Sarapan, 137.0 cSv in Kizil-Kuduk, 123.2 cSv in Zagotskot, 112.1 cSv in Chagan).

2. The zone of maximal radiation risk comprising populated areas within the Abaisky, Abralinsky, Beskaragaisky and Jana-Semeisky districts of the Semipalatinsk region. The estimated dose equivalent of the population was 35 to 100 cSv (for example, 94.5 cSv in Zulkarash village of Abaisky district, 87.7 cSv in Karaul, 68.1 cSv in Kainar, 49.3 cSv in Kara-Togai village of Beskaragaisky district, 62.0 cSv in Znamenka village of Jana-Semeisky district).
3. The zone of increased radiation risk comprising the populated areas of 6 districts in the Semipalatinsk region (Tchubartausky, Novo-Shulbinsky, Borodulihinsky, Charsky, Jarminsky, Ayaguzsky) and Semipalatinsk city itself. The radiation doses of the population at these areas ranged from 7 to 34.9 cSv.
4. The zone of minimal radiation risk, comprising 5 most distant districts of the Semipalatinsk region (Makanchinsky, Urdjarsky, Taskeskensky, Kokpektinsky and Aksuatsky). The dose equivalent of the population of this radiation risk zone was less than to 6.9 cSv.

To be sure, the distinguishing of these zones is conventional. It is difficult to set any clear territorial borders for specific doses of external or internal radiation exposure. The "behavior" of radionuclides within the radioactive cloud is unknown as well as why radioactive fallout occured in territories very far from the hypocenter of nuclear tests, for example, 1000 kilometres away in Altaisky region of the Russian Federation, after the A-bomb explosion of 1949.

1.2. Period of underground nuclear tests (1963-1989)

One of the main peculiarities of radiation exposure of the resident population of the Semipalatinsk area was that there were 2 possible sources of exposure:

1. Radioactive fallout on the ground, accumulated in the period when atmospheric explosions were made.
2. Radioactive clouds coming after occurrence of some accidents during underground nuclear explosions. According to official statements of experts of the former USSR Defence Department, 346 underground nuclear explosions were made at the Semipalatinsk nuclear test site from 1963 to 1989. It was reported, that after 30% (or about 100-125 of those explosions) the radioactive inert gases xenon and krypton came out into the open and formed radioactive clouds. In a number of cases currents of gas mixed with air reached some populated areas of the Semipalatinsk region and Semipalatinsk city.

In 1963 control was exercised over the parameters for radioactive fallout in Semipalatinsk city and some other districts of the Semipalatinsk region. In 1967 and later, the concentrations of radioactive substances and their isotope spectra in the air were estimated. For the determination of the concentrations of radioactive substances in "near-the-surface" air, the method of filtration through the tissue FPP-15 was used. Air was filtered using an air-capturing device with a volume-velocity of current $6\text{-}8 \cdot 10^4$ litres per hour. Radioactive substancies were collected with the use of a horizontal case open on one side, which had two baths with a surface 0.3 m^2 each.

In the period from 1966 to 1981, 15 instances of contamination of the air by iodine isotopes were noticed. All resulted from the coming of radioactive clouds over the Semipalatinsk region. We consider that 11 cases were attributable to radioactive clouds after the atomic bomb explosions at the Semipalatinsk nuclear test site and that 4 others - the were due to nuclear explosions in the USA and China.

Some examples of appearance of radioactive gases in Semipalatinsk city are given below.

April, 1972

The concentration of the fallout was 10 times higher than the natural level - 31.5 microCurie/km^2 against 3.5 microCurie/km^2. The appearance of isotopes Zn95, Nb95, and Ru103 was registered.

April, 1974

An increase of radioactivity up to 1 micro Curie/km^2 was registered, whereas the radioactivity from the natural everyday fallout was 0.2-0.4 microCurie/km^2.

April, 1978

The total concentration of radioactive substances and the density of the fallout increased 1.5-4 times above the background level.