INVESTIGATION OF GAS-CONDENSATE CONTAMINATION WITH ARTIFICIAL RADIONUCLIDES AT LIRA FACILITIES

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At present artificial radionuclides became a constant component of the environments as a result of carrying out experimental nuclear explosions, due to operation and emergences at nuclear power-engineering enterprises. In 1980-s, not far from Karachaganak oil-gas-condensate field (KOGCF) in the territory of Western Kazakhstan oblast, underground cavities (UC) TK1-TK6 at the depth of 800-930 m were created by nuclear explosions – the so called LIRA facilities. TK1-TK4 cavities contain oil-gas-condensate now which was injected from KOGCF. In view of further utilization of the oil-gas-condensate the problem how to assess radiocontamination of this hydrocarbon production placed in UC became topical now.

Oil-gas-condensate was sampled from the cavities with the help of special sampler. ^{137}Cs and ^{241}Am content of oil-gas-condensate was determined with the help of instrumental gamma-spectrometric method [1], ^{90}Sr and $^{239+240}Pu$ – according to analytical technique [2] including preliminary treatment by aquafortis ("wet process").

No significant values of ^{137}Cs, ^{241}Am, and ^{90}Sr volume activities in oil-gas-condensate (<0.8

Bq/l, <0.3 Bq/l, and <0.3 Bq/l, correspondingly) were measured. $^{239+240}$Pu specific activity in the oil-gas-condensate samples collected from UC TK1-TK4 varied from 0.05 to 0.28 Bq/l.

According to infrared spectroscopy and Raman scattering spectroscopy data there was no any metalloorganic compounds in the oil-gas-condensate samples which could be associated with plutonium isotopes.

After separation from mechanical impurities [3] consisting of fine sand, clay micro-particles, and different mineral salts, both oil-gas-condensate filtrate and mechanical impurities were analyzed for $^{239+240}$Pu content. It was revealed that the oil-gas-condensate filtrate samples did not contain significant Pu isotopes content (<0.02 Bq/l), and this enables to suppose Pu isotopes to be concentrated in mechanical impurities as PuO_2.

Thus, based on experimental material one can arrive at the conclusion that the oil-gas-condensate being kept in the LIRA underground facilities is fit for further processing provided suitable decision of the State sanitary and epidemiologic inspection bodies will be received and some technical and economical problems will be solved.

References

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