

RADIATION SOURCES IN THE EU

A REVIEW OF STEPS IN THE EUROPEAN UNION

BY VITTORIO CIANI

Many years ago, Member States of the European Union (EU) conferred on the Union the task of establishing uniform safety standards to protect the health of workers and the public against dangers arising from ionizing radiation. Standards were issued for the first time in 1959, when many industrialized countries established their own basic laws regulating the development and the future use of nuclear energy. Within the context of those laws on nuclear energy, systematic approaches to radiation protection were adopted in most EU Member States.

When the first standards were issued, the European Communities had only six Member States, in contrast to fifteen today. Since then, the radiation protection provisions adopted by more and more industrialized countries have been largely consistent, bound by the harmonizing effect of recommendations from the International Commission on Radiological Protection (ICRP). In fact, EU Directives on radiological protection, as well as guidance issued by international organizations, long have been based on ICRP recommendations.

In this article, the role and activities of the EU concerning the safety of radiation sources are reviewed. Also briefly presented are results from a recent study of the management of radiation sources in EU Member States.

EU LEGAL PROVISIONS

Various legal texts of the EU directly apply to radiation sources. They are the:

■ **Council Directive 96/29/Euratom.** It lays down basic safety standards for the health protection of the general public and workers against the dangers of ionizing radiation.

■ **Council Regulation 93/1493/Euratom.** It covers shipments of radioactive substances between Member States.

■ **Council Directive 92/3/Euratom.** It addresses the supervision and control of shipments of radioactive waste between Member States and of shipments into and out of the Community.

The first of these Directives, together with the Euratom Treaty itself, is the cornerstone of the EU radiation protection legislation. It includes two important definitions. It defines *source* as an apparatus, a radioactive substance, or an installation capable of emitting ionizing radiation or radioactive substances. Secondly, it defines *sealed source* as a source whose structure is such as to prevent, under normal conditions of use, any dispersion of the radioactive substances into the environment.

The Directive's scope is broad. It applies to "all practices which involve a risk from ionizing radiation emanating from an artificial

source or from a natural radiation source in cases where natural radionuclides are or have been processed in view of their radioactive, fissile or fertile properties, namely: a) the production, handling, use, holding, processing, storage, transport, import to and export from the Community and disposal of radioactive substances; b) the operation of any electrical equipment emitting ionizing radiation and containing components operating at a potential difference of more than 5kV; c) any other practice specified by the Member State...."

One main requirement is a system of reporting or, in cases decided upon by each Member State, of prior authorization. Prior authorization is mandatory under the Directive for "the use of X-ray sets or radioactive sources for industrial radiography or processing of products or research or the exposure of persons for medical treatment and the use of accelerators except electron microscopes."

The aim of the reporting/authorization system is to ensure that radiation sources are used under the control of competent national authorities, which in turn will

Mr. Ciano is Principal Administrator, Directorate-General for Nuclear Safety and Civil Protection, European Commission, Rue de la Loi 200, B-1049 Brussels, Belgium.

ensure compliance with radiation protection requirements relevant to workers and the public. Mandatory is the requirement for optimization of protection.

At the end of 1992, the establishment of the internal market within the EU was completed. This implied an area without internal frontiers in which the free movement of goods, persons, services and capital is ensured.

Within this area, national competent authorities could no longer rely on border controls to obtain information on radiation sources entering into the territories under their jurisdiction. This made necessary the adoption of Council Regulation 93/1493/Euratom. The regulation's key requirement, which applies only to shipments between Member States, is that the holder of a sealed source who intends to carry out its shipment, has to obtain a prior written declaration from the consignee of the source that he/she complies with relevant national provisions applicable for the source's intended use. The declaration must have been visaed by the competent authorities of the Member State of destination.

If the radioactive substances are not in the form of a sealed source, only a *post factum* information from the holder to the competent authorities of the Member State of destination is required.

Council Directive 92/3/Euratom established a system basically requiring that transboundary shipments of radioactive waste only can be made if the competent

authorities of the States involved, whether EU Member or not, have given their prior informed consent to the shipment. Outside the Directive's scope are shipments where a sealed source is returned by its user to the supplier of the source in another country. This exemption does not apply to sealed sources containing fissile materials.

EU STUDY

The reporting/authorization provisions on the use of radiation sources are binding as to the result to be achieved. However, national authorities have the choice of forms and methods of application.

To obtain an overview of how authorities in EU Member States manage the control of radiation sources, the European Commission (EC) funded a study on the management and disposal of disused sealed radioactive sources in the EU. The study included a review of the different regulatory frameworks in each Member State and an analysis of the management practices employed for sealed sources throughout the EU, with a view to identifying possible gaps and contradictions.

The authors of the study, using their own technique and assumptions, arrived at a rough estimation that approximately 500,000 sources have been supplied during the past 50 years to various operators in the EU's current fifteen Member States. Of these, approximately 110,000 sources are currently in use and approximately 30,000 disused sources are held in local storage at the users' premises.

The study indicated that radiation sources, in particular sealed sources, are generally used in compliance with all the rules necessary to ensure their safety. Equally, safety is ensured when the sealed sources are either returned to producers or sent to a licensed facility for the management of radioactive waste.

However, there are indications that controls can become weak when the sources are removed from active use and the time they are returned to producers for possible reuse, or declared as waste and placed under systems of radioactive waste management. In some cases, control was lost, giving rise to the phenomenon of "orphan sources".

Among practices reviewed in the study, the following appear to be particularly efficient for ensuring good control of radiation sources.

Databases. Databases on the nature and location of sources are essential; they constitute the baseline against which checks can be made to verify that sources are properly managed and located where they should be.

Systems of economic incentives/penalties. Systems such as fixed period licenses or annual license fees proved to be efficient in discouraging long-term storage of disused sources at the user's premises. The practice that the cost of disposal of a source is paid at the time of purchase is also attractive; it directly links the benefits expected from the use of the source with the totality of the related costs.

A particular problem is connected with non-registered sources, i.e., sources present on



EU territory for which no documentation exists. They may have been in use before enforcement of current legislation, or they may have been imported without informing the competent authorities. Among these sources, radium sources for medical application are a specific problem because of their early introduction and wide distribution.

Recently, the Commission's attention was drawn to the control of sealed sources through recurrent findings of sources in scrapyards and their occasional melting in metal production facilities. These events have caused deaths, important health effects, and associated economic losses as a result of the exposure of persons and contamination of industrial facilities.

In June 1999, the Council of Ministers concluded that there was a need for the EU "to develop common views to address the problems related to radioactive scrap metal and proper management of spent radioactive sealed sources".

The EC presently is studying possible actions to reduce the likelihood of incidents and accidents involving radiation

sources. From a radiation protection point of view, higher risks are posed by high-activity radioactive sources, normally in the form of sealed sources. Several approaches to the issue are possible and they do not necessarily exclude one another; on the contrary, the complexity of the issue demands that it be tackled from several angles. However, any possible line of action must include the long-term aim of ensuring the establishment throughout the world of strong national infrastructures for radiation protection.

Ideally, radiation protection authorities should enforce a system that keeps high-activity sources under strict control from the moment they are produced, or enter their national territory, until they are conferred to a licensed facility for the management of radioactive waste.

FUTURE STEPS

Existing radiation protection infrastructures in Member States are ensuring that radiation sources in use are reasonably controlled within the EU. Accidents involving sources on territories where the European Treaties apply occur

only occasionally and in most cases because current rules are not followed.

Studies are being done on the question of whether additional legal requirements would be justified at the EU level. Among the actions being considered are the opportunity of establishing radiometric control on the importation of metal scrap and of extending, with respect to high-activity sealed sources, the system of notification/authorization under the basic safety standards Directive.

Radiation sources, however, are used throughout the world and some countries lack appropriate infrastructures. In those countries the probabilities are high that sources will be lost from control or involved in accidents. International trade, especially in materials intended for recycling, raises the possibility that radiation sources will enter EU territory without controls.

In 1998, the EC co-sponsored -- together with the IAEA, the International Criminal Police Organization and the World Customs Organization -- the Conference on the Safety of Radiation Sources and the Security of Radioactive Materials in Dijon, France. The Commission supports follow-up actions to that Conference and welcomes the IAEA's initiative to develop an action plan that would address the international dimensions of the safety of radiation sources. □

Photo: At the EC's Joint Research Centre in Ispra, Italy, radiation sources, such as cobalt-60, are managed and controlled for safe use. (Credit: JRC)