

Acronyms

AA	Activated Alumina
AEA	Atomic Energy Act
ALARA	As Low as Reasonably Achievable
AX	Anion Exchange
BAT	Best Available Technology
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESQG	Conditionally Exempt Small Quantity Generator
CWA	Clean Water Act
CWS	Community Water System
CX	Cation Exchange
DOT	Department of Transportation
DWB	Dry Weight Basis
FBRR	Filter Backwash Recycling Rule
HMO	Hydrous Manganese Oxide
ICRP	International Commission on Radiological Protection
IEMA	Illinois Emergency Management Agency
IEPA	Illinois Environmental Protection Agency
ISCORS	Interagency Steering Committee on Radiation Standards
IX	Ion Exchange
LLRW	Low-Level Radioactive Waste
MARLAP	Multi-Agency Radiological Laboratory Analytical Protocols Manual
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MCL	Maximum Contaminant Level
MPRSA	Marine Protection, Research, and Sanctuaries Act
MSWLF	Municipal Solid Waste Landfill
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NCRP	National Council on Radiation Protection and Measurements
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
OGWDW	Office of Ground Water and Drinking Water
OSHA	Occupational Safety and Health Administration
PFLT	Paint Filter Liquids Test
POTW	Publicly Owned Treatment Works
POU	Point of Use
PPE	Personal Protection Equipment
RCRA	Resource Conservation and Recovery Act
RO	Reverse Osmosis
SDWA	Safe Drinking Water Act
SPARRC	Spreadsheet Program to Ascertain Radionuclides Residuals Concentration
SSCT	Small System Compliance Technology
TBLL	Technically Based Local Limit
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
TENORM	Technologically Enhanced Naturally Occurring Radioactive Materials
UIC	Underground Injection Control
USDW	Underground Source of Drinking Water
US EPA	United States Environmental Protection Agency
WWTP	Wastewater Treatment Plant

Definitions

Activated Carbon - A highly adsorbent form of carbon used to remove odors and toxic substances from liquid or gaseous emissions. In waste treatment, it is used to remove dissolved organic matter from waste drinking water.

Agency – When not otherwise specifically stated, 'Agency' refers to the Illinois Emergency Management Agency

Agreement State – A State that has signed an agreement with the NRC authorizing the State to regulate certain uses of radioactive materials within the State.

Aliquot - A measured portion of a sample taken for analysis. One or more aliquots make up a sample.

Analytical Result – A formal numerical estimate of the concentration of an analyte in a sample, which is obtained by carrying out once following the procedure specified in an analytical method.

Aqueous - Something made up of water.

Aquifer - An underground geological formation, or group of formations, containing water. Sources of groundwater for wells and springs.

Background Level - The concentration of a substance in the environment that occurs naturally or is not the result of human activities.

Backwashing - Reversing the flow of water back through the filter media to remove entrapped solids.

Biosolids – Sewage sludge that has been treated and stabilized as to meet land application criteria under US EPA Part 503 Biosolid regulations.

Code of Federal Regulations (CFR) - Document that codifies all rules of the executive departments and agencies of the federal government. It is divided into fifty volumes, known as titles. Title 40 of the CFR (referenced as 40 CFR) lists all environmental regulations.

Combined radium – The sum of radium-226 and radium-228 concentrations. May be used interchangeable with 'Total Radium'.

Community Water System - A public water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

Concentration - The relative amount of a substance mixed with another substance. An example is five ppm of carbon monoxide in air or 1 mg/l of iron in water.

Decay Products - Degraded radioactive materials, often referred to as "daughters" or "progeny"; radon decay products of most concern from a public health standpoint are polonium-214 and polonium-218.

Detection – To have obtained experimental evidence that the analyte concentration is greater than zero.

Detection Limit (DL) – The minimum concentration of an analyte that can be identified, measured, and reported with 99% confidence that the analyte concentration is greater than zero.

Dose Rate - In exposure assessment, dose per time unit (e.g. mg/day), sometimes also called dosage.

Drinking Water Treatment Media – Filters, resins, sand, gravel, or any substrate in which raw water is moved over or through for the purpose of treatment. This definition is not to be interpreted as exhaustive, only to provide explanation for the context in which it is used in this guidance.

Duplicate Samples – Second identical sample collected from a specific location and submitted for analysis as a check on laboratory accuracy, possible sample error or method variability.

Effluent - Wastewater--treated or untreated--that flows out of a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters.

Environment - The sum of all external conditions affecting the life, development and survival of an organism.

Environmental Laboratory Advisory Board (ELAB) – A Federal Advisory Committee, with members appointed by EPA and composed of a balance of non-state, non-federal representatives, from the environmental laboratory community, and chaired by an ELAB member.

Exceedance - Violation of the pollutant levels permitted by environmental protection standards.

Fields Currently in Use - fields which, in 2011, are being land applied with treatment residuals containing radium.

Filtration - A treatment process, under the control of qualified operators, for removing solid (particulate) matter from water by means of porous media such as sand or a man-made filter; often used to remove particles that contain pathogens.

Finished Water - Water is "finished" when it has passed through all the processes in a water treatment plant and is ready to be delivered to consumers.

Definitions (Continued)

Generator - Any person whose act or process of treating groundwater for drinking water usage or treating the resulting wastewater, concentrates radium-226 and/or radium-228 in a treatment residual. This definition is not to be interpreted as exhaustive, only to provide explanation for the context in which it is used in this guidance.

Gross Alpha/Beta Particle Activity - The total radioactivity due to alpha or beta particle emissions as inferred from measurements on a dry sample.

Ground Water - The supply of fresh water found beneath the Earth's surface, usually in aquifers, which supply wells and springs.

Ground Water Under the Direct Influence (GUI) of Surface Water - Any water beneath the surface of the ground with: 1. significant occurrence of insects or other microorganisms, algae, or large-diameter pathogens; 2. significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions. Direct influence is determined for individual sources in accordance with criteria established by a state.

Half-Life - The time required for half of the atoms of a radioactive element to undergo self-transmutation or decay (half-life of radium is 1620 years).

Hazardous Waste - By-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. Possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity), or appears on special EPA lists.

Hazardous Waste Landfill - An excavated or engineered site where hazardous waste is deposited and covered.

Homogenous - Having a uniform or consistent set of characteristics throughout.

Influent - Water, wastewater, or other liquid flowing into a reservoir, basin, or treatment plant.

Ion Exchange Treatment - A common water-softening method often found on a large scale at water purification plants that remove some organics and radium by adding calcium oxide or calcium hydroxide to increase the pH to a level where the metals will precipitate out.

Lagoon - A shallow pond where sunlight, bacterial action, and oxygen work to purify wastewater.

Land Application - Discharge of wastewater or treatment residuals onto the ground for treatment or reuse.

Landfills - 1. Sanitary landfills are disposal sites for non-hazardous solid wastes spread in layers, compacted to the smallest practical volume, and covered by material applied at the end of each operating day. 2. Secure chemical landfills are disposal sites for hazardous waste, selected and designed to minimize the chance of release of hazardous substances into the environment.

Laboratory split sample or Laboratory Duplicate - The analysis performed identically on two sub-samples of the same sample, usually taken from the same container. The results from duplicate analyses are used to evaluate analytical or measurement precision and include variability associated with sub-sampling and the matrix, but not the precision of field sampling, preservation, or storage internal to the laboratory.

Low-Level Radioactive Waste - Radioactively contaminated industrial, municipal, or research waste such as paper, rags, plastic bags, or water-treatment residues. It is waste that does not meet the criteria for any of three other categories of radioactive waste: spent nuclear fuel and high-level radioactive waste; transuranic radioactive waste; or uranium mill tailings. Its categorization does not depend on the level of radioactivity it contains. With regards to 32 IAC Section 330.40(d), low-level radioactive waste includes treatment residuals containing radium whose combined radium concentration exceeds 200 pCi/g on a dry weight basis.

Maximum Contaminant Level - The maximum permissible level of a contaminant in water delivered to any user of a public system. MCLs are enforceable standards.

Method Uncertainty - Defined as the "predicted uncertainty of a result that would be measured if a method were applied to a hypothetical laboratory sample with a specified radionuclide activity or concentration.

Measurement Uncertainty or Uncertainty of Measurement - A parameter associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurement.

Measurand - A quantity that is being determined by measurement. When interpreting results, it is the number preceding the measurement uncertainty ($\bar{x} \pm .2$)

Method Detection Limit - The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

Definitions (Continued)

National Pollutant Discharge Elimination System (NPDES) - A provision of the Clean Water Act which prohibits discharge of pollutants into waters of the United States unless a special permit is issued by EPA, a state, or, where delegated, a tribal government on an Indian reservation.

National Environmental Laboratory Accreditation Conference (NELAC) – A voluntary organization of State and Federal environmental officials and interest groups purposed primarily to establish mutually acceptable standards for accrediting environmental laboratories.

National Environmental Laboratory Accreditation Program (NELAP) – The overall National Environmental Laboratory Accreditation Program of which NELAC is a part.

pH - An expression of the intensity of the basic or acid condition of a liquid; may range from 0 to 14, where 0 is the most acid and 7 is neutral. Natural waters usually have a pH between 6.5 and 8.5.

picoCuries - A rate of radioactive decay equal to one trillionth the decay rate of the fundamental unit, the Curie. One picoCurie represents 2.2 radioactive disintegrations per minute.

Picocuries Per Gram (pCi/g) - A unit of measure for levels of radioactivity in soil or other dry solids; becquerels per cubic meter is metric equivalent.

Picocuries Per Liter (pCi/L): A unit of measure for levels of radioactivity in water or other aqueous liquids; becquerels per cubic meter is metric equivalent.

Public Water System - A system that provides piped water for human consumption to at least 15 service connections or regularly serves 25 individuals.

Publicly Owned Treatment Works (POTWs) - A waste-treatment works owned by a state, unit of local government, or Indian tribe, usually designed to treat domestic wastewaters.

Quality Control Sample (QCS) or Quality Control Check Sample – (1) A sample prepared from method analytes that are obtained from a source external to the laboratory and different from the source of calibration standards. The QCS is used to check calibration standard integrity.

Radium-226 and Radium-228 - Radium is a naturally-occurring radioactive metal formed by the decay of uranium and thorium in the environment. It occurs at low levels in virtually all rock, soil, water, plants, and animals. Radon is a decay product of radium-226. Its most common isotopes are radium-226, radium 224, and radium-228.

Radon - Radon is a naturally occurring radioactive gas found in soils, rock, and water throughout the U.S. Radon is the largest source of exposure to naturally occurring radiation.

Raw Water - Intake water prior to any treatment or use.

Receiving Waters - A river, lake, ocean, stream or other watercourse into which wastewater or treated effluent is discharged.

Reverse Osmosis - A treatment process used in water systems by adding pressure to force water through a semi-permeable membrane. Reverse osmosis removes most drinking water contaminants. Also used in wastewater treatment. Large-scale reverse osmosis plants are being developed.

Sewage - The waste and wastewater produced by residential and commercial sources and discharged into sewers. solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. It includes, but is not limited to: domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and material derived from sewage sludge. It does not include ash generated during the incineration of sewage sludge or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works.

Sludge or Sewage Sludge - For the purposes of this guidance and Section 330.40(d): A semi-solid residue from any of a number of water treatment processes at any stage of treatment or processing. (I.e., inclusive of biosolids). Can be a hazardous waste. In accordance with IEPA Part 391 sludge regulations, IEMA has retained the terminology of “sludge” throughout this document for consistency. Sludge may be used interchangeable with biosolids throughout this document.

Superfund - The program operated under the legislative authority of CERCLA and SARA that funds and carries out EPA solid waste emergency and long-term removal and remedial activities. These activities include establishing the National Priorities List, investigating sites for inclusion on the list, determining their priority, and conducting and/or supervising cleanup and other remedial actions.

Definitions (Continued)

TENORM - Technologically-Enhanced, Naturally-Occurring Radioactive Material (TENORM) is produced when activities such as uranium mining, drinking water treatment, or sewage sludge treatment, concentrate or expose radioactive materials that occur naturally in ores, soils, water, or other natural materials. View US EPA's TENORM webpage, <http://www.epa.gov/radiation/tenorm/> for further information.

Treatment Residual – As used within the context of this implementation guidance: Spent medias, resins, slurries, sludges, or any solid or semisolid utilized at a drinking water treatment plant which has been used for the removal of contaminants or to improve water quality. This also includes sewage sludge or biosolids resulting from the treatment of waste water.

Treatment Residuals containing radium – All treatment residuals will contain at least a small amount of radium. For the purposes of this implementation guidance; A treatment residual in which the concentration of radium-226 and/or radium-228 has been technologically enhanced as a result of the treatment of ground water and/or wastewater.

Treated Wastewater - Wastewater that has been subjected to one or more physical, chemical, and biological processes to reduce its potential of being health hazard.

Treatment - As used in the context of this implementation guidance: Any method, technique, or process designed to remove solids and/or pollutants from drinking water, solid waste, waste-streams, effluents, and discharges.

Treatment Plant - A structure built to treat drinking water or wastewater.

Wastewater - The spent or used water from a home, community, farm, or industry that contains dissolved or suspended matter.

Water Table - The level of groundwater.