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Glossary

ACTION PLAN. An action plan addresses assessment findings and root causes identified in an audit or assessment report. It is intended to set forth specific actions that the site will undertake to remedy deficiencies. The plan includes a timetable and funding requirements for implementation of the planned activities.

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.

AS LOW AS REASONABLY ACHIEVABLE. Describes an approach to radiation protection to control or manage exposures (both individual and collective) to the work force and the general public and releases of radioactive material to the environment as low as social, technical, economic, practical, and public policy considerations permit. As used in DOE Order 5400.5, ALARA is not a dose limit but rather a process that has as its objective the attainment of dose levels as far below the applicable limits of the Order as practicable.

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.

CLASS GA GROUNDWATERS. Class GA waters are fresh groundwaters that can be used as a source of potable water supply. The New York Code of Rules and Regulations, Title 6, Part 703.5, "Water quality standards for taste-, color-, and odor-producing toxic and other deleterious substances," specifies the standards for specific substances or groups of substances in Table 1 of subdivision (f).

COMPLIANCE FINDINGS. Conditions that may not satisfy applicable environmental or safety and health regulations, DOE Orders and memoranda, enforcement actions, agreements with regulatory agencies, or permit conditions.

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.

Glossary

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 LIMIT OR LEVEL. The smallest amount of a substance that can be distinguished in a sample by a given measurement procedure at a given confidence level.

DERIVED CONCENTRATION GUIDE (DCG). Concentrations of radionuclides in air and water by which a person continuously exposed and inhaling 8,400 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 (Groundwater). The process whereby solutes are spread or mixed as they are transported by groundwater as it moves through sediments.

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 in order to determine compliance with applicable standards and permit requirements.

ERG. One-billionth (1E-09) of the energy released by a 100 watt bulb in 1 second.

EXPOSURE. The subjection of a target (usually living tissue) to radiation.

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

Glossary

GAMMA ISOTOPIC (also GAMMA SCAN). An analytical method by which the quantity of several gamma ray-emitting radioactive isotopes may be determined simultaneously. Typical nuclear fuel cycle isotopes determined by this method include but are not limited to Co-60, Zr-95, Ru-106, Ag-110m, Sb-125, Cs-134, Cs-137, and Eu-154. Naturally occurring isotopes that are often requested include Be-7, K-40, Ra-224, and Ra-226.

FINDING. A Department of Energy compliance term. A finding is a statement of fact concerning a condition in the Environmental, Safety, and Health program that was investigated during an appraisal. Findings include best management practice findings, compliance findings, and noteworthy practices. A finding may be a simple statement of proficiency or a description of deficiency (i.e., a variance from procedures or criteria). See also SELF-ASSESSMENT.

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. (See also TRANSURANIC WASTE.)

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.

INTERIM STATUS. Any facility in existence on the effective date of statutory or regulatory amendments under RCRA that render the facility subject to the requirement to have a RCRA permit shall have interim status and shall be treated as having been issued a permit (Title 6 New York Code of Rules and Regulations [NYCRR] Part 373).

INTERSTITIAL LEAK DETECTION SYSTEM. The (annular) space between the inner and outer tank walls in a double-walled storage tank.

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 the same number of protons but different number of neutrons in the nucleus. An element can have many isotopes. For example, the three isotopes of hydrogen are protium, deuterium, and tritium, with one, two, and three neutrons in the nucleus, respectively.

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.

LAND DISPOSAL RESTRICTIONS (LDR). Regulations promulgated by the U.S. EPA (and by NYSDEC in New York State) governing the land disposal of hazardous wastes. The wastes must be treated using the best demonstrated available technology or must meet certain treatment standards before being disposed.

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

LINE MANAGEMENT SELF-ASSESSMENT (LMSA). The qualitative evaluation of a particular program operation and/or organization by those immediately responsible for overseeing the work. (See also SELF-ASSESSMENT.)

LOWER LIMIT OF DETECTION (LLD). The lowest limit an instrument is capable of detecting. A measurement of analytical sensitivity.

LOW-LEVEL WASTE. Radioactive waste not classified as high-level waste, transuranic waste, spent fuel, or uranium mill tailings. (See CLASS A, B, and 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. Depending on the sample medium, the smallest amount or concentration of a radioactive or nonradioactive analyte that can be reliably detected using a specific analytical method. Calculations of the minimum detectable concentrations are based on the lower limit of detection.

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

N-DODECANE/TRIBUTYL PHOSPHATE. An organic solution composed of 30% tributyl phosphate (TBP) dissolved in n-dodecane used to separate the uranium and plutonium from the fission products in the dissolved fuel and to separate the uranium from the plutonium.

Glossary

NOTICE OF VIOLATION. A letter of notice from a regional water engineer in response to an instance of significant noncompliance with a SPDES permit. Generally, an official notification from a regulatory agency of noncompliance with requirements put forth in a permit.

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

PARAMETER. Any of a set of physical properties whose values determine the characteristics or behavior of something (e.g., temperature, pressure, density of air). In relation to environmental monitoring, a monitoring parameter is a constituent of interest. Statistically, the term “parameter” is a calculated quantity, such as a mean or variance, that describes a statistical population.

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 are multiplied to obtain a quantity that indicates the degree of biological damage produced by ionizing radiation. (See RADIATION DOSE.) The factor is dependent upon radiation type (alpha, beta, gamma, or x-ray) and exposure (internal or external).

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. Electrons 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.

Glossary

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. 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.

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. (See ISOTOPE.)

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.

Glossary

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

SELF-ASSESSMENT. Self-assessments are appraisals conducted by the WVDP to identify and correct any existing deficiencies in the environmental monitoring program. See also **LINE MANAGEMENT SELF-ASSESSMENT**. Under the WVDP environmental monitoring procedure *Self-Assessments for Environmental Programs*, information obtained from an appraisal is categorized as follows:

KEY FINDING. A direct and significant violation of a DOE regulatory, or other applicable guidance or procedural requirement, or a recurring pattern of observed deficiencies that could result in such a violation. A finding is a deficiency that requires corrective action.

OBSERVATION. A weakness that, if not corrected, could result in a deficiency. An observation may result if an explicit procedural nonconformance is noted but the nonconformance is an isolated incident or of minor significance. An observation requires corrective action.

COMMENT OR CONCERN. A comment is a subjective opinion of the assessment team that may be used to improve any of the specific environmental monitoring program activities noted in *Self-Assessments for Environmental Programs* such as sample collection, preparation, logging, storage, and shipping; instrument and equipment calibration; data receipt and data entry; training requirements and records; and compliance with discharge permit requirements. Corrective action in response to a comment or concern is at the discretion of the cognizant staff.

COMMENDABLE PRACTICE. A significant strength noted during the course of a self-assessment.

DEFICIENCY. A condition that does not meet or cannot be documented to meet applicable requirements.

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

SOLID WASTE MANAGEMENT UNIT. Any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely and systematically released.

SPENT FUEL. Nuclear fuel that has been used 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.

SUPER SOLID WASTE MANAGEMENT UNIT. Individual SWMUs that have been grouped and ranked into eleven larger units — super-solid waste management units (SSWMUs) because some SWMUs are contiguous or so close together as to make monitoring of separate units impractical.

SURFACE WATER. Water that is exposed to the atmospheric conditions of temperature, pressure, and chemical composition at the surface of the Earth.

SURVEILLANCE. The act of monitoring or observing a process or activity to verify conformance with specified requirements.

Glossary

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.

TRANSURANIC WASTE. Transuranic means elements which have an atomic number greater than 92, including neptunium, plutonium, americium, and curium.

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.

X-RAY. Penetrating electromagnetic radiations having wave lengths shorter than those of visible light. They are usually produced by bombarding a metallic target with fast electrons in a high vacuum. In nuclear reactions it is customary to refer to photons originating in the nucleus as gamma rays and those originating in the extranuclear part of the atom as x-rays. These rays are sometimes called roentgen rays after their discoverer, W.C. Roentgen.

Acronyms

AEA. Atomic Energy Act

ALARA. As Low As Reasonably Achievable

ANOVA. Analysis of Variance

BEIR. Committee on Biological Effects of Ionizing Radiation

BOD. Biochemical Oxygen Demand (5-day)

CAA. Clean Air Act

CDDL. Construction and Demolition Debris Landfill

CEDE. Committed Effective Dose Equivalent

CEQ. (President's) Council on Environmental Quality

CERCLA. Comprehensive Environmental Response, Compensation, and Liability Act

CFR. Code of Federal Regulations

CO. Certificate-to-Operate

CPC. Chemical Process Cell

CSRFF. Contact Size-reduction Facility

CSS. Cement Solidification System

CWA. Clean Water Act

CX. Categorical Exclusion

CY. Calendar Year

DCG. Derived Concentration Guide

DE. Dose Equivalent

DMR. Discharge Monitoring Report

DOE. (U.S.) Department of Energy

DOE-EM. (U.S.) Department of Energy, Office of Environmental Restoration and Waste Management

DOE-HQ. Department of Energy, Headquarters Office

DOE-OH. Department of Energy, Ohio Field Office

Acronyms

DOE-WV. Department of Energy, West Valley Area Office

EA. Environmental Assessment

EDE. Effective Dose Equivalent

EE. Environmental Evaluation

EHS. Extremely Hazardous Substance

EID. Environmental Information Document

EIS. Environmental Impact Statement

ELAP. Environmental Laboratory Approval Program

EML. Environmental Measurements Laboratory

EMSL. Environmental Monitoring Systems Laboratory (Las Vegas)

EPA. (U.S.) Environmental Protection Agency

EPI. Environmental Physics, Inc.

EPCRA. Emergency Planning and Community Right-to-Know Act

ES&H. Environmental Safety and Health

FFC Act. Federal Facility Compliance Act

FONSI. Finding of No Significant Impact

FSFCA. Federal and State Facility Compliance Agreement

FY. Fiscal Year

GC/MS. Gas Chromatograph/Mass Spectrometer

HEPA. High-efficiency Particulate Air (Filter)

HLW. High-level (Radioactive) Waste

HPIC. High-pressure Ion Chamber

HVAC. Heating, Ventilation, and Air Conditioning

ICRP. International Commission on Radiological Protection

INEL. Idaho National Engineering Laboratory

Acronyms

IRTS. Integrated Radwaste Treatment System

LAS. Linear Alkylate Sulfonate

LDR. Land Disposal Restriction

LIMS. Laboratory Information Management System

LLD. Lower Limit of Detection

LLW. Low-level (Radioactive) Waste

LLWTF. Low-level Liquid Waste Treatment Facility

LPS. Liquid Pretreatment System

LWTS. Liquid Waste Treatment System

MDC. Minimum Detectable Concentration

MDL. Method Detection Limit

MSDS. Material Safety Data Sheet

MTAR. Monthly Trend Analysis Report

NCRP. National Council on Radiation Protection and Measurements

NDA. Nuclear Regulatory Commission-licensed Disposal Area

NEPA. National Environmental Policy Act

NERL CRD. National Exposure Research Laboratory Characterization Research Division (formerly EMSL).

NESHAP. National Emissions Standards for Hazardous Air Pollutants

NFS. Nuclear Fuel Services, Inc.

NIST. National Institute of Standards and Technology

NOI. Notice of Intent

NPOC. Nonpurgeable Organic Carbon

NPDES. National Pollutant Discharge Elimination System

NRC. (U.S.) Nuclear Regulatory Commission

NYCRR. New York Code of Rules and Regulations

Acronyms

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

ODIS. On-site Discharge Report

ORR. Operational Readiness Review

OSHA. Occupational Safety and Health Act

OSR. Operational Safety Requirement

OVE. Outdoor Ventilated Enclosure

PC. Permit-to-Construct

PCB. Polychlorinated Biphenyl

PCDD. Polychlorinated dibenzo-p-dioxin

PCDF. Polychlorinated dibenzofurans

PQL. Practical Quantitation Limit

PVU. Portable Ventilation Unit

QA. Quality Assurance

QAP. Quality Assessment Program

QC. Quality Control

QEMDR. Quarterly Environmental Monitoring Data Report

RCRA. Resource Conservation and Recovery Act

RESL. Radiological and Environmental Science Laboratory

RFI. RCRA Facility Investigation

RMW. Radioactive Mixed Waste

RTS. Radwaste Treatment System

SAR. Safety Analysis Report

Acronyms

SARA. Superfund Amendments and Reauthorization Act

SD. Standard Deviation

SDA. (New York) State-licensed Disposal Area

SDWA. Safe Drinking Water Act

SER. (annual) Site Environmental Report

SI. International System of Units (Système Internationale)

SPDES. State Pollutant Discharge Elimination System

STS. Supernatant Treatment System

SWMU. Solid Waste Management Unit

SSWMU. Super Solid Waste Management Unit

TCL. Target Compound List

TIC. Tentatively Identified Compound

TLD. Thermoluminescent Dosimetry

TOC. Total Organic Carbon

TOX. Total Organic Halogens

TPQ. Threshold Planning Quantity

TRI. Toxic Release Inventory

TSCA. Toxic Substances and Control Act

TSDF. Treatment, Storage, and Disposal Facility

USGS. U.S. Geological Survey

VOC. Volatile Organic Compound

WESR. WVDP Effluent Summary Report

WNYNSC. Western New York Nuclear Service Center

WVDP. West Valley Demonstration Project

WVNS. West Valley Nuclear Services Company, Inc.

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-03 Ci)		L	liter
	μCi	microcurie (1E-06 Ci)		mL	milliliter
	nCi	nanocurie (1E-09 Ci)		m ³	cubic meter
	pCi	picocurie (1E-12 Ci)		gal	gallons
Bq	becquerel (27 pCi)	ft ³	cubic feet		
			ppm	parts per million	
			ppb	parts per billion	

	<u>Symbol</u>	<u>Name</u>		<u>Symbol</u>	<u>Name</u>
<u>Dose</u>	Sv	sievert (100 rems)	<u>Area</u>	ha	hectare (10,000 m ²)
	mSv	millisievert (1E-03 Sv)			
	Gy	gray (100 rads)			

	<u>Symbol</u>	<u>Name</u>		<u>Symbol</u>	<u>Name</u>
<u>Length</u>	m	meter	<u>Concentration</u>	μCi/mL	microcuries per milliliter
	km	kilometer (1E+03 m)		mL/L	milliliter per liter
	cm	centimeter (1E-02 m)		μCi/g	microcuries per gram
	mm	millimeter (1E-03 m)		mg/L	milligrams per liter
	μm	micrometer (1E-06 m)		μg/mL	microgram per milliliter

	<u>Symbol</u>	<u>Name</u>		<u>Symbol</u>	<u>Name</u>
<u>Mass</u>	g	gram	<u>Flow Rate</u>	MGD	million gallons per day
	kg	kilogram (1E+03 g)		CFM	cubic feet per minute
	mg	milligram (1E-03 g)		LPM	liters per minute
	μg	microgram (1E-06 g)			
	ng	nanogram (1E-09 g)			
	t	metric ton (1E+06 g)			

Unit Prefixes

centi	$1/100 = 1 \times 10^{-2} = 0.01$
milli	$1/1,000 = 1 \times 10^{-3} = 0.001$
micro	$1/1,000,000 = 1 \times 10^{-6} = 0.000001$
nano	$1/1,000,000,000 = 1 \times 10^{-9} = 0.000000001$
pico	$1/1,000,000,000,000 = 1 \times 10^{-12} = 0.000000000001$

Scientific Notation

Scientific notation is used to express very large or very small numbers. A very small number is expressed with a negative exponent: 1.3×10^{-6} . To convert this number to decimal form, the decimal point is moved left by the number of places equal to the exponent. Thus, 1.3×10^{-6} becomes 0.0000013.

A very large number is expressed with a positive exponent: 1.3×10^6 . To convert this number to decimal form, the decimal point is moved right by the number of places equal to the exponent. Thus, 1.3×10^6 becomes 1,300,000.

The power of 10 is also expressed as E. For example, 1.3×10^{-6} can also be written as 1.3E-06. The chart below shows the values of exponents.

1E+01	=	10
1E+00	=	1
1E-01	=	0.1
1E-02	=	0.01
1E-03	=	0.001
1E-04	=	0.0001
1E-05	=	0.00001
1E-06	=	0.000001 <u>One Millionth</u>
1E-07	=	0.0000001
1E-08	=	0.00000001

Conversion Chart

Both traditional radiological units (curie, roentgen, rad, rem) and the Systeme Internationale (S.I.) units (becquerel, gray, sievert) are used in this report. Nonradiological measurements are presented in metric units with the English equivalent often in parentheses.

1 centimeter (cm)	=	0.3937 inches (in)
1 meter (m)	=	39.37 inches (in) = 3.28 feet (ft)
1 kilometer (km)	=	0.62 mile (mi)
1 milliliter (mL)	=	0.0338 ounce (oz)
	=	0.061 cubic inch (in ³)
	=	1 cubic centimeter (cm ³)
1 liter (L)	=	1.057 quart (qt)
	=	61.02 cubic inches (in ³)
1 gram (g)	=	0.0353 ounce (oz)
	=	0.0022 pound (lb)
1 kilogram (kg)	=	2.2 pounds (lb)
1 curie (Ci)	=	3.7×10^{10} disintegrations per second (d/s)
1 becquerel (Bq)	=	1 disintegration per second (d/s)
	=	27 picocuries (pCi)
1 roentgen (R)	=	2.58×10^{-4} coulombs per kilogram of air (C/kg)
1 rad	=	0.01 gray (Gy)
1 rem	=	0.01 sievert (Sv)
1 millirem (mrem)	=	0.001 rem

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