



**Dounreay Site  
Restoration Ltd**

**Glossary of Terms Used in the Documents  
Applying for an Authorisation to Dispose of  
Radioactive Wastes on or from the Premises at  
Dounreay**

## GLOSSARY OF TERMS

ADU	Ammonium Di-Uranate
AFCF	Active Filter Change Facility
ALARP	As Low As Reasonably Practicable
AMRR	Alkali Metal Residue Removal
ATO	Authority to Operate
BNFL	British Nuclear Fuels
BPEO	Best Practicable Environmental Option
BPM	Best Practicable Means
Bq	Becquerel
BRP	Breeder Removal Project
C	Celsius
CEFAS	Centre for Environment, Fisheries, and Aquaculture Science
CHILW	Contact Handled Intermediate Level Waste
CoPA	Control of Pollution Act, 1974
CRP	Caesium Removal Plant
CMA	Cave Maintenance Area
CWS	Conditioned Waste Store (future)
DACH	Derived Airborne Concentration hour
DCO	Discharge Control Objective
DL	Derived Limit
DDL	Derived Discharge Limit
DEFRA	Department for Environment, Food and Rural Affairs
DF	Decontamination Factor
DFR	Dounreay Fast Reactor
DMTR	Dounreay Materials Test Reactor
DRWI	Dounreay Radioactive Waste Inventory
DSRL	Dounreay Site Restoration Limited
DSRP	Dounreay Site Restoration Plan
EC	European Commission
EMS	East Minor Sources
EMS	Environmental Management System
EPD	Environmental Programmes Department
ETP	Effluent Treatment Plant
EU	European Union
EURATOM	Treaty of the European Atomic Energy Community
FCA	Fuel Cycle Area
g	gram
Gy	Gray (1Gy = 1J/kg)
GDL	Generalised Derived Limits
h	hour
ha	Hectares
HAC	Highly Active Cell
HAD	High Active Drain
HAL	Highly Active Liquor
HAZOP	Hazards of Operating studies
HEPA	High Efficiency Particulate Air
HLW	High Level Waste category
HMIPI	Her Majesty's Industrial Pollution Inspectorate
HPA-RPD	Health Protection Agency Radiation Protection Division (formerly the National Radiological Protection Board)
HSE	Health and Safety Executive

IAEA	International Atomic Energy Authority
ICRP	International Commission on Radiological Protection
ILLW	Intermediate Level Liquid Waste
ILW	Intermediate Level Waste
IPC	Integrated Pollution Control
IPPC	Integrated Pollution Prevention and Control
ISO	International Standards Organisation
ISRS	International Safety Rating System
IX(P)	Ion Exchange (Plant)
l	litre
LAD	Low Active Drain
LCBL	Lifecycle Baseline
LEDT	Liquid Effluent discharge Tunnel
LLLETP	Low Level Liquid Effluent Treatment Plant
LLLW	Low Level Liquid Waste
LLW	Low Level Waste
LMD	Liquid Metal Disposal
LMDP	Liquid Metal Disposal Plant (for PFR)
m	metre
MAC	Medium Active Cell
MDA	Minimum Detectable Activity
min	minute
MSM	Master slave manipulators
NAD	Non-Active Drain
NaK	Sodium/Potassium liquid metal coolant
NDA	Nuclear Decommissioning Authority
NDP	NaK Destruction Plant (for DFR)
NII	Nuclear Installations Inspectorate
NRPB	National Radiological Protection Board (now the Health Protection Agency Radiation Protection Division (HPA-RPD))
NTWP	Near Term Work Plan
OS	Ordnance Survey
OSPAR	Oslo-Paris Convention on discharges to the marine environment
PAL	Plutonium Analysis Laboratory
PCD	Primary Circuit Decontamination
PFR	Prototype Fast Reactor
PIE	Post-Irradiation Examination
POCO	Post-Operational Clean-out
PPE	Personal Protective Equipment
PWD	Plant Washings Drain
PWT	Plant Washings Tank
RCEP	Royal Commission on Environmental Pollution
RHILW	Remote Handled Intermediate Level Waste
RRP	Residue Recovery Plant
RSA	Radioactive Substances Act, 1993
SAC	Special Areas of Conservation
SAD	Suspect Active Drain
SDP	Sodium Disposal Plant
SEG	Safety and Environment Group
SEPA	Scottish Environment Protection Agency
SI	Standard International
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
Sv	Sievert
te	tonne

TBP/OK	Tributylphosphate in Odourless Kerosene
UKAEA	United Kingdom Atomic Energy Authority
UPP	Ultrafiltration Pilot Plant
WMS	West Minor Sources
WPC	Waste Posting Cell
WRACS	Waste Receipt, Assay, Characterisation and Supercompaction Plant
WVN	Water Vapour Nitrogen (process)

## UNIT PREFIXES

Tera (T) =  $1 \times 10^{12} = 1,000,000,000,000$

Giga (G) =  $1 \times 10^9 = 1,000,000,000$

Mega (M) =  $1 \times 10^6 = 1,000,000$

milli (m) =  $1 \times 10^{-3} = 0.001$

micro ( $\mu$ ) =  $1 \times 10^{-6} = 0.000,001$

## TERMS

**Active** (Radioactive) - Possessing, or pertaining to, radioactivity.

**Activity** (Radioactivity) - The number of spontaneous nuclear disintegrations occurring per unit time in a given quantity of radioactive material. (See also "Becquerel").

**Actinide** - The generic term for the group of radioactive elements which starts with actinium (atomic number 89) and ends with element 105. Actinides include the natural elements thorium and uranium, and also the transuranic elements plutonium and americium

**Agenda 21** - Agreement signed by the UK at the United Nations Conference on Environment and Development (Earth Summit) which established a global programme of action for the 21<sup>st</sup> century to direct progress towards more sustainable forms of development. This involves viewing economic, social and environmental issues together and not in isolation.

**Alpha ( $\alpha$ ) particle** - Alpha particles are composed of 2 protons and 2 neutrons and are emitted from some radionuclides during radioactive decay. Alpha particles lose their energy rapidly as a result of collision with other atoms and travel only short distances in dense media.

**Article 35** – Part of the Euratom treaty relating to radioactive waste management stating that "Each Member State shall establish the facilities necessary to carry out continuous monitoring of the level of radioactivity in the air, water and soil and to ensure compliance with the basic standards."

**Article 37** – Part of Euratom Treaty relating to radioactive waste management stating that "Each Member State shall provide the Commission with such general data relating to any plan for the disposal of radioactive waste in whatever form as will make it possible to determine whether the implementation of such plans is liable to result in the radioactive contamination of the water, soil or airspace of another Member state."

**Becquerel (Bq)** - The SI unit for the number of radioactive disintegrations taking place per second in a material. In practice, this unit is so small that multiples of the unit are commonly used.

**Beta ( $\beta$ ) particle** - Beta particles are electrons that are emitted from some radionuclides during radioactive decay. They are much smaller than alpha particles and travel further in dense media. Positively charged electrons are occasionally distinguished from electrons and are called positrons.

**Collective Dose** - Long-lived radionuclides can cause exposures over a wide area and an extended period of time, often long after a release has stopped. To take account of this, annual individual doses in the exposed population can be summed over various time periods after a release of radioactivity. If the doses are summed over all time the quantity is known as the collective dose commitment. If doses are summed to a specified time, e.g. 500 years, the quantity is known as the collective dose commitment truncated at 500 years. Collective doses are measured in man-Sieverts (man Sv)

**CHILW** - Solid ILW that is high in  $\alpha$  activity and low in  $\beta\gamma$  activity, allowing it to be handled while wearing suitable PPE.

**Conditioned Waste Package** - A solid block of material (usually cement or glass) in which radioactive waste has been immobilised so that its rate of degradation and the escape of radioactivity into the environment are both ALARP.

**Critical Group** – That group of the public most exposed, by virtue of their habits, to any impact of radioactive discharges.

**Decontamination Factor** - Factor by which radioactivity of material is reduced after an operation, or a series of operations.

**Derived Airborne Concentration** - The Derived Air Concentration (DAC) for any radionuclide, is that concentration of radioactive material in air, expressed in  $\text{Bq.m}^{-3}$  which, if breathed in for a working year of 2000 hours, would result in the Annual Limit on Intake (ALI) for inhalation, which equates to a dose of 20 mSv.

**Derived Air Concentration Hour** - The Derived Air Concentration hour (DACH) is a time integrated air concentration of a radionuclide, measured as a fraction or multiple of a DAC. That is:

$$\text{DACs} \times \text{time (in hours)} = \text{DACH.}$$

For example an air concentration of 1 DAC breathed in for 1 hour would result in an integrated exposure of 1 DACH. Further if an air concentration of 1 DAC is breathed in for 2000 hours, or 2 DAC is breathed in for 1000 hours this would result in an integrated exposure of 2000 DACH which is equivalent to the ALI.

**Fast Reactor** - A nuclear reactor in which no moderator is used to slow down the neutrons. The fuel must have a high concentration of fissile material which is usually plutonium.

**Gamma ( $\gamma$ ) radiation** - Electromagnetic radiation of very short wavelength, emitted by many radioactive atoms when they decay. Gamma radiation is generally of shorter wavelength than X-rays and is therefore more penetrating and can travel long distances in dense media. There is a need for shielding of radioactive substances that give rise to gamma radiation and X-rays.

**Generalised Derived Limit** - A Generalised Derived Limit for a particular nuclide and environmental material (such as soil, water, etc.) is the level of activity of a particular nuclide in a particular material that would give rise to an effective dose to an average member of the critical group equal to the annual dose limit (1000  $\mu\text{Sv/yr}$ )

**Geo** – Coastal geological feature formed by erosion, where higher levels of contaminants, than found in the more exposed coastal features, can accumulate

**Hazard** - An event that can potentially cause damage to persons, property or the environment.

**HAZOP** - A structured technique used to identify hazards.

**Helios Target** - Test Reactor fuel comprising high enriched uranium used in the production of medical isotopes and physics experiments

**High Level Waste** - The treatment of irradiated nuclear fuels produces wastes that are initially heat producing because of energy released by the decay of short lived radionuclides. As the potential for heat generation diminishes with time, HLW decays to ILW.

**Individual Dose** – The proper term is effective dose and is the quantity obtained by multiplying the equivalent dose to tissues and organs by a weighting factor appropriate to each and summing the products.

**Intermediate Level Waste** - Wastes containing radioactivity levels exceeding the upper limits for LLW, but which do not require heating factors to be accounted for in the design of storage or disposal facilities.

**IPPC Authorisations** – Limits on the discharge of non-radioactive elements from metal production and processing non-ferrous metals.

**Irradiated** - Material which has been subjected to irradiation in a reactor.

**Low Level Waste (LLW)** - Wastes containing radioactive materials other than those acceptable for disposal as VLLW, but not exceeding 4 GBq/te of alpha activity or 12 GBq/te of  $\beta\gamma$  activity.

**Man-sievert** – the unit of collective dose.

**Micron** – Unit of measurement equivalent to 0.000001 of a metre.

**Nuclide** - A species of atom characterised by the number of protons and of neutrons.

**Passive Safety** - A system designed to be safe by virtue of its own characteristics, without relying on active components (normally powered electrically or by some other fuel).

**Post Operational Clean-out (POCO)** - Stage 1 decommissioning work, performed using personnel, equipment, methods and waste routes that served the plant in its former operational role, under the operational safety case.

**Radionuclide** - An unstable nuclide which emits ionising radiation.

**Raffinate** – The residue after removal of valuable components in a solvent extraction process.

**RHILW** - Solid ILW that can only be handled remotely in shielded facilities on account of high  $\beta\gamma$  radiation.

**Sievert (Sv)** - The SI unit of dose equivalence. It takes into account the different biological effects of each ionising radiation.

**TBP/OK** - Tri-butyl phosphate/odourless kerosene is a combination of chemicals used in the fuel cycle solvent extraction process.

**Very Low Level Waste** - Wastes which can safely disposed of with ordinary refuse (dustbin disposal), each 0.1 m<sup>3</sup> of material containing less than 400 kilobecquerels (kBq)(0.4 Bq/g) of  $\beta\gamma$  activity, or single items containing less than 40 kBq (0.04 Bq/g) of activity.

**Waste Treatment** - A process whereby radioactive waste in an initially raw state is subjected to chemical and/or physical changes that permit it to be immobilised into an acceptable conditioned waste package.