



*Analysis of a questionnaire on
radioactivity in consumer products*

1. Introduction

In 2021, it became clear that various consumer products containing (low) concentrations of radionuclides are being put on the market. The issue primarily revolved around items such as "quantum pendants," bracelets, and sleep masks that contained radionuclides. These products, marketed for various supposed health benefits, had drawn scrutiny due to their potential radioactive emissions.

In the summer of 2021, the ANVS (Netherlands Authority for Nuclear Safety and Radiation Protection) began receiving questions from citizens about these items. Upon further investigation, authorities found that these products, particularly pendants and bracelets, contained nuclides from natural decay chains, primarily from the Th-232 and U-238 series. Radiation levels from these items exceeded exemption limits, with some pendants emitting skin doses as high as 50 mSv per year.



Following these findings, the ANVS launched several enforcement actions. National suppliers were identified, with seven targeted in total. These suppliers were ordered to stop selling the products, inform their buyers, retrieve the sold items, and hand them over to the authorities for safe disposal. However, the ANVS faced significant challenges with international suppliers, making enforcement difficult when dealing with global e-commerce platforms.

To raise awareness, the ANVS published a news item in December 2021, warning the public about the risks associated with these products. The message urged people to store these items safely and offered the opportunity to send them in for radiation checks. This campaign extended internationally, with HERCA member states being informed and a notification being sent through the EU's RAPEX system—a rapid alert system for unsafe consumer products.

As part of the ongoing investigations, customs in the Netherlands also detected other consumer products with radioactive materials, including mattresses with memory foam, horse blankets, and hairbrushes. This highlighted the broad range of consumer goods containing potentially hazardous materials. However, the low radiation levels in some of these products made detection difficult using standard customs portal monitors or hand-held radiation monitors, creating further challenges for authorities in preventing their import.

2. Questionnaire

During a HERCA BoH meeting in 2022 the Polish authorities raised an issue concerning the selling of personal ornaments or sleeping masks which contain radioactive materials. To gain a broader European perspective, a survey was circulated to member states. The Polish authority has shared the results of the survey with the HERCA WG-RSIP. The results are included in this document.

The purpose of the questionnaire, as performed in 2022, was to gather information from each participating country on the issue of consumer products containing radioactive materials.

Feedback was asked on the following questions:

1. If such items are on the market in the responding country?
2. What actions you have taken (if any)?
3. Did you perform any research/examination of those items?
4. Does this require license/notification to regulatory bodies?
5. Any changes in the national law to prohibit selling that kind of items?

3. Respondent types

The questionnaire was sent to national authorities in 26 European countries. Answers were received from national authorities of 10 countries.

4. Results of the questionnaire

Those countries that responded confirmed that these products were available through online marketplaces and national suppliers. Many of these countries had already banned the sale of such items or taken steps to restrict their import. Research and analysis had been conducted in some countries, revealing unnecessary radiation exposure with no health benefits, leading to further prohibitions.

Presence in Market:

Most countries reported that such products are available either through online platforms or in local stores. These items are often marketed through e-commerce platforms.

Actions Taken, Research and Examination:

Countries have taken varied actions:

- Conduction of measurements, measurements confirmed these products often do not meet exemption levels.
- Informing the Consumer Protection Board, some of the products were prohibited from being sold by law.
- Performing of online searches and planning to test these products.
- Examination of samples and discussion of the potential for legal amendments.

Licensing/Notification Requirements:

The need for licensing or notification to regulatory bodies varies as some countries do not require a license and other countries have prohibited the distribution of these products.

Legislative Changes:

Most countries did not enact new laws specifically for these products, as existing regulations already covered their control. However, some are discussing possible amendments to ensure better regulation.

5. Discussion

From March 2023, the ongoing concern regarding consumer products containing radioactive materials was discussed during several HERCA WG-RISP meetings. The HERCA questionnaire revealed that many European countries are aware of these potentially hazardous consumer products. Several have already taken steps to regulate them, either through existing laws or by conducting scientific research to measure their risks. Although no major legal changes have been enacted in response, ongoing discussions indicate the importance of continued regulation in this area.

Nevertheless, there are also considerable legal and regulatory challenges associated with "negative ion" products, such as amulets, and bracelets, which are believed to promote health benefits but contain low levels of radionuclides. To start with, the definition of "consumer product" according to the IAEA and EU Basic Safety Standards as an item containing radionuclides that is available to the public without special regulatory control. These products often stay below the exemption levels, leading to questions about whether their inclusion of NORM is deliberate and if permits are required. Such products, marketed as health devices, fall into a grey area as they may not be subject to the same prohibition to add radionuclides to jewellery or toys.

Investigations have revealed varying levels of radioactivity in these products, with some reaching up to 170 mSv/a in hotspots. Items such as mobile phone stickers have shown radiation levels up to 40 mSv/a. Additionally, there are many different products on the market that are also similar to one another, making it impractical to visually distinguish between products that are permitted and those that are prohibited. The difficulties in measurement and calibration, particularly for beta and gamma radiation from NORM, make it challenging to accurately determine the risks. Despite these concerns, many products remain below the legal exemption levels, which further complicates enforcement.

The main issue, however, remains the application of the justification principle.

6. Future work

The ongoing nature of this issue has raised several questions for the future. While the majority of items sold represent only a low risk (<50mSv/year to the skin), the continuous wearing of some of them (amulet etc.) may lead to doses exceeding the annual dose limit. Additionally, other more dangerous objects (containing alpha emitters, for example) are likely to transit via the same platforms.

International cooperation remains critical as enforcement against international suppliers proves to be a significant challenge. The discussion during the HERCA WG-RISP meetings underscored the need for continued alertness, regulatory adjustments, and public education to ensure these radioactive consumer products are effectively controlled.

Further work could be envisaged, in particular on sharing information on the regulatory framework, justification, detection and, where appropriate, the action taken by each country.