

Management of Disused Sealed Sources in Austria - 12147

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ABSTRACT

The use of sealed radiation sources is regulated by the Austrian Radiation Protection Act [1] and the General Radiation Protection Ordinance [2]. The Austrian radiation protection legislation requires minimisation of radioactive waste. The preferred radioactive waste management option concerning sealed sources, both spent and disused, is the return to the manufacturer. If this is not possible a reuse by a third party is encouraged. According to this requirement, disused sealed sources shall, as far as possible, be stored on the site of the licence holder until a new owner is found. If this is not possible, disused sealed sources shall be transported to Nuclear Engineering Seibersdorf, which is a recognised storage facility for radioactive waste in Austria, for temporary storage pending reuse. Sources, which cannot be reused, are declared as radioactive waste. Since Austria is a Member State of the European Union, the Council Directive 122/2003/Euratom on High Activity Sealed Sources and Orphan Sources [3] is applied. This directive defines high activity sealed sources on the basis of their total activity. The possession of such sources is subject to certain obligations. Therefore it is in the interest of the owner to return disused sources as soon as possible to the manufacturer or to deliver them to Nuclear Engineering Seibersdorf. In case of the loss and finding of an "orphan" source the competent authority secures, recovers and stores the source at the cost of the owner of the source with recourse. In line with the directive the licensee of a High Activity Sealed Source has to notify the main data concerning this source to the Central Source Register which is maintained by the Federal Minister of Agriculture, Forestry, Environment and Water Management for all radioactive sources. This register was put into operation in 2006.

INTRODUCTION

In Austria around 2350 sealed sources are in use in medicine, industry, research and education. Sources containing Co-60, Cs-137, Ir-192, Am-241 and other radionuclides are widely used for the calibration of measuring devices, density measurements, irradiation and sterilisation of products as well as for testing of materials. For medical applications such as radiotherapy or irradiation of blood sources containing Co-60 and Cs-137 are very common. These kinds of sources are few in number but they have a rather high activity. The activity of all these sources reaches from some kBq for calibration emitters up to some TBq for irradiation facilities.

The control of radioactive sources (especially disused sealed sources) has a high priority in Austria. It is important to ensure that the exposure for staff, public and environment is low as reasonably achievable. Austria has established adequate arrangements and provision for preventing dangers for the health of workers and the

general public arising from the application of ionising radiation. Many amendments to European and international regulatory framework concerning the safety and security of radiation sources have been transposed into national legislation as far as it was necessary. The Austrian regulatory framework transposes those parts of the EURATOM Basic Safety Standards (Council directive 96/29//ERATOM) that pertain radiation sources as well as the Council Directive 2003/122/EURATOM into national legislation and include the relevant international recommendations and the IAEA Guidance.

LEGAL FRAMEWORK

The legal requirements for the safe management of radioactive sources from the time of they are manufactured to the time they are placed in a recognised installation for their long-term storage are laid down in the Radiation Protection Act and the General Radiation Protection Ordinance. The Radiation Protection Act requires the holder to obtain prior authorisation for any practice involving a radiation source, including taking possession of a source. A license is only granted if practice with radiation sources is in compliance with specific conditions and obligations, if a radiation officer is appointed and if the regular operation entails no hazard from ionising radiation. A license further needs a safety assessment, a safety analysis and a concept for emergency preparedness. A concept for decommissioning and dismantling, a concept for the recycling or reuse of a radioactive substance and the management of radioactive waste are obligatory for any handling. There is only an exemption for very small sources with an activity or activity concentrations below exemption levels which are defined in the General Radiation Protection Ordinance. The Radiation Protection Act stipulates that radioactive material may only be transferred to persons who are in the possession of the requisite license. Every licensed handling is regularly inspected by the licensing authority in order to assure a safe operation.

The handling with radiation sources without an appropriate license is forbidden. There are no exceptions to this requirement. Anyone not fulfilling the requirements or obligations of a license commits a crime and will be fined.

Regarding radioactive waste Austria follows the principle of minimisation. The preferred radioactive waste management option concerning sealed sources, both spent and disused, is the return to the manufacturer. The user of this source should have a written commitment from the supplier, where the latter agrees to take back the source if disused. If it turns out that the supplier is unable to respect his commitment, e.g. in case of bankruptcy, the user or holder is obliged to take all necessary steps to send this disused sealed sources to a third party. According to this requirement, disused sealed sources shall, as far as possible, be stored on the site of the licence holder of this source until a new owner is found. If this is not possible, disused sealed sources shall be transported to a recognised storage facility for temporary storage pending reuse. Nuclear Engineering Seibersdorf is such a recognised storage facility in Austria. Sources, which cannot be brought back to the manufacturer or which cannot be reused, are declared as radioactive waste. As a further consequence the recognised storage facility conditions this source and puts it in the interim storage facility.

HIGH-ACTIVITY SEALED RADIOACTIVE SOURCES

For the management of high-active sealed radiation sources and orphan sources the provisions of the European Council directive 2003/122/EURATOM have to be applied in the European Community. This Directive defines high activity sealed sources on the basis of their total activity. EU Member States must have in place a regulatory system for the authorisation of practices involving of such high-activity sealed sources. In 2006 Austria transposed this directive in national law. The radiation protection framework covers for the authorisation of such a practice the following:

- Responsibilities
- Minimum staff competencies, including training and information
- Minimum source, source container and additional equipment performance criteria
- Requirements for emergency procedures and communication links
- Work procedures to be followed
- Maintenance of equipment, sources and containers
- Adequate management of disused sources

In addition financial provisions must have been made to cover the cost of managing disused sources safely, including in the eventuality of the holder becoming insolvent or going out of business. Therefore, the license holder of a high-active sealed radiation source must provide the licensing authority with a specific third-party liability insurance or bank guarantee in order to ensure the safe disposal of the source also in case of bankruptcy. Otherwise a license for the possession of such a radioactive source will not be issued. Instead of such an insurance or bank guarantee, the Federal State, the Federal Provinces or any local authority can issue a declaration of liability.

It is in the interest of the owner to return disused sources as soon as possible to the manufacturer or to deliver them to Nuclear Engineering Seibersdorf. The costs for this process are borne by the owner. The holder is strictly liable.

CENTRALISED REGISTER FOR RADIOACTIVE SOURCES

In 2006 a centralised register for radioactive sources was established in Austria. This register is maintained by the Federal Minister of Agriculture, Forestry, Environment and Water Management. According to the Radiation Protection Act the owner of radiation sources has to notify the purchase, possession, form of the radioactive material, the date the source was entered into the register, nuclide, activity, the unique identification of the source (manufacturer, model number, serial number, date of manufacturer) storage and any kind of transfer (remanufacture or disposal) to the Central Source Register. Exemptions from the requirement to report are made i.e. in case the radioactive material is below exemption limits. He is also obliged to report on the status of the radioactive sources every year. License holders are granted a grace period for filing the necessary reports for existing sources.

There are mainly three groups participating in the database with the following responsibilities:

The Federal Minister of Agriculture, Forestry, Environment and Water Management is the main user of the database. The ministry is responsible for the proper operation and maintenance of this tool, the preparation of reports and analyses, data entry, providing users with advice and for the development and improvement of the database.

The licensee has to transmit the relevant data of its sources to the register. He has to notify every acquisition or transfer. The licensee has no direct access to the database because of safety reasons.

The competent authority has an access to the register, too. A verification of the data of the license is possible with this tool.

In case of the loss and finding of a source the centralised register for radioactive sources plays an important role for finding the owner of the source or for getting information regarding the specification of the “orphan” source.

The registration of every radioactive source in one database gives a good overview of all the sources which are in use in Austria. Currently there are around 2350 radioactive sources registered in the database. 435 of these registrations are High Activity Sealed Sources. The most frequent radionuclides are Co-60, Cs-137, Ir-192 and Am-241. The register also contributes to estimate future amount of radioactive waste arising because of these sources.

ORPHAN SOURCES

In the Radiation Protection Act orphan radioactive sources are defined as “radioactive sources which are subject to authorisation or at least registration and which are not under regulatory control either

- because they never have been under regulatory control or
- because they have been abandoned, lost, misplaced, stolen or
- because they have been transferred to a new holder, without proper notification of the competent authority, or without informing the recipient”.

Article 26 of the Radiation Protection Act lays down the relevant provisions for the finding of orphan sources. Any loss of actual control over radioactive materials whose activity exceeds the exemption levels must be reported immediately to the competent authority. The competent radiation protection authorities (in general the District Authorities) have to confiscate orphan sources and arrange for their recycling or disposal as radioactive waste at the expense of their pre-possessor. In case this pre-possessor cannot be found under Austrian jurisdiction, the confiscating national or provincial authorities have to bear the costs for disposal themselves. Otherwise, the occurring costs can be claimed back by recourse.

NUCLEAR ENGINEERING SEIBERSDORF

Nuclear Engineering Seibersdorf is the only centralised waste management facility in Austria, where all conditioned low level and intermediate level radioactive waste arising in Austria is currently interim stored. High level waste does not arise in

Austria. Nuclear Engineering Seibersdorf is a recognised storage facility regarding radioactive waste management in Austria. This limited liability company with a controlling stake owned by the Austrian Government is located at the Seibersdorf site of the Austrian Institute of Technology south of Vienna. Nuclear Engineering Seibersdorf is responsible for the treatment, conditioning and interim storage of all radioactive waste generated in Austria. The following treatment, conditioning and waste handling facilities are in operation there:

- Low- and intermediate level waste incinerator (40 kg/h)
- High force compactor (1100 t)
- Waste water treatment facility (precipitation, filtration)
- Sludge dryer
- Cementation equipment
- Drum drying facility
- Waste assay system
- Hot-cell facility
- Buffer storage facilities for raw radioactive waste
- Interim storage facilities for conditioned radioactive waste.

Concerning sealed sources – both spent and disused – the preferred management option is the return to the manufacturer. If disused sources cannot be returned to the manufacturer and recycling (i.e. reuse by a third party) is also not possible, they have to be brought to Nuclear Engineering Seibersdorf for storage or for treatment as radioactive waste. This includes ionising smoke detectors, too.

The following treatment techniques are applied for disused and sealed sources:

- Radioactive sealed sources are segregated according to their half life, i.e. Co-60, Cs-137 or Am-241. They are enclosed in stainless steel cartridges and/or lead shielding and retrievably stored in 200-litre-drums.
- Radium sources are encapsulated by welding them into stainless steel capsules; they are retrievably stored in lead shielding. Other sources are collected in small steel containers and stored in shielded drums.
- High-activity sources can be handled in the hot cell facility and are stored in storage tubes in one of the hot cell boxes.

Nuclear Engineering Seibersdorf has also a license for recovering orphan sources. For the case that such sources are confiscated, the competent radiation protection authority informs Nuclear Engineering Seibersdorf for arranging a recovery and a safe and secure transport to its installation.

REFERENCES

1. **Radiation Protection Act** (“Strahlenschutzgesetz - StrSchG”) of June 11th, 1969, Federal Law Gazette no. 227/1969, as amended by the Radiation Protection EU-Adaptation-Act 2002 of August 20th, 2002, Federal Law Gazette I no. 146/2002 and by the Radiation Protection EU-Adaptation-Act 2004 of December 10th, 2004, Federal Law Gazette I no. 137/2004.
2. **General Radiation Protection Ordinance 2006** („Allgemeine

WM2012 Conference, February 26 – March 1, 2012, Phoenix, Arizona, USA

Strahlenschutzverordnung“), Federal Law Gazette no. 191/2006 of 22nd May 2006.

3. **Council Directive 2003/122/EURATOM on the control of high-activity sealed radioactive sources and orphan sources**, Official Journal of 31.12.2003 No L346/57.