



European  
Commission

# **RADIOACTIVITY MONITORING IN FOOD AND FEED – CURRENT STATUS IN THE EU COUNTRIES**

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A colorful illustration featuring various scientific and technical symbols such as gears, a magnifying glass, a location pin, a rocket, a test tube with a flame, a chemical structure, a plug, a flask, and arrows, set against a dark background.

**MEASUREMENTS  
MATTER**  
In our daily life

Joint  
Research  
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# Joint Research Center inside the European Commission



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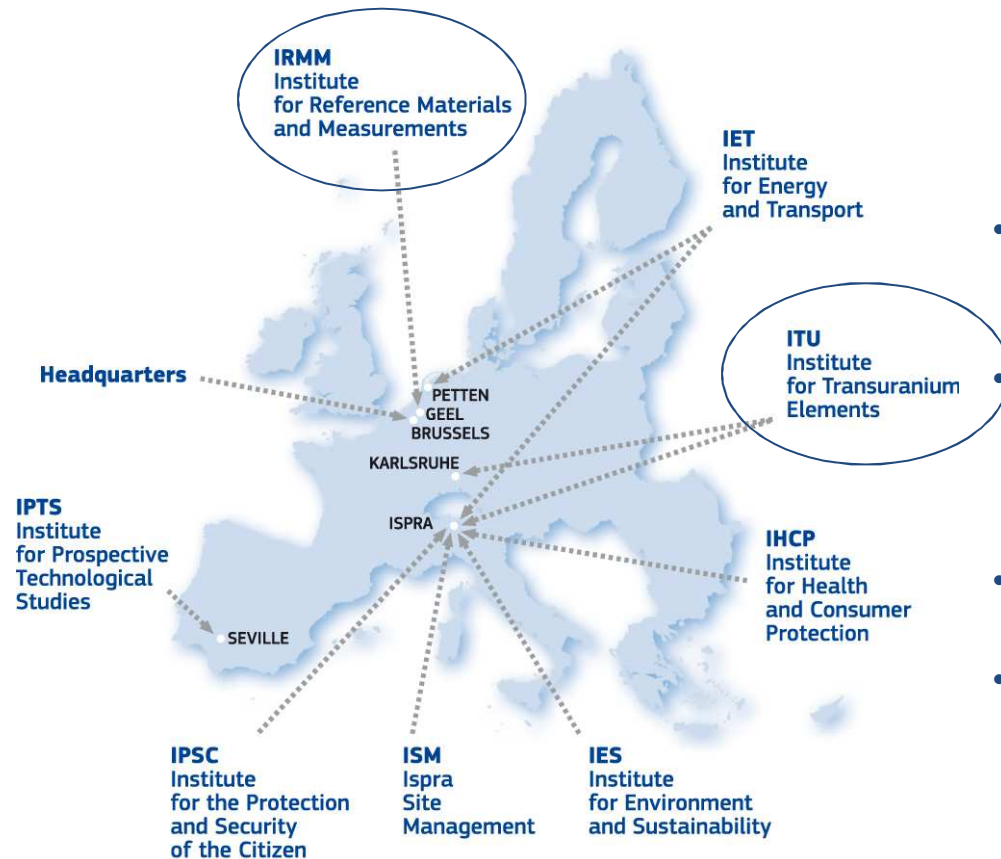
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*Joint Research Centre*

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# The Joint Research Centre (JRC)



- European Commission's in-house science service
- Supporting EU policies with independent, evidence-based scientific and technical support
- ~ 3.000 staff (2014)
- 7 institutes on 6 locations

# Content

- EU legislation
- Environmental radioactivity monitoring in EU MS
- Food and feed stuff – important part of environmental monitoring
- Inter-Laboratory Comparisons (ILCs) and Reference Materials (RM) in food matrices
- Summary





# EU Legislation - environmental monitoring

## Primary legislation

**Euratom Treaty**

2010/C 84/01

Consolidated version of the Treaty Establishing the European Atomic Energy Community

## Secondary legislation

**Basic Safety Standards**

Council Directive (Euratom)  
No 59/2013

Laying down basic safety standards for protection against the dangers arising from exposure to ionizing radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom.

**Environmental and foodstuff monitoring**

Commission  
Recommendation  
(Euratom) No 473/2000

On the application of Article 36 of the Euratom Treaty concerning the monitoring of the levels of radioactivity in the environment for the purpose of assessing the exposure of the population as a whole.



## Environmental radioactivity monitoring in EU

- EU Member States obligation under EURATOM Treaty Art. 35 + 36
- Mainly anthropogenic radionuclides (e.g. Cs-137, I-131 and Sr-90)
- Realistic and reliable internal doses estimation – by activity concentrations measurements
- Monitoring of food and feed – an important part of the environmental monitoring

# National environmental monitoring networks in EU Member States

- Surveillance around nuclear installations
- National surveillance networks
- Emergency preparedness networks
- Mobile equipment



## Environmental monitoring information exchange networks in the EU

DG JRC

**EURDEP** – European Radiological Data Exchange Platform –  
– automatic monitoring data exchange; > 4400 stations in 35  
European countries

**EURDEP** → **IAEA for monitoring at worldwide level (IRMIS)**

**ECURIE** – EC Early Notification and Urgent Information Exchange  
network – better preparedness and response to trans-boundary  
events

**ENSEMBLE** – harmonisation and coherence of emergency  
management and decision-making in relation to long range  
atmospheric dispersion modelling

DG SANCO

**RASFF** – the Rapid Alert System for Food and Feed crossing borders



# Food and feed stuff radioactivity monitoring

## Food:

- To obtain a full overview of radionuclides' migration in food chain
- To determine the level of contamination to the public

## Feed:

- Ingestion is the most important transfer pathway to animals



# EU Legislation in the field of food monitoring

## Maximum permitted levels in foodstuff after emergency exposure

Council Regulation (Euratom) No 3954/87	Laying down maximum permitted levels of radioactive contamination of foodstuffs and of feedingstuffs following a nuclear accident or any other case of radiological emergency.
Commission Regulation (Euratom) No 944/89	Laying down maximum permitted levels of radioactive contamination in minor foodstuffs following a nuclear accident or any other case of radiological emergency.
Council Regulation (Euratom) No 2218/89	Amending Regulation (Euratom) No 3954/87 laying down maximum permitted levels of radioactive contamination of foodstuffs and of feedingstuffs following a nuclear accident or any other case of radiological emergency.
Council Regulation (EEC) No 2219/89	On the special conditions for exporting foodstuffs and feedingstuffs following a nuclear accident or any other case of radiological emergency.
Commission Regulation (Euratom) No 770/90	Laying down maximum permitted levels of radioactive contamination of feedingstuffs following a nuclear accident or any other case of radiological emergency.

## Import of foodstuff from Japan after Fukushima nuclear accident

Commission Implementing Regulation (EU) No 322/2014	Imposing special conditions governing the import of feed and food originating in or consigned from Japan following the accident at the Fukushima nuclear power station.
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# EU legislation in the field of food monitoring

## Chernobyl affected areas

<b>Council Regulation (EEC) No 737/90</b>	On the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl nuclear power-station.
<b>Council Regulation (EC) No 616/2000</b>	Amending Regulation (EEC) No 737/90 on the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl nuclear power station.
<b>Commission Regulation (EC) No 1609/2000</b>	Establishing a list of products excluded from the application of Council Regulation (EEC) No 737/90 on the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl nuclear power station.
<b>Commission Recommendation (EC) No 274/2003</b>	On the protection and information of the public with regard to exposure resulting from the continued radioactive caesium contamination of certain wild food products as a consequence of the accident at the Chernobyl nuclear power station.
<b>Commission Regulation (EC) No 1635/2006</b>	Laying down detailed rules for the application of Council Regulation (EEC) No 737/90 on the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl nuclear power-station.
<b>Council Regulation (EC) No 733/2008</b>	On the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl nuclear power station.
<b>Council Regulation (EC) No 1048/2009</b>	Amending Regulation (EC) No 733/2008 on the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl nuclear power station.

# Food Monitoring Programmes

## Routine:

- Compliance with safety standards
- Long term trends
- Control of environmental accumulation

## Emergency:

- Tailored to the nature of the incident
- Assessment of the radiological situation
- Support countermeasures



## Food stuff measurements

- Separate ingredients – to obtain information on radionuclides in food
- Whole meals – for general surveillance programmes

Contamination levels of the different ingredients




Composition of the national diet



**Representative figure for the radioactivity level in a mixed diet**

# Feedstuffs monitoring

## Maximum permitted levels in feedstuff after emergency exposure

<b>Council Regulation (Euratom) No 3954/87</b>	Laying down maximum permitted levels of radioactive contamination of foodstuffs and of feedingstuffs following a nuclear accident or any other case of radiological emergency.
<b>Commission Regulation (Euratom) No 770/90</b>	Laying down maximum permitted levels of radioactive contamination of feedingstuffs following a nuclear accident or any other case of radiological emergency.
	
<b>New proposal for a Council Regulation (Euratom)</b>	Laying down maximum permitted levels of radioactive contamination of foodstuffs and of feedingstuffs following a nuclear accident or any other case of radiological emergency

- Standardisation of measurements is needed
- Regular monitoring should be conducted – establishment of background levels for agricultural environment



# Radioactivity Environmental Monitoring (REM) data bank

- Art. 36 of the Euratom Treaty – EU Member States are obliged to inform the Commission on the levels of radioactive contamination of the various compartments of the environment.
- Objectives:
  - to preserve for further scientific study a historical record of the Chernobyl accident,
  - to store the radioactivity monitoring data of the EC Member States.
- Interlaboratory comparison (ILC) scheme supports REM – laboratories performance identification.



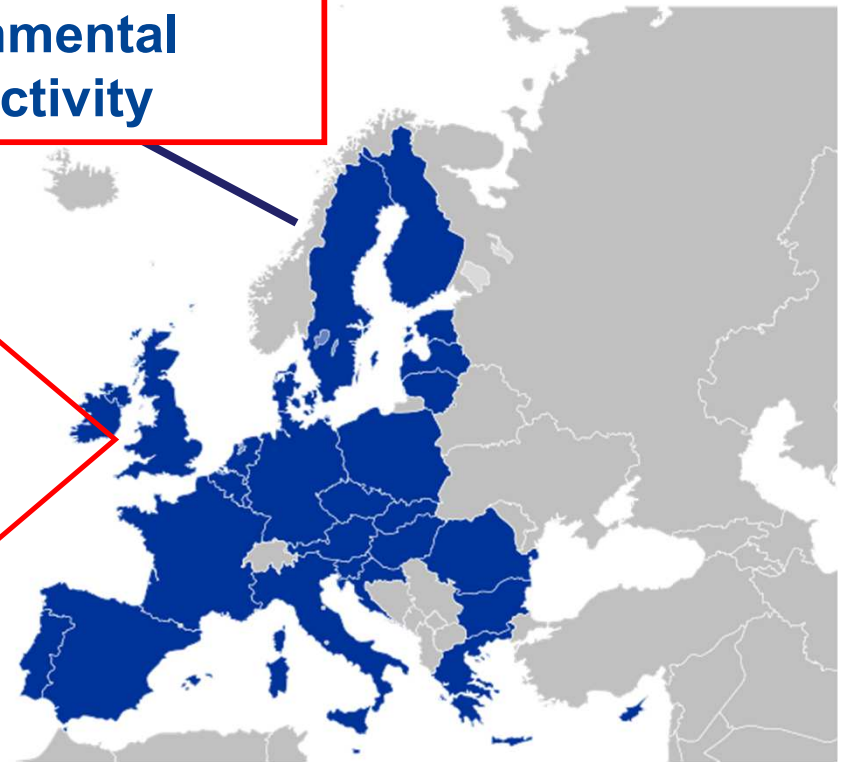
**DG ENERGY**

**EURATOM Treaty  
Art. 35/36  
MS obligations to  
monitor and report  
environmental  
radioactivity**

Quality and  
comparability of  
reported values?

**EC  
JRC  
IRMM**

**ILC**





**2003**

**Air filter**

$^{137}\text{Cs}$



**2005**

**Milk powder**

$^{134/137}\text{Cs}$ ,  $^{40}\text{K}$ ,  $^{90}\text{Sr}$



**2008**

**Water**

$^{238/234}\text{U}$ ,  $^{226/228}\text{Ra}$



**2010**

**Soil**

$^{40}\text{K}$ ,  $^{137}\text{Cs}$ ,  $^{212/214}\text{Bi}$ ,  $^{212/214}\text{Pb}$ ,  
 $^{226}\text{Ra}$ ,  $^{230/232}\text{Th}$ ,  $^{234/235/238}\text{U}$ ,  
 $^{238/239/240}\text{Pu}$ ,  $^{90}\text{Sr}$



**2011**

**Bilberry**

$^{90}\text{Sr}$ ,  $^{137}\text{Cs}$ ,  $^{40}\text{K}$



**2012**

**Water**

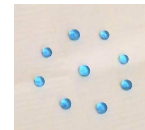
**Gross alpha/beta activity**



**2014**

**Air filter**

$^{137}\text{Cs}$



# Milk powder and Bilberry powder ILC

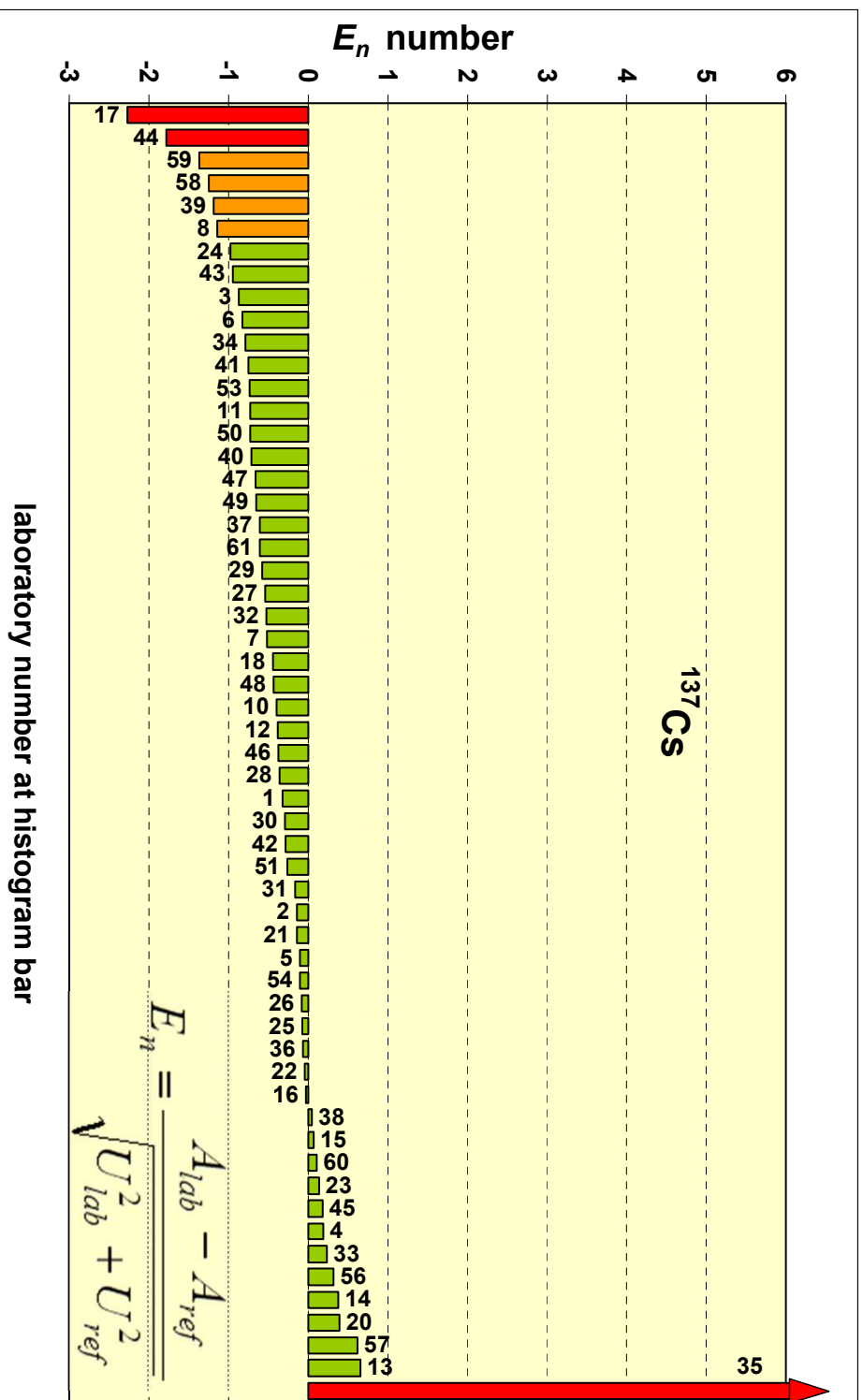
		Cs-137	Sr-90
Milk powder	No. of laboratories	58	44
	No. of results compatible with $E_n$ number	51	30
	The most popular measurement method	Direct gamma-spectrometry (90%)	Proportional counting (63%)
Bilberry powder	Participating laboratories	76	48
	No. of results compatible with $E_n$ number	53	26
	The most popular measurement method	Direct gamma-spectrometry (99%)	Proportional counting (48%)

$$E_n = \frac{A_{lab} - A_{ref}}{\sqrt{U_{lab}^2 + U_{ref}^2}}$$

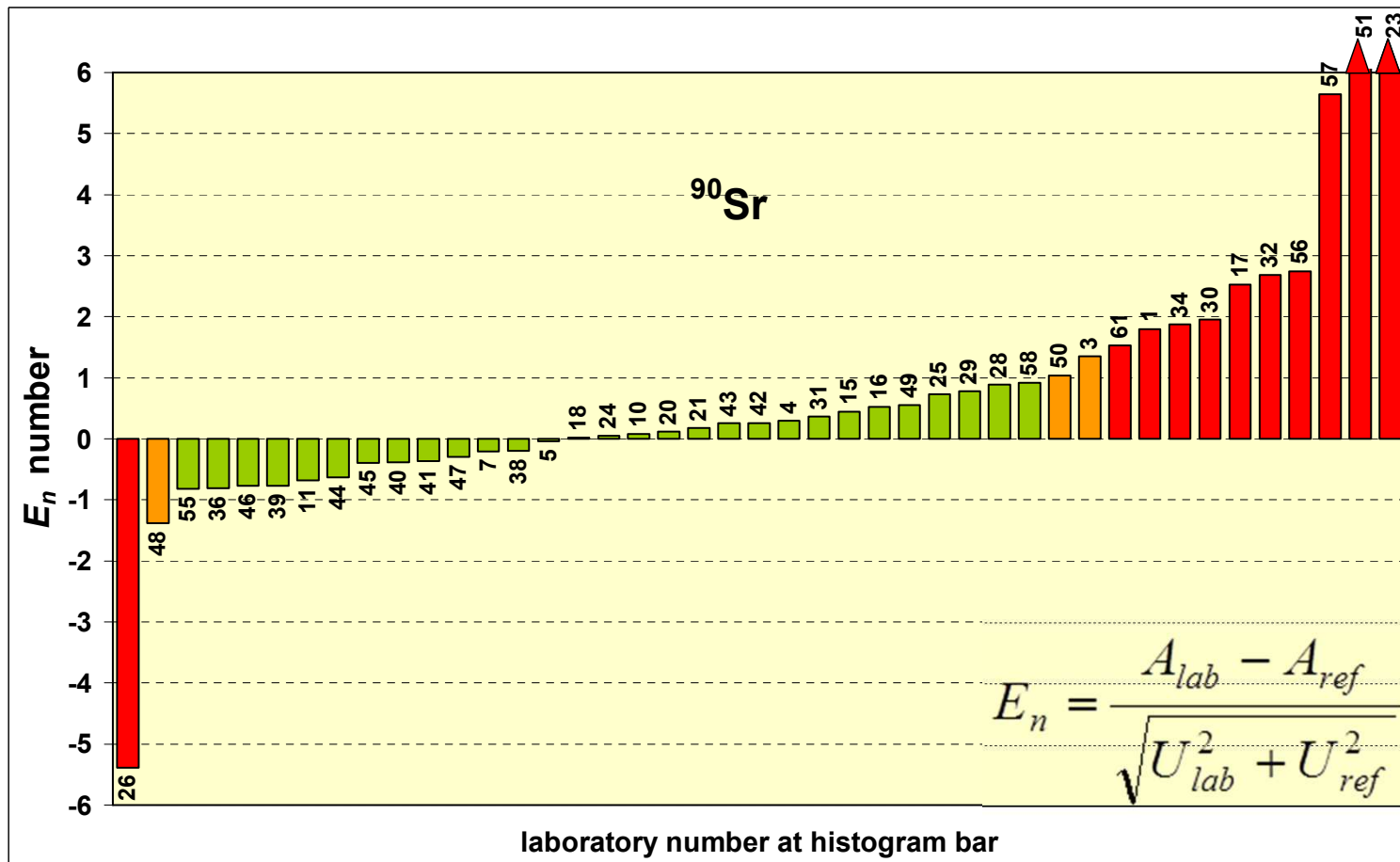


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# $E_n$ number of $^{137}\text{Cs}$ activity concentration in milk powder



# $E_n$ number of $^{90}\text{Sr}$ activity concentration in milk powder





## Organic Matrix Reference Materials for gamma emitting radionuclides

RM Number and Matrix	Reference date for decay correction	Cs-137 Certified Value [Bq · kg <sup>-1</sup> ]
IAEA-330 , Spinach	15 October 2007	1235
IAEA-446 , Baltic Sea Seaweed	01 August 2006	18.8
IAEA-372 , Grass	01 June 2006	11320
IAEA-156 , Clover	01 August 1986	264
IRMM-426, Bilberry powder*	in preparation	

\*Characterised for Cs-137, K-40 and Sr-90



## Summary

- **Harmonisation of the radioactivity measurement system – one of the main aims**
- EC-JRC-IRMM:
  - Co-ordination and organisation of the regular intercomparisons among MS and other laboratories for monitoring of radioactivity
  - Preparation of Reference Materials
- Future plans:
  - Survey on national legislation, monitoring schemes and measurement methods – overview of EU-wide situation
  - Preparation of a CEN standard on measurements of gamma emitting radionuclides in feed stuff

# Thank you for your attention



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