TRAINING COURSE FOR BORDER GUARDS ORGANIZED BY THE INSTITUTE OF ATOMIC ENERGY IN ŚWIERK, POLAND

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INTRODUCTION

Danger of illegal trade in radioactive and fissile material has recently increased due to disintegration of the former Soviet Union. A substantial part of these materials is suspected to be smuggled through Poland to Western Europe. Proper countermeasures like establishing radiation detecting gates at border crossings and specific training programs for border guards have been set up by Polish authorities.
On request of Polish Border Guard Command the Institute of Atomic Energy (IAE) has prepared a series of training courses for border guard officers. The courses covered both theoretical and practical subjects concerned with radiation safety and were focused on detection and safeguarding of radioactive or fissile material at border crossings.

THE PURPOSE OF THE COURSE

The main subject areas covered by the course included: transport regulations for radioactive materials, radiation protection safety procedures, operation of radiation survey meters and physical properties of fissile materials. Since border guard officers could not spend much time off their posts, the duration of the course had to be limited to three days of intensive training. Emphasis was laid on developing practical skills in detecting and safeguarding of nuclear material. The practical part covered also hands on experience in measurement of radiation, decontamination of areas and persons, and setting up radiation safety zones.

The syllabus of the course was evaluated and approved by the Polish Atomic Energy Agency. A handbook covering the course material was edited in Radiation Protection Division of IAE and published by the Institute's Publishing Division. The handbook contained texts of all lectures and technical parameters of radiation monitors used during the course. There was also included a complete set of example documents accompanying isotopic sources in transport and their marking.

SYLLABUS OF THE COURSE

1. Elementary information on ionizing radiation

- types of radiation and their properties (alpha, beta; range, penetration power)
- natural and man-made radiation sources (exposure of the population to these sources)
- basic concepts and quantities (activity, Radioactive Decay Law, half-life)
- types of radiation sources (radioisotope sources opened and sealed, radiation generators)

Demonstration: basic properties of alpha, beta and gamma radiation.
The aim was to distinguish different types of radiation and act accordingly in protecting yourself and the general public when the source is found. To know what activity means and how it is changing with time.

2. Exposure to ionizing radiation

- biological effects of radiation (health hazard resulting from exposure to ionizing radiation)
- internal and external exposure and methods to limit these
- dose limits for occupationally exposed persons and for members of general public
- characteristics of potential exposure at border crossings

Demonstration: penetrating power of alpha, beta and gamma radiation; shielding.
The aim of this lecture was to make trainees aware of the danger of exposure to ionizing radiation. They were also practicing with the role of distance, time and shielding in limiting external exposure with numerical examples. Past incidents with radiation sources on border crossings were called on and evaluated as examples.

3. Assessment of internal and external exposure

- measurement of external exposure (dose rate and contamination measurements, personal dose)
- measurement of internal (whole body counter, thyroid activity counter, activity of excreta)
- basic rules of work in contaminated areas (radiation safety zone, decontamination procedure)

Each trainee was asked to perform decontamination of himself and of a given area. Direct and indirect (smear test) measurements of contamination were performed using alpha and beta calibration sources.

4. Operation of dosimetric equipment

- radiation monitors different types
- contamination monitors for measurement of alpha, beta and gamma contamination
- radiation detection gate (type installed at border crossings)

The trainees were operating monitors under conditions of a simulated radiation accident. They were also taught how to prepare and check the monitor before starting measurement.

5. Isotope transport regulations

- dose limits and transport regulations for radioactive materials (according to international standards)
- transport of radioactive materials (containers, marking, surface dose rate limits, documentation)
- regulations concerning vehicles for transport of radioactive materials

Demonstration: containers, packets and their marking

6. Practical training and demonstrations

- practical operation of radiation measuring devices
- detection and safeguarding of radiation source (use of manipulators, containers and shielding)
- demonstration of different radiation source packing and transport documentation
- demonstration of specialized laboratories of IAE (whole body counter, thyroid activity counter, spectrometric laboratory)
- a visit to fissile material store (uranium of different shapes, plutonium containers and fuel elemnets)

CONCLUSIONS

Two series of courses were organized and altogether 300 border guard officers were trained in 1994. Each course was concluded with a theoretical and practical examination. The practical part consisted of a simulated radiation accident arranged with low activity calibration sources. The trainee was asked to resolve the situation according to the rules. All important elements from the practical part of the syllabus were involved in the examination together with relevant regulations.
Each trainee was given a copy of the handbook for future reference.

REFERENCES

N. Golnik, J.Janeczek, B. Filipiak, Z. Haratym and others - Radiation Protection, Course for Border Guards (in Polish) Institute of Atomic Energy, Świerk-Otwock, 1994.