Radiological education and training in former Soviet Union countries

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Abstract
IAEA is applying great efforts to assist former Soviet Union countries in education and training. Many of them are focused on regional training center in Minsk, Republic of Belarus based on International Sakharov Environmental University (ISEU). There were 3 Post-Graduate Educational and Training Courses on radiation protection and safety of radiation sources held in Minsk since 2001. The major part of participants of these courses is from countries belonging to the Community of Independent States (CIS). 10 CIS states had endorsed in 2000 in Minsk, Belarus, the Agreement on co-operation in education and training in radioecology, radiobiology, RP and related fields. ISEU was nominated as the leading institution of the special Permanent CIS commission on the topic created within the agreement. The activity of this commission, role of IAEA and regional peculiarities of training programme in Minsk are discussed in the report.

1. Introduction

Radiological education and training in former Soviet Union was concentrated in several higher educational institutions concentrated in Russia (except medical higher institutions where training of medical radiologists was located in other countries too). After disintegration it is appeared that in the most of new independent countries there were no a higher institution to train specialists in radiation protection and industrial radiology. Only Russia, Ukraine and Armenia having nuclear power plants and big well developed classical and specialized universities have been able to cover their demands in training specialists in the field. At the same time such big country like Kazakhstan has no any institution for that and has no even nuclear physics chair in classical universities till now. That is why several years ago the government of this country committed to start training specialists in the field to the chair of inorganic chemistry of one of Kazakh universities which was focused on training in radiation chemistry.

The situation in Belarus in the beginning of 90th was almost the same. There was only two nuclear physics chairs in Belarus State University and Gomel State University and also chair of radiation chemistry in Belarus State University. But there were several research institutions focused on nuclear and radiation problems. The ISEU was created in 1992 as a college on radioecology to train specialists in radioecology, radiobiology, radiation medicine, radiation protection who could be able to alleviate consequences of the Chernobyl disaster. The content of training in the university in the field steadily developed from purely radioecological and radiobiological issues to more wide radiation protection disciplines. That is why in 1999 the national IAEA technical co-operation project to develop national training centre on the base of ISEU was started. Now this centre is used not only for national training and professional updating in radiology but also for organizing big international training events like Post-Graduate Educational and Training Course (PGEC) on radiation protection and safety of radiation sources.

Independently on that the Commission on education of member countries of the Community of Independent States (CIS) formed by the most of former Soviet Union countries had commenced the Permanent commission on education and training in radioecology, radiation biology, radiation protection and related topics in 2001(shortly, Permanent Commission on Radioecology, PCR). The ISEU was nominated as the head organization of the commission. This commission has developed the plan of co-operation of member states in education and training of radiation protection specialists and try to implement it now.

2. Peculiarities of training of radiation protection specialists in Belarus

Belarus has some small history in nuclear training. In the beginning of 60th of previous century the nuclear physics chair was created in Belarus State University. The purpose was to train specialists for young nuclear research institute situated in the settlement Sosny (pine tries in Russian) near Minsk having research reactor and focused its research on the small reactors, devoted partially for submarines. Then the nuclear physics chair was opened in Gomel State University in the end of 70th in co-operation with some of Russian research institutes. The training on this chair is mostly theoretical one till now. It should be noted that radiation chemistry also was created in 60th under the same research demands as for nuclear physics chair in Belarus state university in Minsk.

The situation on the market of radiation protection specialists was hardly changed in 1996 after the Chernobyl disaster. It appeared that there are a little of specialists and no research institutions to alleviate its consequences. Moscow research centres like Institute of Biophysics controlled and regulated situation. National emergency authorities had no enough specialists and equipment to control radiation and to make forecasts of spreading of radioactive contamination. Now there are several research institutions created in Belarus after Chernobyl explosion: Institute of Radiobiology, Institute of Radiation Medicine and Endocrinology transformed now into the Centre of Radiation Medicine and Human Ecology, Institute of Radiology like the Institute of Agricultural Radiology in Obninsk, Russia, focused primarily on agricultural problems, Institute of Radioecological Problems created on the base of Sosny centre. At the same time, medical radiology and nuclear medicine was also developed in Belarus to struggle against cancer. But facilities for that were made only in big cities like Minsk, Gomel, Mogilev only. There are only few gamma radiation sources for this purposes in the country and one medical accelerators centre in Minsk in the Institute of Oncology and Medical Radiology. If Chernobyl disaster would not happened Belarusians would have almost the same situation in training in radiology like in the most of former Soviet countries. But now somebody from Belarus decision makers miss Chernobyl problems with radiological ones. Because of that few years ago several special research institutions were re-settled from Minsk to Gomel closer to the contaminated areas.

The ISEU try to cover now all national training needs in the field of radiation protection. Training in radioecology is transformed now into training in general radiology. After completion of modules on math, general physics including nuclear physics, chemistry, basics of biology focused on molecular, cellular and physiological level students study such special disciplines as “Interaction of ionizing radiation with substance”, “Registration of ionizing radiation and spectrometry”, “Radiochemistry”, “Dosimetry”, “Calculation methods in dosimetry”, “Radiation monitoring”, “Radiation protection” which concentrated on calculation of parameters of physical protection tools, “Radiation safety” focused on safety techniques and legislation, “Radiation risks” and many of specialized subjects within 3 specialisms on radiology, life safety and radiation monitoring (more than 10 disciplines each). Specialism is optional for students. Moreover, all students study special courses on processing radiation data, have field practice in contaminated zone and study radiation emergency response and countermeasures. It covers all the topics included into the Standard Syllabus processed by IAEA for training in radiation protection and realizing by ISEU also at the level of post-graduate short courses.

3. International co-operation in education and training

3.1. PGEC in Belarus

Main peculiarities of PGEC in Belarus were described at the International Conference on National Infrastructures for Radiation Safety in 2003 [1]. There were passed some time after it and several new findings from the PGEC conducting experience were recognized being useful. The main of them are following.

- Presentation of the project proposals by the possible supervisors should be done not later than the 6th week of the course. It provides an opportunity for collating material needed and to write down the plain text of the work.
- Parts VII and VIII should be overlapped with duration not less than 5 weeks.
- Evaluation for parts IV and V should be jointed.
- Tutorials for parts of the Syllabus should be done before evaluation (a day for tutorials or just before quiz – recommendation for Belarus): at least 3 lessons before the evaluation (it can take a day for tutorials and evaluation).

- Extracting time for Personal work (for preparation to the evaluation and project).

Duration of modules including details about lectures/laboratory or field exercises/practical lessons/technical visits/tutorials/evaluation is presented in the table 1 in comparison with Standard Syllabus and previous course in 2004 – 2005. It is slightly different to Belarus and Greece and depends on peculiarities of the course working Syllabus.
Indication of duration in weeks/days/lessons express real implementation of the course including overlapping material and facilitate the understanding how it goes.

Part	Title	Standard duration (weeks)	PGEC Minsk 2004–2005 (w/d/l)*	PGEC Minsk 2005–2006 (w/d/l)
I	Review of fundamentals	2	3/18/70	3,2/20/88
II	Quantities and measurements	1,5	3,4/17/64	4/20/73
III	Biological effects in ionizing radiation	1	2/10/17	1,6/8/18
IV	Principles of Radiation Protection and the international framework	0,5	1/5/8	0,6/4/10
V	Regulatory control	1,5	1,4/7/12	1/5/12
VI	Assessment of external and internal exposures	2,5	2,8/14/26	2,8/15/39
VII	Protection against occupational exposure	3	4,4/22/38	4,6/24/42
VIII	Medical exposures in diagnostic radiology, radiotherapy and nuclear medicine	2	4,4/20/27	4,6/24/33
IX	Exposure of the public due to practices	1,5	1,4/7/25	1,4/7/25
X	Intervention in situations of chronic and emergency exposure	1,5	1,2/6/22	2/10/25
XI	Training the trainers	1	1/5/14	1/5/14
	Field practice	–	1/6/23	1/6/23
	Evaluation	–	2/11/21	2/10/23

*w/d/l denotes weeks/days/lessons.

Table 1: Duration of parts of the Standard Syllabus for the Minsk PGEC in 2004 – 2005 and in 2005 – 2006

From table 1 one can conclude that there are planned more lessons in the parts I,II,III,IV,VI,VII,VIII,X but duration of them in some cases is squeezed due to concentration of the lessons and optimization of their sequence.

Challenging by current situation in the world two of the most important amendments to the Standard Syllabus were done:
1) focusing on problems of NORM (naturally occurred radioactive materials);
2) training in security of sources.
Belarus mines potassium chloride very much. Concentration of the radioactive salt components after mining while transporting increase threats to be overexposed for transport and boarderguard personnel. Providing security of sources now is one of the most important activities of radiation protection specialists.

Training on PGEC at ISEU in Minsk had passed dozens of participants from CIS, Baltic and Eastern Europe countries. For many of them this is the sole opportunity to train specialists in the field with accordance to international requirements processed by IAEA.

3.2. Activity of the PCR in CIS

Recently the new programme for the period from 2004 – 2008 of co-operation of CIS countries in education and training on radiation protection was developed at the meeting of PCR in Obninsk in December, 2003. At the meeting of PCR in Minsk in March, 2005 it was focused on the following major tasks.

- Enforcement of integration in and between CIS member states of profiled higher institutions.
- Development of training facilities and equipment, creation of joint information medium.
- Enhancing quality of education and training and development of training materials.
- Development and expansion of co-operation in research.

The programme includes the following directions of activities:

- creating and maintenance of information base on education and training in the field, for control by the process and for employment of graduates;
- developing of PhD and full doctoral courses;
- processing and co-ordination of training programmes for all levels of education, organization of seminars and workshops for PhD students and young lecturers;
- organizing contests for young professionals in the field;
- holding research conferences for students;
- organizing fellowships of young professionals;
- creation of the international centre of re-training and professional updating on the base of ISEU possibly together with Moscow Engineering Physical Institute;
- creating joint syllabi and textbooks.

Realization of these activities should harmonize the situation in the CIS in the field of radiation protection.

References

[1] A. Timoshchenko, e.a. Contributed papers of International Conference on National infrastructures for Radiation Safety, Rabat, Morocco, 1–5 September, 2003, pp/ 329 – 333.

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