

## **Radionuclide vectors for radioactive gas-aerosol releases of NPPs with WWER and PWR power units**

*Tuesday, 16 April 2019 17:00 (2 hours)*

The research focusing on the gas-aerosol releases of 7 European NPPs with Soviet Union design of power units and 40 other European NPPs with PWR power units was conducted.

List 1 was created. It consists of all controlled and accounted during observation period radionuclides, which were noted in releases of the researched NPPs.

List 2 consists of radionuclides, which existed technical instruments can detect. The List 1 consists of 82 radionuclides in comparison with the IAEA List [1], which consists of 803 radionuclides.

List 3 was created. It consists of all radionuclides, which give the main benefit to the total exposure dose under NPP normal operation conditions established before 2017 year. This List (Total NG, 110mAg, 14C, 58Co, 60Co, 134Cs, 137Cs, 3H, 181Hf, 131I, 124Sb, 90Sr, 75Se, 106Ru, 239Pu + 240Pu) is universal for all researched NPPs.

List 4 is created. Using this List it is possible to reduce the list of controlled and accounted radionuclides to 20 units (taking into account virtual radionuclide "Total NG" – to 15 units) in comparison with the Governmental List of 94 radionuclides [2].

List 5 is created. It consists of radionuclides, which give benefit over 99 % of total exposure dose of radioactive releases of 40 researched NPPs with PWR units. This List consists of 12 radionuclides: Total NG (41Ar, 85Kr, 85mKr, 87Kr, 88Kr, 131mXe, 133Xe, 133mXe, 135Xe, 135mXe, 138Xe), 14C, 3H, 131I, 58Co, 60Co, 137Cs, 11C, 90Sr, 134Cs, 110mAg, 124Sb, 65Zn.

It is proved that Lists of radionuclides, which give benefit over 99 % of total exposure dose of radioactive releases of soviet design NPPs with WWER-440 and WWER-1000 power units and NPPs with PWR units are equal.

Thus it's possible to make a conclusion that creation of radionuclides processes and radionuclide migration and processes of release are equal for WWER and PWR.

The common list is created for 47 NPPs with WWER and PWR power units. It consists of radionuclides, which give benefit over 99 % of total exposure dose of radioactive releases. This list includes 27 radionuclides. Nevertheless, it generated a question if 11 radionuclides, which were detected only on 2 % of the researched NPPs, stay legitimately in this List. This question needs additional discussion.

### List of References

1. Radiation Protection and Safety of Radiation Sources: International Basic Standards// General Safety Requirements Part 3 № GSR Part 3 (Interim) –IAEA, 2011.
2. Government Regulation No. 1316-P, dated 08 July 2015

**Primary author:** Ms VUKOLOVA, Angelina-Nataliya ("Kurchatov Institute" NRC)

**Co-authors:** Mr DOLGIKH, Alexandr («Rosenergoatom» JSC); Mr RUSINKEVICH, Andrey ("Kurchatov Institute" NRC)

**Presenter:** Ms VUKOLOVA, Angelina-Nataliya ("Kurchatov Institute" NRC)

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