EFFECTS OF THE FUKUSHIMA DAIICHI ACCIDENT IN HUNGARY

MEASUREMENTS, RESULTS AND PUBLIC ACCEPTANCE

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Introduction

The contaminated air mass reached Europe from the North in two waves, firstly detected in Reykjavik (Iceland) on 20th of March.

Hungary:

Radiological Monitoring and Data Acquisition Network (RAMDA)

— ^{131}I isotope in aerosol samples **22nd – 24th of March** at first time

— Maximum activity concentration in **late March**: 1.0 – 1.4 mBq/m^3

— Decreased under the detection limit until **late May** (1 –2 µBq/m^3)

- The “Frédéric Jouliot-Curie” National Research Institute for Radiobiology and Radiohygenie (the centre of RAMDA) collected aerosol samples, milk, grass and vegetable samples originated from open filed cultures.
- The Environmental Protection Service (EPS) collected aerosol samples daily + whole body counting measurements on tourists and workers arrived from Japan.

Method

- Cesium isotopes: quickly adsorb on the surface of the aerosol molecules (glass fiber filter)
  Iodine isotopes: parlty adsorb, partly remains gaseous (activated carbon containing filter)

- There is a measurable difference between samples collected in Budapest and in the country side in terms of Iodine isotopes:
  Isotope Institute Ltd. located in the KFKI Campus produces radioiodine (5 – 20 µBq/m^3 in the air) which is not measurable outside the capital city.
- There are traces of ^{137}Cs (with 30.1 year of half life) in the soil: typically under 2 µBq/m^3.

- The Annual Committed Effective Dose for inhaled radioisotopes was calculated for ^{131}I, ^{134}Cs and ^{137}Cs referring to the highest activity concentrations measured in Hungary

Results

- Activity concentration maxima in **aerosol samples** (mBq/m^3)

in contrast with the measurements in Budapest after the Chernobyl accident

1986 (1st - 3th of May)			**2011** (11th of March - 14th of April)		
^{131}I	^{134}Cs	^{137}Cs	^{131}I	^{134}Cs	^{137}Cs
3190	550	1010	**1.47 ± 0.15**	**0.09 ± 0.01**	**0.11 ± 0.01**

- **Food and grass samples** (Bq/kg or Bq/L)

Sample type	**1986** (1st - 3th of May)		**2011** (11th of March - 14th of April)	
	^{131}I	^{134}Cs and ^{137}Cs	^{131}I	^{134}Cs and ^{137}Cs
Grass	9700	1180	**0.5 – 3.0**	**0.2 – 0.7**
Vegetables	400	2700	**0.2 – 1.0**	**< 1.13**
Milk	1500	45	**< 0.7**	**< 0.6**

- **Annual Committed Effective Dose** (nSv/h)

2010		**2011** (17th of Feb. - 9th of May)	
^{131}I	^{137}Cs	^{131}I	^{134}Cs and ^{137}Cs
0.7	0.2	**3.9**	**2.7**

Hazai környezetradiológia Fukushima után (Inland environmental radiology after Fukushima), *Nukleon*, 2012, V., 113

Conclusions

- Due to the **huge distance** between Budapest, Hungary and Fukushima, Japan (~ 8922 km in a straight line) there where small, but measurable amounts of radioisotopes in the air which could reach Hungary.
- In the biological samples there where also traceable amounts of ^{131}I, ^{134}Cs and ^{137}Cs but **significantly lower** than in the measurements taken after the Chernobyl accident.
- The Annual Committed Effective Dose for the inhalation of the ^{131}I, ^{134}Cs and ^{137}Cs isotopes showed elevated values, but **remained far under the dose limit** to the members of the public from artificial source (1 mSv/year).
- Whole body counting measurements on tourists and workers arrived from Japan resulted in **insignificant effects** (in 4 cases only the natural ^{40}K was measurable, in one measurement taken on a NPP worker from the Tsukuba Ibaraki Prefecture there was negligible amount of ^{131}I)
- In a 2009 survey (EUROBAROMETER) 50 – 60 % of Hungarians advocated nuclear energy in association with safety and maintaining the proportion (40%) in electricity generation. After the Fukushima accident, the supportiveness **dropped with about 10 % but only in relation with safety.**