
Summaries

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On the Issue of Enhancement of Scientific and Technical Support System of the State Nuclear Regulatory Authority of Ukraine

This article provides brief overview of the current national and international experience gained by technical support organizations of the regulatory authorities for nuclear and radiation safety. The requirements and strategic tasks are formulated as regards enhancement of the system of scientific and technical support of the State Nuclear Regulatory Committee of Ukraine.

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Conservative RIA analysis with the use of spatial kinetic model

Description of the methodology of conservative RIA analysis with the use of spatial kinetic reactor core model is presented. It is shown that its application yields more conservative assessment of reactor core parameters for which acceptance criteria for the rod ejection RIA are established, in comparison with the point-one-dimensional kinetic model.

Application of the methodology based on using point-one-dimensional kinetic model and power peaking factor obtained from stationary calculations of states that can be realized during RIA is also allowable if choice of the given state is substantiated. But, as it is shown, the choice of reactor core state for power peaking factor definition is not trivial, and it can be calculated on the basis of rod ejection RIA analysis with the use of 3-D spatial kinetic reactor core model. Performed studies lead to a conclusion that the necessity to use spatial kinetic software for RIA analysis shall be put in the regulatory documents.

G. Gromov, A. Sevbo

On the issue of determination of integrated core damage frequency

This article deals with comparison of the results of probabilistic safety assessment for Ukrainian nuclear power plants with the probabilistic safety criteria. It is shown, that the probabilistic safety criteria are intended for comparison with the full scale risk assessments concerned with operation of nuclear power plants during a calendar year. The approach for quantification of integral core damage frequency is proposed.

V. Bogorad, T. Litvinska, A. Nosovskyi,
V. Ryazantsev, R. Trypailo

Analysis of national and international safety requirements to the use of ionizing radiation sources in gamma defectoscopy

The article provides the analysis of results of current practice on radionuclide defectoscopy, national regulatory rules and standards, international standards and recommendations of International Commission on Radiological Protection and International Atomic Energy Agency. The results can be used for further improvement of national safety requirements in gamma defectoscopy.

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I. Morozov, R. Morozova, V. Skorochod, V. Medvedyev

Neutron-shielding properties of high-hydrogen titanium and zirconium hydrides

The MCNP-4B code is used for analytical comparison of the neutron-shielding properties of high-hydrogen titanium and zirconium hydrides anagocic properties some traditional neutron-absorbing materials such as RX-277 (USA) used in dry-storage containers at the Zaporizhzhya NPP. The analysis confirms the high shielding properties of titanium and zirconium hydrides.

O. Ligotskyi, A. Nosovsky, I. Chemerys

Analysis of international approaches which are used at development of the operational safety performance indicators

Description of international approaches and experience of the use of the operational safety performance indicators system is provided for estimation of current status of safety and making a decision on corrections in the operation practice. The state of development of the operational safety performance indicators system by the operating organization is overviewed. The possibility of application of international approaches during development of the integral safety performance indicators system is analyzed. Aims and tasks of future researches are formulated in relation to development of the integral safety performance indicators system.

Summaries

Z. Alekseeva, T. Vasilenko, S. Kondratyev, Eu. Nikolaev, N. Burzak, T. Kutuzova, B. Zlobenko, L. Spasova

Safety assurance aspects under siting of radioactive waste disposal facilities

This paper analyses general provisions of the normative document «Requirements on siting of radioactive waste disposal facilities», which establishes the technical requirements and managerial procedures for siting of near surface and geological disposal facilities.

S. Alyokhina, V. Voronina, V. Goloschapov, A. Kostikov

Determination of equivalent heat conductivity of the multi-placed sealed basket for the spent nuclear fuel storage by solution of the inverse problem

The technique of determination of equivalent heat conductivity of a basket with spent nuclear fuel is developed on the basis of solving the inverse conjugate heat transfer problem. The equivalent heat conductivity of the basket of cask, which is used at Zaporizhya NPP, is calculated. The influence of selection of the reference points' location on the obtained value of equivalent heat conductivity is investigated.

S. V. Gabelkov, R. V. Tarasov, N. S. Poltavtsev, M. P. Starolat, A. V. Pilipenko, A. G. Mironov, V. V. Makarenko, F. V. Belkin

Sintering of cubic zirconia — matrix for immobilization of high level waste

Sintering of compacts from nanosized cubic zirconia powder containing 10 % mas. oxide of yttrium (stabilizer of structure) and 15 % mas. oxide of europium (dummy chemical of actinide americium) was investigated. The ceramic matrix for immobilization of actinide from cubic zirconia with relative density of 95,4 %, with grains having size 4–6 mm and pores of three intervals of sizes (0,85–1,1 mm, 0,4–0,6 mm and 0,2–0,3 mm) was produced at optimum temperature 1400 °C within 1 hour. Sintering runs intensively at temperatures between 900–1200 °C and is less active in the range of 1200–1400 °C. Activation energies of sintering equal 40,1 ± 2,1 kJ/mol and 7,1 ± 2,1 kJ/mol accordingly. Ceramic material has moderated

(700–900 °C) and intensive (900–1400 °C) grain growth. Activation energies of grain growth in the specified intervals of temperatures equal 12,8 ± 5,1 kJ/mol and 191 ± 10 kJ/mol accordingly.

V Bogorad, T. Litvinska, A. Nosovskyj, A Slepchenko

Analysis of international practice of implementation of optimization principle at NPP decommissioning

The analysis results are presented for current practice on application of radiation protection optimization principle. General organizational and methodological recommendations are considered on implementing optimization procedures into NPP decommissioning practice.

Vahid Hasani Moghaddam, I. V. Kazachkov

The peculiarities of corium melt spreading and fragmentation in the coolant pool under reactor vessel during severe accidents at NPP

The paper contains an analysis of the problem of corium melt jets' spreading and interaction with coolant in a pool under reactor vessel, in the passive protection system against severe accidents at NPP. The features of the melt jets' penetration into a coolant pool are considered for the diverse melt-coolant density ratio, viscosity ratio, and some other physical properties and factors.

K. Shevtsov, I. Bodrova, Yu. Yesypenko, V. Kovalchuk, O. Petrenko, O. Shevtsova

The problem of terminological equivalence in nuclear and radiation safety documents

This article covers some typical problems that arise during translation of nuclear and radiation safety documents and caused by some gaps between Ukrainian and international terminology, as well as absence of unified nuclear terminology system in this area. It is shown the necessity of systematic work on development of a national nuclear terminology standard with the use of international good practice.