

NUCLEAR RADIATION LANDSCAPE MAPPING AS A BASE
FOR RADIO-NUCLOID ENVIRONMENT ESTIMATION

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Nuclear pollution has become at present one of the most important factors influencing the environment and biosphere.

Since 1986 the nuclear pollution of the European Part of Russia and many other countries of Europe is determined by Cs-137 fall out as a result of largest nuclear disaster in human history at Chernobyl Power Plant. The Cs-137 pollution of the European Part of Russia is seen at Table 1.

Table 1

Distribution of areas (thousands of sq.km in numerator, % in denominator) with various levels of pollution by Cs-137 in natural zones of the European territory of Russia

| Natural zone | Area of zone thousands of sq.km. | Level of pollution, kBk/sq.m | | | | | | |
|--------------------------|----------------------------------|------------------------------|-------------|------------|--------------|-------------|------------|-------------|
| | | 3,7-7,4 | 7,4-18,5 | 18,5-37 | 37-185 | 185-555 | 555-1480 | > 1480 |
| Tundra and forest-tundra | 358,9 | 54,0 15 | 0,9 0,3 | - | - | - | - | - |
| Taiga | 1593,0 | 258,0 16 | 30,2 1,9 | 3,9 0,2 | 0,94 0,05 | - | - | - |
| Leaf-bearing forests | 796,7 | 187,0 23 | 149,0 19 | 70,0 9 | 36,7 5 | 5,5 0,7 | 2,1 0,3 | 0,3 0,04 |
| Forest-steppe and steppe | 763,7 | 373,5 49 | 185,2 24 | 88,6 5 | 11,2 1,5 | 0,22 0,5 | - | - |

Values of Cs-137 pollution less than 7,4 kBk/sq.m feature the polluted areas formed before Chernobyl disaster, and resulting from nuclear tests made at the end of 1940s till beginning of 1970s. Values exceeding 7,4 kBk/sq.m feature Chernobyl's fall out backgrounded by global pollution. In Russia the lowest permissible level of Cs-137 pollution of 37 kBk/sq.m was accepted, and according to the law of the Russian Federation on social protection of citizens exposed to nuclear radiation as a result of disaster this limit was taken as extreme value for determination of areas where population has economical privileges, while 185 kBk/sq.m was taken as extreme value where population have rights to migrate, and 1480 kBk/sq.m is a limit for alienation zone.

After the Chernobyl disaster mapping of nuclear polluted areas in Russia has become of an extreme importance. National maps of Cs-137 pollution (with isolines) compiled in Russia have a very good surveying accuracy. The authors took part in their compilation and the approach was to use both remote sensed data and soil tests.

These maps form a base for estimation of nuclear pollution of the environment and ranking the areas according to doses of nuclear radiation risks. The authors elaborated principles of medium and small-scale nuclear polluted landscape mapping, which are founded on geoinformation data base with nuclear pollution data and computer drawing.

The data base includes four information sets:

- 1 - nuclear pollution parameters;
- 2 - parameters of geosystems influencing behavior of radio-nucloids within them;
- 3 - migration parameters of radio-nucloids within "soil-vegetation" and "vegetation - living creatures" systems;
- 4 - data on population, its number, way of life, dietary of people.

The territorial distribution of the above information features the areas with simular radio-nucloid environmental conditions.

The principles of nuclear environmental landscape mapping are applied to maps of the Middle-Russian Hills and surrounding plains, which are areas traversed by the Chernobyl trace.