Greenpeace Chernobyl sampling operation (October 2005)

The Greenpeace sampling operation of October 2005, was concentrated in the area West from the Chernobyl reactor outside the so-called 'exclusion zone' at publically accessible territory. In total, some 40 samples at different locations of soil, berries, fruit and milk were analysed in the CREMZV[1] laboratory at Kiev. Another 2 samples were brought to the Oekologie Institute in Vienna for analysis.

The 2 soil samples handed over to the IAEA on April 24th were taken at 2 locations (see map):

- Bober (711 inh., 40km from Chernobyl) which has been evacuated in Sept. 1986 but publically accessible and outside the controlled zone around the city of Poliskoe,
- the 'Forest' some 10km West from Bober and some 50km from Chernobyl.

Analysis of samples

1. Analysis in Ukraine

The CREMZV Laboratory of Ukraine analysed 2 soil samples of Bober, similar to the the samples given to the IAEA today.

Nr	Sample code	location	Sample description	Sample weight, kg		Specific activity of radionuclides (Q), Bq/kg or Bq/l; error of measurement, %									
				wet	dry	^{134}Cs		^{137}Cs		^{90}Sr		$^{239+240}$Pu		^{238}Pu	
						Q	%	Q	%	Q	%	Q	%	Q	%
36	251005.01		Soil sample from village Bober, next to roof edge		0.27	340	27	280000	7			2.6	20	1.1	28
37	251005.02	3	Soil sample from village Bober, next to roof edge		0.32	200	24	150000	12	950	23				

Most remarkably are the levels of Cs-137 which are at 280 and 150kBq/kg. The maximum levels established by the EURATOM directive 96/29 for 'clearance' is 10kBq/kg and a total amount of 10kBq. Thus it is 15 and 28 times more radioactive than these limits.

1Centre of Radiation-Ecological Monitoring of the Exclusion Zone (CREMZV) of the State Specialized Scientific and Industrial Enterprise "Chernobyl Radioecological Centre " (SSSIE "Ecocentre"). http://cremzv.mns.gov.ua/

Location of 'Bober' and the 'forest' sampling places:

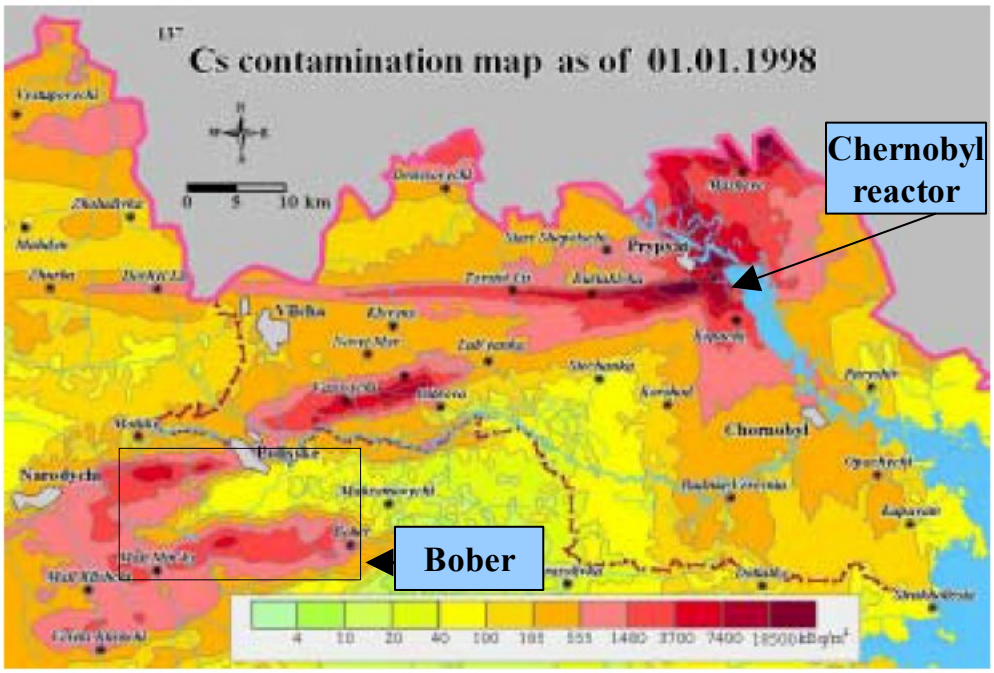
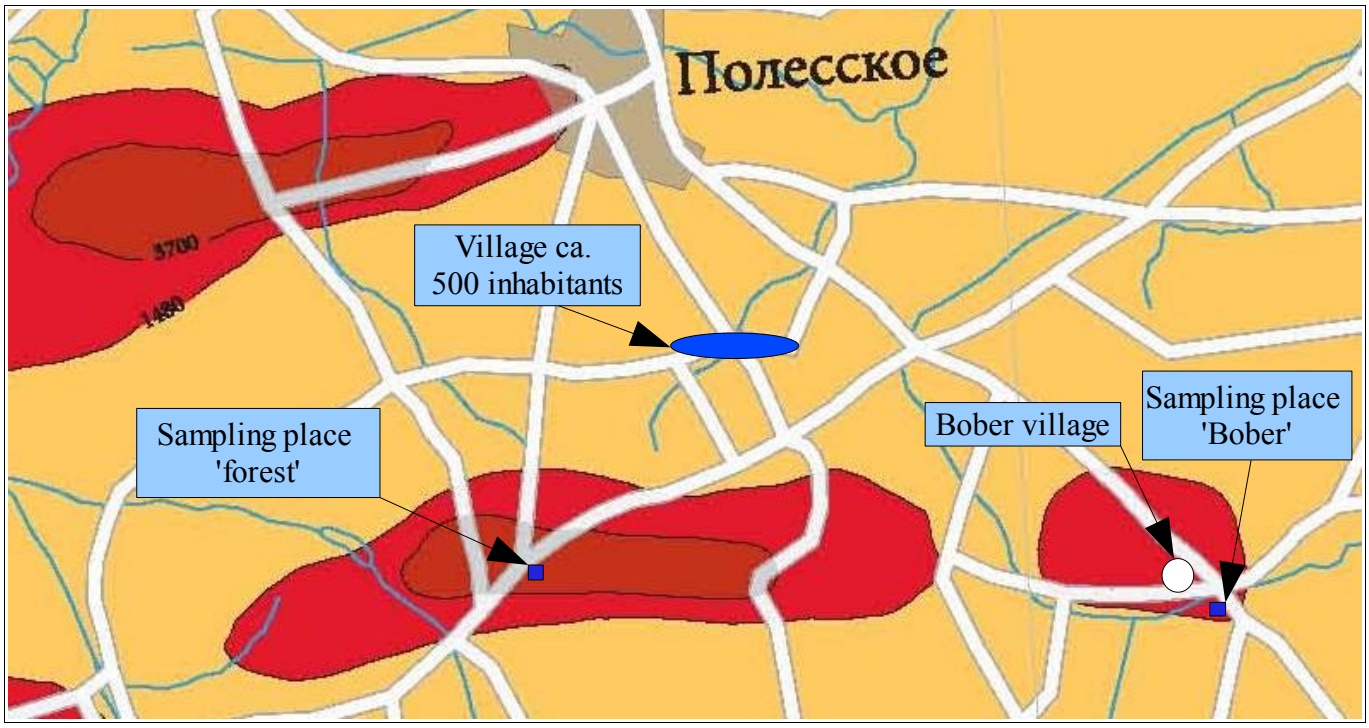


Fig. 4. ^{137}Cs contamination map of the adjacent territory to Chornobyl NPP (Ukrainian part).



2. Analysis of 'hot particle' in Austria

The laboratory of the Oekologie Institute[2] in Vienna analysed one sample from the Forest.

From that sample, a so-called 'hot particle' was isolated. This is a small but highly radioactive grain of spent fuel, which was ejected from the reactor by the explosion on April 26th 1986. Such a grain is highly dangerous if inhaled or ingested or when it sticks close to the body. The fact that the local population is using this forest for logging firewood must be regarded as a serious radiation risk.
The samples given to the IAEA do not contain such dangerous hot particle.

soil sample:

Isotope	**Concentration:**
Cs137	118 kBq/kg (1.7%)
Cs134	122 Bq/kg (2.3 %)
Eu154	9.4 Bq/kg (30%)
Co60	3.9 Bq/kg (2.8%)
Sb125	< 30 Bq/kg
Am241	< 17 Bq/kg
Eu155	< 18 Bq/kg
Ru106	< 44 Bq/kg
Nb94g	< 0.8 Bq/kg
K40	134 Bq/kg (3%)
Th232ff	8.8 Bq/kg (6.9%)
Pb/Bi214	4.7 Bq/kg (18%) no equ. with Ra226
(%): counting statistics, 1s, max(int, ext SD) for mutli-line nuclides LLD: alpha=beta = 0.05 evaluation acc. ISO/ÖNORM Bq/kg for dry sample, ref date 14 Apr 2006	

sediment sample ('hot particle')

Isotope	**Concentration:**
Cs137	238 kBq (1%)
Eu154	1.6 kBq (8.4%)
Cs134	0.33 kBq (7.6%)
Am241	2.8 kBq (5%)
high Sr90 concentration to be anticipated due to high Bremsstrahlung dose rate. Pu239/240 to be anticipated in the same order of magnitude as Am241. By their composition, the soil sample appears to be typical, mainly condensed fallout, whereas the sediment is mainly nuclear fuel.	

2 http://www.ecology.at/wir/ma.php?maID=TW

3. European Regulation:

The EU DIRECTIVE 96/29:

DEFINITIONS ART. 1:

clearance levels: values, established by national competent authorities, and expressed in terms of activity concentrations and/or total activity, at or below which radioactive substances or materials containing radioactive substances arising from any practice subject to the requirement of reporting or authorization may be released from the requirements of this Directive.

ARTICLE 5: Authorisation and clearance for disposal, recycling or reuse

1. The disposal, recycling or reuse of radioactive substances or materials containing radioactive substances arising from any practice subject to the requirement of reporting or authorization is subject to prior authorization.
2. However, the disposal, recycling or reuse of such substances or materials may be released from the requirements of this Directive provided they comply with clearance levels established by national competent authorities. These clearance levels shall follow the basic criteria used in Annex I and shall take into account any other technical guidance provided by the Community.

Some key nuclides:

Isotope	***Max. quantity (Bq)***	***Max. concentration (kBq/kg)***
Sr-90	10E4	10E2
Cs-137	10E4	10
Pu-239	10E4	1
Am-241	10E4	1