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GLOSSARY

Definitions in this glossary reflect the usage of words and terms in the Yucca Mountain Site Characterization Plan (SCP). These definitions may or may not be used in the same way in other circumstances.

A horizon	The uppermost zone in the soil profile from which soluble salts and colloids have been leached and in which organic matter has accumulated.
abnormal	Describes events or conditions that do not occur on a routine basis or that are not expected during normal operations; also describes materials that are not handled routinely, such as experimental spent fuel.
absorbed radiation dose	A measure of the amount of energy deposited by ionizing radiation in a given mass of absorbing medium. The unit of absorbed radiation is the rad.
accelerometer	A motion detector whose response is linearly proportional to the acceleration of the earth materials with which it is in contact.
access drift	A drift that connects the mains and the perimeter drifts; it delineates the waste emplacement panels and provides access to the waste emplacement drifts. In the vertical waste emplacement configuration, there is also a midpanel access drift that supplies additional ventilation to the more numerous drifts.
accessible environment	(1) The atmosphere, (2) land surfaces, (3) surface waters, (4) oceans, and (5) all of the lithosphere that is beyond the controlled area.
accessory mineral	A mineral whose presence in a rock is not essential to the proper classification of the rock. Accessory minerals generally occur in minor amounts typically less than 1 weight percent; in sedimentary rocks they are mostly heavy minerals.
accidental radiological releases	Releases of radioactivity that deviate from the planned or expected behavior or course of events in connection with the operation of the facility and that have environmental protection or safety significance.
accretionary boundary	A boundary between two plates that are moving apart, with new oceanic-type lithosphere being created at the seam.
acidic	A descriptive term applied to those igneous rocks that contain more than 66 percent SiO_2.

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acoustic velocity log	Generic term for a well log that displays any of several measurements of acoustic waves in rocks exposed in a borehole.
actinides	Radioactive elements in the series beginning with atomic number 89 and continuing through 103.
activation products	The group of radionuclides that are formed as a result of neutron capture by chemical elements present in the fuel assembly hardware and fuel rod cladding.
active institutional controls	Controls instituted by a government to guard a repository against intrusion and to perform monitoring or maintenance operations.
actual retrieval period	The time required to retrieve the emplaced waste from the underground facility. For design purposes, this period is 34 years.
adsorption	The condensation of gases, liquids, or dissolved substances or solids.
advanced conceptual design (ACD)	The design phase that will be used to explore selected design alternatives and will firmly fix and refine the design criteria and concepts to be made final in later design efforts. The project feasibility will be demonstrated, life-cycle costs estimated, preliminary drawings prepared, and a construction schedule developed as required by U.S. Department of Energy Order 6410.1.
advection	The movement of dissolved solids by ground-water flow.
advertent human intrusion	Intentional intrusion or entry into the repository for purposes of waste retrieval or other disposal-related materials (i.e., canister materials).
aeromagnetic survey	A magnetic survey made with an airborne magnetometer from a moving aircraft.
aftershock	An earthquake that follows a larger earthquake or main shock and originates at or near the focus of the larger earthquake. Generally, major earthquakes are followed by a large number of aftershocks that decrease in frequency over time.
affected area	Either the area of socioeconomic impact or the area of environmental impact.

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affected Indian Tribe	Any Indian Tribe (1) within whose reservation boundaries a repository for radioactive waste is proposed to be located or (2) whose federally defined possessory or usage rights to other lands outside the reservation's boundaries arising out of congressionally ratified treaties may be substantially and adversely affected by the locating of such a facility, provided that the Secretary of the Interior finds, upon the petition of the appropriate governmental officials of the Tribe, that such effects are both substantial and adverse to the Tribe.
affected State	Any State that (1) has been notified by the U.S. Department of Energy in accordance with Section 116(a) of the Nuclear Waste Policy Act of 1982 as containing a potentially acceptable site, (2) contains a candidate site for site characterization or repository development, or (3) contains a site selected for repository development.
aggradation	The process of building up a surface by deposition.
aging	Storage of radioactive materials, especially spent nuclear fuel, to permit the decay of short-lived radionuclides.
air-cored	A core drilled using only compressed air as the drilling fluid, rather than other drilling fluids such as air-foam or drilling mud.
air-fall tuff	See "ash-fall tuff."
air-foam method	A procedure for drilling wells into rock formations, wherein the well cuttings are returned to the ground surface in a mixture of compressed air and a chemical foaming agent. The method offers the advantage of using minimum drilling fluids, thus fluid migration into the rock formation is also minimized.
alkali flat	A level lake-like plain formed in a shallow depression where accumulated water evaporates depositing fine sediment, dissolved minerals, or efflorescent salts.
allochthonous	A term applied to rocks that have been transported to their present outcrop location by tectonic processes, as in a thrust sheet.
alluvial fan	A low, outspread, relatively flat to gently sloping mass of rock material shaped like an open fan or segment of a cone made by a stream where it runs out onto a level plain or meets a slower stream. The fans generally form where streams issue from mountains onto low land.

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alpha activity	See "alpha decay."
alpha decay	A radioactive transformation in which an alpha particle is emitted by a nuclide, thus changing one nuclide to another that has a lower atomic number and weight.
alpha particle	A positively charged particle emitted in the radioactive decay of certain nuclides. It is made up of two protons and two neutrons bound together, and it is identical with the nucleus of a helium atom. It is the least penetrating of the three common types of radiation: alpha, beta, and gamma.
alpha spectrometry	A method of determining the type and concentration of certain radioactive isotopes by analysis of the alpha wave spectra that are emitted.
alteration (geologic)	Changes in the chemical or mineralogic composition of a rock, generally produced by weathering, hydrothermal solutions, or metamorphism.
altithermal	A period of high temperature, especially the postglacial thermal optimum.
ambient radiation monitoring	The measurement of the level of radiation present in the surrounding environment.
amplitude (of a fold)	For a symmetrical, periodic fold system the amplitude of a fold is analogous to the amplitude of a wave form, (i.e., half the original distance between the antiformal and synformal enveloping surfaces).
anelastic strain	Time-dependent, but eventually recoverable strain that occurs in a (anelastic) body after change in applied stress.
angle of internal friction	The angle between a resultant force acting on a plane of friction and the perpendicular line to that plane.
anion exclusion	The virtual exclusion of anions from pores between adjacent grains in a compacted clay-water system as a result of the solution between the pores being composed of overlapping diffuse layers.
antecedent moisture	The amount of moisture present in a soil mass at the beginning of a runoff period.
anticipated processes and events	Those natural processes and events that are reasonably likely to occur during the period the intended performance objective must be achieved.
anticline	A fold that is generally convex upward and the core of which contains stratigraphically older rocks.

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Antler orogeny	An orogeny that extensively deformed Paleozoic rocks of the Great Basin in Nevada during late Devonian and early Mississippian time.
aperture	The perpendicular distance separating the adjacent rock walls of an open discontinuity.
application	The act of making a finding of compliance or non-compliance with the qualifying or disqualifying conditions specified in the guidelines of Subparts C and D, in accordance with the types of findings defined in Appendix III of the guidelines (10 CFR 960).
aquefaction	The sudden large decrease of the shearing resistance of a cohesionless soil caused by the collapse of the structure by shock or strain and associated with a sudden but temporary increase of the pore fluid pressure. It involves temporary transformation of the material into a fluid mass.
aquifer	A formation, group of formations, or a part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.
aquitard	A confining bed that retards but does not prevent the flow of water to or from an adjacent aquifer; a leaky confining bed. It does not readily yield water to wells or springs but may serve as a storage unit for ground water.
areal power density (APD)	The concentration of thermal power produced by emplaced waste, which is averaged over the area of an emplacement panel and expressed in watts per square meter or in kilowatts per acre. The initial value (IAPD) at the time the waste is emplaced is a design input parameter used in far-field thermal and thermo-mechanical response calculations.
arid	A climate characterized by dryness. Variously defined as having precipitation amounts insufficient for plant life or for crops without irrigation. Arid regions have less than 25 cm (10 in.) of annual rainfall or a higher evaporation rate than precipitation rate.
arroyo	A term applied in the arid and semiarid southwestern United States to a small, deep, flat-floored channel or gully of an ephemeral or intermittent stream.
articulation	The action or manner of jointing, or the state of being jointed.

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ash	Pyroclastic material less than 4.0 mm in diameter. This term refers to both unconsolidated detritus and the consolidated deposit.
ash-fall tuff	(1) A tuff deposited by volcanic ash settling out of the atmosphere and forming a blanketing deposit of relatively uniform thickness regardless of the underlying topography. (2) A deposit of volcanic ash resulting from such a fall and lying on the ground surface.
ash-flow tuff	A tuff deposited by a volcano-derived hot density current. It can be either welded or unwelded and often fills in channels making the thickness of the resulting deposit a function of the underlying topography.
as low as reasonably achievable (ALARA)	As low as reasonably achievable taking into account the state of technology, and the economics of improvements in relation to benefits to the public health and safety, other societal and socioeconomic considerations, and the utilization of atomic energy in the public interest.
asthenosphere	A weak layer or shell of the earth below the lithosphere in which isostatic adjustments take place, mafic magmas may be generated, and seismic waves are strongly attenuated.
astronomic forcing	Variations in the earth's orbit that influence climate by changing the latitudinal and seasonal distribution of incoming solar radiation.
atmospheric stability class	An index that indicates the atmosphere's ability to disperse airborne releases.
atomic energy defense activity	Any activity of the Secretary of Energy performed in whole or in part in carrying out any of the following functions: Naval reactors development, weapons activities, verification and control technology, defense nuclear materials production, defense nuclear waste and materials by-products management, defense nuclear materials security and safeguards and security investigations, and defense research and development.
attenuation	(1) A reduction in the amplitude or energy of a signal, such as might be produced by passage through a filter. (2) A reduction in the amplitude of seismic waves, as produced by divergence, reflection and scattering, and absorption.

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Atterberg limits	In a sediment, the water-content boundaries between the semiliquid and plastic states (known as the liquid limit) and between the plastic and semisolid states (known as the plastic limit).
autecology	The study of the relationships between individual organisms or species.
authiclastic	A term applied to rocks that have been brecciated in place by mechanical processes.
authigenic	(1) Generated on the spot. (2) Pertaining to minerals formed on the spot where they are now found, before burial and consolidation of sediment.
autochthon	A body of rocks that remains at its site of origin, where it is rooted to its basement. Although not moved from their site, autochthonous rocks may be mildly to considerably deformed.
B horizon	Soil layer characterized by the secondary accumulation or enrichment of clay, iron, or aluminum, and by the development of distinctive structures not present in the parent material.
back-arc spreading	Sea-floor spreading center behind an island arc chain relative to a subduction boundary.
backfill	(1) The general fill that is placed in the excavated areas of the underground facility. Backfill materials may be either excavated tuff or other earthen materials. (2) The material or process used to refill an excavation.
background radiation	Radiation that is produced by sources other than the facility of specific interest, such as naturally occurring radioactive minerals in the earth, cosmic rays, naturally occurring radionuclides in living organisms, and fallout from weapons tests.
bacterial metabolites	An intermediary product of metabolism.
bailer	A long, hollow, steel cylindrical container or pipe with a valve at the bottom for admission of fluids, attached to a wire line and used in cable-tool drilling for recovering and removing water, cuttings, and mud from the bottom of a borehole.
bajada	A broad, gently inclined detrital surface extending from the base of a mountain range out into an inland basin formed by the lateral coalescence of a series of alluvial fans and having an undulating character.

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barometric efficiency	The ratio of the product of the change in hydraulic head and the specific weight of water to the change in atmospheric pressure.
barrier	Any material or structure that prevents or substantially delays movement of water or radionuclides.
base flow	Sustained or fair-weather flow of a stream, whether or not affected by the works of man.
base level	(1) The theoretical limit or lowest level toward which erosion of the earth's surface constantly progresses but seldom, if ever, reaches. (2) The level below which a stream cannot erode its bed.
Basin-Range faulting	Faulting characterized by normal (extensional) fault movements. Regional geologic structure dominated by generally subparallel fault-block mountains separated by broad alluvium-filled basins.
bearing strength	The maximum load per unit area that the ground can support without failing in shear or causing excessive settlement of the soil under imposed loads.
bench-scale testing	Testing of materials, methods, or chemical processes on a small scale, such as on a laboratory worktable.
benchmark	(1) Comparison of the results of one computer code with the results of another code designed to solve an identical problem to show that they produce similar results. The particular problem for which this comparison is made is called a "benchmark problem." (2) A relatively permanent metal tablet or other mark firmly embedded in a fixed object, indicating a precisely determined elevation.
beta particle	A negatively charged particle, physically identical with the electron, that is emitted by certain radionuclides.
beta radiation	See "beta particle."
bifurcating	The separation or branching of a stream into two parts.
binding constant	A measure of the affinity of a microorganism to an actinide. Analogous to a sorption coefficient.
biological half-life	The time required for an organism to eliminate half the amount of a radionuclide ingested or inhaled.
biosphere	The zone at and adjacent to the earth's surface where all life forms exist.

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blind-hole drilling	A technique for sinking shafts. It uses a multiple-cone bit with a diameter larger than 6 feet.
blocking temperature	The temperature at which the potassium-argon clock is reset for a specific mineral.
blooie line	A pipe or flexible tube that conducts air or other gas laden with cuttings from the collar of a borehole to a point far enough removed from the drill rig to keep air around the drill free from dust.
body-wave	A seismic wave that travels through the interior of the earth (or other geologic body) and that is not related to any boundary surface. A body wave may be either longitudinal (p-wave) or transverse (s-wave), depending on the direction of particle motion with respect to the direction of propagation and the direction of constant phase.
boiling water reactor (BWR)	A nuclear reactor system that uses boiling water in the primary cooling system. Steam from the primary cooling system turns turbines to generate electricity.
borehole	A hole made with a drill, auger, or other tools for exploring strata in search of minerals, supplying water for blasting, emplacing waste, proving the position of old workings or faults, or releasing accumulations of gas or water. Boreholes include core holes, dry-well-monitoring holes, waste-emplacement boreholes, and test holes for geophysical or ground-water characterization.
borehole deformation gauge	An instrument used to measure deformation or change in deformation of the wall of a borehole, in response to changes in applied stress in the volume of material containing the borehole. This phase typically is used in reference to a particular type of gauge developed by the U.S. Bureau of Mines (USBM), which measures the change in one or more diameters in response to overcoring of the borehole. The USBM borehole deformation gauge has also been used in relatively long-term monitoring applications.
borehole-flow survey	A survey using a device called a "spin flow meter," the purpose of which is to determine the vertical velocity of ground water within the well bore.
borehole geophysical method	A method for investigating geophysical rock mass responses and structure in situ by means of instruments lowered into one or more boreholes. See also: "borehole-to-borehole geophysical method," "crosshole geophysical method," and "borehole-to-surface geophysical method."

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borehole geophysical survey (directional survey)	Determination of the direction and deviation from the vertical of a borehole by precise measurements at various points along its central axis. Also, the record of information thus obtained.
borehole jacking	A test that measures in situ rock-mass deformation through the application of unidirectional pressures to the opposite sides of a borehole.
borehole-to-borehole geophysical method	A method for investigating geophysical rock mass responses and structure in situ by means of instruments lowered into adjacent boreholes. Electrical or seismic phenomena are propagated between the holes, yielding information about the intervening rock mass.
borehole-to-surface geophysical method	A method for investigating geophysical responses and structure in situ by means of instruments deployed in a borehole, and on the surface adjacent to the borehole. Electrical or seismic phenomena are propagated between the hole and the surface, yielding information about the intervening rock mass.
borescope	A straight-tube telescope with a mirror or prism used to visually inspect a cylindrical cavity.
borosilicate glass	A silicate glass containing at least five percent boric acid and used to solidify commercial or defense high-level waste.
borrow area	An area in which earth material (sand, gravel, etc.) is taken to be used for fill at another location.
Bouguer gravity	The observed value for gravitational acceleration at a point on the surface of the earth, corrected for latitude effects, elevation effects, the acceleration from a horizontal slab extending between the station elevation and the datum elevation (Bouguer correction), and the acceleration from the terrain around the station.
boundary element method	A method for modeling the behavior of continuous physical systems in which modeling segments are only defined along the boundary of the modeled region.
Bowen ratio	The ratio of heat loss by conduction to heat loss by evaporation.
branch corridor	A corridor that runs at an angle to the main corridors of the repository and that leads to the storage rooms.

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Brazil test	A method for the determination of the tensile strength of rock, concrete, ceramic, or other material by applying a compressive load radially to the outer surface of a test cylinder or disk. The cylinder or disk is supported on the opposite side by a tangent plane.
breakout	(1) See "demonstration breakout room." (2) The process of pulling up drill pipes or casings from a borehole and disconnecting them for stacking.
breccia	Rock consisting of sharp, angular fragments cemented together or embedded in a fine-grained matrix.
bridge plug	A downhole tool composed primarily of slips, plug mandrell, and rubber sealing elements that is run in and set in dense, nonfractured rock in a borehole to permanently isolate a zone. Multiple bridge plugs may be set in a borehole to isolate numerous zones.
brittle-ductile	See "ductile-brittle transition zone."
broadband sound	Sound that encompasses the audible frequencies.
Brunauer-Emmett-Tesler (BET) surface area	The total surface area of a powder or of a porous solid measured by the volume of gas (usually N_2) adsorbed on the surface of a known weight of the sample.
bulk air permeability	The ease with which air moves through a medium due to the total pressure difference.
bulk aquifer properties	The properties of an aquifer representing the combined effect of all individual values or variations within that aquifer, including fracture and matrix properties.
bulk density	The mass of an object or material divided by its volume, including the volume of its pore spaces.
bulk modulus	A modulus of elasticity relating a change in volume to the hydrostatic state of stress. It is the reciprocal of compressibility.
bulk permeability	Volume-averaged permeability. See "permeability."
bulk porosity	The total void volume divided by total volume of rock mass.
bulkhead	A tight partition of masonry, steel, or concrete used in the underground facility to control ventilation and to separate construction activities from waste emplacement activities.

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burnup	A measure of nuclear-reactor fuel consumption expressed either as the percentage of fuel atoms that have undergone fission or as the amount of energy produced per unit weight of fuel.
by-product material	Any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material.
cage	The platform of a mine hoist used to carry men or materials.
calc-alkalic series	An igneous rock or group of igneous rocks, in which the weight percentage of silica is between 56 and 61 when the weight percentages of CaO and K_2O+NA_2O are equal.
calcic horizon	A diagnostic subsurface soil horizon, at least 15 cm thick, characterized by enrichment in secondary carbonates.
calcite and opaline silica deposits	See "calcite silica deposits."
calcite silica deposits	Deposits in the area of Yucca Mountain located at the surface and in fault zones consisting of calcite and opaline silica.
calcrete	A conglomerate consisting of surficial sand and gravel cemented into a hard mass by calcium carbonate, which precipitates from solution from infiltrating waters, or by calcium carbonate, which is deposited by the escape of carbon dioxide from vadose water.
caldera	A volcanic collapse structure, generally on the order of tens of kilometers in diameter, formed during the eruption of volumetrically large (tens to hundreds of cubic kilometers of dense rock equivalent) ash-flow and ash-fall tuff deposits.
calibration (of a model)	A part of the model validation process involving the trial-and-error adjustment of model parameters.
caliche	Gravel, sand, or desert debris cemented by porous calcium carbonate; also the calcium carbonate cement.
caliper log	A well log that shows the variation of diameter of an uncased borehole with depth.
calomel	A weathering product, Hg_2Cl_2, of cinnabar, HgS.

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candidate site	An area within a geohydrologic setting that is recommended for site characterization by the Secretary of Energy under Section 112 of the Nuclear Waste Policy Act of 1982, approved for characterization by the President under Section 112, or undergoing site characterization under Section 113.
canister	As used in this document, a canister is the initial metal receptacle in which solid radioactive waste is placed for transport to the repository. The canister is not intended to meet the 300- to 1000-year containment requirement of 10 CFR 60.113 (a)(1)(ii)(A) (see "container").
capable fault	A fault that has exhibited one or more of the following characteristics, as described in 10 CFR Part 50: (a) movement at or near the ground surface at least once within the past 35,000 year or movement of a recurring nature within the past 500,000 year, (b) macroseismicity instrumentally determined with records of sufficient precision to demonstrate a direct relationship with the fault, or (c) a structural relationship to a capable fault according to characteristics (a) and (b) such that movement on one could be reasonably expected to be accompanied by movement on the other.
capillary barrier	An interface between two geologic media that impedes unsaturated water flow because the media have different hydrologic properties. For example, flow from a medium with small pores or interstices into a medium with larger pores is inhibited if the receiving medium is unsaturated.
capillary forces (pressure)	A difference in pressure across the interface between two immiscible fluid phases jointly occupying the interstices of a rock. It is due to the tension of the interfacial surface, and its value depends on the curvature of that surface.
capillary fringe	The zone immediately above the water table in which all of the rock pores are filled with water that is under less than atmospheric pressure and that is continuous with the water below the water table.
carbon-14 dating	See "radiocarbon dating."
casing	(1) A liner in a shaft or borehole to prevent entry of loose rock, gas, or liquid, or to prevent the loss of circulating liquid into porous, cavernous, or fractured ground. (2) The process of inserting casing into a borehole (see "emplacement borehole liner" and "cladding hulls").

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casing collar locator (CCL)	A well log used in conjunction with other logs, in cased holes, for depth control. The CCL responds to the thickness of ferrous metal at the threaded junctions between consecutive lengths of casing.
cask	A receptacle that holds one or more fuel assemblies, canisters, or disposal containers and provides shielding for highly radioactive materials during transportation. See "transporter cask," "shipping cask," and "transfer cask."
catchment area	(1) As applied to an aquifer, the recharge area and all areas that contribute water to it. (2) As applied to surface hydrologic systems, see "drainage basin."
cation exchange capacity (CEC)	A measure of the quantity of readily exchangeable cations neutralizing negative charge, expressed in moles of charge per unit mass.
cation-ratio dating	An experimental method for dating rock (desert) varnish. Curves (regression lines) representing the differential leaching rates of several minor elements in rock varnish (K+Ca:Ti) are calibrated using isotopically dated deposits to produce an area-specific plot of cation leaching ratios versus time. Using these calibrated cation-leaching curves, the time of initial varnish formation (minimum time since surface stabilization) can be dated for a variety of stable surfaces within the region.
Cauchy boundary condition	A semipervious boundary in flow through porous media media occurring when a thin layer of reduced permeability is formed at the ground surface.
cauldron	A caldera that has been eroded below the level at which the original topography is no longer recognizable. The location is inferred on the basis of the geometry of the erupted rock units and by the structural modification of the precaldera rocks.
characterization parameter	A physical property or condition (either measurable or calculable) whose value is to be determined in the site program in order to obtain, compute, or evaluate a performance parameter for a design or performance issue.
charophytes	One of a group of green algae in the order Charales and comprising the stoneworts.
chelation	Decomposition or disintegration of rocks or minerals resulting from the action of organisms or organic substances.

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chemisorption	A process in which a layer of atoms or molecules of one substance forms on the surface of a solid or liquid. The adsorbed layer is held by chemical bonds.
chromatographic	Of or relating to several techniques such that a distribution of a solute between a stationary phase and a mobile phase occurs. The stationary phase may be a solid or a liquid supported as a thin film on the surface of an inert solid. The mobile phase flowing over the surface of the stationary phase may be a gas or liquid. Types of chromatographic separations include adsorption, ion exchange, or partition (separation based on solubility) chromatography.
chronic intake	A continuous inhalation or ingestion exposure lasting for days or years.
cistern	An artificial reservoir for storing liquids, especially water.
cladding	The metallic outer sheath of a fuel element, generally made of stainless steel or a zirconium alloy.
cladding hulls	The empty metal tubes that remain after spent fuel is removed from them for reprocessing.
closed basin	A district draining to some depression or lake within its area, from which water escapes only by evaporation.
closed-system method	See "uranium-trend method."
closure	Final backfilling of the remaining open operational areas of the underground facility and boreholes after the termination of waste emplacement, culminating in the sealing of shafts.
cluster analysis	A procedure for arranging a number of objects in homogeneous subgroups based on their mutual similarities and hierarchical relationships.
cold trap	A tube whose walls are cooled with liquid nitrogen or some other liquid to condense vapors passing through it.
cold working	The increased resistance to further plastic deformation. Occurs when a metal or alloy is plastically deformed at temperatures below the recrystallization temperature of the alloy.

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collar	(1) The top or uppermost portion of a shaft. A concrete ring or slab around a shaft used to prevent water inflow and to support the headframe. (2) The threaded connector between consecutive lengths of casing.
colloform structures	Said of the rounded, finely banded kidney-like mineral texture formed by ultra-fine-grained rhythmic precipitation.
comb structures	A vein filling in which subparallel crystals, often of quartz, have grown perpendicular to the vein walls and thus resemble the teeth of a comb.
commercial waste	High-level radioactive waste generated in private industrial and other nongovernment facilities.
competent (geologic)	(1) A bed or stratum that is able to withstand the pressure of folding without flowage or change in original thickness. Competent strata tend to form parallel folds. (2) A bed or stratum that is resistant to weathering.
complementary cumulative distribution function (CCDF)	The CCDF is equivalent to one minus the cumulative distribution function.
complex response	Reaction of a fluvial system to a disruption of the equilibrium of the system.
complexing agent	A ligand (molecule or ion) that can donate one or more electron pairs to a metal atom or ion such that a complex is formed.
compliant-joint model	A conceptual and numerical model for a jointed medium whereby the deformation of the joints is treated separately from, and additionally to, the deformation of the intact material between joints. The stress-strain behavior of the joints and the matrix are idealized from observations of rock-mass behavior. In general, this approach does not allow for coupling of normal and shear joint responses. The total response of a representative volume of jointed material is posed as a constitutive stress-strain relationship for an equivalent homogenous material.
composite head	The combined or average hydraulic pressure of more than one hydrologic unit measured as a whole within a borehole.
compressibility	The change of specific volume and density under hydrostatic pressure; reciprocal of bulk modulus.

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compression index	The value of the slope of the line when the void ratio is plotted against the logarithm of the effective stress of a porous medium.
compressional wave	An elastic body wave for which particle motion is in the same direction as propagation for an elastically isotropic medium. In an anisotropic medium, the particle motion may deviate from the propagation direction. It is the fastest type of seismic wave and travels at about 6.0 to 7.7 km/s in the crust.
compressive strength	The maximum compressive stress that can be applied to a material, under given conditions, before failure occurs.
computed impedance tomography (CIT)	Tomographic imaging technique based on back projection along equal potential surfaces.
conceptual design	This design phase will concentrate on the surface and underground system, structure, emplacement, and component designs that require site characterization data and will provide the information to ensure that data-gathering plans relative to design will be adequately included in the Site Characterization Plan (SCP). Known site-specific data will be incorporated to assist in the identification of additional data needs, and sufficient design detail will be developed to ensure that all site data needs are identified. Data-accuracy requirements will be established and site-specific licensing issues related to site characterization will be identified.
conceptual perimeter drift boundary	The projection to the surface of the perimeter drift as defined in the conceptual design perimeter presented in Chapter 6 of the Site Characterization Plan. Perimeter drift "defines the outer limits of mined openings at waste emplacement depths" Rautman et al. (1987).
concordant	(1) A contact between an igneous intrusion and the country rock, which parallels the foliation or bedding of the latter. (2) Structurally conformable strata displaying parallelism of bedding or structure. (3) Radiometric ages determined by more than one method or by the same method from more than one mineral and that are in agreement.
conductivity	See "hydraulic conductivity" or "thermal conductivity."
conduits (hydrology)	A subterranean passage completely filled with water and always under hydrostatic pressure.

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confined aquifer	An underground water-bearing unit or formation with defined, relatively impermeable upper and lower boundaries. It contains confined ground water such that, if penetrated by a well, the water level will rise above the top of the aquifer.
confinement	As pertains to radioactivity, the retention of radioactive material within some specified bounds. Confinement differs from containment in that there is no absolute physical barrier in the former.
confining unit	A body of impermeable or distinctly less permeable material stratigraphically adjacent to one or more aquifers.
congruent leaching	A process of dissolving wherein the ratio of the rates of dissolution of constituents is proportional to their concentration ratios.
conjugate fault sets	A system of faults consisting of two sets symmetrically disposed about an inferred stress axis and of the same age and deformational episode.
connate water	Water no longer in circulation or contact with the present water cycle. Connate water is usually saline water trapped during the deposition of sediments and may be considered as "fossil water."
consolidation	The operation performed on spent fuel assemblies during which the upper and lower fuel-assembly tie plates are removed, the assembly spacer grids and any other assembly structural members are removed, and the fuel tubes are collected and formed into a closely packed bundle for insertion into a canister or container. The nonfuel structural members of the fuel assemblies are reduced in volume and placed in canisters or containers for shipment and disposal.
constant flux injection test	A type of hydraulic test, performed on a well, in which water is injected into an isolated interval of the well bore at constant flow rate. The method permits the evaluation of the hydraulic conductivity and storativity of a portion of the aquifer in the vicinity of the isolated interval.
constant head injection test	A test conducted to determine some hydraulic property, (i.e., hydraulic conductivity, transmissivity) in a well in which water is pumped in at a varied rate to keep the pressure or "head" constant.
constant-head node	A point within a numerical model at which the head is held constant.

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constitutive model	A mathematical model of a material or a process that expresses its essential quality or nature. A constitutive model is expressed by constitutive equations that mathematically express the relationship between the quantities of interest (e.g., constitutive equations establishing a linear elastic relationship between stress and strain).
constrained modulus	Ratio of axial stress to axial strain for a material tested triaxially with the minor and intermediate principal stress directions constrained.
contact (geology)	A plane or irregular surface between two different types or ages of rocks.
contact-handled transuranic waste	Transuranic (TRU) waste, usually contained in metal drums, whose surface radiation dose rate (less than or equal to 0.2 rem per hour) is sufficiently low to permit direct handling. Such waste does not usually require shielding other than that provided by its container.
contact-handled waste	Low-level radioactive waste that can be handled manually without exceeding established radiation exposure guidelines.
container	The metal barrier portion of the waste package that is placed around the waste form.
containment	The confinement of radioactive waste within a designated boundary.
containment barriers	Natural or man-made components of geologic disposal system designed to confine radioactive waste within a designated boundary.
containment period	The first several hundred years following permanent closure of a geologic repository when radiation and thermal levels are high, the uncertainties in assessing repository performance are large, and special emphasis is placed on the ability to contain wastes by waste packages within an engineered barrier system.
continental margin	The environment between the shoreline and the abyssal ocean floor including the continental shelf, continental borderland, continental slope and continental rise.
continuous-mining machine	A machine equipped with a rotating cutting head with pick-like bits for cutting into rock and for dropping the cuttings into a collection device for loading into cars or conveyers.

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continuum theory	In dealing with flow through porous media, the microscopic flow through the complex network of interconnected pores is disregarded in favor of the macroscopic overall average flow that takes place.
contoured stereonet	Stereonet plots containing multiple measurements from a geologic structure often reveal irregularities and the plot results in a scatter. Lines connecting areas of equal density (number of points per 1 percent area) are constructed to treat the data statistically.
control point	Any situation in a horizontal or vertical control system identified on a photograph and used as a base for a dependent survey.
controlled area	(1) A surface location, to be identified by passive institutional controls, that encompasses no more than 100 square kilometers and extends horizontally no more than five kilometers in any direction from the outer boundary of the original location of the radioactive wastes in a disposal system, and (2) the subsurface underlying such a surface location.
convection	A process of mass movement of portions of any fluid medium (liquid or gas) as a consequence of different temperatures in the medium and hence different densities. The process thus moves both the medium and the heat, and the term convection is used to signify either or both.
convective dispersion	Thermally induced dispersion of a liquid or a gas.
conventional light scattering (nephelometry)	The measurement of the cloudiness of a medium; especially the determination of the concentration or particle sizes of a suspension by measuring, at more than one angle, the scattering of light transmitted or reflected by the medium.
conventional shaft-sinking methods	Methods employing drilling, blasting, and mucking procedures in shaft construction.
convergence anchors	Fixtures set in rock serving as permanent reference points so that displacement between fixtures can be measured over time.
convergent boundary	A band along which moving plates collide and volume is lost either by shortening and crustal thickening or subduction and destruction of crust. The site of volcanism, earthquakes, trenches, and mountain building.
convergent flow	The coalescence of many overland flows downslope to make one large flow.

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cooling (spent fuel)	Storage of fuel elements after discharge from reactors, usually under water, to allow for the decay of short-lived radionuclides and hence the decrease of radioactivity and heat emission to acceptable levels. Synonymous with aging.
cordillera	A group of mountain ranges including valleys, plains, rivers, lakes, etc. Its component ranges may have various trends, but the cordillera generally will have one general direction.
corebarrel	Device used to remove drilled core from a borehole.
corehead	A hollow, cylindrical drill bit for carving, removing, and holding a core or sample of rock or soil material from the drill hole.
coring shovel	See "corebarrel."
cosmic-ray secondaries (secondary cosmic rays)	Radiation produced when primary cosmic rays enter the atmosphere and collide with atomic nuclei and electrons.
covariance	The arithmetic mean of the products of the deviations of corresponding values of two quantitative variables from their respective means.
credible abnormal conditions	The state of conditions expected to have a reasonable potential for occurring infrequently during the life of a repository. It is generally used to identify those conditions that need to be considered for use in developing contingency plans for related operations.
credible accident scenario	An accident scenario having a probability of occurrence of greater than a specified number to be determined.
credible scenario	A scenario having a probability of occurrence greater than or equal to 10^{-8} per year.
creep	Slow deformation that results from a long application of a constant stress.
crest-stage gauge	A gauge that records the highest level of a stream during a runoff event. A variety of different types of gauges do this, usually using floats to indicate the high-water mark.
critical path	Environmental exposure pathway that dominates the transport of material from the source of emission to human receptors.

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critical saturation	In an unsaturated environment, the saturation level that marks the transition between matrix-dominated fluid flow and fracture-dominated fluid flow.
critical threshold	The limits of equilibrium of a system, which, when exceeded, results in a change in the system or the system's responses. Examples include (1) sediment movement in streams, which begins at a critical threshold velocity, and (2) slope failure, which occurs when a critical threshold of slope stability is exceeded.
criticality	The condition in which a nuclear chain reaction is self-supporting. It occurs when the number of neutrons present in one generation cycle equals the number generated by the previous cycle.
crosshole geophysical method	See "borehole-to-borehole geophysical method."
crosshole recirculation test	A type of well test, usually involving a chemical tracer (or sometimes conducted only with water) in which water is injected into one well, either at constant flow rate or, less frequently, at constant pressure, and withdrawn from a nearby second well, to be reinjected into the first well. Once steady flow is established, a chemical tracer may be injected, the concentration of which is recorded as a function of time in the recirculation loop. The test yields information on the hydraulic and dispersive properties of the aquifer.
crustifications	Those deposits of minerals that are in layers and form crusts that have been distinctively deposited from solution.
cryosphere	That portion of the earth's surface that is permanently frozen.
cumulative distribution function (CDF)	For a given value of ζ and a random variable R, the CDF of R at ζ is the function that gives the probability that R is less than or equal to ζ, written $P(R \leq \zeta)$. That is, the CDF accumulates probabilities of all values of R less than or equal to ζ.
cumulative impact	Projected impact of a proposed facility in combination with other existing and proposed facilities and actions.
cumulative releases of radionuclides	The total number of curies of radionuclides entering the accessible environment in a 10,000-year period.

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Curie point	The temperature above which thermal agitation prevents spontaneous magnetic ordering. Specifically, the temperature at which the phenomenon of ferromagnetism disappears and the substance becomes simply paramagnetic.
cyclic deformation	Subjecting a sample to multiple loading cycles such that the peak load is never surpassed.
damaged zone	See "modified permeability zone."
damping factor	The ratio of the observed damping to that required for critical damping (the point at which the displaced mass returns to its original position without oscillation).
datum (in geology)	The top or bottom of a bed of rock, or any other surface, on which contours are drawn (e.g., a datum horizon).
daughter products	A nuclide that results from radioactive decay. For example, radium-226 decays to radon-222, which, in turn, decays to polonium-218. Thus, radon is the daughter of the radium, and the polonium is the daughter of the radon.
debris (geomorphology)	Any surficial accumulation of loose material detached from rock masses by decay and disintegration; it mainly consists of rock fragments and soil.
debris cone	An alluvial fan with steep slopes and composed of coarse fragments.
decay (radioactive)	(1) The process whereby radioactive materials undergo a change from one nuclide, element, or state to another, releasing radiation in the process. This action ultimately results in a decrease in the number of radioactive nuclei present in the sample. (2) The spontaneous transformation of one nuclide into a different nuclide or into a different isotope of the same nuclide.
decay chain	The sequence of radioactive disintegrations in succession from one nuclide to another until a stable daughter product is reached.
decay coefficient	A constant, characteristic of a nuclear species, which expresses the probability that an atom of the species will decay in a given time-interval. For a large number of atoms of a species, the decay constant is the ratio between the number of decaying atoms per unit of time and the existing number of atoms.

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decollement	Detachment structure of strata due to deformation, resulting in independent styles of deformation in the rocks above and below. A decollement is associated with folding and overthrusting.
decommissioning	The permanent removal from service of surface facilities and components necessary for preclosure operations only, after repository closure, in accordance with regulatory requirements and environmental policies.
decontamination	The removal of unwanted material (especially radioactive material) from the surface of or from within another material.
deconvolution technique	A linear mathematical operation whereby the effects of convolution on a signal are reversed to recover the signal. Convolution has many analogs in nature, such as multiple additive reflections of a seismic signal from different reflecting horizons in a layered sequence of geologic strata.
decoupling	The act of disconnecting differing mechanical stress regimes by an interfering boundary such as a fault or fault zone.
decrepitation	The shattering of a rock mass or rock sample caused by the buildup of excessive pressures in contained fluids as a result of heating, or the action of differential thermal expansion or contraction of its heated grains.
defense high-level waste	High-level radioactive waste generated by activities related to the national defense program, including the manufacture of nuclear weapons, the operation of naval reactors, and research and development at weapons laboratories.
deflectometer	A displacement-measuring instrument that is installed in a drillhole or embedded in a structure such as a dam. The deflectometer detects relative displacement of different points along the drillhole, in the plane perpendicular to the hole axis. The instrument may consist of an assembly that is permanently installed, or a sonde that is deployed within special tubing or casing.
deformation modulus	See "modulus of deformation."
degradation	The general lowering of the surface of the land by erosive processes, especially by the removal of material by flowing water.

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delta function	A mathematical function that is infinite when its argument is zero, and zero elsewhere, and has the property that its integral over any interval that includes zero is unity.
demonstration breakout room (DBR)	A horizontal drift, located in an exploratory shaft, which will accommodate a number of rock mechanics tests to be performed during exploratory shaft facility (ESF) construction.
dense rock equivalent (DRE)	A measure of volume used when describing tuff deposits. DRE is the equivalent volume of a tuff deposit when it is compressed to the density of hard rock of equivalent composition.
density borehole compensated (DBC) log	The record resulting from use of formation density logging tool with multiple detectors, which allows an adjustment to the density value for each depth point to compensate for borehole rugosity at or near that point. (See "formation density log with dual proximity" and "multidetector compensated gamma-gamma tool.")
desert pavement	A residual concentration of wind-polished, gravel-sized rock fragments, mantling a desert surface where wind has removed most of the smaller particles, and the lag surface protects the underlying material from further eolian erosion.
desert varnish	A thin, dark, shiny film or coating, composed of hydrated manganese and iron oxides with trace silica, formed on the surfaces of rock fragments, as well as on ledges and rock outcrops in desert regions. It is believed to be caused by exudation of mineralized solutions from within and deposited by evaporation on the surface.
design bases	The principal determinants that establish the overall repository design. There are two bases for the repository design: (1) the waste to be disposed and (2) the geologic characteristics of the site.
design-basis event	A credible accident or natural phenomenon (e.g., earthquakes or floods) that is used to establish design bases because its consequences are the most severe of all those postulated for other credible accidents or phenomena.
design earthquake	A hypothetical earthquake against which protective measures are taken.

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design life	The period of time for which a structure, system, or component is designed to perform its intended function. The repository design life ends when the repository is of no further operational use, waste retrieval is no longer a concern, and closure and decommissioning begin.
design package	Consists of the design of the repository (design drawings), supporting analysis, operating plan, and equipment demonstrations.
desorption	Freeing from a sorbed state. Removing a sorbed substance by the reverse of adsorption or absorption.
determination	A decision by the Secretary of Energy that a site is suitable for site characterization for the selection of a repository site or that a site is suitable for the development of a repository, consistent with applications of the guidelines of Subparts C and D in accordance with provisions set forth in Subpart B of 10 CFR Part 960.
development area	The underground area being prepared for emplacement of waste packages. Development includes excavation of the emplacement drifts and boreholes, installation of rock support in the drifts, and outfitting the emplacement boreholes with liners and covers. As the panel from the development of a panel is completed, bulkheads are installed to seal the panel from the development area and the panel is added to the ventilation circuit for the waste emplacement area.
deviatometer	A geophysical instrument that is lowered into a well to measure the deviation of the well from a vertical line originating at the bottom of the well. Most deviatometers use the earth's magnetic field for positional reference, although some are gyroscopic in nature.
deviatoric stress	In the engineering discipline of rock mechanics, the difference between the major principal stress and the minor principal stress.
dielectric constant	The force F between two electric charges e, separated by a distance r in a vacuum, is given by $F = e^2/r^2$. In any other medium this relationship becomes $F = e^2/Dr^2$ where D is the dielectric constant of the medium. The dielectric constant is a measure of the polarity of the medium.
differential extension	A situation in which the offset or separation along the strike of a fault or fracture increases in one direction from an initial point and decreases in the other direction.

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differential thermal analysis (DTA)	Thermal analysis carried out by uniformly heating or cooling a sample that undergoes chemical or physical changes, while simultaneously heating or cooling in identical fashion a reference material that undergoes no changes.
diffusion	If the concentration at one surface of a layer of a liquid is d_1 and at the other surface, d_2, the thickness of the layer h and the area under consideration A, then the mass of the substance that diffuses through the cross-section A in time t is $m = \frac{\Delta A (d_2 - d_1)t}{h}$ where Δ is the coefficient of diffusion.
diffusivity	Diffusivity or coefficient of diffusion is the amount passing through an area in a given direction in a given amount of time.
dilatancy	An increase in the bulk volume during deformation caused by a change from close-packed structure to open-packed structure, accompanied by an increase in the pore volume. The latter is accompanied by rotation of grains, microfracturing, and grain boundary slippage.
dip slope	A slope of the land surface with a slope angle approximately equal to the dip of the underlying rocks.
direct tensile strength	A directional property of a material that is determined by measuring the tensile force required to induce failure. The force exerted on the sample must be purely tensile, if possible, and be neither compressive nor involve applied shear stress.
Dirichlet boundary condition	A boundary condition encountered in flow through porous media that occurs when the flow domain is adjacent to a body of open water.
discharge flux	The amount of flux discharging from a specified region.

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discordant	(1) A contact between an igneous intrusion and the country rock that is not parallel to the foliation or bedding of the latter. (2) Structurally unconformable. Said of strata lacking parallelism of bedding or structure. (3) Said of radiometric ages, determined by more than one method for the same sample or for coexisting minerals that are in disagreement beyond experimental error. (4) Said of topographic features that do not have the same or nearly the same elevation.
dispersivity	A characteristic property of a porous medium, which is one of two components of the coefficient of hydrodynamic dispersion. Also known as dynamic dispersion.
displacement	A general term for the relative movement of the opposing sides of a fault.
disposal	The emplacement in a repository of high-level radioactive waste, spent nuclear fuel, or other highly radioactive material with no foreseeable intent of recovery, whether or not such emplacement permits the recovery of such waste and the isolation of such waste from the accessible environment.
disposal container	See "container."
disposal system	See "mined geologic disposal system."
disqualifying condition	A condition that, if present at a site, would eliminate that site from further consideration.
disruptive event	A natural or human-induced event that would change the geohydrologic, geochemical, or rock characteristics of the site from their present conditions or adversely affect the expected performance of the engineered barrier system.
disruptive scenarios	See "disruptive event."
dissemination	Said of a mineral constituent of a rock deposit in which the desired minerals occur as scattered particles in the rock.
dissolution kinetic parameters	Those physical and chemical conditions that influence the rate at which a mineral will dissolve.
distribution coefficient (K_d)	The ratio of the activity on solid phase per unit mass of solid to the activity in solution per unit volume of solution under equilibrium conditions. This ratio not under equilibrium conditions is given by R_d.

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distribution function (statistical)	The distribution function F(x) (x is assumed to be continuous) is the probability of occurrence in the interval (x, x + Δx) divided by Δx as the interval size (Δx) shrinks to zero.
disturbed conditions	Conditions arising from the occurrence of disruptive events.
disturbed zone	That portion of the controlled area, excluding shafts, whose physical or chemical properties are predicted to change as a result of underground facility construction or heat generated by the emplaced radioactive waste such that the resultant change of properties could have a significant effect on the performance of the repository.
divergent zone	See "accretionary boundary."
dolly	A device that cradles the waste container within the horizontal emplacement borehole. The dolly is emplaced in the borehole along with the container it carries.
domino model	See "planar-rotational faults."
dose	The quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body.
dose commitment	The integrated dose that results from an intake of radioactive material when the dose is evaluated from the beginning of the intake to a later time; also used for the long-term integrated dose to which people are considered committed because radioactive material has been released to the environment.
dose equivalent (radiation)	An estimate of the amount of biological damage done by the deposition in tissue of a given unit of absorbed radiation dose. The dose equivalent is obtained by multiplying the absorbed radiation dose by a quality factor. The unit of dose equivalent is the rem.
dose limit	The limit established by the U.S. Environmental Protection Agency or the U.S. Nuclear Regulatory Commission for the exposure of people to radiation.
double-couple focal mechanism	Simplist mechanism causing displacement along a fault and conserving angular momentum such that the net torque is zero.
double-ring infiltrometer	A device used to measure infiltration. Consists of two concentric rings placed around a testing area.

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down-dip	A direction that is downward from and parallel to the dip of a structure or surface.
downwasting	The general term for the dislodgement and downslope transport of soil and rock material under the direct application of gravitational body stress.
drag fold	A minor fold, usually one of a series, formed in an incompetent bed lying between more competent beds, produced by movement of the competent beds in opposite directions relative to one another.
drainage basin	A region or area bounded by a divide and occupied by a drainage system; specifically, the tract of country that contributes water to a particular stream channel or system of channels, a lake, reservoir, or other body of water.
drainage capture	See "stream capture."
drawdown	The lowering of the water table or potentiometric surface caused by pumping.
drift	Horizontal, or nearly horizontal, mined passageway. (See "main," "emplacement drift," and "perimeter drift.")
drift-pumpback test	A type of well test involving a single well and a chemical tracer in which the tracer is injected into an isolated interval of the well, allowed to drift with the natural motion of the ground water; then pumped back out. The temporal variation of the returning tracer's concentration provides information on the dispersive and transport properties of the aquifer.
drill-and-blast mining	A method of mining in which holes are drilled into the rock and then loaded with explosives. The blast from the explosives breaks the rock so that the rock can be removed. The underground opening is expanded by repeated drilling and blasting.
drill and test	Hydrologic testing of selected rock intervals when each interval is first penetrated by a borehole. This testing takes place before a borehole is completed to its total depth.
drill cutting (well cuttings)	Rock chips cut by a bit in the process of well drilling and removed from the hole in the drilling fluid in rotary drilling, in the bailer in cable-tool drilling, or by air when air is the drilling fluid.

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drilling fluid	The circulation medium used in drilling to remove cuttings from the bit, to carry cuttings to the surface for disposal, to cool the bit, to stabilize the borewall in open intervals (as with drilling mud), and to energize downhole drilling tools (as with mud meters or air hammers).
drillstring	(1) A term used in rotary drilling for the assemblage in a borehole of drill pipe, drill collars, drill bit, and core barrel (if in use), connected to and rotated by the drilling rig at the surface. (2) A term used in cable drilling for the assemblage in a borehole of drill bit, drill stem, cable, and other tools, connected to the walking beam at the surface.
drive core	A core sample acquired by special tools that force a sampling cup or tube into the borewall. This method works best in soft rock formations.
Drucker-Prager yield criterion	This criterion is used to evaluate the yield response of a material subjected to a three-dimensional stress field. It states that the material will yield in a ductile fashion if the combination of stresses, as computed by an equation defining the criterion, exceeds the experimentally determined limiting values of the criterion for that material.
drusy cavities	An irregular cavity or opening in a vein or rock, having its interior surface or walls lined (encrusted) with small projecting crystals, usually of the same minerals as those of the enclosing rock, and sometimes filled with water.
dry-bulb (DB) temperature	Temperature that is indicated by a conventional dry thermometer and is not dependent on atmospheric humidity.
dual induction focused log (DIFL)	A geophysical logging tool for measurement of the formation resistivity, which uses several coils to focus the signal, enhancing the true formation response at the expense of the material nearest the borehole, and improving vertical (axial) resolution.
ductile-brittle transition zone	The hypothesized zone of decoupling at the transition between brittle and ductile behavior that occurs at a depth of approximately 15 km in the Great Basin. Below this zone, extension probably occurs by ductile stretching, thinning, or intrusions of basaltic material from below or by a combination of these factors. Earthquakes generally do not occur below the transition zone.

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ductile fold	A fold that undergoes plastic deformation rather than brittle deformation. The beds, especially the competent beds, tend to be the same thickness regardless of their position on the fold. The incompetent beds may thin at the limbs and thicken at the hinges.
durations (coda)	The latter part of a seismogram following the early, identifiable surface waves and in which arrive long trains of waves. It may last for hours, especially if long oceanic paths are involved.
duripan	A diagnostic subsurface soil horizon that is characterized by cementation by silica and by accessory cements. Duripans occur mainly in areas of volcanism that have arid or Mediterranean climates.
dust devils	A small but vigorous whirl-wind, usually of short duration, rendered visible by dust, sand, and debris picked up from the ground.
dynamical models (statistical)	A model is said to be dynamic if it possesses either or both of these properties: (1) at least one variable occurs in the governing equations with value taken at different points in time or in the form of time-derivatives, etc., (2) at least one equation contains a function of time.
earth flow	A slow flow of unconsolidated earth material lubricated with water, occurring as either a low-angle terrace flow or a somewhat steeper but slow hillside flow.
earthquake focal mechanisms	All processes that take place at the focus of an earthquake. All kinds of faulting (thrust, normal, strike-slip) give rise to different, yet common forms of energy release. If the earthquakes generating these faults are considered as point sources, the "focal mechanism" can be analyzed by looking at the radiation pattern (zones of dilatation and compression).
eddy-correlation technique	A method of studying the effects of sea surface on the air above it by measuring simultaneous fluctuations of the horizontal and vertical components of the airflow from the mean.
effective bulk permeability	The permeability of a portion of rock mass sufficiently large to include the effects of cracks, joints, faults, etc., as well as the effects of interconnected pores. See also "permeability."

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effective neutron multiplication factor, K_{eff}	The ratio of the number of neutrons in a given generation to the number of neutrons in the immediately preceding generation. For criticality, K_{eff} must be unity (if $K_{eff} > 1$ then supercritical).
effective permeability	The measure of the ease with which a particular fluid can move through a porous medium. For example, soils have differing effective permeabilities for water and air.
effective porosity	The amount of interconnected pore space and fracture openings available for transmission of fluids, expressed as the ratio of the volume of the interconnected pores and fracture openings to the volume of rock.
effective precipitation	That part of precipitation producing runoff.
effective saturated thickness	That thickness of an aquifer contributing to the flow of ground water.
elastic compression	Compression in which the strain is reversible and the body recovers its original shape when the stresses are removed.
elastic modulus (modulus of elasticity)	The ratio of stress to its corresponding strain under given conditions of load, for materials that deform elastically.
elastic-plastic media	A material in which instantaneous elastic strain at a constant stress is followed by continuously developed permanent strain as long as the stress is maintained.
elastoplastic strain hardening	Material behavior in which the rate of development of permanent, plastic strain in an elastic-plastic material subjected to constant stress diminishes as the total amount of such plastic strain accumulates.
electric log (E-log)	The generic term for a well log that displays electrical measurements of induced current flow (e.g., resistivity log, potential curve log) in the rocks of an uncased borehole.
electrical conductivity	A measure of the ease with which a conduction current can be caused to flow through a material under the influence of an applied electric field. Electrical conductivity is the reciprocal of resistivity.
electrical resistivity	The electrical resistance per unit length of a unit cross-sectional area of a material.

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electrical survey (ES)	A generic term referring to the combined use of several geophysical logging tools: self potential (SP), resistivity in short and long normal configuration, and resistivity in a lateral configuration. These logs are sensitive to the following properties of the geologic section penetrated by a drillhole: resistivity of the rock matrix, porosity, electrical properties of the formation fluid, electrical properties of the drilling and or other fluid in the well base, electrical anisotropy, and inhomogeneity of the rock and the temperature downhole.
electrochemical potentiokinetic reactivation (EPR)	Electrical force generated by means of chemical action in manufactured cells (dry batteries) or by natural means (galvanic reaction).
electron microprobe	An analytical instrument that uses a finely focused beam of electrons to excite x-ray emission from selected portions of a sample. From the emitted x-ray spectrum the composition of the sample at the point of excitation can be determined.
electron spin resonance	Resonance occurring when electrons undergoing transitions between energy levels in a substance are irradiated with electromagnetic energy of a proper frequency to produce maximum absorption.
electrostatic adsorption	The removal of a solute particle from a solution as a result of an electrostatic charge disparity between the particle and the rock matrix. A particle with a strong charge disparity may displace one with a weaker disparity on the rock matrix in a process known as ion exchange.
elute	To remove adsorbed material from an adsorbent by means of a solvent.
emplacement	The act of placing waste containers in prepared positions. For the proposed repository at Yucca Mountain, two methods are currently being considered: emplacement of a single waste container in a shallow vertical borehole in the floor of the emplacement drift or emplacement of multiple waste containers in long horizontal boreholes in the wall of the drift.
emplacement borehole	A borehole used specifically for emplacement of waste.

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emplacement borehole liner	A sleeve placed in a vertical or horizontal borehole to prevent sloughed rock from interfering with the emplacement or removal of waste packages. It does not serve a shielding or containment function. The liner runs the complete length of horizontal boreholes, but, in vertical boreholes, extends only from the mouth of the borehole to just below the shoulder of the emplaced waste container. See "casing."
emplacement drift	A drift in which waste emplacement boreholes are located.
emplacement envelope	The components that surround the emplaced waste containers(s). The emplacement envelope includes boreholes, liner(s), borehole shield plug, and borehole cover.
emplacement horizon	The specific geologic stratum or portion thereof in which waste will be emplaced below the earth's surface. A portion of the Topopah Spring Member of the Paintbrush Tuff is currently the target emplacement horizon at Yucca Mountain.
en echelon	Geologic features that are in an overlapping or staggered arrangement (e.g., faults). Each is relatively short, but collectively they form a linear zone in which the strike of the individual features is oblique to that of the zone as a whole.
engineered barrier system (EBS)	(1) The waste packages and the underground facility (10 CFR Part 60); (2) The man-made components of a disposal system designed to prevent the release of radionuclides from the underground facility or into the geohydrologic setting. The EBS includes the radioactive-waste form, radioactive-waste canisters, materials placed over and around such canisters, any other components of the waste package, and barriers used to seal penetrations in and into the underground facility (10 CFR Part 960).
enrichment	The processes by which the relative amount of one constituent material or element contained in a rock is increased. This may be due either to the removal of other constituents selectively or to the introduction of increased amounts from an external source.
environmental assessment (EA)	The document required by Section 112(b)(1)(E) of the Nuclear Waste Policy Act of 1982.
environmental impact statement (EIS)	The document required by Section 114 of the Nuclear Waste Policy Act of 1982 as amended by the Nuclear Waste Policy Amendments Act of 1987.

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epeirogeny	Movements of uplift and subsidence that have produced the broader features of the continents and oceans, e.g., plateaus and basins, in contrast to orogeny, which has produced mountain chains.
ephemeral drainage	Drainage of a stream or portion of a stream that flows briefly in direct response to precipitation in the immediate vicinity and whose channel is at all times above the water table.
epicenter (earthquake)	The point on the earth's surface directly above the exact subsurface location of an earthquake.
epiclastic rock	A rock formed at the earth's surface by consolidation of fragments of preexisting rocks. A sedimentary rock whose fragments are derived by weathering or erosion.
epithermal	Said of a hydrothermal mineral deposit or alteration typically formed within about 1 kilometer of the earth's surface in a temperature range of 50 to 200°C.
epithermal neutron log	A well log of the wall-contact sonde type that measures epithermal neutron radiation in the 0.1 to 100 eV energy range, which is induced by bombardment with neutrons at several MeV energy. It is similar to the thermal neutron tool but relatively insensitive to the presence of thermal neutron absorbers such as chlorine, boron, or lithium.
epithermal neutron porosity	A porosity estimate determined from the epithermal neutron response. It is generally calculated using either (1) a calibration relationship developed using samples of the formation material, or (2) a standard calibration relationship that ensures full saturation with fresh water and a rock matrix of pure limestone.
equivalent continuum model	A conceptual and numerical model whereby the mechanical, thermomechanical, hydrologic, or geochemical response of a locally heterogeneous rock mass is characterized on a relatively large scale by the appropriate properties of a homogeneous continuum.
equivalent energy density concept	A procedure for determining the areal power density for wastes that differ in age and burnup from the average values used in determining the design basis areal power density. The equivalent areal power density is that waste loading that deposits the same energy in the host rock over a fixed period of time (usually 2,000 years) as would waste having the average characteristics.

eugeosyncline	A geosyncline in which volcanism is associated with clastic sedimentation; the volcanic part of an orthogeosyncline that is located away from the craton.
Eulerian-Lagrangian solution technique	Technique for the solution of ground-water flow and transport.
Eureka low	A subprovince of the Great Basin with anomalously low heat flow in southern Nevada.
evaluation	The act of carefully examining the characteristics of a site in relation to the requirements of the qualifying and disqualifying conditions specified in the guidelines of 10 CFR 960 Subparts C and D. Evaluation includes the consideration of favorable and potentially adverse conditions.
evapotranspiration	A term embracing that portion of the precipitation returned to the air through direct evaporation or by transpiration of vegetation; no attempt is made to distinguish between the two.
EX-size borehole	A 38-mm (1.5-in.) diameter borehole.
exfoliation	The process by which concentric scales, plates, or shells of rock, from less than a centimeter to several meters in thickness, are successively spalled or stripped from the bare surface of a larger rock mass.
expected partial performance measure (EPPM)	A measure for determining whether a scenario class needs to be included in the final calculation of the complementary cumulative distribution function (CCDF).
expected repository performance	The manner in which the repository is predicted to function, considering those conditions, processes, and events that are likely to prevail or may occur during the time period of interest.
explicit-dynamical models	General circulation models in which day-to-day synoptic-scale weather systems and their associated patterns of precipitation are treated explicitly, requiring time steps of the order of minutes to hours for the atmospheric portion of the climate model.
exploratory shaft	A vertical shaft of sufficient depth to allow in situ characterization of the emplacement horizon. The shaft is large enough to allow people and test equipment to be transported from the surface to the underground excavations.

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exploratory shaft facility (ESF)	The exploratory shafts, any associated surface structures, and underground openings constructed for the purpose of site characterization.
exposure	The radiation dose received by the absorption of radiation or the intake of a radionuclide by any individual.
extensometer	A device used to measure deformation.
extraction ratio	The ratio of the excavated area of all drifts to the total area. (Note that in the case of horizontal emplacement orientation, the area of the emplacement boreholes is not included in the ratio.)
fabric	The spatial and geometrical configuration of all those components that make up a deformed rock, including texture, structure, and preferred crystallographic orientation.
faceted spur	A ridge, or a divide between stream valleys, that has an inverted-V face in cross section that is produced by faulting or erosion.
facility	Any structure, system, or system component, including engineered barriers, created by the U.S. Department of Energy to meet repository performance or functional objectives.
facility cask	See "transporter cask."
falling head injection test	A test to determine the hydraulic conductivity in which the hydraulic head is allowed to fall during a specified period of time. The hydraulic conductivity is calculated from the drop in hydraulic head and the cross-sectional area.
fallout	Fission and activation products, produced by the above-ground detonation of a nuclear device, that precipitate back down to the land surface.
fan	See "alluvial fan."
fanglomerate	A sedimentary rock consisting of slightly water-worn heterogeneous fragments of all sizes, deposited in an alluvial fan, and later cemented into a firm rock.
far field	That portion of the host rock surrounding the underground facility within which the thermal effects of the emplaced waste can be analyzed by considering only the areal power density without consideration of the specific geometric characteristics of the underground facility.

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fault	A fracture or zone of fractures along which there has been displacement of the side relative to one another, parallel to the fracture or zone of fractures.
fault trace (line)	The line of a fault plane on the ground surface or on a reference plane.
favorable condition	A condition that, though not necessary to qualify a site, is presumed, if present, to enhance confidence that the qualifying condition of a particular guideline can be met.
felsic	Amnemonic term derived from "Fe" for feldspar, "l" for feldspathoids, and "s" for silica and applied to light-colored rocks containing an abundance of one or all of these constituents.
ferricrete	A conglomerate consisting of surficial sand and gravel cemented into a hard mass by iron oxide derived from the oxidation of percolating solutions of iron salts.
ferriginous zone	Pertaining to or containing iron (e.g., a zone in a sandstone that is cemented with iron oxide).
Fickian dispersion	Dispersion that follows Fick's first law: The mass of diffusing substance passing through a given cross section per unit time is proportional to the concentration gradient.
field density test	See "rubber-balloon method."
final procurement and construction design	The design that will develop the final (working) drawings and specifications for procurement and construction. The completion of this design phase will match the completion of the Title II design effort for the entire repository. This design phase will emphasize the completion of design of ancillary support items, final design refinement for the items necessary to demonstrate compliance with the design criteria and performance objectives of 10 CFR Part 60, the development of construction bid packages for all systems, and the development of final procurement and construction schedules.
fines	Clay- and silt-sized soil particles with a maximum particle size less than 8 mm.

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first motion	The initial motion of the ground resulting from a seismic event. A first-motion study or fault-plane solution, is a technique by which motion on fault planes associated with earthquakes can be determined, thus giving information on the orientation of faults and slip directions of earthquakes.
first-order landscape element	The primary divisions of the earth's physiographic features, consisting of the continents and ocean basins.
first-year activities	Site characterization activities, as defined by the NWPA, that will be initiated during the first year of site characterization.
fission product	A nuclide produced by the fission of a heavier element.
fission track dating	A method of calculating an age in years by determining the ratio of the spontaneous fission-track density to induced fission tracks. The method which has been used for ages from 20 years to 1.4×10^9 years, works best for micas, tectites, and meteorites, and is also useful for determining the amount and distribution of the uranium in the sample.
fission tracks	The paths of radiation damage made by the spontaneous fission of uranium-238 impurities.
flatjack	A hollow metal cushion formed of two nearly flat plates, butt-welded around the edges, and inflated under controlled pressure to bear against restraints. A flatjack is used to test in situ stress and rock-mass deformability.
flocculate	The act or process by which a number of individual, minute, suspended particles are tightly held together in clot-like masses or are loosely aggregated or precipitated into small lumps, clusters, or granules.
flow breccia	A breccia that is formed contemporaneously with the movement of a lava flow; the cooling crust becomes fragmented while the flow is in motion and is either incorporated into the flow, or falls in front of the moving flow and is overridden.
flow path	The theoretical line that ground water follows in moving from a recharge area to a discharge area.
flow rocks	Igneous rocks that have been emplaced by the physical process of flowing.

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flow unit	A group of stacked pyroclastic deposits that were emplaced as separate ash-flow tuffs during the same or closely associated eruptive event(s).
fluid density log	A record in a wellbore of the variation of the density of a fluid column with depth. The record is most commonly made during the drilling process as a means of assessing the properties and performance of the drilling fluid.
fluid inclusion	A cavity, typically 1.0 to 100.0 microns in diameter, in a mineral containing liquid or gas, formed by the entrapment in crystal irregularities of fluid, commonly that from which the rock crystallized.
fluid potential	The mechanical energy per unit mass of a fluid, (e.g., water or oil), at any given point in space and time, with respect to an arbitrary state and datum. The fluid potential is the total head multiplied by the acceleration due to gravity.
fluid pressure (hydrostatic pressure)	The pressure exerted by water at any given point in a body of water at rest. The hydrostatic pressure of ground water is generally due to the weight of water at higher levels in the zone of saturation.
flume	An artificial, inclined channel used for conveying water.
fluorometry	Measurement of the intensity and color of fluorescent radiations.
flushing fluid (drill fluid)	Usually pure or mud-laden water (sometimes applied to compressed air, natural gas, or oil) circulated through a drill string to keep the bit cool and to wash away the cuttings produced by the bit face. Also called circulation fluid.
flux	The ratio of the volume of fluid per unit area per unit time. Also known as specific discharge.
fluxgate magnetometer	An electrical instrument that measures the change in magnetic field along the axis of its sensor with a sensitivity of one gamma or more. Used on the ground, it measures the relative vertical magnetic intensity.
fly ash	All particulate matter that is carried in a gas stream.
focal depth (depth of focus)	The distance from the focus of an earthquake to the epicenter.

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focal mechanism (fault-plane solution)	Determination of the orientation of a fault plane and the direction of slip motion on it from an analysis of the sense of the first motion of the P waves or the amplitudes of the P waves, S waves, and surface waves.
focal sphere	An arbitrary reference sphere drawn about the hypocenter or focus of an earthquake, to which body waves recorded at the earth's surface are projected for studies of earthquake mechanisms.
focus	The initial rupture point of an earthquake where strain energy is first converted to elastic wave energy.
foliation	A general term for a planar arrangement of textural or structural features in any type of rock. The planar structure that results from flattening of the constituent grains of a metamorphic rock.
forging	Using compressive force to shape metal by plastic deformation.
formation density log (FDL)	Vertical profile of changes in density of a formation around a borehole. The intensity of scattered gamma radiation induced by irradiating the formation with medium-energy gamma rays reflects the electron density of the formation, which is proportional to true blue density. This technique is mainly used as a porosity indicator.
formation density log (FDL) with dual proximity (FDD)	A formation density logging tool with two or more detectors at different distances from the gamma source to compensate for the effects of mud cake and possibly formation invasion, and to detect borehole rugosity effects.
formation water	Water present in a water-bearing formation under natural conditions, as opposed to introduced fluids such as drilling mud.
fractional crystallization	Crystallization of a magma body in which newly formed crystals are removed from communication with a melt before they can react with the residual liquid.
fracture	A general term for any break in a rock, whether or not it causes displacement, due to mechanical failure by stress. Fractures include cracks, joints, and faults.
fracture aperture	The perpendicular distance separating the adjacent rock walls of an open discontinuity.

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fracture conductivity	The hydraulic conductivity within a fracture or system of fractures.
fracture contact area	The cumulative area of a rock fracture over which the mating walls of the fracture are actually in mechanical contact. Expressed as a proportion of the total fracture area.
fracture flow	The movement of water through a fracture system.
fracture permeability	Permeability as a result of fractures. Where fracture density is high, fracture permeability is high.
fracture persistence	The areal extent or size of a discontinuity within a plane. It can be crudely quantified by observing the discontinuity trace lengths on the surface of exposures.
fracture pore system	See "fractured porous media."
fracture porosity	The portion of large-scale rock-mass bulk porosity that is caused by voids associated with opening or aperture of fractures.
fractured porous media	Media exhibiting porosity resulting from the presence of joints or other fractures as well as from the rock medium itself.
free air	That portion of the earth's atmosphere, above the planetary boundary layer, in which the effect of the earth's surface friction on the air motion is negligible.
free energy	The maximum amount of work in addition to expansion work that can be obtained from a given process occurring at constant temperature and pressure.
free flow	In hydraulics, flow that is not disturbed by submergence or backwater.
free surface	The upper surface of a layer of fluid where the pressure on it is equal to the external atmospheric pressure.
free water	Water in the soil in excess of field capacity that is free to move in response to the pull of gravity.

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Freundlich isotherm	A mathematical model representing the partitioning of solutes between liquid and solid phases in a porous medium as determined by laboratory experiments. The Freundlich isotherm is commonly expressed in graphical form where mass sorbed per unit mass of dry solids is plotted against the concentration of the constituent in solution.
frit glass	(1) A glass containing fluxing material and employed as a constituent in a glaze body, or other ceramic composition. (2) A glassy material produced by fusing a mixture or enamel and quenching it in water.
fuel	As used in this document, fissionable material usable as the source of power when placed in a critical arrangement in a nuclear reactor.
fuel assembly	A single mechanical unit consisting of a number of fuel rods held together by a mechanical support structure designed to maintain proper spacing of the fuel rods and to facilitate their handling.
fuel burnup	See "burnup."
fuel cladding	See "cladding."
fuel consolidation	The removal of spent-fuel rods from an assembly and repacking in a denser array to reduce the volume per metric ton of fuel. See "consolidation."
fuel element	See "fuel assembly."
fuel rod	A long, slender, cylindrical tube (usually made of stainless steel or Zircaloy) containing nuclear fuel in the form of uranium oxide fuel pellets. Also called "fuel pin."
gamma-gamma density log	See "formation density log."
gamma radiation	Electromagnetic ionizing radiation that is emitted from a nucleus during some types of radioactive decay processes. Gamma radiation can penetrate various thicknesses of absorbing material, depending primarily on the energy of the gamma ray and the composition of the material. Gamma radiation is primarily an external radiation hazard.
gamma ray log	A radioactivity log obtained by recording the natural radioactivity of the rocks traversed by a cased or uncased borehole or well, and expressed by measuring the intensity of naturally emitted gamma rays and plotting the data as a function of depth.

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gamma-ray spectrum log	The radioactivity log curve of the intensity of broad-spectrum undifferentiated natural gamma radiation emitted from the rocks in a cased or uncased borehole. It is used for correlation and for distinguishing shales (which are usually richer in naturally radioactive elements) from sandstones, carbonates, and evaporites.
gangue	A valueless rock or mineral aggregate in an ore; that part of an ore that is not economically desirable, but cannot be avoided in mining.
gap-grain boundary inventory	Portions of the radionuclides in spent fuel that are segregated in part from the matrix and exist in concentrations higher than those found in the matrix, at the location of the grain boundary or between the fuel pellet and cladding.
gas chromatograph-mass spectrometer (GCMS)	An analytical technique that interfaces a gas chromatograph with a mass spectrometer. This technique utilizes the separation capabilities of the gas chromatograph such that the separated phases can be analyzed by the mass spectrometer. The resulting mass spectrum contains information on the structure of organic compounds and mixtures of organic compounds. This technique is also useful in detecting isotopes used in tracer studies.
gas drive	A process for recovering fluid from a porous rock, either in situ or in the laboratory, in which injection of a gas at elevated pressures is used to displace the fluid. The method is commonly applied in recovering oil from petroleum reservoirs after pumping becomes unproductive.
gas tracer test	A test in which slowly moving air currents can be directly observed by using smokes. These may range from simple dust clouds, through various chemical smokes, to more refined techniques employing gas and radioactive tracers.
general siting guidelines	Technical criteria established by the U.S. Department of Energy to be used in the site selection process.
geodetic survey	Survey in which account is taken of the figure and size of the earth and corrections are made for earth curvature.
geodetic trilateration	Determining the relative position of points on the on the earth's surface by using a method of surveying in which the lengths of the three sides of a series of touching or overlapping triangles are measured and the angles are computed from the measured lengths.

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geologic disposal system (GDS)	See "mined geologic disposal system."
geologic repository	A system requiring licensing by the U.S. Nuclear Regulatory Commission used for the disposal of radioactive wastes in excavated geologic media. A geologic repository includes (1) the geologic repository operations area and (2) the portion of the geologic setting that provides isolation of the radioactive waste and is located within the controlled area.
geologic repository operations area	A high-level radioactive waste facility that is part of a geologic repository, including both surface and subsurface areas and facilities, where waste-handling activities are conducted.
geopetal structure	Pertaining to any rock feature that indicates the relation of top to bottom at the time of formation of the rock.
geophone	See "seismometer."
geosyncline	Large, generally linear trough that subsided deeply throughout a long period of time during which a thick sequence of stratified sediments accumulated.
geothermal gradient	The change in temperature of the earth with depth expressed either in degrees per unit depth, or in units of depth per degree.
geothermometer	A mineral or mineral assemblage whose composition, structure, or inclusions are fixed within known thermal limits under particular conditions of pressure and composition and whose presence denotes a limit or range for the temperature of formation of the enclosing rock.
geotomography	A geophysical technique for acquisition and analysis of data in order to image the internal characteristics of a rock sample or in situ rock mass, using measurements made externally to the sample or from shafts and boreholes.
geotransport	Movement of radionuclides through subsurface soils and rocks, especially the movement of radionuclides in ground water.

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gouge (fault gouge)	Soft, uncemented pulverized clayey or claylike material, commonly a mixture of minerals in finely divided form, found along some faults or between the walls of a fault, and filling or partly filling a fault zone; a slippery mud that coats the fault surface or cements the fault breccia. A gouge is formed by the crushing and grinding of rock material as the fault developed, as well as by subsequent decomposition and alteration caused by underground circulating solutions.
gradation	The proportion of material of each particle size, or the frequency of distribution of various sizes, constituting a particulate material such as a soil, sediment, or sedimentary rock. The limits of each size are chosen arbitrarily.
grain density	Density of the solid components of a rock.
gravimeter log	A record of the gravity effects in boreholes to determine average rock densities.
gravitational potential	The amount of work that must be done to move a particle of unit mass to a specified position from a reference position.
gravity anomaly	The difference between the observed value of gravity at a point and the theoretically calculated value. It is based on a simple gravity model, usually modified in accordance with some generalized hypothesis of variation in subsurface density as related to surface topography.
gravity survey	Measurements of the gravitational field at a series of different locations. The object is to associate variations with differences in the distribution of densities and hence rock types.
greatest potential adverse impact	The maximum dose to an individual at the nearest unrestricted location. Equals the dose to the "maximum individual."
gross thermal loading	The total waste heat generation divided by the gross area of the repository. See "areal power density."
ground magnetic	A determination of the magnetic field at the surface of the earth by means of ground-based instruments.
ground surface infrared radiation	Electromagnetic radiation lying in the wavelength interval from about 0.8 microns to an indefinite upper boundary sometimes arbitrarily set at 1,000 microns. Bounded by visible radiation at its lower limit and microwave radiation at its upper limit.

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ground truth	Data collected at ground sites used to verify or refute remote sensing data.
ground water	All subsurface water as distinct from surface water.
ground-water sources	Aquifers that have been or could be economically and technologically developed as sources of water in the foreseeable future.
groundmass	The material between the larger conspicuous crystals in an igneous rock.
grout curtain	An area into which grout has been injected to form a barrier around an excavation or under a dam through which ground water flows at a reduced flow.
guideline	A statement of policy or procedure that may include, when appropriate, qualifying, disqualifying, favorable, or potentially adverse conditions as specified in the "guidelines."
guidelines	Part 960 of Title 10 of the Code of Federal Regulations--General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories.
hackly fracture	The property of a fracture or break along jagged surfaces as shown by certain minerals or rocks.
half-closure stress	The stress applied perpendicular to a fracture, required to reduce the unstressed aperture by half.
Harden Profile Index	A numerical soil index that relates 10 soil properties for each soil horizon. It is used to estimate ages of deposits or geomorphological events, and to condense descriptive field data to a numerical scheme that depicts the overall development of the soil profile.
headframe	The steel or timber frame at the top of a shaft that supports the sheave or pulley for the hoisting cables and serves various other purposes.
heat of hydration	The quantity of heat liberated or consumed when a substance takes up water.
heat-dissipation probe	An instrument used to measure matric potential in unsaturated rock.
heat pulse log	The record produced by a geophysical tool for measuring small amounts of axial flow in a borehole. The tool is typically stationed at a fixed depth, energized so as to heat a small volume of borehole fluid, and monitored to detect passage of heated fluid at detectors on the tool.

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heavy liquid	In analysis of minerals, a liquid of high density (1) in which specific-gravity tests can be made or (2) in which mechanically mixed minerals can be separated.
high-angle fault	A fault with a dip greater than 45 degrees.
high-level radioactive waste	The highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived form such liquid waste that contains fission products in sufficient concentrations; and other highly radioactive material that the U.S. Nuclear Regulatory Commission, consistent with existing law, determines by rule requires permanent isolation.
higher-level finding	Finding that must be made for each qualifying and disqualifying condition of the U.S. Department of Energy's siting guidelines (10 CFR Part 960) at or before the repository site selection decision point. Higher-level findings are Level 2 or Level 4 findings, which are defined in 10 CFR Part 960, Appendix III.
highly populated area	Any incorporated place (recognized by the decennial reports of the U.S. Bureau of the Census) of 2,500 or more persons, or any census-designated place (as defined and delineated by the Bureau) of 2,500 or more persons, unless it can be demonstrated that any such place has a lower population density than the mean value for the continental United States. Counties or county equivalents, whether incorporated or not, are specifically excluded from the definition of "place" as used herein.
horst	An elongated, relatively uplifted crustal unit or block that is bounded by faults on its long sides.
host rock	The geologic medium in which radioactive waste is emplaced. (At Yucca Mountain, the likely host rock will be the welded tuff of the Topopah Spring Member of the Paintbrush Tuff.)
hot cell	A facility that allows remote viewing and manipulation of radioactive substances.

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hot-wire anemometer flow meter	Device for measurement of very low air velocities and the fluctuating velocities that occur in turbulent flow. Basically, it consists of a wire or wires, usually platinum, supported in a frame and heated electrically. When exposed to an air current the heated wires cool, and as a result its electrical resistance alters. Measurements of resistance change may be correlated with the velocity of the air flow that caused the change.
human interference	Actions of humans in the future that could interfere with isolation of radioactive materials placed in a repository. Includes direct contact with waste, such as drilling of wells or sinking of shafts and withdrawal of contaminated water or rock materials.
human interference (inadvertent)	The result of future human activities that inadvertently modifies the ability of a mined geologic disposal system to effectively isolate waste through the modification of the baseline hydrologic, geochemical, or rock characteristics. Includes activities such as extensive ground-water withdrawal or irrigation near the controlled area boundary.
human intrusion	Human activities conducted at the site that inadvertently result in direct contact with waste materials, or the creation of pathways to the accessible environment (i.e., exploratory drilling).
hydraulic barrier	A natural or artificial obstacle (e.g., a dike or fault gouge) to the movement of ground water.
hydraulic bulk conductivity	Conductivity of bulk rock mass.
hydraulic conductivity	The volume of water that will move through a medium in a unit of time under a unit hydraulic gradient through a unit area measured perpendicular to the direction of the flow.
hydraulic conductivity ellipsoid	A three-dimensional ellipse in which the square roots of the values of the principal hydraulic conductivities are the major axes. The hydraulic conductivity ellipsoid is used to graphically determine the conductivity value for any direction of flow in an anisotropic medium.

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hydraulic fracturing	The fracturing of a rock in a fluid reservoir by pumping in water (or other fluid) and sand (or other granular material) under high pressure. The purpose is to produce artificial openings in the rock in order to increase permeability or to measure the secondary stresses in situ. The pressure opens cracks and bedding planes, and the sand introduced into these cracks serves to keep them open when the pressure is reduced.
hydraulic gradient	A change in the static pressure of ground water, expressed in terms of the height of water above a datum, per unit of distance in a given direction.
hydraulic head	The height above sea level to which a column of water can be supported by the static pressure at that point. The total hydraulic head is the sum of elevation head (elevation above an arbitrary location) and pressure head.
hydraulic-stress test	Any procedure in which stresses (by pumping, injection, slugging, etc.) are imposed on an aquifer in order to evaluate its transmissive and/or storage properties.
hydrochemical facies	The diagnostic chemical character of ground-water solutions occurring in hydrologic systems. It is determined by the flow pattern of the water and by the effects of chemical processes operating between the ground water and the minerals within the lithologic framework.
hydrodynamic dispersion	The velocity distribution due to laminar flow through the pores combined with the effect of tortuous flow paths.
hydrofrac	See "hydraulic fracturing."
hydrofracture measurement	A method for measuring secondary principal stresses in situ by inducing artificial fractures. See "hydraulic fracturing."
hydrogen index log	See "neutron log."
hydrologic balance	The relative states of inflow, outflow, and storage of moisture over a given area of the earth's surface.
hydrologic tracejector	A geophysical tool for measuring axial flow in a borehole. The tool is typically stationed at a fixed depth, then caused to eject a small amount of miscible fluid containing a radioactive tracer, into the borehole fluid. The tool is then monitored to detect passage of the tracer at detectors on the tool.

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hydrometer analysis	A method to determine the particle-size distribution of a sediment consisting of silt-size or finer particles.
hydrosphere	The aqueous envelope of the earth, including the ocean, all lakes, streams, and underground waters, and the water vapor in the atmosphere.
hygrometer	An instrument that is used to measure the humidity of the air.
Hypalon	Brand name for an impermeable synthetic fabric manufactured by Du Pont.
hypocenter	The focus or specific point at which initial rupture occurs in an earthquake.
ice shelves	Floating ice permanently attached to a land mass.
imbricate thrusts	A set of nearly parallel and overlapping fault planes characterized by rock slices that are approximately equidistant and have the same displacement.
impedance	The product of seismic velocity and density.
incision	The process whereby a downward-eroding stream deepens its channel or produces a narrow steep-walled valley. Especially the downcutting of a stream during, and as a result of rejuvenation, whether due to relative movement (uplift) of the crust or other cause.
indirect tensile strength test	See "Brazil test."
indirect test	See "Brazil test."
induced polarization	The production of a double layer of charge at a mineral interface, or production of changes in double layer density of a charge, brought about by application of an electric or magnetic field.
induction electrical survey (IES)	An electric-log curve obtained in an uncased borehole by transmitting coils (led with a constant alternating current) that induce concentric eddy currents in the rocks surrounding the borehole. These in turn induce fields that are detected by receiver coils. The magnitude of the fields is proportional to the conductivity of the surrounding rocks, and the log gives a continuous record of conductivity with depth.

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inductively coupled plasma (ICP) spectroscopy	An analytical method that uses inductively coupled plasma to convert the sample solution to an atomic vapor for analysis with a multichannel analyzer. This method provides a rapid means of chemically analyzing solutions and provides multi-element analytical data rather than data on a single element, as is the product of atomic absorption spectrometry.
industrial minerals	Any rock, mineral, or other naturally occurring substance of economic value, exclusive of metallic ores, mineral fuels, and gemstones; one of the nonmetallics.
information needs	(1) The lowest level of the issues hierarchy for performance and design issues. They comprise requirements for additional data or analyses about particular natural conditions or design elements. (2) Additional information needed to satisfy information requirements, (i.e., information requirements minus available relevant information) and thereby demonstrate compliance with regulations, etc.
ingestion-dose pathway	Those components of the food chain or water system that might contribute to the radiation exposure of an individual as the result of an intake of food or water.
inoculate	To implant microorganisms into a culture medium.
insolation	Protection against direct solar radiation provided by Earth's atmosphere.
institutional controls	Administrative controls, records, physical constraints, and combinations thereof that would limit intentional or inadvertent human access to the waste emplaced in a repository.
instrumental neutron activation analysis (INAA)	A technique for the trace element analysis of rocks and minerals using a sample that has been bombarded with neutrons in a reactor. From the identities of the radioisotopes, the identities of the parent elements in the sample can be determined. The quantity of the parent element can then be calculated.
interbasin flow	The flow of water between adjacent surface or groundwater basins.
interface zone (hydrology)	The contact zone between two fluids of different chemical or physical makeup.

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interflow (water storm seepage)	The runoff (water) infiltrating the surface soil and moving toward streams as ephemeral shallow perched ground water above the main ground-water level. Interflow is usually considered part of direct runoff.
interfluve	The relatively undissected upland between adjacent streams flowing in the same general direction.
interglacial	Pertaining to or formed during the time interval between two successive glacial epochs or between two glacial stages.
intermittent stream	A stream that flows only periodically, as, after a rainstorm, during wet weather, or during part of the year.
internal drainage	Surface drainage in which the water does not reach the ocean, such as drainage toward the central part of an interior basin.
intrinsic dispersion	The variation with frequency of seismic velocity in an elastic material because of variations in the elasticity. Distinguished from the geometric dispersion associated with the physical configuration of the material.
intrinsic permeability (specific permeability)	Pertaining to the relative ease with which a porous medium can transmit a liquid under a hydraulic or potential gradient. It is a property of the porous medium and is independent of the nature of the liquid alone.
intrusion (igneous)	(1) The process of emplacement of magma in pre-existing rock, (2) magmatic activity, or (3) the igneous rock so formed within the surrounding rock.
inverse problem	The problem of gaining knowledge of the physical features of a disturbing body by analysis of its effects. Finding the model from observed data.
ion chromatography	A term referring to analytical techniques that involve the chromatographic separation of ions utilizing high performance separation technology and automatic detection systems. The techniques involved usually employ ion exchange column systems using detection systems such as conductivity detectors or electrochemical detectors in a continuous flow system. Generally, this technique is used for separating and quantifying ions with pKa values greater than 7.

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ion-microprobe	An instrument that uses a focused beam of ions that, in striking the surface of a sample, produces a resulting emission of ions from the surface of the sample. These ions are collected and analyzed. This technique complements the electron microprobe technique by providing information on the concentration and distribution of isotopes of the elements in the surface of a solid. This technique can handle detection of elements lighter than sodium, which generally is the limit of the electron microprobe.
ionic strength	A measure of the average electrostatic interactions among ions in a solution; it is equal to one-half the sum of the terms obtained by multiplying the molality of each ion by its valence squared. For a simple salt like KNO_3, the ionic strength is equal to its concentration. For a mixture of KNO_3 with $AgIO_3$, the ionic strength varies as a function of the concentration of each salt.
ionizing radiation	Any radiation (e.g., alpha, beta, and gamma radiation) displacing electrons from atoms or molecules, thereby producing ions.
irreversible reaction	A reaction that proceeds in one direction.
island arc	A chain of islands usually with a curving archlike pattern, generally convex toward the open ocean, having a deep trench or trough on the convex side and usually enclosing a deep basin on the concave side. They are usually affiliated with subduction zones.
isolation	The inhibiting of the transport of radioactive material so that the amounts and concentrations of this material entering the accessible environment will be kept within prescribed limits.
isolation barrier	The earth material around the underground disposal rooms; it acts to prevent radioactivity from entering the biosphere.
isometric	Used to describe minerals that form within the crystallographic system and whose structure is that of three equal and mutually perpendicular axes.

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isostatic anomaly	The (1) observed Bouguer anomaly, corrected for the isostatic compensation that is theoretically required to support the weight of topographic features on the earth's crust; or (2) the density deficiency associated with the oceans. The isostatic compensation correction is calculated by assuming that the total weight per unit area of any column of crustal material is the same if the bottom of the column is taken at a particular compensation depth (Pratt model or density contrast (Airy model)).
isotopic dating	See "radiometric dating."
isotopic exchange	A process whereby atoms of the same element in two different molecules or in different sites in the same molecule exchange places. The equilibrium in such an exchange reaction is influenced slightly by the relative masses of the two atoms which exchange; the process forms the basis of one of the methods of isotope separation and concentration.
issue	A question relating to the performance of the mined geologic disposal system that must be resolved to demonstrate compliance with the applicable Federal regulations (including 10 CFR Part 60, 10 CFR Part 960, 40 CFR Part 191, and 10 CFR Part 20). See Section 8.1.1.
joint	A surface of fracture or parting in a rock, without displacement.
kataseism	Earth movement toward the focus of an earthquake.
Kelvin equation	An equation giving the increase in vapor pressure of a substance that accompanies an increase in curvature of its surface; the equation describes the greater rate of evaporation of a small liquid droplet compared with that of a larger one, and the greater solubility of small solid particles compared with that of larger particles.
key	To establish a mechanical bond in a construction joint to stabilize the rock mass.
key block analysis	A method of analysis for estimating support requirements for underground openings, using a topological treatment of rock-mass joint orientations.

kinematic	The analysis of displacements and strains; it is based on geometric analysis plus a number of assumptions regarding the manner in which geometrical relationships serve to indicate displacements.
kinetics	A branch of science that deals with the effects of forces upon the motions of material bodies or with changes in a physical or chemical system.
Klinkenberg permeability (factor)	A factor indicating the dependence of measured permeability of a porous medium to gas pressure. This permeability is larger than that of a liquid because of the slip phenomenon in which the velocity of a gas layer in the immediate vicinity of the surface of the grains is finite in contrast of the zero velocity of a liquid.
Kriging	A statistical procedure that uses information from the degree of spatial continuity of a regionalized variable to find an optimal set of weighting factors that are used in the estimation of a geologic surface at the unsampled points. The method also provides measures of the uncertainty of the estimate.
lagging	Heavy planks or timbers for supporting the roof of a mine for floors of working places, and for the accumulation of rocks and earth in a stope.
laminations	The finest stratification or bedding typically exhibited by shales and fine-grained sandstones.
Landsat V Thematic Mapper imagery	Multispectral scanner remote sensing imagery from the Landsat V satellite.
Langmuir isotherm	A mathematical model representing the partitioning of solutes between liquid and solid phases in experiments. It is commonly expressed in two-ordinate graphical form where mass sorbed per unit mass of dry solids is plotted against the concentration of the constituent in solution.
lanthanides	Any element in a series of elements of increasing atomic numbers beginning with lanthanum (57) or cerium (58) and ending with lutetium (71).
lapse rates	The decrease in an atmospheric variable with height; the variable is temperature unless otherwise specified.
lateral faulting	A fault in which the net slip is practically in the direction of the fault strike.
lateral flow	Any flow where the major flow component is horizontal.

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lateral offset	The horizontal distance one fault block moves in relation to the other.
leakance (leakage coefficient)	The quantity of water that flows across a unit area of the boundary between the main aquifer and its overlying or underlying semiconfining layer per unit head difference across this semiconfining layer.
lenticle	A small lentil.
lentil	A minor rock-stratigraphic unit of limited geographic extent, being a subdivision of a formation and similar in rank to a member, and thinning out in all directions.
license application	An application for a license from the U.S. Nuclear Regulatory Commission to construct a repository.
license application design	The design phase that completes the resolution of design and licensing issues identified and assessed in earlier design phases and will develop the design of the items necessary to demonstrate compliance with the design requirements and performance objectives of 10 CFR Part 60. Design requirements resulting from safety and reliability analyses will be fully integrated in this design to support the safety analysis report.
licensing	The process of obtaining the permits and authorizations required to site, construct, operate, close, and decommission a repository.
licensing assessment	An assessment of whether a license application complies with all of the requirements that it purports to meet. For this program it is the sum of the individual findings for each of the requirements of 10 CFR 60.
ligand	A group, ion, or molecule coordinated to a central atom in a complex.
light water reactor (LWR)	A nuclear reactor that uses ordinary water as a moderator, in contrast to heavy water (a compound of hydrogen and oxygen containing a higher proportion of the hydrogen isotope deuterium).
linear energy transfer (LET)	A measure of the energy deposited by ionizing radiation per unit of path length. The quality factor used in determining dose equivalent is based on the LET.

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linear expansion	The change in linear dimension of a solid resulting from the change in temperature. The coefficient of linear expansion is the change in a solid's unit linear dimension per 1 degree change in temperature.
linear variable differential transformer	Sensor used to measure displacements and relate them to changes in electrical outputs.
lineation	A general, nongeneric term for any linear structure in a rock (e.g., flow lines, slikensides, linear arrangements or components in sediments, or axes of folds).
liner	See "emplacement borehole liner."
liquefaction	In cohesionless soil, the transformation from a solid to a liquid state as a result of increased pore pressure and reduced effective stress.
liquid penetrant testing	A penetrant method of nondestructive testing used to locate defects open to the surface of nonporous materials; penetrating liquid is applied to the surface and after 1 to 30 minutes excess liquid is removed, and a developer is applied to draw the penetrant out of defects, thus showing their location, shape, and size.
listric surface	A curvilinear, usually concave-upward surface of a fracture or fault that curves, at first steeply then more gently, from a horizontal position. Listric surfaces bound wedge-shaped masses and appear to be thrust against or along each other.
lithophysae	Bubblelike structures in rocks, generally hollow, composed of concentric shells of finely crystalline alkali feldspar, quartz, and other materials.
lithostatic load	The force exerted on an object or underground structure by the weight of overlying material in the lithosphere.
lithostatic pressure	The stress to which a rock formation is subjected by the weight of the overlying rocks in the lithosphere.
load cell	A strain-gaged cylinder or cell that can be calibrated to measure compressive loads directly.

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local magnitude (M_L)	The logarithm of the amplitude of an earthquake wave with a 1-s period measured exactly 100 km away from the earthquake. This mathematical relationship holds only for shallow focus events, and a correction factor must be added if the amplitude of the wave is not recorded at a position exactly 100 km away from the event.
logging cable	A survey cable or hoist cable containing one or more insulated electrical conductors enclosed in a tightly wrapped sheath of steel wires.
logging sondes	A downhole device containing the measuring instrument in logging a well or borehole, which is lowered on a logging cable (wire line) (e.g., a circular container used in electric logging and in which the electrode devices are set).
logistic regression	A regression analysis for sparse data using a maximum likelihood method.
loss of containment	The time at which the ensemble of waste packages first fails to conform to the numerical interpretation of "substantially complete containment."
low-angle fault	A fault with a dip of 45 degrees or less.
low-level waste (radioactive)	Radioactive material that is neither high-level radioactive waste, spent nuclear fuel, transuranic waste, nor byproduct material as defined in Section 11a(2) of the Atomic Energy Act of 1954.
lower-level finding	A finding that must be made for each qualifying and disqualifying condition of the U.S. Department of Energy's Siting Guidelines (10 CFR Part 960) at or before the site nomination and recommendation decision point. Lower level findings are Level 1 or Level 2 findings, which are defined in 10 CFR Part 960, Appendix III.
lysimeter	A structure used to measure quantities of water used by plants, evaporated from soil, and lost by deep percolation. It consists of a basin, having closed sides and a bottom fitted with a drain, in which soil is placed and plants are grown. Quantities of natural and artificial precipitation are measured, the deep percolate is measured and analyzed, and the water taken up by the plants is weighed.
macroscopic continuum approach	See "continuum theory."

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magnetic log	Record of the magnetic susceptibility of the rocks surrounding a borehole using electromagnetic induction.
magnetic particle testing	A nondestructive method of inspection for determining the existence and extent of possible defects in ferromagnetic materials. Finely divided magnetic particles applied to the magnetized part are attracted to and outline the pattern of any magnetic leakage fields created by discontinuities.
magnetic polarity time scale	A chronology based on counting reversals of the earth's magnetic field.
magnetic survey	A survey made with a magnetometer on the ground or in the air that reveals local variations, or anomalies, in the total intensity, component intensity, or component direction of the earth's magnetic field.
magnetic susceptibility	The ratio of induced magnetization to the strength of the magnetic field causing magnetization.
magneto-stratigraphy	All parts of stratigraphy based on paleomagnetic signatures.
magnetotelluric (MT) method	An electromagnetic method of surveying in which natural electric and magnetic fields are measured. Usually the two horizontal electric-field components plus the three magnetic-field components are recorded.
main	One of the three main drifts that run from the base of the two ramps and men-and-materials shafts through the underground facility to provide access to the waste emplacement panels. See "tuff main," "service main," and "waste main."
man-rem	A unit used in health physics to compare the effects of different amounts of radiation on groups of people. It is obtained by multiplying the average dose equivalent to the whole body or a given organ or tissue (measured in rems) by the number of persons in that population.
mantle	The zone of earth below the crust and above the core, which is divided into the upper mantle and the lower mantle, with a transition zone between.
marker bed	A geologic formation that is distinctive and easily recognized over long distances, especially in the subsurface.
mass conservation	The physical principal that mass cannot be created or destroyed in the absence of fission or fusion.

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mass spectrometer	An instrument that is composed of an (1) inlet system, (2) ion source, (3) electrostatic accelerating system, and (4) detector and readout-system. This instrument produces charged particles consisting of the parent ion and ion fragments of the original molecule and sorts these ions according to their mass-to-charge ratios (mass spectra).
mass spectrometry	An analytical technique that uses a mass spectrometer to produce a mass spectrum of the ions, molecules, functional groups, etc., present in the sample. The mass spectra are used to identify the structure of organic compounds and in analyzing complex organic mixtures.
mass transfer kinetics	The process study of the kinetics of sorption as a function of water velocity. The adsorption of sorption radionuclides is a dynamic process and has a reaction kinetics rate. This process study evaluates the kinetic limitations of sorption in an advective system.
mass wasting	A general term for the downslope movement of soil and rock material under the direct influence of gravity. The debris removed is not carried within, on, or under another medium.
massif	Body of intrusive igneous or metamorphic rock at least 10 to 20 miles in diameter occurring as a structurally resistant mass in an uplifted area that may have once been a mountain core.
matrix	Relatively fine-grained material in which coarser fragments or crystals are embedded; also called groundmass.
matrix diffusion	The movement of dissolved species from water in the connected pore space to water in the dead end pore spaces by the action of gradients in species concentration. In particular, the connected pore spaces may be fracture networks and the dead end pore spaces may be matrix pores.
maximally exposed individual	See "maximum individual."
maximum individual	A hypothetical member of the public whose habits, activities, and location tend to maximize the radiological dose received from some given operation.

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maximum individual dose	The highest radiation dose delivered to the whole body or to an organ that a person can receive from a release of radioactivity. The hypothetical person who receives this dose is referred to as the maximally exposed individual.
maximum permissible concentrations	The average concentration of a radionuclide in air or water to which a worker or member of the general population may be continuously exposed (40 hours per week only for workers) without exceeding regulatory limits on external or internal radiation doses. Specified in Appendix B of 10 CFR Part 20.
mechanical	A term applied to the material properties that govern the physical response of a material to applied physical stress or to the analysis of that response (e.g., mechanical properties, mechanical analysis).
mechanical dispersion	A microscopic mixing process caused entirely by the motion of fluid in a porous medium.
melange terrain	Composed of a heterogeneous mixture of rock material. Specifically, a mappable body of deformed rocks consisting of a pervasively sheared, fine-grained, commonly pelitic matrix, thoroughly mixed with angular and poorly sorted inclusions of native and exotic tectonic fragments, blocks, or slabs.
Mercalli intensity	A scale for measuring earthquake intensity in terms of the effects perceived by people near the earthquake.
mercury injection method	A method used for determining the porosity of a rock sample.
mesostasis	The last-formed interstitial material of an igneous rock.
metallogenic provinces	An area characterized by a particular assemblage of mineral deposits, or by one or more characteristic types of mineralization. A metallogenic province may have had more than one episode of mineralization, or metallogenic epoch.
metamorphic grade	The intensity or rank of metamorphism, measured by the amount or degree of difference between the original parent rock and the metamorphic rock.
metasomatic	The process by which one mineral is replaced by another of different chemical composition owing to reactions set up by the introduction of material from external sources.

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metastable	Pertaining to a body or system existing at an energy level above that of a more stable state and requiring the addition of a small amount of energy to induce a transition to the more stable state.
metastable (radionuclide)	A state of temporary nuclear stability that occurs in some types of radioactive decays. During these decays (called isomeric transition), an intermediate product is formed by the first stage of decay. This product has a half-life long enough to be considered a separate isotope.
meteoric water	(1) Water occurring in or derived from the atmosphere. (2) Pertaining to water of recent atmospheric origin.
mined geologic disposal system (MGDS)	A system, requiring licensing by the U.S. Nuclear Regulatory Commission, that is used for the disposal of high-level radioactive waste in excavated geologic media. It is synonymous with "geologic repository."
mineral assemblages	The minerals that compose a rock, especially an igneous or metamorphic rock. The term includes the different kinds and relative abundances of minerals, but excludes the texture and fabric of the rock.
mineral paragenesis	A general term for the order of formation of associated minerals in time succession, one after another.
mineral stability	The tendency of a mineral species to remain unaltered under the conditions of temperature and pressure currently experienced.
mini-sosie (shallow seismic reflection)	A method of acquiring and analyzing seismic reflection data to image the subsurface. One or more tamping-type vibrators are used in conjunction with a geophone array. Deconvolution of the recorded wavetrains is required to eliminate the signature of the source vibrators.
miogeosyncline	A geosyncline in which volcanism is not associated with sedimentation.
mitigation	(1) Avoiding an impact altogether by not taking a certain action or parts of an action, (2) minimizing impacts by limiting the degree or magnitude of the action and its implementation, (3) rectifying an impact by repairing, rehabilitating, or restoring the affected environment, (4) reducing or eliminating an impact over time by preservation and maintenance operations during the life of the action, or (5) compensating for the impact by replacing or providing substitute resources or environments.

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mixing height (or depth)	The height above the surface of the earth defining a layer where vigorous vertical mixing occurs; this mixing layer represents the vertical extent to which pollutants can be mixed in the atmosphere.
modal petrography	The analysis of the actual mineral composition of a rock, usually expressed in weight or volume percentages.
modified Mercalli scale	An earthquake intensity scale having 12 divisions ranging from I (not felt by people) to XII (damage nearly total), commonly abbreviated MM.
modified permeability zone (MPZ)	The zone immediately surrounding an underground excavation in which the permeability of the rock mass has been altered due to stress redistribution and blast damage effects.
modulus of deformation	Experimentally determined coefficient of proportionality relating applied stress to observed strain.
modulus of elasticity	See "elastic modulus."
modulus of rupture	The maximum tensile stress in a sample undergoing bending, or the maximum shear stress in a sample undergoing torsion, corresponding to peak load.
modulus of subgrade	See "modulus of subgrade reaction."
modulus of subgrade reaction	Coefficient of proportionality (Cp) in the empirical expression: $P_s = (Cp)(S)$, where P_s is the soil pressure and S is equivalent to the settlement resulting from external pressure.
Mohorovicic Discontinuity	The boundary surface that marks a rapid change in seismic velocity. It marks the level at which P-wave velocities change abruptly. Its depth ranges from about 5 to 10 km beneath the ocean floor to about 35 km below the continents, although it may reach 60 km or more under some mountain ranges. It is variously estimated to be between 0.2 and 3 km thick.
Mohr-Cohlomb criterion	A criterion of failure for solid material undergoing loading, relating peak stress conditions to confining pressure. May be used for intact material, or used to represent the minimum "residual" strength reached by a material subjected to deformation beyond the peak.

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moisture-retention curve	A graph showing the percentage of soil moisture (by mass or volume) versus applied tension.
molecular diffusion	Macroscopic transport of mass, independent of any convection within the system.
molecular sieve	A term used to describe the function of zeolite materials, which are clay-like in chemical nature, and from which all water can be removed without alteration of their molecular structure. As a result of this, the material becomes microporous to such an extent that about half its volume is occupied by very small holes or channels. The material thus readily adsorbs molecules that are small enough to enter the pores vacated by the water molecules. Zeolites therefore act as selective devices that adsorb smaller molecules readily but exclude larger ones. For this reason, they are called molecular sieves.
molecular-sieve adsorption	The removal of a solute particle from a solution as the solution is forced through a material whose molecular structure is such that its physical arrangement precludes the passing of (and thus traps) the solute particle.
moments (statistical)	In general, the mean value of a power of a variate.
Monte Carlo simulation	A random-sampling process for generating uniformly distributed pseudorandom numbers and using these to "draw" random samples from known frequency distributions.
morphometric analysis	The measurement and mathematical analysis of the configuration of the earth's surface and of the shape and dimensions of its landforms. The main aspects examined are the area, altitude, volume, slope, profile, and texture of the land as well as the varied characteristics of rivers and drainage basins.
morphotectonics	The tectonic interpretation of the morphological or topographic features of the earth's surface. It deals with their tectonic or structural relations and origins, rather than their origins by surfacial processes of erosion and sedimentation.
motile	Exhibiting or capable of movement.
muck	Broken rock or ore that results from excavation during mining operations.

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mud cake	The material filling the cracks, crevices, pores, etc. of the rock or adhering to the walls of the borehole. The cake may be derived from the drill cuttings, circulating drill mud, or both. It is formed when the water from the drilling mud filters into porous formations, leaving the mud ingredients as a caked layer adhering to the walls of the drillhole.
multibarrier system	A system of natural and engineered barriers, operating independently or relatively independently, that acts to contain and isolate the waste.
multidetector compensated gamma-gamma tool	See "formation density log with dual proximity."
multidetector compensated neutron porosity tool	See "neutron borehole compensated log."
multiple point borehole extensometer (MPBX)	An instrument placed in boreholes, drilled in walls of mined openings and tunnels and used to measure relative displacement changes parallel to the borehole axis in response to excavation or other loading of rocks in response to excavation or changes in the stress field.
multiwell aquifer test	A test to determine an aquifer's capacity; it involves adding or withdrawing measured quantities from more than one well and measuring the resulting changes in hydraulic head.
mylonite	A deformed rock or texture with a streaky or banded structure produced by shearing of rocks. Often used as a sense-of-shear indicator.
natural background radiation	The radiation that occurs naturally in the environment from such sources as cosmic rays, the naturally occurring radioactive elements in the earth, and naturally occurring radionuclides in living organisms (different from "background radiation").
natural barrier	The physical, mechanical, chemical, and hydrologic characteristics of the geologic environment that individually and collectively act to minimize or preclude radionuclide transport.
natural gamma log	A geophysical wireline method whereby a gamma radiation detector such as a scintillation counter is used in a borehole to record the variation of natural gamma activity with depth.

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natural system	A host rock suitable for repository construction and waste emplacement and the surrounding rock formations. Includes natural barriers that provide containment and isolation by limiting radionuclide transport through the geohydrologic environment to the biosphere and provide conditions that will minimize the potential for human interference in the future.
near-field	That portion of the rock surrounding emplaced waste in which analysis of the thermal and thermomechanical effects of the waste must consider the specific geometric characteristics of the underground facility, including borehole size and orientation, standoff distance, drift shape dimensions and spacing, or overall layout of the facility.
neotectonics	The study of the post-Miocene structures and structural history of the earth.
net infiltration	The amount of precipitation that enters the unsaturated zone below the surficial root zone.
Neumann boundary condition	A boundary condition in which the flux normal to the boundary surface is prescribed for all points. A special case of this type of boundary is the impervious boundary where the flux normal to the boundary vanishes everywhere.
neutron activation analysis	A quantitative analytical technique for elemental analysis that involves the production of a radioactive isotope by the capture of neutrons by the nuclei of the substance to be analyzed. The identification of the radioactive isotopes is done by measurement of the half-life (or energy of the beta particles) or by the gamma-ray spectrum.
neutron borehole compensated (NBC) log (compensated log)	A well log made with a mandrell-type neutron logging tool having two neutron detectors. The neutron porosity is derived from the ratio of the counting rates of the two detectors.
neutron log	A radioactivity log that measures the intensity of neutrons or gamma rays produced when rocks around a borehole are bombarded by neutrons from a synthetic source.
neutron moisture tube	A probe lowered into an access hole used for measuring water content of soil and rocks as indicated by the scattering and absorption of neutrons emitted from a source, and the resulting gamma radiation received by a detector.

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neutron-neutron log (NNL)	Any of the several neutron log curves that measures the abundance of neutrons of a discrete energy range. Neutrons arrive at the detector after "random walk" scattering and slowing, most effectively by hydrogen nuclei. Depending on the neutron-energy selectivity level of the indicator, these curves may be divided into epithermal neutron log and thermal neutron log types.
neutron probe	A probe that measures the intensity of radiation (neutrons or gamma rays) artificially produced when rocks around a borehole are bombarded by neutrons from a synthetic source. The results are recorded on a neutron log.
neutron scattering	The change in direction of neutrons caused by collision with nuclei in a material.
neutron soil-moisture meter	See "neutron moisture tube."
nivation	The process of excavation of a shallow depression in a mountainside by removal of fine material around the edge of a shrinking snow patch or snowbank, chiefly through sheetwash, flow, and solution in meltwater.
no-flow boundary	See "Neumann boundary condition."
nodal plane	A plane through the earthquake focus in which no energy of the longitudinal wave kind is radiated but where transverse wave energy is at a minimum.
nonradiological risk	A risk from sources other than exposure to radiation.
normal conditions	The state or conditions expected to be present most of the time. It is generally used to indicate conditions of temperature, opening stability, equipment, etc., expected about 90 percent of the time.
normal fault	A fault in which the hanging wall appears to have moved downward relative to the footwall. The angle of the fault is usually 45 to 90 degrees measured from the horizontal.
nuclear borehole geophysical log	Log that measures and records radiations from rocks penetrated by a borehole or well. A sonde (on a wire line) is lowered and raised making measurements of radioactive properties of the rocks as a function of depth. Used in cased and uncased holes.
nuclear fuel cycle	Those operations associated with the production of electrical power for public use by any fuel cycle through utilization of nuclear energy.

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NX-sized borehole	The letter code for a 76-mm (3-in.) borehole from which a 54.8-mm (2.16-in.) diameter core is typically extracted.
oblique extension	Extension along a fault in which the motion is a combination of slip along the dip of the fault plane and slip that is purely horizontal.
observation well	A special well drilled in a selected location for the purpose of observing parameters such as fluid levels and pressure changes.
occupational dose	The radiation dose received by a person in a restricted area or in performing work duties involving exposure to radiation.
occupational exposure	The absorption of radiation or the ingestion of a radionuclide by any individual on duty and engaged in operations involving the management, storage, and disposal of radioactive waste.
oceanic mixed layer	The surface layer of the ocean that is well mixed by winds, waves, seasonal cooling, and salinity increases resulting from evaporation.
ODEX drilling method	An under-reamer type percussion drilling method that uses special tools to pull a string of casing into the hole as the hole is drilled. The under-reamer type bit provides a clearance hole for the casing, while providing a means to extract the drill string and tools. The ODEX system is often used with a downhole hammer, and may be used with various drilling fluids including mud, foam, or air alone.
off-normal	See "abnormal."
offsite	That area not under effective control of persons possessing or using spent nuclear fuel or radioactive waste.
ongoing activities	Site characterization activities, as defined by the Nuclear Waste Policy Act of 1982, that were in progress at the time of Presidential approval (May 1986).
open-system method	See "uranium-trend method."
operational phase	The period of time from the receipt of the first waste at the site of the repository to closure and decommissioning.
orbital elements	A set of seven parameters defining the orbit of a body attracted by a central inverse-square force.

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orogeny	The process of forming mountains, particularly by folding and thrusting.
orographic	Said of the precipitation that results when moisture-laden air encounters a high barrier and is forced to rise over it, such as the precipitation on the windward slopes of a mountain range facing a steady wind from a warm ocean. Also, said of the lifting of an air current caused by its passage up and over a mountain.
osmotic potential	The pressure that is developed across a membrane, which is permeable to the solvent but not the solute, when differing concentrations of a solute are placed in contact with opposite sides of the membrane, and flux of solvent across the membrane is not allowed.
outflow	Water that flows out (e.g., ground-water seepage and stream water flowing out of a drainage basin). Also, the amount of water that has flowed out.
out-year activities	Site characterization activities, as defined by the Nuclear Waste Policy Act of 1982, that will be initiated after the first year of site characterization.
overburden stress (geostatic pressure)	The vertical pressure at a point in the earth's crust, which is equal to the pressure caused by the weight of a column of the overlying rock or soil.
overcoring	(1) A process for determining stress components in a rock mass. The process consists of drilling a small diameter borehole and inserting deformation-sensing devices. Subsequently, a larger diameter hole is drilled concentrically with the first hole and, in doing so, relieves the stress in the rock cylinder. The measured deformations are related to stresses through elastic relationships. (2) (rock mechanics) A method of measuring in situ stress. The method involves installation of multidirectional strain recording devices in small boreholes and removing the devices by the coring and enclosing wall rock while recording the resulting strain relief. (3) The drilling of a relatively larger diameter core, encompassing a preexisting, smaller diameter hole. The larger and smaller holes need not be concentric.
overcoring stress	In situ stress determined by the method of overcoring.
overdraft	Withdrawal of ground water in excess of replenishment.

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overpack	Any receptacle, wrapper, box, or other structure that becomes an integral part of a radioactive waste package and is used to enclose a waste container for purposes of providing additional protection or for meeting the requirements of an acceptance or isolation criterion for a specific site. An overpack is often used to encase a damaged or contaminated waste package for which repair or decontamination is impractical.
oversaturated	Contains, because of its manner of preparation, more solute than normally expected under the given condition.
oxidation-reduction reaction	A chemical reaction in which one or more electrons are transferred between two or more chemical constituents of the system.
oxygen-isotope analysis	Analysis of the fractionation of oxygen isotopes (oxygen-18/oxygen-16) in oxygen-bearing geologic materials which may be used as an indication of the source or temperature of formation of the materials.
P-wave	See "compressional wave."
pack rat midden	Preserved plant remains, dung, and refuse deposited in rock cavities by rodents of the genus Neotoma and held together by dried urine.
packaging	The container, any overpacks and their contents, excluding radioactive materials and their encapsulating matrix but including absorbent material, spacing structures, thermal insulation, radiation shielding, devices for absorbing mechanical shock, external fittings or handling devices, neutron absorbers or moderators, and other supplementary equipment that surrounds the radioactive material.
packer	A removable device used in drilled holes to isolate one part of a borehole from another in order to carry out studies of particular formations or parts thereof.
packer tests	An in situ flow test carried out in a drillhole by isolating an interval of uncased (open) hole and injecting water or gas into the interval. The rate of inflow is measured at a range of values of constant injection pressure. The tests may be performed in some cased holes if the test interval is perforated.

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packer-injection tests	A variety of tests whereby a liquid (usually water) or gas is injected into a "sealed off" or isolated portion of a borehole or well to obtain data on such things as formation permeability and fracture flow parameters of rocks.
paleo-	A combining form denoting the attribute of great age or involving ancient conditions (e.g., paleoclimate, paleosol, paleohydrology).
palynology	The branch of science concerned with the study of pollen of seed plants and spores of other embryophytic plants, whether living or fossil.
pan evaporation data	Data collected on evaporation rates by directly measuring the drop in water level in the evaporation pan at specific time intervals.
panel	A nearly rectangular section of the underground layout sized to accommodate a certain amount of waste and used in planning, scheduling, and design analyses.
paragenesis	See "mineral paragenesis."
partial penetration	A well that does not fully penetrate the aquifer under development.
partial pressure	The pressure exerted by a specified component in a mixture of gases.
particle-tracking technique	A numerical procedure commonly used in calculating the dispersive transport properties of an aquifer. In practice, mathematical points or "particles" are permitted to move (1) in the direction of water flow to simulate advection, and (2) in accordance with some random statistical distribution (frequently Gaussian) to simulate dispersion.
particle velocity	The velocity with which an individual particle of water moves through the subsurface.
Pasquill stability class	See "atmospheric stability class."
passive institutional control	(1) Permanent markers placed at a disposal site, (2) public records and archives, (3) government ownership and regulations regarding land or resource use, and (4)other methods of preserving knowledge about the location, design, and contents of a disposal system.

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passive margin	In plate tectonics, movement along extensional ridges occurring in such a way as not to deform or distort the large bodies of horizontally stratified sediments lying in the continental margin.
Peclet number	A dimensionless quantity that measures the magnitude of advective transport relative to the magnitude of diffusive transport.
Peltier type thermocouple psychrometer	A water potential thermocouple psychrometer that is wetted by passing a current through the thermocouple junction, causing it to cool below the dewpoint, resulting in the condensation of water vapor on the sensing junction.
perched ground water	Unconfined ground water separated from an underlying body of ground water by an unsaturated zone. Its water table is a perched water table. Perched ground water is held up by a perching bed whose permeability is so low that water percolating downward through it is not able to bring water in the underlying unsaturated zone above atmospheric pressure.
perched spring	A spring whose source of water is a body of perched ground water.
perennial stream	A stream that flows throughout the year and from source to mouth; a permanent stream.
perennial yield (safe yield)	That rate at which water can be withdrawn from an aquifer without depleting the supply to such an extent that withdrawal at this rate is harmful to the aquifer itself, or to the quality of the water, or is no longer economically feasible.
performance allocation	A part of the process for developing strategies for the resolution of issues, used to guide the site characterization program. See Section 8.1.2.
performance assessment	Any analysis that predicts the behavior of a system or system component under a given set of constant and/or transient conditions. Performance assessments will include estimates of the effects of uncertainties in data and modeling.
performance confirmation	The program of tests, experiments, and analyses that is conducted to evaluate the accuracy and adequacy of the information used to determine with reasonable assurance that the performance objectives for the period after permanent closure can be met.
performance criterion	A criterion establishing qualitative operational, safety, or environmental limits.

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performance goal	A specific value assigned to a performance measure as part of the performance-allocation process.
performance measure	A physical quantity that describes the performance of a system, system element, structure, component, or process in meeting the licensing strategy for an issue.
performance objective	The predetermined standard or specification used to evaluate the acceptability of each system, structure, or component during a performance assessment. Different performance objectives may be suitable for the preclosure and postclosure periods.
performance parameter	In performance allocation, a physical quantity (either measurable or calculable) used to evaluate a performance measure.
perimeter drift	The drift that encircles the emplacement area, advancing in a clockwise direction as the emplacement area is developed. It functions as the exhaust airway for the emplacement area.
perlitic	The texture of a glassy igneous rock that has cracked due to contraction during cooling, the cracks forming small spheruloids. It is generally confined to natural glass, but occasionally found in quartz and other noncleavable minerals and as a relict structure in devitrified rocks.
permanent closure	See "closure."
permeability	In hydrology, the capacity of a medium (rock, sediment, or soil) to transmit ground water. Permeability depends on the size and shape of the pores in the medium and how they are interconnected.
permeametry	Determination of permeability of a material by passing a liquid through a sample of known dimensions and recording the pressure drop and flow rate through the bed.
permissible dose	That dose of ionizing radiation that, in light of present knowledge, carries negligible probability of causing a severe somatic injury or a genetic effect.
persistence (of discontinuity)	One of the ten parameters selected to describe discontinuities in rock masses, being the discontinuity trace length as observed in an exposure, which may give a crude measure of the areal extent or penetration length of a discontinuity. Termination in solid rock or against other discontinuities reduces the persistence.

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petrofabric	The actual rock fabric as analyzed on the thin-section or micro scale, including grain shapes and relationships.
phenocryst	A large crystal in a groundmass of smaller crystals or glass.
phreatophyte	A plant that consumes and then transpires inordinate amounts of water compared to xerophytes.
physical adsorption (physisorption)	The process by which molecules stick to a surface by van der Waals forces. In physisorption no chemical bonds are broken. The molecule is not changed in content but it may be bent or stretched in the proximity of the surface.
phytoliths	A discrete, distinctively shaped, minute (less than 30 microns in diameter) solid body of isotropic silica originally precipitated by terrestrial plants as unwanted material or as reinforcement or cell structures.
Picard iteration	A method that gives approximate solutions of an initial value problem which is of the form $y' = f(x,y)$, $y(x_o) = y_o$ and is assumed to have a unique solution on some interval containing x_o.
piezometer	An instrument for measuring the change of pressure of a material subjected to hydrostatic pressure.
piezometric surface	The elevations to which water will rise in artesian wells, or wells penetrating confined aquifers; determined by both water pressure and elevation of the aquifer.
pillar	A solid mass of rock left standing to support a mine roof.
pintle	Handling fixture on the waste container; a knob welded to one end of the waste container that can be grappled by the handling mechanism in the surface facility or during emplacement or retrieval operations.
piper diagram	A trilinear graph designed to represent chemical analyses of water as percentages of total equivalents per liter.
placer	A surficial deposit formed by mechanical concentration of mineral particles from weathered debris. The common types are beach placers and alluvial placers. The mineral concentrated is usually a heavy mineral such as gold, cassiterite, or rutile.

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planar-rotational faults	A group of parallel faults in which both the faults and beds rotate together during extension, much like tilting dominos. These types of faults generally have no penetrative deformation, pressure solution, or bedding-plane slip associated with them.
plane-strain	A state of strain in which all displacements that arise from deformation are parallel to one plane, and the strain normal to that plane is zero.
plate	A segment of the lithosphere that is internally rigid and moves independently over the interior, meeting in convergence zones and separating at divergence zones.
plate bearing	A procedure performed in small tunnels or adits to measure the deformation characteristics of a rock mass.
plug	A sealing component used for structural support.
plugback	To cement off a lower section of casing in a drillhole to block fluids below from rising in the casing to a higher section being tested.
plunge (structural geology)	The inclination of a fold axis or other geologic structure, measured by its departure from horizontal.
pluvial	Pertaining to rain or to precipitation. Also said of a climate characterized by relatively high precipitation.
pneumatic testing	Pressure testing of a process vessel by the use of air pressure.
Poisson's ratio	The ratio of the lateral strain to the longitudinal strain in a body that has been stressed longitudinally within its elastic limit.
population dose	The sum of the radiation doses received by the individual members of a population exposed to a particular source or event. It is expressed in units of man-rem.
pore pressure (neutral stress)	The stress transmitted by the fluid that fills the voids between particles of a soil or rock mass (e.g., that part of the total normal stress in a saturated soil caused by the presence of interstitial water).
porosity	The ratio of the total volume of interstices in rock or soil to its total volume, expressed as a percentage or as a fraction.
postclosure	The period of time after the closure of the geologic repository.

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postclosure system guideline	Guideline that establishes waste containment and isolation requirements that are based on U.S. Nuclear Regulatory Commission and Environmental Protection Agency regulations. It is also a qualifying condition.
potassium-argon dating (K-Ar)	Determination of the age of a mineral or rock in years. Ratio of radiogenic argon-40 to potassium-40 and the known radioactive decay rate of potassium-40 to argon-40.
potential evapotranspiration	The amount of water that would be removed from the land surface by evaporation and transpiration processes if sufficient water were available in the soil to meet the demand.
potential field	A field which obeys Laplace's equations, such as gravity, magnetic, or electrical fields.
potentially acceptable site	Any site at which, after geologic studies and field mapping but before detailed geologic data gathering, the U.S. Department of Energy undertakes preliminary drilling and geophysical testing for the definition of site location.
potentially adverse condition	A condition that is presumed to detract from expected system performance, but further evaluation, additional data, or the identification of compensating or mitigating factors may indicate that its effect on the expected system performance is acceptable.
potential Q-scenario	Used to designate an accident scenario in which the probability and dose consequence are sufficiently close to the Q-scenario criteria that a change in assumptions or data used in analyses could cause the criteria to be exceeded.
potentiometric surface	An imaginary surface representing the total head of ground water and defined by the level to which water will rise in a well. It is usually represented as a contour map in which each point tells how high the water would rise in a well tapping that aquifer at that point.
power spectrum	The series of squared Fourier coefficient values.
pozzolan	Siliceous material, such as diatomaceous earth, opaline chert, and certain tuffs, that can be finely ground and combined with portland cement. Portland-pozzolan cements are highly resistant to penetration and corrosion by salt water.
preclosure	The period of time before and during the closure of the geologic repository.

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preclosure radiological safety	The siting and design considerations important in protecting the public and the repository workers from exposures to radiation during repository operations and prior to repository closure.
pressure head	The height of a column of liquid supported, or capable of being supported, by pressure at a point in the liquid.
pressure plate apparatus	An instrument used for determining pressure head in unsaturated rock.
pressurized water reactor (PWR)	A reactor system that uses pressurized water in the primary cooling system. Steam formed in a secondary cooling system is used to turn turbines to generate electricity.
pre-waste-emplacement	Before the authorization of a repository construction by the U.S. Nuclear Regulatory Commission.
primary area	The surface location, as indicated on a map, of the principal area that may be suitable for waste emplacement. When projected downward along the location of faults and other geologic features, the boundaries of the primary area encompass the principal region within the target emplacement horizon that is considered potentially suitable for waste emplacement. See "emplacement horizon."
primary porosity	The porosity that developed during the final stages of emplacement or that was present within particles at the time of deposition. Primary porosity includes all predepositional and depositional porosity of a particle, sediment, or rock.
primer	A cap, tube, or wafer containing percussion powder or compound used to ignite an explosive charge.
principal stress	A stress that is perpendicular to one of three mutually perpendicular planes that intersect at a point in a body on which the shearing stress is zero; a stress that is normal to a principal plane of stress. The three principal stresses are identified as least or minimum, intermediate, and greatest or maximum.
probable maximum flood	The most severe flood reasonably possible based on comprehensive hydrometeorological application of probable maximum precipitation and other hydrologic factors favorable for maximum flood runoff.

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product	A description of a result obtained from a design activity, including, for example; design drawings, a design report, supporting analyses, a report of equipment demonstration, an operations plan, etc. A product of a design activity may be an input item for another design or performance-assessment activity.
protected area	An area encompassed by physical barriers and to which personnel access is controlled.
proton spinner	The proton (hydrogen nucleus) has a magnetic movement magnetometer because of its spin. The spin axis precesses in the presence of a magnetic field, giving rise to an alternating magnetic field with a characteristic frequency that is proportional to the strength of the applied field. In the magnetometer, a strong field is briefly applied to align the spin axis in a sample of fluid. When the initial pulse stops, precession follows at a particular frequency. The alternating field is detected by a measurement coil, and the frequency is counted to determine the strength of the ambient field.
prototype weldments	A model (whose component parts are joined by welding) suitable for use in complete evaluation of form, design, and performance.
provenance	A place of origin. The area from which the constituent materials of a sedimentary rock or facies are derived.
proxy data	Any geologic evidence of past climate. Paleoclimate can not be directly measured in the field, therefore, evidence collected in the field is used to infer these past climatic parameters.
psychrometer	A hygrometer consisting of two similar thermometers with the bulk of one being kept wet so that the cooling that results from evaporation makes it register a lower temperature than the dry one. The difference between the readings constitutes a measure of the dryness of the atmosphere.
psychrometric chart	A nomograph for graphically obtaining relative humidity, absolute humidity, and dew point, from wet- and dry-bulb thermometer readings.
public radiation safety assessment package	A general approach to the resolution of Issue 2.1 including the following design steps: a design evaluation, identification of radiation source characteristics, a radionuclide transport evaluation, a public radiation exposure calculation, and a performance evaluation for compliance with goals.

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pumping test	(1) Yield of water. A test made with a pump in a new well to determine its water-yielding capacity. Quantities and water levels are recorded during the test period. The test pumping rate is usually greater than that at which water will be required and covers a period sufficiently long to indicate whether the yield can be maintained. (2) Quality of water. Taking water samples during the test to determine by chemical analyses, the chief constituents and organic purity. Tests may extend over about 14 days, and finally a full mineral analysis is often made and may be used to prescribe treatment and purification processes.
pycnometer	A standard vessel often provided with a thermometer for measuring and comparing the densities of liquids or solids.
pyroclastic	Pertaining to clastic rock material formed by volcanic explosion or aerial expulsion from a volcanic vent. Also, pertaining to rock texture of explosive origin.
pyrophoric	(1) Igniting spontaneously. (2) Emitting sparks when scratched or struck, especially with steel.
Q-list	A list of geologic repository structures, systems, and components that have been determined to be important to safety, waste isolation, or both, and are thereby subject to the highest quality assurance (QA) level (QA Level I) of the formal QA Plan.
Q-scenario	An accident scenario that exceeds a probability of occurrence of 10^{-5} per year and causes an offsite dose of 0.5 rem or greater.
qualified site	A site that, having been characterized, is considered to be technically suitable for a repository.
qualifying condition	A condition that must be satisfied for a site to be considered acceptable with respect to a specific guideline.
quality assurance (QA)	all the planned and systematic actions necessary to provide adequate confidence that a structure, system, or component is constructed to plans and specifications and will perform satisfactorily.
Quality Assurance Level I	Those radiological health and safety related items and activities that are important to either safety or waste isolation and that are associated with the ability of a geologic nuclear waste repository to prevent or mitigate the consequences of a process or event that could cause undue risk to the radiological

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	heath and safety of the public. Items and activities important to safety are those engineered structures, systems, and components essential to the prevention or mitigation of an accident that could result in a radiation dose either to the whole body or to any organ of 0.5 rem or greater either at or beyond the nearest boundary of the unrestricted area at any time until the completion of the permanent closure of the repository. Activities important to waste isolation are those that must meet the criteria that address postclosure performance of the engineered and natural barriers to prevent the release of radionuclides. The criteria for items or activities important to safety and waste isolation are found in 10 CFR Part 60 and 40 CFR Part 191.
Quality Assurance Level II	Those activities and items related to the systems, structures, and components that require a level of quality assurance sufficient to provide for reliability, maintainability, public and repository worker nonradiological health and safety, repository worker radiological health and safety, and other operational factors that would have an impact on the environment and on U.S. Department of Energy and Yucca Mountain Project Office concerns.
Quality Assurance Level III	Those activities and items not classified as quality assurance (QA) Levels I or II.
quality control	Quality assurance actions that provide a means to control and measure the characteristics of an item, process, or facility to established requirements.
quality factor (radiation)	A measure of the relative biological damage from a given type of radiation related to linear energy transfer (LET).
radar remote sensing	A remote sensing system that has a microwave energy source and a microwave detector for intercepting and measuring returned radar signal. Returned signals are processed to give an image of returned microwave energy, which can be correlated to topography and geologic features. See "side-looking airborne radar."
radial borehole test (azimuthal survey)	A survey method in which potential electrodes are moved along radii about a drillhole containing a fixed current electrode. The second current electrode (infinite electrode) is a great distance away.
radiation dose	The quantity of radiation absorbed per unit of mass by the body or any portion of the body.

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radiation field intensity	In general, the quantity of radiant energy at a specified location passing perpendicularly through unit area in unit time.
radiation zone	An area that contains radioactive materials or radiation field in quantities significant enough to require the control of personnel entry to the area.
radioactive decay	A spontaneous nuclear transformation (disintegration) in which nuclear particles or electromagnetic energy (such as alpha particles, beta particles, or gamma photons) are emitted.
radioactive-waste facility	A facility subject to the licensing and related regulatory authority of the U.S. Nuclear Regulatory Commission pursuant to Sections 202(3) and 202(4) of the Energy Reorganization Act of 1974 (88 Stat. 1244).
radiocarbon dating	The determination of the age of a material by measuring the proportion of the isotope carbon-14 (radiocarbon) in the carbon that it contains. The method is suitable for the determination of ages up to about 60,000 years.
radiography testing	A method used to determine flaws in pipe or other metals by use of a source emitting x-rays or gamma rays, which penetrate the metal and are transcribed onto film.
radioisotope	A radioactive isotope of an element.
radiological environmental monitoring	The measurement of radioactive contaminant concentrations or radiation intensity in the environment.
radiological exposures to public	The radiation dose received by the absorption of radiation or the intake of radionuclides by an individual except when that individual is a worker engaged in operations involving the management, storage, and disposal of radioactive waste.
radiolysis	The decomposition of molecules (often the water molecule) due to interactions with gamma radiation.
radiometric dating	The calculation of the age of a material by a method based on the decay of radionuclides that occur in the material.
radionuclide	An unstable radioactive nuclide that decays toward a stable state at a characteristic rate by the emission of ionizing radiation(s).

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radionuclide retardation	The process that causes the time required for a given radionuclide to move between two locations to be greater than the ground-water travel time because of physical and radionuclide interactions between the radionuclide and the geohydrologic unit through which the radionuclide travels. See "retardation."
raise boring	A mining method by which a vertical circular opening is excavated from the bottom up using a special drill bit.
random walk theory	A succession of movements along line segments where the direction, and possibly the length, of each move is randomly determined.
reasonably achievable	Mitigation measures or courses of action shown to be reasonable considering the costs and benefits in accordance with the National Environmental Policy Act of 1969. See "as low as reasonably achievable."
reasonably available technology	Technology that exists and has been demonstrated, or for which the results of any requisite development, demonstration, or confirmatory testing efforts before application will be available within the required time periods.
reasonably foreseeable releases	Releases of radioactive wastes to the accessible environment that are estimated to have more than one chance in 100 of occurring within 10,000 yr.
recharge (hydrologic)	The process by which water is added to the zone of saturation, either directly into a geologic formation or indirectly by way of another formation or through unconsolidated sediments.
recurrence interval	(1) The average time interval between occurrences of a hydrologic or geologic event of a given or greater magnitude. (2) In an annual flood series, the average interval in which a flood of a given size recurs as an annual maximum. (3) In a partial duration series, the average interval between floods of a given size, regardless of their relationship to the year or any other period of time. This distinction holds even though, for large floods, recurrence intervals are nearly the same on both scales.
regulated area	An area to which public access is limited or controlled.
regulatory agency	The government agency responsible for regulating the use of sources of radiation or radioactive materials or emissions and responsible for enforcing compliance with such regulations.

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relative age	The geologic age of a fossil organism, rock, geologic feature, or event, defined relative to other organisms, rocks, features, or events rather than in terms of years.
relative permeability	The ratio between the effective permeability of a given fluid at a partial saturation to the permeability at 100 percent saturation (the absolute permeability). It ranges from zero at low saturation to 1.0 at a saturation of 100 percent.
relative porosity	The ratio of the volume of interstices in a rock or soil to its total volume. It is usually stated as a percentage.
release limit	A regulatory limit on the concentration or the amount of radioactive material released to the environment; usually expressed as a radiation dose.
remanent magnetization	Permanent magnetization induced by an applied magnetic field, causing an alignment of magnetic domains or particles, which is then fixed in the material through the effects of cooling, deposition, mechanical shock, or other process, rendering the material permanently magnetized.
remote-handled transuranic (TRU) waste	Transuranic waste that requires shielding in addition to that provided by its container in order to protect people nearby because its surface dose rate (greater than 0.2 rem/hr) precludes safe direct handling.
remote sensing	Collection of information about an object by a recording device that is not in physical contact with it. The term is usually restricted to include methods that record reflected or radiated electromagnetic energy, rather than methods that involve significant penetration into the earth. The technique employs such devices as the camera, infrared detectors, microwave frequency receivers, and radar detectors.
removal	The removal of emplaced waste for performance confirmation, inspection, analysis, or any other purpose not directly related to public health and safety (and the environment).
repository	See "geologic repository."
repository area boundary	See "controlled area."

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residual gravity	In gravity prospecting, the portion of a gravity effect remaining after removal of some type of regional effect; usually the relatively small or local anomaly components of the total or observed gravity field.
residual saturation	The saturation at which the water network in the rock pores becomes disconnected and the water conductivity is zero.
residual stress (ambient stress field)	The concept of residual stress is based on the coexistence of locked-in strains, resulting from crystal distortion due to past external loads, and locking strains that constrain them. The residual stresses giving rise to locked-in and locking strains are present in finite bodies with no external loads applied on their boundaries, thus the vector sum of residual stresses within such bodies is zero. The strains are stored by cementation, and physical and chemical reaction between anisotropic grains which occur while under applied stress.
residual uncertainties	Those levels of uncertainty remaining after careful investigation, design, and development have been completed. For example, the present uncertainty in seismic hazard to surface facilities can be reduced by a careful program of field investigation and data evaluation, but not to zero uncertainty.
resistivity imaging technique	A geophysical prospecting method in which direct measurements are made of the ratio of voltage to current. The current is a function of the conducting property of a rock and is controlled by its water content and its salinity. If these values are high, then its conductivity is also high and its electrical resistivity is low.
resistivity survey	Any electrical exploration method in which current is introduced into the ground by two contact electrodes and potential differences are measured between two or more other electrodes.
resonant column test	A test to study the effects of variations in stress or strain amplitudes while a cylindrical column of soil is vibrated in either the longitudinal or torsional mode, normally in a triaxial cell.
response surface	A nonlinear function that describes the manner in which the output varies with changes in input variable.

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restricted area	Any area to which access is controlled by the U.S. Department of Energy for purposes of protecting individuals from exposure to radiation and radioactive materials before repository closure, but not including any areas used as residential quarters, although a separate room or rooms in a residential building may be set apart as a restricted area.
resurgent caldera	A caldera that has been subjected to broad upwarping or doming after formation. Resurgence usually results in formation of a highly faulted structural dome in the center of the caldera.
retardation	The act or process that reduces the rate of movement of a chemical substance in a water stream relative to the average velocity of the water. The movement of the chemical substance in the water can be retarded by sorption and desorption reactions, by precipitation and dissolution reactions, and by diffusion into the pore water of the rock matrix. See "radionuclide retardation."
retention curve	See "moisture-retention curve."
retention pond	An earthen structure designed to hold stormwater runoff; sometimes used to mean an evaporation pond.
retrievability	The capability that is provided by the repository system--by means of design approaches, construction methods, and operating procedures--to allow waste retrieval to be performed.
retrievability period	The time during which emplaced waste is capable of being retrieved. For design purposes, this period begins with emplacement of the first waste and ends 50 years thereafter at the end of the caretaker period.
retrieval	The act of intentionally removing radioactive waste from the underground location at which the waste had been previously emplaced for disposal.
retrograde metamorphism	A type of polymetamorphism by which metamorphic minerals of a lower grade are formed at the expense of minerals characteristic of a higher grade metamorphism. A readjustment necessitated by a change in physical conditions (e.g., a lowering of temperature).

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reverse air-vacuum drilling	A drilling method using reverse circulation (down the annulus and up the drill pipe) with air as circulation medium, to avoid fluid loss into the formation and to provide high quality in situ moisture content data. Circulation is forced by drawing a vacuum on the drill pipe at the surface.
reverse drilling (rotary)	A method of drilling in which drilling fluid is forced to the bit by way of the annulus, around the drill pipe, and flows back to the surface up the inside of a rapidly rotating drill stem.
Richard's equation	The mathematical equation generally used to describe flow through an unsaturated porous medium.
Richter magnitude	See "Richter scale."
Richter scale	A numerical scale of the energy released by an earthquake, as measured on an instrument (e.g., a seismometer) that transforms the mechanical effects of earth shocks into electrical signals.
ring-fracture zone	A steep sided fault pattern cylindrical in outline and associated with caldera subsidence.
rock burst	A sudden yielding that occurs when a volume of rock is strained beyond its elastic limit and the accompanying failure is such that the accumulated energy is released instantaneously. A rock burst can vary from the splitting off of small slabs of rock to the collapse of large pillars, roofs, or other massive parts of a mine.
rock quality designation (RQD)	A drill core quality rating used as a parameter for classification of rock quality. Evaluated by determining the percentage of recovery of core in lengths that are greater than twice the diameter of the core.
rock varnish	See "cation-ratio dating."
roof loading	Any covered structure, not classified as a bridge, that constitutes a transverse drain, waterway or other opening under a road, railroad canal, or similar structure.
rotary drilling	A drilling process consisting of a rotating drill pipe at the bottom of which is attached a hard-toothed drill bit.
rubber-balloon method (field density test)	A method to determine field or in situ density of naturally occurring soils or fill materials for the control of compaction.

rubidium-strontium dating	Determination of an age for a mineral or rock in years based on the ratio of radiogenic strontium-87 to rubidium-87 and the known radioactive decay rate of rubidium-87.
rupture zone	A zone in the lithosphere characterized by brittle or ductile fracturing of rock.
sand-cone method	A standardized method for measuring bulk density of granular materials including alluvium, whereby a bulk sample is weighed in a conical vessel of prescribed dimensions.
saturated conductivity	See "hydraulic conductivity."
saturated flow	Ground-water flow through the saturated zone.
saturated zone	That part of the earth's crust beneath the water table in which all voids, large and small, are ideally filled with water under pressure greater than that of the atmosphere.
scaling	(1) The removal of loose rock from a newly blasted wall or roof. (2) The term scaling can be used to describe, for example, the conducting of experiments, previously done at a laboratory scale, at a field scale (the scaling of experiments). Differences in the results of the experiments may be due to a scaling effect.
scanning Auger technique	A surface analytical technique.
scanning-transmission electron microscope	A type of electron microscope that has the capability of forming the electron beam into a fine probe and scanning it across a thin specimen. The transmitted scanned beam is collected below the specimen by a solid-state detector and is reproduced electronically as an image on a cathode-ray tube.
scarification	The process of breaking up and loosening the surface of a material.
scouring	An erosional process, especially by moving water.
seafloor spreading ridge	An extensional ridge associated with a continuous seismic mountain range extending through the ocean where oceanic crust is increasing by convective upwelling of magma. The new material moves away at a rate of 1 to 10 cm/yr.
seal	An engineered component that reduces water flow.

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secondary compression	The reduction in volume of sediments under constant pressure that results from changes in the internal structure of the sediments.
secondary creep	Time-dependent strain occurring under constant stress at a minimum and almost constant rate.
secondary mineral	A mineral formed later than the rock enclosing it, usually at the expense of an earlier-formed primary mineral, as a result of weathering, metamorphism, or solution.
secondary porosity	The porosity developed in a rock after its deposition or emplacement, through such processes as solution or fracturing.
Secretary	The Secretary of Energy.
sediment yield	The amount of material eroded from the land surface by runoff and delivered to a stream system.
seep	An area, generally small, where fluid percolates slowly to the land surface. For water, it may be considered as a synonym of seepage spring, but it is used by some for flows too small to be considered as springs.
seepage face	A belt along a slope, such as the bank of a stream, along which water emerges at atmospheric pressure and flows down the slope.
seiche	A periodic oscillation of a body of water whose period is determined by the resonant characteristics of the containing basin as controlled by its physical dimensions. These periods generally range from a few minutes to an hour or more.
seismic	Pertaining to, characteristic of, or produced by earthquakes or earth vibrations.
seismic acceleration	The acceleration associated with the passage of seismic waves at the surface or subsurface, as applicable.
seismic belt	An elongate earthquake zone such as the belts of the circum-Pacific, the Mediterranean and trans-Atlantic, the mid-Atlantic, and the mid-Indian.
seismic lines	The route taken on the surface for deploying seismic sources and detectors in the performance of seismic reflection or seismic refraction surveys.
seismic loading	A temporary stress generated during a seismic cycle.

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seismic pumping	A concept for ground-water movement in response to stress and strain changes associated with seismic activity, for which direct evidence is very sparse or nonexistent.
seismic reflection survey	A survey based on measurement of the travel times of waves that originate from an artificially produced disturbance and that are reflected back to the surface at nearly vertical incidence from boundaries separating media of different elastic-wave velocities.
seismic refraction survey	A program to map geologic structure by using head waves. Head waves involve energy that enters a high-velocity medium (refractor) near the critical angle and travels in the high-velocity medium nearly parallel to the refractor surface. The objective is to determine the arrival times of the head waves to map the depth to the refractors in which they traveled.
seismic velocity	The rate of propagation of an elastic wave, usually measured in kilometers per second. The wave velocity depends on the type of wave as well as the elastic properties and density of the earth material through which it travels.
seismogenic	Capable of generating seismic waves and a seismic event of significant magnitude.
seismometer	An instrument that detects and measures ground motion and produces a signal proportional to the displacement of the point where the instrument is in contact with the earth. May be used in a broad context to refer also to geophones (output signal proportional to velocity) and accelerometers (proportional to acceleration).
seisviewer log	A well log wherein a pulsed, narrow acoustic (sonar) beam scans the borehole wall in a tight helix as the tool moves up the borehole. A display of the amplitude of the reflected wave on a cathode ray tube (television screen) is photographed yielding a picture of the borehole wall to reveal fractures, vugs, etc.
self-potential curve	An electric log curve that records changes in natural potential along an uncased borehole.
semiarid	Said of a type of climate in which there is slightly more precipitation (25-50 cm) than in an arid climate, and in which sparse grasses are the characteristic vegetation. In Thornthwaite's classification, the moisture index is between -20 and -40.

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service main	The drift running parallel to the waste and tuff mains southwest through the longitudinal axis of the underground repository dedicated to equipment and personnel access.
settlement	The lowering of the overlying strata in a mine, owing to the extraction of the mined material.
settlement plug	A plug of cast concrete or similar material placed within a shaft, anchored to the surrounding bedrock, to provide physical support to overlying backfill in the shaft.
Sevier Orogeny	A name proposed by R. L. Armstrong for the well-known deformations that occurred along the eastern edge of the Great Basin in Utah during times intermediate between the Nevadan orogeny further west and the Laramide orogeny further east, culminating early in the late Cretaceous.
SH-wave (shear wave)	Shear waves with motion parallel to the free surface.
shaft collar	See "collar."
shaft liner	A structural lining usually made of steel, concrete, or timber that provides safe rock support and aids in preventing ground water from entering the shaft.
shaft pillar	An undisturbed buffer zone surrounding a shaft of sufficient area, so that any possible subsidence in nearby mined areas will not disturb the integrity of the shaft facility.
shaft station	A horizontally excavated opening of a shaft at a desired depth.
shear	(1) A stress state that produces a strain causing contiguous parts of a body to slide relative to each other in a parallel direction. (2) Surfaces and zones of failure by shear or surfaces along which differential movement has taken place.
shear modulus	The ability of atoms in a solid to slide past one another. The higher the value of the shear modulus the more rigid the material. Also referred to as the modulus of rigidity.
shear resistance	See "shear strength."
shear strength	The internal resistance of a body to shear stress, typically including a frictional part and a part independent of friction called cohesion.

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shear stress	That component of stress that acts tangential to the plane through any given point on a body; any of the tangential components of the stress tensor.
shear wave (s-wave)	A type of seismic body wave propagated by a shearing motion of material, so that there is oscillation perpendicular to the direction of propagation. It does not travel through liquids or the outer core of the earth. Its speed is 3.0 to 4.0 km/s in the crust and 4.4 to 4.6 km/s in the upper mantle. The "s" stands for secondary, so named because it arrives later than the p-wave (primary body wave).
sheave	A large, pulley-type wheel at the top of the headframe that carries the hoist rope.
sheet flow (laminar flow)	An overland flow or downslope movement of water taking the form of a thin, continuous film over relatively smooth soil or rock surfaces and not concentrated into channels larger than rills.
shelby tube	A thin-shelled tube used to take deep-soil samples. The tube is pushed into the undisturbed borehole and driven into the ground.
shield plug	A cylinder of concrete, steel, or other dense material used to plug emplacement boreholes after waste package emplacement. Its main function is to attenuate radiation by providing shielding from the radioactive waste.
shielding	The material interposed between a source of radiation and personnel to protect against radiation exposure; commonly used shielding materials are concrete, water, and lead.
shielding collar	A component of the shielding closure that provides radiation shielding by extending from the closure to the transporter cask during emplacement or retrieval.
shipping cask	A specially designed and certified massive metal container that provides shielding and containment in accordance with Federal and/or international radiological safety rules and regulations for safe transportation of radioactive materials through the public domain.
shotcrete	Cement-based compounds sprayed on mine surfaces to prevent erosion by air and moisture and on rock surfaces to stabilize against minor rock falls. Also used to prevent dehydration and decrepitation.

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side-looking airborne radar (SLAR)	An airborne radar system in which a long, narrow, stabilized antenna, aligned parallel to the motion of an aircraft or satellite, projects radiation at right angles to the flight path. Returned signals are processed to give an image of returned microwave energy, which can be correlated to topography and geologic features.
sieve analysis	Determination of the percentage distribution of particle size by passing a measured sample of soil or sediment through standard sieves of various sizes.
sieve deposit	The formation of a coarse-grained mass on an alluvial fan whose material is sufficiently coarse and permeable to permit complete infiltration of water before it reaches the toe of the fan.
significant source of ground water	As defined in 40 CFR Part 191, an aquifer that (1) is saturated with water having less than 10,000 milligrams per liter of total dissolved solids, (2)is within 770 meters (2,500 feet) of the land surface, (3) has a transmissivity greater than 3×10^{-5} m^2/s (200 gallons per foot per day), provided that any second formation or part of a formation included within the source of ground water has a hydraulic conductivity greater than 1×10^{-6} m/s (2 gallons per square foot per day), and (4) is capable of continuously yielding at least 1,600 liters per hour (10,000 gallons per day) to a pumped or flowing well for a period of at least a year; or an aquifer that provides the primary source of water for a community water system.
sink	(1) A depression containing a central playa or saline lake with no outlet, as where a desert stream comes to an end or disappears by evaporation. (2) To drill or put down a shaft or borehole. (3) A water lodgement or trap at a pumping station. (4) Generally synonymous with outflows or withdrawal of ground water.
sinking deck	A scaffold for staging that is designed for use during shaft sinking, particularly during lining operations.
site	A potentially acceptable site or a candidate site, as appropriate, until such time as the controlled area has been established, at which time the site and the controlled area are the same.
skin effect	The phenomena in which alterations in permeability in the vicinity of a drill hole are caused by drilling and completion operations.

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skip	A basket, bucket, or open car used to raise materials that is mounted vertically or on an incline on wheels, rails, or shafts and hoisted by a cable.
slabbing	A stress-induced failure mechanism of the rock around an excavation.
Slake-durability	An index test that tests a rock's resistance to mechanical weathering by rotating samples in a sieve mesh drum for 10 minutes and comparing the sample's final weight to its initial weight.
slash	A mining technique in which a large-diameter drilled hole is enlarged by using the drill-and-blast method.
sleeve	As related to the waste package, a metallic or non-metallic liner that may be located in the emplacement hole to aid in the emplacement and possible retrieval of the waste.
slough	Fragmentary rock material that has crumbled and fallen away from the sides of a borehole or mine working. It may obstruct a borehole or be washed out during circulation of the drilling mud.
slug flow	Movement of an isolated body of water, such as free water moving downward in the zone of aeration. The term is based on slang for a small amount of liquid, such as a slug of whiskey.
slug injection test	A method for determination of the in situ hydraulic conductivity of an aquifer by instantaneous addition of water to a piezometer.
snowcourses	A line or a series of connecting lines of regularly spaced observation stations (usually 10 or more) at which snow samples are taken for measuring depth, density, and water equivalent for forecasting subsequent runoff.
snowpillows	A device used to record the changing weight of the snow cover at a point. It consists of a fluid-filled bladder or metal container lying on the ground, the internal pressure of which measures the weight of overlying snow.
soil aspect	The direction toward which a slope faces with respect to the compass or to the rays of the sun.

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soil horizons	A layer of soil that is distinguishable from adjacent layers by characteristic physical properties such as structure, color, or texture, or by chemical composition, including content of organic matter or degree of acidity, or alkalinity. Soil horizons are generally designated by a capital letter, with or without a numerical annotation (e.g., A horizon).
soil profile	A vertical section of soil from the surface to the bedrock that can usually be divided into three zones, or horizons, which develop as weathering takes place. The thickness of the soil profile depends on the age of the soil and the climate. The transitions from one zone to another are normally indistinct.
soil water	Water in the belt of soil. The upper subdivision of the zone of aeration, limited above by the land surface and below by the intermediate belt. This zone contains plant roots and water available for plant growth.
solar constant	The rate at which solar radiant energy is received outside the atmosphere on a surface normal to the incident radiation at the earth's mean distance from the sun.
solar radiation	The electromagnetic radiation emitted by the sun.
sole fault	A low-angle thrust fault forming the base of a thrust nappe. The basal main fault of an imbrication.
solid solution	A single crystalline phase that may be varied in composition within finite limits without the appearance of an additional phase.
sols	A colloidal dispersion of a solid in a liquid.
solution channel	Tubular or planar channel formed by solution in carbonate rock terranes, usually along joints and bedding planes. It is the main water carrier in carbonate rocks.
sonic log	A geophysical log made by an instrument, lowered and raised in a borehole or well, that continuously records, as a function of depth, the velocity of sound waves as they travel over short distances in the adjacent rocks. The log reflects porosity and lithologic changes.
sonic velocity log	A geophysical log made by an instrument, lowered and raised in the borehole or well, that continuously records, as a function of depth, the velocity (or inter-time) of sound waves as they travel over short distances in the adjacent rocks.

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sorption	A term including both adsorption and absorption. The binding, on a microscopic scale, of one substance to another, such as by adsorption or ion exchange. In this document, the word is especially used for the sorption of dissolved radionuclides onto aquifer solids or waste-package materials by means of close-range chemical or physical forces.
sorptive minerals	The minerals (e.g., zeolites) that have the ability to take up large amounts of some guest molecules or ionic species. These molecules or ions can be in aqueous or gaseous form.
special nuclear material	(1) Plutonium, uranium-233, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the U.S. Nuclear Regulatory Commission, pursuant to the provisions of section 51 of the Nuclear Waste Policy Act of 1983, determines to be special nuclear material, but does not include source material, or (2) any material artificially enriched by any of the foregoing but does not include source material.
specific activity	The measure of radioactivity as a function of mass. The unit of specific activity is curie per gram.
specific capacity (of a well)	The rate of discharge of a water well per unit of drawdown.
specific discharge (q/a)	Discharge (hydraulic) per unit area. It is often used to define the magnitude of a flood.
specific electrical conductance	The electrical conductivity of water at 25°C, measured in micro-ohms per centimeter.
specific gravity	The ratio of the density of a substance to the density of water when both densities are obtained by weighing in air.
specific storage	The volume of water that a unit volume of aquifer releases from storage under a unit decline in hydraulic head.
specific yield	The ratio of the volume of water that a given mass of saturated rock or soil will yield by gravity to the volume of that mass.
spectral amplitude	A seismometer whose response is linearly proportional to the acceleration of the earth materials with which it is in contact.
spectroscopy	The production and observation of a spectrum and all methods of recording and measuring, including the use of the spectroscope.

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spent nuclear fuel	Fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing.
spinner magnetometer	A laboratory instrument that continuously rotates the specimen whose remanent magnetism it is measuring, to produce an alternating voltage in a nearby coil by electromagnetic conduction.
splay (fault)	One of a series of minor faults at the extremities of a major fault; often associated with rifts.
split-barrel sampling (penetration test)	A method for making soil borings with a split-tube (split-spoon) sampler in order to obtain both representative samples of soil for identification and a record of the soil's resistance to penetration by the tube.
spud	The beginning of actual drilling operations on a well or borehole; the first abrasion of the soil by the drill, or the first entrance of the drill into the ground; the preliminary boring of a well through earth material down to rock or other solid substrata.
stability, repository	The condition resulting from the nature and rates of natural processes affecting the site during the recent geologic past and the expectation that they will be relatively slow and will not significantly change during the next 10,000 yr or jeopardize the isolation of the waste. As defined in 10 CFR Part 60, the nature and rates of natural processes (e.g., erosion and faulting) have been and are projected to be such that their effects will not jeopardize the isolation of the waste.
stability (series)	A grouping of minerals according to their persistence in nature (i.e., to their resistance to alteration or destruction by weathering, abrasion, or post-depositional solution (e.g., olivine (least stable), augite, hornblende, biotite (most stable)). The most stable minerals are those that tend to be at equilibrium at the earth's surface.
stable isotope	A nuclide that does not undergo radioactive decay.
stage (in hydrology)	The height of a water surface above an established datum plane.
standard mean ocean water (SMOW)	The mean isotopic composition of sea water; a reference standard for isotopes of oxygen and hydrogen.

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standard neutron activation	A method of identifying stable isotopes of elements in a sample by irradiating the sample with neutrons to render the elements radioactive, after which the elements are identified by their characteristic radiations.
standoff	A variable distance between a drift wall or floor and the radioactive waste in a horizontal or vertical emplacement borehole. The standoff distance aids in controlling temperatures and radiation levels in the drift.
static water table	The average level of ground water that does not vary over time.
statistical distribution function	The distribution function, F(x), of a variate x is the total frequency of members with variate values less than or equal to x. As a general rule, the total frequency is taken to be unity, in which case the distribution function is the proportion of members bearing values less than or equal to x. Similarly, for p variates x_1, x_2 ...x_p the distribution function $F(x_1,x_2,...x_p)$ is the frequency of values less than or equal to x, for the first variate, x_1, x_2 for the second, and so on.
statistical dynamical models	These meteorological models include thermodynamic or energy balance models. The equations are often formulated in terms of averages for days, months, years, or longer intervals.
statistical moments	See "moments."
steel sets	Steel support beams used for ground control in underground mines.
stemming	The material (sand, clay, gravel) that fills a shothole after the explosive charge has been inserted, to prevent the explosion from "blowing out" the top of the hole. Also, the process of installing packers or stemming material, in order to isolate an interval of a borehole, usually with a conduit of some type installed between the interval and the surface.
stereonet contouring	See "contoured stereonet."
stereonet plot	A two-dimensional projection of a hemispherical surface. Therefore, three-dimensional measurements are viewed in two dimensions, lines are plotted as points and planes are plotted as great circles. These plots are useful for determining angular relationships between lines and planes in space.

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Stiff diagram	A diagram plotting cations and anions in water and used as a method to show water-composition differences and similarities in total ionic content between water samples.
stoichiometry	(1) The application of the laws of definite proportions and of the conservation of matter and energy to chemical activity. (2) The quantitative relationship between constituents in a chemical reaction.
storage	Retention of high-level radioactive waste, spent nuclear fuel, or transuranic waste with the intent to recover such waste or fuel for subsequent use, processing, or disposal.
storage coefficient	See "storativity."
storativity	The volume of water released from storage in a vertical column of 1 square foot when the water table or other potentiometric surface declines 1 foot. In an unconfined aquifer, it is equal to the specific yield. Also called storage coefficient.
straddle packer	A set of two or more packers deployed on a string of drill pipe or tubing, to isolate one or more intervals of a borehole. Often provided with some means of opening and shutting hydraulic communication between the pipe and the interval, and between the pipe and the packers. Used for hydrologic testing and for hydraulic fracturing.
strandline	(1) The ephemeral line or level at which a body of standing water (e.g., the sea) meets the land; the shoreline, especially a former shoreline now elevated above the present water level. (2) A beach, especially one raised above the present sea level.
stratiform deposits	Said of a special type of strata-bound deposit in which the desired rock or ore are strictly coextensive with one or more sedimentary, metamorphic, or igneous layers (e.g., beds of salt or iron oxide, or layers rich in chromite or platinum in a layered igneous complex).
stream capture (piracy)	The natural diversion of the headwaters of one stream into the channel of another stream having greater erosional activity.

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stress cancellation	In situ stress is often measured by relieving the stress in a volume of rock, measuring the resultant strain or other physical response, then reloading the rock volume under controlled conditions to reverse the response. When the original state of the rock volume is achieved, the applied stress is regarded to be equal to the in situ stress. In this method, stress is applied until the unloading response is canceled.
stress drop	(1) Sudden shear displacement accompanied by a sudden reduction in the shear stress on the fault plane. It reflects release of stored strain energy, much of which is radiated as seismic waves. (2) Loss of stress in a loading test.
stress province (field)	The state of stress, either homogeneous or varying from point to point and through time, in a given domain.
stress raisers	Changes in contour or discontinuities in structure that cause local increases in stress.
stress tensor	A description of the state of stress at a point, which involves nine components, referring to three orthogonal coordinate axes. Three components are normal stresses, acting perpendicular to the coordinate planes; the remaining six components are shear stresses acting parallel to the coordinate planes.
stress trajectory	A line used to represent a stress field in a diagram, which is parallel to the principal direction of stress.
striation	One of a series of parallel, usually straight scratches or smooth furrows developed on a rock surface by tectonic forces, as a result of the abrasion of one projecting rock against another during fault movement.
strike rail goniometer	A tool that allows a geologist to measure the strike of a geologic feature in an underground exposure without using a magnetic compass.
stringer	A narrow vein or irregular filament in a rock mass of different material.
structural grain	The broad, linear arrangement of geologic structures (such as folds and bedding) of a country or region. For example, the arrangement of roughly parallel ridges and valleys often displayed in regions of tilted strata.

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study plan	A plan that will describe the coordination of the work in more detail than is given in the discussions at the study level in Section 8.3.1 (site program).
subalpine	Of, pertaining to, or inhabiting cool, upland slopes beneath the timber line. Characterized by the dominance of evergreen trees.
subduction boundary	An elongate region along which a crustal block descends beneath another crustal block.
substantially complete containment	(1) By virtue of the intrinsic properties and design of the waste package components subjected to the range of conditions anticipated in the underground facility, 80 percent or more of the waste packages will retain all their radioactivity for a containment period of 1,000 years after permanent closure of the repository. (2) At any time during the containment period, at least 99 percent of the radioactivity resulting from the original waste emplaced in the underground facility will be retained within the set of waste packages. (3) Any releases from the waste packages that occur during the containment period should be gradual such that releases from the engineered barrier system in any year during this period should not exceed one part in 100,000 of the total inventory of radionuclide activity present in the geologic repository system in that year.
subsurface facilities	In this document, the underground facility and the shafts, ramps, boreholes, and shops.
suite (igneous)	(1) A set of apparently comagmatic igneous rocks. (2) A collection of rock specimens from a single area, generally representing related igneous rocks.
supergene phenomena (secondary enrichment)	The supergene process of mineral deposition; near-surface oxidation produces acidic solutions that leach metals, carry them downward, and reprecipitate them thereby enriching sulfide minerals already present.
surface facilities	All repository operations and support facilities located on the surface of the site.
surface rupture	Deformation on the surface due to a momentary loss of cohesion or loss of resistance to differential stress and a release of stored elastic energy.
surface-wave	A seismic wave that travels along the surface of the earth, or parallel to the earth's surface. Surface waves include Rayleigh waves, Love waves, and coupled waves.

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swelling index number	A numerical expression to indicate the relative swelling properties of a sample when heated under standardized conditions.
synergism	Cooperative action of discrete agencies such that the total effect is greater than the sum of the two or more effects taken independently.
synoptic-scale	Pertaining to simultaneously existing meteorologic conditions that together give a description of the weather; also, said of a weather map or chart that shows such conditions.
system	The geologic setting at the site, the waste package, and the repository all acting together to contain and isolate the waste. See "mined geologic disposal system."
system element	A subsystem or component of the total mined geologic disposal system to which performance can be allocated for meeting the regulatory and functional requirements.
system guideline	The system guidelines of the U.S. Department of Energy's Siting Guidelines (10 CFR Part 960) establishes postclosure and preclosure requirements for a repository system. These requirements are based on U.S. Nuclear Regulatory Commission and U.S. Environmental Protection Agency regulations.
system performance	The complete behavior of a system in response to the conditions, processes, and events that may affect it.
system requirements (SR)	The Federal, State, local, U.S. Department of Energy, and Office of Civilian Radioactive Waste Management programmatic requirements that must be met by the prospective mined geologic disposal system (MGDS) at Yucca Mountain during all phases of MGDS development and after MGDS permanent closure.
tagging	Labeling radioactive atoms so that their movements can be traced by use of the Geiger tube.
tandem accelerator spectrometer (TAMS)	An electrostatic accelerator in which negative mass hydrogen ions generated in a special ion source are accelerated as they pass from ground potential up to a high-voltage terminal. Both electrons are then stripped from the negative ion by passage through a very thin foil or gas cell, and the proton is again accelerated as it passes to ground potential.
target horizon	The geologic unit in which it is planned to locate the repository.

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tectosilicates	A class or structural type of silicate characterized by the sharing of all four oxygens of the SiO_4 tetrahedra with neighboring tetrahedra and with an Si:O ratio of 1:2. Quartz, SiO_2 is an example.
teleseismology	The aspect of seismology dealing with records made at a distance from the source of the impulse.
televiewer logs (tv)	See "seisviewer log."
tendon rods	A steel bar or wire that is tension-anchored to formed concrete, and allowed to regain its initial length to induce compressive stress in the concrete before use.
tensiometer	An instrument consisting of a porous cup attached to an airtight, water-filled tube. The porous cup is inserted into the soil at the desired depth, where it comes into contact with the soil water and reaches hydraulic equilibrium. The equilibration process involves the passage of water through the porous cup from the tube into the soil. The vacuum created at the top of the airtight tube is a measure of the pressure head in the soil.
tensor	Physical quantities that are three-dimensional entities acting over surfaces or through volumes and requiring either six or nine quantities for their description.
thermal	A term applied to material properties that govern the flow of heat and resultant temperature of the material, or a term for the analysis of that response (e.g., thermal properties, thermal analysis).
thermal conductivity	(1) The time rate of transfer of heat by conduction, through unit thickness, across unit area for unit difference of temperature. (2) A measure of the ability of a material to conduct heat. Typical values of thermal conductivity for rocks range from 3 to 15 millicalories/cm-sec-degree C.
thermal decay	Chemical breakdown of a compound or substance at elevated temperature. Simple substances or constituent elements are produced.
thermal demagnetization	A technique of partial demagnetization by heating the specimen to a temperature T, then cooling to room temperature in a nonmagnetic space; this destroys a partial thermoremanent magnetization for that temperature interval, but leaves unaffected a partial thermoremanent magnetization for temperature intervals above T.

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thermal diffusivity	Thermal conductivity of a substance divided by the product of its density and heat capacity. In rock, the common range of values is from 0.005 to 0.025 cm^2/s.
thermal loading	The application of heat to a system. Usually measured in terms of watt density. The thermal loading for a repository is the watts per acre produced by the radioactive waste in the active disposal area.
thermal/mechanical (units of rock)	A term applied exclusively to the delineation of stratigraphic units based on a combined consideration of their thermal, mechanical, and thermomechanical properties.
thermistor	An electrical resistor making use of a semiconductor whose resistance varies sharply in a known manner with temperature.
thermocouple	(1) A device consisting of two dissimilar metals joined at two points, the potential difference between the two junctions being a measure of their difference in temperature. (2) An EMF-generating device that responds to temperature changes, formed by joining two dissimilar metals. Most often made by joining two dissimilar metal wires, and used to sense temperature.
thermocouple psychrometers	A psychrometer that uses thermocouples to measure temperature depression. See "psychrometer" and "thermocouple."
thermodynamic	(1) For geology and rock mechanics, the interacting properties of a geologic system as they are affected by heat and react physically to the stress. (2) For chemistry, thermodynamics refers to the energy evolved and consumed in chemical reactions and the relationship of this energy to equilibrium. The "thermodynamic data base" refers to a compilation of specific thermal properties (e.g., enthalpy, entropy, and free energy) of different chemical species that can be quantified.
thermogravimetric analysis (TGA)	A method of analysis that measures the loss or gain of weight by a substance as the temperature of the substance is raised or lowered at a constant rate.
thermoluminescence	The property possessed by many substances of emitting light when heated. It results from release of energy stored as electron displacements in the crystal lattice.

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thermoluminescent dosimeter (TLD)	A type of dosimeter (or radiation measurement device) containing a "chip" of thermoluminescent material that emits light when subjected to heat. The amount of light emitted is directly proportional to the radiation dose absorbed by the chip, enabling the quantification of this dose.
thermomechanical	An adjective applied to the material properties that govern the physical response of a material to applied thermal stress, or to the analysis of that response (e.g., coefficient of thermal expansion thermomechanical analysis).
thin section	A fragment of rock or mineral mechanically ground to a thickness of approximately 0.03 mm and mounted between glasses as a microscope slide. This reduction renders most rocks and minerals transparent or translucent, thus making it possible to study their optical properties.
thixotropic	The property of certain colloidal substances, to weaken or change from a gel to a fluid when shaken but to increase in strength upon standing.
three-component geophone	An instrument that contains at least three detectors and produces three signals that are proportional to the velocity of the earth in three orthogonal directions, where it is in contact with the instrument.
thrust	A fault with a dip of 40 or less over much of its extent in which the hanging wall moves up relative to the footwall. Horizontal compression rather than vertical displacement is its characteristic feature.
time domain reflectometry (transient electromagnetic method)	An electromagnetic method in which the waveform of the transmitted signal is a pulse, step function, ramp, or other form and in which measurements are made after changing. This method uses a train of primary pulses with measurements being made during the off-time between pulses.
tipping bucket rain gage	A type of recording rain gage. The precipitation collected by the receiver empties into one side of a chamber, which is partitioned transversely at its center and is balanced bistably upon a horizontal axis; when a predetermined amount of water has been collected, the chamber tips, spilling out the water and placing the other half of the chamber under the receiver; each tip of the bucket is recorded on a chronograph, and the record obtained indicates the amount and rate of rainfall.

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to the extent practicable	The degree to which an intended course of action is capable of being effected in a manner that is reasonable and feasible within a framework of constraints.
tomographic analysis	Analysis by reconstruction of an object from a set of its projections.
total magnetic intensity (TMI) log	A geophysical wireline tool that measures the magnitude of the vector resultant of the horizontal and vertical components of the earth's magnetic field as a function of depth in a borehole. Usually incorporating a proton precession magnetometer See "proton spinner."
tracer (radioactive)	One of several radioactive materials of short half-life that is introduced to a ground-water system in order to aid studies of ground-water movement.
transfer cask	A shielded enclosure for movement of highly radioactive material.
transform fault	Horizontal shear fault that terminates abruptly at both ends, but which nevertheless may show great displacement.
transformation (crystallography)	The change from one crystal polymorph to another by one of several processes.
transient-line source technique	Similar to the "time domain reflectometry"; but, in addition, may be used to determine thermal properties by application of a heating pulse.
transition-state theory	A theory that molecules, before undergoing reaction, must form an activated complex in equilibrium with the reactants, and that the rate of any reaction is given by the rate of decomposition of the complex to form the reaction products.
transition temperature	Either the temperature at which a substance changes from one state of aggregation to another (a first-order transition), or the temperature of culmination of a gradual change (a second-order transition).
transmissivity	The volumetric rate at which water of the prevailing kinematic viscosity is transmitted through a unit width of an aquifer under a unit hydraulic gradient. Mathematically it is the product of permeability and the thickness of the zone of the aquifer being measured.
transpiration	The process by which water vapor escapes from a living plant and enters the atmosphere.

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transporter cask	The cask mounted on the waste transporter that provides shielding while the waste container is being transported from the waste-handling buildings to the emplacement borehole.
transuranic (TRU) waste	Waste containing more than 100 nanocuries of alpha-emitting transuranic isotopes, per gram of waste, with half-lives greater than twenty years, except for (1) high-level radioactive wastes, (2) wastes that the U.S. Department of Energy has determined, with the concurrence of the Environmental Protection Agency Administrator, do not need the degree of isolation required by 40 CFR Part 191, or (3) wastes that the U.S. Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61.
trenching	The digging of shallow trenches to expose the underlying stratigraphy, structure, etc., for inspection and sampling.
Tresca yield criterion	This criterion states that when a material is subjected to increasing stress, it will yield in a ductile fashion when the maximum shear stress attains a value equal to one-half the yield strength of the material.
triaxial compression test	A test in which a specimen of rock is subjected to a confining pressure and then loaded axially to failure.
trilateration	A method of surveying in which the lengths of the three sides of a series of touching or overlapping triangles are measured (electronically) and the angles are computed from the measured lengths.
triple junction	A point or small region where three lithospheric plates meet.
tubbing	Cast-iron liner plates for shafts, fabricated to specification, that bolt together to give support to rock.
tuff	A compacted pyroclastic deposit of volcanic ash and dust that may contain rock and mineral fragments incorporated during eruption or transport.
tuff main	A drift plan to run southwest through the longitudinal axis of the proposed repository that provides access from the surface to the underground facilities for the removal of tuff and exhaust of air during development.

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two-phase flow	Flow through porous media in which both liquid and gas coexist in pore channels.
two-well convergence test	An aquifer test in which one well is pumped while water levels are monitored in both the pumping well and a nearby well. In a variation of the test, a chemical tracer may be placed in the unpumped well and allowed to migrate into the pumping well. Temporal variations in the concentration of the tracer in the pump's effluent stream are measured properties of the aquifer.
two-well recirculating test	See "cross hole recirculation test."
ultrasonic testing	A nondestructive testing method that employs high-frequency mechanical vibration energy to detect and locate structural discontinuities or differences and to measure thickness of a variety of materials.
unanticipated processes and events	Those processes and events affecting the geologic setting that are judged not to be reasonably likely to occur during the period the intended performance objective must be achieved, but which are nevertheless sufficiently credible to warrant consideration.
unconfined aquifer	An aquifer containing ground water that has a water table or upper surface at atmospheric pressure.
unconfined compression test	A test in which a rock sample is loaded axially to failure without application of confining pressure.
unconfined compressive strength	The load per unit area at which an unconfined prismatic or cylindrical specimen of soil or rock will fail in an unconfined compression test.
underground facility	The underground structure, including openings and backfill materials, but excluding shafts, boreholes, and their seals.
undersaturated	Contains less solute than the solution is capable of dissolving under the given conditions.
undisturbed performance	The predicted behavior of a disposal system, including consideration of the uncertainties in predicted behavior, if the disposal system is not disrupted by human intrusion or the occurrence of unlikely natural events.
uniaxial compression test	See "unconfined compression test."

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unit-cell	The smallest volume of parallelepiped within the three-dimensional repetitive pattern of a crystal that contains a complete sample of the atomic or molecular groups that compose this pattern. Crystal structure can be described in terms of the translatory repetition of this unit in space in accordance with one of the space lattices.
unrestricted area	Any area, access to which is not controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials, and any area used for residential quarters.
unsaturated flow	The flow of water under such conditions that the voids of the porous media are only partially filled with water, the remainder of the pore space being taken up by air.
unsaturated hydraulic conductivity	Hydraulic conductivity of an unsaturated material.
unsaturated zone	The zone between the land surface and the water table. Generally, water in this zone is under less than atmospheric pressure and some of the voids may contain air or other gases at atmospheric pressure. Beneath flooded areas or in perched water bodies, the water pressure locally may be greater than atmospheric.
unstressed aperture	The physical aperture or opening width of a fracture under a condition of zero normal or shear stress applied across the fracture. The condition of zero stress may be approximated by ascertaining that the actual stress transmitted across the fracture is very small with respect to the half-closure stress or shear strength of the fracture.
upper plate	The hanging wall of a fault.
uranium fuel cycle	The operations of milling uranium ore, chemical conversion, and isotopic enrichment of uranium, fabrication of uranium fuel and reprocessing of spent uranium fuel.
uranium-series disequilibrium dating (uranium-series age method)	Calculation of an age in years for Quaternary materials based on the general finding that the decay products uranium-234, thorium-230, and protactinium-231 in natural materials are commonly in disequilibrium with their parent isotopes, uranium-238 and uranium-235, either deficient or in excess. The age is determined from the measured activity ratios of these isotopes.

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two-phase flow	Flow through porous media in which both liquid and gas coexist in pore channels.
two-well convergence test	An aquifer test in which one well is pumped while water levels are monitored in both the pumping well and a nearby well. In a variation of the test, a chemical tracer may be placed in the unpumped well and allowed to migrate into the pumping well. Temporal variations in the concentration of the tracer in the pump's effluent stream are measured properties of the aquifer.
two-well recirculating test	See "cross hole recirculation test."
ultrasonic testing	A nondestructive testing method that employs high-frequency mechanical vibration energy to detect and locate structural discontinuities or differences and to measure thickness of a variety of materials.
unanticipated processes and events	Those processes and events affecting the geologic setting that are judged not to be reasonably likely to occur during the period the intended performance objective must be achieved, but which are nevertheless sufficiently credible to warrant consideration.
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unconfined compression test	A test in which a rock sample is loaded axially to failure without application of confining pressure.
unconfined compressive strength	The load per unit area at which an unconfined prismatic or cylindrical specimen of soil or rock will fail in an unconfined compression test.
underground facility	The underground structure, including openings and backfill materials, but excluding shafts, boreholes, and their seals.
undersaturated	Contains less solute than the solution is capable of dissolving under the given conditions.
undisturbed performance	The predicted behavior of a disposal system, including consideration of the uncertainties in predicted behavior, if the disposal system is not disrupted by human intrusion or the occurrence of unlikely natural events.
uniaxial compression test	See "unconfined compression test."

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unit-cell	The smallest volume of parallelepiped within the three-dimensional repetitive pattern of a crystal that contains a complete sample of the atomic or molecular groups that compose this pattern. Crystal structure can be described in terms of the translatory repetition of this unit in space in accordance with one of the space lattices.
unrestricted area	Any area, access to which is not controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials, and any area used for residential quarters.
unsaturated flow	The flow of water under such conditions that the voids of the porous media are only partially filled with water, the remainder of the pore space being taken up by air.
unsaturated hydraulic conductivity	Hydraulic conductivity of an unsaturated material.
unsaturated zone	The zone between the land surface and the water table. Generally, water in this zone is under less than atmospheric pressure and some of the voids may contain air or other gases at atmospheric pressure. Beneath flooded areas or in perched water bodies, the water pressure locally may be greater than atmospheric.
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upper plate	The hanging wall of a fault.
uranium fuel cycle	The operations of milling uranium ore, chemical conversion, and isotopic enrichment of uranium, fabrication of uranium fuel and reprocessing of spent uranium fuel.
uranium-series disequilibrium dating (uranium-series age method)	Calculation of an age in years for Quaternary materials based on the general finding that the decay products uranium-234, thorium-230, and protactinium-231 in natural materials are commonly in disequilibrium with their parent isotopes, uranium-238 and uranium-235, either deficient or in excess. The age is determined from the measured activity ratios of these isotopes.

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uranium-thorium method	Calculation of an age in years for geologic material, often zircon, based on the known radioactive decay rate of uranium-238 to lead-206, uranium-235 to lead-207 and thorium-232 to lead-208 whose ratios give three independent ages for the same sample.
uranium-trend method	An open-system dating method based on uranium-series decay and the migration of daughter products of uranium-238 through a soil or sediment column. A successful technique in dating Quaternary deposits.
usable area	The surface location, as indicated on a map, of that portion of the primary area within which the underground facility can be located. Delineation of the usable area within the primary area will consider overburden thickness; the characteristics of the target emplacement horizon including mechanical and thermal properties of the tuff, thickness, and dip; and mining feasibility. See "primary area."
vadose zone	The unsaturated region of soil, or the zone of aeration between the ground surface and the water table.
validation (of a computer code)	The documented confirmation of the adequacy, (i.e., suitability for its intended purpose) of the computer code under review--demonstration that what the software does is appropriate to the problem. Validation includes assurance that any physical model, as embodied in software, is a correct representation of the intended physical system or process.
van der Waals attraction	The relatively weak attractive forces that act on neutral atoms and molecules and that arise because of the electric polarization induced in each of the particles by the presence of other atoms.
variance-reduction techniques	Analytic or numerical techniques applied to reduce the variance of estimates of the statistical moments of a distribution.
verification of computer codes	The documented confirmation that the computer code performs exactly the mathematical and logical operations described in the user's manual and other documents.
vertical seismic profiling (VSP)	A seismic survey method in which either a mandrel-type wall-locking tool or a hydrophone streamer, is lowered into a borehole on a wireline cable. The seismic source is usually located on the surface but can also be deployed in either the same or an adjacent borehole.

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vertical volumetric flux	The amount of water moving through the subsurface in a vertical direction.
Vibroseis	Trade name for a seismic method in which a vibrator is used as an energy source to generate a wave train of controlled frequencies.
vitric	Said of igneous material that is characteristically glassy, (i.e., contains more than 75 percent glass).
volumetric moisture content	Total unit volume of a soil or rock divided into the volume of contained water.
waste container	See "container."
waste containment time	See "containment period."
waste emplacement borehole	A borehole used specifically for emplacement of waste. See "emplacement borehole."
waste emplacement envelope	See "emplacement envelope."
waste form	The radioactive waste materials and any encapsulating or stabilizing matrix.
waste main	A drift running parallel to the tuff and service mains through the longitudinal axis of the proposed underground facility and dedicated to transporting waste.
waste management	The planning, execution, and surveillance of essential functions related to the control of radioactive (and nonradioactive) waste, including treatment, solidification, packaging, transportation, initial or long-term storage, surveillance, disposal, and isolation.
waste matrix	The material that surrounds and contains the waste and to some extent protects it from being released into the surrounding rock and ground water. Only material within the canister (or drum or box) that contains the waste is considered part of the waste matrix.
waste package	The waste form and any containers, shielding, packing, and other absorbent materials immediately surrounding an individual waste container.
waste package envelope	See "emplacement envelope."
waste standoff	See "standoff."

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waste storage envelope	See "emplacement envelope."
waste transporter	The vehicle used to move radioactive waste from the waste-handling building to the waste-emplacement borehole in the underground facility.
waste type	Refers to spent fuel (such as fuel rod assemblies from boiling water reactor or pressurized water reactor systems) or high-level waste (commercial or defense).
water balance (hydrologic budget)	An accounting of the inflow to, outflow from, and storage in a hydrologic unit such as a drainage basin, aquifer, soil zone, lake, or reservoir; the relationship between evaporation, precipitation, runoff, and the change in water storage, expressed by the hydrologic equation.
water-holding capacity	The smallest value to which the water content of a soil can be reduced by gravity drainage.
water of hydration	Water that is chemically combined in a crystalline substance, but that may be driven off by heat.
water potential	The total energy with which a rock matrix holds a unit weight of pore fluid.
water saturation method	A method used for determining porosity of a rock sample.
water table	That surface in a body of ground water at which the water pressure is atmospheric.
water yield	The runoff from a drainage basin; precipitation minus evapotranspiration.
well completion	The final sealing off of a drilled well (after drilling apparatus is removed from the borehole) with valving, safety, and flow-control devices.
wet-bulb depression	The difference in degrees between the dry-bulb temperature and the wet-bulb temperature.
wet-bulb temperature	Temperature at which water evaporating into air can bring the air to saturation adiabatically at that temperature; a measure of the evaporating capacity of air.
wet-chemical analysis	Any of the methods for chemical determinations using water or other liquids as part of the process.

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Whittemore pin measurements	The Whittemore gauge in a dial micrometer with resolution of about 2.5 microns and a nominal gauge length of 25 cm. Specially prepared pins are anchored about 25 cm apart on the exterior surface of the measured specimen or rock mass, and the Whittemore gauge is used to manually measure any relative movement.
whole rock sample	A sample in which a portion of the rock, rather than individual minerals, is used for analysis. For certain types of analysis (e.g., in the rubidium-strontium age method), it is preferred.
wick	To carry (as moisture) by capillary action.
wind rose	A diagram to illustrate the frequency with which wind blows from the various points of the compass.
windshield survey	Recording activities of interest in a chosen area by means of observation from a motor vehicle.
working level	Any combination of the short-lived radon daughters in one liter of air that will result in ultimate emission of 1.3×10^5 MeV (million electron volts) of potential alpha energy, and exposure to these radon daughters over a period of time is expressed in terms of "working level months." Inhalation of air containing a radon daughter concentration of 1 working level for 173 hours results in an exposure of 1 working level month.
wrench fault	A lateral fault in which the fault surface is more or less vertical.
x-ray diffraction (XRD)	A qualitative analytical technique that detects and interprets the diffraction of a beam of x-rays, usually by the three-dimensional periodic array of atoms in a crystal that has periodic repeat distances (lattice dimensions) of the same order of magnitude as the wavelength of the x-rays. This technique is most widely used for qualitative identification of crystalline substances.
x-ray fluorescence (XRF)	A type of x-ray emission spectroscopy in which the characteristic x-ray spectrum of a substance is provided by using x-rays of short wavelength to induce the substance to emit x-rays of a longer wavelength. This technique is most widely used for the quantitative (chemical) identification of crystalline substances.
xeric	Said of a habitat characterized by a low or inadequate supply of moisture.

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xerophyte	A plant with very low water requirements.
Young's modulus	A linear relationship of stress and strain in an elastic material under tension or compression loading.
zeolites	A group of hydrous aluminosilicate minerals containing sodium, calcium, barium, strontium, and potassium, and characterized by their ease of exchange of these ions.
Zircaloy	An alloy whose major constituent is zirconium, used as cladding material for nuclear fuel rods.