

Glossary

Definitions of relevant terms and some commonly used abbreviations.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
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Term Meaning

A	
Absorbed dose	Quantity of energy imparted by ionising radiation to unit mass of matter such as tissue. Unit gray, symbol Gy. 1 Gy = 1 joule per kilogram.
Activity Concentration	The activity per unit mass or volume, e.g. Bq kg ⁻¹ , Bq l ⁻¹
AECL	Atomic Energy Canada Limited
ALARA	"As low as reasonably achievable", refers to actions directed to limiting doses to individuals, the number of exposed individuals, and the probability of receiving a dose.
Allometry	Relationships between body mass of organisms and various parameters (including of relevance to PROTECT radionuclide biological half-life and dietary dry matter intake).
Assessment Endpoint	The biological effect inferred from measurements or predictions and which the assessment framework is designed to study.
Assessment factor	Allowance for degree of uncertainty, caused by lack of effects data. For example, an estimated lowest observed effect concentration may, as a precautionary approach, be divided by a assessment factor (normally within the range of 10 to 10000) to safeguard against harmful effects, where the magnitude of the assessment factor reflects the degree and type of uncertainty (e.g. lack of chronic exposure data, lack of data for different taxonomic groups or trophic levels, etc.). The assessment factor (AF) is also known as the safety factor.
Assessment Framework	Identification and demarcation of the assessment boundaries. In FASSET, the framework contains the process from problem formulation through to characterisation of the effects of radiation on individuals. The overall assessment system describes the tools, methods and information flow used to carry out the impact assessment.
Authorisation	The granting by a regulatory body or other governmental body of written permission for an operator to perform specified activities.

B	
BAT	Best Available Technology: a term applied to abatement technology designed to limit pollutant discharges. The term constitutes a moving target on practices, since developing societal values and advancing techniques may change what is currently regarded as 'best available'. Similar terms include 'best practicable means' and 'best practicable environmental option'.
BCG	Biota Concentration Guidelines: the media concentration for which the corresponding dose rate is equal to the screening dose rate used in the USDoe's graded approach and RESRAD-BIOTA assessment tool.
BCG calculator	Biota Concentration Guidelines calculator: A semi-automated tool for implementing screening and analysis methods contained within the USDoe graded approach. Although the BCG calculator is still available RESRAD-BIOTA has been developed to replace it.
Benchmark	Risk assessment benchmarks are the concentrations, doses or dose rates that are estimated to equate to predefined criteria (e.g. predicted no effects dose rate, severe risk) based on exposure-response information and political/societal decisions.
Bioaccumulation	The process whereby an organism accumulates substances in living tissues to concentrations higher than those existing in the surrounding media.
Bioassay	A test to determine the relative strength of a substance by comparing its effect on a test organism with that of a standard preparation.
Bioavailability	Defined as the fraction of the contaminant that can be taken up by living organisms, dependant both on the chemical speciation of the exposure source(s) and on the physiological status of the organism.
Biodiversity	The number and abundance of species found within a common environment. This includes the variety of genes, species, ecosystems, and the ecological processes that connect everything in a common environment.
Biological half-life	The time required for a biological system (e.g. an animal) to eliminate, by natural processes, half the amount of a substance that has been absorbed into that system.
Biomagnification	Situations where the concentration of certain substances increases up the food chain.
Biosphere	That part of the environment normally inhabited by living organisms. In practice, the biosphere is not usually defined with great precision, but is generally taken to include the atmosphere and the Earth's surface, including the soil, surface water bodies, seas and oceans and their sediments. There is no generally accepted definition of the depth below the surface at which soil or sediment ceases to be part of the biosphere, but this might typically be taken to be the depth affected by basic human actions, particularly farming. In waste safety in particular, the biosphere is normally distinguished from the geosphere.
Birds Directive	The abbreviated term of 'Council Directive 79/409/EEC of 2 April 1979 on the Conservation of Wild Birds'. It is the aim of this directive to promote the conservation and protection of listed species of birds within the European Union.
BPEO	Best Practicable Environmental Option, see BAT.
BPM	Best Practicable Means, see BAT.

BWG	Biota Working Group: Part of the IAEA EMRAS programme aimed at comparing and validating models used and developed by member states for biota dose assessments that may be used as part of a regulatory processes concerning authorised releases of radionuclides in order to improve Member States' capabilities for protection of the environment.
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C	
Conceptual model	Representation of the environmental system and of the physico-chemical and biological processes that determine the transport/transfer of contaminants from sources through environmental media to ecological receptors within the system.
Contaminant	Any physical, chemical, biological, or radiological substance or matter that has a potentially adverse effect on air, water, or soil, with the implication that the amount is measurable.
CR	Concentration ratio: ratio used to quantify the equilibrium between an environmental medium and a living organism (e.g., water to fish CR). Sometimes referred to as concentration factor or bioaccumulation factor.
Cytogenetic effect	An observed effect in chromosomes that can be correlated with adverse hereditary effects or genetic effects (effects that are inheritable and appear in the descendants of those exposed).

D	
DCC	Dose Conversion Coefficient expressed as Gy per unit time of the target organism per Bq per unit of mass or volume of the source. The DCC is specific to each radionuclide and organism and was calculated for external and internal exposure. Sometimes referred to as the Dose Conversion Factor.
DCF	Dose Conversion Factor, see Dose Conversion Coefficient.
DCL	Derived consideration level: A band of absorbed dose rate for each Reference Animal and Plant within the ICRP proposed framework. These do not represent dose limits but a range of doses which form a starting point from which dose limits may be considered in the future.
Dispersion model	Model for the representation of the spreading of radionuclides in air (aerodynamic dispersion) or water (hydrodynamic dispersion) resulting mainly from physical processes affecting the velocity of different molecules in the medium.
Dose	See absorbed dose
Dose constraint	A restriction on annual dose to an individual (human), which may either relate to a single dose or to a complete site, in order to ensure that when aggregated with doses from all sources, excluding natural background and medical procedures, the dose limit is not exceeded.
Dose rate	Dose (normally absorbed dose) received over a specified unit of time.
Dose-effect	The relationship between dose (usually an estimate of dose) and the gradation of the effect in an exposed population, that is a biological change measured on a graded scale of severity.
Dose-response	A correlation between a quantified exposure (dose) and the proportion of an exposed population that demonstrates a specific effect (response).
Dosimetry	The measurement and calculation of radiation dose in matter and tissue resulting from exposure to ionising radiation.
DWB	Direct Weighted Bootstrap

E	
EA R&D 128	Radiological assessment approach for wildlife and associated tool developed by the England and Wales Environment Agency.
Ecological impact	The total effect of an environmental change, natural or man-made, on the community of living organisms.
Ecological Receptor	Living organisms at various organisational levels (i.e. ecosystems, communities, populations, individual organisms) potentially exposed to and adversely affected by stressors because they are present in the source(s) and/or along stressor migration pathways. This term does not refer to humans.
Ecosystem	The interacting system of a biological community and its nonliving surroundings.
ECx	Effect Concentration: the concentration of a chemical required to cause a given effect to x% of a population or community. For example, EC10: concentration of a chemical required to cause a given effect in 10% of a population or community.
EDRx	Effects Dose Rate: the radiation dose rate required to cause a given effect to x% of the measured endpoint. For example, EDR10: the dose rate required to cause the production of 10% less seeds (which in principle could affect all of a population or community). Effect A biological change caused by an exposure. Strictly speaking, an effect is the change in an endpoint under consideration when it is compared to a control.
EIA	Environmental Impact Assessment
EMRAS	Environmental Modelling for Radiation Safety: An IAEA programme aimed at improving models for the purposes of radiation protection of the public and the environment (http://www-ns.iaea.org/projects/emras).
EMCLS	Environmental Media Concentration Limits: Used as part of the ERICA Tool and defined as the activity concentration in the selected media (soil, air, water or sediment) that would result in a dose-rate to the most exposed reference organism equal to that of the selected screening dose-rate.
Endpoint	In toxicity testing and evaluation it is the biological response that is measured. Endpoints vary with the level of biological organisation being examined and include responses at the subcellular level to the community level such as biomarkers (subcellular level), survival, growth, reproduction (individual level), primary production, and structure (and abundance) and function in a community (population or community level). Endpoints are used in toxicity tests as criteria for effects.
ENEV	Environmental No Effects Value: a dose level at which a population of organisms will not be affected (defined by Environment Canada).
Environment	Water, air, land, plants and man and all other organisms living therein, and the interrelationships which exist among them.
EIS	Environmental Impact Statement: a document providing information for decision makers on the positive and negative effects of an action, practice or policy, which identifies and evaluates the environmental impacts of the hazard source and feasible alternatives, including taking no action.

Environmental Justice	Often used interchangeably with the term environmental equity, refers to the distribution and effects of environmental problems and the policies and processes to reduce differences in who bears environmental risks. In a general sense, it includes concern for disproportionate risk burden placed upon any population group, as defined by gender, age, income, race, nationality or generation.
Environmental quality criteria	The levels of pollution and lengths of exposure, above which adverse effects may occur on health and welfare.
Environmental	The level of contaminants prescribed by law or regulation that cannot be quality standards exceeded during a specified time in a defined area.
EQSs	Environmental Quality Standards
ERA	Ecological Risk Assessment
ERICA	Environmental Risk from Ionising Contaminants: Assessment and Management , EURATOM 6th Framework project.
ERICA Tool	A tool implementing the ERICA tiered approach for radiological assessment of wildlife in freshwater, terrestrial and marine ecosystems developed by an EURATOM 6th Framework consortium.
EURATOM	European Atomic Energy Community
Exposure	The co-occurrence or contact between the endpoint organism and the stressor (e.g. radiation or radionuclide).
Exposure Assessment	The process of measuring or estimating the intensity, frequency, and duration of exposures to an agent currently present in the environment or of estimating hypothetical exposures that might arise from the release of new chemicals into the environment.
Exposure pathway	A route by which radiation or radionuclides can reach humans and cause exposure - an exposure pathway may be very simple, e.g. external exposure from airborne radionuclides, or a more complex chain.

F

FASSET	Framework for Assessment of Environmental Impact EURATOM 5th Framework project.
Feature species	see reference organisms
Fecundity	The number of viable offspring produced by an organism; mature seeds produced, eggs laid, or live offspring delivered, excluding fertilised embryos that have failed to develop.
Fertility	The ability to produce offspring.
Foundation species	Highly interactive species that are often extremely abundant or ecologically dominant.
FRED	The FASSET Radiation Effects Database (FRED) which has been updated through the addition of a quality scoring exercise of each literature source to evaluate how useable the data is in the context of defining dose (rate) effect relationships for incorporation into the SSD and other approaches. In addition new literature sources have been added to the database and it has been updated to make it available on the internet. It has been renamed as the FREDERICA database in recognition of these changes (www.frederica-online.org).

G

Gamma air kerma	Gamma air kerma is exposure measured in air which is in effect, the absorbed dose measured in air. See Kerma.
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H

Habitats Directive	The abbreviated term of 'Council Directive 92/43/EEC of 21 May 1992 on the conservation of Natural Habitats and the Wild Fauna and Flora'. It is the aim of this directive to promote the conservation of certain habitats and species within the European Union.
Hazard	A condition or physical situation with a potential for an undesirable consequence, such as harm to health or environment.
Hazard analysis	Procedure used to (1) identify potential sources of release of hazardous materials from fixed facilities or transportation accidents; (2) determine the vulnerability of a geographical area to a release of hazardous materials; and (3) compare hazards to determine which present greater or lesser risks to a community.
Hazard Identification	Recognising that a hazard exists and trying to define its characteristics. The process of determining whether exposure to an agent can cause an increase in the incidence of an adverse health or environmental effect.
HDRx	Hazardous Dose (rate) affecting x% of the species of a given ecosystem. This value is estimated from the Species Sensitivity Distribution.
HNED (R)	The highest no effect dose or dose rate in a toxicity test that does not causes a statistically significant effect in comparison to the control. The same definition applies for Concentration. See NOEC.
Hormetic pattern	Pattern of dose response where there is an initial 'positive' effect at low concentrations of a chemical or low radiation dose rates, followed by a progressive negative effect at higher concentrations or dose rates.

I

IAEA	International Atomic Energy Agency, see www.iaea.org
ICRP	International Commission on Radiological Protection, see www.icrp.org
Indicator or Organisms	A species, whose presence or absence may be characteristic of environmental conditions in a particular area of habitat; however, species composition and relative abundance of individual components of the population or community are usually considered to be a more reliable index of water quality.
IUR	International Union of Radioecology (http://www.iur-uir.org/en/)

K

Kd	Distribution Coefficient used to quantify the equilibrium between solid and liquid phases (soil or sediment-interstitial water), usually expressed in l kg ⁻¹ . It is the ratio of the mass of the solute species adsorbed (or precipitated) on the solid particles per unit of dry mass of the soil or sediment to the solute concentration in the liquid phase. It represents the partition of the solute in the soil or sediment matrix and soil or sediment water, assuming that equilibrium conditions exist between the solid and liquid phases. The Kd values are dependent on the soil or sediment physical and chemical characteristics.
Kerma	Kerma is the kinetic energy released in material measured in Gy. Kerma can be quoted for any specified material at a point in free space or in an absorbing medium. See gamma air kerma.
Keystone species	A species that plays a critical role in maintaining the structure of an ecological community and whose impact on the community is greater than would be expected based on its relative abundance or total biomass.

L

LEL	Lowest Effect Level
LOEC, LOED (R)	The lowest observed effect concentration in a toxicity test that causes a statistically significant effect in comparison to the control. The same definition applies for Dose or Dose Rate (in place of Concentration).

M

Measurement endpoint	Measured or predicted value that an assessment produces.
Morbidity	A loss of functional capacities generally manifested as reduced fitness, which may render organisms less competitive and more susceptible to other stressors, thus reducing the life span.
Mortality	Death; the death rate; ratio of number of deaths to a given population.

N

NATURA 2000 Site	A protected ecological area within the EU containing threatened habitats and/or species.
Natural Background	The doses, dose rates or activity concentrations associated with natural sources or any other sources in the environment which are not amenable to control. This is usually considered to include doses, dose rates or concentrations due to natural sources but may also include global fallout (but not local fallout) from atmospheric nuclear weapon tests and depending upon context, fallout from incidents such as the Chernobyl accident.
NCRP	National Council on Radiation Protection and Measurements, see www.ncrponline.org
NEA	Nuclear Energy Agency. A specialised agency within the Organisation for Economic Co-operation and Development (OECD). See www.nea.fr
NEC	No effect concentration, see NOEC, NOED(R)
NGO	Non-Governmental Organisation
NoE	Network of Excellence: EC funding mechanism
NOEC, NOED (R)	No observed effect concentration is the highest concentration in a toxicity test not causing a statistically significant effect compared with the control. The same definition applies for Dose or Dose Rate (in place of Concentration). See also HNEDR.
NPP	Nuclear Power Plant

O

OECD	Organisation for Economic Co-operation and Development, see www.oecd.org
Occupancy factors	The maximum fraction of time during which individuals may be exposed to a given dose rate of ionising radiation.
OSPAR	The mechanism by which 15 governments of the western coasts and catchments of Europe, together with the EC, cooperate to protect the marine environment of the North-East Atlantic.

P

PNED (R)	Predicted No-Effect Dose (Rate) expressed in Gy or Gy per unit of time.
PNEC	Predicted No-Effect Concentration, see NOEC, NOED(R) for No Effect Concentration.
Precautionary Principle	The precautionary principle applies where scientific evidence is insufficient, inconclusive or uncertain and preliminary scientific evaluation indicates that there are reasonable grounds for concern that the potentially dangerous effects on the environment, human, animal or plant health may be inconsistent with the desired level of protection.
PROTECT	Protection of the Environment from Ionising Radiation in a Regulatory Context

Protection goal The measurable aims of environmental protection

R

Radiation weighting factors Factor (numeric value) which represents the relative biological effectiveness of the different radiation types, relative to X- or gamma-rays, in producing endpoints of ecological significance.

Radioactive Material Material designated in national law or by a regulatory body as being subject to regulatory control because of its radioactivity.

Radioactive Substance A substance that emits ionising radiation. See also radioactive material.

Radioecological Sensitivity A combination of features which includes biology and habits of an organism, that contribute to the likelihood of an organism being exposed to radioactive substances in its environment.

Radionuclide An unstable nuclide that undergoes spontaneous transformation, emitting ionising radiation.

RAP Reference Animals and Plants: Group of 12 reference organisms proposed as part of the ICPR framework.

RBE Relative Biological Effectiveness: For a given type of radiation, the RBE is the dose of the reference radiation needed to produce the same effect dose of the given radiation needed to produce a given biological effect.

REACH Registration, Evaluation and Authorisation of Chemicals and EU regulatory framework

Receptor See ecological receptor

Reference Organisms A series of entities that provide a basis for the estimation of radiation dose rate to a range of organisms that are typical, or representative, of a contaminated environment. These estimates, in turn, would provide a basis for assessing the likelihood and degree of radiation effects.

Relative Biological Response The proportion or absolute size of an exposed population that demonstrates a specific effect. May also refer to the nature of the effect.

RESR

AD-BIOTA Radiological assessment tool which implements the USDOE's graded approach for evaluating radiation doses to freshwater and terrestrial biota.

Risk A statistical concept describing the expected frequency or probability of undesirable effects arising from exposure to a contaminant. A measure of the probability that damage to life, health, property, and/or the environment will occur as a result of a given hazard. A technical estimation of risk is usually based on the expected value of the conditional probability of the event occurring times the consequence or magnitude of the event given that it has occurred.

Risk assessment A qualitative or quantitative evaluation of the risk posed to human health and/or the environment by the actual and/or potential presence of contaminants. It includes problem formulation, exposure and dose-response assessment and risk characterisation.

Risk characterisation The synthesis of information obtained during risk assessment for use in management decisions. This should include an estimation of the probability (or incidence) and magnitude (or severity) of the adverse effects likely to occur in a population or environmental compartment, together with identification of uncertainties.

Risk communication The exchange of information about health or environmental risks among risk assessors and managers, the general public, news media, interest groups, etc.

Risk evaluation A component of risk assessment in which judgments are made about the significance and acceptability of risk.

Risk management The selection and practical implementation of regulatory and non-regulatory responses to risk. Practical implementation of procedures, actions or policies to mitigate, reduce, remove or monitor health or environmental risks.

RQ Risk Quotient: ratio of predicted dose rate to benchmark dose rate.

S

Safety factors See assessment factor.

Screening assessment Simple and generally highly conservative assessment tier.

Screening value	As used by the ERICA and PROTECT projects the screening value is equivalent to the PNED(R).
SD	Standard Deviation
SETAC	Society of Environmental Toxicology and Chemistry
Source	Anything that may cause radiation exposure — such as by emitting ionising radiation or by releasing radioactive substances or materials — and can be treated as a single entity for protection and safety purposes.
SSD	Species Sensitivity Distribution establishing the statistical distribution of the radiosensitivity of species.
Sustainability	The ability of an ecosystem to maintain ecological processes and functions, biological diversity, and productivity over time.
Synergism	An interaction between two substances that results in a greater effect than both of the substances could have had acting independently.

T	
TeNO RM	Technologically-Enhanced Naturally Occurring Radioactive Material. Refers to radioactive materials that occur naturally but which have been exposed or concentrated by human activity.
TGD	European Chemicals Bureau Technical Guidance Document on risk assessment (http://ecb.jrc.ec.europa.eu/DOCUMENTS/TECHNICAL_GUIDANCE_DOCUMENT/EDITION_2/tgdpart2_2ed.pdf)
Threshold	A contaminant concentration (or dose), below which no deleterious effect occurs.
Tiered assessment	Approach involving progressively detailed tiers of assessment generally starting with highly conservative and simple ('screening') assessments and progressing through more detailed realistic tiers if warranted.
Toxicant	A substance that kills or injures an organism through chemical or physical action or by altering the organism's environment; for example, cyanides, phenols, pesticides, or heavy metals; especially used for insect control.
Trigger value	See screening value

U	
Uncertainty	This arises from imprecision due to lack of information, expert judgement and/or measurement errors and could be reduced with increased knowledge and/or experimentation.
UNSC EAR	United Nations Scientific Committee on the Effects of Atomic Radiation
USDOE	
graded approach	United States Department of Energy graded approach for evaluating radiation doses to aquatic and terrestrial biota.

V	
Valued ecosystem components	Assessed species selected for both scientific and public interest reasons.

W	
WFD	Water Framework Directive. EC water legislation for integrated river basin management.
Wildlife	All non-domesticated plants, animals and other organisms.