

PUE “INSTITUTE OF RADIATION SAFETY “BELRAD”

APPROVED

Director of PUE “Institute of Radiation
Safety “Belrad”

_____ A.V. Nesterenko

“ _____ ” _____ 20__

SHORT REPORT

**UNDER THE CONTRACT No. 36 (ATLAS-2) DATED TO JUNE 25, 2008
(STAGES 1 AND 2)**

Deputy director
for international cooperation

_____ V.I. Babenko
« _____ » _____ 20__

MINSK

2010

According to the Contract No. 36 dated to June 25, 2008 following actions given in the table 1 were performed in framework of the stages 1 and 2.

Table 1 – Data on the number of measurements and the quantity of the preparation VITAPECT given in framework of the stages 1 and 2 to the Contract No. 36.

Settlement	Date	Number of measurements			Quantity of VITAPECT		Notes
		expected	all	children	expected	actual	
Narovlya gymnasium of Gomel region	03-05.11.2009	330	324	301	660	-	
	01.04.2010	-	-	-	-	660	
	27-29.04.2010	330	330	352	-	-	The measurements were combined: 375 measurements
	28.05.2010	-	45		-	-	
	20.05.2010	-	-	-	-	180	Additionally
Narovlya secondary school No.2 of Gomel region	03-06.11.2009	540	504	485	1080	-	
	01.04.2010	-	-	-	-	1080	
	04-07.05.2010	540	322	547	-	-	The measurements were combined: 558 measurements
	26-27.05.2010	-	236		-	-	
	20.05.2010	-	-	-	-	301	Additionally
TOTAL:		1740	1761	1685	1740	2221	

Hereafter there is a statistical data processing.

NAROVLYA, GYMNASIUM

Characteristics	Value	Source
¹³⁷ Cs contamination density of the territory	9.26 Ci/km ²	Dose catalogue of the Ministry for Public Health Services of the Republic of Belarus, 2004
Number of inhabitants	8152 persons	Narovlya district executive committee, date to 01.01.2009
External dose	1.11 mSv/a	Dose catalogue of the Ministry for Public Health Services of the Republic of Belarus, 2004
Internal dose	0.60 mSv/a	-----<-----
Cumulative dose	1.71 mSv/a	-----<-----

According to the data dated to November 2009 in the Narovlya gymnasium there are 359 children, 41 teachers and 17 persons of another staff.

November 3-5, 2009

The measurement of children in the Narovlya gymnasium was performed in the gymnasium building. A total of measured persons was 324 persons (301 children and 23 adults).

Average ¹³⁷Cs specific activity in the whole group (n = 301): (31.6 ± 2.9) Bq/kg.

Average specific activity in the critical group (n = 30): (120.2 ± 23.9) Bq/kg.

Median value in the whole group: 22.1 Bq/kg.

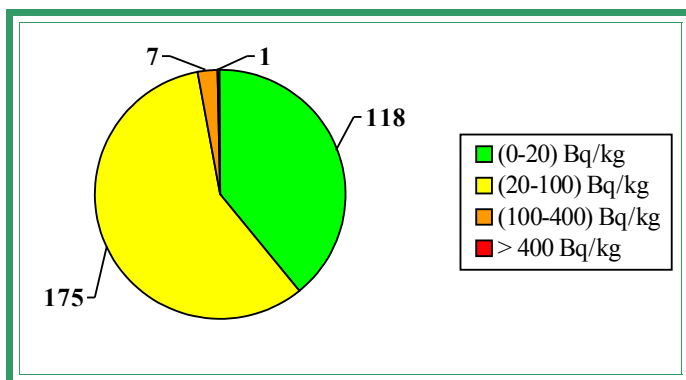
Median value in the critical group: 74.9 Bq/kg.

The table 2 demonstrates the maximal levels of ^{137}Cs specific activity (the critical group) according to the results of measurements performed from November 03, 2009 and November 05, 2009.

Table 2

No.	Surname Name Patronymic	Occupation	Sex	Weight, kg	Year of birth	Sp. activity, Bq/kg
1.	L. A. E.	SCHOOLGIRL	F	33	2002	737.7
2.	K. A. D.	SCHOOLGIRL	F	56	1997	298.3
3.	F. D. A.	SCHOOLBOY	M	43	2001	193.8
4.	P. A. S.	SCHOOLGIRL	F	52	1997	188.8
5.	M. I. S.	SCHOOLBOY	M	21	2002	186.6
6.	Z. Yu. S.	SCHOOLGIRL	F	31	1999	182.9
7.	N. A. A.	SCHOOLBOY	M	36	1997	167.4
8.	M. A. E.	SCHOOLGIRL	F	28	1998	110.2
9.	Ts. V. K.	SCHOOLGIRL	F	34	1999	99.8
10.	K. Yu. Yu.	SCHOOLGIRL	F	43	1995	96.2
11.	K. V. Yu.	SCHOOLGIRL	F	70	1992	95.5
12.	K. N. A.	SCHOOLBOY	M	25	2002	92.9
13.	K. D. A.	SCHOOLGIRL	F	32	1998	91.0
14.	B. N. N.	SCHOOLBOY	M	73	1992	90.1
15.	E. A. S.	SCHOOLBOY	M	34	2000	75.0
16.	M. V. Yu.	SCHOOLBOY	M	50	1995	74.9
17.	E. N. P.	SCHOOLBOY	M	54	1995	71.2
18.	Sh. A. A.	SCHOOLGIRL	F	31	2000	70.3
19.	Sh. A. V.	SCHOOLBOY	M	28	1999	68.2
20.	M. E. V.	SCHOOLGIRL	F	53	1994	64.0
21.	K. V. L.	SCHOOLBOY	M	61	1994	59.9
22.	L. O. G.	SCHOOLGIRL	F	40	1997	58.2
23.	K. O. S.	SCHOOLGIRL	F	57	1994	58.1
24.	K. A. S.	SCHOOLBOY	M	69	1997	57.6
25.	P. D. N.	SCHOOLBOY	M	63	1995	56.5
26.	M. D. S.	SCHOOLBOY	M	58	1998	55.2
27.	E. K. A.	SCHOOLGIRL	F	57	1995	53.3
28.	R. A. E.	SCHOOLGIRL	F	24	2001	52.7
29.	M. A. N.	SCHOOLBOY	M	47	2000	51.9
30.	M. N. D.	SCHOOLGIRL	F	61	1995	47.0

The figure 1 contains the diagram of the interval ^{137}Cs specific activity distribution in pupils in the Narovlya gymnasium of Gomel region in accordance with the results of measurements performed from November 03, 2009 and November 05, 2009.



← Figure 1 – Diagram of the interval ^{137}Cs specific activity distribution in pupils in the Narovlya gymnasium of Gomel region in accordance with the results of measurements performed from November 03, 2009 and November 05, 2009.

On April 01, 2010 600 packings of the pectin preparation VITAPECT were given for children.

April 27-29, 2010 and May 28, 2010

The measurement of children in the Narovlya gymnasium of Gomel region was performed in the gymnasium building and consisted of two stages: from April 27 to April 29, 2010 and on May 28, 2010. A total of measured persons was 375 persons (352 children and 23 adults).

Average ^{137}Cs specific activity in the whole group (n = 352): (22.8 ± 1.3) Bq/kg.

Average specific activity in the critical group (n = 30): (70.2 ± 11.9) Bq/kg.

Median value in the whole group: 18.2 Bq/kg.

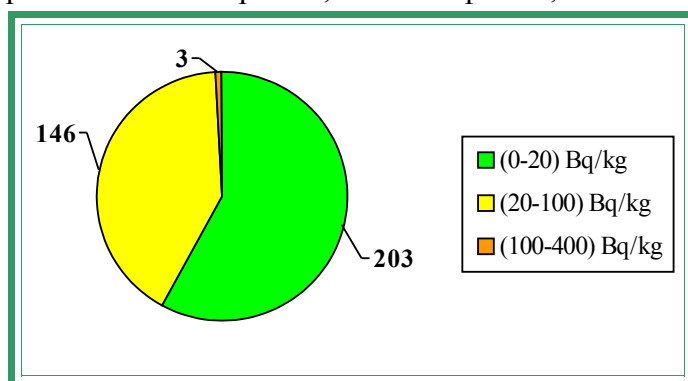
Median value in the critical group: 48.3 Bq/kg.

The table 3 demonstrates the maximal levels of ^{137}Cs specific activity (the critical group) according to the results of measurements performed from April 27, 2010 to April 29, 2010 and on May 28, 2010.

Table 3

No.	Surname Name Patronymic	Occupation	Sex	Weight, kg	Year of birth	Sp. activity, Bq/kg
1.	P.D.N.	SCHOOLBOY	M	71	1995	393.5
2.	N.D.A.	SCHOOLBOY	M	54	1992	129.2
3.	L.G.I.	SCHOOLGIRL	F	27	2000	106.1
4.	N.E.V.	SCHOOLGIRL	F	51	1997	97.5
5.	L.A.E.	SCHOOLGIRL	F	36	2002	88.1
6.	F.Ya.A.	SCHOOLGIRL	F	43	1996	85.8
7.	M.D.N.	SCHOOLGIRL	F	22	2001	79.1
8.	M.E.N.	SCHOOLGIRL	F	54	1994	75.0
9.	E.A.S.	SCHOOLBOY	M	35	2000	70.6
10.	K.Yu.Yu.	SCHOOLGIRL	F	47	1995	66.9
11.	A.E.N.	SCHOOLGIRL	F	48	1995	63.7
12.	M.E.V.	SCHOOLGIRL	F	56	1994	60.7
13.	K.A.D.	SCHOOLGIRL	F	59	1997	60.2
14.	P.A.S.	SCHOOLGIRL	F	55	1997	58.0
15.	F.D.A.	SCHOOLBOY	M	46	2001	48.4
16.	C.V.K.	SCHOOLGIRL	F	34	1999	48.2
17.	M.A.E.	SCHOOLGIRL	F	31	1998	45.0
18.	M.N.D.	SCHOOLGIRL	F	62	1995	44.9
19.	R.A.E.	SCHOOLGIRL	F	22	2001	43.6
20.	F.Ya.A.	SCHOOLGIRL	F	43	1996	43.5
21.	M.E.D.	SCHOOLGIRL	F	32	1999	43.1
22.	L.A.G.	SCHOOLGIRL	F	29	2000	42.5
23.	F.V.G.	SCHOOLGIRL	F	52	1999	42.5
24.	B.N.S.	SCHOOLBOY	M	27	2001	42.2
25.	M.D.V.	SCHOOLGIRL	F	32	2000	39.0
26.	K.A.V.	SCHOOLGIRL	F	45	2002	38.2
27.	B.S.V.	SCHOOLGIRL	F	51	1994	38.2
28.	B.M.A.	SCHOOLGIRL	F	25	2001	37.6
29.	L.A.S.	SCHOOLGIRL	F	19	2003	37.4
30.	R.A.N.	SCHOOLBOY	M	22	2003	36.7

The figure 2 contains the diagram of the interval ^{137}Cs specific activity distribution in pupils in the Narovlya gymnasium of Gomel region in accordance with the results of measurements performed from April 27, 2010 to April 29, 2010 and on May 28, 2010.



←Figure 2 – Diagram of the interval ^{137}Cs specific activity distribution in pupils in the Narovlya gymnasium of Gomel region in accordance with the results of measurements performed from April 27, 2010 to April 29, 2010 and on May 28, 2010.

To demonstrate the efficiency of the effects of pectin preparations there are comparative data on interval distribution of the specific activity of ^{137}Cs in children having taken VITAPECT and having passed two WBC measurements (from November 03 to November 05, 2009 and from April 27 to April 29, 2010 and on May 28, 2010). This group consists of 295 children.

November 3-5, 2009
April 27-29 and May 28, 2010

The first measurement of children in the Narovlya gymnasium of Gomel region was performed in the gymnasium building. A total of measured persons was 324 persons (301 children and 23 adults).

The measurement of children in the Narovlya gymnasium of Gomel region was performed in the gymnasium building and consisted of two stages: from April 27 to April 29, 2010 and on May 28, 2010. A total of measured persons was 375 persons (352 children and 23 adults).

The data of statistical processing of the results of measurements of the group of children having passed two WBC measurements and having taken VITAPECT-T (295 children).

Average specific activity of ¹³⁷Cs:

after the first measurement: $(31.9 \pm 3.0 \text{ Bq/kg})$,

after the second measurement: $(22.7 \pm 1.5 \text{ Bq/kg})$.

Reduction of average specific activity of ¹³⁷Cs was 29 %.

Increase of specific activity: in 14% children.

The same level of specific activity: in 16% children.

Reduction of specific activity: in 70 % children.

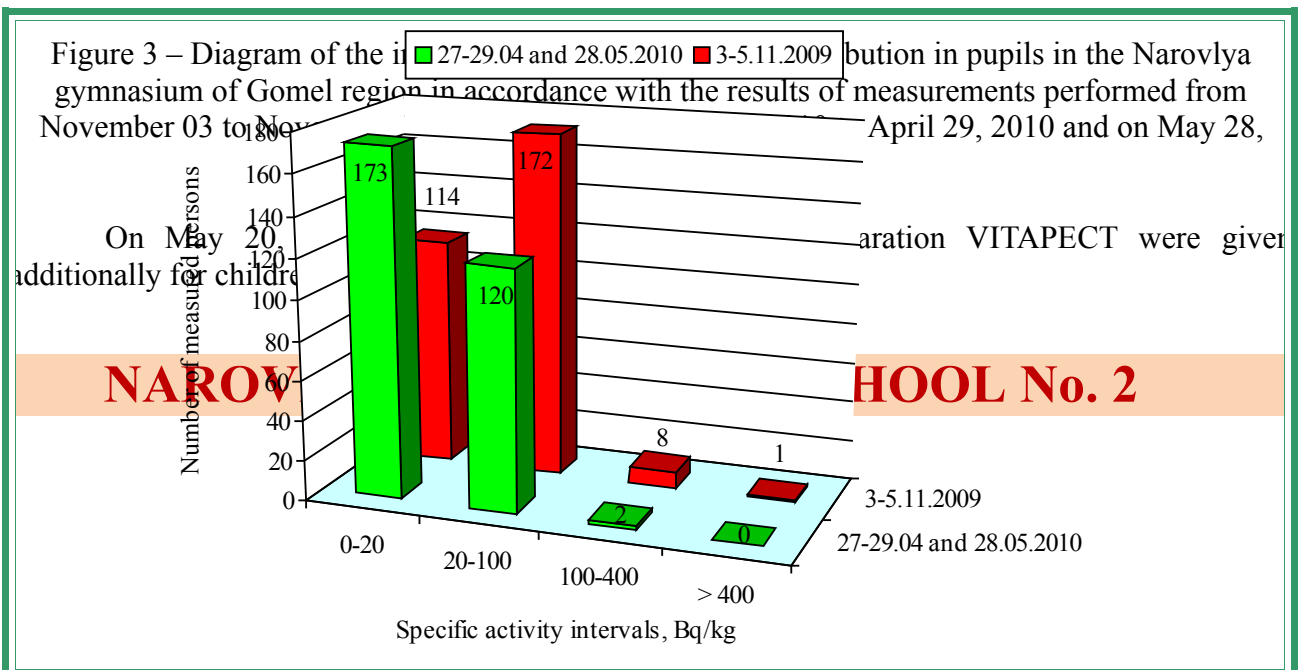
The evaluation of the scientific significance according to T-Student criterion (n = 295): t=3.86. The received criterion $t > 1.96$; $p < 0.01$.

Median value after the first measurement: 22.1 Bq/kg.

Median value after the second measurement: 17.9 Bq/kg.

Reduction of median value of specific activity of ¹³⁷Cs was 19%.

The figure 3 contains the diagram of the interval ¹³⁷Cs specific activity distribution in pupils in the Narovlya gymnasium of Gomel region in accordance with the results of measurements performed from November 03 to November 05, 2009 and from April 27, 2010 to April 29, 2010 and on May 28, 2010.



Characteristics	Value	Source
¹³⁷ Cs contamination density of the territory	9.26 Ci/km ²	Dose catalogue of the Ministry for Public Health Services of the Republic of Belarus, 2004
Number of inhabitants	8152 persons	Narovlya district executive committee, date to 01.01.2009

External dose	1.11 mSv/a	Dose catalogue of the Ministry for Public Health Services of the Republic of Belarus, 2004
Internal dose	0.60 mSv/a	-----<-----
Cumulative dose	1.71 mSv/a	-----<-----

According to the data dated to November 2009 in the Narovlya secondary school No.2 there are 578 children, 45 teachers and 17 persons of another staff.

November 3-6, 2009

The measurement of children in the Narovlya secondary school No.2 of Gomel region was performed in the school building. A total of measured persons was 504 persons (485 children and 19 adults).

Average ^{137}Cs specific activity in the whole group (n = 485): (44.8 ± 3.5) Bq/kg.

Average specific activity in the critical group (n = 30): (268.2 ± 34.6) Bq/kg.

Median value in the whole group: 23.9 Bq/kg.

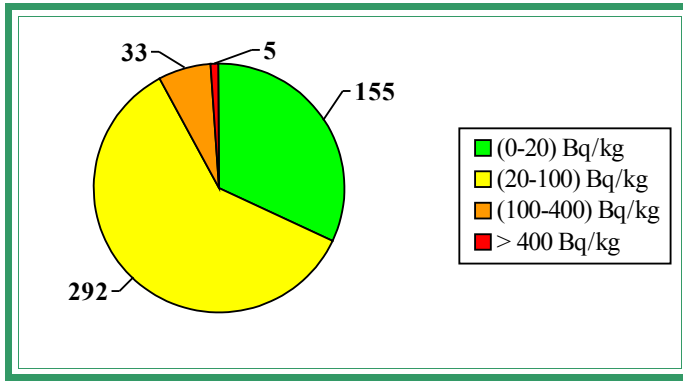
Median value in the critical group: 196.0 Bq/kg.

The table 4 demonstrates the maximal levels of ^{137}Cs specific activity (the critical group) according to the results of measurements performed from November 03, 2009 to November 06, 2009.

Table 4

No.	Surname Name Patronymic	Occupation	Sex	Weight, kg	Year of birth	Sp. activity, Bq/kg
1.	P.A.V.	SCHOOLBOY	M	44	1994	889.8
2.	P.I.V.	SCHOOLGIRL	F	45	1997	646.4
3.	M.A.O.	SCHOOLGIRL	F	21	2001	633.8
4.	Z.M.S.	SCHOOLBOY	M	49	1996	495.7
5.	B.A.A.	SCHOOLGIRL	F	32	1997	462.5
6.	K.Yu.V.	SCHOOLBOY	M	33	1999	372.7
7.	M.L.V.	SCHOOLGIRL	F	25	2001	359.8
8.	G.N.N.	SCHOOLGIRL	F	28	1997	329.7
9.	M.G.V.	SCHOOLBOY	M	42	1997	326.0
10.	A.R.M.	SCHOOLBOY	M	43	1996	267.2
11.	M.N.V.	SCHOOLBOY	M	27	1998	254.6
12.	D.V.K.	SCHOOLBOY	M	43	1998	243.9
13.	K.Yu.V.	SCHOOLGIRL	F	69	1992	237.3
14.	B.V.V.	SCHOOLBOY	M	21	2001	220.1
15.	G.E.S.	SCHOOLBOY	M	39	1998	199.2
16.	L.M.M.	SCHOOLGIRL	F	40	1999	192.8
17.	K.A.N.	SCHOOLBOY	M	28	1997	171.9
18.	B.A.V.	SCHOOLGIRL	F	30	1999	168.0
19.	Z.E.D.	SCHOOLBOY	M	51	1996	167.4
20.	P.D.V.	SCHOOLBOY	M	27	1999	159.2
21.	M.I.I.	SCHOOLGIRL	F	45	1996	146.0
22.	S.I.Yu.	SCHOOLBOY	M	47	1998	144.3
23.	J.V.P.	SCHOOLBOY	M	58	1992	133.6
24.	H.K.N.	SCHOOLGIRL	F	35	2001	130.8
25.	P.D.N.	SCHOOLBOY	M	58	1995	121.5
26.	K.E.A.	SCHOOLBOY	M	57	1994	119.6
27.	G.O.I.	SCHOOLGIRL	F	24	2001	113.9
28.	K.V.V.	SCHOOLBOY	M	29	2001	113.3
29.	G.A.O.	SCHOOLGIRL	F	35	1999	113.0
30.	K.V.V.	SCHOOLGIRL	F	40	1998	111.3

The figure 4 contains the diagram of the interval ^{137}Cs specific activity distribution in pupils in the Narovlya secondary school No.2 of Gomel region in accordance with the results of measurements performed from November 03, 2009 to November 06, 2009.



← Figure 4 – Diagram of the interval ^{137}Cs specific activity distribution in pupils in the Narovlya secondary school No.2 of Gomel region in accordance with the results of measurements performed from November 03, 2009 to November 06, 2009

On April 01, 2010 1080 packings of the pectin preparation VITAPECT were given for children.

May 4-7, 2010 and May 26-27, 2010

The measurement of children in the Narovlya secondary school No.2 of Gomel region was performed in the school building and consisted of two stages: from May 04 to May 07, 2010 and from May 26, 2010 to May 27, 2010. A total of measured persons was 558 persons (547 children and 11 adults).

Average ^{137}Cs specific activity in the whole group (n = 547): (24.6 ± 0.5) Bq/kg.

Average specific activity in the critical group (n = 30): (56.5 ± 3.8) Bq/kg.

Median value in the whole group: 22.7 Bq/kg.

Median value in the critical group: 47.3 Bq/kg.

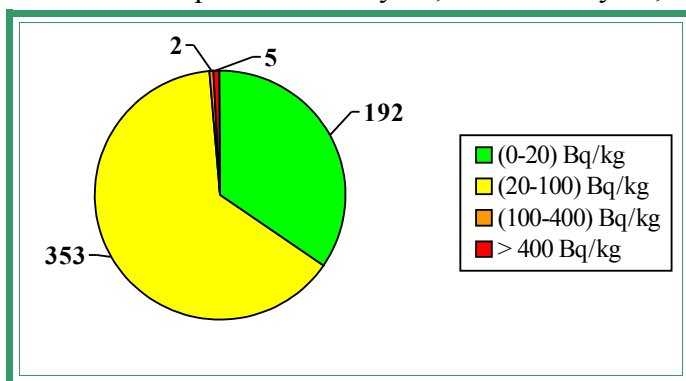
The table 5 demonstrates the maximal levels of ^{137}Cs specific activity (the critical group) according to the results of measurements performed from May 04, 2010 to May 07, 2010 and from May 26, 2010 to May 27, 2010.

Table 5

No.	Surname Name Patronymic	Occupation	Sex	Weight, kg	Year of birth	Sp. activity, Bq/kg
1.	P.A.V.	SCHOOLBOY	M	44	1994	127.2
2.	M.A.O.	SCHOOLGIRL	F	21	2001	102.4
3.	P.I.V.	SCHOOLGIRL	F	43	1997	95.3
4.	K.D.A.	SCHOOLBOY	M	34	1998	84.0
5.	B.A.A.	SCHOOLGIRL	F	26	2000	72.6
6.	K.Yu.S.	SCHOOLBOY	M	62	1995	71.9
7.	H.A.A.	SCHOOLBOY	M	44	1996	63.1
8.	G.N.N.	SCHOOLGIRL	F	29	1997	54.5
9.	G.O.I.	SCHOOLGIRL	F	24	2001	54.3
10.	K.V.V.	SCHOOLBOY	M	25	2002	53.4
11.	K.E.A.	SCHOOLBOY	M	57	1994	51.9
12.	P.D.V.	SCHOOLBOY	M	27	1999	51.6
13.	D.V.K.	SCHOOLBOY	M	46	1998	51.2
14.	Z.E.D.	SCHOOLBOY	M	51	1996	49.2
15.	O.K.A.	SCHOOLGIRL	F	23	2002	47.8
16.	K.Ya.A.	SCHOOLGIRL	F	26	2000	46.8
17.	K.A.N.	SCHOOLBOY	M	30	1997	46.5
18.	K.Yu.S.	SCHOOLGIRL	F	29	1999	45.4
19.	M.Ya.V.	SCHOOLGIRL	F	30	2000	45.4
20.	H.K.N.	SCHOOLGIRL	F	35	2001	44.8
21.	B.V.V.	SCHOOLBOY	M	26	2002	44.5
22.	Z.M.R.	SCHOOLGIRL	F	21	2001	44.1
23.	C.P.Yu.	SCHOOLBOY	M	29	2001	44.0

24.	V.E.P.	SCHOOLGIRL	F	26	2002	43.8
25.	B.R.S.	SCHOOLGIRL	F	26	2000	43.6
26.	G.V.N.	SCHOOLBOY	M	29	1997	43.5
27.	J.A.O.	SCHOOLBOY	M	25	2002	43.2
28.	B.E.A.	SCHOOLBOY	M	31	1998	43.1
29.	B.V.V.	SCHOOLBOY	M	23	2002	42.6
30.	M.Yu.D.	SCHOOLGIRL	F	34	2002	42.3

The figure 5 contains the diagram of the interval ^{137}Cs specific activity distribution in pupils in the Narovlya secondary school No.2 of Gomel region in accordance with the results of measurements performed May 04, 2010 to May 07, 2010 and from May 26, 2010 to May 27, 2010.



←Figure 5 – Diagram of the interval ^{137}Cs specific activity distribution in pupils in the Narovlya secondary school No.2 of Gomel region in accordance with the results of measurements performed May 04, 2010 to May 07, 2010 and from May 26, 2010 to May 27, 2010

To demonstrate the efficiency of the effects of pectin preparations there are comparative data on interval distribution of the specific activity of ^{137}Cs in children having taken VITAPECT and having passed two WBC measurements (from November 03 to November 06, 2009, from May 04 to May 07, 2010 and from May 26 to May 27, 2010). This group consists of 465 children.

November 3-6, 2009

May 4-7, 2010 and May 26-27, 2010

The first measurement of children in the Narovlya secondary school No.2 of Gomel region was performed in the school building. A total of measured persons was 504 persons (485 children and 19 adults).

The second measurement of children in the Narovlya secondary school No.2 of Gomel region was performed in the school building and consisted of two stages: from May 04 to May 07, 2010 and from May 26, 2010 to May 27, 2010. A total of measured persons was 558 persons (547 children and 11 adults).

The data of statistical processing of the results of measurements of the group of children having passed two WBC measurements and having taken VITAPECT-T (465 children).

Average specific activity of ^{137}Cs :

after the first measurement: $(45.4 \pm 3.6 \text{ Bq/kg})$,

after the second measurement: $(24.8 \pm 0.6 \text{ Bq/kg})$.

Reduction of average specific activity of ^{137}Cs was 45 %.

Increase of specific activity: in 37% children.

The same level of specific activity: in 12% children.

Reduction of specific activity: in 51 % children.

The evaluation of the scientific significance according to T-Student criterion (n = 465): $t=7.99$. The received criterion $t > 1.96$; $p < 0.01$.

Median value after the first measurement: 24.0 Bq/kg.

Median value after the second measurement: 22.9 Bq/kg.

Reduction of median value of specific activity of ^{137}Cs was 5%.

The figure 6 contains the diagram of the interval ^{137}Cs specific activity distribution in pupils in the Narovlya secondary school No.2 of Gomel region in accordance with the results of measurements performed from November 03 to November 06, 2009, from May 04, 2010 to May 07, 2010 and from May 26, 2010 to May 27, 2010

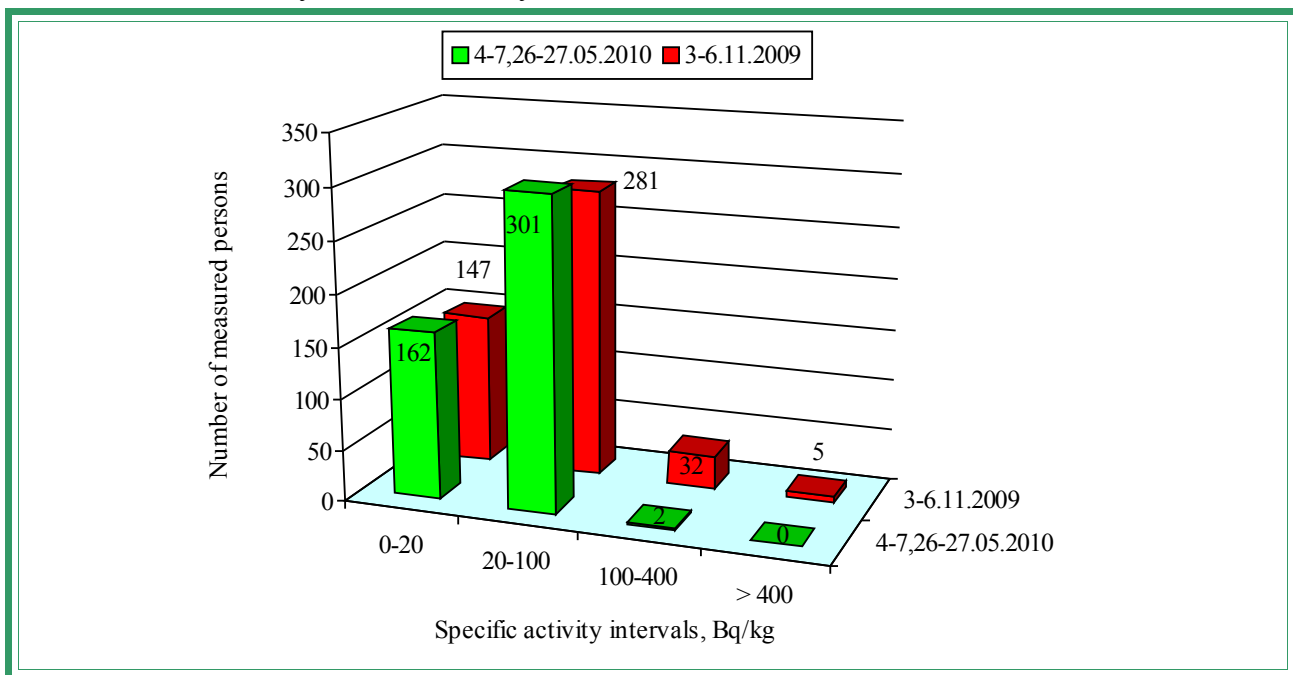


Figure 6 – Diagram of the interval ^{137}Cs specific activity distribution in pupils in the Narovlya secondary school No.2 of Gomel region in accordance with the results of measurements performed from November 03 to November 06, 2009, from May 04, 2010 to May 07, 2010 and from May 26, 2010 to May 27, 2010

On May 20, 2010 301 packings of the pectin preparation VITAPECT were given for children.

Senior engineer

I.V. Krasnopyorov