

Towards to Building Nuclear Competence of Radiation Protection Specialists

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During few last years a giant pool of training materials related to numerous training courses in radiation protection and safe use of radiation sources was produced by IAEA. Almost each of them contains quotations from the nuclear science to provide trainees by the core nuclear physics knowledge sufficient for clear understanding as origination of ionizing radiations as well as its impact on substance. The main tendency of this training material is the utmost simplification of the knowledge using very rough and even not valid models of an atom and a nucleus, origination of radioactivity like Rutherford-Bohr model, equality of proton and neutron masses, etc. In some of training packages the neutrino in beta-decay reactions is omitted. Even taking into account that this material is designated mostly to practitioners who will not develop conceptual matters of the subject and there is a lack of time within the course schedule to deliver more concise knowledge, it is very important, however, to provide trainees by conceptually closed material. It is important because radiation protection specialists should understand clearly why beta spectra are broad, why the half life time of radioactive substance is constant for each kind of a nucleus, etc. to avoid rough expert mistakes when estimating some projects. For instance, several years ago there were some projects towards fast remediation of radioactively contaminated areas in Belarus using chemical reactions to influence on radioactive decay. And, unfortunately, these projects were under serious consideration for some time in radiation protection authorities.

To build more competence among non-physicists involved in radiation protection and radiation use structures the non-traditional curriculum for teaching basics in nuclear physics is developed in International Sakharov Environmental University (Minsk, Belarus) for students of university and IAEA PGEC course. The course is started from fundamental structure of matter containing qualitative description of quarks and leptons, fundamental interactions (special attention to the action radius of various forces is paid). The role of conservation laws and basics of quantum field concepts are also essential. After that building a nucleus, its static properties and nuclear reactions are considered within several widespread models. The special attention is focused on fundamental explanation of constancy of half life time of radioactive elements, on conduction of attenuation law for ionizing radiation beams in matter, etc. Trainees are taught to use simple formulas for quantitative estimations of different effects to make them even orally. It provides to save rigorous approach to explanation of nuclear phenomena and to give trainees the instrument of deep understanding the practical use of ionizing radiations, action of their various sources. The quantum philosophy: "All what is not forbidden can be happened but with proper probability" and understanding the principally random character of radioactive decay are introduced in minds of trainees to give them an instrument of solving many of practical problems. For instance, one should take them

into account proposing assurance approach to juggling in a court a suit brought by a worker of atomic power station against his bosses when he has got leukemia.

The academic schedule, kinds of lessons and their content is discussed in the report in details.