

## WHAT TO DO ?



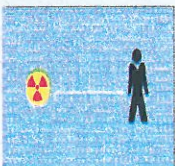
Try to recognize the symbol of radioactive material.



Don't touch the source/ radioactive material.



Spend as less time near the Source of Radiation as possible.



Maximize your distance from the source as much as possible.



Put some shield between the source and yourself .



Warn others and secure the area until the trained help arrives.



Contact Pakistan Nuclear Regulatory Authority (PNRA) immediately.

## Typical Devices with Radioactive Sources



## Typical Labeling

Following terms are usually used in association with radiation warning symbols to indicate the nature of radioactive material and its quantity.

### Units of Radioactivity

Curie (Ci)  
Milli Curie (mCi)  
Becquerel (Bq)  
Giga Becquerel (GBq)

### Radioisotopes

Cobalt 60 (Co-60 or  $^{60}\text{Co}$ )  
Iridium 192 (Ir-192 or  $^{192}\text{Ir}$ )  
Cesium 137 (Cs-137 or  $^{137}\text{Cs}$ )  
Radium 226 (Ra-226 or  $^{226}\text{Ra}$ )

### Examples of Other Markings

Type A or B  
"Radioactive"  
I-White, or II-Yellow, or III-Yellow

## Pakistan Nuclear Regulatory Authority

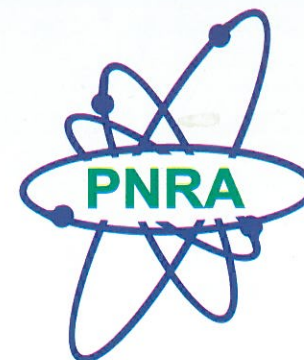
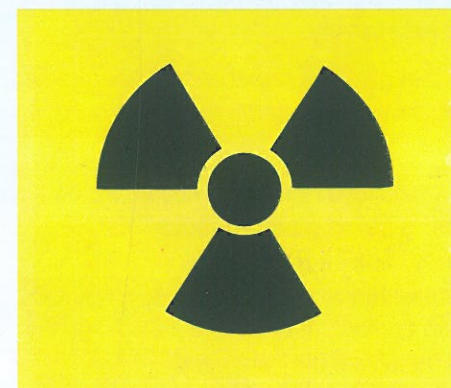
P.O. Box, 1912  
Islamabad, Pakistan

Toll Free No.: 0800-777-66

Fax: +92-51-9261724

E-mail: officialmail@pnra.org

# Reducing Risk of Radioactivity in the Scrap Metal Industry



Pakistan Nuclear Regulatory Authority



## Introduction

Radiation has existed everywhere in the environment. It is all around us and we need to be aware of its various types and how to protect ourselves from harmful exposure. It is easy to protect ourselves from the radiation which can be sensed by our natural senses like sunlight, heat etc. But radiation which cannot be sensed can be very dangerous e.g. X-rays, gamma rays, alpha particles etc.

There are different types of radiation such as heat, light, microwaves, X-rays, gamma rays etc. No form of radiation is harmful if used under controlled conditions. Over-exposure of sunlight can cause skin burns. Similarly X-rays, used for diagnostic purpose, can cause skin burns if exposed excessively.

A material that gives off radiations is called radioactive material. Radioactive material may be in solid, liquid or powder form.

Usually a radioactive material is sealed inside a metal capsule and is called a sealed radioactive source. Sealed Radioactive Sources are widely used in medicine, industry and agriculture and have enormous benefits if they are used according to the design and following the safety & security measures. If lost, misplaced, or stolen, they can have deadly consequences.

In Pakistan, radioactive materials and activities producing radiation are regulated by Pakistan Nuclear Regulatory Authority (PNRA).



## Radioactive Source Containers are Usually Heavy

Radioactive sources are stored in special metal containers that act as shield to stop radiations from getting out.

Heavy metal containers (lead, tungsten or depleted uranium) are used to block the gamma rays. Neutron sources are shielded by wax. This shielding is used to protect those who work and handle the sources and the general public.



## Radioactive Sources have Labels

The "trefoil" (shown below) is the international radiation symbol used to label radioactive sources, containers, or devices. In addition to the trefoil symbol, the word "radioactive" may also appear. Some containers used for transporting sources may have other information on the amount of radioactivity e.g. Curie (Ci), Becquerel (Bq) or the type of protective container e.g. Type A or B, I white or II Yellow. Some sources, such as fine needles used for killing tumors, are too small to have any symbols. However, their containers are usually labeled.



## Radiation Sources in Scrap Metal

Those working with scrap metal should be aware of the radiation warning symbol and other terms used in association with these symbols to indicate the presence of radiation. Scrap dealers are at risk, if they do not have proper radiation detection systems and procedures in place to check the scrap and if their workers are not trained to recognize radiation symbols.

## Hazards from Radioactive Sources

Radioactive sources emit radiations which have harmful effects. Effects of radiation depend upon its level. High levels of radiations can severely harm people. **Early effects of radiation include general weakness, dehydration, nausea and vomiting. Late effects of radiation include infertility, cancer or even death.**



## Protection from Radioactive Sources

We can protect ourselves from radiation in about the same way we protect ourselves from the sun. When we go outside, we can avoid getting a sunburn by not spending much time outside or shielding ourselves from the sun with sunscreen, a hat or a long sleeved shirt. We can be protected from overexposure to all forms of radiation if we exercise the principal of

**Time,— Distance,—and Shielding.**

- Reducing the time spent near radioactive material, will reduce the amount of radiation exposure.
- The intensity of radiation and its effects drop off sharply with distance from the source.
- Shielding materials, like cement blocks, lead, steel, and other metals, will block the radiation.

## Preventing Radiation Exposure & Contamination

In addition to the exposure risks, melting down a radioactive source can contaminate equipment, requiring very costly clean-up, long-term waste management and interruption of business. Therefore, foundries and steel factories should have procedures in place to detect radioactive material.

## Procedures and Instructions

If radioactive material is found or suspected, the staff needs to know what to do and who to contact. Operators should develop procedures to follow and make sure that workers understand those procedures.

## Training

All staff responsible for collecting, transporting and processing scrap metal should be provided with training on the procedures to monitor radiation and check for radioactive materials. Training should include how to recognize radiation warning symbols or the terms normally used in association with these symbols.