

## GLOSSARY

### absorbed dose

Energy transferred to matter when ionizing radiation passes through it; measured in rads.

### absorber

Material, such as concrete and steel shielding, that absorbs and diminishes the intensity of ionizing radiation.

### absorption

The process by which the number and energy of particles or photons entering a body of matter are reduced by interaction with the matter.

### acceptable daily intake (ADI)

The amount of toxicant intake (in milligrams per day) for a 70-kilogram person that is not expected to result in adverse effects after chronic exposure. (See fractional ADI.)

### acclimation

Physiological and behavioral adjustments of an organism to changes in its immediate environment.

### acclimatization

The acclimation or adaptation of a particular species over several generations to a marked change in the environment.

### activation

The process of making a material radioactive by bombardment with neutrons, protons, or other nuclear particles.

### activation products

Nuclei formed by the bombardment of material with neutrons, protons, or other nuclear particles.

### activity

A measure of the rate at which a material is emitting nuclear radiation, usually given as the number of nuclear disintegrations per unit of time. (See curie.)

### adaptation

A change in structure or habit of an organism that produces an adjustment to the environment.

ADI

See acceptable daily intake.

adsorption

The adhesion of a substance to the surface of a solid or solid particles.

Atomic Energy Commission (AEC)

A five-member commission established by the Atomic Energy Act of 1954 to supervise the use of nuclear energy. The AEC was dissolved in 1975 and its functions were transferred to the Nuclear Regulatory Commission (NRC) and to the Energy Research and Development Administration (ERDA), which became the Department of Energy (DOE).

air quality

A measure of the levels of pollutants in the air.

air-quality standards

The prescribed level of pollutants in the outside air that cannot be exceeded legally during a specified time in a specified area.

air sampling

The collection and analysis of air samples for detection or measurement of substances.

alpha ( $\alpha$ ) particle

A positively charged particle, consisting of two protons and two neutrons, that is emitted during certain radioactive decay from the nucleus of certain nuclides; it is the least penetrating of the three common types of radiation (alpha, beta, and gamma).

ambient air

The surrounding atmosphere, usually the outside air, as it exists around people, plants, and structures. (It is not the air in immediate proximity to emission sources.)

anion

A negatively charged ion. (See ion.)

aquatic biota

The sum total of living organisms of any designated aquatic area.

aquiclude

A saturated geologic unit that is incapable of transmitting significant quantities of water under ordinary hydraulic gradients.

aquifer

A saturated geologic unit that can transmit significant quantities of water under ordinary hydraulic gradients; the water can be pumped to the surface through a well, or it can emerge naturally as a spring.

aquitard

A less permeable bed in a stratigraphic sequence. They are not permeable enough to transmit significant quantities of water.

TC

archaeological sites (resources)

Areas or objects modified or made by man, and the data associated with these features and artifacts.

arcuate

A curved or bent axial trace in a fold. (The fold would be called "arcuate.")

arenaceous limestone

Limestone with a texture or appearance of sand.

arkose

A sandstone containing 25 percent or more of feldspars, usually derived from silicic igneous rocks (e.g., granite).

artesian well

A well in a confined aquifer with a water level that rises above the top of the aquifer; if it rises above the ground surface, the well is known as a flowing artesian well.

ash

Inorganic residue remaining after ignition of combustible substances.

atmosphere

The layer of air surrounding the earth.

backfill

Material such as stone, clean rubble, or soil that is used to refill an excavation.

background exposure

See exposure to radiation.

background radiation

Ionizing radiation present in the environment from cosmic rays and from natural sources in the earth; background radiation varies considerably with location. (See natural radiation.)

bedrock

Any solid rock exposed at the earth's surface or overlain by unconsolidated surface material such as soil, gravel, or sand.

benthic region

The bottom of a body of water; this region supports the benthos.

benthos

The plant and animal life whose habitat is the bottom of a sea, lake, or river.

beta particle

An elementary particle emitted from a nucleus during radioactive decay; it is negatively charged, identical to an electron, and easily stopped, as by a thin sheet of metal.

biological dose

The radiation dose absorbed in biological material (measured in rem).

biochemical oxygen demand (BOD)

A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water; the greater the amount of organic waste, the greater the BOD.

biological shield

A mass of absorbing material placed around a radioactive source to reduce the radiation to a level safe for humans.

biosphere

The portion of the earth and its atmosphere capable of supporting life.

biostratigraphy

The study of stratigraphy via fossilized remains.

biota

The plant and animal life of a region.

### borosilicate glass

A strong, chemically and thermally resistant glass made primarily of sand and borax; for waste management, high-level waste is incorporated into the glass to form a leach-resistant, nondispersible (immobilized) material.

### British thermal unit (Btu)

A unit of heat; the quantity of heat required to raise the temperature of 1 pound of water by 1 degree Fahrenheit. One Btu equals 1055 joules (or 252 calories).

### burial ground

A place for burying unwanted materials in which the earth acts as a receptacle to prevent the dispersion of wastes in the environment and the escape of radiation.

### °C (degree Celsius)

The Celsius temperature scale is related to the Fahrenheit scale as follows:

$$^{\circ}\text{F} = ^{\circ}\text{C} \times \frac{9}{5} + 32$$

### calcareous cement

A calcium-carbonate-based cement.

### calcareous zone or formation

A stratigraphic unit composed largely of calcium carbonate (calcite or limestone).

### calcine

The process in which the water portion of slurried waste is driven off by evaporation at high temperature in a spray chamber, leaving a residue of dry solid unmelted particles, also referred to as the calcine.

### cancer

The name given to a group of diseases that are characterized by uncontrolled cellular growth.

### canister

A metal (steel) container into which immobilized radioactive waste is sealed.

canyon building

A heavily shielded building used in the chemical processing of radioactive materials; operation and maintenance are by remote control.

carbon dioxide (CO<sub>2</sub>)

A colorless, odorless, nonpoisonous gas that is a normal component of the ambient air; it is an expiration product of normal plant and animal life.

carbon monoxide (CO)

A colorless, odorless gas that is toxic if breathed in high concentration over a certain period of time; it is a normal component of most automotive exhaust systems.

carcinogen

An agent capable of producing or inducing cancer.

carcinogenic

Capable of producing or inducing cancer.

Carolina bay

Ovate, intermittently flooded, marshy depression of a type occurring abundantly on the Coastal Plain from New Jersey to Florida.

cask (radioactive materials)

A heavily shielded massive container for holding radioactive material.

cation

A positively charged ion. (See ion.)

CFM vault

A waste disposal vault designed specifically for RCRA delisted, effluent treatment facility, and mixed waste sludges that have been solidified using a cement/flyash matrix and cast in place in the disposal vault. The designs of such facilities must meet the requirements set forth in DOE Orders for the disposal of low-level radioactive waste.

clarifier

A tank or other vessel used to accomplish removal of settleable solids.

clastic dike

A sedimentary dike formed by broken rocks from overlying or underlying material.

common carriers

Vehicles such as trucks, trains, barges, and planes, that are licensed to transport the wide assortment of goods and materials distributed regularly across the country.

Comprehensive, Environmental Response Compensation, and Liability Act (CERCLA)

Establishes National Priority List (NPL) of abandoned hazardous waste sites ("Superfund").

concentration

The quantity of a substance contained in a unit quantity of a sample (e.g., milligrams per liter, or micrograms per kilogram).

condensate

Liquid water obtained by cooling the steam (overheads) produced in an evaporator system; also, any liquid obtained by cooling saturated vapor.

coolant

A substance, usually water, circulated through a processing plant to remove heat.

correlatable

Able to establish a connection between geological formations or events.

cretaceous

End of Mesozoic era, between 136 and 65 million years ago.

crystalline metamorphic rock

Rock consisting wholly of crystals.

cuesta

A ridge formed from sedimentary rock, steep on one side, but with a gentle slope on the other.

cumulative effects

Additive environmental, health, and socioeconomic effects that result from a number of similar activities in an area.

curie (Ci)

A unit of radioactivity equal to  $3.7 \times 10^{10}$  (37 billion) disintegrations per second; also a quantity of any nuclide or mixture of nuclides having 1 curie of radioactivity.

daughter

A nuclide formed by the radioactive decay of another nuclide, which is called the parent.

Darcy's law

$$v = -K \frac{dh}{dl}$$

The empirical physical law that describes groundwater flow under saturated or unsaturated conditions; the darcy is a unit of permeability and is related to hydraulic conductivity.

decay heat (radioactivity)

The heat produced by the decay of radionuclides.

decay, radioactive

The spontaneous transformation of one nuclide into a different nuclide or into a different energy state of the same nuclide; the process results in the emission of nuclear radiation (alpha, beta, or gamma radiation).

decommissioning

Removing facilities such as processing plants, waste tanks, and burial grounds from service and reducing or stabilizing radioactive contamination; includes the following concepts:

- The decontamination, dismantling, and return of an area to its original condition without restrictions
- Partial decontamination, isolation of remaining residues, and continued surveillance and restrictions

decomposition

The breakdown of a substance into its constituent parts.

decontamination (radioactive)

The removal of radioactive contaminants from surfaces of equipment by cleaning or washing with chemicals, by wet abrasive blasting using glass frit and water, or by chemical processing.

Defense Waste Processing Facility (DWPF)

Facility designed to process high-level defense waste into a suitable form for permanent storage or disposal; under construction at the SRP.

#### demography

The statistical study of human populations, including population size, density, distribution, and such vital statistics as age, sex, and ethnicity.

#### depositional regimes

A geologic term referring to the systematic laying or throwing down of material over a substantial area.

#### detritus

Dead organic tissues and organisms in an ecosystem.

#### dip

The angle that a structural surface (e.g., a bedding or fault plane) makes with the horizontal, measured perpendicular to the strike of the substance.

#### disposal

Placement of wastes in a facility such that the wastes remain isolated from the environment permanently or until decay has progressed to a point where releases pose no threat or hazard.

#### distillation

Separation process achieved by creating two or more coexisting zones that differ in temperature, pressure, or composition.

#### dose

The energy imparted to matter by ionizing radiation; the unit of absorbed dose is the rad, which is equal to 0.01 joule per kilogram of irradiated material in any medium.

#### dose commitment

The dose an organ or tissue would receive during a specified period of time (e.g., 50 to 100 years) as a result of intake (as by ingestion or inhalation) of one or more radionuclides from a 1-year release.

#### dose equivalent

The product of the absorbed dose from ionizing radiation and such factors that account for differences in biological effectiveness due to the type of radiation and its distribution in the body; it is measured in rem (Roentgen equivalent man).

#### dose rate

The radiation dose delivered per unit time (e.g., rem per year).

dosimeter

A small device (instrument) carried by a radiation worker that measures radiation dose (e.g., film badge or ionization chamber).

drawdown

The height difference between the water level in a formation and the water level in a well caused by the withdrawal of groundwater.

ecology

The science dealing with the relationship of all living things with each other and with the environment.

ecosystem

A complex of the community of living things and the environment forming a functioning whole in nature.

effluent

A liquid waste, discharged into the environment, usually into surface streams.

effluent standards

Defined limits of waste discharge in terms of volume, content of contaminants, temperature, etc.

electron

An elementary particle with a unit negative charge and a mass  $1/1837$  of the proton; electrons surround the positively charged nucleus and determine the chemical properties of the atom.

element

One of the 105 known substances that cannot be divided into simpler substances by chemical reactions; all nuclides of an element have the same atomic number.

eluate

The liquid resulting from removing the adsorbed material from an ion-exchange medium.

emission standards

Legally-enforceable limits on the quantities or kinds of air contaminants that might be emitted into the atmosphere.

#### endangered species

Species of plants and animals that are threatened with either extinction or serious depletion in an area.

#### energy

The capacity to produce heat or do work. Electrical energy is measured in units of kilowatt-hours.

#### environmental dose commitment (EDC)

A dose representing exposure to and ingestion of environmentally available radionuclides for 100 years following a 1-year release of radioactivity.

#### environmental fate

The result of the physical, biological, and chemical interactions of a substance released to the environment.

#### environmental impact statement (EIS)

A document prepared pursuant to Section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1969 for a major Federal action significantly affecting the quality of the human environment.

#### environmental transport

The movement of a substance through the environment; includes the physical, chemical, and biological interactions undergone by the substance.

#### eocene

Lower tertiary period, after paleocene but before oligocene.

#### epidemiology

The study of diseases as they affect populations.

#### epoch

Length of geologic time.

#### estuarine

Pertaining to an area where salt and fresh water come together; area affected by tides.

exposure to radiation

The incidence of radiation on living or inanimate material by accident or intent:

- Background - exposure to natural background ionizing radiation
- Occupational - exposure to ionizing radiation that takes place during a person's working hours
- Population - exposure to a number of persons who inhabit an area

°F (degree Fahrenheit)

The Fahrenheit temperature scale is related to the Celsius scale as follows:

$$^{\circ}\text{C} = \frac{(^{\circ}\text{F} - 32)}{1.8}$$

facies

A group of rocks that differ from surrounding rocks.

fall line

Imaginary line marking the point that most rivers drop steeply from the uplands to the lowlands.

fallout

The descent to earth and deposition on the ground of particulate matter (which can be radioactive) from the atmosphere.

fanglomerates

Sedimentary rock of water-worn heterogeneous fragments of every size, settling in an alluvial fan and cementing into rock.

fault

A fracture or a zone of fractures within a rock formation along which vertical, horizontal, or transverse slippage has occurred in the past.

faunal

Animal and plant fossils of a certain rock unit.

feldspar

Most common group of aluminum silicate minerals (containing other metals, such as potassium, sodium, and iron) that forms rock.

ferruginous

Containing iron oxide.

fission

The splitting of a heavy atomic nucleus into two approximately equal parts, which are nuclei of lighter elements, accompanied by the release of energy and generally one or more neutrons; can occur spontaneously or can be induced by neutron bombardment.

fission products

Nuclei formed by the fission of heavy elements (primary fission products); also, the nuclei formed by the decay of the primary fission products, many of which are radioactive.

fluvial

Relating to, or living in or near, a river.

flux

Rate of flow through a unit area.

food chain

The pathways by which any material entering the environment passes from the first absorbing organism through plants and animals to humans.

fractional ADI

A defined fraction of an acceptable daily intake of an individual substance, or the sum of such fractions for each of a number of substances. (See acceptable daily intake.)

fracture porosity

Breaking in a rock, resulting in porosity.

fuller's earth

Fine grained natural earth substance; has high absorbency and consists mostly of hydrated aluminum silicates.

gamma rays ( $\lambda$ )

High-energy, short-wavelength, electromagnetic radiation accompanying fission and emitted from the nucleus of an atom; gamma rays are very penetrating and require dense (e.g., lead) or a thick layer of materials for shielding.

#### gamma spectrometry

Identification and quantification of radioisotopes by measurement of the characteristic gamma rays emitted by elements undergoing radioactive decay.

#### genetic effects

Radiation effects that can be transferred from parent to offspring; radiation-induced changes in the genetic material of sex cells.

#### geologic repository (mined geologic repository)

A facility for the disposal of nuclear waste; the waste is isolated by placement in a continuous, stable geologic formation at depths greater than 1000 feet.

#### geology

The science that deals with the earth: the materials, processes, environments, and history of the planet, especially the lithosphere, including the rocks, their formation and structure.

#### glass frit

Ground or powdered glass.

#### glaucconitic

Mineral aggregate containing glauconite (a complex silicate mineral containing iron, aluminum, sodium, potassium, calcium, and magnesium), giving it a green color.

#### gneiss

Rock formed from bands of granular minerals alternating with bands of minerals that are flakey or have elongate prismatic habits.

#### gradient

Slope, particularly of a stream or land surface.

#### groundwater

The supply of water under the earth's surface in an aquifer.

#### gypsum

Mineral containing hydrated calcium sulfate ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ).

#### half-life (biological)

The time required for a living organism to eliminate, by natural processes, half the amount of a substance that has entered it.

#### half-life (effective)

The time required for a radionuclide in an organism to reduce its activity by half as a combined result of radioactive decay and biological elimination.

#### half-life (radiological)

The time in which half the atoms of a radioactive substance disintegrate to another nuclear form; varies for specific radioisotopes from millionths of a second to billions of years.

#### half-thickness

The thickness of any absorber that will reduce the intensity of a beam of radiation to one half its initial intensity.

#### halogens

The group of five chemically related nonmetallic elements that include fluorine, chlorine, bromine, iodine, and astatine.

#### health physics

The science concerned with the recognition, evaluation, and control of health hazards from ionizing radiation.

#### health risk

The probability that a specified health effect will occur from a defined exposure to a toxic chemical or radiation.

#### health risk assessment

An evaluation and interpretation of available scientific evidence on the toxicity of a substance, its presence in the environment at some level, and its accessibility for human exposure, providing a judgment and, if appropriate, an estimate of the probability that risk exists.

#### heating value

The heat released by combustion of a unit quantity of a fuel, measured in joules or Btus.

#### heavy metals

Metallic elements of high molecular weight, such as mercury, chromium, cadmium, lead, and arsenic, that are toxic to plants and animals at known concentrations; many exhibit cumulative effects.

#### heavy water (D<sub>2</sub>O)

Water in which the molecules contain deuterium (D<sub>2</sub>), an isotopic form of hydrogen that is heavier than ordinary hydrogen, and oxygen.

High-efficiency particulate air (HEPA) filter

A type of filter designed to remove 99.9 percent of the particulates as small as 0.3 micron in diameter from a flowing air stream.

high-level waste

High-level liquid waste or the products from the solidification of high-level liquid waste or irradiated fuel elements, if discarded without reprocessing.

historic resources

The sites, districts, structures, and objects considered limited and non-renewable because of their association with historic events, persons, or social or historic movements.

holocene

Epoch of quaternary period from end of the pleistocene (10,000 years ago) epoch to the present time.

hornblende

Most common mineral of the amphibole group.

hydraulic conductivity

Water flow rate in volume per unit time through a unit cross-section under a unit hydraulic gradient. (See Darcy's law; hydraulic gradient.)

hydraulic gradient

The difference in hydraulic head as a function of distance between wells. (See Darcy's law.)

hydraulic (water) head

Height of water with a free surface above a subsurface point.

hydrocarbons (HC)

Organic compounds consisting primarily of hydrogen and carbon; emitted in automotive exhaust and from the incomplete combustion of fossil fuels such as coal.

hydrograph

Graph showing water characteristics such as velocity or flow, in relation to time.

hydrologic regimen

Total quantity and characteristic behavior of water in a drainage basin.

hydrology

The science dealing with the properties, distribution, and circulation of natural water systems.

hydrosphere

The water portion of the surface of the earth, as distinguished from the solid portion (the lithosphere).

hydrostratigraphic unit (HSU)

Rock or soil body extending laterally for a considerable distance.

induced radioactivity

Radioactivity created when substances are bombarded with neutrons, as in a reactor.

indurated

Soil or rock compacted and hardened by heat, pressure, and cementation.

inert gas

A gas such as argon, xenon, or krypton that is ordinarily totally unreactive. Also called noble gases.

intensity (radioactive)

The energy or the number of photons or particles of radiation incident on a unit area per unit of time; the number of atoms disintegrating per unit of time.

interfluvial

Falling in the area between two streams.

intergranular porosity

Porosity between grains of rock.

interim storage (waste)

Temporary storage of drums, sealed canisters, or other vessels containing immobilized hazardous or radioactive wastes in a shielded or unshielded storage facility, until transfer to a Federal repository or other permanent disposal/storage facility.

#### intermediate-activity waste

Low-level radioactive waste or mixed waste with radioactivity of 300 millirem per hour or more at 7.6 centimeters from the surface of the container.

#### intruder

A member of the public similar to the maximally exposed individual who, after a 100-year institutional control period, remains on the site 24 hours a day; lives in a house on the site; consumes all food from crops and animal products grown on the site; drinks water from a well drilled on the site; breathes the air on the site; and moves about on the site.

#### ion

An atom or molecule that has gained or lost one or more electrons and has, thus, become electrically charged. Negatively charged ions are anions; positively charged ions are cations.

#### ion exchange

The process in which a solution passes over an ion-exchange medium, which removes the soluble ions by exchanging them with labile ions from the medium; this process is reversible, so the adsorbed ions can be eluted from the medium, and the medium can be regenerated.

#### ion-exchange resin

Polymeric spheres (usually polystyrene-divinylbenzene copolymers) containing bound groups that carry an ionic charge, either positive or negative, in conjunction with free ions of opposite charge that can be displaced.

#### ionization

The process whereby ions are formed from atoms or molecules; nuclear radiation can cause ionization, as can high temperatures and electric discharges.

#### ionizing radiation

Radiation capable of displacing electrons from atoms or molecules, thereby producing ions.

#### irradiation

Exposure to radiation.

#### isotope

An atom of a chemical element with a specific atomic number and atomic weight; isotopes of the same element have the same number of protons but different numbers of neutrons.

joule

A unit of energy or work equivalent to 1 watt per second, 0.737 foot-pound, or 4.18 calories.

kaolin

Clay mineral group characterized by a silicon-oxygen sheet and an aluminum-hydroxyl sheet alternately linked to form a two-layer crystal lattice.

kilometer

A metric unit of length equal to 0.62137 mile or 1000 meters.

leachate

Liquid that has percolated through solid waste or other media and has extracted dissolved or suspended materials from the solids into the liquids.

leaching

The process whereby a soluble component of a solid or mixture of solids is extracted as a result of percolation of a liquid around and through the solid.

leukemia

A form of cancer characterized by extensive proliferation of non-functional immature white blood cells (leukocytes).

life-cycle cost

The total cost associated with the management of waste throughout its existence or for some specified period of time (e.g., 100 years).

TC

lignite

A brownish-black coal of low Btu value between stages of peat and sub-bituminous coal.

limonite

Hydrous ferric oxides occurring naturally but having unknown origins.

liters per second (lps)

A metric unit of flow rate equal to 15.85 gallons per minute.

lithology

Rock descriptions by color, structure, grain size, etc.

lithosphere

The solid part of the earth, composed predominantly of rock.

long-lived nuclides

Radioactive isotopes with half-lives greater than about 30 years.

low-activity waste

Low-level radioactive or mixed waste with radioactivity of less than 300 millirem per hour at 7.6 centimeters from the container.

low-level waste

Radioactive waste not classified as high-level waste, transuranic waste, spent nuclear fuel, or byproduct material.

man-rem

See person-rem.

margin of safety (MOS)

The ratio between the risk value (see fractional ADI) for noncarcinogens and 1; the smaller the risk value, the larger the MOS; the smaller the MOS, the higher the risk.

marine terrace

Narrow coastal strip altered by marine deposit and erosion.

maximum contaminant level (MCL)

Maximum permissible level of a contaminant in drinking water, based on a 70-kilogram adult consuming 2 liters of water a day (from National Primary Drinking Water Standards).

maximum permissible dose

That dose of ionizing radiation established by competent authorities as an amount below which there is no appreciable risk to human health; at the same time, it is below the lowest level at which a definite hazard is believed to exist.

mica

Variously colored, or colorless mineral silicates, crystallizing in monoclinic forms that separate into thin leaves.

micro ( $\mu$ )

Prefix indicating one millionth. One microgram ( $\mu\text{g}$ ) = 1/1,000,000 of a gram or  $10^{-6}$  gram.

micrometer ( $\mu\text{m}$ )

A unit of length equal to one one-millionth ( $10^{-6}$ ) of a meter.

micron

A micrometer ( $10^{-6}$  meter). (Note: "micrometer" is the preferred usage.)

Middendorf/Black Creek

Upper Cretaceous age formations of high water yield, colloquially referred to as the lower and upper Tuscaloosa Formations; the Middendorf Formation is separated from the overlying Black Creek Formation by a clay aquitard known as the "mid-Tuscaloosa clay."

migration

The natural travel of a material through the air, soil, or groundwater.

moderator

A material used to decelerate neutrons from fission to thermal energies.

molecule

A group of atoms held together by chemical forces; the smallest unit of a compound that can exist by itself and retain all its chemical properties.

monoclinical

Strata varying from the horizontal in one direction only.

mutagen

An agent (physical, chemical, or radioactive) capable of inducing mutation (above the spontaneous background level).

mutagenesis

The occurrence or induction of mutation, a genetic change that is passed on from parent to offspring.

mutation

An inheritable change in the genetic material (in a chromosome).

nano

Prefix indicating one thousandth of a micro unit; one trillionth; 1 nanocurie =  $10^{-9}$  curie.

## National Register of Historic Places

A list maintained by the National Park Service of architectural, historic, archaeological, and cultural sites of local, state, or national significance.

natural radiation; natural radioactivity

Background radiation: cosmic, soil, rocks.

neutron

An uncharged elementary particle with a mass slightly greater than that of the proton, found in the nucleus of every atom heavier than hydrogen-1; a free neutron is unstable and decays with a half-life of about 13 minutes into an electron and a proton.

neutron flux

Number of neutrons flowing through a unit area per unit time.

NO<sub>x</sub>

Refers to the oxides of nitrogen, primarily NO and NO<sub>2</sub>. These are often produced in the combustion of fossil fuels. In high concentrations, they constitute an air pollution problem.

nodes

The intersection of horizontal and vertical grids.

nuclear energy

The energy liberated by a nuclear reactor (fission or fusion) or by radioactive decay.

nuclear reaction

A reaction in which an atomic nucleus is transformed into another element, usually with the liberation of energy as radiation.

nucleus

The small positively charged core of an atom, which contains nearly all the mass of the atom.

nuclide

An atomic nucleus specified by its atomic weight, atomic number, and energy state; a radionuclide is a radioactive nuclide.

organic degreasers

Cleaning agents having organic chemical structures, such as trichloroethane, trichloroethylene, tetrachloroethylene, and tetrachloromethane (carbon tetrachloride). Trade names include Perchlor and Trichlor, or Perclene and Triclene.

outcrop

The exposure of bedrock or strata projecting through overlying soil.

Paleocene

Epoch of Tertiary period between the Gulfian of the Cretaceous period (65 million years ago) and before the Eocene (55 million years ago) period.

particulates

Solid particles small enough to become airborne.

parts per million (ppm)

The unit commonly used to represent the degree of concentration. In air, ppm is usually volume pollutant per 1,000,000 volumes of air; in water, a weight per 1,000,000 weight units.

pascal

A metric unit of pressure; 101,000 pascals is equal to 14.7 pounds per square inch (psi).

pD

The negative log of the deuterium (heavy hydrogen) ion concentration (activity) in solution; analogous to the term pH, which refers to the hydrogen (protium) ion concentration (activity). (See pH.)

penplain

Almost featureless, plain land surface.

perched

A water-bearing area of small lateral dimensions lying above a more extensive aquifer.

permeability

Capacity of rock to transmit a fluid. (See Darcy's law.)

TC

person-rem

The radiation dose commitment to a given population; the sum of the individual doses received by a population segment.

pH

A measure of the hydrogen ion concentration (activity) in an aqueous solution; specifically, the negative logarithm of the hydrogen ion concentration. Acidic solutions have a pH from 0 to 7; basic solutions have a pH greater than 7.

phosphatic marl

Soft, loose, earthy phosphates that crumble easily.

photon

Electromagnetic radiation; a quantum of electromagnetic energy having properties of both a wave and a particle but without mass or electric charge.

physiography

Description of earth surface features, including air, water, and land.

Piedmont province

Large area forming a plateau at the base of the Appalachian mountains, extending from New Jersey to Alabama.

piezometric maps

Lines of equal groundwater pressure drawn on a map.

piezometric surface

The surface to which water in an aquifer would rise by hydrostatic head.

pisolitic clay

Clay that exhibits an internal structure of pea-sized clay grains.

Plant (or SRP) stream

Any natural stream on the Savannah River Plant; surface drainage is via these streams to the Savannah River.

Pleistocene

Epoch of the Quaternary period, between Pliocene (1.8 million years ago) and Holocene (10,000 years ago).

Pliocene

Epoch of the Tertiary period, between Miocene (5 million years ago) and Pleistocene (1.8 million years ago).

pounds per square inch (psi)

A measure of pressure; atmospheric pressure is about 15 psi.

plume

The elongated pattern of contaminated air or water originating at a point-source emission, such as a smokestack, or a waste source, such as a hazardous waste disposal site.

pyrite

Isometric mineral:  $\text{FeS}_2$  (iron sulfide).

quality factor (radioactive)

The factor by which absorbed dose, in rads, is multiplied to obtain a quantity expressing the irradiation incurred by various biological tissues, taking into account the biological effectiveness of the various types of radiation.

quartz

Crystalline silica:  $\text{SiO}_2$ .

quartzite

Very hard, metamorphosed sandstone.

Quaternary age

The period from the end of the Tertiary (1.8 million years ago) to the present time.

radiation

The emitted particles or photons from the nuclei of radioactive atoms. Some elements are naturally radioactive; others are induced to become radioactive by bombardment in a reactor. Naturally-occurring radiation is indistinguishable from induced radiation.

radiation absorbed dose (rad)

The basic unit of absorbed dose equal to the absorption of 0.01 joule per kilogram of absorbing material.

radioactivity

The spontaneous decay or disintegration of unstable atomic nuclei, accompanied by the emission of radiation.

radioisotopes

Nuclides of the same element (same number of protons in their nuclei) that differ in the number of neutrons and that spontaneously emit particles of electromagnetic radiation.

RCRA vault

A waste disposal vault designed to meet RCRA minimum technology standards.

recommended maximum contaminant level (RMCL)

Proposed maximum permissible level of a contaminant in drinking water.

residence time

The period of time during which a substance remains in a designated area.

Resource Conservation and Recovery Act (RCRA)

Federal legislation that regulates the transport, treatment, and disposal of solid and hazardous wastes.

risk assessment

A process of combining the hazard per unit exposure for a substance with the probable exposure to that substance to produce an estimate of risk or hazard to exposed individuals or the population from that substance. (See health risk assessment.)

roentgen (R)

A unit of exposure to ionizing radiation equal to or producing 1 coulomb of charge per cubic meter of air.

roentgen equivalent man (rem)

The unit of dose for biological absorption; equal to the product of the absorbed dose in rads, a quality factor, and a distribution factor.

saltcrete

A mixture of partially decontaminated salts and concrete.

sandstone

Clastic rock containing large individual particles visible to the unaided eye.

sanitary landfilling

An engineered method of solid waste disposal on land in an acceptable manner; waste is spread in thin layers, compacted to the smallest practical volume, and covered with soil at the end of each working day.

saprolite

A rock that is earthy, soft, clay-rich, extremely decomposed.

Savannah River Ecology Laboratory (SREL)

An ecological research institution operated by the University of Georgia under contract from DOE.

Savannah River Laboratory (SRL)

A nuclear research facility operated by E. I. du Pont de Nemours and Company under contract from DOE.

Savannah River Plant (SRP)

A 780-square-kilometer (192,700-acre), controlled-access area near Aiken, South Carolina, containing industrial facilities that produce nuclear materials for national defense.

schist

Strongly foliated crystalline rock formed by dynamic metamorphism that can be split easily into thin slabs, or flakes.

scrubber

An air pollution control device that uses a liquid spray to remove pollutants from a gas stream by absorption or chemical reaction.

sedimentation

The settling of excess soil and mineral solids of small particle size contained in water.

seep lines

Small zone where water leachate percolates slowly to the surface; a series of groundwater or leachate springs.

seepage basin

An excavation in the ground to receive aqueous streams containing chemical and radioactive wastes. Insoluble materials settle on the floor of the basin and soluble materials seep with the water through the soil column, where they are removed partially by ion exchange or other absorption processes with the soil. Dikes prevent overflow or surface runoff.

seismic

Pertaining to any earth vibration, especially an earthquake.

seismicity

The tendency for the occurrence of earthquakes.

settling tank

A tank in which settleable solids are removed by gravity.

shield

An engineered body of absorbing material used to protect personnel from radiation.

short-lived nuclides

Radioactive isotopes with half lives no greater than about 30 years (e.g., cesium-137 and strontium-90).

siliceous cement

Cement with an abundance of silica.

siltstone

Silt having the texture and composition of shale, but lacking its fine lamination.

sink

An area from which water drains or is removed.

sludge

The precipitated solids (primarily oxides and hydroxides) that settle to the bottom of the vessels containing liquid wastes.

slurry

A suspension of solid particles (sludge) in water.

stationary source

A source of emissions into the environment that is fixed, as a stack or chimney, rather than moving, as an automobile.

storage (waste)

Retention of radioactive or hazardous waste in a man-made container (such as a drum, tank, or vault) in a manner that permits retrieval, as distinguished from disposal, which implies no retrieval.

storage coefficient

Volume of water released from storage in a vertical column of 1.0 square foot when the water table declines 1.0 foot.

stratified

Formed or arranged in layers.

stratigraphy

Division of geology dealing with the definition and description of rocks and soil, both major and minor natural divisions.

strike

The direction or trend that a structural surface (e.g., a bedding or fault plane) takes as it intersects the horizontal.

sulfur dioxide (SO<sub>2</sub>)

A heavy pungent colorless gas (formed in the combustion of coal); SO<sub>2</sub> in high concentration is considered a major air pollutant.

sulfur oxides (SO<sub>x</sub>)

Primarily SO<sub>2</sub> and SO<sub>3</sub>; a common air pollutant.

supernatant; supernate

The portion of a liquid above settled materials in a tank or other vessel.

surface water

All water on the earth's surface, as distinguished from groundwater.

surficial deposit

Most recent geological deposit lying on bedrock or on or near the earth's surface.

Tertiary age

First period of Cenozoic era, thought to be between 65 and 1.8 million years ago.

threshold dose

The minimum dose of a given substance that produces a measurable environmental response factor.

total suspended particulates (TSP)

The concentration of particulates in suspension in the air, irrespective of the nature, source, or size of the particulates.

toxicity

The quality or degree of being poisonous or harmful to plant or animal life.

tracer injection detection test

Injection of dye in water to trace water flow.

transmissivity

The rate at which water of prevailing kinematic viscosity is transmitted through a unit width under a unit hydraulic gradient.

transuranic (TRU) waste

Without regard to source or form, radioactive waste that at the end of institutional control periods is contaminated with transuranium radionuclides with half-lives greater than 20 years in concentrations greater than 100 nCi/g.

transuranium elements

Elements above uranium in the periodic table; all 13 known transuranic elements are radioactive and are produced artificially.

Triassic period

First period of the Mesozoic era; thought to be between 225 and 190 million years ago.

tritium (H-3)

A radioactive isotope of hydrogen, a weak beta emitter with a half-life of 12.3 years.

turbidity

Measure of sediment or suspended foreign particle concentration in solution.

Tuscaloosa

See Middendorf/Black Creek.

unconsolidated

Loosely arranged or unstratified sediment.

unit cancer risk (UCR)

The excess risk due to a continuous lifetime exposure to one unit of carcinogen concentration, expressed as a probability; also called carcinogenic potency factor.

vadose zone

The unsaturated zone in soil above the water table.

vault

A reinforced concrete structure for storing canisters of immobilized high-level radioactive waste.

venting

Release of gases or vapors under pressure to the atmosphere.

volatile organic compounds

A broad range of organic compounds, often halogenated, that vaporize at ambient or relatively low temperatures, such as benzene, acetone, chloroform, and methyl alcohol.

waste, hazardous (RCRA)

Any solid waste (can also be semisolid or liquid, or contain gaseous material) having the characteristics of ignitability, corrosivity, toxicity, or reactivity, defined by RCRA and identified or listed in 40 CFR 261. For this EIS, "hazardous" refers to substances or constituents, used in their everyday sense, without specific regard to technical or regulatory definitions, unless indicated.

waste, mixed

Waste having both hazardous and low-level radioactive content.

waste, radioactive

Materials from nuclear operations that are radioactive or are contaminated with radioactive materials, and for which there is no practical use or recovery is impractical.

watershed

The area drained by a given stream.

water table

The upper surface of the groundwater.

zero release

Refers to the design of hazardous waste disposal/storage sites that meet minimum requirements for secure disposal/storage; derived from RCRA regulations.

zooplankton

Planktonic (floating) animals that supply food for fish.

## LIST OF ACRONYMS AND ABBREVIATIONS

ADI	acceptable daily intake
AEC	U.S. Atomic Energy Commission
BOD	biochemical oxygen demand
Btu	British thermal unit
cc	Cubic centimeters, cm <sup>3</sup> or cc (1 cc = 1 milliliter)
CCDF	Complementary cumulative distribution function
CEQ	President's Council on Environmental Quality
CERCLA	Comprehensive, Environmental Response Compensation, and Liability Act
CFM	cement/flyash matrix
cfm	cubic feet per minute
CFR	Code of Federal Regulations
cfs	cubic feet per second
Ci	Curie
COE	U.S. Army Corps of Engineers
CTF	chemical transfer facility
DOE	U.S. Department of Energy
DOE-HQ	U.S. Department of Energy - Headquarters
DOE-SR	U.S. Department of Energy - Savannah River Operations Office
DOI	U.S. Department of the Interior
DPSOL	Du Pont Savannah Operating List
DPSOP	Du Pont Savannah Operating Procedure
DWPF	Defense Waste Processing Facility
D <sub>2</sub> O	heavy water or deuterium oxide
EA	environmental assessment
ED	Environmental Division, DOE-SR

EDC	environmental dose commitment
EIS	environmental impact statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ERDA	U.S. Energy Research and Development Administration
ESA	Endangered Species Act
FEIS	final environmental impact statement
FHETF	F- and H-Area effluent treatment facility
FMF	Fuel Materials Facility
FMF-EA	Fuel Materials Facility - Environmental Assessment
FONSI	Finding of No Significant Impact
FWCA	Fish and Wildlife Coordination Act
FWS	U.S. Fish and Wildlife Service
g/L	grams per liter
HC	hydrocarbon
HEPA	high-efficiency particulate air (filter)
HSU	hydrostratigraphic unit
HSWA	Hazardous Solid Waste Amendments
HWCTR	Heavy Water Components Test Reactor
LETF	liquid effluent treatment facility
lps	liters per second
LSS	liquid scintillation solvents
MCL	maximum contaminant level
mg	milligram (one-thousandth of a gram)
ml	milliliter (one-thousandth of a liter)
mm	millimeter (one-thousandth of a meter)

MOA Memorandum of Agreement

MOU Memorandum of Understanding

mrem millirem (one-thousandth of a rem)

NAAQS National Ambient Air Quality Standards

nCi nanocuries ( $10^{-9}$  curie)

NEPA National Environmental Policy Act of 1969 (42 USC 4321 et seq.)

NERP National Environmental Research Park

NESHAP National Emissions Standards for Hazardous Air Pollutants

NHPA National Historic Preservation Act

NMFS National Marine Fisheries Service

NOI Notice of Intent

NPDES National Pollutant Discharge Elimination System

NPL National Priority List

NRC U.S. Nuclear Regulatory Commission

NSPS New Source Performance Standards

PCB polychlorinated biphenyl

ppb parts per billion ( $10^{-9}$ ) (one thousandth of a part per million)

PSD prevention of significant deterioration

R roentgen

rad radiation absorbed dose

RCRA Resource Conservation and Recovery Act

rem roentgen equivalent man

RMCL recommended maximum contaminant level

SCDHEC South Carolina Department of Health and Environmental Control

SCWMRD South Carolina Wildlife and Marine Resources Department

SCWRC South Carolina Water Resource Commission

SHPO	State Historic Preservation Office
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SPCC	Spill Prevention Control and Countermeasure
SREL	Savannah River Ecology Laboratory
SRL	Savannah River Laboratory
SRLUC	Savannah River Land Use Committee
SRP	Savannah River Plant
TRU	transuranic
TSP	total suspended particulates
TSS	total suspended solids
UCR	unit cancer risk
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
VOC	volatile organic compounds