



# Radiation and Waste Safety

Most of the ionizing radiation that people are exposed to in day-to-day activities comes from natural, rather than manmade, sources. Nuclear radiation is a powerful source of benefit to mankind, whether applied in the field of medicine, agriculture, environmental management or elsewhere. The health effects of radiation - both natural and artificial - are relatively well understood and can be minimized through careful safety measures and practices. The Department of Technical Co-operation is sponsoring a programme with the support of the Nuclear Safety Department aiming at establishing Basic Safety Standard requirements in all Member States.

## A global issue

Safe use of nuclear radiation and disposal of radioactive waste should be of concern to all countries in the world regardless of their own nuclear technological development because:

- benefits of nuclear technology are dependent on an understanding of the risks involved;
- countries may be vulnerable to hazards associated with illicit trading in, or disposal of, radioactive materials whether or not they are directly responsible;
- accidents involving radioactive fallout may affect countries far from the source of the contamination.



CREDIT: NRPB

The health benefits of radiation are well understood

## Risk and control

Fatal accidents involving large scale radiation contamination have occurred but there are also minor incidents, some of which cause injury or environmental contamination. Medical care may be required not only in the short term but for years and environmental clean-up operations may be extremely costly. Legislation, monitoring and control is preferable to overcoming the effects of an accident because control was not in place.

### Brazil, Goiânia

A few years ago, in the Brazilian city of Goiânia, equipment that had been used for treating cancer patients was abandoned in a building that was partly demolished after the radiotherapy institute moved to new premises.

Unaware of the danger, two people entered the premises, removed the radiation source assembly and subsequently ruptured it, exposing the radioactive source, a luminescent powder. They then sold the assembly to a scrap metal dealer. He took it home and his children played with what they thought was a harmless substance like carnival facepaint. Several people eventually died, including one six year old child. Not only was this a tragedy for the families concerned, but the city was obliged to mount a very costly clean-up operation.

## Legislation

The Agency recognizes its mandate to take an active role in responding to the needs of Member States. Also required will be a demonstrable commitment by Member States to appropriate legislation and regulatory controls for radiation and waste safety infrastructure.

### Basic Safety Standards

To control the radiation exposure of workers, medical patients and the public, many countries have developed laws, which are supported by administrative measures and enforced by inspectors. Equally important is to have internationally agreed standards and IAEA has played a lead role in developing and refining these. Basic Safety Standards (BSS) are intended to ensure protection against ionizing radiation and the safety of all types of radiation sources. Protection under the BSS is based on:

- Justification of the practice. No practice involving exposure to radiation shall be adopted unless it produces a benefit that outweighs the harm it causes or could cause.
- Optimization of protection. Radiation doses and risks shall be kept as low as reasonably achievable.
- Limitation of individual risk. Exposure of individuals shall not exceed specified dose limits.



CREDIT: NRPB

For workers the dose limit is 50 mSv in any single year

*You can have a law but, unless you have the people to enforce it, what is the point of having the law?*

P. Barretto, IAEA

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## Mexico

An unregistered medical radiation source was inadvertently incorporated into a consignment of scrap metal which was subsequently melted down into iron bars. The iron bars were imported into the US for use in construction and for furniture for a well known fast food outlet. The lorry driver who was delivering the iron bars lost his way and by chance found himself at the entrance of a nuclear research facility in the US. The radioactivity of his consignment triggered the alarm system and the source of the contamination was eventually ascertained.

## The Model Project

The Model Project addresses real needs because failure to establish and maintain an adequate radiation protection infrastructure, including legislation and regulation, leaves countries at risk:

- to incidents involving accidental contamination
- from condemnation by world opinion for failing to deal adequately with such an incident
- to unscrupulous or criminal dumping of radioactive waste
- of being unable to derive benefits from nuclear technology.

The Agency can help governments to draw up legislation, and the necessary regulations for administering the legislation (registration and monitoring procedures), by providing legal expertise. Governments have the responsibility for enacting the legislation and providing resources to ensure that the administrative procedures are carried out.

Training is an important component of the Model Project and involves not only training in nuclear technology but training of administrators, regulators, radiation protection and medical personnel. Long term sustainability is dependent on national capability in all these fields.



CREDIT: IAEA

Air sampling can be used to determine the level of radiation exposure of the public

## Project progress

A survey indicated that over 50 countries would be in need of assistance at various levels. A management strategy to meet these needs has led to action plans being drawn up in collaboration with national authorities. These have been sent to the government of each country for formal agreement. The plans are designed to achieve Basic Safety Standards (BSS) in radiation protection by year 2000.



The Agency can help governments to draw up legislation relating to safe transport of waste - by road, rail or sea

The national action plans are designed to be realistic and they recognize the constraints experienced by individual countries. For this reason IAEA has appointed four regional officers for handling Agency/government liaison. They will be based in:

- Addis Ababa, Ethiopia, for Africa
- Beirut, Lebanon, for West and East Asia
- San José, Costa Rica, for Latin America
- Bratislava, Slovakia, for Eastern Europe

Within each action plan, there are milestones to be achieved within a set time frame. These cover both generic and specific activities.

Generic activities - apply to all countries and, as a first priority, cover notification, registration and subsequent control of all radiation sources, whatever their use, within the country. Later steps will cover protection of workers, patients receiving medical treatment and the public from environmental releases; safe emergency plans; transport arrangements, etc..

Specific milestones - apply according to the country's particular needs, for example, personnel training.

It is expected that most Member countries, with inadequate radiation safety infrastructures will respond positively to the Agency's invitation to participate in the Model Project. It is hoped that in time they will, in the light of the Agency's advice, take the steps required and provide adequate resources. With legislation in place, countries may benefit from continuing technical expertise from IAEA to upgrade their facilities for the peaceful use of nuclear technology.

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