



European Directive Quality of drinking water

Radioactive parameters

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98/83/EC European Directive



Drinking water quality

- Pesticides,
- Microbiological,
- Metals
- ...

Radiological parameters



98/83/EC European Directive

WHO recommendations (ICPR)

- Tritium $\leq 100 \text{ Bq/L}$
- Total Indicative Dose (TID) $< 0,1 \text{ mSv/year}$



French Case



➤ Totale Indicative Dose (TID) $< 0,1 \text{ mSv/year}$

➤ Reference (routine) analysis :

- tritium $\leq 100 \text{ Bq/L}$
 - Gross alpha $\leq 0,1 \text{ Bq/L}$
 - Gross bêta
 - Potassium 40
- } $\beta_{\text{gr}} \leq 1,0 \text{ Bq/L}$



Cas ①

$\alpha \leq 0,1 \text{ Bq/L}$
&
 $\beta_{\text{gr}} \leq 1 \text{ Bq/L}$
&
Tritium $\leq 100 \text{ Bq/L}$

TID $\leq 0,1 \text{ mSv/year}$

Water suitable for consumption
=
nothing else to do



Cas ②

$\alpha > 0,1\text{Bq/L}$

ou

$\beta_{\text{gr}} > 1\text{Bq/L}$

et

Tritium $\leq 100\text{ Bq/L}$



Cas ②

$\alpha > 0,1 \text{ Bq/L}$
or
 $\beta_{gr} > 1 \text{ Bq/L}$
&
Tritium $\leq 100 \text{ Bq/L}$

Determination of radionuclides
from **natural origin**

U234,238 – Ra226 -
Po210 et Ra228 -
Pb210

Calculation of TID

$\leq 0,1 \text{ mSv/an}$

$> 0,1 \text{ mSv/an}$

Suitable for
consumption

Need to think about
corrective procedure



Cas ③

$$\alpha \leq 0,1\text{Bq/L}$$

et

$$\beta_{\text{gr}} \leq 1\text{Bq/L}$$

et

$$\text{Tritium} > 100 \text{ Bq/L}$$



Cas ③

$\alpha \leq 0,1 \text{ Bq/L}$
&
 $\beta_{gr} \leq 1 \text{ Bq/L}$
&
Tritium $> 100 \text{ Bq/L}$

Determination of radionuclides
from **artificial origin**

C14 - Sr 90 et Co60 -
I131 - Cs134,137 -
Pu238, 239, 240 -
Am241

Calculation of TID

$\leq 0,1 \text{ mSv/an}$

$> 0,1 \text{ mSv/an}$

Suitable for
consumption

Need to think about
corrective procedure



Cas ④

$\alpha > 0,1\text{Bq/L}$

ou

$\beta_{\text{gr}} > 1\text{Bq/L}$

et

Tritium $> 100\text{ Bq/L}$



Cas ④

$\alpha > 0,1 \text{ Bq/L}$
or
 $\beta_{gr} > 1 \text{ Bq/L}$
&
Tritium $> 100 \text{ Bq/L}$

Determination of radionuclides
from both origins **natural/artificial**

Calculation of TID

$\leq 0,1 \text{ mSv/an}$

Suitable for
consumption

$> 0,1 \text{ mSv/an}$

Need to think about
corrective procedure



Need for new methods / resins

- Lot of samples to deal with
- Detection limit to achieve
- Methods non applicable anymore



Need for new methods / resins

➤ Reference (routine) analysis :

- tritium ≤ 100 Bq/L
 - Gross alpha $\leq 0,1$ Bq/L
 - Gross bêta
 - Potassium 40
- } $\beta_{gr} \leq 1,0$ Bq/L

Use of LSC with α / β discrimination

« Actinide resin » : Ca interference

« Gross alpha resin » : no gross beta



Need for new methods / resins

Cas
②

$\alpha > 0,1\text{Bq/L}$
or
 $\beta_{\text{gr}} > 1\text{Bq/L}$
&
Tritium $\leq 100\text{ Bq/L}$

Determination of
radionuclides from **natural**
origin

U234,238 –
Ra226 - **Po210** et
Ra228 - **Pb210**

New french standards

Direct measure with gamma spec.

« Lead resin » using LSC

« MnO₂ » Ra228



Spain



$\alpha \leq 0,1\text{Bq/L}$
&
 $\beta_{\text{gr}} \leq 1\text{Bq/L}$
&
Tritium $\leq 100\text{ Bq/L}$



Cas ②

Cas ③

Cas ④



Portugal



$$\alpha \leq 0,1 \text{ Bq/L}$$

&

$$\beta \leq 1,0 \text{ Bq/L}$$

&

$$\text{Tritium} \leq 50 \text{ Bq/L}$$

Calculation of TID

?

Cas ②

Cas ③

Cas ④



Northern european countries



?

Uranium

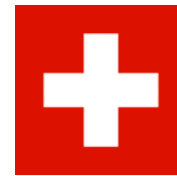
Radium

Tritium



What about your country ?

Specific needs ?





Thank you for your attention !