

Future Needs in Radiation Protection Training For NPP Workers in Slovenia

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ABSTRACT – Short review of history of radiation protection training for NPP workers in Slovenia and legal requirements regarding this field are presented. Courses developed in co-operation between Milan Čopič Nuclear Training Centre and Krško Nuclear Power Plant are briefly described and their implementation presented. Using available data we have predicted probable number of courses and participants in forthcoming years. Some results from inquiry on courses for regularly exposed workers are presented, enabling us to modify courses according to participants' needs.

1. Introduction

Radiation protection training for NPP workers is the result of co-operation between Krško Nuclear Power Plant, Slovenian only nuclear power plant, and Jožef Stefan Institute, Ljubljana, Slovenian major research institution. This co-operation started in mid-seventies with the beginning of the plant construction. One of the aspects of the co-operation was also education and training of plant personnel, originally implemented through different departments of Jožef Stefan Institute. First course on nuclear technology was organised in 1975 with involvement of different lecturers from the Institute and other organisations. Since then, courses on nuclear technology were organised regularly, according to Nuclear Power Plant's needs.

In order to fulfil legislative requirements and to assure safe operation, the Krško Nuclear Power Plant has also formed its own Training Department to perform and co-ordinate required training and retraining of the staff and also workers of the subcontractors, involved in regular operation and especially in outage activities.

In 1989 Milan Čopič Nuclear Training Centre was established, as one of the new Jožef Stefan Institute's departments. It was done to concentrate and enhance activities related to training of the Nuclear Power Plant's personnel and also to enable further development in this field. Due to this reorganisation and increased requirements from the Nuclear Power Plant, the number of organised courses has strongly increased and co-operation expanded.

One of the activities where co-operation between Jožef Stefan Institute and Krško Nuclear Power Plant is strong and permanent is also training in the field of radiation protection. Jožef Stefan Institute is authorised to perform training in this field and also to supervise related activities in Krško Nuclear Power Plant. Training is implemented in both organisations, with

participation of lecturers and instructors from both sides. Therefore, it is of mutual interest to analyse future requirements and to define future needs in the field of training. This will enable us to prepare and organise training in the most effective way with limited resources available.

2. Legal framework

Requirements regarding radiation protection training of NPP workers, as well as other occupationally exposed workers, were defined in 1981 by Slovenian Regulation [1] and in 1984 by Yugoslav federal Law [2]. According to this legislation, occupationally exposed workers in the Nuclear Power Plant are divided into **three categories (groups)**:

- 1) **Radiation protection specialists** are members of the first group. Their training is extensive and demanding, comprising general health physics subjects as well as knowledge of basics of nuclear technology. The duration of required training is **200 hours** with oral exam at the end. Re-examination is obligatory on two-year basis.
- 2) **Regularly exposed workers** are members of the second group. All licensed personnel and others working with sources of ionising radiation in the Controlled Area of the Nuclear Power Plant belong to this group. Required training is **forty hours** with oral exam and re-examination on five-year basis.
- 3) **Occasionally exposed workers** belong to the third group. This is the biggest group consisting of all workers working occasionally in Controlled Area performing maintenance or outage tasks. Required training is **ten hours** for workers of the Nuclear Power Plant and **four hours** for others. Obligatory re-examination is on five years.

According to requirement of Slovenian Nuclear Safety Administration, recommendations of international organisations relating implementation of radiation protection should be also considered.

Internal regulations and Radiation Protection Programme of Krško Nuclear Power Plant regulate the details and requirements for particular jobs and tasks thus assuring consistency with legal requirements and their fulfilling.

3. Implementation of training

According to the outline given in the Regulations and in co-operation with management of Krško Nuclear Power Plant, different courses were developed at Milan Čopič Nuclear Training Centre to cover legal requirements of radiation protection training. Since legal licensing requirements extend beyond radiation protection, some of the developed courses have radiation protection as a part of broader content.

For regularly exposed workers three initial courses were developed:

- **Radiation Protection 2 (RZ2)**: basic course to cover legal requirements for regularly exposed workers,
- **Basic Nuclear Technology Course (OTJE)**: aimed at technical staff of Krško Nuclear Power Plant, and
- **Nuclear Technology Course (TJE)**: aimed as initial training for Control Room staff and other licensed personnel, as well as engineering staff.

These courses are organised and performed at Milan Čopič Nuclear Training Centre with co-operation of experts from the Nuclear Power Plant and other organisations. Annually, 2 to 3 courses of these kinds were organised. Numbers of participants per year attending courses for regularly exposed workers in last ten years are on the Figure 1.

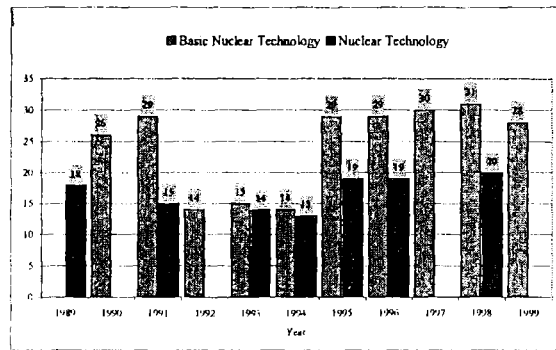


Figure 1: Number of participants in courses for regularly exposed workers (RZ2 Courses)

For occasionally exposed workers two initial courses were developed:

- **Radiation Protection 3a (RZ3a):** for occasionally exposed workers of the Nuclear Power Plant, and
- **Radiation Protection 3b (RZ3b):** for occasionally exposed workers from subcontractor organisations.

These courses are organised and performed at Krško Nuclear Power Plant. In last 6 years, 22 to 28 courses of these kinds were organised per year. Number of participants per year attending courses for occasionally exposed workers are on the Figure 2.

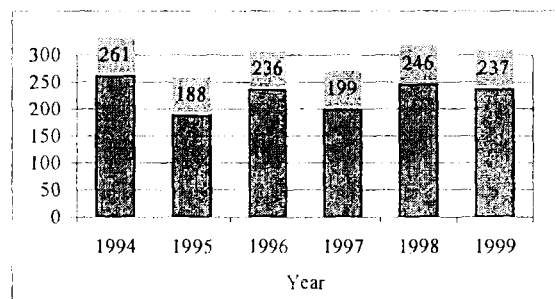


Figure 2: Number of participants per year in courses for occasionally exposed workers (RZ3a and RZ3b Courses)

Courses for radiation protection specialists have not been organised yet. Legal outline for these courses has been given, but there is no approved programme. Now, we are working on the syllabus and proposition for updated licensing approach to implement legal requirements within limitations given by small number of possible candidates and limited resources for the Course implementation.

Very important part of radiation protection training is also re-examination, regularly combined with refreshing courses. Although refreshing courses are not legal requirement, we organise them with limited course content, derived from basic course. This is also valid for re-examination of radiation protection specialists, where refreshing courses are more intensive and usually combined with topics aimed at professional improvement. The numbers of participants in refreshing courses for specialists and regularly exposed workers are on Figure 3.

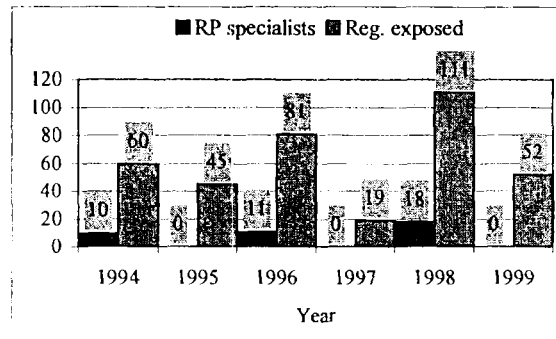


Figure 3: Number of participants in refreshing courses for radiation protection specialists (RZ1 Courses) and regularly exposed workers (RZ2 Courses).

4. What should be done in the future

Predicting future is always problematic, but we will try to give some estimations of future needs in radiation protection training for NPP workers.

The easiest things to predict and plan are refreshing courses. Since Krško Nuclear Power Plant and Milan Čopič Nuclear Training Centre keep records of training in computerised database, it is easy to extract annual requirements for re-examination for the next five years. Predicted numbers of courses and participants in courses for regularly exposed workers are on Figure 4. Planned increase in number of participants for year 2003 is due to requirement that re-examination for licensed personnel should be related to re-licensing. For specialists, we plan refreshing courses in years 2000, 2002 and 2004 with approximately 17 participants in two courses, per each of these years.

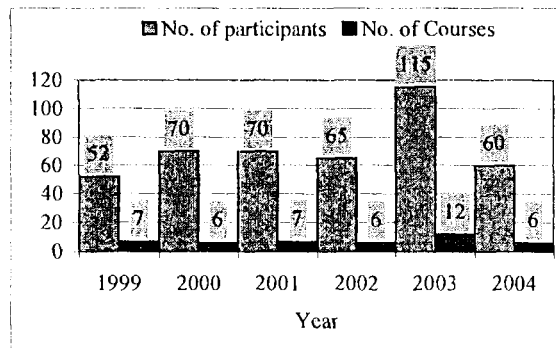


Figure 4: Number of courses and participants in courses for regularly exposed workers (RZ2 Courses)

Number of initial courses is harder to predict. Number of courses and participants in courses for regularly exposed workers (RZ2) and occasionally exposed workers (RZ3a and RZ3b cumulative) are on Figures 5 and Figure 6.

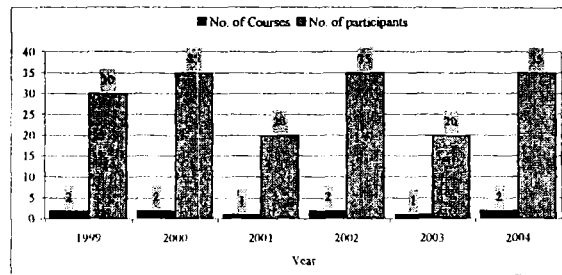


Figure 5: Predicted numbers of courses and participants in initial courses for regularly exposed workers (RZ2 Courses)

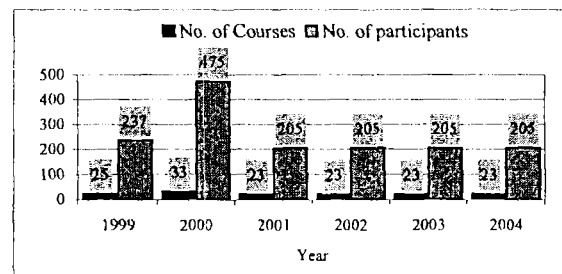


Figure 6: Number of courses and participants in initial courses for occasionally exposed workers (RZ3a and RZ3b)

5. What participants expect from the course

Recently, we have performed inquiry among regularly exposed workers regarding initial and refreshing courses on radiation protection. Up to now, we have received 70 questionnaires from workers from Krško Nuclear Power Plant (86%) and other organisations (14%). Majority was experienced workers (53% with more than 10 years of experience in nuclear technology) performing different jobs. Professional structure of inquired workers is on the Figure 7.

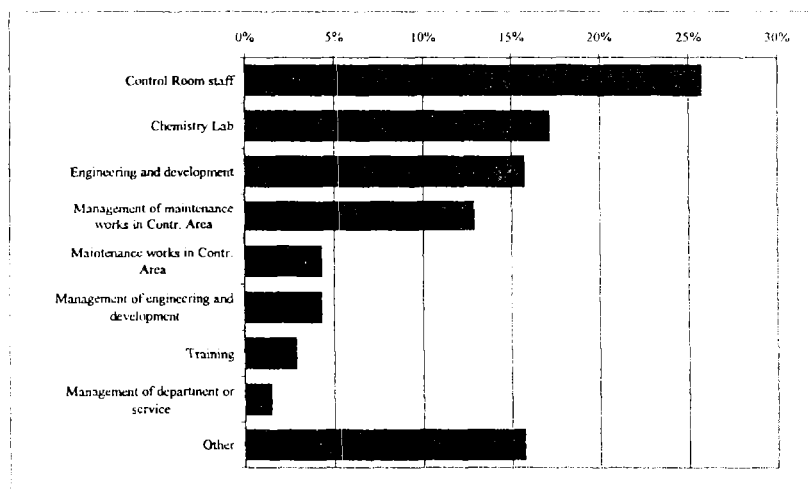


Figure 7: Professional structure of inquired regularly exposed workers

Inquiry was divided into two parts, the first related to the initial training for regularly exposed workers and the second to the refreshing courses. Majority expressed opinion that initial courses were sufficient and adequate for their work. The same applies to the refreshing courses. This is not substantially different from the results we receive from inquiries performed immediately after courses.

Our main point of interest were suggestions relating future courses, especially refreshing courses. We have inquired on important topics for a refreshing course, important novelties to be included and also field of interest for personal improvement. The results of these inquiries are on Figure 8, Figure 9 and Figure 10.

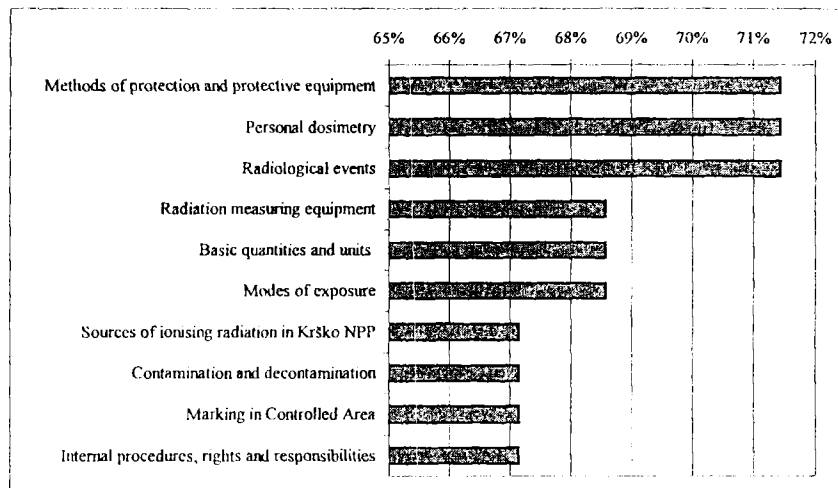


Figure 8: Answers to question what are important topics for a refreshing course

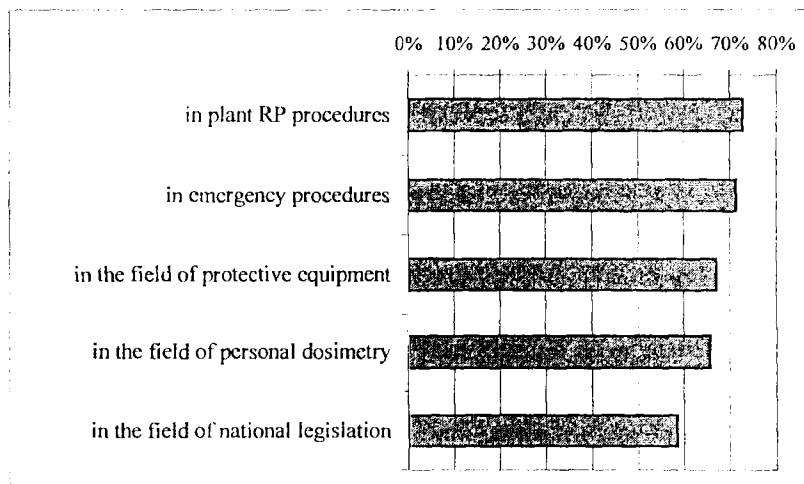


Figure 9: Answers to question what novelties should be included in a refreshing course

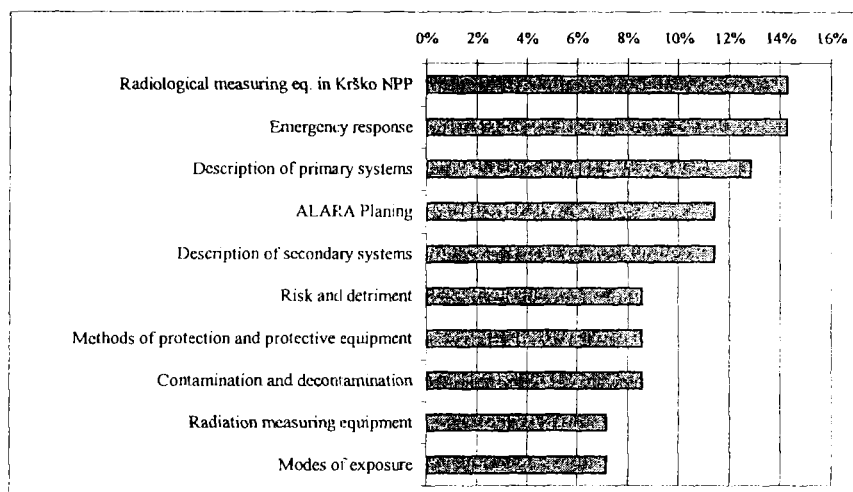


Figure 10: Answers to question what are the fields workers want to improve personally

6. Conclusions

Krško Nuclear Power Plant and Milan Čopič Nuclear Training Centre have successfully developed and implemented radiation protection training for regularly and occasionally exposed workers in the Nuclear Power Plant.

The programme for radiation protection specialists should be developed in near future to enable training of fresh workers in Radiation Monitoring and Control Organisational Unit of Krško Nuclear Power Plant.

We should evaluate our courses for regularly exposed worker and modify them taking into account the results of our inquiry.

New activities should be planed to satisfy requirements for personal improvements of particular workers.

7. References

- [1] Regulation on Required Education, Working Experience and Obligatory Training of Workers Using Sources of Ionising Radiation or Working in Radiation Protection Services, and on Verification of Their Competence, Off. Gaz. SRS, 9/81.
- [2] Act on Radiation Protection and the Safe Use of Nuclear Energy, Off. Gaz. SFRY, 62/84.