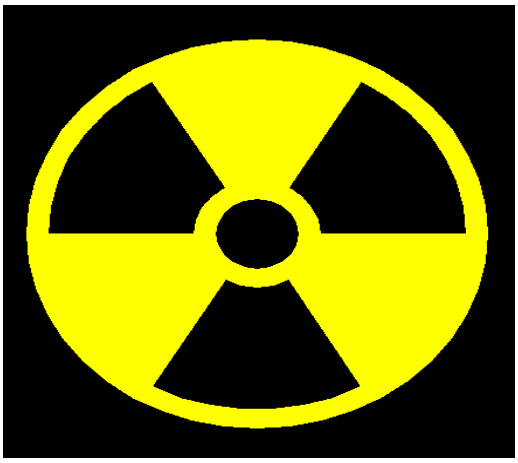
Joint Resilience Unit

Resilience through Partnership

The Radiation (Emergency Preparedness & Public Information) Regulations 2001 (REPPIR)

A Public Guide to Radiation Emergencies



The danger of radiation contamination is a minimal risk to us all. This guidance aims to ally some of the fears that you may have and to illustrate some of the advice and basic facts on radiation exposure and the systems in place to deal with any radiological release.

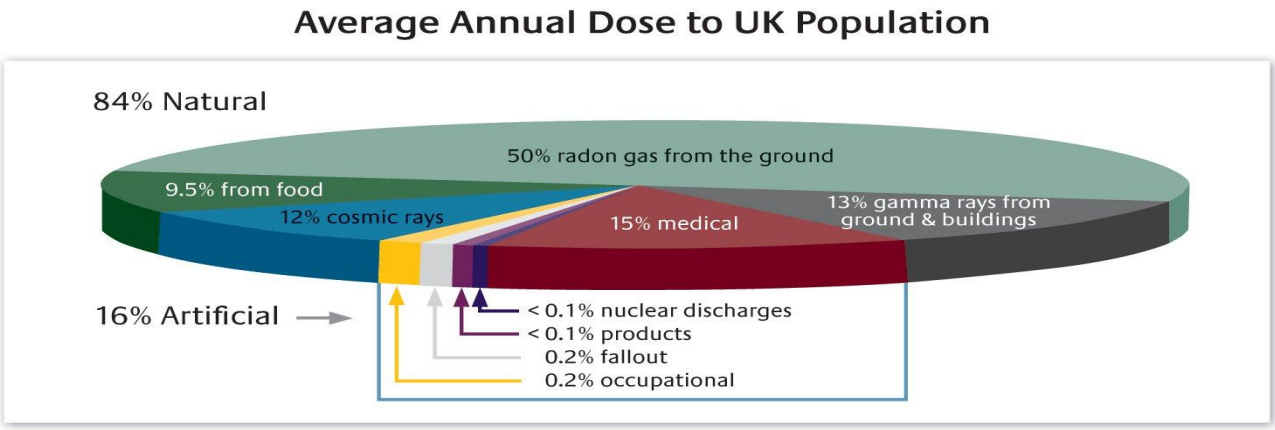
The International Nuclear Event Scale (INES)

INES Level	Health & Environmental Effects
Level 7 Major Accident Chernobyl 1986 (Russia) Fukushima Diiachi 2011(Japan)	Major release of radioactive material. Widespread health and environmental effects. Implementation of planned countermeasures
Level 6 Serious Accident Kyshtym 1956 (USSR)	Significant release of radioactive material. Implementation of planned countermeasures
Level 5 Accident with wider consequences Windscale (UK) 1957 Three Mile Island (USA) 1979	Limited release of radioactive material requiring some planned countermeasures. Several deaths.
Level 4 Accident with local consequences	Minor release of radioactive material unlikely to require countermeasures other than food controls. Possibility of at least one death.
Level 3 Serious Incident	Exposure limits in excess of 10 times the annual limit. Non lethal health effects other than the possibility of burns.
Level 2 Incident	Exposure to a member of the public in excess of 10 mSv. Worker exposed to above annual limits.
Level 1 Anomaly	

(Source: UN IAEA)

What is Radiological Exposure ?

Radiation is all around us; it affects everyone as we go about our daily business. Surprisingly the most common form of exposure, 84%, is from natural sources in the ground, in our food, medical procedures such as X-rays and buildings.



(Source Health Protection Agency)

Radiation levels are measured in sieverts, showing the effectiveness of a particular type of radiation at causing damage to tissues, and are used to measure lower levels of radiation, and for assessing long-term risk, rather than the short-term acute impact of exposure.

There are 1,000 millisieverts (mSv) in a sievert.

People are exposed on average to around 2mSv of radiation a year from the natural environment, although there is considerable variation in this dose between individuals.

In the UK, the legal limit for radiation exposure from sources such as nuclear plants for members of the public is 1mSv a year, based on recommendations from the International Commission on Radiological Protection.

For emergencies, the upper limit is set higher - 5mSv or more - but these figures are set conservatively, at levels far below those that would significantly raise health risks.

This table illustrates the average risk levels in the UK.

Radiological Risk	Dose (1 unit = 1mSv)	Risk of death
Living in Cornwall	7.8 units	1 in 3,200
From a brain scan	5 units	1 in 5000
Average annual dose to UK citizens	2.6 units	1 in 10,000
Average annual dose received by a coal miner	1.2 units	1 in 23,000
Average dose from radon in the home	1 unit	1 in 25,000
Dose from a return flight from London to Los Angeles	0.14	1 in 230,000
Dose from a one week holiday in Cornwall	0.1	1 in 250,000
Dose from drinking mineral water every day for a year	0.065	1 in 500,000
Dose over the next 50 years in the UK from Chernobyl	0.046	1 in 500,000
Dose from a single X-Ray	0.02	1 in 1.25 million
Dose from eating a 135g bag of Brazil Nuts	0.01	1 in 2.5 million
Average dose from fallout of nuclear weapons testing	0.005	1 in 5 million
		Compare with risk of death from other sources, per year: 1 200 from heart disease 1 in 400 from cancer 1 in 1,000 from smoking 1 in 7,000 coal miners annual risk 1 in 10,000 from a road accident

(Dept of Energy & Climate change)

What Types of Radiation are there?

There are two types of radiation; radiation is the transfer of energy from one place to another:

Non Ionising Radiation

Such as – visible light, signals from mobile phones and radio waves.

Ionising Radiation

Such as – emissions from Uranium ore and X-rays.

Both types of radiation have the ability to disrupt stable atoms causing chemical changes in living matter which may cause harm to health.

Unstable atoms in a material decay and emit Ionising Radiation. As the material decays the atoms change to a different form, the decay time is known as the 'half life'. Each material has its own 'half life'; this can vary from a few seconds to thousands of years.

There are three types of Ionising Radiation, Alpha particles, Beta particles and Gamma. Alpha and Beta are particles whilst Gamma is a wave similar to X-Rays. All three have the ability to enter the body or other materials and cause harm.

Alpha Particles

These are big, heavy and slow and not able to penetrate very far through materials. They do not pose a hazard outside of the body, however, particles can be breathed in, ingested with food or enter the body via open wounds. They can damage tissue and cause cancers.

Beta Particles

These are light, small and fast and can penetrate exposed skin; however, they can be stopped with tin foil or Perspex.

Gamma Rays

Gamma Rays have no weight and pass easily through the body; therefore they can cause damage inside and out. They can however be stopped or the effects reduced by the use of thick heavy shielding (E.G lead).

What are the Effects?

At low levels there are no immediate ill effects to humans, however, any exposure is considered capable of increasing the likelihood of cancers and the passing of hereditary illnesses to children.

Persons exposed to very high dosed may receive burns, damage to the gastric, cardiovascular and nervous system. Very high doses can cause death.

What are the Countermeasure Actions?

In the unlikely event of a release of radioactive material the following actions may be introduced.

Sheltering

Go In, Stay In, Tune In – find the nearest shelter and remain there until informed otherwise. If possible listen to messages conveyed by radio or television, keep all windows, doors and ventilation systems closed to minimise the material from entering.

Evacuation

The removal of people away from a contaminated area.

Iodine Tablets

The distribution of Iodine Tablets has shown to speed up the removal radioactive iodine from the body.

Who does What?

The Roles of Responding Agencies

Police
Responsible for co-ordinating any response and advising members of the public. Consult with partners on the best course of action to protect the public.

Fire Service
The main responsibility is to fight any associated fires and search and rescue operations; they may also assist with any decontamination.

Local Authorities
Assist in the implementation of any countermeasures including transport, housing and the provision of welfare services.

NHS
Making provisions to treat those affected and ensuring any plans for the issue of iodine tablets are drawn up.

Water Companies
Decide what if any action to take if water supplies are affected.

Central Government
The Dept for Energy and Climate Change are the lead office for any nuclear emergency and would co-ordinate the governments' response.

Ministry of Defence
Assist with the provision of dedicated response teams.

Food Standards Agency
Ensure that consumers are protected from exposure from contamination through food chain pathways; ensure that alternate food supplies are available and that any contaminated food is disposed of.

Environment Agency
Advise on the environmental issues surrounding any contamination and the appropriate disposal of any contaminated waste.

Health Protection agencies
Provide advice on public protection and for specifying Emergency Reference Levels of dose for the introduction of countermeasures. Co-ordinate radiation monitoring.

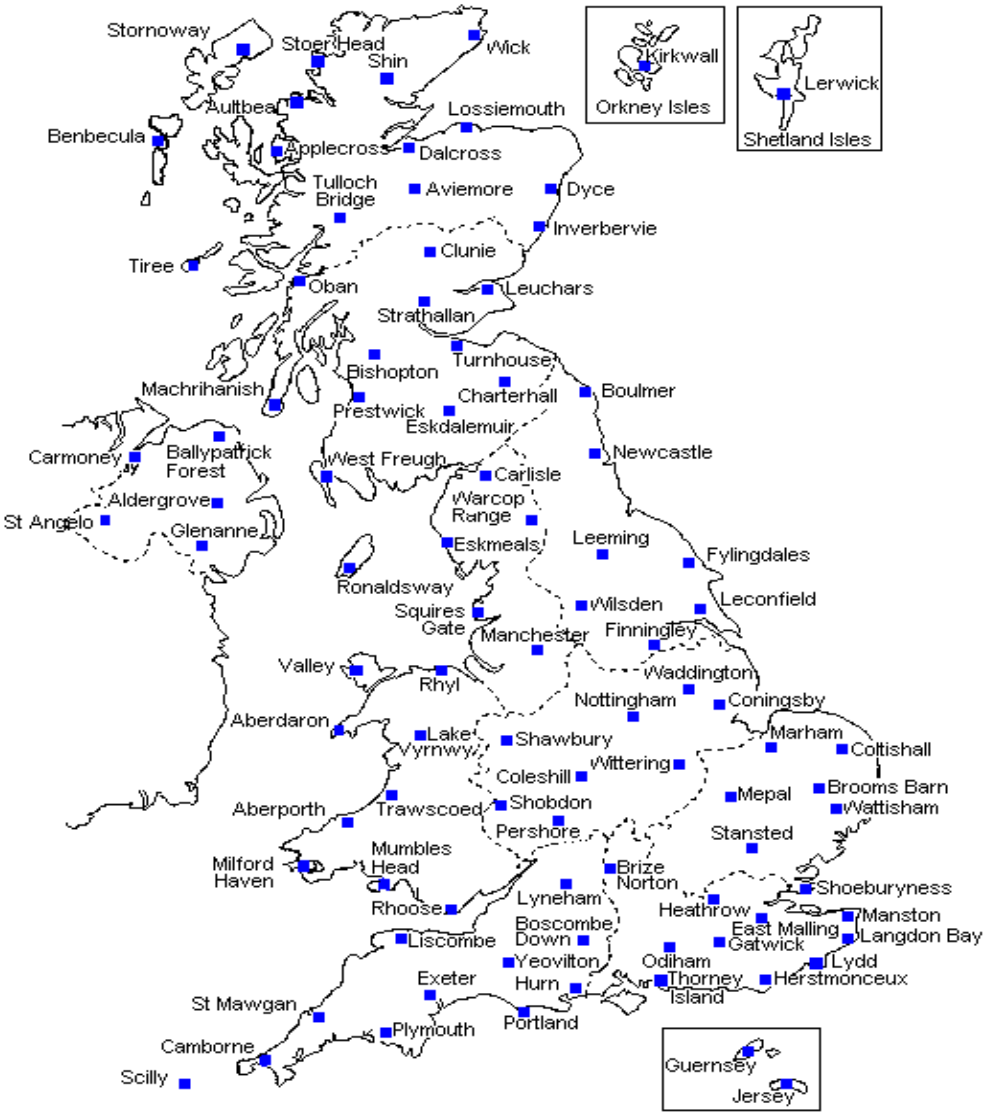
Met Office
Provide assistance with any weather conditions which may affect any released material.

How do we Monitoring Radioactivity?

Monitoring after any nuclear emergency will play an important part in any decisions made in respect of information to the public and the provision of countermeasures. It can relate to the immediate effects as well as the long term environmental issues.

The responsibility for monitoring lies with a number agencies including nuclear operators, local authorities, the Environment Agency, health authorities and food standards agencies.

Throughout the UK there are 94 permanent monitoring stations known as the Radiation Incident Monitoring Network (RIMNET) which detect and measure radiation levels.



(Source DEFRA RIMNET Monitoring Stations)

What Emergency Plans are in Place?

The Radiation (Emergency Preparedness and Public Information) Regulations 2001 made under the health and Safety at Work Act 1974 lays down the basic health and Safety protection for workers and the general public against the dangers of ionising radiation.

These regulations impose a duty on Local Authorities to assist protecting and provide information to the public in the event of a radiation emergency.

The Joint Resilience Unit has written plans to deal with the Local Authority response to a radiation accident.