



## Consumer products

### *Improving radiation protection in practice*

#### What are consumer products?

Several products that are widely available for purchase by the public contain small amounts of radioactive material. This material has been intentionally added because it is essential for the correct operation of the product in question or improves its performance.



For example, the addition of thorium-232 to high intensity discharge lamps — widely used for street lighting or in sports arenas — improves the metallurgical properties of the electrodes and prolongs their lifetime. When alternative lamps are used, more lamps as well as more energy is necessary to produce the same amount of light.

Consumer products are sold globally, including over the internet. Examples of consumer products that contain small amounts of radioactive material include:



ionization chamber smoke detectors.



tungsten welding electrodes.



car headlamps.



irradiated gemstones produced artificially.

By definition, these consumer products must represent a low level of risk so that they can be sold or made available to the public without special surveillance or regulatory control after their sale. Individual radiation doses to users of consumer products normally do not exceed a value of the order of 10  $\mu$ Sv in a year.

## What do the IAEA Safety Standards say?

In 2014, the IAEA published the General Safety Requirements Part 3: Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards. This is often referred to simply as the BSS. The BSS is jointly sponsored by eight international organizations with responsibilities in various areas of radiation protection.

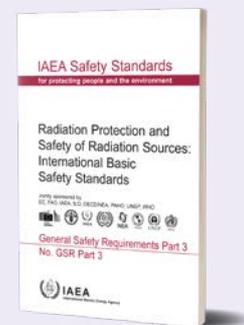
The requirements in the BSS take account of the most recent scientific evidence relating to exposure due to radiation. The BSS is used by many States as the basis for their national regulations dealing with radiation protection and safety.

The term 'consumer product' has a very specific meaning in the IAEA Safety Standards. It is defined as "a device or manufactured item into which

radionuclides have deliberately been incorporated or produced by activation, or which generates ionizing radiation, and which can be sold or made available to members of the public without special surveillance or regulatory control after sale."

The *Safety Guide Radiation Safety for Consumer Products (SSG-36)* provides advice and guidance on how to apply the requirements in the BSS to the regulatory control of consumer products.

In addition to the IAEA, the BSS is jointly sponsored by the European Commission, the Food and Agriculture Organization of the United Nations, the International Labour Organization, the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development, the Pan American Health Organization, the United Nations Environment Programme and the World Health Organization.



## Challenges

### Authorization and regulation



Authorization for the manufacture and sale of consumer products is the responsibility of each national regulatory body. Authorizations should only be granted if the regulatory body considers that the particular use of radioactive material is justified and if the finished product meets the criteria for exemption.

When products are sold directly to the public, controlling their future use and disposal is not realistic. Products that do not meet the criteria for exemption are therefore not considered 'consumer products' and may need to be regulated.

### Justification



Justification decisions in relation to consumer products made in the country where they are manufactured should, ideally, be accepted in all countries where products are sold. Unfortunately, such a global system does not exist.

It is also the case that many consumer products are manufactured and sold without the knowledge of the national regulatory body. This could be the case when products are sold online.

### Irradiated gemstones



The colour of certain gemstones may be altered or intensified by irradiation, thereby increasing their commercial value. If this irradiation is carried out in a research reactor or using electron beams, radioactive by-products (called activation products) can be produced within the gemstone. Irradiated gemstones may need to be stored to allow the radiation levels to reduce before these gemstones can be cut or sold to the public.

Depending on the chemical composition of individual gemstones and the presence of impurities, different activation product radionuclides with different half-lives will be produced. Sometimes these activation products have such long half-lives that storage to allow exemption values to be reached is not feasible. Such irradiated gemstones need to be managed as radioactive waste.



Inadequate regulation of the irradiated gemstone industry can result in large radiation doses being received by cutters, jewellers and members of the public. Skin burns from handling and wearing irradiated gemstones that have not been stored for a sufficiently long time are not uncommon.

### Toys and jewellery



Practices involving the frivolous use of radiation or radioactive substances in commodities or in consumer products is deemed not to be justified. The same is true of human imaging using radiation that is performed as a form of art or for publicity purposes.

## How does the IAEA support Member States?



The IAEA supports its Member States in the implementation of all aspects of the Safety Standards through the organization of national and regional workshops and other training events. Online webinars are also regularly organized.

