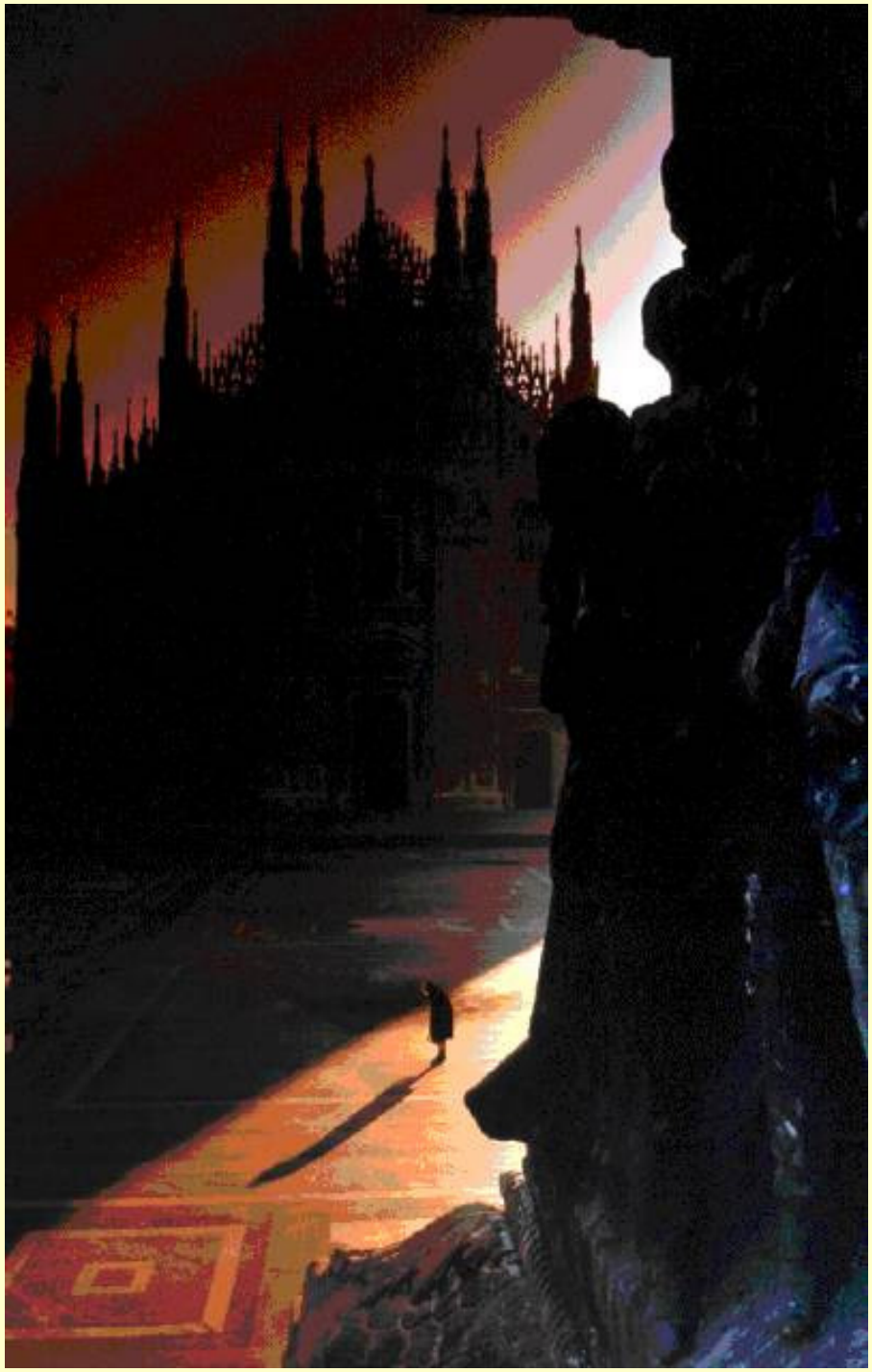


The Environmental Protection Agency of Lombardia

ARPA Lombardia (Italy)

ARPA Lombardia operates in the framework of Italian Regional Environmental Agencies, coordinated at a national level by the National Environmental Agency (APAT - Rome)

in Italy: 21 Regional Environmental Protection Agencies

ARPA Lombardia:

13 offices in the main towns of the region

around 1,000 people employed

Lombardia region:

9,000,000 people

1/6 of Italian population

The main tasks of ARPA:

- monitoring of chemical and physical pollutants in the environment
- supports public authorities in environmental policy activities
- supports stakeholders involved in environment recovery plans

The structure of ARPA Lombardia

Regional headquarter:

- Administration
- Coordination
- General policy

13 provincial departments in the main towns of Lombardia: operational and technical tasks

AIR

SOIL

WATERS

PHYSICAL AGENTS

WASTES

I.P.P.C

Integrated Pollution Prevention Control

Office for Physical Agents:

Director: *dr. Adriano Cati*

25 staff members

- Noise and vibrations
- **Ionizing Radiations**
- Electromagnetic Fields

- **4 physicists**

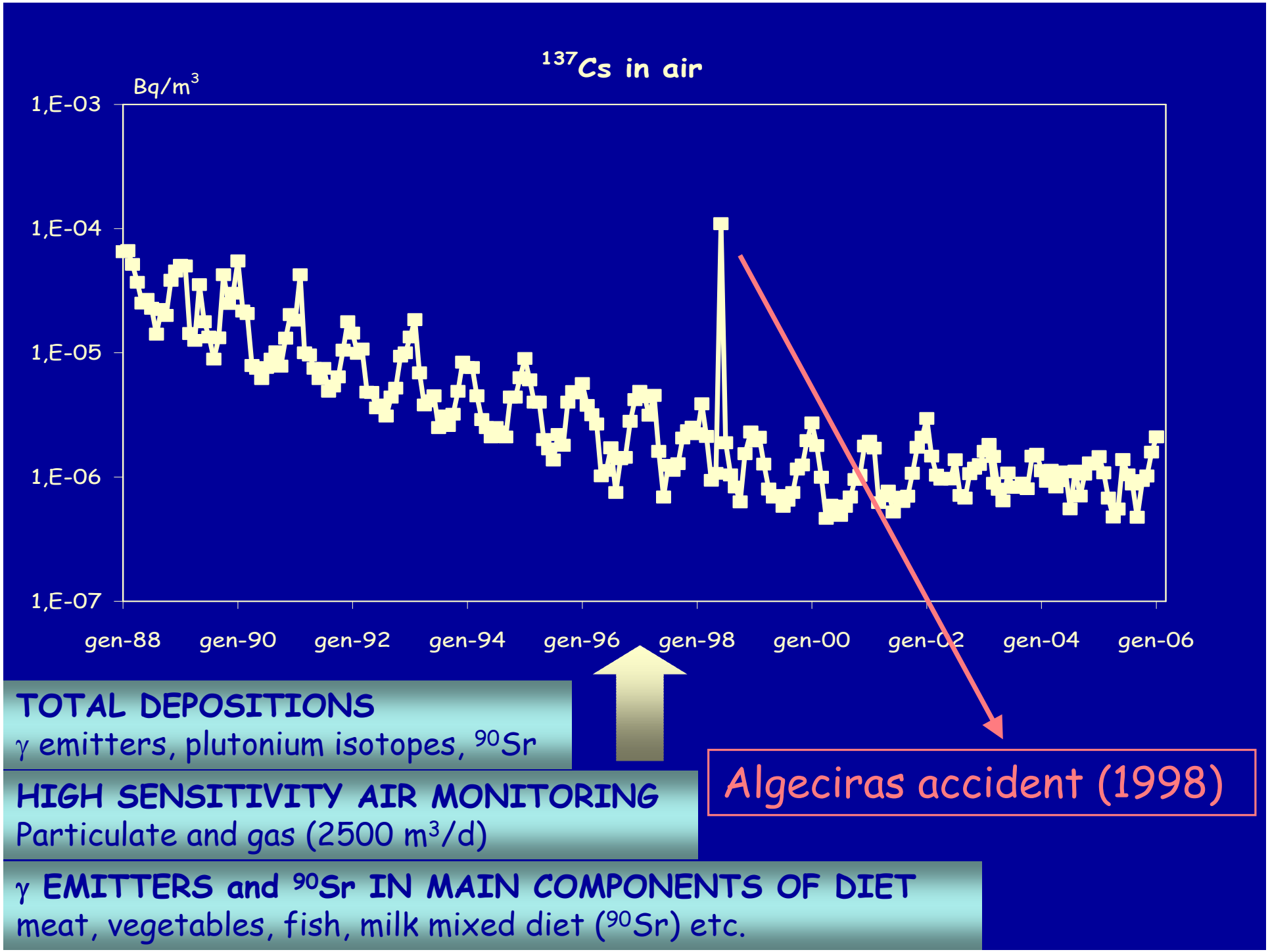
dr. Rosella Rusconi, dr. Daniela Lunesu, Mr. Pietro Badalamenti, Ms. Silvia Maltese

- **4 chemists**

dr. Maurizio Forte, Mr. Giuseppe Abbate, Mr. Michelino Palermo, Mr. Gianni Gadaleta

- **2 secretaries**

Mrs. Letizia Fava, Ms. Valentina Pedone


^{137}Cs in air
Bq/m^3
1,E-03
1,E-04
1,E-05
1,E-06
1,E-07
gen-88
gen-90
gen-92
gen-94
gen-96
gen-98
gen-00
gen-02
gen-04
gen-06
TOTAL DEPOSITIONS
γ emitters, plutonium isotopes, ^{90}Sr
HIGH SENSITIVITY AIR MONITORING
Particulate and gas (2500 m^3/d)
γ EMITTERS and ^{90}Sr IN MAIN COMPONENTS OF DIET
meat, vegetables, fish, milk mixed diet (^{90}Sr) etc.
Algeciras accident (1998)

Ionizing Radiation Section:

- Gives technical support to public authorities (health offices etc.) facing radioprotection problems
- Assists stakeholders in case of accidents involving radioactive sources
- Runs regional programs for emergency preparedness
- Runs special monitoring programs for the study of radioactive nuclides behaviour in the environment and the assessment of dose to population

RADON INDOOR

DMOS IN PO RIVER

MOSSES (^{137}Cs and ^{90}Sr)

DEPTH PROFILE IN SOILS (^{137}Cs and ^{90}Sr)

NATURAL RADIOACTIVITY CONTENT OF DRINKING WATERS

Ionizing Radiation Section:

- Development of new procedures
- Cooperation with university
- Collaboration with standardization organizations (UNI, ISO)
- Analytical services to private customers
- Member of the IAEA ALMERA Network

One of the few radiochemical labs operating in Italy

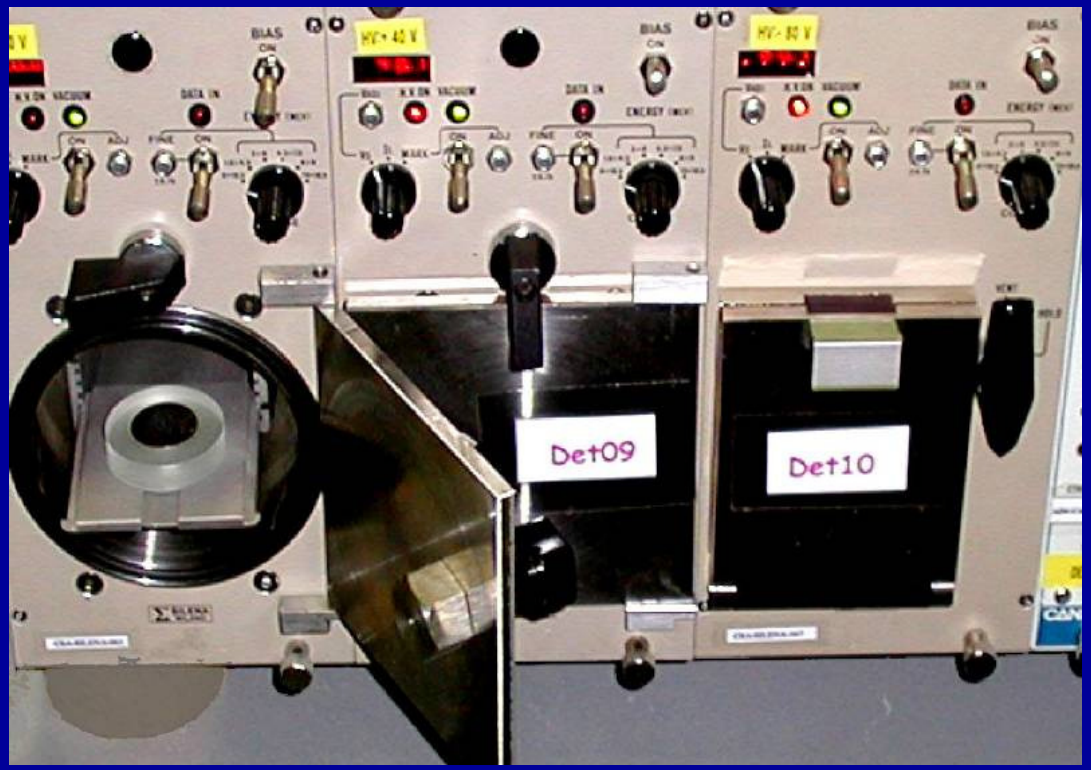
Equipment & methods:

- 6 HPGe γ detectors
- 1 HPGe γ/**X** detector
- 1 portable HPGe γ detector *(in-field measurements)*

X and γ emitters (5 keV<E<2 MeV)

Equipment & methods:

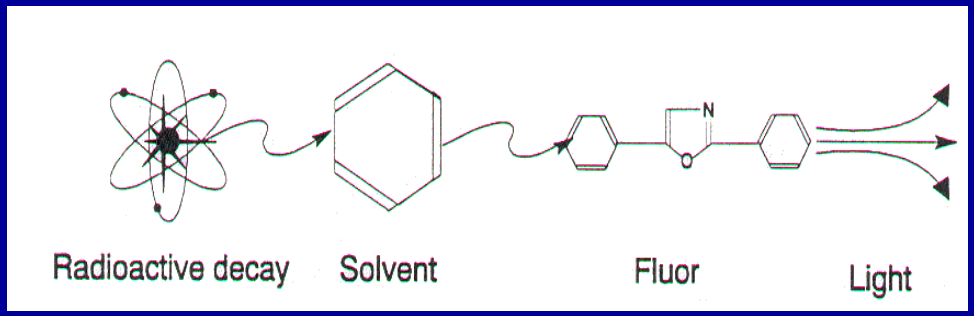
- 3 silicon surface barrier detectors
- Electrodeposition device



Plutonium and Uranium isotopes, ^{210}Po

Equipment & methods:

- 1 ultra low-level scintillation counter (LSC)



Gross α and β

U isotopes

^{226}Ra

^{222}Rn

^{3}H

^{210}Pb

^{90}Sr

Equipment & methods:

- 2 gross α counters
- 2 gross β counters

Gross α and β, ^{90}Sr, ^{210}Pb

Equipment & methods:

- Systems for ambient γ dose (TLD)
- Track detectors (CR39) for indoor ^{222}Rn measurement
- Lucas cells and emanometric device for ^{222}Rn in water
- Portable survey probes for in-field measurement of α, β and γ contamination

Equipment & methods:

Pre-treatment of organic and inorganic matrices:

- Plastic fume-hood for HF treatment
- Mills and blenders
- Ovens and muffle furnaces

Chemical lab facilities:

- Ionic and extraction chromatography
- Atomic absorption spectrometer
- Surveilled area for radioactive tracing

Quality Assurance:

- In 2004 ARPA Lombardia earned its certification according to internationally recognized ISO 9001 Standards

- In 2007 analytical methods were accredited under ISO/IEC 17025: gamma specrometry, gross activity in water, radon indoor

INTERCOMPARISONS

1988	ENEA-INMRI	γ emitters	Water
1990	ENEA-INMRI	γ emitters	Water
1990	ENEA-INMRI	^{90}Sr	Water
1992	ENEA-INMRI	γ emitters	Soil
1992	WHO-IRC	^{3}H and ^{90}Sr	Water
1993	WHO-IRC	Uranium, ^{226}Ra and ^{60}Co	Water
1994	WHO-IRC	^{3}H, ^{14}C and ^{137}Cs	Water
2001	ANPA	Uranium	Soil
2001	NRPB	^{222}Rn	Air
2002	WHO-IRC	Gross α and β, ^{3}H and ^{40}K	Water
2003	ENEA	^{222}Rn	Water
2003	IAEA	Radium and Uranium isotopes	Water
2003	NRPB	^{222}Rn	Air
2004	APAT-INMRI	γ emitters	Air filter
2004	EC-IRMM	U isotopic ratios	Simulated urine
2004	EC-IRMM	^{137}Cs	Air filter
2005	EC-IRMM	γ emitters and ^{90}Sr	Milk powder
2005	EC-IRMM	U, Pu and Cs isotopic ratios	Saline medium
2005	NRPB	^{222}Rn	Air
2006	SOGIN	^{3}H	Metal scrap
2006	APAT-INMRI	^{222}Rn	Air
2006	IAEA	γ emitters	Water, soil and grass
2007	EC-IRMM	Radium and Uranium isotopes	Water
2007	IAEA	γ emitters, Uranium isotopes and ^{90}Sr	Water, soil and grass
2007	IAEA	^{210}Po	Water
2007	HPA (NRPB)	^{222}Rn	Air
2008	CEA	^{210}Pb and ^{210}Po	Water

Drinking Water Regulations

Radon and daughters:

UE: Commission Recommendation on the protection of the public against exposure to radon in drinking water supplies (2001)

^{222}Rn > 100 Bq/L: Member States should set a reference level for radon (= 100 Bq/L if practical) to be used for consideration whether remedial action is needed to protect human health

^{222}Rn > 1000 Bq/L: remedial action always deemed to be justified on radiological protection grounds

Drinking Water Regulations

Radon and daughters:

UE: Commission Recommendation on the protection of the public against exposure to radon in drinking water supplies (2001)

^{210}Po > 0.1 Bq/L and/or ^{210}Pb > 0.2 Bq/L:

Consideration should be given to whether remedial action is needed to protect human health

Individual water supplies: milder requirements with respect to remedial actions

Drinking Water Regulations

UE: Council Directive 98/83 on the quality of water intended for human consumption

^{3}H < 100 Bq/L
T.I.D.< 0.1 mSv/y

The parametric indicator value will only be exceeded if the radionuclides are persistently present at similar activity concentrations for a full year

Total Indicative Dose:

The T.I.D. is the committed effective dose for one year of intake resulting from all the radionuclides whose presence in a water supply has been detected, both of natural and artificial origin, excluding tritium, K-40, radon and radon decay products.

The TID is calculated from the radionuclide concentrations and the dose coefficients for adults:

$$H\ (Sv) = \Sigma_i\ A_i\ (Bq/kg) * h_i\ (g)\ (Sv/Bq) * C\ (kg)$$

the parametric indicator value will only be exceeded if the radionuclides are persistently present at similar activity concentrations for a full year

Drinking Water Regulations

Monitoring frequencies, monitoring methods and the most relevant locations for monitoring points to be set later in Annex II (still missing)

Annex II: some anticipation……

Drinking Water Regulations

Monitoring: where and when

TRITIUM: Monitoring of drinking water for tritium shall be necessary where a source of tritium is present within the catchment and it cannot be shown on the basis of other surveillance programmes that the level of tritium is well below its parametric indicator value of 100 Bq/L.

If required → audit frequency (Annex I of Directive 98/83)

Drinking Water Regulations

Monitoring: where and when:

Total Indicative Dose (TID) (1):

Monitoring of drinking water shall be necessary where a source of artificial or enhanced natural radioactivity is present within the catchment and it cannot be shown on the basis of other surveillance programmes that the level of TID is well below its parametric indicator value 0.1 mSv/year.

Drinking Water Regulations

Monitoring: where and when:

Total Indicative Dose (TID) (2):

Monitoring for artificial nuclides required → audit frequency (Annex I of Directive 98/83)

Monitoring for natural nuclides required → Member States shall define its appropriate frequency considering all relevant information available on temporal variations of natural radionuclide levels in different types of waters (from a single check-up measurement up to the frequency of audit monitoring)

Drinking Water Regulations

Monitoring: where and when:

In presence of remedial actions:

Where methods for removing radionuclides from drinking water have been introduced to ensure that a parametric indicator value is not exceeded, monitoring shall be carried out at the audit frequency.

Audit frequency (Annex I of Directive 98/83)

Volume of water distributed or produced each day within a supply zone (Notes 1 and 2) m^3	Check monitoring number of samples per year (Notes 3, 4 and 5)	Audit monitoring number of samples per year (Notes 3 and 5)
≤ 100	(Note 6)	(Note 6)
> 100 ≤ 1 000	4	1
> 1 000 ≤ 10 000	4 + 3 for each 1 000 m^3/d and part thereof of the total volume	1 + 1 for each 3 300 m^3/d and part thereof of the total volume
> 10 000 ≤ 100 000		3 + 1 for each 10 000 m^3/d and part thereof of the total volume
> 100 000		10 + 1 for each 25 000 m^3/d and part thereof of the total volume

Note 6: The frequency is to be decided by the Member State concerned.

Drinking Water Regulations

Screening parameters:

Member States may use screening methods for gross alpha activity and gross beta activity to monitor for the parametric indicator value for T.I.D., excluding tritium, potassium-40, radon and radon decay products.

Drinking Water Regulations

Screening parameters:

Gross α < 0.1 Bq/L

Gross β < 1 Bq/L

➔ T.I.D. < 0.1 mSv/y, generally no further investigation required

Gross α < 0.1 Bq/L
and/or
Gross β < 1 Bq/L

➔ analysis for specific radionuclides required, also on the basis of available information about likely sources of radioactivity

Drinking Water Regulations

Analysis for specific radionuclides:

$$\sum_{i=1}^{n} \frac{C_i(obs)}{C_i(ref)} \leq 1$$

C_i(obs): measured concentration

C_i(ref): reference concentration

If one of the activity concentrations exceeds 20% of its reference concentration, analysis of additional radionuclides shall be required

Origin	Nuclide	Reference concentration
Natural	U-238[2]	3.0 Bq/l
	U-234[2]	2.8 Bq/l
	Ra-226	0.5 Bq/l
	Ra-228	0.2 Bq/l
Artificial	C-14	240 Bq/l
	Sr-90	4.9 Bq/l
	Pu-239/Pu-240	0.6 Bq/l
	Am-241	0.7 Bq/l
	Co-60	40 Bq/l
	Cs-134	7.2 Bq/l
	Cs-137	11 Bq/l
	I-131	6.2 Bq/l


...thanks and greetings from Milano

Which analyses ?