ENVIRONMENTAL ACTIVITY LEVELS MEASURED AT THE NIJMEGEN UNIVERSITY AFTER THE CHERNOBYL ACCIDENT

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As a consequence of the Chernobyl nuclear reactor accident on April 26, 1986 large areas of Europe became contaminated with fission products. Since then many measuring programs have been started in order to determine the radionuclides and the activity levels in air, water, soil and vegetables. They served to determine which countermeasures had to be taken to keep the dose equivalent to the public as low as reasonably achievable. At the University of Nijmegen rainwater was collected during the first three weeks of May 1986 and the samples were measured with a Germanium detector coupled to a 4096-channel MCA. From quantitative analysis of the γ-spectra thus obtained and the amount of rainwater, we reported 55 GBq as the total activity precipitated per square kilometer in the Nijmegen area (Be87). People all over Europe were very concerned about the radiation risk when consuming contaminated foodstuffs. This caused us to measure a variety of samples we obtained from different countries.
Table 1 shows measured activity levels in such samples.

Sample	Activity ($Bq.kg^{-1}$)		
	^{134}Cs	^{137}Cs	Total
Mushrooms (The Netherlands)			
a) Paxillus involutus (Sept. 1986)	110	240	350
b) Chantarelles (Oct. 1986)	80	220	300
Cherries (Greece, Aug. 1986)	190	410	600
Hay (Serfaus, Austria, July 1986)	1400	2800	4200

No detectable activity was found in samples of milk (Krakow, Poland, June 1986), drinking water (Krakow, Poland, June 1986 and Leningrad, USSR, Sept. 1986), peaches (Nijmegen, The Netherlands, Sept. 1986) and several other fruits picked in the autumn of 1986 in The Netherlands.

Particular attention was given to the air inlet filters of large air conditioning systems. Because of the enormous flow rates of air of such systems the total accumulated activity in these filters could reach considerable values. Table 2 presents the measured activities per radionuclide of a representative sample from an air inlet filter from one of the buildings of the University of Nijmegen. This sample was taken on May 16, 1986, at which time the total filter was due to be changed.

Table 2. Measured activities in an air inlet filter at the University of Nijmegen after the Chernobyl accident.

Nuclide	Specific Activity ($kBq.kg^{-1}$) 16 May, 1986
$^{95}Zr/^{95}Nb$	50
^{103}Ru	56
$^{106}Ru/^{106}Rh$	360
$^{129m}Te/^{129}Te$	1000
^{131}I	730
$^{132}Te/^{132}I$	300
^{134}Cs	350
^{137}Cs	630
$^{140}Ba/^{140}La$	800
^{141}Ce	50
^{144}Ce	50
Total	4880

The adsorption coefficient for atmospheric dust for this type of filter is 0.35 and the total volume of air which passed through this section of the filter from May 2 until May 6 amounted to $1.6 * 10^6$ m^3. However, care must be taken in calculating the air activity concentration of the different radionuclides from the values given in table 2, since the adsorbed quantities may not be indicative of the concentration, for instance in the case of iodine. Worried technicians who had to change these filters were reassured by monitoring during the exchange. They were advised to wear dust masks to prevent internal contamination by inhalation.

REFERENCES

Be87 Beentjes L.B. and Duijsings J.H.: Radioactive Contamination in Nijmegen Rainwater after the Chernobyl Accident. The Science of the Total Environment, 64, 253-258, 1987.