

## **Technical Cooperation**

**Report Title:** Transportation of Disused Sealed Radioactive Sources: Lessons Learned in Venezuela (2022–2025)

**Report Issue Date:** August 25, 2025

**Author:** Belkys Araque

**Institución:** National Center for Development and Research in Telecommunications Foundation CENDIT

## **Introduction**

The transportation of disused sealed radioactive sources is a critical operation within the life cycle of radioactive materials, due to the risks they pose to human health and the environment if not properly managed. This practice requires a robust regulatory framework, both national and international, highly trained personnel, and strict adherence to safety protocols that guarantee the protection of people and the environment during their transfer and final disposal.

In Venezuela, the experiences accumulated since 2022 have allowed us to identify strengths and areas for improvement in nuclear security. This document presents the main lessons learned, with the aim of strengthening national practices, improving radiation protection, and complying with international standards.

Disused sources come from medical (radiotherapy), industrial (scintigraphy, density measurement), and academic applications. This experience has been with medical sources, whose transfer to temporary storage facilities requires rigorous physical security measures to prevent theft, loss, or malicious use.

## **Lessons Learned**

### **1. Interinstitutional Coordination**

Effective planning has been key to synchronizing the work of multiple institutions: logistics operators (CENDIT, IVIC, FILIDT), regulatory bodies (Ministry of Defense and Ministry of Internal Affairs, Justice and Peace), and source holders (hospitals). The early definition of roles, safe routes, checkpoints, and emergency protocols significantly reduces operational risks.

### **2. Threat and Vulnerability Assessment**

Before each operation, a systematic threat assessment was conducted, considering geographic, social, and political factors. This allowed for the adjustment of physical protection measures, incorporating satellite tracking and armed escorts, with the active participation of security forces, first responders, and emergency response teams, perimeter protection, and immediate response to contingencies when transporting Category 1 and 2 sources.

### **3. Staff Training**

Technical training has been essential to ensure compliance with procedures, proper packaging handling, and contingency response. Ongoing training has strengthened operational efficiency and awareness of nuclear safety, hazardous cargo lifting, and radiation protection.

### **4. Regulatory Compliance**

Strict implementation of the IAEA Regulations for the Safe Transport of Radioactive Materials (SSR-6 Rev. 1), harmonized with the national legal framework for environmental, safety, and transport matters. Classification, labeling, documentation, and the use of packaging designed with in-house resources have been essential to facilitate audits, inspections, and traceability, under the supervision of the regulatory body.

### **5. Physical Security and Endogenous Development**

During transportation, we have armed escorts and national geolocation technologies, remote speed control, and safety sensors, allowing us to generate:

- Safe route map
- Flowchart of the transportation process
- Chart of reported incidents

### **Recommendations**

- Consolidate national safe transportation protocols
- Strengthen international technical cooperation
- Conduct periodic drills
- Promote national technological development
- Ensure continuous and transparent financing
- Assert communication with the public

### **Conclusion**

The Venezuelan experience in transporting disused radioactive sources has generated valuable lessons that should be systematized and shared. The results include:

- List of transported sources (2022–2025)
- Secure transport protocol
- Threat assessment
- Training record
- Funding projects

Nuclear physical security is an essential part of national critical infrastructure and requires institutional commitment, adequate resources, and a deep-rooted security culture.