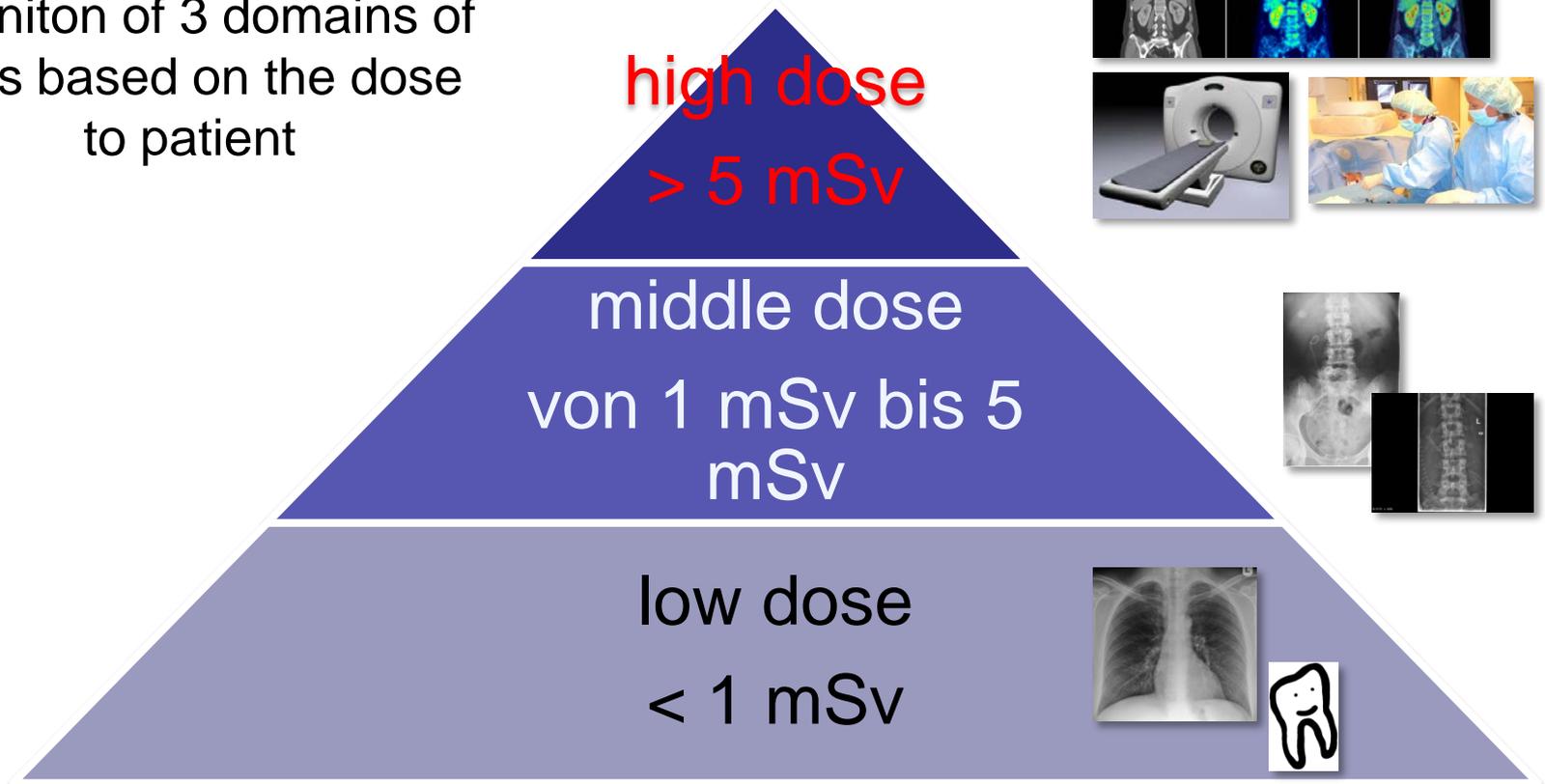
Radioactive sources

- **Orphan sources**
 - Authorisation mandatory for
 - Incineration centers
 - Metal scrap dealers
 - Requirement on:
 - Training
 - Storage
 - Safety concept
 - Mandatory installation of measurement device at the entrance



Medicine, Swiss approach

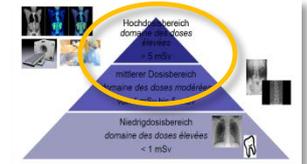
Definiton of 3 domains of risks based on the dose to patient





Medicine

- **According to the domain of dose (to patient) different requirements are foreseen:**
 - Documentation needed for authorisation procedure
 - Presence of medical physicist
 - Introduction of Clinical Audit
 - Possibility of screening program
 - Possibility of X-Ray imagery for non clinical purpose (scanner, etc.)
 - Introduction of clinical incident reporting system (CIRS)
- **Inclusion of the 3 level of justification according to ICRP in the legislation**





Medicine, diagnostic reference level

- Adaptation and introduction of diagnostic reference level in all medical field, mandatory of automated exposition control



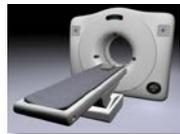
X-Ray Unit

DAP



Densitometry

AGD



CT

CTDI_{vol} and DLP



Radioscopy

IRP



PET / CT

Activity, CTDI_{vol} and DLP



Technical ordinance in medicine

- Adaptation of the quality assurance for the all X-ray chain from the X-ray unit till the image



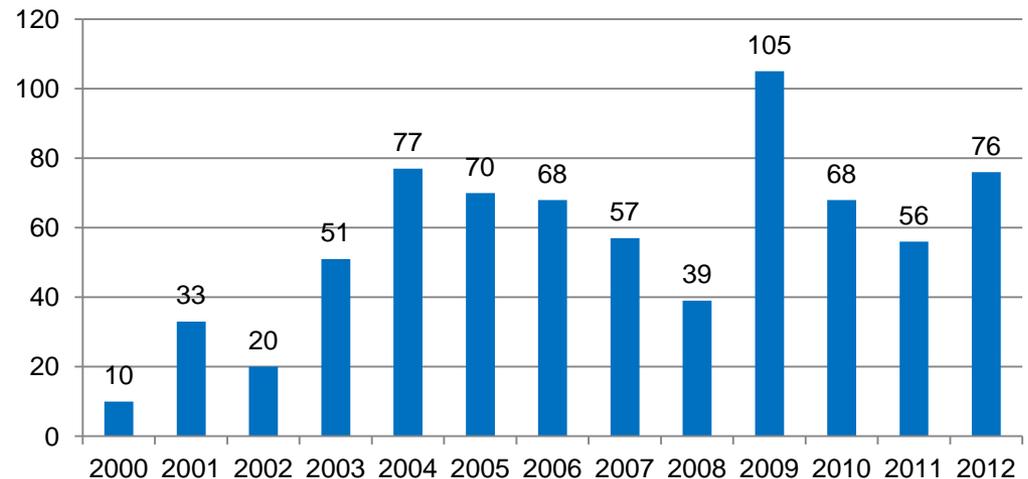
- New dose limit for carriers and comforters
- Introduction of the new controlled area concept, controlled and supervised area
- New requirement on fire resistance for storage room with radioactive sources in the medical field



Training and education

- Euratom BSS definition of RPE / RPO, recognition of training
- Goal: mutual recognition of RP

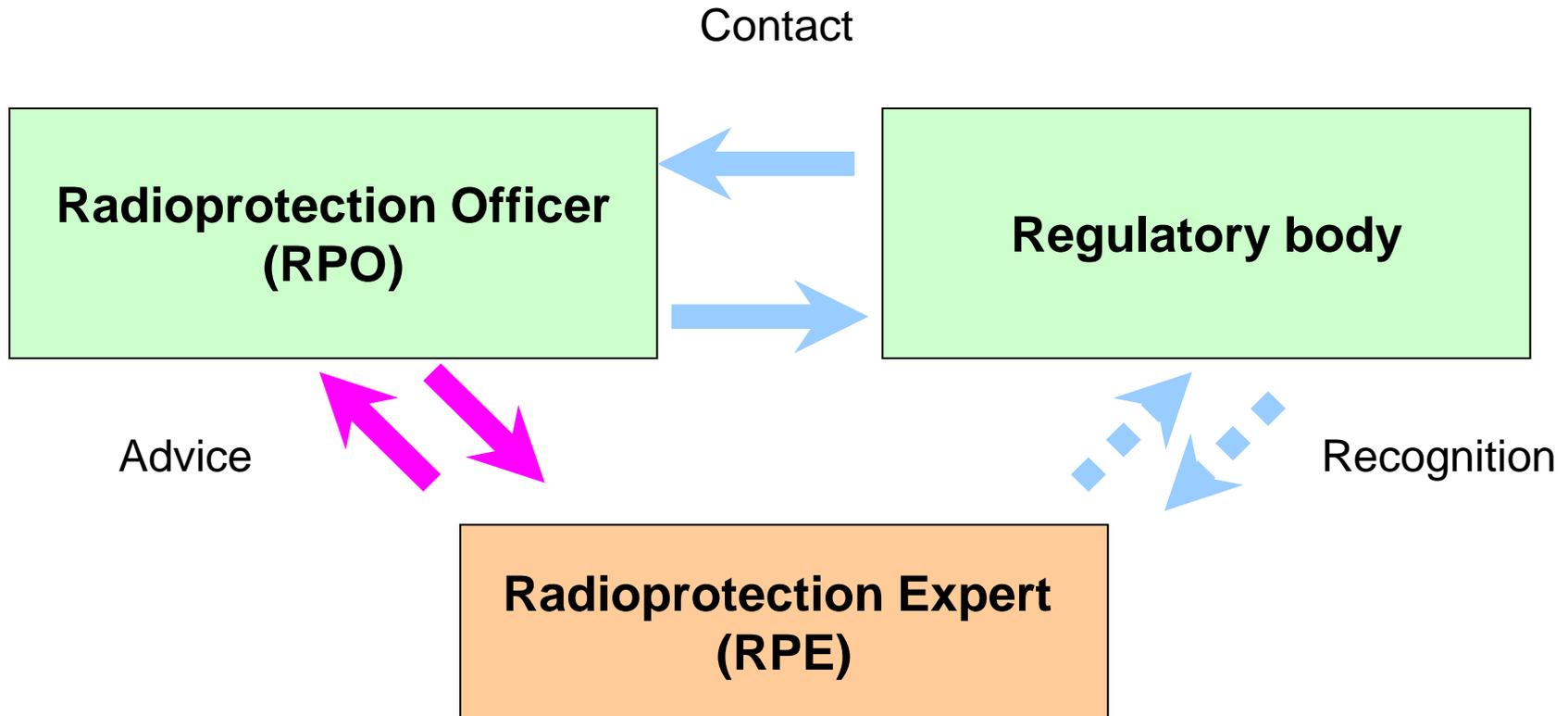
In CH
in the medical field only
more than 50 recognition per year
since Bilateral Agreement with EU



- For the requirement on education in radiation protection and recognition of the competence of expert in the different field (nuclear powerplant, medical, industrial) a Swiss approach was adopted.



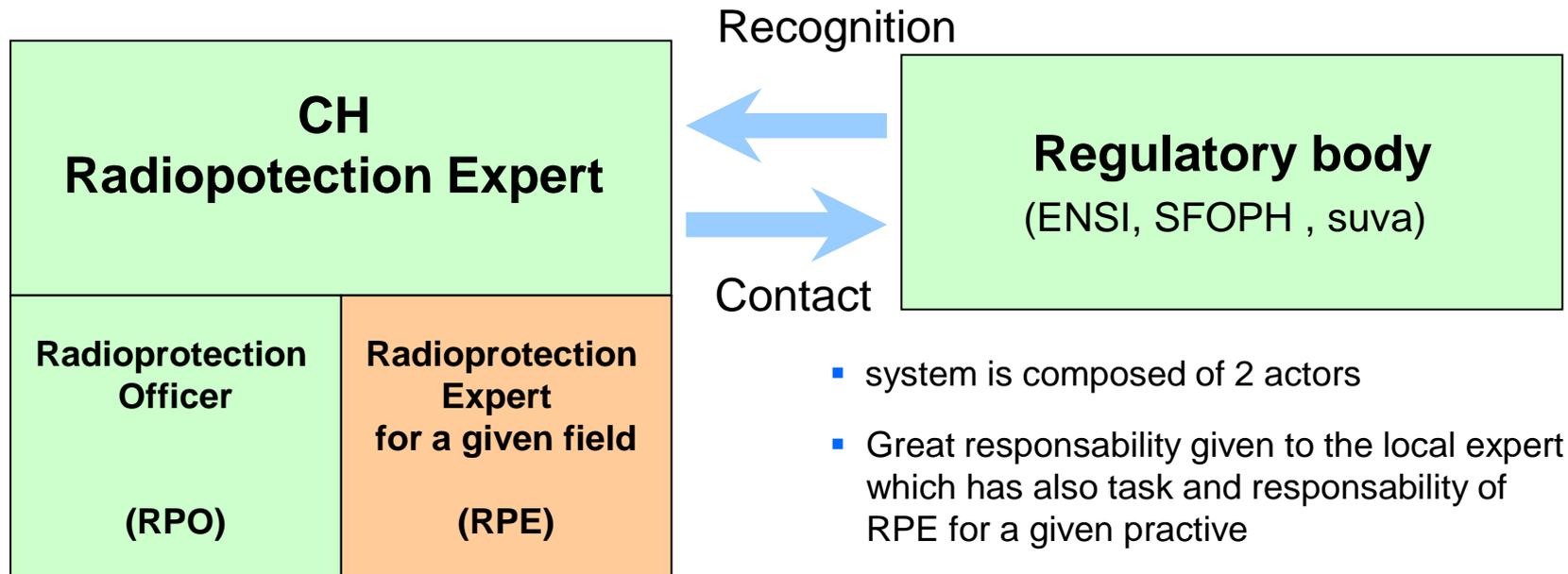
Concept EUTERP, EU-BSS





Swiss System

Goal of the system in CH and of the training in radiation protection is to guarantee the security of population, workers, patient and environment



- system is composed of 2 actors
- Great responsibility given to the local expert which has also task and responsibility of RPE for a given practice
- Mandatory recognition of all CH radioprotection Expert in the different field in Switzerland



Swiss System

Old System used the definition of qualified person in radiation protection.

New we will have 8 categories of person dealing with ionizing radiation and each of them need a different training and education:

1. Person dealing with ionizing radiation
2. Person having responsibility to third one
3. Medical personal (without physician, protection of patient)
4. Medical physician (Radiology, nuclearmedicine, general practitioner with X-ray units)
5. Medical physicist
6. Radiation Protection Expert (RPE CH)
7. Radon expert
8. Person in emergency organization or taking part to emergencies



Training and education

- Necessity to have a responsible recognized RPE (CH) in all Authorization (medicine / industry / nuclear power plant)
- Emergency Personal, training mandatory
- Recognition of the education through a regulatory body for the categories 2 to 8
- Definition of the education in legislation for all 48 groups
 - Competence
 - Content of the education
 - Taxonomy for the content of the training (5 levels, Bloom Taxonomy)
 - Autorised activity
- Introduction of a mandatory continuous education in radioprotection
- RPE/RPO introduced in the Swiss concept with one category RPE (CH)



Continuous education

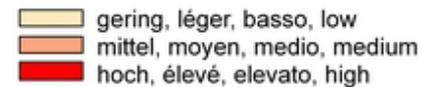
- Mandatory continuous education for all RPE (CH) having a function
- Continuous education is composed of
 - Lessons learn
 - New development
- This continuous education must be recognized by a regulatory body
- Periodicity: 5 years or 3 years for high dosis and risk (Therapy, etc.)
- For all other person involved in radiation protection, mandatory continuous education under the responsibility of the RPE (CH)



Radon

Existing radon program from 1994 to 2014

Art. 110-118a : Ordinance on radiation protection (ORaP)



Dwelling and building with public access:

Limit value 1000 Bq/m³

Guideline value 400 Bq/m³

Workplaces:

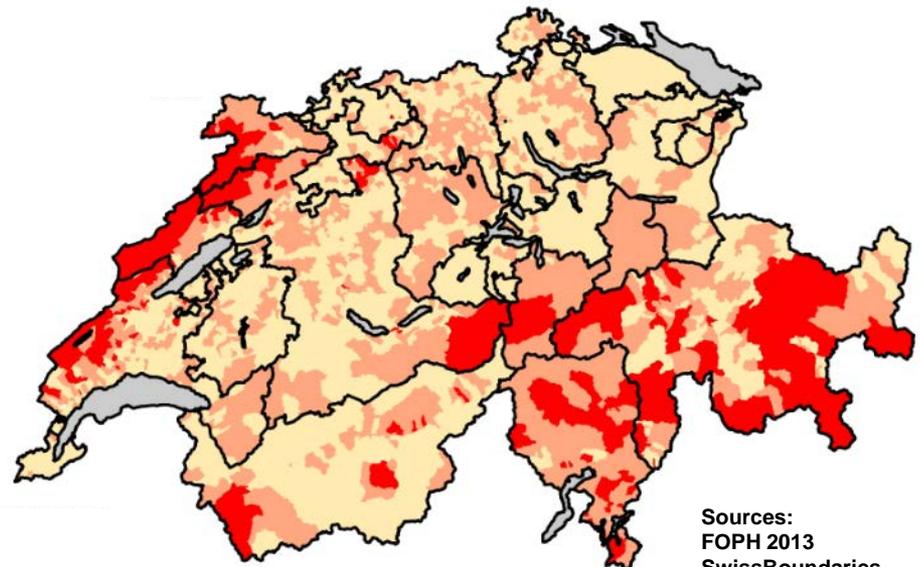
Limit value 3000 Bq/m³

Statistics (State 2013):

~ 150'000 measured buildings

~ 3'000 buildings > 1000 Bq/m³

~12'000 buildings > 400 Bq/m³



Sources:
FOPH 2013
SwissBoundaries
2012©Swisstopo



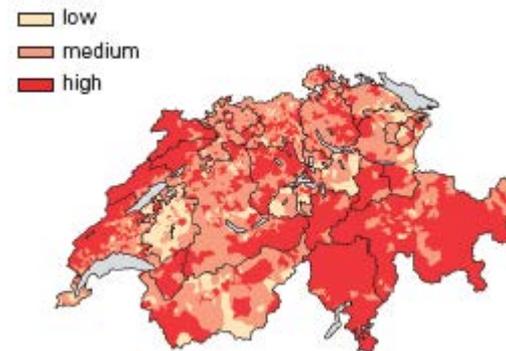
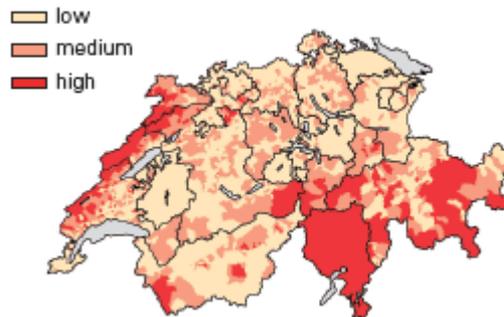
New reference value for Radon

- Population
 - 300 Bq/m³ instead of value of 1000 Bq/m³
 - All Switzerland is to be considered as radon area
- Workplace
 - 1000 Bq/m³ instead of all value of 3000 Bq/m³
 - monthly 170 kBqh/m³
 - or 1000 Bq/m³ for 170 h stay per month
 - than limit of 20 mSv/y (planned or work situation)



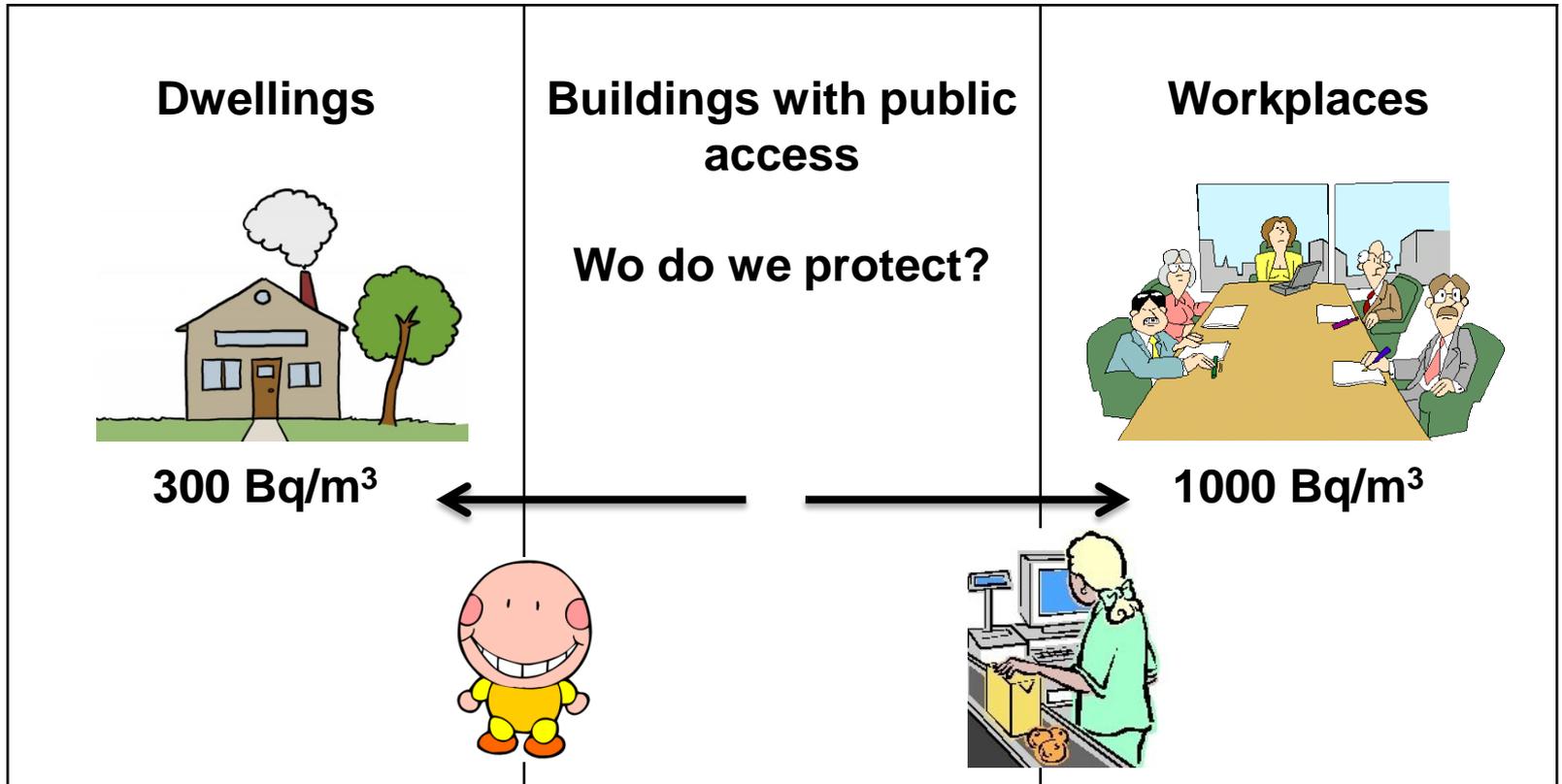
Buildings concerned

Home and dwellings with concentration higher than the limits of	1000 Bq/m³	300 Bq/m³
Already identified	3000 building (2%)	15'000 building (12%)
Estimation for all Switzerland	5000 - 10'000 building	50'000 - 100'000 building





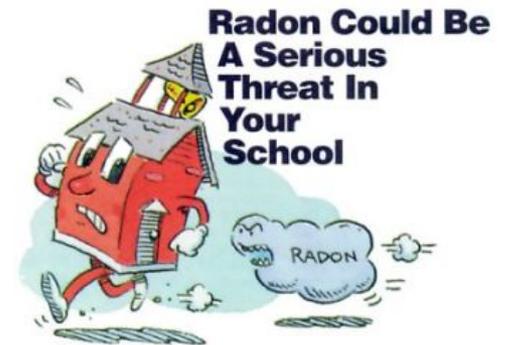
Radon reference level





Accredited measurements

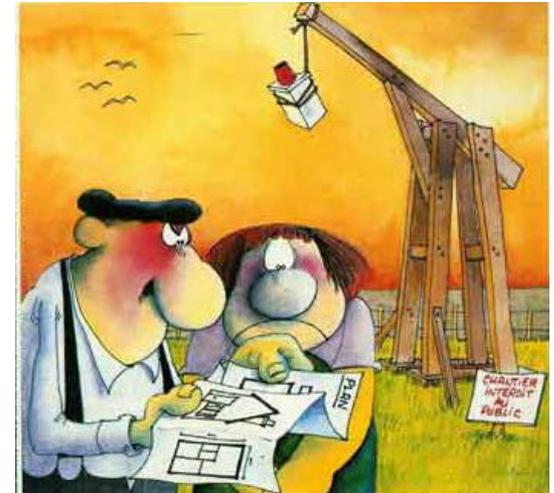
- Cantons need an accreditation from SFOPH
- Accreditation validity max 5 years
- Measurements protocols (in development: working group METAS)
- In case of exceeding the reference value: notification of the concerned authority
- Delay of 1 month after receiving results to register measurement in the radon database
- Measurements in schools and kindergarten overseen





Building permission

- **Canton** has the obligation to inform building owner about the requirements of ORaP
- **Building owner** is responsible :
 - to be under reference level
 - to take prevention measures (conform to state of the art)
 - make a radon measurement in new buildings
- **In case of exceeding the reference value :**
 - radon mitigation within 1 year
 - building owner can use the private law to receive reimbursement from the construction company





Graded approach for radon mitigation

- Radon mitigation, in case of exceeding 300 Bq/m³ :
- Priority for schools and kindergartens
- Dwellings:
 - According emergency of the case und economical criteria
 - Ultimately by the next renovation with building permission
 - Possibility of derogation if the principle of proportionality isn't respected
- Building owner:
 - pays the mitigation costs
 - measures radon after mitigation and inform the authority about result





Protection of renters

- About **70%** of the Swiss household are renters
- The canton can ask for a measurement in case of renter request
- In case of exceeding the reference value :
 - **Now:** building owner has 3 years to mitigate
 - **Future:** renter can use the private law





Workplaces

- Obligation of measurement for the employers in “workplaces with radon risk”: underground facilities, caves and supplies facilities
- In case of exceeding the reference value of 1000 Bq/m^3 : Calculation of the radon concentration integrated on the working time over 1 month
- If the integrated radon concentration exceed 170 kBqh/ m^3 : transfer to planned exposure situation
- 170 kBqh/ m^3 : 1000 Bq/m^3 over 170 hours monthly working time





Radon consultants

- Requirements for the institution organizing radon training defined in the legislation
- FOPH publishes a list of radon consultants
- Radon consultants on the list are obliged to prove their activity
- Work done according to the state of the art





State of the art

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Eidgenössisches Departement des Innern EDI
Bundesamt für die Umwelt Baul
Baukriterienbereich Verbraucherschutz

BAG-Empfehlungen: bauliche Massnahmen für Neubauten

Gemäss [Art. 110 der Strahlenschutzverordnung](#) gilt für Neubauten ein gesetzlicher Richtwert von 400 Bq/m³. Das BAG empfiehlt jedoch, ein möglichst tiefes Niveau anzustreben. Der Standard [Minergie-ECO](#) sieht vor, dass die Radonkonzentration 100 Bq/m³ nicht überschreitet.

Vorsorgliche Massnahmen zum Radonschutz für alle Neubauten in der Schweiz:

1. Durchgehende Bodenplatte
2. Dauerhafte Abdichtung gegen das Eindringen und Aufsteigen von radonhaltiger Bodenluft, Wasser und Feuchtigkeit. Bei der Durchführung von Leitungen durch die erdberührenden Bauteile soll standardmässig ein Rohrdurchführungssystem (RDS) verwendet werden.
3. Damit langfristig keine Risse entstehen, soll für die Bodenplatte und die erdberührenden Wände wasserdichter Beton nach SIA-NORM 272 verwendet werden. Wird auf wasserdichten Beton verzichtet, sind Feuchtigkeitssperren einzubauen.
4. Nach Beendigung der Arbeiten und Bezug des Gebäudes ist eine anerkannte Kontrollmessung vorzunehmen.
5. Zusätzliche Massnahmen für Neubauten mit geringem Energiekonsum bzw. mit kontrollierter Lüftung: <ul style="list-style-type: none"> Bei Erdsonden und Erdregistern für Wärmepumpen soll für die Durchführung von Leitungen durch die erdberührenden Bauteile standardmässig ein RDS verwendet werden. Die Rohre müssen luftdicht und mit dichten Stössen ausgeführt sein, zudem ist ein Material zu verwenden, das chemischen und physischen Einflüssen langfristig standhält (z. B. Polyethylen). Erdsonden sollen seitlich versetzt in einiger Entfernung des Gebäudes und nicht unter der Bodenplatte verlaufen. Bei Luftbrunnen muss zusätzlich die Kesselfüllung durch eine undurchlässige Schicht (z. B. Lehm oder Folie) seitlich und nach unten begrenzt sein. Nach Beendigung der Arbeiten ist eine anerkannte Kontrollmessung unbedingt erforderlich. Bei kontrollierter Lüftung¹ soll die Frischluftansaugung mindestens 1.5 m über der Erdoberfläche platziert werden. Die Lüftungsanlage ist druckneutral oder mit einem leichten Überdruck (wenige Pascal) zu betreiben. Falls kein Überdruck im Gebäude aufgrund möglicher Wasserkondensation in den Wänden erzeugt werden kann, oder die Bodenplatte keine ausreichende Dichtigkeit aufweist, kann alternativ eine Unterboden-Entlüftung installiert werden (siehe 6. Zusätzliche Massnahme).
6. Zusätzliche Massnahme für Neubauten mit erdberührenden Wohn- und Aufenthaltsräumen oder mit einem Naturkeller: <p>Unterboden-Entlüftung (Radondrainage): perforierte Rohre (aus einem Material, das langfristig eine gute Plastizität aufweist, z. B. Polyethylen) in einer Kiesschicht unter der Bodenplatte mit einer Anschlussmöglichkeit für eine allfällige Bodenentlüftung. Die Art der Rohrverlegung ist von der Durchlässigkeit des umgebenden Materials abhängig. Es muss sichergestellt werden, dass die ganze Fläche des Hauses entlüftet wird.</p>

➤ Die internationale Broschüre [Radon: Vorsorgemassnahmen bei Neubauten](#) enthält detailliertere technische Hinweise. Die Publikation entspricht dem Konsens unter den beteiligten Ländern und deren Inhalt kann deshalb von nationalen Empfehlungen abweichen (z. B. wird in der Schweiz empfohlen, die geeigneten Schutzmassnahmen für Neubauten unabhängig vom Radonrisiko in der Gemeinde zu treffen).

➤ Kontaktlisten: [Liste der kantonalen Radonverantwortlichen](#) (Willing des Radonprogramms), [Liste der Radonfachpersonen](#) (Beratung zu baulichen Vorsorgemassnahmen und Sanierungen)

➤ Referenzen:
¹ SIA-NORM 180/1999: Wärme- und Feuchteschutz im Hochbau
² SIA-Merkblatt 2023: Lüftung in Wohnbauten (Punkte 6.7.1 und 6.7.2)

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Radon

Precautions for new buildings

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation
Federal Department of Home Affairs DHA
Federal Office of Public Health FOPH

Baden-Württemberg
MINISTERIUM FÜR UMWELT, NATURENSCHUTZ UND ENERGIE

AUTONOME PROVINZ
NORDRHEIN-WESTFALEN
Umweltministerium

REGIONAL AUTONOMA
DE LA CANTON DE VALAIS
Département de l'Environnement

Bayerisches Landesamt für Umwelt

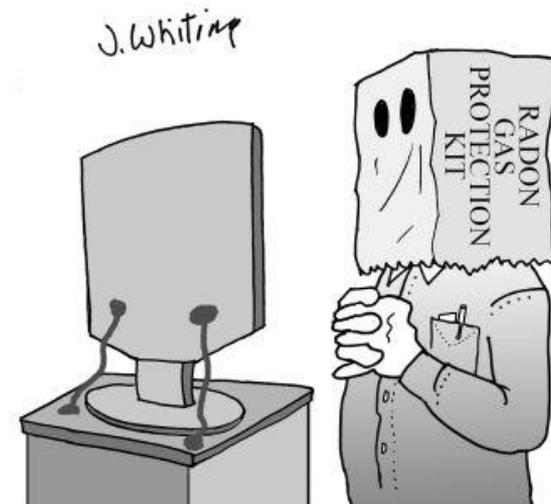
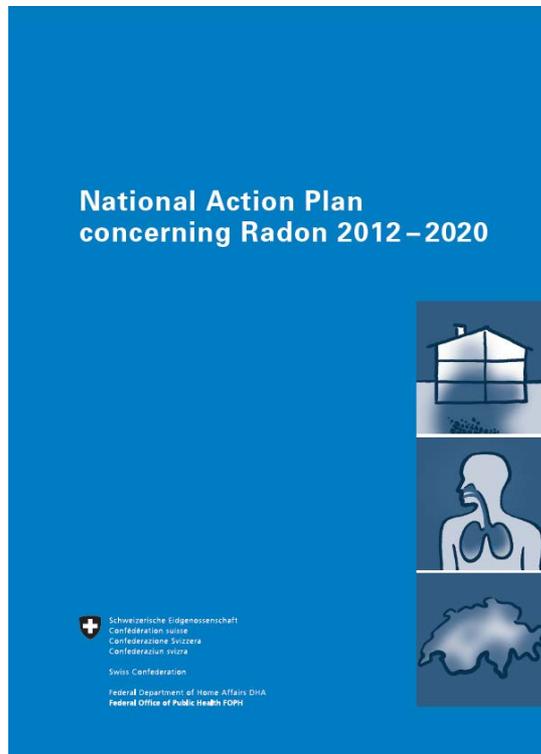
LEAD
CONSTRUCTION

AGES

July 2014: new Version of the **SIA-NORM 180** :
 “Thermal insulation, protection against humidity
 and air quality in buildings” Radon included

New action plan on Radon 2012 - 2020

www.ch-radon.ch



Jack found his Radon Gas Protection Kit on the Internet at Amazon.com.



Radioactivity at the Swiss border

- Introduction in the legislation of a concept to be able measure radioactivity at the border
- Concept planed a collaboration between SFOPH Office of Border Gards office
- Control of radioactivity by import and export
- Concept for measurement at the border is now in progress
- Mobile measurement system





Resume

- Revision of 10 Ordinances in radiation protection
- Long project, more than 4 years, not finished
- Harmonization with Euratom BSS and ICRP 103
- New expositions situation, new limit and reference values rise questions and many adaptations in the legislation are needed (clearance level, radon, medicine, HASS)
- Education concept (RPE/RPO) of BSS vague and difficult to integrate in Switzerland, Swiss approach



Thank you for your attention



Bern, Switzerland