SOURCES OF IONIZING RADIATION IN INDUSTRY: LICENSING AND CONTROL

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ABSTRACT

In this paper are presented several methods, which the Inspection on the Safe Use of Atomic Energy (ISUAE) applies for the control on the use of sources of ionizing radiation (SIR) in industry. It reviews some problems, which we have to solve during our inspections. An analysis and assessment of them is done. The prescribed safety ensuring measures are discussed.

Licenses for the use of Sources of Ionising Radiation (SIR) are issued by the Inspection on the Safe Use of Atomic Energy (ISUAE) based on a request, co-ordinated with other specialised control bodies (National Centre of Radiobiology and Radiation Protection, Ministry of Internal Affairs, Ministry of Environment and Water) and accompanied by the necessary documentation for each stage of the atomic energy use. The documentation includes: grounds for the necessity to carry out this activity, comparable evaluation of its efficiency, basic characteristics of the envisaged for use SIR, characteristics and plan of the site, the supervised and controlled zones, planned measures for ensuring radiation protection and non – admission of uncontrollable spreading of radioactive substances in the environment, organisation of inner – company control, programmes for collective and personal dose exposure control.

LICENSING ACTIVITIES

In the field of radiation protection the ISUAE has issued last year 954 licenses. 697 of them are long term and 257 are single action licenses. The distribution of the licenses according to the type of performed activity is shown on **Fig. 1**. 72% of the total number of licenses are issued for operation of SIR, 17% for SIR transportation, 8% for services and 3% for SIR storage.

Distribution of the issued licenses according to the application field is shown on **Fig. 2**. 43% of the total number of licenses are connected with the use of SIR in industry, 15% in science and education, 18% in medicine, 21% for Fire Detecting Systems and 3% for other use.

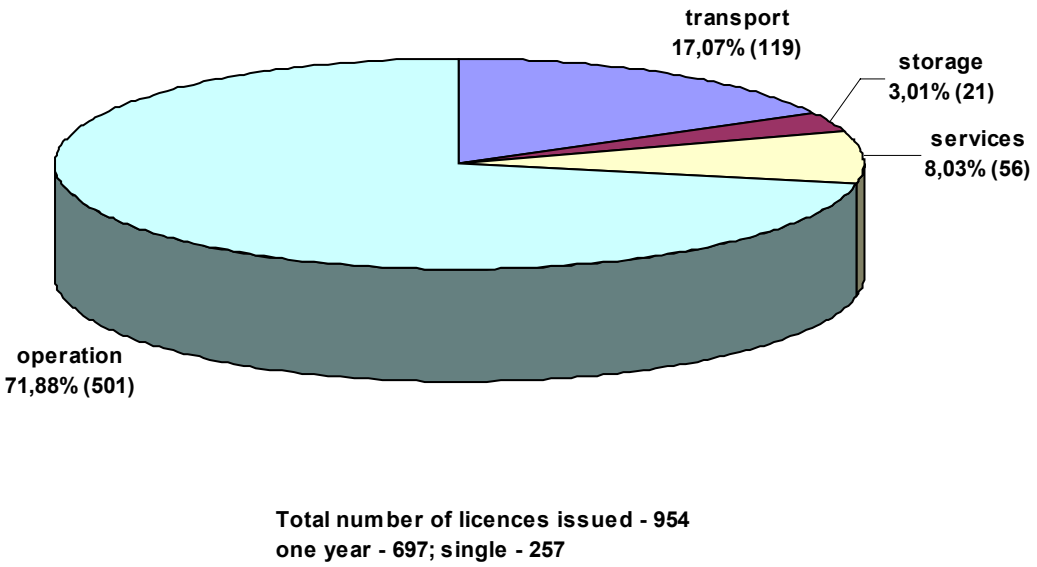


FIGURE 1. Licences issued as per types of activity

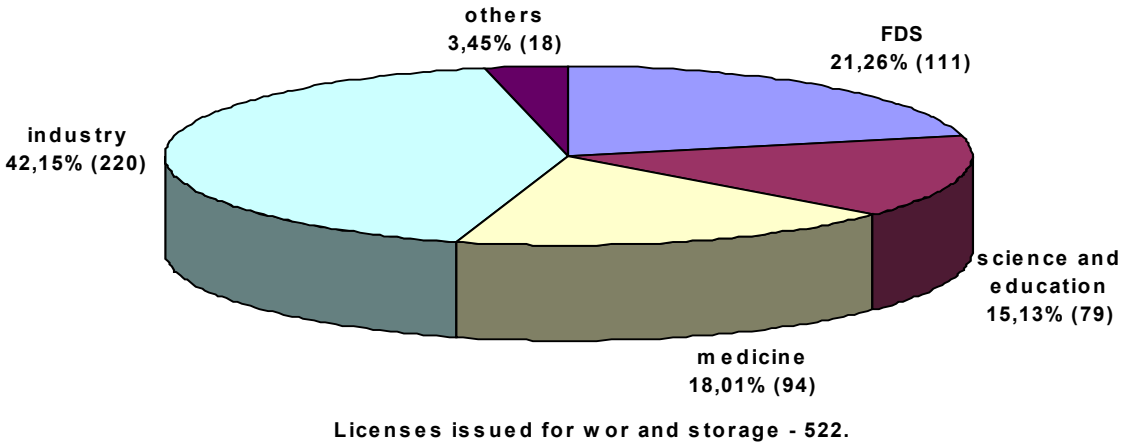


FIGURE 2. Licences issued for work and storage as per field

ANALYSIS AND EVALUATION

During last year no radiation protection accidents in facilities using SIR have been registered. Data obtained from radiation and dose exposure measurements in the respective facilities show that there are no deviations from the requirements of the Basic Standards of Radiation Protection – 92 (BSRP-92).

The draft of BSRP – 2000 is almost prepared for adoption. Some requirements in the field of radiation protection, conformable to the European standards are added.

On the basis of the results from inspections conducted in facilities using SIR, as well as the documents submitted and stored in the ISUAE, the following basic problems can be outlined:

1. The legislation in force in the field of radiation protection, as a whole, is outdated, incomplete and some times contradictory. The CUAEPP programme for bringing up to date the existing legislation and for development of new legislative acts in this field is under way. It is co–ordinated with the concerned Control State Bodies and foresees that up to the year 2001 the whole legislative base in the field of radiation protection will be brought in full correspondence with the European legislation and the IAEA recommendations. In this way the necessary harmonisation will be achieved in accordance with the requirements of the European Union.

2. Reduction of qualified personnel in the facilities leads to great difficulties in carrying out efficient radiation and dose exposure control, as well as the precise keeping of the required documentation. Due to changes in ownership (connected with structural changes and privatisation), as well as lack of finances in some facilities, SIR are stored in unsuitable and not well guarded premises. This increases the potential danger of theft.

3. Great part of SIR in the devices of technological control, irradiation facilities and fire detecting systems are with expired validity according to their certificates. There are no legislative documents for their secondary certification and further use and very soon these SIR will generate radioactive waste (RAW) of large volume and activity. This additionally will complicate the solution of the question of their long-term storage in view of the existing national problem of RAW storage and disposal.

4. Spent high-level sources from therapeutic apparatuses, with a valid certificate, are treated as RAW. According to point 11 of the additional paragraphs of the Act on the Use of Atomic Energy for Peaceful Purposes they are not expected to be used for other medical purposes. Storage of these in principle suitable for further use sources is economically not sound and leads to accumulation of RAW with high total activity.

5. There is a problem with the final disposal of RAW, too. The only one repository in Bulgaria, near Novi Han, is temporarily closed. The owners of SIRs which are out of use or whose period of use has expired should keep them until the repository is upgraded and commissioned. For the moment the SIR are kept in licensed by the ISUAE storage facilities.

Because of these problems, the policy of the CUAEPP is that the owners of SIR should conclude contracts with the manufacturers of SIR and give them back, when their validity is over. But the problem with the final disposal of the existing RAW is still opened.

Following a CUAEPP initiative in 1999 a national campaign for a complete inventory of the existing SIR and RAW was undertaken in all facilities in the industry, science, education, agriculture, medicine, including the facilities of the Ministry of Defence and the Ministry of Internal Affairs.

REGULATORY INSPECTIONS

The control activities of the ISUAE in the field of radiation protection are carried out by the Department of Radiation Protection by an approved CUAEPP annual plan. It consists of systematic inspections (routine, topical,

complex) according to the principles, criteria and methodology adopted by the IAEA and adapted to the particular conditions and characteristics of the inspected facilities which use SIR.

Every inspection includes preparation, on site inspection, documentation instification(??) of the results and control on the implementation of the resolutions. The inspections include the following topics:

– Organisation of the radiation monitoring of technological systems and occupational exposure control of technology and dose monitoring. Legally required documentation and technical documentation;

– Technical state of the systems and the equipment for radiation control. Rules for operation. Procedures and regulation of technical maintenance;

– Technical state and efficiency of radiation protection barriers;

– Radiation situation. Deviations from the requirements of radiation protection;

– Staff occupational exposure. Methods and technical means of personal dose exposure control;

– Quality assurance programme. ALARA Programme;

– Emergency preparedness. Emergency plan. Organisation and technical means for ensuring radiation protection on the site;

– Radioactive releases in the environment. Radiation situation on the plant site, the supervised and control zones around the site;

– Radioactive waste – generation, segregation, treatment and storage;

– Keeping of operational and technical documentation. Storing of information, reports, records and other documents connected with radiation protection on the site;

– Technical and organisational problems. Corrective actions and compensating measures for ensuring the radiation protection on the site.

The controlled facilities using SIR are classified according to the type, technical peculiarities and the specifics of the applied or research activities in the following four areas:

Nuclear Facilities: KOZLODUY NPP and Research Reactor IRT-2000 (Bulgarian Academy of Sciences).

Industry: non-destructive testing, technological control devices, neutralisers of static electricity, fire detecting systems, uranium mining and treatment facilities etc.

Science, education and agriculture: I, II, III class laboratories, research centres, irradiation facilities, accelerators, X-ray fluorescent and structural analysis, radioactive indicators etc.

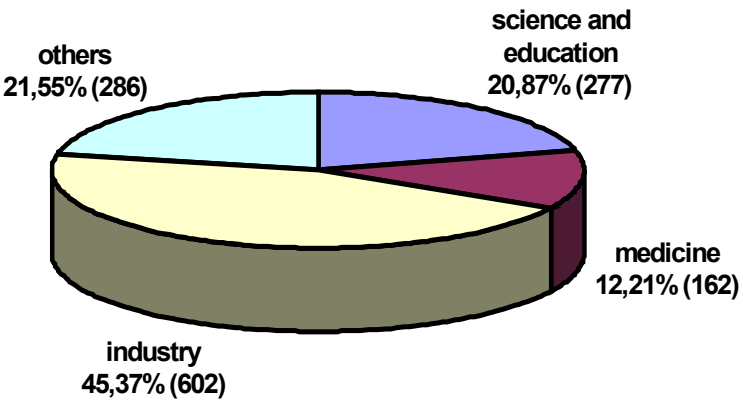
Medicine: diagnostic and therapeutic apparatuses, research laboratories and nuclear medicine centres, radio-pharmaceutics, radioimmunology etc.

In 1999 in the field of radiation protection 417 planned and additional inspections have been made on sites using SIR (nuclear facilities excluded). The complex inspections were 8 and the routine – 408. According to the field of application 219 inspections were made in industry, 93 – in the field of science, education and agriculture and 105 in medicine. As a result a total of 165 prescriptions were issued (depending on the application field) as follows: industry – 117, science, education and agriculture – 32, medicine – 16.

The inspectors of the Department of Radiation Protection have conducted 36 commissions for granting an operation permit on sites using SIR.

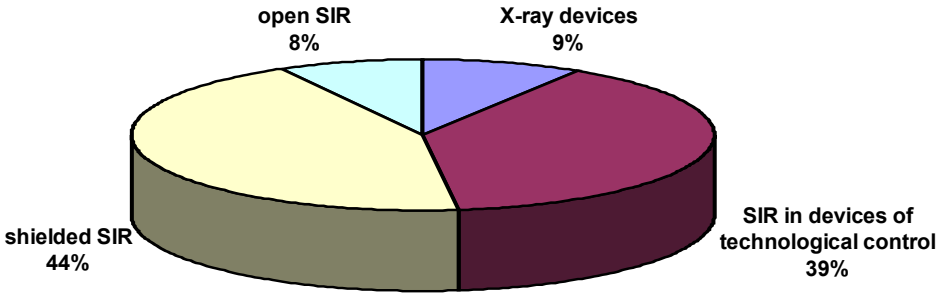
The total number of sites using SIR, which were under control to the end of 1999, is 2467. **Fig. 3** shows the distribution of the sites under control, which use SIR according to the field of application. Facilities using fire detection systems are 964.

The total number of the controlled in 1999 SIR is 8955. **Fig. 4** shows their distribution according to their type. There are more than 45 612 fire alarm sensors with more than 82 776 SIR. They are mainly sensors with 239-Pu which total to 61 594 of SIR.



Total number of controlled units - 2467.
Note: Of them 964 units with fire detection systems (FDS) not shown on the diagram.

FIGURE 3. Controlled units as per fields of application



Total number of SIR - 8955.
Note: 45612 FDS containing 82776 SIR are not shown on the disgram

FIGURE 4. Distribution of SIR as per types

As a preventive measure in conducting control activities, the participation of ISUAE inspectors in the examination commissions on radiation protection for the personnel on sites using SIR in industry and medicine has proved to be a good practice. Examinations are conducted according to programmes and synopsis approved by the ISAUE. During 1999 Inspectors of the Department of Radiation Protection have participated in 28 examination commissions.

During 1999 very good interaction, co – operation and mutual exchange of information was established between the CUAEPP, the Ministry of Health (National Centre of Radiobiology and Radiation Protection and the Regional Inspectorates), the Ministry of Internal Affairs (Department of Control of Dangerous Devices and Goods, National Police Directorate, National Investigation Bureau, National Bureau for Combating Organised Crime, Regional Directorates), the Ministry of Defence (Civil Protection Directorate) and the Ministry of Environment and Water. This facilitated the solving of the problems and the questions connected with ensuring the radiation protection on sites using SIR throughout the country. A number of working meetings, conferences, joint inspections, exercises and routine contacts have been realised on expert and managerial level.

Following a CUAEPP initiative, together with the Civil Protection Directorate additional inspections of the major metallurgical plants of the country have been realised in order to check the radiation control efficiency of the scrap metal.

On the initiative of the Ministry of Internal Affairs experts of the ISUAE took part in the international exercise practice of border control on registering illicit traffic of nuclear material and SIR, as well as on action for finding illicit possession of radioactive materials.

PRESCRIBED MEASURES FOR ENSURING SAFETY

Based on the results of the inspection and on article 30 of the Act on the Use of Atomic Energy for Peaceful Purposes, the control inspectors serve prescriptions for prevention and elimination of the recovered violations of the requirements for the safe use of atomic energy.

In 1999 sites using SIR were served with 141 prescriptions, which are distributed according to the field of application as follows: industry – 93; science, education and agriculture – 32; medicine – 16. The prescribed measures deal with bringing up to date the documentation, setting the rules for organisation of internal control for the use, storage and accounting of SIR, renewal of licenses with expired validity, inventory of RAW repositories, application of additional measures for improving the radiation protection, improving qualification of the staff working with SIR, establishment of incoming radiation control of the scrap metal in metallurgical plants, enhanced radiation control of the storage of SIR with expired certificate. In connection with the requirements for foreign customers for a certificate of radioactive contamination for the exported scrap metal as well as to avoid the Spanish type incident of June ’98 all metallurgical plants have been served with prescriptions to introduce an incoming radiation control of the scrap metal.

Prescriptions are mandatory and the control of their implementation is carried out on the basis of the documentation submitted to the ISUAE and by additional inspections on the sites.

For violations of the legal documents according to article 42 of the Act on the Use of Atomic Energy for Peaceful Purposes 3 penalty acts have been handed to officials who committed the violations and administrative punitive measures have been implemented.

For activities without a license from the ISUAE the guilty official has been sanctioned according to Article 356 “g” of the Penal Code.