PURIFICATORY FILTERS INTO WWR-M REACTOR TECHNOLOGICAL VENTILATION SYSTEM FOR REDUCTION OF ATMOSPHERIC RADIONUCLIDE EJECTION

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Physical starting of the WWR-M reactor has been performed in january of 1959, the nominal reactor power has been achieved in summer of 1960.

According to the reactor project the four systems of technologic ventilation have been designed to create the rarefaction into the technological rooms, to where the radionuclides in gaseous or aerosol forms are able to penetrate during the reactor operation. The rarefaction is necessary for the radionuclides not to penetrate to the people stay rooms but to eject into the atmosphere through the vent tube of 60 m height. At the same time they dilute,disperce and decay in air and after that they fall down on earth surface in the concentrations, significantly less then the acceptable limit.

According to regulation of the time when the WWR-M reactor was being designed and constructed, installation of filters into the technologic ventilation systems was not required and for that reason the purificatory filters were installed only in the B-4 system of four ventilation systems to produce the rarefaction into the hot chambers for manufacturing the reactor produced radionuclides, and to perform the preliminary clearing the pumped air in the FPP fabric filters on the output from each chamber.

During the reactor operation the detailed investigations of the radionuclide creative mechanisms and of the radionuclide concentrations, when ejected into the atmosphere, have been performed [1].

In accordance with the obtained results some technical procedures, which reduced significantly the quantity of the created and ejected radionuclides to the atmosphere, have been employed. For example, the deairat removal makes it possible to reduce the ejection of the radioactive gases and their daughter aerosol products up to ten times.

At present the averaged statistic dose rate for the population is approximitely equal to 400 ber/year for the human being [2]. According to the Petrov's, Schehter's and Schmatko's results addition to the year-averaged dose due to the WWR-M reactor operation is equal to 0.2 ber/year for the human being, e.g. the WWR-M reactor exploitation at the operational regime does not increase practically the dose rate for population.

However, at present the "Санитарные правила проектирования и эксплуатации реакторов исследовательского назначения" №1128-73, put into performance in 1973, require installation of the purificatory filters into technologic ventilation. The relevant instructions of the "Саннадзор" organization for the filter setting up into the technologic ventilation systems have been issued.

The instructions were intended not only for reducing the radionuclide ejection during the normal reactor operation but mainly for prevention of the radionuclide ejection for the emergent reactor operation. To fulfill the instruction a charcoal filter with the STK and with Du350, filled with D23 and FPP-15-3 has been installed into one of two lines of the B-2 technologic ventilation system. In this system the charcoal filter was located in front of the Du350 filter, which enables to minimize building and mounting works and not to reconstruct the vent-center.

The investigations to determine the operational effectiveness of the filter system show that for the operating system the ejection of the daughter radioactive products due to radioactive gases and of the iodine radionuclides in atomic and molecular forms, is reduced no less then by 95% [3–4], and the rarefactions into the technological rooms are reserved within the limits, established by the scheduler for the exploitation of the reactor systems.

At present preliminary works to install these filter systems on other lines of the WWR-M reactor technological ventilation are in progress.

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