

The Global School

Goiânia's lessons shape actions on radiation safety and security decades later.

Two families live and work at the scrap yard on Rua 6, in the Brazilian city of Goiânia. Everyone pitches in to sort plastic and metal collected off the streets for recycling. The place is also home to world's worst accident involving a radioactive source.

Now largely forgotten by the outside world, the accident is not by Alexandre Oliveira. For the past two decades, Dr Oliveira has treated patients from the 1987 accident caught unaware about the risks of a dumped radiation source.

Men, women and children from the scrapyard had, unknowingly, daubed radioactive powder, like makeup, on their skin. It glittered and glowed blue in the dark — caesium chloride.

"They burned their skins; they burned their skins from very mild burns up to very severe burns, up to now open. Twenty years of lesions not yet healed. Not yet," Dr Oliveira said.

It started when scrap merchants pillaged and then sold a metal canister left at an abandoned medical clinic. To them it was harmless, valuable metal. They had no clue it contained a powerful radioactive source, used to treat cancer.

"The junkyard owner took the equipment to his dining room and called the neighbors, relatives, friends to show them the glittering powder. Small fragments of the source were taken, rubbed on the skin, were given to other people as souvenirs and that is the way contamination became to spread," recalls Dr Nelson José Valverde, a radiation specialist, who has also treated patients since the time of the accident.

The powdery caesium spread undetected for over two weeks. Some 250 people were contaminated. Four died in the first month, including a little girl that lived at Rua 6. The legacy of a handful of caesium is 3,000 cubic meters of contaminated waste. It's buried in two green hills, at what scientists call a near surface repository, on the outskirts of the city. It will take 300 years before the land can be used again.

Photo: It looks like just a scrapyard, but stands as a global schoolhouse when it comes to radiation safety and security. The scrapyard at Rua 6 in Goiânia, Brazil, was home to one of the world's worst radiation accidents in 1987. Its lessons still shape national and global actions decades later.

Credit: K.Hansen/IAEA

Old House on Rua 6

by Kirstie Hansen





The accident started when scrap merchants found a metal canister in an abandoned medical clinic. To them it was a chunk of valuable metal. What they didn't know was that it contained a powerful radioactive source, once used to treat cancer. The source contained caesium chloride. It was sold to a junkyard, whose owner cut open its protective steel and lead casing. Inside he was fascinated to discover the radioactive powder that glittered and glowed blue in the dark.

Goiânia's plight focused international attention. "Before the 1987 accident the regulations were weak when it came to controlling radiation used in medicine and industry worldwide," says Eliana Amaral, IAEA Director of Radiation, Transport and Waste Safety.

"There was no awareness that sources must be controlled from 'cradle to grave'; and to prevent the public accessing them".

Goiania changed that. "After the accident these concepts were fostered," Ms Amaral says.

The IAEA introduced rigorous safety standards for radioactive sources, namely the International Basic Safety Standards No.115, co-sponsored by several international organizations. Today Brazil requires that each and every source is licensed for lifetime tracking to final disposal.

"In principle since the Goiânia accident, more and more countries have realized that this situation may cause serious accidents and injuries, so they are strengthening their legal and regulatory infrastructure...So there is an improvement in this line," Friedrich Vilmos says. He heads an IAEA unit that supports countries to control radioactive sources.

It is important to go beyond 'policeman attitudes,' says Eliana Amaral. "Training people to safely use radioactive materials and developing a strong safety culture among users, is also necessary to thwarting potential accidents," she says.

Brazil's request that the IAEA draw lessons learned from Goiânia, paved the way for more open, transparent reporting of radiological accidents. It highlighted to the rest of the world important ways to prevent, and plan to respond to future accidents and emergencies.

"With all the developments which took place since the Goiânia accident — in terms of controlling the movement of radioactive sources, preparing emergency response plans, preparing waste management — certainly the public and the environment are better protected now than 20 years ago," Didier Louvat, Head of IAEA Waste and Environmental Safety section, says.

Despite improvements, worldwide radioactive sources are still lost and abandoned. Last year, the IAEA was informed of ten such incidents involving dangerous sources.

War and political upheaval fuel the problem: Iraq, the collapse of the Soviet Union, civil strife in Africa, to name a few. But it's not a problem of developing countries alone. North America and Europe also report instances of 'losing control' of radioactive sources each year.

Lax legal, technical or regulatory capabilities in countries can allow radioactive sources to slip through managerial cracks.

Mr Friedrich says these 'orphaned' sources often enter the scrap metal exchange chain. "This is how then they move across borders. Most of the cases of

detecting radioactive sources at borders are this kind of inadvertent movement. There are only very, very few cases, where there was, I would say, intelligence information that they were deliberately trafficked for certain malicious purpose," he said.

The penalties to stop companies dumping old radioactive sources vary from country to country. "One obvious thing is that the license is immediately withdrawn if there is a breach of that part of the law or regulation," Mr Friedrich says. It may include legal prosecution against the persons who illegally dumped the source.

But what if a company goes bankrupt? "Well that is a very real case. This is one of the reasons why sources still become abandoned nowadays," Mr Friedrich says.

The IAEA is developing a safety standard for dealing with orphaned sources in the metal recycling industry. It offers guidelines for regulatory authorities, scrap dealers and metal recyclers on how to deal with radioactive sources found in the scrap.

Fortunately, there has not been any real malicious use of radioactive sources. "Everything is, let's say speculation," Friedrich says. "But it is easy to imagine that a radioactive source combined with a conventional explosive device can be disbursed in the air, or if a source capsule is opened up and put in the drinking water supply, it can contaminate the water, or it can be disbursed into an air conditioning system of a large office building... But these are all speculations. Fortunately this has never happened so far," Mr Friedrich says.

The IAEA is driving a 'cradle to grave' approach to the way countries take responsibility to keep radioactive material safe and secure. From assisting Member States to search and secure abandoned sources, to training border guard to detect them, to boosting a country's regulatory capacity.

"Safety must remain a strong concern and security is a rising concern, but both have to be covered very, very adequately," Didier Louvat says.

The world needs radiation sources. Used safely, radiation saves lives. Some three million people are treated with radiotherapy each year. It's used to test steel quality in cars, and check for flaws in jet engines. It's part of our daily lives.

Only a small percentage of sources are strong enough to cause serious radiological harm. But it's those few that the international community and governments must be sure to control. So that an accident like Goiânia is never repeated. ☸

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Photo: P.Pawliczek/IAEA

Sources are often "lost" in times of war and upheaval: the collapse of the Soviet Union, the disintegration of Yugoslavia, civil wars in Africa, wars in Korea, Vietnam and Iraq to name a few. Many turn up in the metal recycling chain. They are detected at border checkpoints or at larger smelters where radiation monitors are installed.



Photo: K.Hansen/IAEA

The legacy of a handful of caesium is 3,000 cubic metres of contaminated waste. It's buried in these two green hills, at a near surface repository on the outskirts of the city. It will take 300 years before the land can be used again.

Goiânia's plight brought global change. The International Atomic Energy Agency introduced more rigorous safety standards for radioactive sources. Today Brazil requires that each and every source is licensed for lifetime tracking to final disposal.



Photo: P.Pawliczek/IAEA