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Glossary

ALLUVIUM. Sedimentary material deposited by flowing water such as a river.

ALLUVIAL FAN. A cone-shaped deposit of alluvium made by a stream where it runs out onto a level plain.

AQUIFER. A water-bearing unit of permeable rock or soil that will yield water in usable quantities to wells. *Confined aquifers* are bounded above and below by less permeable layers. Groundwater in a confined aquifer is under a pressure greater than the atmospheric pressure. *Unconfined aquifers* are bounded below by less permeable material, but are not bounded above. The pressure on the groundwater in an unconfined aquifer at the top of the aquifer is equal to that of the atmosphere.

BACKGROUND RADIATION. Includes both natural and manmade radiation such as cosmic radiation and radiation from naturally radioactive elements and from commercial sources and medical procedures.

BECQUEREL (BQ). A unit of radioactivity equal to one nuclear transformation per second.

CLASS A, B, AND C LOW-LEVEL WASTE. Waste classifications from the Nuclear Regulatory Commission's 10 CFR Part 61 rule. Maximum concentration limits are set for specific isotopes. Class A waste disposal is minimally restricted with respect to the form of the waste. Class B waste must meet more rigorous requirements to ensure physical stability after disposal. Greater concentration limits are set for the same isotopes in Class C waste, which also must meet physical stability requirements. Moreover, special measures must be taken at the disposal facility to protect against inadvertent intrusion.

CONFIDENCE COEFFICIENT OR FACTOR. The chance or probability, usually expressed as a percentage, that a confidence interval includes some defined parameter of a population. The confidence coefficients usually associated with confidence intervals are 90%, 95%, and 99%.

COSMIC RADIATION. High-energy subatomic particles from outer space that bombard the earth's atmosphere. Cosmic radiation is part of natural background radiation.

COUNTING ERROR. The variability caused by the inherent random nature of radioactive disintegration and the detection process.

CURIE (Ci). A unit of radioactivity equal to 37 billion (3.7×10^{10}) nuclear transformations per second.

DETECTION LEVEL. The minimum concentration of a substance that can be measured with a 99% confidence that the analytical concentration is greater than zero.

DERIVED CONCENTRATION GUIDE (DCG). Concentrations of radionuclides in air and water by which a person continuously exposed and inhaling 8400 cubic meters of air or ingesting 730 liters of water per year would receive an annual effective dose equivalent of 100 mrem per year from either mode of exposure. The committed dose equivalent is included in the DCGs for radionuclides with long half-lives. (See Appendix B.)

DISPERSION. The process whereby solutes are spread or mixed as they are transported by groundwater as it moves through sediments.

Glossary

DOSIMETER. A portable device for measuring the total accumulated exposure to ionizing radiation.

DOWNGRADIENT. The direction of water flow from a reference point to a selected point of interest (see GRADIENT).

EFFECTIVE DOSE. See EFFECTIVE DOSE EQUIVALENT under RADIATION DOSE.

EFFLUENT. Flowing out or forth; an outflow of waste. In this report, effluent refers to the liquid or gaseous waste streams released into the environment from the facility.

EFFLUENT MONITORING. Sampling or measuring specific liquid or gaseous effluent streams for the presence of pollutants.

ENVIRONMENTAL MONITORING. The collection and analysis of samples or the direct measurements of environmental media. Environmental monitoring consists of two major activities: effluent monitoring and environmental surveillance.

ENVIRONMENTAL SURVEILLANCE. The collection and analysis of samples, or the direct measurement, of air, water, soil, foodstuff, and biota from DOE sites in order to determine compliance with applicable standards and permit requirements.

EXPOSURE. Subjecting a target (usually living tissue) to radiation.

FALLOUT. Radioactive materials mixed into the earth's atmosphere. Fallout constantly precipitates onto the earth.

GRADIENT. Change in value of one variable with respect to another variable, especially vertical or horizontal distance.

GRAY. A unit of absorbed dose.

GROUNDWATER. Subsurface water in the pore spaces of soil and geologic units.

HALF-LIFE. The time in which half the atoms of a radionuclide disintegrate into another nuclear form. The half-life may vary from a fraction of a second to thousands of years.

HIGH-LEVEL WASTE (HLW). The highly radioactive waste material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid waste derived from the liquid, that contains a combination of transuranic waste and fission products in concentrations sufficient to require permanent isolation.

HYDRAULIC CONDUCTIVITY. The ratio of flow velocity to driving force for viscous flow under saturated conditions of a specified liquid in a porous medium; the ratio describing the rate at which water can move through a permeable medium.

ION. An atom or group of atoms with an electric charge.

ION EXCHANGE. The reversible exchange of ions contained in solution with other ions that are part of the ion-exchange material.

Glossary

ISOTOPE. Different forms of the same chemical element that are distinguished by having different numbers of neutrons in the nucleus. An element can have many isotopes. For example, the three isotopes of hydrogen are protium, deuterium, and tritium.

KAME DELTA. A conical hill or short irregular ridge of gravel or sand deposited in contact with glacier ice.

LACUSTRINE SEDIMENTS. A sedimentary deposit consisting of material pertaining to, produced by, or formed in a lake or lakes.

LEACHED HULLS. Stainless steel cladding that remains after acid dissolution of spent fuel.

LOW-LEVEL WASTE. Radioactive waste not classified as high-level waste, transuranic waste, spent fuel, or uranium mill tailings (see CLASS A,B,C LOW-LEVEL WASTE).

MAXIMALLY EXPOSED INDIVIDUAL. A hypothetical person who remains in an uncontrolled area who would, when all potential routes of exposure from a facility's operations are considered, receive the greatest possible dose equivalent.

MEAN. The average value of a series of measurements.

MILLIREM (MREM). A unit of radiation dose equivalent that is equal to one one-thousandth of a rem. An individual member of the public can receive up to 500 millirems per year according to DOE standards. This limit does not include radiation received for medical treatment or the 100 to 360 mrem that people receive annually from background radiation.

MINIMUM DETECTABLE CONCENTRATION. The smallest amount or concentration of a radioactive or nonradioactive element that can be reliably detected in a sample.

MIXED WASTE. A waste that is both radioactive and hazardous. Also referred to as RADIOACTIVE MIXED WASTE (RMW).

OUTFALL. The end of a drain or pipe that carries wastewater or other effluents into a ditch, pond, or river.

PARTICULATES. Solid particles and liquid droplets small enough to become airborne.

PERSON-REM. The sum of the individual radiation dose equivalents received by members of a certain group or population. It may be calculated by multiplying the average dose per person by the number of persons exposed. For example, a thousand people each exposed to one millirem would have a collective dose of one person-rem.

PLUME. The distribution of a pollutant in air or water after being released from a source.

PROGLACIAL LAKE. A lake occupying a basin in front of a glacier; generally in direct contact with the ice.

QUALITY FACTOR. The extent of tissue damage caused by different types of radiation of the same energy. The greater the damage, the higher the quality factor. More specifically, the factor by which absorbed doses (see RADIATION DOSE) are multiplied to obtain a quantity that indicates the degree of biological damage produced by ionizing radiation. The factor is dependent upon radiation type (alpha, beta, gamma, or x-ray) and exposure (internal or external).

Glossary

RAD. Radiation absorbed dose. One hundred ergs of energy absorbed per gram.

RADIATION. The process of emitting energy in the form of rays or particles that are thrown off by disintegrating atoms. The rays or particles emitted may consist of alpha, beta, or gamma radiation.

ALPHA RADIATION. The least penetrating type of radiation. Alpha radiation can be stopped by a sheet of paper or outer dead layer of skin.

BETA RADIATION. Electron emitted from a nucleus during fission and nuclear decay. Beta radiation can be stopped by an inch of wood or a thin sheet of aluminum.

GAMMA RADIATION. A form of electromagnetic, high-energy radiation emitted from a nucleus. Gamma rays are essentially the same as x-rays and require heavy shielding such as lead, concrete, or steel to be stopped.

INTERNAL RADIATION. Radiation originating from a source within the body as a result of the inhalation, ingestion, or implantation of natural or manmade radionuclides in body tissues.

RADIATION DOSE.

ABSORBED DOSE. The amount of energy absorbed per unit mass in any kind of matter from any kind of ionizing radiation. Absorbed dose is measured in rads or grays.

DOSE EQUIVALENT (DE). Also known simply as "dose." A measure of external radiation, dose is the product of the absorbed dose, the quality factor, and any other modifying factors. Dose equivalent is used to compare the biological effects of different kinds of radiation on a common scale. The unit of dose equivalent is the rem or sievert.

COLLECTIVE DOSE EQUIVALENT. The sum of the dose equivalents for all the individuals comprising a defined population. The per capita dose equivalent is the quotient of the collective dose equivalent divided by the population. The unit of collective dose equivalent is person-rem or person-sievert.

EFFECTIVE DOSE EQUIVALENT (EDE). An expression of the health risk of doses of radiation to an individual. Since some organs are more sensitive than others, each organ is given a weighting factor. This tissue-specific weighting factor is multiplied by the organ dose for each organ and the numbers are added together to obtain the effective dose equivalent. The effective dose equivalent includes the **COMMITTED EFFECTIVE DOSE EQUIVALENT** (from internal deposition of radionuclides) and the dose equivalent (from penetrating radiation from external sources). Units of measurement are rems or sieverts.

COLLECTIVE EFFECTIVE DOSE EQUIVALENT. The sum of the effective dose equivalents for the individuals comprising a defined population. Units of measurement are person-rems or person-sieverts. The per capita effective dose equivalent is obtained by dividing the collective dose equivalent by the population. Units of measurement are rems or sieverts.

COMMITTED DOSE EQUIVALENT. A measure of internal radiation. The predicted total dose equivalent to a tissue or organ over a fifty-year period after a known intake of a radionuclide into the body. It does not include contributions from sources of external penetrating radiation. Committed dose equivalent is measured in rems or sieverts.

Glossary

COMMITTED EFFECTIVE DOSE EQUIVALENT. The sum of the committed dose equivalents to various tissues in the body, each multiplied by the appropriate weighting factor. Committed effective dose equivalent is measured in rems or sieverts.

RADIOACTIVITY. A property possessed by some elements such as uranium whereby alpha, beta, or gamma rays are spontaneously emitted.

RADIOISOTOPE. A radioactive isotope of a specified element. Carbon-14 is a radioisotope of carbon. Tritium is a radioisotope of hydrogen.

RADIONUCLIDE. A radioactive nuclide. Radionuclides are variations (isotopes) of elements. They have the same number of protons and electrons but different numbers of neutrons, resulting in different atomic masses. There are several hundred known nuclides, both manmade and naturally occurring.

REM. An acronym for Roentgen Equivalent Man. A unit of radiation exposure that indicates the potential effect of radiation on human cells.

SIEVERT. A unit of dose equivalent from the International System of Units. Equal to one joule per kilogram.

SPENT FUEL. Nuclear fuel that has been exposed in a nuclear reactor; this fuel contains uranium, activation products, fission products, and plutonium.

STANDARD DEVIATION. An indication of the dispersion of a set of results around their average.

THERMOLUMINESCENT DOSIMETER (TLD). A device that luminesces upon heating after being exposed to radiation. The amount of light emitted is proportional to the amount of radiation to which the luminescent material has been exposed.

UPGRADIENT. Referring to the flow of water or air, it is analogous to upstream. A point that is “before” an area of study that is used as a baseline for comparison with downstream data. See **GRADIENT** and **DOWNGRADIENT**.

WATERSHED. The area contained within a drainage divide above a specified point on a stream.

WATER TABLE. The upper surface in a body of groundwater. The surface in an unconfined aquifer or confining bed at which the pore water pressure is equal to atmospheric pressure.

Acronyms

ANOVA. Analysis of Variance

BEIR. Committee on Biological Effects of Ionizing Radiation

CDDL. Construction and Demolition Debris Landfill (formerly the “cold dump”)

CERCLA. Comprehensive Environmental Response, Compensation, and Liability Act

CSS. Cement Solidification System

DCG. Derived Concentration Guide

DE. Dose Equivalent

DOE. Department of Energy

DOE-HQ. Department of Energy, Headquarters Office

DOE-ID. Department of Energy, Idaho Operations

EA. Environmental Assessment

EDE. Effective Dose Equivalent

EE. Environmental Evaluation

EIS. Environmental Impact Statement

ELAP. Environmental Laboratory Accreditation Program

EML. Environmental Measurements Laboratory

EMSL. Environmental Monitoring Systems Laboratory (Las Vegas)

EPA. Environmental Protection Agency

FONSI. Finding of No Significant Impact

FSFCA. Federal and State Facilities Compliance Agreement

FY. Fiscal Year

Acronyms

HLW. High-level Radioactive Waste

ICRP. International Commission on Radiological Protection

INEL. Idaho National Engineering Laboratory

IRTS. Integrated Radwaste Treatment System

LLD. Lower Limit of Detection

LLW. Low-level Radioactive Waste

LLWTF. Low-level Liquid Waste Treatment Facility

LPS. Liquid Pre-treatment System

LWTS. Liquid Waste Treatment System

MDC. Minimum Detectable Concentration

NCRP. National Council on Radiation Protection and Measurements

NDA. Nuclear Regulatory Commission - licensed Disposal Area

NEPA. National Environmental Policy Act

NESHAP. National Emission Standards for Hazardous Air Pollutants

NIST. National Institute of Standards and Technology

NFS. Nuclear Fuel Services Company, Inc.

NOI. Notice of Intent

NRC. Nuclear Regulatory Commission

NYSDEC. New York State Department of Environmental Conservation

NYSDOH. New York State Department of Health

NYSERDA. New York State Energy Research and Development Authority

NYSGS. New York State Geological Survey

OSR. Operational Safety Requirement

QA. Quality Assurance

Acronyms

QAP. Quality Assurance Program

QC. Quality Control

RCRA. Resource Conservation and Recovery Act

RMW. Radioactive Mixed Waste

SAR. Safety Analysis Report

SARA. Superfund Amendments and Reauthorization Act

SDA. (New York) State-licensed Disposal Area

SI. International System of Units

SPDES. State Pollutant Discharge Elimination System

STS. Supernatant Treatment System

SWMU. Solid Waste Management Unit

SSWMU. Super Solid Waste Management Unit

TLD. Thermoluminescent Dosimeter

USGS. U.S. Geological Survey

WNYNSC. Western New York Nuclear Service Center

WVDP. West Valley Demonstration Project

WVNS. West Valley Nuclear Services Co., Inc.

WVPO. West Valley (DOE) Project Office

Units of Measure

	<u>Symbol</u>	<u>Name</u>		<u>Symbol</u>	<u>Name</u>
<u>Radioactivity</u>	Ci	curie	<u>Volume</u>	cm ³	cubic centimeter
	mCi	millicurie (1E-03Ci)		L	liter
	μCi	microcurie (1E-06Ci)		mL	milliliter
	nCi	nanocurie (1E-09 Ci)		m ³	cubic meter
	pCi	picocurie (1E-12 Ci)		ppm	parts per million
	fCi	femtocurie (1E-15Ci)		ppb	parts per billion
	aCi	attocurie (1E-18 Ci)			
Bq	becquerel (27 pCi)				
	<u>Symbol</u>	<u>Name</u>		<u>Symbol</u>	<u>Name</u>
<u>Dose</u>	Sv	sievert (100 rems)	<u>Time</u>	y	year
	Gy	gray (100 rads)		d	day
				h	hour
		m		minute	
			s	second	
	<u>Symbol</u>	<u>Name</u>		<u>Symbol</u>	<u>Name</u>
<u>Length</u>	m	meter	<u>Area</u>	ha	hectare (10,000 m ²)
	km	kilometer (1E+03)			
	cm	centimeter (1E-02 m)			
	mm	millimeter (1E-03 m)			
	μm	micrometer (1E-06 m)			
	<u>Symbol</u>	<u>Name</u>			
<u>Mass</u>	g	gram			
	kg	kilogram (1E+03 g)			
	mg	milligram (1E-03)			
	μg	microgram (1E-06 g)			
	ng	nanogram (1E-09 g)			
	t	metric ton (10 ³ kg)			

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