8 Internal Radiation Hazards

Radionuclides can be more harmful when they have been taken into the body, so it is important to minimize their intake based on the TEDE ALARA principle. The routes of entry into the body are:

1. Inhalation (breathing it)
2. Ingestion (eating or swallowing it)
3. Absorption (through unbroken skin or through wounds)

Remember - Internal sources irradiate the body tissue 24 hours a day, seven days a week, until they have been eliminated from the body by excretion and decay.

Any radioactive substance is a potential internal hazard. The most important internal hazards in a nuclear power plant are radioiodine, airborne particulates, and tritium. If you work unprotected in 1 Derived Air Concentration (DAC) for 2,000 hours a year, you will receive a dose equal to the annual dose limit.

Table 8.1 Derived air concentration (DAC)

Nuclide	DAC	
	(Bq/m^3)	($\mu Ci/mL$)
Tritium	800,000	2.2 E-5
Radioiodine (I-131)	700	2.0 E-8
Unknown particulates (based on Co-60)	500	1.4 E-8

The derived air concentrations for most nuclei of significance are defined in Section 9.

Thyroid Blocking

In the event of known or suspected exposures to radioiodines, a potassium iodide (KI) pill may be taken to reduce thyroid dose. These pills should be taken as soon as possible after the exposure.

Note: A potassium iodide pill is not a substitute for proper respiratory protection.

Protective Equipment

In most cases, high internal exposures are due to not using protective equipment or using it improperly.

In an effort to reduce high internal exposures, protective equipment should be provided that will not only give protection, but is also reasonably comfortable. The following is an alphabetical list of selected items of safety and protective equipment.

Safety and Protective Equipment

Absorbent cotton
Acid-resistant vests and gloves
Adhesive tape
Air lines, breathing
Air lines, self-contained breathing
air splints
Airways
Ambulance cart
Ammonia inhalants

Bandages
Band aids
Blanket, disposable
Blanket
Blanket, lead
Blood pressure cuff
Bolt cutter
Boots

Cartridges, ammonia
Cartridges, organic vapor
Coats, winter
CO_2 monitor
Combined, gas/O_2, monitor
Coveralls, welders' flameproof
Cream, antibiotic
Cylinders, SCBA

Descent device (Sky Genie & Miller)
Disinfectant, dettol
Draeger gas analyzer and tubes
Dressings
Dressings, burn

Ear plugs
Egress air pack
Elastic eyeglass holders
Extrication device
Eye pads

Face shields
Fall arresting devices
Fire axe
Fire blanket
Fire coats
Fire hats
First aid kits
Forcible entry device

Glasses, safety
Gloves, high voltage
Gloves (various)
Goggles, burning
Goggles, safety
Goggles, welders'
Ground fault circuit interrupters
Grounding cables

Harnesses, safety
Hats, safety
Heat stress monitor
Helmets, welders'
Hip waders
Hoods, disposal
Hoses
Hydrogen monitor

Ice pack

Lanyards
Lens-cleaning station
Life-saving airway
Lights, explosion-proof

Masks, dust

Noise survey meters

Overshoes, rubber
Oxygen cannula and mask

Pads, abdominal
Penlight
Pins, safety
Plastic suits
Psychrometer
Python monitor

Rain wear
Respirators
Resuscitator
Rope
Rubber mats

Saline solution
Sand bags
Scott air packs
Shoes, safety
Signs, warning
Spill, chemical clean-up kits
Spine boards
Spine kits
Splint, traction
Staging rails
Stair chair
Stretcher, basket
Stretcher, Bradford
Suit, heat proximity

Tester, high potential
Tongue depressors
Towels, absorbent paper
Trauma kit

Velometer
Visors

Zorb-all (for spilled oil)