

RADIATION ENVIRONMENTAL INSPECTION IN RUSSIA

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The Serpukhov region is situated to the south of Moscow. The local extraction and production of building materials in the Serpukhov region are produced in considerable amounts. Besides that some quantity of building materials and construction units are imported to Serpukhov from other regions. According to the geological data the mean radon gas concentrations in soil are estimated as 20-40 kBq/m³, but the maximum radon concentration reaches 1000 kBq/m³. Developed building industry and geological peculiarities of the region make it necessary to carry out radiation control during all stages of building production. During years 1993-1994 in Serpukhov we controlled region factors at the following objects: 19 schools, 37 kindergartens, 3 technical colleges. 11 many-storey houses, 6 sand-pits, 3 plants of building materials. The main gamma- and radon gas control measurements were done to nation regulation [1], but in the special cases we took into account the methodical data [2] and recommendations of Institute of Radiation Hygiene (St. Petersburg). The additional radiation factors of alpha-beta contamination were measured for some rooms at schools and in the kindergartens.

The following devices have been used:

- DRG-01T, SRP-68 - for the internal gammas;
- RGA-01T, RGG-01T - for the radon gas;
- NC-302B, BDZA - for alpha contamination
- MKS-01R, NC-302B - for beta contamination;
- AMA-03F analyzer and DGDK-80B semiconductive detector for gamma spectrometry.

The summary results of our inspections are following:

1. The natural radionuclides in raw materials and building constructions. The specific concentration of Ra, Th and K-40 were measured by gamma-spectrometry method. The values of effective radioactivities A_{eff} were calculated according to [1] and presented in Table 1.
2. Equivalent equilibrium specific radioactivity of radon gas in indoor air A . During radiation inspections the momentary and daily integrated values of A were measured by filtration (paper filters) and sorption (carbon columns) methods. The summary results are presented in Table 2.
3. Gamma dose rate (P). The gamma dose rates were measured inside each room of all buildings. The value of gamma dose rate lay in interval 7...33 R/h for all cases. Summary results of radiation measurements are given in Table 3 (the gamma and cosmic background not subtracted).

Table 1. Comparison Charecteristic of Building Materials

Site of sample-taking	Staff	A _{eff} ,Bq/kg
Sand-pit "Syanovo",Serpukhov	sand	15
Sand-pit "Oka", Serpukhov	sand	32
Sand-pit "Oka", Serpukhov	sand+gravel mixture	90
Sand-pit "Serpukhov # 9"	sand	110
Sand-pit "Serpukhov # 1"	gravel	310
Sand-pit "Serpukhov # 1"	road metal	170
Sand-pit "Kuzmitshevo",Serpukhov	sand	88
Sand-pit "Kuzmitshevo",Serpukhov	road metal	260
Sand-pit "Dashkovka",Serpukhov	clay(fit for building)	280
Burnt Clay Plant,Serpukhov	burnt clay	300
Sand-pit of Brick-making Plant,Serpukhov	clay	170
Brick-making Plant,Serpukhov	brick	190
Heat and Power Plant, Kashira	ashes	200
Krivoy Rog (Ukraine)	road metal	544
Karelia	road metal	755
Ignatpol (Ukraine)	road metal	459

Table 2.Distribution of Number of Objects due to A Range of A , Bq/m

Floor	0...40	40...100	100-150	150-200
3-d floor	86 %	14 %	-	-
2-d floor	94 %	6 %	-	-
1-st floor	67 %	28 %	4 %	1 %
basement	49 %	30 %	18 %	3 %

Table 3. Distribution of number of objects due to p .

Object	No rooms with	Rooms with p :	
	p >20 R/h	20<p <30 R/h	p > 30 R/h
Schools,colleges	79 %	21 %	-
Kindergartens	74 %	22 %	4 %
Many-storeyed houses	80 %	20 %	-

On the basis of obtained data we conclude:

1. The products of local building industry correspond to 1-st class of radiation quality [1] ($A_{eff} < 370 \text{ Bq/kg}$), this is confirmed by our annual sertification measurements. The imported raw building materials correspond to 2nd or even 3rd class of radiation quality, what depends on location of sand-pits.
2. On the factor of external gamma radiation all investigated objects correspond to "radiation free" objects. Nevertheless all new buildings must be subjected to radiation inspection because local building industry uses the imported raw materials and building products.
3. n the factor of radon gas in indoor air the radiation situation is more or less normal for all investigated objects. But some rooms in the kindergartens show the radon gas concentrations in indoor air close to thereshold levels. In these cases we recomended to take measures directed to decreasing the radon gas concentrations in indoor air

REFERENCES

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