



DEVELOPMENT OF ATMOSPHERIC AIR ^{85}Kr MONITORING METHODOLOGY ON THE TERRITORY OF THE USSR

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Highly sensitive, low-background and high-performance method of beta-radioactivity measurements of the gas samples was developed in mid-eighties at Khlopin Radium institute. This method was based on the use of the serial automated installation for liquid scintillation measurements and special scintillating cells. Cells were equipped with the gas valve, and their internal surface were covered by a thin layer of organic scintillator. This method found was successfully was applied for ^{85}Kr activity measurements in atmospheric krypton samples and for ^{85}Kr concentration measurements in atmospheric air.

For the first time, method developed for ^{85}Kr activity measurements, was practically tested in May - June, 1986, while studying radioactive pollution characteristics in the air basin of Russia and Ukraine after the Chernobyl NPP accident. Thus for sampling of atmospheric krypton the industrial krypton-xenon mix manufactured at air-separating plants, located in the cities of Cherepovets, Lipetsk, Krivoi Rog and Enakiyevo was used. In the end of April and in the first half of May it was determined that 1,5-fold excess concentrations of ^{85}Kr in atmospheric air were observed in atmospheric air of considerable part of the European territory of Russia and Ukraine

During the period from 1987 to 1991 this method was used for monitoring of ^{85}Kr on the territory of the former USSR in the air basin of Russia, Ukraine and Kazakhstan. Industrial krypton-xenon mix manufactured at 14 large air-separating plants was also used for sampling. Six of them were situated in Russia (Novomoskovsk, Lipetsk, Cherepovets, Chelyabinsk, Nizhni Tagil, Orsk). Seven - in Ukraine (Enakiyevo, Kommunarisk, Krivoi Rog, Makeyevka, Mariupol, Severodonetsk, Dneprodzerzhinsk). One plant was situated in Temirtau, in Kazakhstan.

The analysis indicated that in Krivoi Rog; Dneprodzerzhinsk; Severodonetsk; Makeyevka; Mariupol; Enakiyevo; Kommunarisk; Novomoskovsk and Cherepovets the average ^{85}Kr concentration in atmospheric air was close to background level during monitoring. But in Lipetsk; Orsk; Nizhni Tagil and Temirtau 10-20% excess of background level was systematically observed. In Chelyabinsk concentration of ^{85}Kr steadily exceeded this level by 2-3 times, and incidentally exceeded it for order. Generally, during this period about 1500 values of concentration ^{85}Kr were obtained. Actually, the large-scale monitoring system of atmospheric ^{85}Kr with a binding of sampling points to 14 air-separating plants covered the territory 1000 x 3000 km was created.

The developed method of ^{85}Kr activity measurement was successfully applied also when carrying out expedition works in Northern Atlantic during the period from 1987 to 1994 with use of ZIF-1000 cryogenic installation for sampling, which initially was intended for liquid nitrogen manufacturing at the ship. Generally, 80 measurements of ^{85}Kr concentration were obtained using this method. It was determined, that the average concentration of ^{85}Kr in atmospheric air in the open regions of the Atlantic Ocean, were close to background level during monitoring. The concentrations of ^{85}Kr steadily exceeded this level by 2-3 times in English Channel, and incidentally exceeded it in tens times.