

CHAPTER 11: GLOSSARY

Ablation: The removal of material from a surface illuminated by intense laser light or x rays. On the NIF scattered laser light or x rays produced from the interactions of the laser beams with targets can be intense enough to remove thin (typically measured in fractions of a micron) layers of material from exposed objects and surfaces.

Absorbed dose: The amount of energy imparted to matter by ionizing radiation per unit mass of irradiated material, in which the absorbed dose is expressed in units of rad or gray (1 rad = 0.01 gray).

Accelerator: An apparatus for imparting high velocities to charged particles.

Acoustic: Containing, producing, carrying, arising from, actuated by, related to, or associated with sound.

Activation products: Radionuclides formed by bombardment and adsorption in material with neutrons, protons, or other nuclear particles. For example, cobalt-60 is an activation product resulting from neutron activation of cobalt-59.

Action level: Defined by regulatory agencies, the level of pollutants which, if exceeded, requires regulatory action.

Acute: With respect to dose or toxicity, one that occurs in a short time.

Acute exposure: The absorption of a relatively large quantity of radiation or intake of radioactive or toxic material over a short period of time.

Activity: The number of nuclear transformations occurring in a given quantity of material per unit time.

Administrative limit: A limit imposed by procedure on the quantity of a radionuclide permitted in a building or part of a building.

Aerosol: A gaseous suspension of very small particles of liquid or solid

Air Quality Control Region (AQCR): An interstate or intrastate area designated by the Environmental Protection Agency for the attainment and maintenance of National Ambient Air Quality Standards.

Air quality: Measure of the health-related and visual characteristics of the air, often derived from quantitative measurements of the concentrations of specific injurious or contaminating substances. Air quality standards are the prescribed level of constituents in the outside air that are regionally mandated during a specific time in a specified area.

Air quality maintenance area: An area, which due to current air quality or projected residential and industrial growth, has the potential for exceeding a national ambient air quality standard.

Air stripper: A groundwater treatment system in which volatile organic compounds are removed from soil by aeration.

Airborne Release Fraction (ARF): The coefficient used to estimate the amount of radioactive material that can be suspended in air and made available for airborne transport under a specific set of induced physical stresses. ARF is used, along with other factors, to determine the source term for an accident or event.

Alameda County Flood Control and Water Conservation District: Also known as Zone 7, the water management agency for the Livermore-Amador Valley with responsibility for water treatment and distribution, and responsible for management of agricultural and surface water and the groundwater basin.

Alluvial fan: Cone-shaped deposits of alluvium made by a stream. Fans generally form where streams emerge from mountains onto the lowland.

Alluvium: Sediment deposited by flowing water.

Alpha particle: A positively charged particle emitted from the nucleus of an atom, having mass and charge equal to those of a helium nucleus (two protons and two neutrons).

Ambient air: The surrounding atmosphere, usually the outside air, as it exists around people, plants, and structures; not considered in monitoring purposes when immediately adjacent to emission sources.

Ambient noise: The residual (background) sound in the absence of specific identifiable noise sources.

Ambient sound level (LDN): The 24-hour equivalent continuous sound level with a night-time penalty added, i.e., the time-averaged A-weighted sound level, in decibels, from midnight to midnight, obtained after the addition of 10 dB to sound levels from midnight to 7:00 a.m. and from 10:00 p.m. to midnight.

American Indian Religious Freedom Act of 1978: This Act establishes national policy to protect and preserve for Native Americans their inherent right of freedom to believe, express, and exercise their traditional religions, including the rights of access to religious sites, use and possession of sacred objects, and the freedom to worship through traditional ceremonies and rites.

Americium: An artificial radioactive element of atomic number 95. Am-241 is produced by the beta decay of Pu-241.

Analyte: The specific component measured in a chemical analysis.

Anion: A negatively charged ion, such as Cl (chloride).

Anticline: A fold in rocks in which the strata dip outward from both sides of the axis, where the oldest strata are in the core of the fold.

AP-42: An EPA compilation of air pollution emission factors and other technical data pertaining to air quality *see* “emission factors”.

Aquifer: A saturated layer of rock or soil below the ground surface that can supply usable quantities of groundwater to wells and springs, and be a source of water for domestic, agricultural, and industrial uses.

Aquitard: Low-permeability geologic formation that bounds an aquifer.

Archival research: Examination of records at the regional offices of the State Historic Preservation Office for evidence of recorded historic and/or prehistoric sites; the use of other archival sources (libraries, private collections, museums) to gather information on historic and prehistoric sites that have not been formally recorded or that have not been completely documented.

Aromatic hydrocarbons: Volatile organic compounds characterized by unsaturated ring structures; in this EIS/EIR, benzene, toluene, ethylbenzene, and xylenes.

Arithmetic mean: The average of a set of terms, computed by dividing their sum by the number of terms. *See* “geometric mean”.

Arroyo: A gully or channel cut by an intermittent stream.

Arsenic (As): A trivalent and pentavalent solid poisonous element of atomic number 33. Arsenic is commonly metallic steel-gray, crystalline, and brittle.

As low as reasonably achievable (ALARA): An approach to radiation protection to manage and control worker and public exposures (both individual and collective) and releases of radioactive material to the environment to as far below applicable limits as social, technical, economic, practical, and public policy considerations permit. ALARA is not a dose limit, but a process for minimizing doses to as far below limits as possible.

Atmospheric dispersion: The spreading downwind of airborne material due to wind speed and atmospheric turbulence; the greater the spread, the greater the dilution and the smaller the airborne material concentrations.

Attainment area: An area considered to have air quality as good as or better than the national ambient air quality standards as defined in the Clean Air Act. An area may be an attainment area for one pollutant and a nonattainment area for others (*see* “nonattainment area”).

Atom: The smallest particle of an element capable of entering into a chemical reaction.

AVLIS: *See* U-AVLIS

Background radiation: Radiation from 1) cosmic sources; 2) naturally occurring radioactive materials, including radon (except as a decay product of source or special nuclear material); 3) global fallout as it exists in the environment (e.g., from the testing of nuclear explosive devices); 4) air travel; 5) consumer and industrial products; and 6) diagnostic x rays and nuclear medicine.

Basement rocks: The undifferentiated complex of rocks that underlies the rocks of interest in an area. The crust of the earth below sedimentary deposits, extending downward to the Mohorovicic discontinuity. In many places the rocks of the complex are igneous and metamorphic and of Precambrian age.

Bay Area Air Quality Management District (BAAQMD): The local agency responsible for regulating stationary air emission sources (including the LLNL Livermore Site) in the San Francisco Bay Area.

Beamlets: Independent laser beams.

Becquerel (Bq): The SI unit of activity of a radionuclide, equal to the activity of a radionuclide having one spontaneous nuclear transition per second. $1 \text{ Bq} = 2.7^{-11}$ curies. Also *see* “Metric units.”

Bedrock mortar: Depression worn in the floors of rock shelters or on the flat portions of exposed bedrock where prehistoric peoples ground grass seeds and acorns into meals. The depression is created by the continual grinding motion of a stone pestle, which is alternately used to pound and grind from side to side.

Beryllium (Be): A toxic and extremely lightweight element with the atomic number 4. It is metallic and used in reactors as a neutron reflector.

Beryllium Chronic Disease: Acute or chronic lung disease caused by inhalation of beryllium particulate. Skin irritation may result from direct contact with soluble beryllium compounds and healing is impaired in beryllium-contaminated wounds.

Best Available Control Technology (BACT): A term used in the Federal Clean Air Act that means the most stringent level of air pollutant control considering economics for a specific type of source based on demonstrated technology.

Best estimate: An estimate made with the numerical inputs that are believed to be representative of the real situation, not biased conservatively.

Best Management Practices: Activities, procedures, or physical structures for reducing the amount of pollution entering the surface water and groundwater.

Bioassay: Measurement of the amount or concentration of radioactive material in the body or in biological material excreted from or removed from the body and analyzed for purposes of estimating the quantity of radioactive material in the body. This typically includes analysis of urine samples and whole-body scans or lung counts.

Biological Resources Evaluations Team (BRET): The team within the Environmental Protection Group of Los Alamos National Laboratory responsible for biological assessments.

Bioremediation: Cleanup of contaminated groundwater by bacteria.

Biota: The plant and animal life of a region.

Blowdown: Water discharged from cooling towers in order to control total dissolved solids concentrations by allowing make-up water to replenish cooling apparatuses.

Bounding: An accident is bounding if no reasonably foreseeable, equally probable accident can be found with greater consequences. A bounding envelope consists of a set of individual bounding accidents that cover the range of probabilities and possible consequences. The term is also used to identify conservative assumptions that will likely overestimate actual risks or consequences.

British thermal unit (Btu): A unit of heat; the quantity of heat required to raise the temperature of one pound of water by one degree Fahrenheit. One British thermal unit equals 1,055 joules (or 252 calories).

Budgeted construction: Construction for which Congress has not yet appropriated the necessary funds, but that appears in the proposed FY DOE budget.

Cadmium (Cd): A bluish white malleable ductile toxic bivalent metallic element of atomic number 48. Used especially in protective plating and in bearing metals.

California Code of Regulations (CCR): Codification of regulations promulgated by the State of California.

California Environmental Quality Act of 1970 (CEQA): Statute that requires that all California state, local, and regional agencies document, consider, and disclose to the public the environmental implications of their actions.

Cancer: A group of diseases characterized by uncontrolled cellular growth. Increased incidence of cancer can be caused by exposure to radiation or to certain chemicals at sufficient concentrations and exposure durations.

Candidate species: Species being reviewed by the United States Fish and Wildlife Service for possible listing as endangered or threatened, but for which substantial biological information to support a listing is lacking and legal protection is not provided.

CAP88-PC: Computer code required by EPA for modeling air emissions of radionuclides.

Carbon monoxide (CO): A colorless, odorless gas that is toxic if breathed in high concentration over a period of time.

Carcinogen: A substance that directly or indirectly causes cancer.

Change-out: A procedure by which components affected by induced radioactivity are periodically rotated between in-service and out-of-service status to allow the induced radioactivity to decay below predetermined limits and thus maintain a lower total level of radioactivity or a longer useful life. In some cases, decontamination cleaning may also be done during the out-of-service period.

Chlorocarbon: A compound of carbon and chlorine, or carbon, hydrogen, and chlorine, such as carbon tetrachloride, chloroform, and tetrachloroethene.

Chlorofluorocarbon (CFC): Any of several simple gaseous compounds that contain carbon, chlorine, fluorine, and sometimes hydrogen, that are used as refrigerants, cleaning solvents, and aerosol propellants and in the manufacture of plastic foams.

Chromium (Cr): A blue-white metallic element of atomic number 24 found naturally only in molecular combination with other elements and used especially in alloys and in electroplating.

Chronic exposure: The absorption of radiation or intake of radioactive and/or chemical materials over a long period of time.

Class I area: Pristine areas in the United States whose air quality requires special protection from pollution from new sources.

Class II area: Areas in the United States with acceptable air quality levels where moderate increases in air pollutant concentrations from new sources are allowed.

Class III area: Areas in the United States with acceptable air quality levels where larger increases in air pollutant concentrations from new sources are allowed than in Class II areas.

Class I substance: One of several groups of chemicals with an ozone depletion potential of 0.2 or higher. Class I ozone-depleting substances have the highest ozone depleting potential and include chlorofluorocarbon, halons, carbon tetrachloride, methyl chloroform, hydrobromofluorocarbon, and methyl bromide.

Clean Air Act Amendments of 1990: Expands the Environmental Protection Agency's enforcement powers and adds restrictions on air toxins, ozone-depleting chemicals, stationary and mobile emissions sources, and emissions implicated in acid rain and global warming.

Clean Air Act: Federal Act that mandates the promulgation and enforcement of air pollution control standards for stationary sources and motor vehicles.

Clean Water Act of 1972, 1987: Federal Act regulating the discharge of pollutants from a point source into navigable waters of the United States in compliance with a National Pollution Discharge Elimination System permit as well as regulating discharges to or dredging of wetlands.

Climatology: The science that deals with climates and investigates their phenomena and causes.

Code of Federal Regulations (CFR): A codification of all regulations promulgated by Federal government agencies.

Collective dose equivalent and collective committed effective dose equivalent: The sums of the dose equivalents or effective dose equivalents to all individuals in an exposed population within 80 km (50 miles) of the radiation source. These are evaluated by multiplying the dose received by an individual at each location by the number of individuals receiving that dose, and summing over all such products for locations within 80 km of the source. They are expressed in units of person-rem or person-sievert. The collective EDE is also referred to as the "population dose."

Colluvium: A general term applied to any loose, heterogeneous, and incoherent mass of soil material and/or rock fragments deposited by rainwash, sheetwash, or slow continuous downslope creep, usually collecting at the base of gentle slopes or hillsides. Deposition by a combination of gravity and water.

Committed effective dose equivalent (CEDE): The calculated effective dose to an individual after exposure to radiation summed over the life of the individual. CEDE assumes a 70 year lifetime for the general population and a 50 year lifetime for the worker population.

Communicator: For this SWEIS, a PC-based, digital system that activates both telephones and pagers located in the Fire Dispatch Center at LLNL.

Community Noise Level: A time-weighted 24-hour average noise level based on the A-weighted decibel scale. The community noise level scales includes an additional 5-dB adjustment to sounds occurring in the evening (7:00 P.M. to 10:00 P.M.) and a 10-dB adjustment to sounds occurring in the late evening and early morning hours (10:00 P.M. to 7:00 A.M.).

Composite noise rating: *see* “Modified Composite Noise Rating” (CNR).

Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA): Administered by EPA, this program, also known as Superfund, requires private parties to notify EPA after the release of hazardous substances or conditions that threaten to release hazardous substances, and undertake short-term removal and long-term remediation.

Computational modeling: Using a computer to develop a mathematical model of a complex system or process and to provide conditions for testing it.

Confined aquifer: An aquifer bounded above and below by impermeable beds, or beds of distinctly lower permeability than that of the aquifer itself.

Conservative: Having consequences that are greater than the most likely consequences; using assumptions that tend to overestimate consequences and err on the safe side.

Containment barrier: In the context of a high-level waste repository, a barrier to release of radioactivity made by man, such as a corrosion-resistant container.

Controlled material: Material designated by DOE, LLNL, or SNL, Livermore for special control because they are classified, hazardous, of national interest, or of high monetary value.

Conventional weapon: A non-nuclear weapon.

Copper (Cu): A common reddish metallic element of atomic number 29 that is ductile and malleable and is one of the best conductors of heat and electricity

Cosmic radiation: Radiation with very high energies originating outside the earth’s atmosphere; it is one source contributing to natural background radiation.

Criteria air pollutant: An air quality pollutant for which EPA has established criteria documents and for which concentration standards exist. These pollutants are sulfur dioxide (SO₂), particulates, carbon monoxide (CO), ozone (O₃), hydrocarbons, nitrogen dioxide (NO₂), and lead.

Critical habitat: “Specific area within the geographical area occupied by [an endangered or threatened] species..., essential to the conservation of the species and which may require special management considerations or protection; and specific areas outside the geographical area occupied by the species... that are essential for the conservation of the species” (Endangered Species Act section 3).

Criticality: The state of a mass of fissile and/or fissionable material when it is sustaining a nuclear fission chain reaction.

Cryogenic target positioner: The system that is composed of a telescoping arm that is used to insert and withdraw the complete target cryogenic system and target, and allows aiming, alignment, and engagement by the NIF laser.

Cultural resources (historic): Material remains, such as trash dumps and architectural features, including structures, foundations, basements, and wells; any other physical alteration of the landscape, such as ponds, roads, landscaping, and fences.

Cultural resources (prehistoric): Any material remains of items used or modified by people, such as artifacts of stone, bone, shellfish, or wood. Animal bone, fish remains, bird bone, or shellfish remains used for foods are included. Physical alteration of the landscape, such as hunting blinds, remains of structures, excavated house pits, and caches of artifacts or concentrations of stones (such as cooking stones) are also prehistoric cultural resources.

Cumulative impacts: As defined by CEQA, “...two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. (a) The individual effects may be changes resulting from a single project or a number of separate projects. (b) The cumulative impact from several projects is the change in the environment, which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future project. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time”.

Curie (Ci): A unit of measurement of radioactivity defined as the amount of radioactive material in which the decay rate is 3.7×10^{10} disintegrations per second or 2.22×10^{12} disintegrations per minute; one curie is approximately equal to the decay rate of one gram of pure radium.

Damage Ratio (DR): The fraction of the material-at-risk impacted by accident-generated conditions.

Day-night average level (LDN): The average noise level in dBA over a 24-hour period with a 10 dB adjustment for events occurring during the night (10:00 P.M. to 7:00 A.M.), and ignoring an evening-hour adjustment.

Decibel (dB): A unit measure of a sound pressure ratio. The reference sound pressure is 0.0002 dynes per square centimeter, or the equivalent of 200 microbar or 20 Pascal (Pa). This is the smallest sound human can hear.

Decibel, A-weighted (dBA): A frequency correction that correlates overall sound pressure levels with the frequency response of the human ear; measured by the use of a metering characteristic and the “A” weighting specified by the American National Standard Institute S1.41971(R176)

Decommissioning: The process of removing a facility from operation, followed by decontamination, entombment, dismantlement, or conversion to another use.

Decontamination: The actions taken to reduce or remove substances that pose a substantial present or potential hazard to human health or the environment—such as radioactive contamination from facilities, soil, or equipment—by washing, chemical action, mechanical cleaning, or other techniques.

Deflagration: To burn or cause to burn with great heat and intense light.

De minimis: Shortened form of “de minimis non curat lex,” which means, “The law does not care for, or take notice of, very small or trifling matters,” meaning a level that is so inconsequential that it cannot be cause for concern.

Depleted uranium: Uranium having a lower proportion of the fissile isotope uranium-235 than is found in naturally occurring uranium.

Derived Concentration Guide: Concentrations of radionuclides in water and air that could be continuously consumed or inhaled for one year and not exceed the DOE primary radiation standard to the public (100 mrem/y EDE).

Deterministic: With results determined by input assumptions and data, but without the probability of occurrence.

Deuterium: The hydrogen isotope that is twice the mass of ordinary hydrogen and that occurs in water; also called heavy hydrogen.

Diatomaceous: Composed of or containing numerous diatoms or their siliceous remains.

Dip: The angle at which a stratum or other planar feature is inclined from the horizontal.

DOE Orders: Rules indicating the procedures and responsibilities of the various units of DOE. DOE orders give details on how overall federal rules and regulations apply to DOE operations and indicates who shares responsibilities for administering them.

Dose: The energy imparted to matter by ionizing radiation; the unit of absorbed dose is the rad, equal to 0.01 joules per kilogram for irradiated material in any medium. Various technical terms—such as dose equivalent, effective dose equivalent, and collective dose—are used to evaluate the amount of radiation an exposed individual or population receives.

Dose equivalent: The product of absorbed dose in rad (or gray) in tissue and a quality factor representing the relative damage caused to living tissue by different kinds of radiation, and perhaps other modifying factors representing the distribution of radiation, etc. expressed in units of rem or sievert (1 rem = 0.01 sievert).

Dosimeter: a portable detection device for measuring the total accumulated exposure to ionizing radiation.

Dosimetry: The theory and application of the principles and techniques of measuring and recording radiation doses.

Downgradient: In the direction of groundwater flow from a designated area; analogous to downstream.

Drainage Retention Basin (DRB): Man-made, lined pond used to capture stormwater runoff and treated water at the LLNL Livermore Site.

Driver: A device for supplying the primary source of energy to an inertial fusion energy target; drivers can be lasers, ion beams, or intense gamma ray sources.

Dynamic test: A non-nuclear scientific experiment that shows how materials react to high-explosive shocks.

Effective dose equivalent (EDE): An estimate of the total risk of potential effects from radiation exposure, it is the summation of the products of the dose equivalent and weighting factor for each tissue. The weighting factor is the decimal fraction of the risk arising from irradiation of a selected tissue to the total risk when the whole body is irradiated uniformly to the same dose equivalent. These factors permit dose equivalents from nonuniform exposure of the body to be expressed in terms of an effective dose equivalent that is numerically equal to the dose from a uniform exposure of the whole body that entails the same risk as the internal exposure (ICRP 1980). The effective dose equivalent includes the committed effective dose equivalent from internal deposition of radionuclides and the effective dose equivalent caused by penetrating radiation from sources external to the body, and is expressed in units of rem (or sievert).

Effluent: A liquid or gas discharged to the environment.

Emission factors: An average value that relates to the quantity of an air pollutant released to the atmosphere by an activity associated with the release of the pollutant and usually expressed as the weight of pollutant divided by a unit weight, volume, distance, or duration of the activity that emits the pollutant. Emission factors are widely used for estimating air pollutant emissions and are often acceptable by regulatory authorities as an appropriate estimation of air pollution emissions to determine compliance with regulations.

Emission offsets: Emission credits used to offset the pollutants to be generated from a new air emission source. Areas that allow no net increase in air pollution emissions require that a new source offset emission increases by decreasing an equivalent amount of emissions from an

existing source. In some cases emission offsets or credits can be obtained from a depository that collects emission credits from retired sources.

Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA): act that requires facilities that produce, use, or store hazardous substances to report releases of reportable quantities or hazardous substances to the environment.

Emergency Response Planning Guidelines: Estimates of concentration ranges at which adverse effects can be expected if exposure to a specific chemical lasts more than 1 hour.

Endangered species: Species of plants and animals that are threatened with either extinction or serious depletion in their range and that are formally listed as such by the United States Fish and Wildlife Service and that are legally protected.

Enduring stockpile: The United States nuclear stockpile of the foreseeable future, consisting of about seven nuclear weapon systems. No new weapon systems will be added to the United States stockpile during this period. Many weapons within the enduring stockpile are older than their design lifetime.

Energetic material: Term that includes high explosives and propellants.

Enriched uranium: Uranium, found in natural uranium, with content of the fissile isotope uranium-235 being greater than 0.7 percent (by weight).

Environmental Assessment (EA): A concise public document that provides sufficient evidence and analysis for determining whether to prepare an environmental impact statement (EIS) or a finding of no significant impact for a proposed action. An EA includes brief discussions of the need for the proposed action, the features of alternatives, the environmental impacts of the proposed action and alternatives, and a listing of agencies and persons consulted.

Environmental impact report (EIR): A detailed report prepared pursuant to CEQA on the environmental impacts from any action carried out, approved, or funded by a California state, regional, or local agency.

Environmental Impact Statement (EIS): A detailed report, required by the National Environmental Policy Act, on the environmental impacts from a federally approved or funded project. An EIS must be prepared by a federal agency when a “major” federal action that may have “significant” environmental impacts is proposed.

Environmental justice: The fair treatment of people of all races, cultures, incomes, and educational levels with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment implies that no population of people should be forced to shoulder a disproportionate share of the negative environmental impacts of pollution or environmental hazards due to a lack of political or economic strength.

Epicenter: The point on the earth’s surface directly over the point at which earthquake motion starts.

Ergonomic factors: Environmental stresses such as repetitive motion and mental or physical fatigue that can create health concerns when uncontrolled. Ergonomics is also known as human engineering.

Emergency Response Planning Guidelines-1 (ERPG-1): The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient and adverse health effects or perceiving a clearly defined, objectionable odor.

Emergency Response Planning Guidelines-2 (ERPG-2): The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action.

Emergency Response Planning Guidelines-3 (ERPG-3): The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects.

Eutrophic: Rich in dissolved nutrients.

Evapotranspiration: A process by which water is transferred from the soil to the air by plants that take the water up through their roots and release it through their leaves and other aboveground tissue.

Explosives: See "High explosives."

Exponential notation: A means of expressing large or small numbers in powers of ten. For instance, $4.3 \times 10^6 = 4,300,000$ and $4.3 \times 10^{-5} = 0.000043$. This relationship is also sometimes expressed in the form $4.3E+6 = 4,300,000$, and $4.3E-5 = 0.000043$.

Exposure: The condition of being made subject to the action of radiation or toxic material. Sometimes also used as a generic term to refer to the dose of radiation absorbed by an individual or population.

Exposure assessment: The determination of the magnitude, frequency, duration, and route of exposure.

Exposure pathways: The course a chemical or physical agent takes from the source to the exposed organism. An exposure pathway describes a unique mechanism by which an individual or population is exposed to chemicals or physical agents at or originating from a release site. Each exposure pathway includes a source or release from a source, an exposure point, and an exposure route. If the exposure point differs from the source, a transport/exposure medium such as air is also included.

External exposure: Radiation exposure from sources outside of the body: cloud passage, material deposited on the ground, and nearby surfaces.

Extirpate: The local disappearance of a species, as opposed to extinction, which is global disappearance.

Fault: A fracture in the earth's crust accompanied by displacement of one side of the fracture with respect to the other and in a direction parallel to the fracture.

Federal facility: A facility that is owned or operated by the federal government, subject to the same requirements as other responsible parties when placed on the Superfund National Priorities List.

Federal facility agreement (FFA): A negotiated agreement that specifies required actions at a federal facility as agreed upon by various agencies (e.g., EPA, RWQCB, and DOE).

Federal Register: A document published daily by the Federal government containing notification of government agency actions, including notification of EPA and DOE decisions concerning permit applications and rule making.

Federally listed species: *see* “threatened, endangered, candidate, or rare species”.

Fiscal year: LLNL's fiscal year is from October 1 through September 30.

Fissile material: Pu239, U233, U235 or any material containing any of these.

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

Flash x-ray: An x-ray apparatus that emits short pulses of x rays useful for examining the behavior of rapidly changing mechanical systems.

Flood, 100-year: A flood event of such magnitude it occurs, on average, every 100 years (equates to a 1 percent probability of occurring in any given year).

Flood, 500-year: A flood event of such magnitude it occurs, on average, every 500 years (equates to a 0.2 percent probability of occurring in any given year).

Floodplain: The valley floor adjacent to the incised channel of a stream, which may be inundated during high water.

Fold: A bend in strata or any other planar structure.

Footprint: The layout of a facility on the ground; also refers to an area affected by release of radioactive materials.

Forbs: Herbs other than grasses.

Freon 11: Trichlorofluoromethane.

Freon 113: 1,1,2-trichloro-1,2,2-trifluoroethane; also known as CFC 113.

Frequency: Number of complete oscillation cycles per unit of time. The unit of frequency is the hertz (Hz).

Fuel-grade plutonium: Plutonium with a high enough content of other plutonium isotopes other than plutonium 239 (such as plutonium-240) that it cannot be used in weapons although it can be used in reactors.

Fugitive dust: The dust released from activities such as construction, manufacturing, or transportation.

Fugitive emissions: Uncontrolled emissions to the atmosphere from pumps, valves, flanges, seals, and other process points not vented through a stack. Also includes emissions from area sources such as ponds, lagoons, landfills, and piles of stored material.

Funded construction: Construction for which Congress has already appropriated the necessary funds.

Fusion: The energy releasing process in which atoms of very light elements such as deuterium and tritium combine to produce heavier elements.

Fusion fuel: Mixture of deuterium and tritium contained in a small capsule called the target.

Fusion reaction: When two nuclei of lighter elements are brought into close enough proximity, they can undergo thermonuclear fusion forming a single nucleus and releasing energy at the slight expense in mass of the original constituents. Typically, a deuterium and tritium nucleus are fused in such a reaction to produce a helium nucleus plus one free neutron. The released energy of 17.6 MeV (million electron volts) is carried mostly as kinetic energy by the neutron (14 MeV).

g notation: Accelerations measured relative to the acceleration of gravity at the earth's surface. Thus, $0.1g = 3.2 \text{ ft/sec}^2$ or 98.3 cm/sec^2 .

Gamma radiation: Short-wavelength electromagnetic radiation emitted from the atomic nucleus with typical energies ranging from 10 keV to 9 MeV. Individual gammas considered as particles are also called photons. Gamma radiation frequently accompanies alpha and beta emissions and always accompanies fission. Gamma rays are very penetrating and are best stopped or shielded against by dense materials such as lead or uranium. Gamma rays are similar to x rays, but are usually more energetic.

Gamma ray: High-energy, short-wavelength, electromagnetic radiation emitted from the nucleus of an atom, frequently accompanying the emission of alpha or beta particles

Gaussian plume: A plume of contaminants is said to be Gaussian when the contaminant concentrations are greatest at the centerline and decrease to either side as $\exp [-(x/\sigma)^2/2]$, where x is the distance from the centerline and σ is the distance to the point where the concentration is down to 37 percent of the centerline concentration. *See* "Standard deviation."

General Plan: A compendium of city or county policies regarding long-term development in the form of maps and accompanying text. The General Plan is a legal document required of each local agency by California Government Code section 65301 and adopted by the City Council or Board of Supervisors. The General Plan may also be called “City Plan,” “Comprehensive Plan,” or “Master Plan.”

Geometric mean: For a set of n terms, the n th root of their product. For a set of positive numbers, the geometric mean is always less than or equal to the arithmetic mean (*see* “arithmetic mean”).

Glovebox: A sealed box in which workers, while remaining outside and using gloves attached to and passing through openings in the box, can safely handle and work with radioactive materials, other hazardous materials, and non-hazardous air-sensitive compounds.

Gram (g): The standard metric measure of weight approximately equal to 0.035 ounce.

Gravinory: The act of feeding on seeds or grain (e.g., Birds may be responsible for high levels of *gravinory* in burned, open plots of *Amsinckia grandiflora*).

Gross alpha: The concentration of all alpha-emitting radionuclides in a sample.

Gross beta: The concentration of all beta-emitting radionuclides in a sample.

Ground acceleration: The intensity of the strong phase of ground shaking in units of g (earth’s gravitational attraction).

Groundwater: Water below the ground surface in the saturated zone.

Habitat: Area where a plant or animal lives.

Half-life (biological): The time required for the body to eliminate one-half of an administered dosage of any substance by regular processes of elimination.

Half-life (ecological): The time required for removal of one-half of the amount of a material deposited in the local environment.

Half-life (radiological): The time required for one-half the radioactive atoms in a given amount of material to decay; for example, after one half-life, half of the atoms will have decayed; after two half-lives, three-fourths; after three half-lives, seven-eighths; and so on, exponentially.

Hazard Index (HI): The ratio between the intake of a chemical and an acceptable health-based reference level. A hazard index of less than 1 indicates a safe level of intake.

Hazardous chemical: Any chemical that is a physical hazard or a health hazard as defined by the Occupational Safety and Health Administration (29 CFR 1910.1201). For Superfund Amendments and Reauthorization Act (SARA) Title III, Section 311, the term is defined the same with certain named exceptions.

Hazardous waste: Hazardous wastes exhibit any of the following characteristics: ignitability, corrosivity, reactivity, or EP-toxicity (yielding toxic constituents in a leaching test), but other wastes that do not necessarily exhibit these characteristics have been determined to be hazardous by EPA. Although the legal definition of hazardous waste is complex, according to EPA the term generally refers to any waste that, if managed improperly, could pose a threat to human health and the environment. The word is defined as under the Resource Conservation and Recovery Act, a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (a) cause or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed. Source, special nuclear material, and byproduct material, as defined by the Atomic Energy Act, are specifically excluded from the definition of solid waste.

(California) Hazardous Waste Control Act (HWCA): Legislation specifying requirements for hazardous waste management in California.

Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX): A high-explosive compound.

High-efficiency particulate air (HEPA) filter: An extended-media, dry type filter used to capture particulates in an air stream; HEPA collection efficiencies are at least 99.97% for 0.3 micrometer diameter particles.

High explosives: Materials that release large amounts of chemical energy when detonated.

High-level waste: Radioactive waste resulting from the reprocessing of spent nuclear fuel. Discarded, unprocessed spent fuel is also high-level waste. It is characterized by intense penetrating radiation and by high heat-generation rates.

Highly enriched uranium: Uranium enriched to 20 percent or greater in uranium 235.

Historic resources: The sites, districts, structures, and objects considered limited and nonrenewable because of their association with historic events or persons, or social or historic movements.

Hohlraum: The metal case surrounding the target on indirect-drive inertial confinement fusion.

Holocene: A standard epoch of geological time, from 10,000 years ago until the present.

Hood: An enclosure or canopy provided with a draft to remove toxic or other noxious vapors or aerosols from the workplace.

Human genome: A set of chromosomes with the genes they contain.

Hydraulic gradient: In an aquifer, the rate of change of total head (water-level elevation) per unit distance of flow at a given point and in a given direction.

Hydric soils: Soils that are saturated, flooded, or ponded long enough (7 days or longer) during the growing season to develop anaerobic conditions in their upper layer.

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

Hydrodynamic test or hydrotest: A non-nuclear scientific experiment that shows how materials react to high-explosives detonation. “Hydro” refers to the fluid-like flow of solids at the center of an explosion. Results are used to investigate hydrodynamic aspects of primary function during pit implosion.

Hydrophytic vegetation: Vegetation that grows in water, soil, or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content.

Igneous: Refers to a rock or mineral that solidified from molten or partly molten material, i.e., from a magma; also, applied to processes leading to, related to, or resulting from the formation of such rocks. Igneous rocks constitute one of the three main classes into which rocks are divided, the others being metamorphic and sedimentary.

Ignition: Self-sustained thermonuclear reaction.

Ignitron switch: A high current switch used to discharge energy storage capacitors, which are used to fire laser flashlamps.

Immediately-Dangerous-to-Life-or-Health (IDLH): Immediately dangerous to life or health concentrations (IDLHs) represents the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing (e.g., severe eye irritation) or irreversible health effects.

Impact: The effect, influence, or imprint of an activity on the environment. Impacts include direct or primary effects, which are caused by the project and occur at the same time and place, and indirect or secondary effects, which are caused by the project and are later in time or farther removed in distance, but still reasonably foreseeable. Indirect or secondary effects may include growth-inducing and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Implosion: Sudden inward compression and reduction in volume of fissionable material inside a nuclear weapons brought about by the detonation of conventional explosives.

Inertial confinement fusion (ICF): An energetic driver beam (laser, x ray, or charged particle) initiated nuclear fusion using the inertial properties of the reactants as a confinement mechanism.

Inertial fusion energy (IFE): The use of high-repetition-rate lasers or ion drivers (about 10 pulses per second) to accomplish laboratory and commercial thermonuclear fusion.

Infrastructure: Utilities and other physical support systems needed to operate a laboratory or test facility. Included are electric distribution systems, water supply systems, sewage disposal systems, roads, and so on.

Ingestion dose: An internal dose that results from the oral intake of food, water, soil, or other media contaminated with radioactive material.

Inorganic compounds: Compounds that either do not contain carbon or do not contain hydrogen along with carbon, including metals, salts, and various carbon oxides (e.g., carbon monoxide and carbon dioxide).

Input parameters: Values of variables needed to run a computer model.

In situ: Refers to the treatment of contaminated areas in place without excavation or removal, as in the in situ treatment of onsite soils through biodegradation of contaminants.

Integrated Safety Management System (ISMS). A system is a systematic approach to defining the scope of work, identifying the hazards, establishing controls, performing the work, and concluding with feedback and improvement. The system defines a process for identifying, planning and performing work that provides for early identification of hazards and associated control measures for hazards mitigation or elimination. The ISMS process also forms the basis for work authorization and provides for both internal and external assessment that provides a continuous feedback and improvement loop for identifying both shortcomings and successes for incorporation into subsequent activities.

Interim Action: An action concerning a proposal that is subject of an ongoing EIS and that DOE proposes to take before a record of decision is issued, and is permissible under 40 CFR 1506.1: Limitation on actions during the NEPA process.

Interim status: A legal classification allowing hazardous waste incinerators or other hazardous waste management facilities to operate while EPA considers their permit applications, provided that they were under construction or in operation by November 19, 1980 and can meet other interim status requirements.

Internal exposure: Radiation exposure from sources inside the body: from materials ingested, inhaled, or (in the case of tritium) absorbed through the skin.

International Commission on Radiological Protection (ICRP): An international organization that studies radiation, including its measurement and effects.

Inventory: The amount of a radioactive or hazardous material present in a building or facility.

Involved worker: Workers that would be involved in a proposed action as opposed to workers that would be on the site of a proposed action but not involved in the action.

Isoconcentration map: A map showing contours of equal concentration of contaminant.

Isotopes: Forms of an element having the same number of protons in their nuclei, but differing numbers of neutrons.

Juniper-oak cismontane woodland: An open woody plant community dominated by California juniper with a shrubby understory of coastal shrubby species.

Joule: The basic SI unit of work or energy. A joule is equal to the kinetic energy of a two-kilogram mass moving at the speed of one meter per second.

Jurassic: A standard period of geologic time, from about 181 million to 135 million years ago.

Laboratories, heavy: Laboratories characterized by high-bay construction, overhead cranes, and in some cases, shielding. Heavy laboratories are typically used for large research apparatus or large mechanical test equipment.

Laboratories, light: Laboratories characterized by small equipment and apparatus. Light laboratories are typically used for direct bench-scale research.

Lagomorphs: Rabbits, conies, and hares.

Land use: The purpose or activity for which a piece of land or its buildings is designed, arranged, or intended, or for which it is occupied or maintained.

Laser: A device that produces a beam of monochromic (single-color) “light” in which the waves of light are all in phase. This condition creates a beam that has relatively little scattering and has a high concentration of energy per unit area of the beam.

Latent cancer fatality: Term used to indicate the estimated number of cancer fatalities which may result from exposure to a cancer-causing element. Latent cancer fatalities are similar to naturally occurring cancers and may occur at any time after the initial exposure.

L_{dn}: *see* “ambient sound level”.

Leaching test: A test conducted to determine the leach rate of a waste form. The test results may be used for judging and comparing different types of waste forms, or may serve as input data for a long-term safety assessment of a repository.

Lead (Pb): Lead is a bluish-white lustrous metal. It is very soft, highly malleable, ductile, and a relatively poor conductor of electricity. It is very resistant to corrosion but tarnishes upon exposure to air.

Leak Path Factor (LPF): The fraction of airborne materials transported from containment or confinement deposition or filtration mechanism (e.g., fraction of airborne material in a glovebox leaving the glovebox under static conditions, fraction of material passing through a HEPA filter). LPF is one of the factors used to calculate the source term for an accident or event.

Level of concern: The concentration of an extremely hazardous substance (EHS) in the air above which there may be serious irreversible health effects or death as a result of a single exposure for a relatively short period of time.

Level of service (LOS): The extent of community, healthcare and educational services provided by local jurisdictions in the vicinity of the proposed sites. LOS is measured in terms of per capita expenditures on services in each of these categories. In traffic studies, LOS means the different operating conditions that occur in a lane or roadway when accommodating various traffic volumes. A qualitative measure of the effect of traffic flow factors such as special travel time, interruptions, freedom to maneuver, driver comfort, convenience, and (indirectly) safety and operating cost. Levels of service are described by a letter rating system of A through F, with LOS A indicating stable traffic flow with little or no delays and LOS F indicating excessive delays and jammed traffic conditions.

Limited-lifetime component: A weapon component that decays with age and must be replaced periodically.

Liquefaction: A type of soil failure in which a mass of saturated soil is transformed from a solid to a liquid state.

Liter (L): The SI measure of capacity approximately equal to 1.057 quart.

Lithic scatter: Concentrations of stone once used for the manufacture of artifacts. The stone includes finished artifacts, roughly formed artifacts, the cores of the stone from which they were made, and the wastes flakes from the manufacturing process.

Livermore Water Reclamation Plant (LWRP): The City of Livermore's municipal wastewater treatment plant, which accepts discharges from the LLNL Livermore Site

Low-income status: Based on Census data definitions of individuals below the poverty line. For the 1990 Census, for example, low-income status included individuals in 4-person families with 1989 income at or below \$12,674. Other poverty thresholds are provided by the Census Bureau for larger and smaller family sizes.

Low-level waste (LLW): Waste defined by DOE O 5820.2A, which contains transuranic nuclide concentrations less than 100 nCi/g. LLW is radioactive waste that is not high-level radioactive waste, spent nuclear fuel, transuranic waste, byproduct material (as defined in section 11e.(2) of the Atomic Energy Act of 1954, as amended), or naturally occurring radioactive material" as defined by DOE O 435.1 , Radioactive Waste Management. Test specimens of fissionable material irradiated for research and development only, and not for the production of power or plutonium, may be classified as low-level waste, provided the concentration of transuranic waste is less than 100 nanocuries per gram.

Magazine: An approved structure designed for the storage of explosives, excluding operating buildings.

Maintenance pollutants: Criteria air pollutants in an Air Quality Maintenance Area that may exceed the ambient air quality standard over time.

Magnitude: A measure of the strength of an earthquake or the strain energy released by it; the logarithm of the amplitude of motion recorded on a seismograph.

Master Oscillator Room (MOR): A self-contained special-purpose room that would house the NIF Master Oscillators and their supporting equipment. The purpose of this facility is to supply the 192 individually shaped and timed low-level laser pulses to the Preamplifier Modules located beneath the Spatial Filters at the NIF main laser hall.

Material-at-Risk: A material-at-risk limit is defined as the maximum amount of the referenced material that is involved in the process and thus at risk in the event of a postulated accident. Material locked in a secure storage is not considered material-at-risk.

Maximally exposed individual (MEI): A hypothetical member of the public at a fixed location who, over an entire year, receives the maximum effective dose equivalent (summed over all pathways) from a given source of radionuclide releases to air. Generally, the MEI is different for each source at a site.

Maximum Contaminant Level (MCL): The highest level of a contaminant in drinking water that is allowed by the United States Environmental Protection Agency regulation.

Maximum credible accident: An accident that has the greatest offsite consequences from hazardous material release and that has a frequency of occurrence greater than 10^{-6} per year, when credit for mitigation is allowed. Such an accident is one of the set of reasonably foreseeable accidents.

Maximum design yield: The maximum theoretical yield expected from a NIF experiment.

Maximum yield experiment: A fusion ignition experiment that generates maximally expected fusion energy.

Metamorphic rock: Any rock derived from preexisting rocks by mineralogical, chemical, and/or structural changes, essentially in the solid state, in response to marked changes in temperature, pressure, shearing stress, and chemical environment, generally at depth in the earth's crust.

Mercury (Hg): A metallic element mostly obtained by reduction from cinnabar, one of its ores. It is a heavy, opaque, glistening liquid (commonly called quicksilver), and is used in barometers, thermometers, etc.

Meteorology: The science dealing with the atmosphere and its phenomena, especially as it relates to weather.

Metric units: Metric system and United States customary units and their respective equivalents are shown in the table below. Except for temperature for which specific equations apply, United States customary units can be determined from metric units by multiplying the metric units by the United States customary equivalent. Similarly, metric units can be determined from United States customary equivalent units by multiplying the United States customary units by the metric equivalent.

Metric and United States Customary Unit Equivalents

Metric Unit	United States Customary Equivalent Unit	United States Customary Unit	Metric Equivalent Unit
Length			
1 centimeter (cm)	0.39 inches (in)	1 inch (in)	2.54 centimeters (cm)
1 millimeter (mm)	0.039 inches (in)		25.4 millimeters (mm)
	3.28 feet (ft)	1 foot (ft)	0.0254 meters (m)
1 meter (m)	1.09 yards (yd)	1 yard (yd)	0.9144 meters (m)
	0.62 miles (mi)	1 mile (mi)	1.6093 kilometers (km)
1 kilometer (km)			
Volume			
1 liter (L)	0.264 gallons (gal)	1 gallon (gal)	3.7853 liters (L)
1 cubic meter (m ³)	264 gallons	1 cubic foot (ft ³)	0.028 cubic meters (m ³)
	35.32 cubic feet (ft ³)	1 cubic yard (yd ³)	0.765 cubic meters (m ³)
	1.35 cubic yards (yd ³)		
Weight			
1 gram (g)	0.035 ounces (oz)	1 ounce (oz)	28.6 gram (g)
1 kilogram (kg)	32.2 ounces (oz) 2205 pounds (lb)	1 pound (lb)	0.373 kilograms (kg)
1 metric ton (MT)	1.10 short ton (2000 pounds)	1 short ton (2000 pounds)	0.90718 metric ton (MT)
Geographic area			
1 hectare	2.47 acres	1 acre	0.405 hectares
Radioactivity			
1 becquerel (Bq)	2.7×10^{-11} curie (Ci)	1 curie (Ci)	3.7×10^{10} becquerel (Bq)
Radiation dose			
1 rem	0.01 sievert (Sv)	1 sievert (Sv)	100 rem
Temperature			
°C = (°F-32)/1.8		°F = (°C × 1.8) + 32	

MeV: A unit of energy equal to 1.6×10^{-6} ergs or 1.6×10^{-13} joules. Short for “million electron volts,” an electron volt being the energy acquired by an electron when it is accelerated through a potential drop of one volt.

Midden: Characteristic soil containing cultural resources and other evidence of use of an area, such as the decomposed organic remains of vegetal foods, animals, and evidence of fires (e.g., ash, carbon, charcoal). Because of the organic content, midden soils tend to differ from surrounding soils in texture and color.

Millirem (mrem): One-one-thousandth of a rem (*see* “rem”).

Minority populations: Includes individuals who report themselves as belonging to any of the following racial groups: Black (reported their race as “Black or Negro,” or reported entries such as “African American, Afro-American, Black Puerto Rican, Jamaican, Nigerian, West Indian, or Haitian”); American Indian, Eskimo, or Aleut; Asian or Pacific Islander, or “Other Race.” In addition, individuals identifying themselves as Hispanic origin are also included in the minority category. Hispanics can be of any race, however. To avoid double-counting minority Hispanic individuals, only white Hispanics were included in the number of racially based minorities in a tabulation, since nonwhite Hispanics had already been counted under their minority racial classification.

Miocene: A standard epoch of geologic time between the Pliocene and Oligocene, from about 28 million to 5.3 million years ago.

Mitigation: CEQA defines as: “(a) Avoiding the impact altogether by not taking a certain action or parts of an action. “(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation. “(c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment. “(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action. “(e) Compensating for the impact by replacing or providing substitute resources or environments” (40 CFR. 1508.20; CEQA Guidelines 15370). NEPA also says regarding alternatives: “...Include appropriate mitigation measures not already included in the proposed action or alternatives” (40 CFR. 1502.14(f)).

Mixed fission products: The ensemble of fission products resulting from the fission of a heavy element such as uranium. *See* “Fission.”

Mixed waste: Waste that contains both nonradioactive hazardous waste and radioactive waste.

Mock nuclear material: Material that is nonradioactive and nonfissile, but similar in density and other characteristics to nuclear material. Mock nuclear material is substituted for a weapon’s nuclear parts in hydrodynamic experiments and flight tests.

Model: A conceptual, mathematical, or physical system obeying certain specified conditions, whose behavior is used to understand the physical system to which it is analogous.

Modified Composite Noise Rating (CNR): Noise rating system that determines impacts from a fixed noise source using objective and subjective factors. Noise ranked A through D is generally

considered to be acceptable with “A” representing essentially no impacts. Rankings above “D” are usually addressed with mitigative measures unless the source is temporary.

Modified Mercalli Scale: An earthquake intensity scale, with 12 divisions ranging from I (not felt by people) to XII (damage nearly total).

Molecular sieve: A material with a rigid, uniform pore structure that completely excludes molecules larger than the structure pore openings and that can absorb certain classes of small molecules from a fluid in contact with the material.

MOR: *see* “Master Oscillator Room”.

Mutagen: A substance that causes genetic or inheritable defects.

NAAQS: *see* “National Ambient Air Quality Standards”.

National Ambient Air Quality Standards (NAAQS): Air quality standards established by the Clean Air Act, as amended. The primary National Ambient Air Quality Standards are intended to protect the public health with an adequate margin of safety, and the secondary National Ambient Air Quality Standards are intended to protect the public welfare from any known or anticipated adverse effects of a pollutant.

National Emission Standards for Hazardous Air Pollutants (NESHAP): A set of national emission standards for listed hazardous pollutants emitted from specific classes or categories of new and existing sources. These were implemented in the Clean Air Act Amendments of 1977.

National Environmental Policy Act (NEPA): Federal legislation enacted in 1969 that requires all Federal agencies to document and consider environmental impacts for federally funded or approved projects and the legislation under which DOE is responsible for NEPA compliance at LLNL.

National Historic Preservation Act of 1966, as amended: This Act provides that property resources with significant national historic value be placed on the National Register of Historic Places. It does not require any permits but, pursuant to Federal code, if a proposed action might impact an historic property resource, it mandates consultation with the proper agencies.

National Ignition Facility (NIF): The laser facility to be used to achieve ignition of fusion fuel and energy gain in a laboratory. The NIF’s primary mission is to perform stockpile stewardship experiments.

National Pollutant Discharge Elimination System (NPDES): Federal regulation under the Clean Water Act that requires permits for discharges into surface waterways.

National Register of Historic Places (NRHP): A register of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture. It is in the Department of Interior and was established pursuant to the National Historic Preservation Act of 1966, as amended (16 USC § 470a).

Natural uranium: Uranium as it occurs in nature. The natural substance is 99.28 percent uranium-238, 0.72 percent uranium-235, and 0.0055 percent uranium-234.

Neodymium: A rare-earth metal listed in the periodic table of elements with an atomic number of 60 and an atomic weight of 144.24.

Neodymium glass laser: A type of solid-state laser that uses neodymium-doped optical fibers, rods, or glass slabs, with small amounts neodymium added, in which laser generation and amplification equipment are made.

NEPA: *see* “National Environmental Policy Act.”

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

Nitrogen oxides (NO_x): Refers to the oxides of nitrogen, primarily NO (nitrogen oxide) and NO₂ (nitrogen dioxide). These are produced in the combustion of fossil fuels and are considered major air pollutants. When nitrogen dioxide combines with volatile organic compounds, in sunlight, ozone is produced.

Noise Control Act of 1972: This Act directs all Federal agencies to carry out programs in a manner that furthers a national policy of promoting an environment free from noise that jeopardizes health or welfare.

Nonattainment area: An air quality control region (or portion thereof) in which the Environmental Protection Agency has determined that ambient air concentrations exceed national ambient air quality standards for one or more criteria pollutants.

Nonhazardous wastes: Routinely generated, nonhazardous wastes include general facility refuse such as paper, cardboard, glass, wood, plastics, scrap, metal containers, dirt, and rubble.

Non-invasive imaging: Imaging methods that do not damage the test specimen, including radiography, computed tomography, and other techniques.

Noninvolved worker: Workers in a fixed population outside the day-to-day process safety management controls of a given facility area. In this SWEIS, this term includes both individual noninvolved workers (an LLNL worker not directly involved with operation of the facility, but located 100 meters from the facility), and the population of noninvolved workers (the LLNL employee population, plus the population at Sandia National Laboratories/California).

Non-ionizing radiation: Electromagnetic radiation of wavelengths greater than 10^{-7} m (1000Å), such as laser, thermal, or radio frequency radiation.

Nonpoint source: Any nonconfined area from which pollutants are discharged into a body of water (e.g., agricultural runoff, construction runoff, and parking lot drainage), or into air (e.g., fugitive dust from construction sites).

Normal operations: All normal conditions and those abnormal conditions that frequency estimation techniques indicate occur with a frequency of more than 0.1 event per year.

NPDES: *see* “National Pollutant Discharge Elimination System”.

Nuclear assembly: The collective term for the primary, secondary, and radiation case in a nuclear weapon. Same as “physics package”.

Nuclear component: A nuclear weapon part that contains fissionable or fusionable material.

Nuclear reaction: A reaction in which an element’s atomic nucleus is transformed into another isotope of the same element or into another element altogether. The process always is accompanied by the release of particles or energy.

Nuclear Regulatory Commission (NRC): The Federal agency charged with oversight of nuclear power and nuclear machinery and applications not regulated by DOE or the Department of Defense.

Nuclear warhead: A device that contains fissionable and fusionable material, the nuclear assembly, and the non-nuclear components.

Nuclear weapon: A warhead that contains fissionable and fusionable material, the nuclear assembly, and the non-nuclear components packaged as a deliverable weapon.

Nuclear weapons complex: The network of laboratories and fabrication plants involved in the design, production, testing, surveillance, and maintenance of United States, nuclear weapons.

Nuclide: A species of atom characterized by the constitution of its nucleus. The nuclear constitution is specified by the number of protons, number of neutrons, and energy content; or, alternatively, by the atomic number, mass number, and atomic mass. To be regarded as a distinct nuclide, the atom must be capable of existing for a measurable length of time.

Numerical simulation: The use of mathematical formulas and models of physical processes to simulate through calculations, the behavior or performance of a device or complex system.

Occupational Safety and Health Administration (OSHA): Oversees and regulates workplace health and safety, created by the Occupational Safety and Health Act of 1970.

Obligate plant species: Species that occur in wetlands most of the time (99 percent).

Offsite: Outside the boundaries of the LLNL Livermore Site and Site 300 properties.

Onsite: Within the boundaries of the LLNL Livermore Site or Site 300 properties.

Opacity restrictions: Visible-emission regulations that are based on the light-scattering properties of suspended matter in the ambient atmosphere and apply to near-field emissions of fixed sources.

Open space: Any area of land or body of water set aside and left essentially unimproved that is dedicated, designated, or reserved for public or private use or enjoyment, or for the use and enjoyment of owners and occupants of land adjoining or neighboring such open house.

Oralloy: Enriched uranium.

Order of magnitude: A factor of ten. When a measurement is made with a result such as 3×10^7 , the exponent of 10 (here 7) is the order of magnitude of that measurement. To say that this result is known to within an order of magnitude is to say that the true value lies (in this example) between 3×10^6 and 3×10^8 .

Ozone (O₃): The triatomic form of oxygen. In the stratosphere, ozone protects the Earth from the sun's ultraviolet rays; in lower levels of the atmosphere, ozone is considered an air pollutant.

Ozone-Depleting Substance(s) (ODS): A compound that contributes to stratospheric ozone depletion. ODS include chlorofluorocarbons, hydrochlorofluorocarbon, halon, methyl bromide, carbon tetrachloride, and methyl chloroform. They are generally very stable in the troposphere and only degrade under intense ultraviolet light in the stratosphere. When they breakdown, they release chlorine or bromine atoms, which then deplete ozone.

Packaging: In the NRC regulations governing the transportation of radioactive materials (10 CFR part 71), the term "packaging" is used to mean the shipping container together with its radioactive contents.

Paleontology: The study of fossils.

Paleontological resources: Fossils.

Part B permit: The second, narrative section submitted by generators in the RCRA permitting process that covers in detail the procedures followed at a facility to protect human health and the environment.

Particulate (airborne): Small particles that are emitted from fixed or mobile sources and dispersed in the atmosphere.

Parts per billion (ppb): A unit of measure for the concentration of a substance in its surrounding medium; for example, one billion grams of water containing one gram of salt has a salt concentration of one part per billion.

Parts per million (ppm): A unit of measure for the concentration of a substance in its surrounding medium; for example, one million grams of water containing one gram of salt has a salt concentration of one part per million.

Pasquill stability categories: Classification scheme that describes the degree of atmospheric turbulence. Categories range from extremely unstable (A) to extremely stable (F). Unstable conditions promote the rapid dispersion of atmospheric contaminants and result in lower air concentrations as compared with stable conditions.

Perched aquifer: Aquifer that is separated from another water-bearing stratum by an impermeable layer.

Perennial stream: A watercourse that flows year-round.

Performance: Essentially equivalent to “reliability”, a nuclear weapon, weapon system, or weapon component’s ability to perform its required function in terms of yield, range, accuracy, and radiation spectrum under stated conditions for a specified period.

Performance standards (incinerators): Specific regulatory requirements established by EPA limiting the concentrations of designated organic compounds, particulate matter, and hydrogen chloride in incinerator emissions.

Permissible Exposure Limit (PEL): Occupational exposure limit regulations endorsed by OSHA. May be for short term or 8-hour duration exposure.

Person-rem: A unit of collective dose commitment to a given population; the sum of individual doses received by a population group.

Petroglyph: Art that was carved or inscribed into bedrock by historic or prehistoric people.

pH: The negative logarithm of the concentration of hydrogen ions in a liquid measured in gram equivalents per liter. A pH of 7 is neutral; smaller numbers indicate an acidic condition, while larger numbers indicate a basic condition.

Photochemical oxidant: A class of compounds typified by ozone that represents oxidizing compounds created in the atmosphere with sunlight as a catalyst under low wind conditions.

Physics package: A collective term for the primary, secondary, and radiation case in a nuclear weapon. Same as “nuclear assembly”.

Piedmont: An area, plain, slope glacier, or other feature at the base of a mountain.

Piezometer: Instrument for measuring fluid pressure used to measure the elevation of the water table in a small, non-pumping well.

Pit: A nuclear weapon’s central core, containing Pu239 and/or highly enriched uranium, that undergoes fission when compressed by high explosives. The pit and the high explosive are known as the nuclear weapon’s “primary”.

Plasma: A cloud of charged particles containing about equal number of positive ions and electrons and exhibiting some properties of a gas but differing from a gas in being a good conductor of electricity and being affected by magnetic fields.

Plate tectonics: A theory of global-scale dynamics involving the movement of rigid plates of the earth’s crust.

Playa: Level area at the bottom of a desert basin that at times is temporarily covered with water; a dry lake bed.

Pleistocene: A standard epoch of geological, from about 1.6 million to 10,000 years ago.

Pliocene: Geological epoch of the Tertiary period, starting about 12 million years ago.

Plume: The spatial distribution of a release of airborne or waterborne material as it disperses in the environment.

Plutonium (Pu): An artificial fissile element of atomic number 94. Defined as a heavy, radioactive, metallic element, with atomic number 94, that produces ionization radiation in the form of alpha particles. Produced in a reactor by bombarding uranium with neutrons, plutonium is used in nuclear weapons and also can be used as fuel in fission reactors. The 15 radioactive plutonium isotopes have half-lives ranging from less than a second to thousands of years.

PM₁₀: Fine particulate matter with an aerodynamic diameter equal to or less than 10 microns.

Point source: Any confined and discrete conveyance (e.g., pipe, ditch, well, or stack).

Population dose (population exposure): Summation of individual radiation doses received by all those exposed to the source or event being considered. The collective radiation dose received by a population group, usually measured in units of person-rem.

Precambrian: Dating from before the Cambrian geologic period more than 570 million years ago.

Precursor pollutants: Pollutants that must be present in the atmosphere before chemical reactions take place and form the pollutant of interest. For example, nitrogen oxides, and volatile organic compounds are precursor pollutants to the formation of ozone.

Prehistoric resources: *See* “Cultural resources (prehistoric).”

Prevention of Significant Deterioration (PSD): Regulations established by the 1977 *Clean Air Act* Amendments to limit increases in criteria air pollutant concentrations above baseline.

Primary and secondary containment: Primary containment is that set of engineered safety features immediately around a radioactive or hazardous material designed to prevent its release; secondary containment is the set of backup features outside the primary containment.

Priority pollutants: A set of organic and inorganic chemicals identified by EPA as indicators of environmental contamination.

Probabilistic: With results taking into account the probability of occurrence. Probabilistic calculations sometimes combine the results of several deterministic calculations, weighting their results by their probabilities. *See* “Deterministic.”

Programmatic EIS: An EIS that, when complete, will examine a nationwide issue.

Prompt radiation: Gamma or neutron radiation emitted during the fission process is said to be prompt (within microseconds) as distinguished from delayed (as much as seconds).

Protective (Preventive) Action Guide: FDA-recommended levels of radiation exposure above, which action should be taken to prevent or reduce the radioactive contamination of human food or animal feeds.

PSD: *see* “Prevention of Significant Deterioration”.

Public: Anyone outside the boundary of a DOE site at the time of an accident or during normal operations.

Quality assurance (QA): A system of activities whose purpose is to provide the assurance that standards of quality are attained with a stated level of confidence.

Quality control (QC): Procedures used to verify that prescribed standards of performance are attained.

Quality factor: The factor by which the absorbed dose (rad) is multiplied to obtain a quantity that expresses (on a common scale for all ionizing radiation) the biological damage to exposed persons, usually used because some types of radiation, such as alpha particles, are biologically more damaging than others. Quality factors for alpha, beta, and gamma radiation are in the ratio 20:1:1.

Quaternary: The geologic era encompassing the last 2–3 million years.

Rad: The unit of absorbed dose and the quantity of energy imparted by ionizing radiation to a unit mass of matter such as tissue, and equal to 0.01 joule per kilogram, or 0.01 gray.

Radiation: The emitted particles or photons from the nuclei of radioactive atoms; including alpha, beta, gamma, and neutrons. Some elements are naturally radioactive; others are induced to become radioactive by bombardment in a reactor. Naturally occurring radiation is indistinguishable from induced radiation.

Radioactive decay: The spontaneous transformation of one radionuclide into a different nuclide (which may or may not be radioactive), or de-excitation to a lower energy state of the nucleus by emission of nuclear radiation, primarily alpha or beta particles, or gamma rays (photons).

Radioactive material: Any material having a specific activity greater than 0.002 microcuries per gram, as defined by 49 CFR parts 173.4-3 (y).

Radioactive waste: Material that contains radionuclides regulated under the *Atomic Energy Act* of 1954, as amended, and is of negligible economic value given the cost of recovery.

Radioactivity: The spontaneous emission of nuclear radiation, generally alpha or beta particles, or gamma rays, from the nucleus of an unstable isotope.

Radiological risk: The product of the accident consequence (dose) and the probability of the accident occurring; calculated by considering a wide range of accidents, from high-probability low-consequence events to low-probability high-consequence events.

Radionuclide: An unstable nuclide. *See* “nuclide and radioactivity.” Standard practice for naming a radionuclide is to use the name or atomic symbol of an element followed by its atomic weight (e.g., cobalt-60 or Co-60, a radionuclide of cobalt).

RADTRAN 5: An NRC-approved code for estimating the radiological impacts of transportation of radioactive materials.

Rare species: Populations and/or individuals occurring in very low numbers relative to other similar taxa in the state, although common or regularly occurring throughout much of their range. They may be found in a restricted geographic region or occur sparsely over a wider area. Although rare, populations are apparently stable.

RCRA Part B permit: A permit issued by EPA under the Resources Conservation and Recovery Act (RCRA) that have allowed LLNL to operate landfills at LLNL Site 300 for the disposal of debris from high explosives tests.

Reasonably foreseeable: An accident or action whose impacts “may have large or catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason” (10 CFR part 1502.22(b) (4)).

Refraction: The change in direction of propagation of a sound upon passage into a medium with different sound speed.

Region of influence (ROI): A geographic area within which LLNL activities may affect a particular resource.

Regional Water Quality Control Board (RWQCB): The California regional agency responsible for water quality standards and the enforcement of state water quality laws within its jurisdiction. California is divided into a number of RWQCBs; the Livermore Site is regulated by the San Francisco Bay Region, and Site 300 is regulated by the Central Valley Region.

Release fraction: The fraction of the material at risk that is released in an accident.

Relevé: A descriptive technique for sampling vegetation.

Rem: A unit of radiation dose equivalent and effective dose equivalent describing the effectiveness of a type of radiation to produce biological effects; coined from the phrase “roentgen equivalent man.” The product of the absorbed dose (rad) and a quality factor (Q).

Resource Conservation and Recovery Act of 1976 (RCRA): A program of Federal laws and regulations that govern the management of hazardous wastes, and applicable to all entities that manage hazardous wastes.

Respirable Fraction (RF): The fraction of airborne radionuclides as particles that can be transported through air and inhaled into the human respiratory system. This term is commonly assumed to include particles 10- μm (micron) Aerodynamic Equivalent Diameter and less.

Resuspension: The process by which material deposited on the ground is again made airborne, such as by wind or vehicle disturbance.

Resuspended inhalation: Exposure route in which radioactive materials enter the body through inhalation of air contaminated with radioactive particulates that were previously deposited on the ground following an accidental release.

Retention tanks: Tanks in which liquid wastes and other effluents are held pending determination of what, if any, treatment they require before disposal.

Riparian: Located along the banks of streams, rivers, lakes, and other bodies of water.

Risk assessment: The use of established methods to measure the risks posed by an activity or exposure by evaluating the relationship between exposure to radioactive substances and the subsequent occurrence of health effects and the likelihood for that exposure to occur.

Risk estimator: A number used to convert the measured or calculated effective dose equivalent to estimates of latent fatal cancers that can be attributed to the exposure.

Risk factor: Numerical estimate of the severity of harm associated with exposure to a particular risk agent.

Risk Group (RG): NIH classification of agents known to infect humans as selected animal agents that may pose theoretical risks if inoculated into humans. There are four groups for the classification of biohazardous agents, RG1, RG2, RG3, and RG4.

Basis for the Classification of Biohazardous Agents

RG1	Agents are not associated with disease in healthy adult humans
RG2	Agents are associated with human disease which is rarely serious and for which prevent therapeutic interventions are <i>often</i> available
RG3	Agents are associated with serious or lethal human disease for which preventative or therapeutic interventions <i>may</i> be available.
RG4	Agents are likely to cause serious or lethal human disease for which preventive or therapeutic interventions are <i>not usually</i> available.

Rock shelter: An opening in exposed rock of sufficient size to allow people to be sheltered from the weather. Used by both historic and prehistoric people, rock shelters contain midden deposits,

grinding holes, evidence of fires, artifacts, and sometimes artwork carved or inscribed onto the walls of the shelters.

Roentgen: a unit of exposure to ionizing x- or gamma radiation equal to or producing 1 electrostatic unit per cubic centimeter of air. It is approximately equal to 1 rad.

Safe Drinking Water Act, as amended: This Act protects the quality of public water supplies, water supply and distribution systems, and all sources of drinking water.

San Francisco Bay Regional Water Quality Control Board (SFBRWCB): The local agency responsible for regulating stationary air emission sources (including the Livermore Site) in the San Francisco Bay Area.

San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD): The local agency responsible for regulating stationary air emission sources (including Site 300) in San Joaquin County.

Sanitary waste: Most simply, waste generated by routine operations that is not regulated as hazardous or radioactive by state or Federal agencies.

SARA: see “*Superfund Amendments and Reauthorization Act.*”

Saturated zone: A subsurface zone below which all rock pore-space is filled with water; also called the phreatic zone.

Scenario: A particular chain of hypothetical circumstances that could, in principle, release radioactivity or hazardous chemicals from storage and handling site, or during a transportation accident.

Scenic corridor: A long, axial vista formed by regularly placed buildings or landscaping.

Sealed source: A manufactured source of radioactive material that is contained in such a way that the material is not easily dispersed or altered chemically under normal use. Sealed sources are generally used to provide a known intensity of a specific type of radiation (e.g., a small gamma-ray source used to calibrate radiation survey instruments).

Section 106 process: A process under the *National Historic Preservation Act* for identifying, evaluating, and nominating historic properties for inclusion in the National Register.

Sedimentary rock: A rock resulting from the consolidation of loose sediment that has accumulated in layers.

Seeps: A spot where water or petroleum oozes from the earth, often forming the source of a small trickling stream.

Sedimentary rock: A rock resulting from the consolidation of loose sediment that has accumulated in layers, consisting of mechanically formed fragments of older rock transported from its source and deposited in water or from air or ice.

Seismic zone: An area defined by the Uniform Building Code (1991), designating the amount of damage to be expected as the result of earthquakes. The United States is divided into six zones: (1) Zone 0 - no damage; (2) Zone 1 - minor damage; corresponds to intensities V and VI of the modified Mercalli intensity scale; (3) Zone 2A - moderate damage; corresponds to intensity VII of the modified Mercalli intensity scale (eastern United States); (4) Zone 2B - slightly more damage than 2A (western United States); (5) Zone 3 - major damage; corresponds to intensity VII and higher of the modified Mercalli intensity scale; (6) Zone 4 - areas within Zone 3 determined by proximity to certain major fault systems.

Seismicity: The tendency for the occurrence of earthquakes.

Select Agents: A select agent is defined as an agent, virus, bacteria, fungi, rickettsiae or toxin listed in Appendix A of *Federal Register 29327* (42 CFR Part 72) titled, *Additional Requirements for Facilities Transferring or Receiving Select Agents*. Select Agents also includes (a) genetically modified micro-organisms or (b) genetic elements that contain nucleic acid sequences associated with pathogenicity from organisms listed in Appendix A, (c) genetically modified micro-organisms listed in Appendix A, and (d) genetically modified micro-organisms or genetic elements that contain nucleic acid sequences coding for any of the toxins in Appendix A, or their toxic subunits.

Sensitivity: The capability of methodology or instrumentation to discriminate between samples having differing concentrations or containing varying amounts of analyte.

Severity: Function of the magnitudes of the mechanical forces (impact) and thermal forces (fire) to which a package may be subjected during an accident; any sequence of events that results in an accident in which a transport package is subjected to forces within a certain range of values is assigned to the accident severity category associated with that range.

Sewerage: The system of sewers.

Shear: Force or motion tangential to the section on which it acts.

Shielding: Any material or obstruction (bulkheads, walls, or other constructions) that absorbs radiation in order to protect personnel or equipment.

Site: In this SWEIS, the term “site” refers to a DOE-controlled Federal site, such as Los Alamos National Laboratory or the Nevada Test Site.

Site-Wide Maximally Exposed Individual (site-wide MEI): A hypothetical person who receives, at the location of a given publicly accessible facility (such as a church, school, business, or residence), the greatest LLNL-induced effective dose equivalent (summed over all pathways) from all sources of radionuclide releases to air at a site. Doses at this receptor location caused by each emission source are summed, and yield a larger value than for the location of any other similar public facility. This individual is assumed to continuously reside at this location 24 hours per day, 365 days per year.

Slip: To move or displace; a movement dislocation adjacent blocks of crust separated by a fault.

Sludge: Precipitated solid matter produced by water and sewage treatment processes. In the context of this EIS/EIR, also the moist precipitate resulting from the dewatering of hazardous waste.

Socioeconomics (analyses): Analyses of those parts of the human environment in a particular location that are related to existing and potential future economic and social conditions. The welfare of human beings as related to the production, distribution, and consumption of goods and services.

Solid waste: Any nonhazardous garbage, refuse, or sludge that is primarily solid; but may also include, semisolid, or contained gaseous material resulting from residential, industrial, commercial, agricultural, or mining operations, and community activities.

Solid Waste Management Unit (SWMU): Any discernible unit at which solid wastes have been placed at any time regardless of whether the unit was intended for solid or hazardous waste management.

Sound level: The quantity in decibels measured by a sound level meter satisfying requirements of the American National Standard Specifications for Sound Level Meters SI.4-1971. Sound level is the frequency-weighted sound pressure level obtained with the standardized dynamic characteristic “fast” or “slow” and weighting A or C.

Sound pressure level (SPL): The level of the A-weighted sound pressure referenced to 20 level micropascal (for air).

Source: Any physical entity that may cause radiation or chemical exposure, for example by emitting ionizing radiation or releasing radioactive or hazardous material.

Source term: In a calculation of contaminant dispersion, the amount of that contaminant assumed available to be dispersed. Source term is calculated as the product of material at risk (MAR), damage ratio (DR), respirable fraction (RF), airborne release fraction (ARF), and leak path factor (LPF).

Special nuclear material: Plutonium, uranium enriched in the isotope U-233 or in the isotope U-235, and any other material that, pursuant to the provisions of section 51 of the Atomic Energy Act of 1954, as amended, has been determined to be special nuclear material, but does not include source material, or any other material enriched by any of the foregoing.

Species of concern: Plants and animals whose conservation status may be of concern to the United States Fish and Wildlife Service, but do not have official or legal protection status.

Specific activity: The amount of radioactivity per unit volume or mass.

Specific conductance: Measure of the ability of a material to conduct electricity; also called conductivity.

Stability class: *see* “Pasquill stability categories.”

Standard deviation: A measure of dispersion used in statistical theory for the average variation of a random quantity. The root-mean-square deviation from an average value.

Stockpile management: The specific tasks and functions including production, routine surveillance and servicing, assembly and dismantlement, and disposal of weapons-related parts and materials.

Stockpile stewardship: The science and technology aspects of ensuring the safety, security, and reliability of the stockpile, including research and development to provide technologies required for stockpile management.

Stockpile Stewardship and Management Program: A single, highly integrated technical program for maintaining the safety and reliability of the United States nuclear stockpile in an era without nuclear testing and without new weapons development and production.

Stockpile surveillance: Routine and periodic examination, evaluation and testing of stockpile weapons and weapon components to ensure that they conform to performance specifications, and to identify and evaluate the effect of unexpected or age-related changes.

Stormwater Pollution Prevention Plan: A plan required by an NPDES permit for controlling stormwater pollution resulting from construction or industrial activities.

Strata: Plural of stratum, which is a single sedimentary, bed or layer.

Strike (of a stratum or fault): The direction of the line of intersection of a horizontal plan with an uptilted geologic stratum or fault plane.

Strike-slip fault: A fault in which the net slip is horizontal, parallel to the strike of the fault.

Subcritical experiment: A dynamic scientific experiment involving special nuclear material in which none of the materials reaches criticality or involves self-sustaining chain-reaction.

Sulfur oxides (SO_x): A general term used to describe the oxides of sulfur; pungent, colorless gases formed primarily by the combustion of fossil fuels. Sulfur oxides, which are considered major air pollutants, may damage the respiratory tract as well as vegetation.

Superfund: The common name used for the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). California has also established a “State Super-fund” under provisions of the California Hazardous Waste Control Act.

Superfund Amendments and Reauthorization Act (SARA): Act enacted in 1986, which amended and reauthorized CERCLA for five years at a total funding level of \$8.5 billion. SARA more stringently defines hazardous waste cleanup standards and emphasizes remedies that permanently and significantly reduce the mobility, toxicity, or volume of wastes. Title III of SARA, the *Emergency Planning and Community Right-to-Know Act*, mandates establishment of community emergency planning programs, emergency notification, reporting of chemicals, and emission inventories.

Surface faulting: As opposed to a thrust fault, a fault that does intersect the surface of the earth; the displacement of ground along the surface trace of a fault.

Surface impoundment: A facility or part of a facility that is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials, although it may be lined with man-made materials. The impoundment is designed to hold an accumulation of liquid wastes, or wastes containing free liquids, and is not an injection well. Examples of surface impoundments are holding, storage, settling and aeration pits, ponds, and lagoons.

Surrogate material: A material, such as tungsten, used to simulate the characteristics of actual weapons materials so tests can be conducted more cost-effectively.

Système International d'Unités (SI): An international system of physical units which include meter (length), kilogram (mass), kelvin (temperature), becquerel (radioactivity), gray (radioactive dose), and sievert (dose equivalent).

Targets: Refers to a microstructure containing a tiny fuel capsule at which the lasers are directed.

Tectonic: Pertaining to the processes causing, and the rock structures resulting from, deformation of the earth's crusts.

Temporary Emergency Exposure Limits: The Temporary Emergency Exposure Limits were developed by the DOE Subcommittee on Consequences Assessment and Protective Actions (SCAPA) for chemicals where ERPG values are not available and serve as a temporary guidance until ERPGs can be developed.

Terawatt (TW): The equivalent of one trillion watts (10^{12}).

Terraces: Relatively horizontal or gently inclined surfaces or deposit sometimes long and narrow, which are bounded by a steeper ascending slope on one side and by a steeper descending slope on the opposite side.

Terrestrial: Pertaining to plants or animals living on land rather than in water.

Tertiary: The period of geologic time between the Cretaceous and the Pleistocene, comprising the Pliocene, Miocene, Oligocene, Eocene, and Paleocene, from about the 65 million to 1.6 million years ago.

Test readiness: Maintaining the essential technologies, staff; skills and infrastructure to resume nuclear testing, if mandated by the president.

Thermoluminescent dosimeter (TLD): A device used to measure external beta or gamma radiation levels, and which contains a material that, after exposure to beta or gamma radiation, emits light when processed and heated.

Thermonuclear: The process by which very high temperatures are used to bring about the fusion of light nuclei-such as deuterium and tritium-with an accompanying release of energy.

Threatened species: A species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range that is legally protected.

Threshold limit Values/Time-Weighted Average (TLV®/TWA): Guidelines or recommendations that refer to airborne concentrations of potentially hazardous substances. A time-weighted average TLV® is an average for a normal 8-hour workday or 40-hour workweek, to which it is believed all workers may be repeatedly exposed, day after day, without adverse effect.

Thrust fault: A fault dipping less than 45°, in which the block above appears to have moved upward relative to the block below.

Tiger Team: A team set up by the Secretary of Energy in 1989 to assess the environment, safety, and health operations at all DOE facilities to determine whether changes were needed to improve the protection of the environment, safety, and health.

Time-weighted average (TWA): Time-weighted average representing 8 or 10 hours of work per day during a 40-hour work week.

Total dissolved solids (TDS): The portion of solid material in a waste stream that is dissolved and passed through a filter.

Total suspended solids (TSS): The total mass of particulate matter per unit volume suspended in water and wastewater discharged that is large enough to be collected by a 0.45-micron filter.

Toxicity assessment: Identification of the types of adverse health effects associated with exposures and the relationship between the magnitude of the exposure and of the adverse effects.

Toxic Substances Control Act of 1976 (TSCA): Act authorizing the Environmental Protection Agency to secure information on all new and existing chemical substances and to control any of these substances determined to cause an unreasonable risk to public health or the environment. This law requires that the health and environmental effects of all new chemicals be reviewed by the Environmental Protection Agency before they are manufactured for commercial purposes.

Trace: A line on one plane representing the intersection of another plane with the first one (e.g., a fault trace).

Transect: A sample area (as of vegetation), usually in the form of a long continuous strip.

Transportainer: A portable container usually constructed of metal that is typically used as temporary storage space.

Transuranic waste (TRU): Material contaminated with alpha-emitting transuranium nuclides, which have an atomic number greater than that of uranium (i.e. 92); including neptunium, plutonium, americium, and curium; with half-lives longer than 20 years, except for: (1) high-level radioactive waste; (2) waste that the Secretary of Energy has determined, with the concurrence of the Administrator of the Environmental Protection Agency, does not need the degree of isolation required by the 40 CFR Part 191 disposal regulations; or (3) waste that the

Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61, and are present in concentrations greater than 100 nCi/g of waste.

Trend (of a fault): If the fault intersects the surface, the general direction of that intersection.

Tritiated water: Water in which one of the hydrogen atoms has been replaced by a tritium atom; sometimes shown as HTO.

Tritium: The radioactive isotope of hydrogen, containing one proton and two neutrons in its nucleus, which decays at a half-life of 12.3 years by emitting a low-energy beta particle. Common symbols for this isotope are H-3 and T.

TRUPACT-II: The package designed to transport contact-handled transuranic waste to the WIPP site. (TRUPACT=Transuranic Package Transporter)

Tuff: A rock formed of compacted volcanic fragments, generally smaller than 4 mm in diameter.

Type A packaging: “A packaging designed to retain the integrity of containment and shielding...under normal conditions of transport as demonstrated by” a water spray test, a free-drop test, a compression test, and a penetration test (40 CFR parts 173.403(gg), 173.465).

Type B packaging: A DOE, DOT, and NRC certified container that must be used for the transport of transuranic waste containing more than 20 curies of plutonium per package. Type B packaging must be able to withstand both normal and accident conditions without releasing its radioactive contents. These containers are tested under severe, hypothetical-accident conditions that demonstrates resistance to impact, puncture, fire, and submersion in water (49 CFR part 173).

U-AVLIS: At LLNL, the process of Atomic Vapor Laser Isotope Separation applied to uranium.

Unsaturated zone: That portion of the subsurface in which the pores are only partially filled with water and the direction of water flow is vertical; is also referred to as the vadose zone.

Uranium: *See* “Natural uranium.” A naturally occurring, heavy metallic element. Designated atomic number 92, uranium has many radioactive isotopes. Enriched uranium is most commonly used as a fuel for nuclear fission, while uranium 238 is the most abundant isotope in nature.

United States Department of Energy (DOE): The Federal agency responsible for conducting energy research and regulating nuclear materials used for weapons production.

United States Environmental Protection Agency (EPA): The Federal agency responsible for enforcing Federal environmental laws. Although some of this responsibility may be delegated to state and local regulatory agencies, EPA retains oversight authority to ensure protection of human health and the environment.

Vacuum-induced stripping or venting: A groundwater treatment system in which a vacuum in the subsurface soil draws off volatile organic contaminants for treatment and/or disposal.

Vadose zone: The partially saturated or unsaturated region above the water table that does not yield water to wells.

Valley fever (coccidioidomycosis): A fungal disease of the lungs endemic to the southwest United States characterized in severe cases by high fever and extreme fatigue.

Vernal pool: A wetland created from standing water, typically in the spring, hence its name.

Viewpoint: A location from which a site is visible.

Viewshed: The geographic area from which a site is visible; a collection of viewpoints.

Volatile organic compound (VOC): Liquid or solid organic compounds that have a high vapor pressure at normal pressures and temperatures and thus tend to spontaneously pass into the vapor state.

Volcanic rock: A generally finely crystalline or glassy igneous rock resulting from volcanic action at or near the Earth's surface either ejected explosively or extruded as lava (e.g., basalt). The term also included near-surface intrusions that form a part of the volcanic structure.

Waste accumulation area (WAA): An officially designated area that meets current environmental standards and guidelines for temporary (less than 90 days) storage of hazardous waste before pickup by the Hazardous Waste Management Division for offsite disposal.

Waste Generator: Any individual or group of individuals that generate radioactive, mixed, or hazardous wastes at LLNL or SNL, Livermore. Waste generator responsibilities are discussed in Section B.3.1.1.

Waste Isolation Pilot Plant (WIPP): A facility in southeastern New Mexico which was developed as the disposal site for transuranic and transuranic mixed waste. Operations began on March 26, 1999.

Waste management: The planning, coordination, and direction of those functions related to generation, handling, treatment, storage, transport, and disposal of waste, as well as associated surveillance and maintenance activities.

Waste management facilities: One or more of the waste management units for LLNL Livermore Site, LLNL Site 300, and SNL, Livermore respectively.

Waste minimization: Actions that economically avoid or reduce the generation of waste by source reduction, reducing the toxicity of hazardous waste, improving energy usage, or recycling. These actions will be consistent with the general goal of minimizing current and future threats to human health, safety, and the environment.

Wastewater treatment plant: A collection of treatment processes and facilities designed and built to reduce the amount of suspended solids, bacteria, oxygen-demanding materials, and chemical constituents in wastewater.

Water table: The water-level surface below the ground at which the unsaturated zone ends and the saturated zone begins, and the level to which a well that is screened in the unconfined aquifer would fill with water.

Weapons effects: Deals with outputs of nuclear weapons and the associated effects on materials, components, systems, and the environment.

Weapons of mass destruction: Umbrella term that includes nuclear, chemical, and biological weapons.

Weapons-grade: Any fissionable material in which the abundance of fissile isotopes is high enough that the material is suitable for use in thermonuclear weapons.

Wetland: An area that has water at or near the surface of the ground during the growing season (wetland hydrology). It supports or is capable of supporting plants that are adapted to wet habitats (hydrophytic vegetation) and has soils that have developed under wet conditions (hydric soils).

Wetland hydrology: Permanent or periodic inundation for at least 7 days during the growing season.

Whole-body radiation: Radiation to the whole body, as opposed to individual organs or parts of the body.

Wind rose: A diagram that shows the frequency and intensity of wind from different directions at a specific location.

X-rays: Penetrating electromagnetic radiations with wavelengths shorter than those of visible light, usually produced by irradiating a metallic target with large numbers of high-energy electrons. In nuclear reactions, it is customary to refer to photons originating outside the nucleus as x rays and those originating in the nucleus as gamma rays, even though they are the same.

Yield: The energy released from a thermonuclear reaction.

Yield experiments: A measure of fusion energy/neutron production in experiments that use a mixture of deuterium and tritium isotopes as fuel.

Zinc (Zn): A bluish white crystalline metallic element of atomic number 30. Zinc has low to intermediate hardness and is ductile when pure but in the commercial form is brittle at ordinary temperatures and becomes ductile on slight heating. It occurs abundantly in minerals, is an essential micronutrient for both plants and animals, and is used especially as a protective coating for iron and steel.

Zone 7: The common name for the Alameda County Flood Control and Water Conservation District.

Zoning: The division of city or county by legislative regulations into areas, or zones, that specify allowable uses for real property and size restrictions for buildings within these areas; a program that implements the policies of the General Plan.

Zoning District: A designated section of a city or county wherein prescribed land use requirements and building and development standards are uniform.