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AMERICAN NUCLEAR SOCIETY

Nuclear Facility Standards Committee

GLOSSARY OF DEFINITIONS AND TERMINOLOGY

Foreword

This glossary is an edited compilation of the "Definitions" provided in each of the Standards issued by the Nuclear Power Plant Standards Committee (NUPPSCO). The glossary is for use by all working groups in NUPPSCO to provide a consistent set of definitions, to minimize the time-consuming task of developing unique definitions for each document and to avoid unnecessary duplication. It is intended to be a living document subject to revision.

A draft "Glossary of Definitions and Terminology" was produced by ANS-50 Coordination Working Group No. 1 under the direction of George Koppel 10/6/1976. The Glossary was intended for use by all standards writing groups within the ANS-50 subcommittee. Although never issued, the Glossary was used informally by the various Working Groups in developing standards.

In October 1983, an alphabetized master list (including duplications) of definitions taken from all standards published through 1983 was prepared. From then thru March 1985 a concerted effort was made to produce a revised, updated Glossary with more precise definitions. It included some new terms and a revised format consisting of three Sections; General Engineering and Editorial, Quality Assurance and Reliability and Safety Systems.

In May 1994, at the direction of NUPPSCO, an updated draft of the Glossary was prepared using as a starting point the original 1976 draft Glossary (G), the 1983-85 master list (C) and adding the new definitions, changes and duplications identified from a review of all NUPPSCO standards issued (or in draft) through 1993. The draft compiled from this new, updated listing clearly indicated the extensive duplication and variations in definition that exists in current standards.

In general, this document provides the most recent definition in the Glossary. Any variations in content or form of the definitions will be provided in a later Appendix. The source document for each definition is identified at the end of each definition (i.e., ANS 3.2-89). Standards with exact duplicates are also identified, as well as those documents which contain a variant form.

A definition followed by a (G) means the definition was in the original Glossary, a (C) or (ANS 3.2-[no date]) means the definition came from the 1983 Master List and that no later version was available for review.

In response to review comments, the 1994 draft glossary was revised to eliminate redundant terms, and duplication (or contradiction) within the several definitions for the same term. Some terms are included in the glossary for convenience, or for emphasis whose meanings are also adequately defined in a common dictionary.

Suggestions for changes or additions to the revised Glossary should be addressed to ANS headquarters standards department.

For additional definitions, refer to:
Nuclear Regulatory Commission Glossary at
www.nrc.gov/reading-rm/basic-ref/glossary/full-text.htm

IAEA Nuclear Safety Glossary at:
http://www-pub.iaea.org/MTCD/publications/PDF/Put1290_web.pdf

European Nuclear Society Glossary of Nuclear Terms at
http://www.euronuclear.org/info/encyclopedia/pdf/Nuclear%20Glossary,2008-04-04.pdf

Note: The use of (ANS xx.x-93) or ANS xx.x-D93 is not consistent with regard to showing the "D" to indicate that the definition was taken from a draft document. When the reviewed version was a draft version, the "D" is not always indicated.

A.

absorbed dose (D). The quotient of de by dm where de is the mean energy imparted by ionizing radiation to matter of mass dm:

$$D = \frac{d\bar{e}}{d\bar{m}}$$

The special name for the unit of absorbed dose in the gray (Gy);
1 Gy = 1J/kg.
[based on ICRU Rpt. 33 & Publication 26]. (ANS 6.1.1-91)

Variant form: (ANS 3.7.1-D92)

academic training. Successfully completed college level work leading to a recognized degree in a discipline related to the position in question. (ANS 3.1)

acceleration sensor. An instrument capable of sensing absolute acceleration and producing a signal that could be transmitted to a recorder. (ANS 2.2-02)

accelerogram. The record of acceleration varying with time for a single linear component of vibration, recorded by a time history accelerograph. (ANS 2.10-03)(ANS 2.20)

A representation (either recorded, modified recorded, or synthetic) of the acceleration of the ground during an earthquake. The accelerogram contains acceleration-time-data pairs. (ANSI/ANS 2.27-08)

acceptable. The word "acceptable" is used when a system or component has been demonstrated to meet its design and performance criteria by test or analysis. (ANS 56.5-89)

acceptable damage. Damage resulting from an event (or appropriate combinations of events) where the safety design requirements for the appropriate category of events are met. Events (and appropriate combinations of events) are categorized by plant conditions in ANSI/ANS 51.1 and 52.1. (ANS 58.3-92) (ANS 58.3-98)

acceptable level of safety. The aggregate of an individual facility's conditions found on case-by-case basis to be adequate to assure protection of the worker and public health and safety considering the probability and consequences of adverse events including the expected response of that facility to those events. (58.3)(58.4-W90)

acceptable method. In many places, the commentary contains words such as, “Reference X provides an acceptable method for performing this aspect of the analysis.” The plain meaning of this wording should be clear, namely that using the methodology or data or approach in Reference X is one way to meet the Standard. The intent of any Requirement that uses this language is to be

permissive, meaning that the analysis team can use another method without prejudice. However, it is important to understand that the intent of the Standard goes beyond the plain meaning, as follows: Whenever the phrasing "acceptable method" is used herein, the intent is that if the analysis uses another method, the other method must accomplish the stated objective with a comparable level of detail, a comparable scope, a comparable level of conservatism, etc. It is not acceptable to use another method that does not accomplish the intent of the Requirement at least as well as the "acceptable method" would accomplish it. Whenever an alternative to the "acceptable method" is selected, it is understood that the peer-review team will pay particular attention to this topic. (ANSI/ANS-2.29—08)

acceptance criteria. The standard against which test results are to be compared for establishing the functional acceptability of the primary containment as a leakage-limiting boundary. (ANS 56.8-02)

access control station. A station established to control access between controlled and uncontrolled areas. Its function is to assure that only authorized personnel, properly equipped, may enter into controlled access areas, and that personnel leaving controlled access have been cleared by the radiation monitors. (ANS 6.7.1-85)

Variant form: (ANS 5.6.1-85)

accessible instruments. Instruments or sensors whose locations permit ready access during plant operation without violation of applicable safety regulations such as those of the Occupational Safety and Health Administration (OSHA), or regulations that address plant security or radiation protection safety. (ANS 2.2-02) (ANS 2.10)

accident. Design Basis Accident Events and those unpostulated events that have the potential for release of significant amounts of radio-active material to the environment. (ANS 4.5-96W)

Variant form: (ANS 56.2-84) (ANS 59.1)

accident duration. The period of time post accident during which the cumulative dose equals 95% of the total ex-pected cumulative dose due to the accident. (ANS 5.6.1-D90)

accident isolation. Establishment of isolation barriers(s) in a specific fluid system or group of fluid systems penetrating the containment to arrest or mitigate the potential consequences of an accident. (ANS 56.2-84)

accident isolation signal. A signal which automatically

initiates the accident isolation function. (ANS 56.2-84)

accident phases. Phase I That period of time extending from the initiation of the accident to the time at which the plant is in a controlled condition. Phase II That period of time extending from the onset of a controlled condition to the time that personnel access is possible to commence activities in parts of the plant that require inspection, repair or replacement. (ANS 4.5-96W)

accuracy. Conformity of an indicated value to an accepted standard value or true value. (ANS 56.8-02)

Variant form: (ANS 6.8.1-81)(ANS 6.8.2-86)

action. One or more manipulations which accomplishes a specified task. One or more actions are necessary to accomplish a function. (ANS 58.8-92)

active component. 1 A component in which mechanical movement or change of state must occur to accomplish the function of the component. (ANS 50.1-93)(ANS 58.14-93) (ANS 51.1/52.1-93) (ANS 56.1-85)

Variant form: (ANS 56.2-84) (ANS 56.5-89)(ANS 54.1-89)

active component failure. A malfunction, excluding passive failures, of an active component that would prevent completion of its intended function upon demand. (ANS 54.1-89)

active failure. A malfunction of a component that prevents mechanical movement or change of state required to accomplish the function of the component on demand.

Examples of active failures include the failure of a valve or check valve to move to its correct position, or the failure of a pump, fan, or diesel generator to start.

Spurious action of a powered component originating within its actuation or control system shall be regarded as an active failure unless specific design features or operating restrictions preclude such spurious action. An example is the unintended energization of a powered valve to open or close. (ANS 50.1-94)(ANS 58.14-93)

Variant form: (ANS 51.1/52.1-93 (ANS 51.10-87)(ANS 56.1-85) (ANS 56.2-84)(ANS 56.4-83) (ANS 56.5-87)(ANS 56.8-02) (ANS 58.2-88)(ANS 58.9-94) A malfunction, excluding passive failures, of a component that relies on mechanical movement to complete its intended nuclear safety function upon demand. (ANSI/ANS-51.10-02)

active function. A function that requires mechanical motion or a change of state (e.g., the closing of a valve or relay or the change in state of a transistor)[1,2]

([1]) Active functions can be either safety-related, supplemented grade or non-safety-related. For guidance see ANS 58.14.
([2]) In passive ALWR designs, passive engineered safety features are those that rely on passive means to provide their functions. Passive means are natural forces (e.g., batteries, rotating inertia, and compressed fluid), energy inherent to the system (e.g., check valves), and non-cycling valves. Passive means do not rely on large continuously rotating machinery, multiple acting valves, or ac powered divisions of electrical power. (ANS 50.1-94)(ANS 58.14-94)

active status. Status of being in the position to record new data without destroying old data previously recorded by the instrument. (ANS 2.10-03)

actuating (motive) power. Electric, pneumatic or hydraulic supply required to operate the isolation valve. (ANS 56.2-84)

additive. In the context of containment spray systems, any substance added to the spray water to adjust pH or enhance fission product removal. (ANS 56.5-87)

additive subsystem. That portion of the containment spray system which is specifically designed to place additive(s) into the spray water during spray operation. (ANS 56.5-87)

adequate. Established to be acceptable by the safety analysis of the plant. (ANS 4.1)

adjusted probable minimum flow. The probable minimum flow adjusted for man's activities. (ANS 2.13-79)

administrative controls. 1 Rules, orders, instructions, procedures, policies, practices, or designation of authority and responsibility. (ANS 50.1-94)(ANS 58.14-94) (ANS 3.2)(ANS 51.1/52.1-93) (ANS 3.2-06)

Variant form: (ANS 56.2-84) and (ANS 59.1).

Administrative limit. Leakage limit assigned to each Type B or Type C component as an indication of potential valve or penetration degradation and used to establish Type B and Type C test performance-based intervals. (ANS 56.8-02)

Aerodynamic entrainment. The suspension and transport of particulate materials, initially at rest, by the flow of gas. (ANS 5.10-98)

Aerodynamic equivalent diameter (AED). The diameter of a sphere with a density of 1g/cm3 that exhibits the same terminal velocity as the particle of concern. (ANS 5.10-98)

aggregate. Aggregate is the granular material which is mixed with water and cement to form concrete. Concrete for

radiation shielding is classified as ordinary or high density according to the unit weight of aggregate used. The aggregates defined in this section are those usually used for radiation shielding; other aggregates are sometimes used when it can be objectively shown that they produce concrete of the required strength, durability, and shielding characteristics.

(1) Aggregate for Ordinary Concrete. Fine and coarse aggregates for ordinary density concrete are described in Descriptive Nomenclature of Constituents of Natural Mineral Aggregates, ASTM C294. They must normally meet the requirements of Specifications for Concrete Aggregates, ASTM C33, except aggregates for concrete to be placed by the PA (pre-placed aggregate) method which meet the gradation requirements of Pre-placed Aggregate Concrete for Structural and Mass Concrete, ACISP-304.
(2) Aggregate for High Density Concrete. Fine and coarse aggregate for high density concrete is special aggregate or mixtures of special aggregate with the natural mineral aggregates used for normal density concrete. Special aggregates are iron shot, steel punchings, or natural-mineral or synthetic aggregate as described in Descriptive Nomenclature of Constituents of Aggregates for Radiation Shielding Concrete, ASTM C638 and meeting the requirements of Specifications for Aggregates for Radiation-Shielding Concrete, ASTM C637.
(3) Hydrous Aggregate. If the water content of the cured concrete cannot be maintained at a level high enough for the desired neutron attenuation requirements with the aggregates specified in (1) and (2), special aggregates having a relatively high water-of-hydration content may be used. Properties of hydrous aggregates are given in ASTM C637.
(4) Boron-Containing Aggregates. Boron containing aggregates are sometimes mixed with other aggregates to enhance neutron capture and reduce secondary gamma ray production. Boron containing minerals are described in ASTM C638. (ANS 6.4-85)

Airborne release factor (ARF). The fraction of affected material that can be suspended in air and become available for airborne transport. (ANS 5.10-98)

Airborne release rate (ARR). The fractional rate of affected material that is suspended into air and becomes available for transport as a function of time. (ANS 5.100-98)

aircraft impact. Accidental impact of an aircraft into a safety-related structure, system or component such that the resulting missile, fire, or smoke could affect the ability of the structure, system or component to perform its intended safety function. (ANS 2.12-78)

The following is taken from 10CFR50.150: Aircraft impact assessment:
(a) *Assessment requirements.*
(1) *Assessment*. Each applicant listed in paragraph (a)(3) shall perform a design-specific assessment of the effects on the facility of the impact of a large, commercial aircraft. Using realistic analyses, the applicant shall identify and incorporate into the design those design features and functional capabilities to show that, with reduced use of operator actions:
(i) The reactor core remains cooled, or the containment remains intact; and
(ii) Spent fuel cooling or spent fuel pool integrity is maintained.
(2) *Aircraft impact characteristics.*[1] The assessment must be based on the beyond-design-basis impact of a large, commercial aircraft used for long distance flights in the United States, with aviation fuel loading typically used in such flights, and an impact speed and angle of impact considering the ability of both experienced and inexperienced pilots to control large, commercial aircraft at the low altitude representative of a nuclear power plant's low profile.

Variant form: (ANS 2.19-89)
ALARA. As Low As Reasonably Achievable. (ANS 55.1-91)

As stated in 10CFR20, ALARA means making every reasonable effort to maintain exposures to radiation as far below the dose limits in this part as is practical consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest.

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

albedo. The probability under specified conditions that a particle entering into a region through a surface will return through that surface. (ANS 6.4-95)

aleatory variability. The variability inherent in a non-deterministic (i.e., stochastic, random) phenomenon (see Variability). Aleatory variability is accounted for by modeling the phenomenon in terms of a probability model. In principle, aleatory uncertainty cannot be reduced by the accumulation of more data or additional information, but the detailed characteristics of the probability model can be improved. Sometimes aleatory variability is called randomness. (ANS-2.27-08) (ANSI/ANS-2.29-08)

aliquot. A known fractional part of a defined quantity.

(ANS 16.1-03)

alternate shutdown. The maintenance of safe hot shutdown or achievement and maintenance of safe cold shutdown independent of and separate from the control room. (ANS 58.6-D92); see, also; dedicated shutdown.

alternate shutdown station. See; auxiliary shutdown station (ANS 58.6-92)

alternate source. A source of water which when combined with the primary source, has sufficient capacity to allow maintaining hot shutdown conditions for a minimum period of 24 hours plus a cool down period sufficient to reduce plant temperature to levels where low temperature and pressure decay heat removal equipment can be implemented. (ANS 51.10)

analysis. Analysis of radiation transport in and through shields including predictions of dose rates and neutron and gamma-ray fluxes as modified by the introduction of shields in the systems involved.
(ANS 6.4-85)

anisotropic. The properties at any point within a medium are different in different directions. (ANS 2.9-89)
(ANS 2.17-89)

annual or annually. Twelve months plus or minus three months with the objective of a long-term average of once a year.
(ANS 3.3-88)

anticipated operational occurrence. Those conditions of normal operation which are expected to occur one or more times during the life of the nuclear power unit and include but are not limited to a loss of all offsite power, an inadvertent control rod withdrawal, and tripping of the turbine generator set.
(ANS 54.1-89)

Variant form: (ANS 6.8.1-89)

anticipated transients without scram. (ATWS) Transients resulting from anticipated operational occurrences in combination with a failure to scram.(ATWS)
(ANS 54.1-89) Also, anticipated transients without trip (ATWT)

approved. Signifies that devices, materials, or assemblies have been successfully tested or accepted by prior class or type testing for a specific purpose or application by a nationally recognized testing laboratory. (ANS 59.4-79W86)

area of intersection. The area of the solution within an arm which intersects a plane tangent to the column at the point where the axis of the arm intersects the surface of the column. (ANS 8.9-87)

area monitor channel. A gamma radiation sensitive detector, electronic processing and alarm circuitry, readout devices, and interconnecting cables used to measure and display the exposure rate

present at the detector location. (ANS 6.8.1-81)

area probability sample. A probability sample selected using a frame which identifies population elements by their geographic location. Note: A frame is a scheme which assigns a unique identification to each population element. (ANS 2.6-81)

area(s) of applicability. The ranges of material compositions and geometric arrangements within which the bias of a calculation method is established. (ANS 8.1-83) (ANS 8.11-75)

areal density. The total mass of fissionable material per unit area projected perpendicularly onto a plane. (For an infinite, uniform slab, it is the product of the slab thickness and the concentration of fissionable material within the slab.) (ANS 8.1-83)

area source. An area of the earth's crust that is assumed to have relatively uniform earthquake source characteristics for use in the PSHA. (See also "volumetric source zone"). (ANSI/ANS 2.27-2008) (ANSI/ANS 2.29-2008)

arm. Any pipe intersecting a column. (ANS 8.9-87)

armed response individual. An onsite individual, not necessarily uniformed, whose primary duty in the event of attempted toxicological and/or radiological sabotage, is to respond, armed and equipped, to delay or prevent such an act. (ANS 3.3-88)

arrhenius model. Used in accelerated aging tests that relates the rate of reaction of a material to temperature by a simple exponential function,

$$r = A \exp(0/kT),$$

where r is the reaction rate, A is a material constant (frequency factor), 0 is the activation energy of the material (ev), k is Boltzmann's constant (0.8617×10^{-4} ev/°K) and T is absolute temperature (°K). (ANS 6.4.2-85)

as-found leakage rate. The leakage rate prior to any repairs or adjustments to the barrier being tested. (ANS 56.8-02)

as-found testing. Leakage rate testing after some period of normal service conditions, performed prior to any repairs or adjustments. (ANS 56.8-02)

as-left leakage rate. The leakage rate following any repairs or adjustments to the barrier being tested. (ANS 56.8-02)

as-left testing. Leakage rate testing performed following repair or adjustment. (ANS 56.8-02)

assured station blackout response facilities. The capability to withstand a station blackout demonstrated by the application of all requirements of this standard. (ANS 58.12-85)

at reactor storage (AR). Storage capability of spent fuel at the reactor facility following unloading. (ANS 2.15)(ANS 2.19-89)

audit. A planned and documented activity performed to determine by investigation, examination, or evaluation of objective evidence the adequacy of and compliance with established procedures, instructions, drawings, and other applicable documents, and the effectiveness of implementation. An audit should not be confused with surveillance or inspection activities performed for the sole purpose of process control or product acceptance. (ANS 3.2-93)

authorized individual. An individual who has been designated by the appropriate authority in writing, or by another equivalent method, to enter a protected or vital area. (ANS 3.3-88)

auto-load. The automatic application of loads to the diesel generator in a predetermined sequence. (ANS 59.52-93)(ANS 59.52-98)

automatic isolation valve. A valve whose closure is initiated by automatic means without any action by a plant operator upon receipt of an isolation signal from a protection system; or a simple or positive acting check valve. (ANS 56.2-84)

auxiliary fuel handling crane. A crane used for handling equipment including fuel assemblies and new fuel shipping containers. (ANS 57.1-93) (ANS 57.3-93) (ANS 57.1-98)

auxiliary shielding. The auxiliary shielding is the shielding provided for the equipment and piping that collects, processes, or stores radioactive materials external to the primary coolant system. (ANS 6.3.1-87)

auxiliary shutdown station. One location separate from the control room with information and controls available that permits actions to be taken to achieve, monitor, and maintain the safe shutdown condition. This is the primary location for activities required to maintain safe shutdown and supervise cool down following hot shutdown. (ANS 58.6-92)

auxiliary supporting features. Systems, structures, components (SSCs) that provide support services (e.g., cooling, lubrication and power) required by safety-related systems to accomplish their safety-related functions. (See ANSI/IEEE-603-1991)
(ANS 50.1-93)

B.

background radiation. That level of radiation which originates from sources other than the one being measured. (ANS 6.8.2-86)
[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]..

background source zone. A part of the earth's crust, usually of large areal dimension, within which potentially damaging earthquakes could occur that are not associated either with known fault sources or even with the uniform pattern, rate, or style of deformation or seismicity commonly identified with volumetric seismic source zones. In PSHA calculations, earthquakes that cannot be associated with other sources default to a background source zone. (ANSI/ANS 2.27-08) (ANSI/ANS 2.29-08)

backtrack. Restoration of the simulator to a previous set of conditions that have been automatically recorded at designated time intervals. (ANS 3.5-85)

backup system. An alternate system of similar functional capability to the normally operating system. It need not be the same seismic category and safety class as the system it backs up. (ANS 57.2-D92) (ANS-57.2-99)

Variant form: (ANS 54.2-85)

barriers to fission product release. Those major physical barriers that are designed to contain and prevent the uncontrolled release of fission products from anywhere within the reactor coolant pressure boundary or primary coolant boundary, as applicable
(ANS 58.3)(ANS 58.4-90W)

best estimate. Reference plant response data based upon engineering evaluation or operational assessment. (ANS 3.5-85)

best-estimate value. The mean value of the probability density function for the random variable of interest. Where the probability density function is not known, the best-estimate value is based on a statistical sample of data or judgment. (ANS 50.1-94)

Variant form: (ANS 51.1/52.1-93)

beyond the design basis events (BDBE). Those events of lower probability than design basis events. (ANS 54.1-89)

bias. A measure of the systematic disagreement between the results calculated by a method and experimental data. The uncertainty in the bias is a measure of both the precision of the calculations and the accuracy of the experimental data. (ANS 8.1-83)(ANS 8.11-75)

binder. Solidification agent (ANS 16.1-03)

bioassay. A radioanalytical measurement to determine the amount and kind of radioactive materials present in the body or specific organs. ANS 3.7.1-95} [For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

blind fault. A blind fault is a fault that does not rupture all the way up to the surface

and consequently does not have a surface trace. These features are usually associated with thrust faults, which are formed by compressive stresses. Blind thrust faults do not penetrate the uppermost layers of crust, but they cause the surface layers to fold over them as they deform, forming a tell-tale hill at the surface that reveals their presence to observers. (ANSI/ANS 2.27-08)

blowdown. Water intentionally discharged from a closed cycle water system to control total dissolved solids (TDS). (ANS 2.13-79)

body burden. The total quantity of a radionuclide present in the whole body or body organ. (ANS 3.7.1-92)

body-burden analysis/whole body counting. Measurement of the amount(s) of radioactive material(s) in the whole body or body organs. (ANS 3.7.1-92)

boiling water reactor coolant pressure boundary. The reactor coolant pressure boundary (RCPB) means all those pressure containing components of the boiling water reactor, such a pressure vessels, piping, pumps and valves which are:
(1) Part of the reactor coolant system (the reactor coolant system extends to and includes the outermost containment isolation valve in the main steam and feedwater piping), or
(2) Connected to reactor coolant system, up to and including any and all of the following:
(a) The outermost containment isolation valve in system piping which penetrates primary reactor containment.
(b) The second of two valves normally closed during normal reactor operation in system piping which does not penetrate primary reactor containment.
(c) The reactor coolant system safety and relief valves. (ANS 52.1-83W) (ANS 56.3-86)

boiling water reactor coolant pressure branch run. A pipe run that originates as a branch of the main run and ends at a terminal end, another main run, another branch run or is free ended, with the exception of the following:
(a) free-ended branch lines throughout which there is no significant restraint to thermal expansion may be considered part of the main run.
(b) branch lines which are included with the main run piping in the stress analysis computer mathematical model (such that the levels of stress and fatigue in the branch runs are accurately determined relative to those in the main run), and are shown to have a significant effect on the main run behavior (such as when the piping sizes are similar), may be considered part of the main run. (ANS 58.2-80)

boundary (RCPB). Boundary (RCPB) means all those pressure containing components of the boiling water reactor,

such as pressure vessels, piping, pumps, and valves which are:
(1) Part of the reactor coolant system (the reactor coolant system extends to and includes the outermost containment isolation valve in the main steam and feedwater piping), or
(2) Connected to reactor coolant system, up to and including any and all of the following:
(a) The outermost containment isolation valve in system piping which penetrates primary reactor containment
(b) The second of two valves normally closed during normal reactor operation in system piping which does not penetrate primary reactor containment
(c) The reactor coolant system safety and relief valves.
(ANS 56.3-97W)

bremsstrahlung. Gamma radiation emitted by an electron when it is deflected by the Coulomb field of an atomic nucleus of charge Z; the fraction of energy radiated as photons by an electron of initial energy E (Mev) is approximated numerically by ZE/1000.
(ANS 6.4.2-85)

brittle solids. Solids that will fragment into particles upon impact or crush forces that exceed the tensile/compressive strength of the material. (ANS 5.10-98)

broken rod. A rod that has been severed into two or more pieces and requires special handling. (ANS 57.10-93)

buildup factor. In the passage of radiation through a medium, the ratio of the total value of a specified radiation quantity at any point to the contribution to that value from radiation reaching the point without having undergone a collision. (ANS 6.4.3-91)

buildup factor, exposure, B_D. A photon buildup factor in which the quantity of interest is exposure. The energy response function is that of absorption in air.
(ANS 6.4.3-91)

buildup factor, energy absorption, B_A. A photon buildup factor in which the quantity of interest is the absorbed or deposited energy in the shield medium. The energy response function is that of absorption in the material. (ANS 6.4.3-91)

bullet-resisting. Protection against complete penetration, passage of fragments of projectiles, and spalling (i.e., fragmentation) of barrier material that could cause injury to a person standing directly behind the barrier. Bullet-resisting barrier material meets the rating for high powered rifle as set forth in Underwriter's Laboratories Publication, "Standard for Bullet-Resisting Equipment" UL 752
(ANS 3.3-88)

C.

Calculation method (method). The mathematical equations, approximations, assumptions, associated

numerical parameters (e.g., cross sections), and calculation procedures which yield the calculated results. (ANS 8.1-83) (ANS 8.11-75)

calm. Any measured wind speed below the starting threshold of the wind speed or direction sensor, whichever is greater. (ANS 3.11-00)

canister. A container or restraints used to hold rods in a close-packed array. The canister may or may not have grids and may or may not act as a confinement barrier. (ANS 57.10-93)(57.10-96)

canning (canned). The placement of spent fuel in a container for purposes of confinement. (ANS 57.9-92)

This also applies to plutonium metals and plutonium oxides (e.g., 3013 can).

capable fault. This definition is taken directly from Title 10, Code of Federal Regulations, Part 100 "Reactor Site Criteria," Appendix A, Seismic and Geological Siting Criteria for Nuclear Power Plants, paragraph III (g):
"A 'capable fault' is a fault which has exhibited one or more of the following characteristics:
(1) Movement at or near the ground surface at least once within the past 35,000 years or movement of a recurring nature within the past 500,000 years.
(2) Macro-seismicity instrumentally determined with records of sufficient precision to demonstrate a direct relationship with a fault. (3) A structural relationship to a capable fault according to characteristics(1) or (2) of this paragraph such that movement on one could be reasonably expected to be accompanied by movement on the other."
In some cases, the geologic evidence of past activity at or near the ground surface along a particular fault may be obscured at a particular site. This might occur, for example, at a site having a deep overburden. For these cases, evidence may exist elsewhere along the fault from which an evaluation of its characteristics in the vicinity of the site can be reasonably based. Such evidence shall be used in determining whether the fault is a capable fault within this definition.
(ANS 2.19-89)(ANS 2.7-82)

capable of measurement. Condition where the instrument system (i.e., sensor to recorded data) is within the channel accuracy specified in this standard. (ANS 3.11-00)

capacity factor. The capacity factor is defined as the energy actually supplied by a plant in a given time interval, divided by the product of the design power and the time interval. The capacity factor may be used in assessing the annual absorbed dose, provided the principal sources are directly related to capacity. (ANS 6.6.1-79)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

Category I structure. Guidance for determining the category of a structure, given in U.S. Nuclear Regulatory Commission (NRC) Regulatory Guide 1.29, "Seismic Design Classification." (ANS 2.2-02)

cell. A unit for storage of an individual fuel assembly. It is a subassembly of a storage rack. (ANS 57.2-D92)(ANS 57.3-93) (ANS 57.2-99)

Census Bureau geographic unit. The term means any of the following: Block, block group, county, county equivalent, census county divisions, census tract, enumeration district, incorporated places, minor civil division, state economic areas, township (See U.S. Department of Commerce DAD No. 33, Series CG-3m Aug. 1973 and the 1970 Census User's Guide, Oct 1974) (ANS 2.6-81)

central alarm station (CAS) A continuously manned area, which is designated a vital area, and which functions as the primary location for monitoring the security system operation. (ANS 3.3-88)

certification. Documented confirmation by an individual or group of the successful completion of a qualification program. Confirmation shall be by an individual or group other than the individual that provided the training. (ANS 3.1-87)

CEUS (Central and Eastern United States): That portion of the United States east of the Rocky Mountains (approximately the 104th parallel. (ANS-2.27-2008)

channel. Electrical circuitry used to achieve control or monitoring of a train of safety equipment. (ANS 58.6-92)

Variant form: (ANS 4.1) (ANS 6.8.2-86)

channel calibration (primary calibration). The determination and if required, adjustment of an instrument, sensor, or system such that it responds within a specified range to an acceleration, velocity, or displacement input, as applicable, or responds as intended to the stimulus provided by a known constant input. (ANS 2.2-02)

channel check. The qualitative verification of the functional status of a time-history accelerograph (T/A). This check is an "in-situ" test and may be the same as a channel functional test. (ANS 2.2-02)

channel functional test (secondary calibration). The determination, without adjustment, that an instrument, sensor, or system responds to a known input of such character that it will verify that the instrument, sensor, or system is functioning in a manner that can be calibrated. (ANS 2.2-02)

charcoal adsorption system. A processing system incorporating activated charcoal at ambient or reduced temperatures for adsorption and decay of radioactive gases.
ANS 55.1-92)(ANS 55.4-93) (ANS 55.4-99)

chemical attack. Detrimental influence due to chemical reaction. (ANS 58.3-92) ANS 58.3-98)

chemical wastes. Liquid radioactive wastes having high conductivity, (i.e., greater than 200 microsiemens), variable insoluble solids content, variable radioactivity content and not containing soaps, detergents, oils, or similar organic materials.
(ANS 55.6-93) (ANS 55.6-99)

classified. Designation applied to an item that has been assigned a safety and, if applicable, a pressure integrity classification.
(ANS 50.1-94)

clean lube oil tank. The clean lube oil storage tank provides a reserve supply of lube oil for all diesel generator engines.
(ANS 59.52-93)

clean steam. Steam generated by the vaporization of condensate.
(ANS 55.1-92)(ANS 55.4-93)
Steam generated by the vaporization of non-radioactive demineralized water. (ANS 55.4-99)

closed cycle circulating water system. A system in which the same water, with the exception of that lost by evaporation, drift, leakage, and blowdown; which is replenished by makeup, is used repeatedly in the circulating water system. (ANS 2.13-79)

closed system. A piping system which penetrates the containment and is a closed loop either inside or outside the containment. Under normal operating conditions or loss-of-coolant accident conditions for closed systems inside containment, the fluid in the system does not communicate directly with either primary coolant or containment atmosphere. (ANS 56.2-84)

coincident occurrence. An occurrence that takes place simultaneously with an initiating occurrence but is independent of the initiating occurrence. A coincident occurrence is not the single failure or common cause failure defined elsewhere herein.(ANS 50.1-93)

cold shutdown. The condition in which the reactor is sub-critical and the reactor coolant system average temperature is below the required temperature to permit major maintenance, consistent with technical specification operational limits.
(ANS 50.1-94)(ANS 58.14-93)

Variant form: (ANS 51.1/52/1-1993)(ANS 58.6-92)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

collective design dose equivalent. The design dose equivalent of a group obtained by summing the anticipated dose equivalents of the individuals comprising that group. (ANS 6.7.1-85)

collective qualifications. Sum of individual qualifications for the people of that functional level in the organization. (ANS 3.1-87)

column. The pipe of largest diameter in a system of intersecting pipes. (ANS 8.9-87)

combined event. An event consisting of the simultaneous occurrence of two or more natural or external man-made hazards. (ANS 2.12-78)

combustible material. Material that does not meet the definition of non-combustible or limited combustible. (ANS 59.4-79W86)

commercial codes and standards. Standards that would be used in the design of conventional or commercial industrial components or sub-components. Examples of commercial standards include the following: Power Piping, ANSI/ASME-B31.2-1989; ANSI/ASME Boiler and Pressure Vessel Code-1992, Section VIII, "Pressure Vessels," Division 1; Valves--Flanges, Threaded and Welding End, ANSI/ASME-B16.34-1988; Overhead Hoists, ANSI/ASME B30.1601987; and "Specification for Electric Overhead Traveling Cranes," CMAA-70-1988. (ANS 57.1-92)

commercial grade (C). A procurement classification applied to an item that is intended to be used as a safety-related item and:
(1) is not subject to design or specification requirements that are unique to NRC licensed facilities or activities; and
(2) is used in applications other that NRC licensed facilities or activities; and
(3) is to be ordered from the manufacturer or supplier on the basis of specifications set forth in the manufacturer's published product description (e.g., catalog).
(Commercial grade items are dedicated* prior to use in a safety-related application.)(See 10 CFR 21.)

*For guidance on the dedication of commercial grade items, see EPRI NP 5652, "Guideline for the Utilization of Commercial Grade Items in Nuclear Safety-Related Applications" (NC16-07) and NRC Generic Letters 89-02 and 91-05. (ANS 50.1).

commercial grade item (ASME NQA-1). An item satisfying (a),(b), and (c) below:
(a) not subject to design of specification requirements that are unique to nuclear facilities;
(b) used in applications other than nuclear facilities;
(c) is to be ordered from the manufacturers' published

product description (e.g., catalog).
(ANS 58.14-92)(ANS 7-4.3.2-92)

Variant form: (ANS 7.10-93)

commercial grade dedication. A process of evaluating, including testing, and accepting commercial grade items to ensure their suitability for safety application.
(ANS 58.14-92)(ANS 7-4.3.2-92)

commercial standards. Standards that would be used in the design of conventional or commercial industrial facilities in the vicinity of an Independent Spent Fuel Storage Installation (ISFSI). Examples include ANSI/ACI 318-89, ANSI/ASME B31.1-89, ANSI/API 620.-86, and ANSI/API 650-88]. (ANS 57.9-92)

common cause failure. Multiple failures of structures, systems, or components (SSCs) as a result of a single phenomenon.
(ANS 50.1-94)
(ANS 51.1/52.1]-93;
2 multiple failures attributable to a common cause. (ANS 54.1-89)

commonly usable domain. Within any zone of the plant, it includes all areas of the zone that can be physically reached by an individual without the use of portable ladders, scaffolding, or other special equipment.
(ANS 6.7.1-85)

component. An item that performs a specific function within a system (usually has a component-level plant unique identification code) and can be either an assembly of interconnected parts or a single part.
(ANS 50.1-94)(ANS 58.14-93)

computed values. Physical parameters calculated by the simulator mathematical models and stored in computer memory.
(ANS 3.5-85)

computer program. A schedule or plan that specifies actions that may or may not be taken, expressed in a form suitable for execution by a program-mable digital computer.
(ANS 7-4.3.2) Not in 92 draft)

concentration. The relative amount of a particular gas within a gas mixture may be expressed in terms of a volumetric concentration. Volumetric concentration is the ratio of the partial volume of the gas considered to the total gases comprising the volume mixture,

XG = NG/NTG

Where;

XG = volumetric concentration of gas
NG = volume of gas (SCM)
NTG = Total volume of gases (SCM)
(ANS 56.1-85)

condition adverse to quality. An all-inclusive term used in reference to any of the following: failures, malfunctions, deficiencies, defective items, and non-conformances. A significant condition adverse to quality

is one which, if uncorrected, could have a serious effect on safety or operability. (ANS 3.2-93)

condition restoration time. The maximum time allowed to restore process parameters, set points for automatic protection devices, or inoperable equipment to within the specified conditions. (ANS 58.4-W90)

conditional license. If an applicant's general medical or psychological condition does not meet the minimum requirements of this standard, the Commission may approve the application and include conditions in the license to accommodate the medical/ psychological condition. (ANS 3.4-94)

confidence level. The probability that the true leakage rate does not exceed the upper confidence limit (UCL). (ANS 56.8-02)

confinement. The structure, system or component (SSC) provided for the purpose of controlling the release of radioactive particulate matter. It may be either a physical barrier or a high efficiency filtration system. (ANS 57.9-92)(ANS 57.10-93)

confinement system. A barrier and its associated systems, including ventilation, that are placed around an area containing radioactive materials to prevent the uncontrolled release of those materials. (ANS 54.1-89)

concealed fault: A fault that once ruptured to the earth's surface but that has subsequently been buried by deposition of material atop the surface trace during the period between surface ruptures. (ANS-2.27-2008)

conservative. The application of uncertainties in the values of analysis input parameters, analysis models, or results in a manner which will tend to ensure the adequacy of structures, systems, or components (SSCs) to perform their intended function. (ANS 56.10-87)

Variant form: (ANS 56.4-83)

consumable. Materials or supplies consumed or expended during installation, operation, testing, maintenance or repair of plant structures, systems components or parts such as:
o Items consumed or expended during the operation of components or routinely replaced during maintenance (e.g., diesel fuel, o-rings, gaskets, hydraulic fluid, lubricating oil, grease, packing, and paint).
o Items consumed or expended in maintaining the chemical control of system process fluids (e.g., resins, additive chemicals and gases such as boron, pH buffer, bromophenal blue, and nitric acid); or
o items consumed or expended during maintenance, installation, and modification activities that are generally used throughout the plant and might not be included in the

above (e.g., solvents, layout fluid, welding rods, lead-testing fluid, tape, and penetrant testing materials). (ANS 50.1)(ANS 58.14-93) [Developed for ANS 51.1/52.1]

container. The primary receptacle forming an isolation boundary between the contained waste and the environment. (ANS 55.1-92)

containment.
See primary containment and secondary containment.
See also, primary reactor containment. (ANS 56.1-85) (ANS 56.5-87)(ANS 56.10-87)

A physical barrier to limit radioactive release to the environment associated with zero leakage and testing on the containment to assure its function. Containments are used for more than reactors. They also are used for shipping and storage of radioactive materials. See ASME B&PVC, Section III, Division 3.

containment atmosphere. Free volume enclosed by the primary reactor containment.
(ANS 56.1-85)(ANS 56.2-84)

containment atmosphere mass weighted average temperature (T). The temperature derived from weighing each temperature sensor reading by the mass it represents.
(ANS 56.8-02)

containment boundary. A physical boundary capable of preventing or limiting the escape of radioactivity which may be released into the primary containment. This boundary may be different than that of the primary containment as defined in ANSI/ANS 51.1-1983 and ANSI/ANS 52.1-1983. For example, closed systems outside of the primary containment may serve as a boundary. (ANS 58.12-85)

containment foundation. The foundation of the containment or reactor building including adjacent foundations if they are constructed integrally with the containment foundation.
(ANS 2.2-02)

containment integrated leakage rate test (CILRT). The leakage rate test performed on the primary reactor containment by simulating some of the conditions (e.g., penetrations vented, drained, flooded, or in operation) that exist during a design-basis accident (DBA). The CILRT consists of the following phases or activities:
(1) inspecting the primary containment;
(2) pressurizing the primary containment system;
(3) stabilizing the containment atmosphere;
(4) conducting a Type A test;
(5) conducting a verification test;
(6) depressurizing the primary containment system.
(ANS 56.8-02)

containment isolation. Closure of mechanical barrier(s) in appropriate fluid systems penetrating the containment which could otherwise represent open paths to the environment for fission

products from inside the containment. (ANS 56.2-84)

containment isolation valve. A valve that is relied upon to perform a containment isolation function. (ANS 56.2-84)(ANS 56.8-02)

Any valve defined by 10 CFR Part 50 Appendix A, Criteria 55, 56, and 57 for those plants required to conform to Appendix A. For plants not required to conform to Appendix A to this part, a containment isolation valve is any valve which is intended to provide a barrier between the containment environments and the outside environment under post-accident loss-of-coolant conditions, as defined in the licensing basis. (ANS 56.8-D93)

containment leakage rate test program. The comprehensive testing of the primary containment system that includes Type A, Type B, Type C and leakage rate verification tests. (ANS 56.8-02)

containment pressures tests. Those periodic and one time tests, including the integrated leak rate test (ILRT) and structural integrity tests (SITs), conducted to verify containment design leakage and structural integrity. (ANS 56.6-86)

containment, primary containment, or reactor containment. For the purpose of this standard, a structure or vessel that encloses the reactor vessel and other components of the reactor coolant pressure boundary and which provides an essentially leak-tight barrier against the uncontrolled release of fission products to the environment. (ANS 56.2-84)

continuous communications. The capacity, through the availability of adequate equipment, to transmit information from one point to another at any given time. (ANS 3.3-88)

continuous leakage monitoring system. A permanently installed, on-line pneumatic measurement system that continuously monitors the leakage rate of containment system penetrations at a pressure not less than P_a. (ANS 56.8-02)

continuous occupancy. State in which operating personnel could be required to be present continuously during the accident duration (e.g., the control room). (ANS 5.6.1-90)

Control Air System (CAS). Instrument quality air, nitrogen or other inert gas. (ANS 59.3-92)

Variant form: (ANS 59.3-83)

control components. Items that control coolant flow or reactivity and must be handled or shifted in position during fuel loading or refueling. Examples are: control rods, flow limiting orifices, burnable poison rods.

(ANS 57.2-92)(ANS 57.3-93) (ANS 57.2-99)

Variant form: (ANS 57.1-92)

control components change mechanism. Handling equipment used to move control components from one fuel assembly or core location to another or to a temporary storage location. (ANS 57.1-92)

control height. The term control height is a quidance height of two to three meters above the floor as used by station radiation protection personnel. (ANS 6.3.1-87)

control raschig rings (control rings). Rings that are non-destructively tested for physical properties and remain in the solution except for short test periods. (ANS 8.5-89)

control total. A population count or estimate for a geographic area which the sum of the estimates or counts, or both, of all the district geography partitions of the area must equal. Distinct geographic partitions, means partitions which do not overlap (i.e., they contain to area in common). (ANS 2.6-81D)

control transfer device. A device that is used to select and isolate the location of control and eliminates the potential for simultaneous control from the Alternate Shutdown Station and the control room. (ANS 58.6-92).

control volume. The smallest geometric subdivision for which thermodynamic states are computed. (ANS 56.4-83)

control unit. A census or other geographic unit used to produce a control total for population estimates of the geographic sub-units into which it has been partitioned.

(ANS 2.6-81)

controlled access. Access to areas that are controlled for purposes of radiation protection. (ANS 5.6.1-90)

Variant form: (ANS 6.7.1-85)

controlled area. That portion of a nuclear facility, including outside yard areas, enclosed equipment, systems, and facilities which may contain radioactive material by definition or design. Controlled area does not normally, but may temporarily, include portions of secondary system areas of the plant. (ANS 55.6-93) (ANS 55.6-99)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

controlled condition. The state of the plant that is achieved when the "subsequent action" portion of the plant emergency procedures is implemented and the critical safety functions are being accomplished or maintained by the control room operator. (ANS 4.5)

controlled parameter. A parameter that is kept within specified limits.
(ANS 8.1-83)

controlled shutdown and cooldown. A shutdown and cooldown condition in which the fuel and reactor coolant pressure boundary conditions might exceed technical specification limits and implementation of plant emergency procedures might be required.
(ANS 50.1-94)

Controllers. Personnel who direct the conduct of the scenario. (ANS 3.8.4-95)

controls. Apparatus and mechanisms, the manipulation of which, directly affect the reactivity, power level, cooling, containment, and other requirements for safe operation of the nuclear reactor. (ANS 3.4-87)

conversion. Modification of existing software to enable it to operate with similar functional capability in a different hardware/software environment. (ANS 10.2-88)

cooling water. Water provided to transfer the heat absorbed by the containment heat removal system to the ultimate heat sink. (ANS 56.5-87)

core recovery. An expression in percentage of core recovered during drilling operation.

$$CR \text{ in } \% = 100 \times \frac{\text{total length of core recovered}}{\text{length of core run}}$$

(ANS 2.19-89)(ANS 2.11-78)

core release fraction. The fraction of the total core radioactive inventory released during an accident with similar chemical or physical properties (e.g., noble gases, halogens).
(ANS 5.6.1-90)

correction factor, shield-tissue interface. A correction factor to be applied to the basic infinite medium exposure buildup factor to correct for the scattering in a tissue phantom after emerging from a shield.
ANS 6.4.3-91)

corrective actions. Those measures taken to terminate or mitigate the consequences of an emergency at or near the source of the emergency.
(ANS 3.8.1-93)(ANS 3.8.2-93) (ANS 3.8.6-94) (ANS 3.8.2-95) (ANS 3.8.6-95)

Variant form:
(ANS 3.7.2-79)(ANS 3.2-93)

coseismic: A term that relates an area or occurrence of a phenomenon to the simultaneous arrival of earthquake waves.
(ANS-2,27-2008)

cover gas- Gas in liquid storage tanks pressurized to prevent in-leakage of air.
(ANS 55.1-92)(ANS 55.4-93) (ANS 55.4-99)

crane. 1) Auxiliary Fuel Handling Crane - a crane used for handling equipment including fuel assemblies and new fuel shipping containers.

2) Cask Crane - a crane designed for handling spent fuel shipping casks. (ANS 57.2-D92) (ANS 57.2-99)

credible passive failure. The passive failure of a piping system or single structural steel load bearing member at a discontinuity; the integrity of which has not been verified by volumetric examination (e.g., radiographic, ultra-sonic). (ANS 57.7-92)

critical area. Those areas which contain nuclear safety-related structures, systems, or components (SSCs). (ANS 59.4-70W83)

critical parameters.
(1) Those parameters that require direct and continuous observation to operate the power plant under manual control.
(2) Input parameters to plant safety systems. (ANS 3.5-85)

critical safety functions. Those safety functions that are essential to prevent a direct and immediate threat to the health and safety of the public. These are the accomplishing or maintaining of:
(1) reactivity control;
(2) reactor core cooling;
(3) reactor coolant system integrity;
(4) primary reactor containment integrity; and,
(5) radioactive effluent control (ANS 4.5)

critical (sub-critical) flow. A fluid flow regime in which the fluid velocity is equal to (less than) the velocity of sound in the fluid at local fluid state conditions, or which is (is not) at its maximum value with respect to some other parametric restraint. (ANS 56.4-83) (ANS 56.10-87)

criticality accident (accident). The release of energy as a result of accidentally producing a self-sustaining or divergent neutron chain reaction. (ANS 8.1-83)(ANS 8.3-91) (ANS 8.6-83)(ANS 8.10-83)

crud. Insoluble particulate materials in the process streams. (ANS 55.6-93) (ANS 55.6-99)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm] Variant form: (ANS 57.10-93)

cryogenic adsorption systems. Processing systems utilizing an adsorbent at cryogenic temperatures for separation or adsorption and decay of radio-active gases. (ANS 55.1-92) (ANS 55.4-93) (ANS 55.4-99)

cryogenic distillation units. Equipment employing cryogenic temperature distillation for separation of noble gases from waste gas streams. ANS 55.1-92) (ANS 55.4-93) (ANS 55.4-99)

cumulative absolute velocity (CAV) The time integral of absolute acceleration over the duration of the strong shaking. This quantity has been shown to be a good indicator of the damage

potential of an earthquake time history. (ANS 2.2-02)

cumulative fraction leached. The sum of the fractions leached during all previous leaching intervals, plus the fraction leached during the last leaching interval, using the initial amount of the species of interest present in the specimen as unity (100%) and assuming no radioactive decay.
(ANS 16.1-03)

current value. That magnitude of a variable that is associated with the present time and is available for display within the response time limits of an information display channel. (ANS 4.5)

cycles of concentration. The ratio of total dissolved solids (TDS) in the water in a closed cycle cooling system to the TDS in the makeup water. (ANS 2.13-79)

cyclostrophic wind. The horizontal wind velocity that results when the centrifugal force exactly balances the horizontal pressure gradient force. It is a good approximation of the real wind in cases of very great wind speed and strong curvature such that the centrifugal force is clearly dominant over the non-pressure gradient forces, such as the Coriolis force. (ANS 2.3-83)

D.

d**amaged rod.** A rod which exhibits visible evidence of structural change to the fuel cladding that would compromise the rod consolidation process or fuel confinement.
(ANS 57.10-93)

damaged fuel. Fuel units that exhibit visible evidence of structural damage to the fuel rod cladding or container.
(ANS 57.9-92)

damped natural wavelength. A characteristic of a wind vane empirically related to the delay distance and the damping ratio. (ANS 3.11-00)

damping ratio. Ratio of the actual damping, related to the inertial-driven overshoot of wind vanes to direction changes, to the critical damping, the fastest response where no overshoot. (ANS 3.11-00)

data. A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation or processing by a programmable digital computer. (ANS 7-4.3.2-82)

data processing. The preparation and compilation of recorded data for subsequent evaluation. (ANS 2.10-90)

data set. A reading of the values of each sensor used in the calculation of containment dry air mass. (ANS 56.8-D93)

The set of readings from all primary test instrumentation for a CILRT taken over a single scan of the data acquisition system (DAS) or CILRT software. (ANS 56.8-02)

Deaggregation. Process used to determine the fractional contribution of each magnitude-distance (M-D) pair or of each seismic source zone, to the total seismic hazard. To accomplish the M-D deaggregation, a set of magnitude and distance bins are selected and the annual probability of exceeding selected ground acceleration parameters from each M-D pair is computed and divided by the total probability of exceedence for all modeled earthquakes. (ANS-2.29-Rev.8)

decontamination factor (DF). The ratio of the concentration of the radioactive material in the influent stream to its concentration in the effluent. (ANS 55.1-92)(ANS 55.4-93) (ANS 55.6-93) (ANS 55.4-99) (ANS 55.6-99)

decontamination wastes. Liquid radioactive wastes generated by decontamination of radioactive plant components, equipment and tools other than personnel protective clothing and equipment. (ANS 55.6-93) (ANS 55.6-99)

dedicated shutdown. Systems and equipment provided specifically for maintaining the reactor in a safe shutdown condition, to compensate for a fire in one or more fire areas which could otherwise affect the safe shutdown capability. (ANS 58.6-92); See alternate shutdown (ANS 58.6-92 proposed)

deep bed plants. Those plants utilizing deep bed demineralizers in the condensate polishing system. (ANS 55.6-93) (ANS 55.6-99)

default value. The value assigned to a variable by the program when that value is not specified by the user. (ANS 10.5-79)

definitive care. The complete medical and surgical treatment of persons exposed or contaminated as a result of an incident involving radioactive material. (ANS 3.7.1-92) Variant form (ANS 3.7.1-1995)

delay distance. The distance that air flowing past a wind vane moves while the vane is responding to 50 percent of the step change in the wind direction. (ANS 3.11-00)

demineralized water. Water purified by ion exchange to a quality at least equal to Type IV in American National Standard Specification for Reagent Water, ANSI/ASTM D1193-77. (ANS 57.2-92) (ANS 57.2-99)

departure from nucleate boiling (DNB) In the PWR, the onset of the transition from nucleate to film boiling. (ANS 50.1-94)

departure from nucleate boiling ratio (DNBR) In the PWR, the ratio of the heat flux ratio (DNBR) required to cause departure from nucleate boiling (DNB) to the actual channel heat flux for given conditions. (ANS 50.1-94)

dependent events. Event combinations for which the occurrence of one event gives information about (i.e., increases or decreases) the possibility of the occurrence of the other event. For example, the occurrence of a hazard such as an earthquake may increase the chance of an explosion at a nearby industrial facility. (ANS 2.12-78)

design. Technical and management processes which lead to and include the issuance of design output documents such as drawings, specifications and other documents defining technical requirements and performance of radiation shields. (ANS 6.4-85)

design basis accident (DBA). The accident initiated by a single component failure or operator error, as described in the safety analysis of the plant, that results in the maximum primary containment internal peak pressure and in fission product release to the containment atmosphere. (ANS 56.8-02)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

design basis accident events. Those events postulated in the plant safety analyses, any one of which may occur during the lifetime of a particular plant, excluding those events (defined as "normal" and "anticipated operational occurrences" in 10 CFR 50) (1) expected to occur more frequently than once during the lifetime of a particular plant; and those events not expected to occur but postulated in the plant safety analyses because their consequences would include the potential for release of significant amounts of radioactive material to the environs. (ANS 4.5-W96)

design basis accidents and transients. Those design basis events that are accidents and transients initiated by a single component failure or operator error and are described in the safety analyses of the plant([3]) and are used in the design to establish acceptable performance requirements for structures, systems and components (SSCs). Design basis accidents and transients that are applicable to the plant are identified in the plant licensing basis documentation (LDB).
([3])These descriptions are primarily in the accident analyses chapter of the FSAR or SSAR.
(ANS 50.1-94)(ANS 58.14-93)

design basis documentation (DBD). The set of documents that is controlled and contain the specifications for the design of the plant. The design basis documentation typically includes design specifications, piping and instrumentation drawings, electrical schematics and safety analyses.
(ANS 50.1-94)(ANS 58.14-93)

design basis event (DBE).

(See, also **design events**) An event that is a condition of normal operation including an anticipated operational occurrence, a design basis accident (or transient), an external event, or a natural phenomenon, for which the plant must be designed to ensure that the three basic safety-related functions are achievable. (See10 CFR 50.49(b)1.for the functions.) (ANS 50.1-93)(ANS 58.14-93) (ANS 58.6-92) (ANS 58.11-93) (ANS 59.52-93) (ANS 59.52-98)

Variant form: (ANS 59.1-92) (ANS 59.51-89)

design basis radioactivity concentrations. Concentration of radiochemical constituents provided in reference Safety Analysis Report (SAR) by Nuclear Steam supply system (NSSS) supplier. (ANS 55.6-93) (ANS 55.6-99)

design bases response spectra (DBRS). Response spectra which were used to design Seismic Category I structures, systems and components (SSCs). (ANS 2.10-90)

design bases time-history. The acceleration time-history which corresponds to the design bases response spectra (DBRS). (ANS 2.10)

design basis tornado. A postulated tornado, used for design purposes only, having characteristics consistent with an acceptably low probability of exceedance. (ANS 2.3-83)

design change. Any revision or alteration of the technical requirements defined by approved and issued design output documents and approved and issued changes thereto. (ANS 3.2-93)

design dose equivalent rate. The design dose equivalent rate is the radiation level determined by the designer. (ANS 6.3.1-87)

designer. The organization that has the responsibility for preparing the fuel assembly design. (ANS 57.5-96)

design events. The purpose of categorizing Design Events is to provide a means of establishing design requirements to satisfy operational and safety criteria of the installation. These Design Events are; normal operation (Design Event I), classified on the basis of expected frequency of occurrence (Design Events II and III), or postulated because their occurrence may result in the maximum potential impact on the immediate environs (Design Events IV). Evaluation of the consequences of any such event can then be used to specify the performance requirements of the systems and subsystems within the installation.

design Event I. Definition. Design Event I consists of that set of events that are expected to occur regularly or frequently in the course of normal operation at the installation. Examples are:

(1) Cask receipt, inspection, unloading, and maintenance;
(2) Fuel unit transfer from cask to pool or pool to cask;
(3) Collection and disposal of air or waterborne radionuclide generated during ISFSI operation; and,
(4) Fuel rod consolidation, if performed at the Independent Spent Fuel Storage Installation (ISFSI).

design Event II - Definition. Design Event II consists of that set of events, that although not occurring regularly, can be expected to occur with moderate frequency or on the order of once during any calendar year of installation operation. Examples are:
(1) Failure of any single active component to perform its intended function upon demand;
(2) Spurious operation of certain active components;
(3) A loss of external power supply for a limited duration;
(4) Minor leakage from flanges piping or component connections; and,
(5) A single operator error followed by proper corrective action.

design Event III - Definition. Design Event III consists of that set of infrequent events that could reasonably be expected to occur once during the lifetime of the installation. Examples are:
(1) A credible passive failure of a radioactive liquid retaining boundary; and,
(2) A loss of external power for an extended interval.

design Event IV - Definition. Design Event IV consists of the events that are postulated because their consequences may result in the maximum potential impact on the immediate environs. Their consideration establishes a conservative design basis for certain systems with important confinement features. Typically this set of events will consist of site specific design events as defined in Design Phenomena. By adherence to the requirements of this standard, the designer may exclude such events as criticality, total loss of pool water, and dropped cask as Design Event IV possible events.
(ANS 57.7-92) (ANS57.7-97)

Variant form: (ANS 57.9-92) (ANS 57.10-93)

design input. Those criteria, parameters, bases, or other design requirements upon which detailed final design is based. (ANS 3.2-93)

design output. Documents, such as drawings, specifi-cations, and other documents, defining technical require-ments of structures, systems, and components (SSCs). (ANS 3.2-93)

design parameters. Material properties, dimensional characterizations, or physical response phenomena necessary to describe or evaluate fuel assembly behaviour.(ANS 57.5-96)

design phenomena. Those natural phenomena and man-induced low probability events for which an ISFSI is designed. Title 10 CFR Part 72 ”Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation (ISFSI)”, Subpart E, "Siting Evaluation Factors," or ANSI/ANS-2.19-1981(R1990) provides the requirement for identification and evaluation of design basis natural or man-induced events. 10 CFR 72, Subpart F provides the general design criteria for structures, systems, and components (SSCs) that are important to confinement. (ANS 57.9-92) (ANS 57.7-97)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

design requirements. A design requirement is the limiting value of a design parameter that ensures that the consequences of any DBE do not result in:
(1) Violation of plant nuclear safety criteria (including off-site radiological dose criteria); and,
(2) Unacceptable degradation of plant components that are required to mitigate the consequences of a DBE. (ANS 58.8-92)

designated rating. That rating required by the fire hazard analysis without any other consideration to its construction capability for purposes of other perils such as tornadoes, radiation, earthquake, etc. (ANS 59.4-79W83)

designated local hospital. A hospital located near a nuclear plant where formal arrangements have been made in advance for the emergency care of personnel who have been injured, contaminated, or exposed, and may also provide definitive care if appropriate facilities and staff are available. (ANS 3.7.1-95)

designated medical examiner. A licensed medical practitioner designated by the facility operator to perform nuclear reactor operator medical examinations. (ANS 3.4-87)

designated vehicle. A vehicle limited to use to onsite plant functions that remains within the protected area except for operational, maintenance, repair, security and emergency purposes. A vehicle, for purposes of this definition, is any motorized prime mover with sufficient power and mechanics to permit its use as an instrument of radiological sabotage; other means of transport, such as electric or gasoline driven carts, jitneys, or trams commonly used within the protected area for the conveyance of material and supplies, are not vehicles. (ANS 3.3-88)

detergent waste. Liquid radioactive waste containing detergents, soaps, or similar organic materials. (ANS 55.6-93) (ANS 55.6-99)

dewatered. Liquid or slurry wastes that have had excess

water removed to meet applicable burial site criteria. (ANS 55.1-92)

diffusion, dispersion. The variation of the concentration along the path of transport in a fluid. For releases to the atmosphere, it occurs after the release has been diluted by the wind speed. (ANS 3.8.6-94)
That component of dispersion that addresses the variation of the concentration of material in a medium along the path of transport. (ANS 3.8.6-95)

direct gamma rays. Gamma rays which do not undergo scattering interactions in transit from the source volume to the receptor location. It differs from "uncollided gamma rays" in that scattering internal to distributed sources (e.g., a pipe containing radioactive fluid) may be included in the direct category. (ANS 6.6.1-79)

discrete time points. The time points during the time course of a DBE that define the time intervals evaluated in this analysis. These points are defined below and are illustrated in Figure 1 of ANS 58.8.
(1) start of event (t_{ST}). The time at which the DBE is initiated.
(2) indication of event (t_{IND}). The time at which the DBE is identified to the plant operators by readily available information, e.g., one or more alarm(s) or display indication(s).
(3) earliest credited action (t_{ECA}). The earliest time following t_{IND} at which credit for safety-related operator actions can be taken.
(4) manual action initiated (T_{MAI}). The time which can not occur prior to t_{ECA} selected by the designer for initiation of a safety-related operator action.
(5) safety-related action completed (t_{SAC}). The time at which the safety-related operator action is evaluated to be completed.
(6) safety-related function completed ($_{SFC}$). The time at which an indication is received that a safety-related system is operating as necessary to achieve its safety-related function.
(7) design requirement limit (t_{LIM}). The time at which a design requirement would be exceeded if a safety-related function has not been completed. (ANS 58.8-92)

dispersion. Collective term encompassing both the transport of material in a media (e.g., atmosphere, body of water) and the diffusion of that material during transport. (See diffusion) (ANS 3.8.6-94)

The combined influence of both the transport of material in a medium (e.g., atmosphere, body of water) and the diffusion of the material during the transport. See diffusion) (ANS 3.8.6-95)

dispersion coefficient (L^2T^{-1}) A measure of the spreading of

a flowing substance due to the nature of the porous medium, with its interconnected channels distributed at random in all directions. (ANS 2.17-89)

dispersivity (L) A geometric property of a porous medium which determines the dispersion characteristics of the medium by relating the components of pore velocity to the dispersion coefficient. (ANS 2.17-89)

displacement. "The relative movement of the two sides of a fault, measured in any chosen direction. In addition, the specific amount of such movement." (See Glossary of Geology, American Geological Institute, 1972). As used here, the term applies to either slip or separation as measured or inferred along a fault. (ANS 2.7-82)

disqualifying condition. A medical or psychological condition that precludes approval for nuclear power plant reactor operator or senior operator licensure. (ANS 3.4-94)

distance constant. The distance that air flows past a rotating anemometer during the time it takes the cup wheel or propeller to reach 63 percent of the equilibrium speed after a step change in the wind speed.(XXXXXXXXXXXXX)

distribution coefficient($M^{-1}L^{3}$) The quantity of the radionuclide absorbed by the solid per unit weight of solid divided by the quantity of radionuclide dissolved in the water per unit volume of water. (ANS 2.17-89)

document. Any written or pictorial information describing, defining, specifying, reporting, or certifying activities, requirements, procedures, or results. A document is considered to be a Quality Assurance Record when it is complete and furnishes evidence of the quality of items or services affecting quality. (ANS 3.2-93)

dose. A quantity of energy absorbed in a reference medium per unit mass. There are several different units of dose in current use:
(1) The Gray (Gy) is a measure of the dose of any ionizing radiation in terms of the energy absorbed per unit mass. One Gray (Gy) is equal to the absorption of one Joule per kilogram (1 Gy = 100 rad).
(2) The Sievert (SV) is a measure of the dose of any ionizing radiation to body tissues in terms of its estimated biological effect relative to a dose of one Roentgen (R) of x-rays. (1 Sv = 100 rem). (ANS 5.6.1-90)

Variant form: (ANS 6.4-85)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

dose equivalent (H). The product of the absorbed dose (D), the quality factor (Q), and the modifying factor (N):

$$H = DQN,$$

where: N is the product of all modifying factors specified by

the International Commission on Radiation Protection (ICRP) (i.e., see Publication 26 and Report 33). Such factors might, for example, take account of absorbed dose rate and fractionalization. At present, the ICRP has assigned the value of 1 to the factor N. The special name for the unit of dose equivalent is the sievert (Sv); 1 Sv = 1 J/kg. (ANS 6.1.1-91)

dose equivalent rate. Dose equivalent rate is used as defined by the International Commission on Radiation Units and Measurements (ICRU), "Radiation Quantities and Units," ICRU Report No. 33-1980 and the unit is millirem per hour, mrem/h (10 μSv/h). (In System International, SD Units, 100 rem = 1 sievert). (ANS 6.3.1-87)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

dose rate and absorbed dose. The term dose is used herein to refer to either exposure (i.e., roentgens), absorbed dose (i.e., rad), dose equivalent (i.e., rem), or dose equivalent index (i.e., rem). These later terms are specifically defined in Report No 19 of the ICRU. For gamma rays, to the degree of approximation acceptable, for practical purposes, and for the purposes of this standard, the absorbed dose, dose equivalent, and dose equivalent index may be considered numerically equivalent. (ANS 6.6.1-79)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

dosimeter. An instrument used for measuring or evaluating the absorbed dose, exposure, or similar radiation quantity. (ANS 3.7.95)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

drawdown (L). The lowering of the water level caused by withdrawal of water, with reference to some datum and to the time since withdrawal began. (ANS 2.9-89)

drift. Water lost from a cooling tower as liquid droplets (i.e., aerosols) entrained in the exhaust air. In the case of spray systems, drift comprises the liquid droplets which become airborne and fall outside the spray collection system. (ANS 2.13-79)

drill. A supervised instruction period aimed at developing and maintaining skills in a particular operation. A drill is often a component of an exercise. (ANS 3.7.3-79)

drill. Supervised instruction period intended to test, develop, and maintain skills in a particular operation. A drill is often a component of an exercise. (ANS 3.8.3-93)(ANS 3.8.4-93) (ANS 3.8.5-D92) (ANS 3.8.4-95)(3.8.3-95)

dry active waste (DAW). Radioactively contaminated compactable and non-compactable material(e.g., rags, paper, plastic, rubber, and wood, glass, concrete, metal). (ANS 55.1-92)

dry basis. A measurement or a calculation performed on the assumption that there is no water vapor or steam present. (ANS 56.1-85)

dry cleaning waste. Liquid solvent wastes generated in the operation of dry cleaning laundry equipment. (55.6-93) (ANS 55.6-99)

dry primary containment. Concept that relies on the volumetric and thermal capacitance of the enclosed free volume as well as the energy removal capabilities of the Containment Heat Removal System (CHRS) to mitigate the consequences of postulated pipe breaks. (ANS 56.4-83)

drywell. In a boiling water reactor, the innermost structure surrounding the reactor coolant pressure boundary. (ANS 56.4-83)

E.

edit. The action of processing data into a meaningful order for subsequent use or disposition to an output medium. (ANS 10.5-79)

education. Successful completion of the requirements established by an accredited educational institution. (ANS 3.1-87)

effective dose equivalent (H_E). The sum of products, of the form

$$\Sigma_T w_t H_T ,$$

where: W_T is the weighing factor specified by the ICRP to represent the proportion of the stochastic risk resulting from irradiation of tissue T to the total risk when the whole body is irradiated uniformly, and H_T is the average dose equivalent in tissue T. The values of W_T recommended by the ICRP are given in Table 2 of ANS 6.1.1-91.

The remainder organs or tissues are taken to be the five not specifically listed that received the highest dose equivalents; a weighing factor (W_T) of 0.066 is applied to each of them, including various portions of the gastrointestinal tract, which are treated as separate organs. The weighing factor values given in Table 2 are under review by the ICRP and are subject to change during the projected life of this standard.

The special name for the unit of effective dose equivalent is the sievert (Sv):

1Sv = 1J/kg.

In this standard the terms "dose" and "fluence-to-dose" are used to denote "effective dose equivalent" and "fluence-to-effective dose equivalent," respectively. (ANS 6.1.1-91)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

effective multiplication factor (k_{eff}) The ratio of the total number of neutrons produced during a time interval (excluding neutrons produced by sources whose strengths are not a function of fission rate) to the total number of neutrons lost by absorption and leakage during the same interval. (ANS 8.1-83)

effluent monitor. Instrument used to determine the level of radioactivity in any path which discharges to the environment. (ANS 6.8.2-86)

emergency. Any unplanned situation which activates the plant's radiological emergency response plan. (ANS 3.8.1-93) (ANS 3.8.3-93)(ANS 3.8.4-93) (ANS 3.8.5-92)(ANS 3.8.6-94)(ANS 3.8.2-95) (ANS 3.8.4-95)(3.8.3-95)

emergency action level (EAL). A parameter or criterion used as a basis for emergency classification. (ANS 3.8.3-93) (ANS 3.8.6-94) (3.8.3-95)

emergency classes. Four emergency classes have been established. These classes are as follows:

(1) **notification of unusual event (NUE):** Events which are in progress or have occurred, which indicate a potential degradation of the level of safety of the plant. Notification of Unusual Events are non routine occurrences which may be of interest to government authorities or to the public. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs. (**This is no longer used.)**

(2) **alert**: Events which are in progress or have occurred, which involve actual or potential substantial degradation of the level of safety of the plant. Any radiological releases are expected to be limited to small fractions of the Environmental Protection Agency (EPA) Protective Action Guideline, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents, EPA 400-R-92-001, Environmental Protection Agency" exposure levels.

(3) **site area emergency**: Events which are in progress or have occurred, which involve actual or likely major failures of plant functions needed for protection or station personnel and the public. Any radioactive releases are not expected to exceed EPA Protective Action Guideline exposure levels except near the site boundary.

(4) **general emergency**: Events which are in progress or have occurred, which involve actual or imminent substantial core degradation with potential for loss of containment integrity. Radiological releases can reasonably be expected to exceed EPA Protective Action Guide-line exposure levels offsite. (ANS 3.8.1-93) (ANS 3.8.2.93) (ANS 3.8.3-93)(ANS 3.8.6-94) (ANS 3.8.2-95) (3.8.3-95)

emergency control center (ECC). A facility operated by the licensee for the purpose of evaluating and controlling emergency situations and coordinating emergency responses. (ANS 3.7.2-79)

emergency diesel generator. A diesel generator unit designed in accordance with "IEEE Standard Criteria for Diesel Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations", ANSI/IEEE Standard 387) and installed to provide a standby power supply in accordance with "IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations", ANSI/IEEE Standard 308. The diesel generators provide standby electric power to comply with the pertinent requirements of 10 CFR 50, Appendix A General Criterion 17, Electric Power Systems. (ANS 59.51-89) [ANS 59.52-93] (ANS 59.52-98)

emergency planning zone (EPZ). Area for which emergency planning is needed to assure that prompt and effective actions can be taken to protect the public. (See also Plume EPZ and Ingestion EPZ). (ANS 3.8.1-87)(ANS 3.8.5-D92)(ANS 3.8.2-95)

emergency procedures. Written procedures which specify actions, including: manipulation of plant controls, to reduce the consequence of an accident or potentially hazardous condition which has already occurred, implementation of the emergency plan, or preparation for possible hazardous natural occurrences. (ANS 3.2)

emergency response facility (ERF) An area or collection of areas designated for emergency use that include:
(1) **control room** (CR): Onsite facility from which the nuclear power plant is operated. The control room is normally the facility where basic response functions are initially performed.
(2) **emergency news center (ENC)**: Facility outside protected area where designated Public Information Officers, from licensee and government agencies provide media updates and respond to information requests.
(3) **emergency operations facility (EOF)**:Facility outside the protected area from which the overall accident management and coordination with offsite response organizations are performed.
(4) **operations support center (OSC)**: Facility outside the protected area from which the overall accident management and coordination with offsite response organizations are performed.
(5) **technical support center (TSC)**: Onsite facility separate from the control room where technical analysis, direction, communications, and other designated emergency functions are performed. (ANS 3.8.1-93)(ANS 3.8.1-93) (ANS 3.8.3-93) (ANS 3.8.4-93) (ANS 3.8.6-94) (ANS 3.8.2-95) (ANS 3.8.4-95) (3.8.3-95)

emergency response plan. A licensing document which describes the licensee's overall emergency response functions, organization, facilities, and equipment, as well as appropriate state, county or local plans. This document is supplemented by specific implementing procedures. (ANS 3.8.1-87)

emergency start. Automatic start of the diesel engine in response to a safety signal such as safety injection or loss of offsite power. (ANS 59.52-93)

emergency start and operation. Automatic start and subsequent running or loading of the diesel engine,or both, in response to a safety signal such as emergency core cooling or loss of offsite power. (ANS 59.52-98)

emergency ventilation system (EVS). An engineered safety feature consisting of fans, gas absorbers, and particulate filters used to reduce the secondary containment atmos-phere's pressure below environmental conditions following a Loss of Coolant Accident (LOCA) for the purpose of dose suppression. This system is referred to as the standby gas treatment system (SGTS)in BWR units. (ANS 56.4-83)

end fitting (nozzle). The portion of the spent fuel assembly which defines the upper and lower extremities. Removal of an end fitting allows access to the in-dividual rods. (ANS 57.10-93)

energetic event. An event that generates a sufficient amount of energy over a brief period (such as less than one minute) to result in the airborne suspension of the material-at-risk, and damages equipment and systems that might result in loss of confinement. (ANS 5.10-98)

energy dependence. Change in instrumentation response with respect to radiation energy for a constant fluence or fluence rate (flux density). (ANS 6.8.2-86)

engineered safety feature (ESF). 1 A nuclear safety-related structure, system, or component (SSC) that serves to control and limit the consequences of releases of energy or radioactivity if an event were to occur to the extent that the worker and public health and safety might be impaired if these energy or radioactivity releases were not additionally restrained. (ANS 51.1)(ANS 56.4-83); 2 A structure, system, or component (SSC) that is relied upon during or following design basis events to ensure the capability to prevent or mitigate the consequences of those events that could result in potential offsite exposures comparable to the guideline exposures of 10 CFR 100.11 excluding reactor coolant pressure boundary (RCPB) and reactor protection system (PRS) items. (ANS 50.1-94)(ANS 58.14-93)

engineered safety feature(s).

For the purpose of this standard, system(s) which is (are) required to prevent, arrest, or mitigate the consequences of an accident or LOCA. (ANS 56.2-84)

A safety class structure, system, or component that serves to control and limit the consequences of releases of energy and radioactivity in the event of Plant Condition 3,4, or 5 events to the extent that the public health and safety might be impaired if these energy and radioactivity releases were not additionally restrained. (ANSI/ANS-51.10-02)

engine-driven pump. A pump that provides proper lube oil circulation under all normal operating conditions. (ANS 59.52-93)

engine-driven oil pump. A pump which receives its motive power directly from the diesel engine and provides proper lubricating oil circulation under all operating conditions. (ANS 59.52-98)

engine lubricating oil cooler. A heat exchanger that provides cooling of the lubricating oil to maintain temperature within specified operating limits. (ANS 59.52-98)

entity or entities. Formal and informal rock-stratigraphic units, soil-stratigraphic units and bio-stratigraphic units (see American Commission on Stratigraphic Nomenclature, mineral deposits, structural features, geomorphic features, and artificial structures. (ANS 2.7-82)

enumeration. A census. (ANS 2.6-81D)

environment. The pressure, temperature, and humidity conditions of the outdoor ambient atmosphere at the nuclear power plant site. (ANS 56.4-83)

environmental factors. Conditions of the environment, usually not directly related to the process, that may affect the margin of subcriticality of a system and that could be subject to change. (ANS 8.9-87)

epicenter - The point on the earth's surface directly above the focus (i.e., hypocenter) of the earthquake source. (ANS-2.29-Rev.8)

epistemic uncertainty: Uncertainty attributable to incomplete knowledge about a phenomenon that affects the ability to model it. Epistemic uncertainty is captured by considering a range of model parameters within a given expert interpretation or multiple expert interpretations each of which is assigned an associated weight representing statistical confidence in the alternatives. In principle, epistemic uncertainty can be reduced by the accumulation of additional information associated with the phenomenon. The uncertainty in the parameters of the probability distribution of a

random phenomenon is epistemic. (ANS-2.27-2008) (ANS-2.29-Rev.8)

equipment. A constituent of component, a component, an assemblage of components, a system, or a structure having at least one function. (ANS 51.1)

equivalent test. A test method utilized in place of a standard or reference test which achieves the same end result. (ANS 6.4.2-85)

essentially unshielded. As used in this standard, essentially unshielded, relative to air scattering, means less than one mean-free-path of attenuation for the dominant energy. If the user of this standard chooses to use an alternative definition in the calculations, the user should clearly define its use in documenting the calculations. (ANS 6.6.1-79)

estimate. A population estimate is a substitute for a complete count of the population as of a current or past date. Usually the estimate utilizes contemporary data. (ANS 2.6-81D)

evacuation occurrence. A circumstance that prevents attaining or maintaining safe shutdown condition from the control room. The circumstance is only that adequate control from the control room is no longer considered possible or desirable. (ANS 58.6-92)

evaluated data. Microscopic cross-section representation derived from basic experimental data, from nuclear models and systematic, and from consideration of integral measurements. (ANS 6.1.2-89)

evaluated nuclear data file/B (END F/B). An evaluated nuclear data file prepared and reviewed by specialists in the field and coordinated and maintained by the Cross Section Evaluation Working Group (CSEWG) and the National Nuclear Data Center at Brookhaven National Laboratory (BNL). (ANS 6.1.2-89)

evaluators. Personnel responsible for assessing the planning, preparation, implementation, and conduct of the drill or exercise. (ANS 3.8.4-95)

event. A condition of plant operation that is postulated for deterministic analysis purposes. An event might consist of an initiating occurrence, coincident occurrence, single failure, or common cause failure, including the consequential effects or combinations thereof. Events that are selected for detailed analysis in licensing basis documentation or design basis documentation become the design basis events and special events defined elsewhere herein. (ANS 50.1-93}
A describable situation that must be accounted for in design. .(ANS 57.5-96)

Variant form: (ANS 51.1)

exchange capacity (ion exchange capacity) The amount of exchangeable ions measured in milligram equivalents per gram of solid material at a given pH. (ANS 2.17-89)

exclusion area. That area surrounding the reactor in which the reactor licensee has the authority to determine all activities including exclusion or removal of personnel and property from the area. See 10 CFR 100.3(a). "Definitions." (ANS 3.7.2-79)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

Variant form: (ANS 3.6-81)

exercise. An event that tests a major portion of the basic elements existing within an Emergency Plan and the Emergency Response Organization. This event should demonstrate the capability of the emergency preparedness organization to cope with a radiological or hazardous chemical emergency which could result in offsite consequences. (ANS 3.7.3-79)

exercise. An event that tests the integrated capability and a major portion of the basic elements existing within emergency plans and emergency response organizations. (ANS 3.8.3-93) (ANS 3.8.4-93)(ANS 3.8.1-87) (ANS 3.8.5-92)

exercise. A planned event that is used to evaluate the integrated capability and a major portion of the basic elements existing within emergency preparedness plans and organizations. (ANS 3.8.4-95) (3.8.3-95)

expected basis radioactivity concentrations. Radiochemical constituents as provided in American National Standard, ANSI/ANS-18.1-84, "Radioactive Source Terms for Normal Operation of Light Water Reactors". (ANS 55.6-93) (ANS 55.6-99)

experience. Applicable work in Power Plant design, construction, preoperational and start-up testing activities, operation, maintenance, onsite activities, or technical services. Observation of others performing work in the above areas is not experience. (ANS 3.1-87)

experimental benchmark. Integral experiment for which measurements are of sufficient accuracy and for which experimental conditions is specified in sufficient detail so that conclusions may be drawn as to the accuracies of calculation models and cross section data. (ANS 6.1.2-89)

experiments. Performance of those plant operations carried out under controlled conditions in order to establish characteristics or values not previously known. (ANS 3.2-93)

exposure. The exposure, X, is the quotient of dQ by dm, where dQ is the absolute value of the total charge (Coulombs) of the ions of one sign produced in air when all the electrons (i.e., negatrons and

positrons) are liberated by photons in a volume element of air having mass dm are completely stopped in air.

$X = dQ/dm$ Coulombs kg^{-1}

The special unit of exposure rate is the roentgen (R)

$R = 2.58 \times 10^{-4}$ Coulombs kg^{-1}. (ANS 6.8.1-81)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

exposure rate. The exposure rate, x, is the quotient of dx by dt, where dx is the increment of exposure in the time interval dt.

$x = dx/dt$ Coulombs $s^{1-}kg^{-1}$

The special unit of exposure rate is the roentgen per second (Rs^{-1}) or the roentgen per hour (Rh^{-1}). (ANS 6.8.1-81)

Variant form: (ANS 6.3.1-87)

exogenous. Originating from outside. (ANS 2.6-81)

extended test interval. The maximum allowable Type A, Type B, or Type C test interval following the demonstration of good performance history. (ANS 56.8-02)

external data files. The data files which exist prior to or after execution of a computer program. (ANS 10.2-88)

Variant form: (ANS 10.5-79)

external man-made hazard. Results from an accident created by man involving vehicles, equipment, or structures, which occur external to an ISFSI and has the potential for causing damage. (ANS 2.19-89)

extracameral effect. Response of an instrument caused by the influence of radiation on any portion of the system other than the detector. (ANS 6.8.1-81)(ANS 6.8.2-86)

extreme environmental load. Load which is credible, but highly improbable. (ANS 2.12-78)

extreme winds. Wind motions other than winds caused by a tornado. They include winds resulting from hurricanes, cyclones, thunderstorms, and due to orographic effects. (ANS 2.19-89)

F.

F scale. A six-tier rating system devised by Fujita to facilitate categorizing tornadoes according to the damage they produce, F-0 to F-6.F-scale winds are defined to apply at the 33 ft (10 m) height.
Although wind speeds are associated with each F-scale rating, rigorous justification for them has not been firmly established. (ANS 2.3-83)

Facility licensee. An applicant for, or holder of, a license for a nuclear facility. (ANS 3.4-94)

facility operator. An authorized representative of a

holder of a license pursuant to 10 CFR 50, "Licensing of Production and Utilization Facilities", or any government, public, or private organization which is the owner and operator or is the designated responsible operator of a nuclear facility. (ANS 3.4-87)

failed fuel. Fuel with a perforation of, or a defect in, the fuel cladding or any distortion or break causing a structural change that requires use of abnormal fuel unit handling procedures or equipment, premature replacement of a fuel assembly, replacement of its component parts, or restrictions on plant operation.
(ANS 57.1-92)(ANS 3.8-?)

A fuel assembly with a perforation of, or a defect in, the fuel cladding, or any distortion or break causing a structural change that requires, due to the fuel condition, any of the following:
Use of abnormal fuel handling procedures or equipment,
Premature replacement of a fuel assembly,
Replacement of its component parts, or restrictions on plant operation. (ANS 57.2-93) (ANS 57.2-99)

failure. The inability of an item to accomplish its design function. (ANS 50.1)
(ANS 58.11-93)(ANS 58.14-93)

Variant form: (ANS 4.1)

failure, common mode. (See common mode failure).

failure, passive. (See passive failure).

failure, undetected. (See undetected failure).

fault. A "fault" is a surface or zone of rock fracture along which there has been displacement. Included are structures such as the "growth faults" in the thick sequences of poorly consolidated sediments of the Gulf Coastal Plain. Excluded are surfaces or zones along which there has been displacement related to surficial or near-surface processes such as glacial-shove features, landslides, karst terrain, or features related to activities of man such as mining, or withdrawal or addition of subsurface fluids.
(ANS 2.7-82)(ANS 2.19-89)
A fracture in the earth along which blocks of crust on either side have moved with respect to one another. (ANS-2.27-2008) (ANS-2.29-2008)
Variant form: (ANS 2.11-78)

fault source: A fault or zone for which the tectonic features causing earthquakes have been identified. These are usually individual faults, but they may be zones comprising multiple faults or regions of faulting if surface evidence of these faults is lacking but the faults are suspected from seismicity patterns, tectonic interpretations of crustal stress and strain, and other evidence. Regions of blind

thrust faults are a good example of the latter. (ANS-2.27-2008)

field monitoring. The outdoor measuring and sampling activities conducted to determine the exposure rate and contamination level to people and the environment during and after an emergency. (ANS 3.8.6-94) (ANS 3.8.2-95) (3.8.3-95)

Variant form: (ANS 3.8.2-93) (ANS 3.8.3-93) (ANS 3.8.5-D92)

fill line (neck). Those components, including piping, valves, and filters used to provide a means to replace fuel oil into the supply tank.

(ANS 59.51-89)

fire area. That portion of a building or plant that is separated from other areas by boundary fire barriers (e.g., walls, floors, or roofs). (ANS 59.4-79W83)

fire barrier. A physical barrier, such as a floor, wall, or partition with penetrations or openings properly protected, which prevents the spread or fire from one side to the other. (ANS 59.4-79W83)

fire extinguishing (suppression) system. A fixed system utilizing an appropriate agent such as water, carbon dioxide, halogenated agents, foam, etc. for control or extinguishment, or both, of fire within the system's designated area of influence. The system may be either automatic or manual in operation. (ANS 59.4-79W83)

fire rating (Fire Resistance Rating). The time, in minutes or hours, that materials or assemblies have withstood a fire exposure as established in accordance with the test procedures of NFPA 251-1972, "Standard Methods of Fire Tests of Building Construction and Materials," ASTM E119-76, "Methods of Fire Tests of Building Construction and Materials," or other recognized rating tests. (ANS 59.4-79W83)

firmware. The combination of software and data that reside on read-only memory. (ANS 7-4.3.2-92)

fissile assembly (assembly). A system consisting of fissile material and other components that significantly influence the reactivity. (ANS 8.6-83)

fissile material. A material, other than natural uranium, that is capable of sustaining a neutron chain reaction. (ANS 8.7-75)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

fission product barrier. A physical barrier that prevents the release of radioactive materials to the environment (e.g., fuel cladding, reactor coolant pressure boundary, primary containment). (ANS 50.1-94)

fission product barriers. The fuel cladding, reactor coolant

pressure boundary, and primary containment. (ANS 51.1)

fission product removal. The process of removing fission products from the post-accident containment atmosphere. (ANS 56.5-87)

fitting function, Taylor. A buildup factor function of distance from the source in the form:

$$B(E,x) = A_1 \exp(-a_1 x) + A_2 \exp(-a_2 x) \quad (1)$$

where: x is the distance from the source in mean free paths and parameters A_1, a_1, and a_2 are functions of the attenuating medium and the source energy, E. The fourth parameter, A_2, is constrained to equal 1 - A_1. (ANS 6.4.3-91)

fitting function, G-P (Geometric Progression). A build up factor function of distance from the source in the form:

$$B(E,x) = 1 + (b-1)/(K-1) \text{ for } K \neq 1$$
$$\text{and}$$
$$B(E,x) = 1 + (b-1)x \text{ for } K = 1 \quad (2)$$
$$K(E,x) = cx^a = d[\tanh(x/X_k - 2) - \tanh(-20)]/[1 - \tanh(-2)]. \quad (3)$$

Where: x is the distance from the source in mean free paths (mfp) and b is the value of the buildup factor at 1 mfp. The variation of parameter K with penetration represents the photon dose multiplication and change in the shape of the spectrum from that at 1 mfp, which determined the value of b. Equation (3) represents the dependence of K on x; a,c,d, and X_K are fitting parameters that depend on the attenuating medium and source energy, E. (ANS 6.4.3-91)

fixed continuous monitor. Any area radiation monitor which operates continuously in a specified location. (ANS 6.8.1-81)

flame spread rating. The numbers or classifications obtained according to NFPA 255-1972. "Method of Test of Surface Burning Characteristics of Building Materials." (ANS 59.4-79W83)

flood-coastal. Abnormally high water on open and semi-enclosed bodies of water resulting from storm surge and tsunami, precipitation, tide, wind-wave activity, and possible flood at nearby stream. (ANS 2.12-78)

flooding. The abnormal presence of a quantity of fluid, either in the form of accumulation, flow, or spray, in buildings which contain structures, systems or components (SSCs) necessary for safe shutdown, emergency core cooling capability, or whose failure could result in offsite radiological consequences comparable to the guideline exposures of 10 CFR 100, "Reactor Site Criteria" (ANS 56-11-88)

flood-lake. Abnormally high water on enclosed bodies of water resulting from high lake level, storm surge and seiche, precipitation, wind-wave activity, and possible flood of nearby stream.

(ANS 2.12-78)

flood-river Abnormally high water on an inland stream resulting from precipitation and snow melt runoff, possible ice blockage, wind-wave activity, and possible dam failure or stream diversion. (ANS 2.12-78)

fluence-to-dose factor. (h_T). The quotient of effective dose equivalent (H_E) by fluence θ (theta) at a specific energy

$h_E = H_E/\theta$. (6.1.1-91)

flux (specific discharge, darcy velocity) (LT^{-1}) The volume of discharge from a given cross-sectional area per unit time divided by the area of the cross section. (ANS 2.17-89)

forecast. A population forecast is a population projection that is useful for analytical, planning, or policy purposes and that is accompanied by a judgment regarding its accuracy. (ANS 2.6-81)

Fractile Hazard Curve: Epistemic uncertainty is expressed by a distribution of exceedence probability values, a distribution of hazard curves, rather than a single value, or a single curve. In a fractile hazard curve, all the points on the curve correspond to the same fractile of the distribution of the probability of exceedence. A 5% percentile hazard curve indicates that we have a 5% confidence that the calculated hazard would be less than that given by the curve. A 95% percentile hazard curve indicates that we are 95% confident that the hazard is below the hazard given by the hazard curve. (ANS-2.29-Rev.8)

fraction leached. A portion of a constituent of a specimen or waste form that has been released from the specimen or waste form during the leaching process, using the quantity present initially as unity (100%). ANS 16.1-03)

Free-fall spill. An elevated release of powder or liquid as a slug of material that falls without obstruction and impacts a hard, essentially unyielding surface. (ANS 5.10-98)

free-field. A ground surface location for an earthquake sensor where the motion will be only of the ground surface and where the effects that are associated with certain surface features, buildings, and components will be insignificant. (ANS 2.2-02)

free liquid. Uncombined liquid not bound by the solid matrix of the solid waste mass, such as liquid that can be drained from a container. (ANS 55.1-92)

free volume. The total enclosed gas volume of a structure or an enclosed space minus the volumes occupied by solid material (e.g., internal walls, pipes, machinery) and liquids (e.g., sumps, suppres-

sion pools, etc.)(ANS 56.1-D85)

freeze. A condition whereby the dynamic simulation is interrupted and remains static until the simulator is taken out of the "freeze" mode, at which time dynamic simulation resumes. (ANS 3.5-85)

fuel assembly. A matrix array of fuel rods which is normally treated as a unit for handling and accountability purposes. (ANS 57.8-93)
The smallest modular unit comprised of individual fuel rod and associated integral component parts for handling, control, support, and maintenance of the unit's geometry. For boiling water reactors, the channel that encloses the fuel bundle and channel fastener is included as part of the fuel assembly for design purposes. (ANS 57.5-96)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

fuel burnup unit. As used throughout this standard, this term is megawatt-days per metric ton of heavy metal (MWd/t), because of subtle differences between other variables (e.g., with subscripting), the other variables are defined in the text where they first appear. (ANS 5.4)

fuel cladding damage. Perforation or excessive distortion or rupture of fuel rod cladding which would permit the release of fission products to the reactor coolant. (ANS 50.1) [Developed for 51.1/52.1]

fuel damage. Damage to a fuel assembly that breaches the cladding or distorts or disrupts spacer grids, fuel rods, end fittings or overall envelope dimensions, rendering it unfit for service in a reactor. (ANS 57.2-92)(ANS 57.3-93) (ANS 57.2-99)

fuel damage limits. Those limits such as cladding strain, amount of fuel melting, amount of cladding deformation or melting, and fractional fuel failure beyond which the accident consequences are unacceptable. Different fuel damage limits are sometimes specified for different postulated accidents or different type of fuels. (ANS 54.1-89)

f**uel design limits**. Those limits such as cladding strain, amount of fuel melting, amount of cladding deformation or melting, and fractional fuel failure beyond which the accident consequences are unacceptable. Different fuel damage limits are sometimes specified for different postulated accidents or different type fuels. (ANS 54.1-89)

fuel handling accident. An accident involving nuclear fuel handling having the potential to adversely impact nuclear safety. (ANS 57.3-93)
An accident associated with nuclear fuel handling

procedures having the potential to adversely impact nuclear safety by increasing k_{eff} or causing radioactivity release. (ANS 57.2-99)

Variant form: (ANS 57.2-D92)

fuel handling equipment. Equipment used for moving new fuel during receipt and inspection, transporting to storage in-plant and loading this fuel and control components in the reactor. (ANS 57.3-93)

fuel handling machine. Any equipment operating over the spent fuel pool [specifically] designed for handling fuel units and control components. (ANS 57.1-92)(ANS 57.2-D92) (ANS 57.2-99)

fuel handling system. Handling equipment used for receiving and inspecting new fuel and fuel containing recycled uranium or irradiated fuel and control components in the reactor, and removing from the reactor, transporting to storage, and inspecting irradiated fuel and loading casks for shipment of irradiated fuel from or storage on the site. (ANS 57.1-92)

fuel oil subsystem. That portion of the fuel oil system which supplies fuel to a single diesel generator unit. (ANS 59.51-89)

fuel oil system. The set of equipment including pumps, tanks, piping, valves and fill and vent lines required to supply fuel to the emergency diesel generators installed in a nuclear power plant. As used here "system" includes the fuel oil equipment for all of the diesel generators for a nuclear unit. (ANS 59.51-89)

fuel preparation machine. A device consisting of a work platform, frame, and movable carriage used for stripping reusable channels from spent fuel and for rechanneling new fuel in boiling water reactors (BWRs). It is normally mounted on the wall of the spent fuel pool. (ANS 57.1-92)

fuel rod. Those items of a fuel assembly that are long, thin-walled tubes closed by end caps. A fuel rod may contain fuel (e.g., uranium, plutonium, and fission products) and non-fuel material (springs, inert gas, and so forth). (ANS 57.1-92)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

Variant form: (ANS 57.9-92)

fuel rod (fuel pin). The smallest component of a reactor fuel assembly which encapsulates the fuel. (ANS 57.8-93)

fuel transfer mechanism. Handling equipment used to move fuel units between the spent fuel pool and the reactor area. (ANS 57.1-92)

fuel unit. 1 An item to be handled that contains fuel rods. It can be a fuel assembly, canned spent fuel assembly, or a canister of

consolidated fuel rods. (ANS 57.1-92); 2 The fundamental item to be stored in the ISFSI. It can be a spent fuel assembly, canned spent fuel assembly, or consolidated fuel rods.
(ANS 57.7-92)(ANS 57.9-92) (ANS 57.7-97)

full reflector. A closely fitting, effectively infinite thickness of water, or its equivalent, surrounding the system of pipes. (ANS 8.9-87)

full scope simulator. A simulator incorporating detailed modeling of systems of the reference plant with which the operator interfaces in the control room environment. The control room operating consoles are included. Such a simulator demonstrates expected plant response to normal and off-normal conditions.
(ANS 3.5-85)

functional requirement. One of the several required capabilities of a fuel assemply that is necessary to meet its design function.(ANS 57.5-96)

functional test. A qualitative or quantitative determination of acceptable operability by observation of system or component behavior during operation.
(ANS 56.5-87)

functionally simulated hardware. Hardware which has dynamic interface with the real-time simulation. (ANS 3.5-85)

G.

gas inventory. A quantity of gas contained in a free volume. (ANS 56.1-D85)

gas stripper. Degassing equipment to remove dissolved gases from liquids.
(ANS 55.1-92)(ANS 55.4-93) (ANS 55.4-99)

general design criteria. The set of design criteria given in 10, CFR 50, "Licensing of Production and Utilization Facilities," Appendix A, "General Design Criteria for Nuclear Power Plants". (ANS 56.2-84)

government agency. Any Federal, State, or local government organization designated in the plant's radiological emergency response plan. (ANS 3.7.1-95) (ANS 3.8.1-93)(ANS 3.8.2-93) (ANS 3.8.3-93)(ANS 3.8.4-93) (ANS 3.8.5-92)(ANS 3.8.6-94) (ANS 3.8.4-95) (3.8.3-95)

grapple. The action attaching to or the device making the attachment to a fuel assembly or control component.
(ANS 57.1-92)(ANS 57.3-93)

greater safety. Preferred configuration of a system or position of an isolation valve from the overall safety viewpoint in the event of a LOCA or any other accident having the same containment isolation requirements as the LOCA.
(ANS 56.2-84)

gripper. The device used for engaging a fuel unit or control component. (ANS 57.1-92)

Ground Acceleration. Acceleration at the ground surface produced by seismic waves. Typically expressed in units of g, the vertical acceleration of gravity at the earth's surface (9.80665 m/s^2). (ANS-2.29-Rev.8)

group quarters. As defined by the U.S. Bureau of the Census. These include: juvenile homes, boarding houses, barracks, etc. (ANS 2.6-81)

group-averaged data. Evaluated data averaged over energy groups (i.e., intervals) as weighted by specified functions. (ANS 6.1.2-89)

grout. A fluid mixture of cement, water, and possibly some fine aggregate. (ANS 6.4-85)

guard. A uniformed individual, armed with a loaded firearm, whose primary duty is the protection of a plant against malevolent acts (e.g., toxicological and radiological sabotage).(ANS 3.3-88)

guidelines. Particular provisions, which are considered good practice, but which are not mandatory in programs intended to comply with this standard. The term "should" denotes a guideline; the term "shall" denotes a mandatory requirement. This definition is taken from American National Standard Quality Assurance Program Requirements for Nuclear Facilities, ANSI/ASME NQA-1-1986. (ANS 10.2-88)(ANS 10.5-79)

H.

Habitable. Capable of providing for continued occupancy during emergency conditions within pre-established radiological and occupational limits set by the 10 CFR 50, "Domestic Licensing of Production and Utilization Facilities," Appendix A, and General Design Criteria for Nuclear Power Plants." Criterion 19, "Control Room." (3.8.2-93) (ANS 3.8.3-93) (ANS 3.8.2-95) (3.8.3-95)

handling equipment. Manually or power-operated devices used for performing relocation operations on rods, spent fuel assemblies or canisters. (ANS 57.10-93)

handling tools. Portable, manually or power-operated devices used for handling or performing operations on fuel assemblies or control components. (ANS 57.1-92) (ANS 57.3-93)

harden. To strengthen against unfavorable environmental conditions. (ANS 58.3-92) ANS 58.3-98)

hazard curve: Curve that gives the probability of a certain ground motion parameter (usually the PGA, PGV, or response spectral values) being exceeded. Hazard curves

are generally generated for periods of exposure of one year, and they give annual probabilities of exceedance. (ANS-2.27-2008)(ANS-2.29-2008)

hazardous waste. Waste that either: (1) is listed as a hazardous waste in Subpart D of 40 CFR 261 or, (2) exhibits any of the hazardous characteristics identified in Subpart C of 40 CFR 261 or, (3) is otherwise identified as a hazardous waste by applicable state regulations.

(ANS 55.1-92)

heterogeneity. The properties or conditions of isotropy or anisotropy vary from point to point in the medium. (ANS 2.9-89)(ANS 2.17-89)

high efficiency particulate air (HEPA) filter. A disposable dry-type filter having minimum efficiency of 99.97% for 0.3 micron particles. (ANS 55.1-92)(ANS 55.4-93) (ANS 55.4-99)

high energy line. Any line, or portion of a line, where the maximum operating pressure exceeds 275 psig, or the maximum operating temperature exceeds 200°F, during normal plant operating conditions. Those lines that operate above these limits for only a relatively short portion (i.e., less than approximately two percent) of the period of time to perform their intended function, may be classified as moderate energy. An example of such a system could be the residual heat removal (RHR) systems in some plant designs.

(ANS 56.4-83)(ANS 56.10-87)

high integrity container (HIC). A NRC- or state-approved container which provides waste stability for near surface disposal in accordance with 10 CFR 61. (ANS 55.1-92)

high purity (clean) wastes. Liquid radioactive wastes of low conductivity, normally less than 50 microsiemens, and low insoluble solids content, normally less than 20 ppm. (ANS 55.6-93) (ANS 55.6-99)

high radiation area. Any area, accessible to personnel, in which there exists radiation at such levels that a major portion of the body could receive in any one hour a dose equivalent in excess of 100 mrem. (ANS 6.8.1-81)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

high school diploma. High school diploma or successful completion of the General Education Development (GED) test. (ANS 3.1)

Holocene: The geologic epoch referring to a period of time between the present and approximately 10,000 years before present. Applied to rocks or faults, this term indicates the period of rock formation or the time of most recent fault slip. (ANS-2.27-2008)

homogeneity. The properties or conditions of isotropy or anisotropy are constant from point to point in the medium. (ANS 2.9-89) (ANS 2.17-89)

homogeneous equilibrium model. A critical flow correlation that is based on the assumptions of equal phase velocities, a homogeneous mixture (i.e., both phase and component), phases and components which are in thermal equilibrium, and isentropic flow of the mixture. (ANS 56.4-83)(ANS 56.10-87)

Hot particle. A discrete radioactive fragment that is insoluble in water, is no larger than approximately 1 millimeter in any dimension, and can expose very small amounts of tissue to very large, highly non-uniform doses. (ANS 3.7.1-1995)

hot shutdown - BWR. In the BWR, the condition in which the reactor is sub-critical and the reactor coolant system average temperature is above the temperature required to permit major maintenance consistent with Technical Specification operational limits. (ANS 58.6-92)(ANS 50.1-93

hot shutdown - PWR. In the PWR, the condition in which the reactor is sub-critical and the reactor coolant system average temperature is also below the required temperature to permit operation of the residual heat removal system, consistent with Technical Specification operational limits. (ANS 50.1-94)(ANS 58.14-93)

hot standby. In the PWR, the condition in which the reactor is sub-critical and the reactor coolant system average temperature is above the required temperature to permit operation of the low pressure residual heat removal (RHR) system, consistent with technical specification operational limits. (ANS 50.1-94)(ANS 51.1-93) (ANS 58.6-92)(ANS 58.14-93) (ANSI/ANS-51.10-02)

human error. A human action that is inappropriate for a situation (e.g., a mistake, blunder, omission, or action deviating from behavior re-quired by design or procedure committed unintentionally or through ignorance). (ANS 50.1-94)

HVAC systems, related to safety. HVAC systems that are required to accomplish the objectives listed in 1.2 of this standard. (ANS 59.2-85)

HVAC systems, safety-related. Same as above. (ANS 59.2-92)

hydraulic conductivity (LT^{-1}). [1]. A medium has a hydraulic conductivity of unit length per unit time if it will transmit in unit time a unit volume of ground water at the prevailing viscosity through a cross section of unit area, measured at right angles to the direction of flow, under a hydraulic gradient of unit change in head through unit length of flow. [2]. The term

"hydraulic conductivity" has been called permeability, coefficient of permeability, field coefficient of permeability, and conductivity. (ANS 2.9-89) (ANS 2.17-89)

Hydrogen Control System (HCS). The system or sub-systems and components provided expressly for the purpose of monitoring and controlling post-accident hydrogen or oxygen accumulation in a primary reactor containment. (ANS 56.1-85)

hydrogeologic unit. Any soil, rock unit or zone which by virtue of its porosity or permeability, or lack thereof, has a distinct influence on the storage or movement of ground water. (ANS 2.9-89)(ANS 2.17-89)

hydroseism. Ground water level fluctuations or surges resulting from seismic events. (ANS 2.9-89)

Hypocenter: The point of the earth's crust where a rupture initiates, creating an earthquake. (ANS-2.29-Rev.8)

I.

impact area. The area inside a circle of radius 50 miles with the reactor at the center. (ANS 2.6-81D)

implementation. The installation and demonstration of operability of a computer program on a given hardware/software configuration. (ANS 10.2-88)

important to confinement (Important Confinement Features. Those features of the ISFSI whose function is:

(1) To maintain the conditions required to store spent fuel safely (e.g., heat removal system if provided), or

(2) To prevent damage to the spent fuel during handling and storage (e.g., transportation package [cask] unloading equipment), or

(3) To provide reasonable assurance that spent fuel can be received, handled, stored, and retrieved without undue risk to the health and safety of the public. Dose commitment criteria provided in American National Standard Guidance for Defining Safety-Related Features of Nuclear Fuel Cycle Facilities, ANSI N46.1-1980 [7]are available for use in determining systems, structures, and components that have important confinement features with respect to public health and safety. (ANS 57.7-92) (ANS 57.7-97)

Variant form: (ANS 57.9-92)

incapacity. The medical or psychological condition of the individual does not meet the minimum health requirements of this standard and accommodation is not possible. (ANS 3.4.94

incendiary device. A self-contained device intended to create an intense fire that can damage normally flame-resistant or retardant materials. (ANS 3.3-88)

induced radioactivity. Radioactivity due to the interaction of an external neutron radiation field with the nuclides of a material. (ANS 6.4.2-85)

independent. The freedom from and insusceptibility to failure resulting from interaction among redundant safety-related components and systems. (ANS 56.5-87)

independent events. Event combinations for which the occurrence of one event does not give information about (i.e., increasing or decreasing) the probability of the occurrence of the other. If two events A and B are independent, the conditional probability for the occurrence of A given the occurrence of B is simply the probability for the occurrence of A alone (i.e., unaffected by the occurrence of B). (ANS 2.12-78)

independent review. Review completed by personnel not having direct responsibility for the work function under review. (ANS 3.2-93)

Independent Spent Fuel Storage Installation (ISFSI). A complex designed and constructed for the storage of spent fuel and other materials associated with spent fuel storage. An ISFSI that is located on the site of another facility can/may share common utilities and services with such other facility and still be considered to be independent, provided that such sharing of utilities and services or physical connections does not

(1) Increase the probability or consequences of an accident or malfunction involving components, structures, or systems that are important to confinement, or

(2) Reduce the margin of safety as defined in the bases for any technical specifications of either facility. (ANS 57.7-92) (ANS 57.9-92)

Variant form: (ANS 2.19-89)

industrial or military facility accident. Explosion, deflagration, missile, fire, toxic gas release or other potential hazard from a fixed facility.

(ANS 2.12-78)(ANS 2.19-89)

inert atmosphere. A gas or gaseous mixture limited in oxygen and other substances that are chemically reactive with sodium or sodium-potassium NaK. (ANS 54.1-89)

inerted containment. A primary reactor containment in which the containment atmosphere is diluted, usually with nitrogen, during normal plant operation. (ANS 56.1-D85)

inertial effect. In sub-compartment pressure and temperature transient analysis, a characteristic of the pressure transient caused by the fluid acceleration term in the momentum equation. (56.10-87)

infiltration. The process of downward movement of water from the surface into underlying materials. (ANS 2.9-89)(ANS 2.17-89)

information display channel. An arrangement of electrical and mechanical components or modules, or both, from measured process variable to display device as required to sense and display conditions within a generating station. (ANS 4.5)

ingestion EPZ. An area of approximately 50 miles radius surrounding a nuclear power plant where actions could be necessary to protect the public from the ingestion of contaminated water or foods. (ANS 3.8.2-93)(ANS 3.8.5-92) (ANS 3.8.6-94) (ANS 3.8.2-95)

initial test interval. The allowable Type A, Type B, or Type C test interval prior to the demonstration of good performance history. (ANS 56.8-02)

initialization condition. A set of data that represents the status of the referenced plant from which real-time simulation can begin. (ANS 3.5-85)

initiating event. An initiating event is a single occurrence, including its consequential effects, that places the plant or some portion of the plant in an off-normal condition. An initiating event and its resulting occurrences are not the single failure defined herein. An initiating event can be a single equipment failure, natural phenomenon, or external man-made hazard. (ANS 58.9-94)

initiating occurrence. A single occurrence and its consequential effects that causes a design basis event. An initiating occurrence is not the single failure defined elsewhere herein. An initiating occurrence can be a manual action, automatic action, an equipment failure, a human error, a natural hazard or a man-made hazard. (ANS 50.1-94) (ANS 51.1/52.1-93] (ANSI/ANS-51.10-02)

Variant form: (ANS 51.1)

injection mode. In the context of this standard with regard to the spray subsystem, the operating condition in which water is sprayed into the containment atmosphere from the injection water supply. With regard to the additive subsystem, the operating condition in which an additive is added to the spray water. (ANS 56.5-87)

injection water supply (PWR). A water storage structure from which water is drawn for the injection mode. (ANS 56.5-87)

input. Data received by a program. (ANS 10.5-79)

in situ experiment (experiment). Neutron multiplication, other nuclear reactivity-multiplication, or

other nuclear reactivity-determining measurement on a sub-critical fissile assembly where protection of personnel against the consequences of a criticality accident is not provided. (ANS 8.6-83)

inspection. Examination or measurement to verify whether an item or activity conforms to specified requirements. (ANS 3.2-93)

instruction. A meaningful expression in a computer programming language that specifies an operation to a digital computer. (ANS 7.4.3.2)

instrument quality air. Clean, dry, oil-free air that will not prevent or degrade any system equipment or component from operating. Recommended air quality limits are contained in ANSI ISA0S73-1981. (ANS 59.3-92)

Variant form: (ANS 59.3-83)

instrumentation station. An assembly of one or more instruments that can provide any function or combination of defined functions [see time-history accelerograph (T/A), acceleration sensor, recorder, seismic trigger (S/T). Supports, foundation, housing, and ancillary equipment are also considered to be a part of the instrumentation station. (ANS 2.2-02)

instrumentation system. All components from sensor to and including data recording, display, and reduction. (Herein referred to as "system.") (ANS 3.11-00)

integral experiment. Experiment carried out for measurement of quantities proportional to energy-and-space-integrated radiation fields in bulk matter representing shielding configurations. (ANS 6.1.2-89)

integration tests. Tests performed during the hardware-software integration process prior to computer system-validation to verify compatibility of the software and the computer system hardware. (ANS 7.4.3.2-1990)

intermediate coolant boundary. The pressure containing portion of those components which are: (1) part of the intermediate coolant system or, (2) connected to the intermediate coolant system up to and including any and all of the following:
(a) The first valve normally closed or capable of automatic actuation during normal reactor operation in piping which does not penetrate reactor containment;
(b) The outermost containment isolation valve in piping which penetrates reactor containment; and,
(c) A passive barrier between the intermediate coolant and the working fluid of a heat extraction system. (ANS 54.1-89)

intermediate coolant system. Those components such as heat exchangers, pumps, tanks and

connecting piping which contain intermediate coolant and are necessary to transport reactor core heat from the reactor coolant system to the principal heat extraction system. (54.1-89)

intermediate reflector. A neutron reflector that contributes reactivity to a column with intersecting arms not exceeding that reactivity corresponding to the presence of a concrete wall in contact with the column and arms in a 2m -square room having 30cm-thick concrete walls and floor. (ANS 8.9-87)

intraplate and interplate: Intraplate pertains to processes within the earth's crustal plates, while interplate pertains to processes at the interface between the plates. (ANS-2.27-2008)

intrinsic permeability (L^2). The measure of the ability of a rock or soil to transmit fluid under a fluid potential gradient (see definition of hydraulic conductivity). (ANS 2.9-89)(ANS 2.17-89)

intrusion alarm. A tamper-indicating, electrical, electromechanical, electro-optical, electronic or similar device which will detect intrusion into a building, protected area or vital area, and alert guards or watchmen by means of visible and audible signals. (ANS 3.3-88)

ion exchanger and filter waste. Liquid radioactive wastes generated as a result of backflushing, regeneration, transfer or replacement of filters and ion exchange resins. (ANS 55.6-93) (ANS 55.6-99)

isolation barrier(s). Mechanical means for preventing passage or release of fluid through fluid systems which penetrate the containment (e.g., valves, closed systems, blind flanges). (ANS 56.2-84)

isolation barrier protection. Protection of the isolation barrier against loss of function from external events such as missiles, pipe whip, jet force, or natural phenomena. (ANS 56.2-84)

isolation pressure. That pressure value below which a selected portion(s) of the air system is automatically isolated from the remainder of the air system to protect the air pressure integrity therein. (ANS 59.3)

isolation valve seal system. A system which provides for control of leakage past the isolation barrier(s). (ANS 56.2-84)

isolation zone. Any area adjacent to a physical barrier that is cleared of all objects which could conceal or shield an individual. (ANS 3.3-88)

isotropic. The properties at any point within a medium are the same in all directions. (ANS 2.9)(ANS 2.17-89)

item. Any plant structure, system, component, or part, including consumable. (ANS 50.1-94)(ANS 58.14-93)

J.

job task analysis. The analysis process used to determine the performance areas and tasks comprising a particular job. (ANS 3.1-87)

K.

keep-warm oil pump. An electric motor driven pump that circulates warm oil through the engine when the unit is in standby. (ANS 59.52-98)

keep-warm heater. A heater used to warm the lubricating oil to within specified limits while the engine is in standby, to enhance engine starting reliability. (ANS 59.52-98)

kernel density: Kernel density estimation is a non-parametric approach to defining a probability distribution. It is created by centering a kernel density function (e.g., Gaussian distribution) at each data point, then summing and renormalizing these individual density functions to create the composite density function. The smoothness of the final composite density is controlled by the size of the individual kernel densities placed at each data point. Kernel density estimation is used in a seismic hazard evaluation to smooth the mapped distribution of past earthquakes that is used as a predictor of the spatial distribution for future earthquakes. (ANS-2.27-2008)

L.

leakage rate. The rate at which the contained fluid escapes from the test volume at a specified test pressure. (ANSI/ANS-56.8-02)

L_a (weight%/24 h). The maximum allowable Type A test leakage rate at pressure p_a.

(ANS 56.8-02)

L_{am} (weight%/24 h). Estimate of leakage rate, derived as a function of the least squares slope and intercept, for the Type A test at pressure P_a obtained from testing the primary containment system by simulating some of the conditions that would exist under DBA conditions (e.g., vented, drained, flooded or pressurized). (ANS 56.8-02)

L_c (weight%/24 h). The composite primary containment leakage rate measured using the CILRT instruments after L_o is superimposed. (ANS 56.8-02)

L_o (weight%/24 h). The known leakage rate superimposed on the primary containment during verification test. (ANS 56.8-02)

lag storage. In-process surge storage of fuel units. (ANS 57.9-92)

lake. As used in this standard, a lake is a natural body of water whose outlet is not controlled. (ANS 2.13-79)

latching or engaging. Physically attaching a tool or grapple to a fuel assembly or control component in a manner to preclude accidental release.
(ANS 57.1-92)(ANS 57.3-93)

leachability. A rate constant (or a combination of several rate constants) that describes the leaching of a nuclide from a material under a given set of conditions.
(ANS 16.1-03)

leachability index. An index value related to the leaching characteristics of solidified waste materials as measured by the leach test defined in this standard. In this standard, the Leachability Index has an exact theoretical meaning only for homogeneous, chemically inert materials, for which bulk diffusion is the predominant rate-determining process during leaching.
(ANS 16.1-03)

leachate. Leachant after use (ANSI/ANS-16.1-2003)

leachant. The liquid that contacts the specimen during the course of a leaching test or contacts a solid waste form at a disposal site (ANSI/ANS-16.1-2003)

leaching interval. The length of time during which a given volume of leachant is in contact with a specimen or solid waste form.
(ANS 16.1-03)

leaching rate/leach rate. The amount of the constituent of the specimen or solid waste form that is leached during one time unit (e.g., g/day or μCi/s). It is frequently expressed per unit of exposed surface area [e.g., $gcm^{-2}(day)^{-1}$.
(ANS 16.1-03)

leach test specimen/leach specimen. The solid body that is immersed into the leachant during the leach test. This body must be representative of the solid that is formed by the combination of waste with the solidification agent.
(ANS 16.1-03).

leach test/leaching test. Procedure to be followed for the determination of the Leachability Index.
(ANS 16.1-03)

leak. An opening that allows the passage of fluid through it. (56.8-02)

leak before break. The principle that early detection of small leaks in piping will occur and corrective action will be taken well before propagation into a large break. (ANS 54.1-89)

leakage. The quantity of fluid escaping from a leak or leaks. (ANS 56.8-02)

leakage rate. The rate at which the contained fluid escapes from the test volume

at a specified test pressure. (ANS 56.8-02)

licensee. An individual licensed operator or senior operator. (ANS 3.4-94)

The organization that holds the operating license for the facility. (ANS 58.6-94) (ANS 3.8.2-95) (ANS 3.8.4-95) (3.8.3-95)

licensed operator. Any individual who possesses an operator's license pursuant to 10 CFR 55, "Operators' Licenses." (ANS 3.1-87)

licensed senior operator. Any individual who possesses a senior operator's license pursuant to 10 CFR 55. (ANS 3.1-87)

licensing basis documentation (LBD). The set of documents that specify the licensing requirements and commitments that form the basis used by the U.S. Nuclear Regulatory Commission (NRC) to license a nuclear power plant or a standard plant design. The LBD consists of:
(1) Final Safety Analysis Report (FSAR) or Standard Safety Analysis Report (SSAR) or the latest versions thereof;
(2) NRC Safety Evaluation Reports;
(3) Operating License, Final Design Approval or Design Certification including the Technical Specifications; and
(4) Correspondence between the NRC and the licensee which contains licensing requirements or commitments for the design or operation of the nuclear power plant or standard plant design. (ANS 50.1-94)(ANS 58.14-93)

licensing commitment. A commitment specified in the plant design basis documentation (e.g., a commitment to apply specific design criteria to an item or to implement the licensing guidance provided in a NRC Generic Letter or Regulatory Guide). (ANS 50.1-94)(ANS 58.14-93)

licensing guidance. A NRC recommendation of an acceptable way to comply with a licensing requirement. (ANS 50.1-94)(ANS 58.14-93]

licensing requirement. A NRC regulation or a requirement stemming directly or indirectly from a NRC regulation (e.g., a NRC license or order). (ANS 50.1) [Developed for ANS 58.14-93]

lifetime (of a fuel assembly). The period starting at the time of shipment from the fabricator's facility and ending when the assembly is destroyed or dismantled, and in no longer identifiable as an assembly. (ANS 57.8-93)

limit. A bounding value of a variable or parameter in design, which is established to ensure that one or more aspects of a functional requirement are satisfied. (ANS 57.5) (ANS 57.5-96)

limited air. The storage atmosphere that limits the

inventory of oxygen such that if all the oxygen is assumed to react chemically with the fuel pellets, the fuel rod cladding would not be damaged. (ANS 57.9-92)

limited combustible material. Material not complying with the definition of non-combustible material, which in the form in which it is used, has a potential heat value not exceeding 3,500 Btu per pound (8,141 kJ/kg), and complies with one of the following paragraphs (1) or (2). Materials subject to increase in combustibility or flame spread rating beyond the limits herein established through the effects of age, moisture, or other atmospheric condition shall be considered combustible.

(1) Materials having a structural base of noncombustible material, with a surfacing not exceeding a thickness of 1/8 inch (3.2 mm) which has a flame spread rating not greater than 50.
(2) Materials, in the form and thickness used, other than as described in (1) having neither a flame spread rating greater than 25 nor evidence of continued progressive combustion and of such composition that surfaces that would be exposed by cutting - through the material on any plane would have neither a flame spread rating greater than 25 nor evidence of continued progressive combustion. (ANS 59.4)

limited scope simulator. A simulator incorporating limited modeling of a generic plant or subsystem design. Such a simulator demonstrates basic operational principles. (ANS 3.5-85)

limit state: The limiting acceptable deformation, displacement, or stress that a Structure, System, and Component (SSC) may experience during or following an earthquake and still perform its safety function. Four Limit States are identified and used by ANSI/ANS-2.26-2004 [1] and ASCE/SEI 43-05 [2]. (ANS-2.27-2008)

limited combustible material. Material not complying with the definition of non-combustible material, which, in the form in which it is used, has a potential heat value not exceeding 3,500 Btu per pound (8,141 kJ/kg), and complies with one of the following paragraphs (1) or (2).
Materials subject to increase in combustibility or flame spread rating beyond the limits herein established through the effects of age, moisture, or other atmospheric condition shall be considered combustible.
(1) Materials having a structural base of non-combustible material, with a surfacing not exceeding a thickness of 1/8 inch (3.2 mm) which has a flame spread rating not greater than 50.
(2) Materials, in the form and thickness used, other that as described in (1) having neither a flame spread rating greater than 25 nor evidence of continued progressive

combustion and of such composition that surfaces that would be exposed by cutting through the material on any plane would have neither a flame spread rating greater than 25 nor evidence of continued progressive combustion. (ANS 59.4-79W83)

limiting conditions for operation. The lowest functional capability or performance levels of equipment required for continued operation of the facility without undue risk to the health and safety of the public. (From American National Standard Protection Criteria for Systems and Components Important to Safety, N283-1976 ANS-58.3). (ANS 4.1)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

limits of detection. The extreme of detection or quantification for the radioactivity of interest by the instrument as a whole or an individual readout scale. The LLD is the minimum quantifiable instrument response or reading. The Upper Limit of Detection (ULD) is the maximum quantifiable instrument response or reading. (ANS 6.8.2-86)

liquefaction: The sudden loss of shear strength and rigidity of saturated, cohesionless soils, due to steady state groundwater flow or vibratory ground motion. The term seismic liquefaction (or cyclic mobility) is used in this Standard for liquefaction phenomena associated with seismic motions. (ANS-2.27-2008) (ANS-2.29-2008)

liquid radioactive waste Liquids containing radioactive material resulting from operation of a nuclear power reactor which by design, definition, operating practice, or procedure, are intended to be processed prior to final disposition. (ANS 55.6-93) (ANS 55.6-99)

local. Any location at or adjacent to the detector. ANS 6.8.1-81)

local leakage rate test (LLRT). The leakage test performed on Type B and Type C components. (ANS 56.8-02)

local redundant system. Is a means of meeting redundancy requirements with local safety-related air supplies. Some examples of local safety-related air sources are stand-by air compressors, isolated reservoirs (i.e., accumulators) operating at system pressure, or high pressure compressed gas bottles. (ANS 59.3)

local control station(s). One or more locations in the plant (e.g., breaker panels) that are separate from the control room and that may be separate from the Alternate Shutdown Station. Such locations have instrumentation and controls that may be used for cool-down of the plant or to supply support functions to plant

equipment needed to accomplish an alternate shutdown. (ANS 58.6-92P)

localization. The isolation of related tasks, which perform a well defined function, within a single sub-program. (ANS 10.2-88)

long-term. In the context of the single failure criterion, that period of time that a safety-related system must operate starting at 24 hours following the initiating occurrence, during which its safety-related function is required. For purposes of the emergency core cooling system and containment spray systems, the long-term might start upon transfer of these systems to the long-term cooling mode. (Note: The concept of short term and long term does not apply to electrical systems or components.) (ANS 50.1-94)(ANS 58.11-93)

Variant form: (ANS 56.10.87) (ANS 51.1/ANS 52.1-92) (ANS 56.5-87)(ANS 58.9-94)

loss-of-coolant accident (LOCA) The loss of reactor coolant at a rate in excess of the reactor coolant normal make-up rate from breaks or openings in the reactor coolant pressure boundary up to and including a break equivalent in size to the largest 10 CFR 50 Appendix K justified pipe rupture, or in the absence of justification, a double-ended rupture of the largest, in the reactor coolant pressure boundary (see Appendix A of 10 CFR 50.) (ANS 50.1-94) (ANS 51.1/52.1-92)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

Variant form: (ANS 51,1-92) (ANS 51.2-92) (ANS 56.2-84) (ANS 58.3).

loss of core coolable geometry. The inability to cool the core sufficiently to maintain it in its original core location (i.e., prevent core geometry changes that could significantly affect core flow distributions or increase core reactivity). (ANS 54.1-89)

low level radioactive waste. Radioactive (low level) waste not classified as high-level radioactive waste, transuranic waste, spent nuclear fuel, or byproduct material as defined in Section II.e of the Atomic Energy Act (e.g., uranium or thorium tailings and waste). (ANS 55.1-92)

low population zone (LPZ). Primarily the sub-area of the impact area immediately surrounding the exclusion area. See section 3B and 11a of 10 CFR 100. (ANS 2.6-81)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

low pressure system. Any system or portion of a system connected to or part of the reactor coolant pressure boundary whose design pressure is less than the design pressure of the reactor vessel. (ANS 56.3-86)

low purity waste (e.g.,floor drains). Liquid radioactive wastes of normally moderate conductivity (50-200 micro-siemens) and moderate insoluble solids content (20-500 ppm). (ANS 55.6-93) (ANS 55.6-99)

lower bounding (upper bounding). Parameter value assumed for the analysis so that the result will be the minimum (maximum) of the set of values that might reasonably be expected to exist in the configuration to which the analysis is to be applied. (ANS 56.4-83)(ANS 56.10-87)

lube oil cooler. A heat exchanger provides the ability to maintain the lube oil temperature within operating limits while the engine is operating. (ANS 59.52-93)

lube oil heater. A heater that warms the lube oil in order to enhance starting reliability and rapid pressurization of the system following an engine start. (ANS 59.52-93)

lube oil system. The set of equipment which provides warmed, if necessary, filtered oil to the diesel generator engine before operation, during normal and emergency starting, and after operation for the purpose of filling and pressurizing internal oil passages and to recirculate cooled, filtered oil through the engine during operation for lubrication and heat removal. The system may also contain a means for draining used oil from the engine and replacing with clean oil. (ANS 59.52-93)

M.

macroseismicity. Recurring earthquakes having a Richter Scale magnitude of approximately three or greater. (ANS 2.7-82)(ANS 2.19.89)

main run. A pipe run that interconnects terminal ends. (ANS 58.2)

maintenance. Those activities necessary to maintain or restore systems to within specified design limits. Maintenance consists of repair, rework, replacement, adjustment, cleaning or other actions necessary to maintain an item in or restore an item to acceptable conditions. (ANS 3.2-93) (replaced "maintenance and modification procedures")

magnitude: A number that characterizes the size of an earthquake. It is related to the energy released in the form of seismic waves. Magnitude is based on measurement of the maximum motion recorded by a seismograph. Several scales have been defined, but the most commonly used are: (1) local magnitude (M_L), commonly referred to as "Richter magnitude," (2) surface-wave magnitude (M_S), (3) body-wave magnitude (m_b), and (4) moment magnitude (M_w or **M**). Scales 1 through 3 have

limited range and applicability and do not satisfactorily measure the size of the largest earthquakes. The moment magnitude scale, based on the concept of seismic moment, is uniformly applicable to all sizes of earthquakes but is more difficult to compute than the other types. All magnitude scales yield approximately the same value for earthquakes of about magnitude 5, but for larger events, m_b, then M_L, and finallyM_S, progressively diverge and increasingly underestimate the size of the earthquake compared to M_w. It is important, therefore, to specify the magnitude scale being referenced, especially for larger earthquakes. (ANS-2.27-2008) (ANS-2;29-2008)

make-up. Water added to the circulating water system to replace that lost by evaporation, drift, blowdown, and leakage.(ANS 2.13-79

malfunction. Failure or degradation in performance of plant equipment. (ANS 3.5-85)

manipulation. A discrete element of an action. (ANS 58.8-92)

man-made hazard. A condition involving vehicles, equipment, material, or structures created by man that occurs outside of a unit and has the potential for causing damage to safety related structures, systems, or components of the unit. (ANS 50.1-94)

Variant form:
(ANS 51.1/52.1-93)

manual. Operation of an isolation barrier by manual physical force, such as turning a hand wheel on a valve. (ANS 56.2-84)

manual action. An action which is taken, as directed in a written emergency procedure, to initiate, allow or facilitate a system or component to perform a function. (ANS 58.12-85)

manual start. The starting of a diesel engine using manual during which all engine trips should be enabled in order to protect the engine. (ANS 59.52-93)
The starting of a diesel engine by operation action. (ANS 59.52-98)

margin. A quantitative relationship between a design evaluation result for a given event and a limit associated with a functional requirement. (ANS 57.5) (ANS 57.5-96)

material-at-risk MAR). The amount of radioactive material available to be acted upon by the physical stresses generated by the accident conditions. (ANS 5.10-98)

maximum pathway leakage rate (MXPLR) The maximum leakage rate attributed to a penetration leakage path. The MXPLR is the larger, not the total, leakage of the two barriers in series. (ANS 56.8-02)

may. Denotes permission, neither a requirement nor a recommendation.

(ANS 3.3-88) (ANS 16.1-03)(ANS 58.2-84) (ANS 59.2-85)(ANS 59.2-D92)

mean free path. The average distance that photons of a given energy travel before an interaction in a given medium occurs. It is equal to the reciprocal of the attenuation coefficient. Thus, the distance x, in ordinary units can be converted into the dimensionless distance ux, the number of "mean-free-path (mfp) lengths."
(ANS 6.4.3-91)

Mean Hazard Curve: Corresponds to the mean of the probability distribution of hazard curves. (ANS-2.29-Rev.8)

Median Hazard Curve: Corresponds to a 50%, or the 50th fractile, hazard curve. (ANS-2.29-Rev.8)

measuring and test equipment (M&TE) Devices or systems used to calibrate, measure, gage, test, or inspect in order to control or acquire data to verity conformance to specified requirements.
(ANS 3.2-93)

mesoscale. The scale of atmospheric phenomena having overall horizontal dimensions from a few kilometers to a few tens of kilometers (ANS 3.11-00)

metal-water reaction. The amount of hydrogen generated due to the reaction of water or steam with zirconium cladding is a function of time and temperature.
(ANS 56.4-83)

minimum accident of concern. The smallest accident a criticality alarm system is required to detect.
(ANS 8.3-91)

minimum critical power ratio (MCPR). In the BWR, the lowest value of the ratio of critical bundle power (i.e., that bundle power which results in transition boiling) to the bundle power at the same location.
(ANS 50.1-94)(ANS 52.1-92)

Minimum delivered flow. The amont of flow that must be delivered to the intact steam generator(s). (ANSI/ANS-51.10-02)

minimum diesel generator capacity. The minimum electrical output from the diesel generators to assure the operation of the minimum plant equipment required to prevent unacceptable consequences for any design basis event including the capacity to power the nuclear safety-related systems and components. (ANS 59.51-95)

minimum pathway leakage rate (MNPLR) The minimum leakage rate that can be attributed to a penetration leakage path (e.g., the smaller of either the inboard or outboard barrier's individual leakage rates). The pathway's MNLPR can be determined by one-half of the total measured leakage rate when tested by pressurizing between the inboard and outboard barriers.
(ANS 56.8-02)

minimum recirculation flow. The amount of flow that must be provided at all times that the pump is operating to protect the pump from overheating and accelerated aging. (ANSI/ANS-51.10-02)

minimum required storage capacity. The minimum required quantity of lubricating oil to provide for engine consumption and operating needs during safety-related functions. (ANS 59.52-98)

miscellaneous liquid wastes, Liquid radioactive wastes which may not be readily amenable to processing and reuse as reactor coolant makeup water. (ANS 55.6-93) (ANS 55.6-99)

missile. A mass that has kinetic energy and is unrestrained.
(ANS 2.12-78)(ANS 51.1-92) (ANS 52.1-92)(ANS 58.1) (ANS 59.1)(ANS 50.1-94)

missile barrier. A physical barrier that protects the containment isolation barriers from potential missiles created by, or that could cause an event that would require containment isolation. (ANS 56.2-84)

missile protection. The protection afforded structures, systems or components (SSCs) against missiles (including jet forces and pipe whip) by physical barriers, restraints, or design configuration.
(ANS 56.2-84)

mixed waste. Waste that meets both the definition of a low-level radioactive waste and the definition of a hazardous waste.
(ANS 55.1-92)

model. Mathematical algorithms that describe the physical processes involved in dose assessments which can be represented as a set of tables, graphs, map overlays, worksheets or computer programs.
(ANS 3.8.6-94)

moderate energy piping system. Any system, or portion of a system, where neither the maximum operating pressure exceeds 275 psig nor the maximum operating temperature exceeds 200°F during normal plant operating conditions. All piping systems not classified as high energy shall be classified as moderate energy piping systems.
(ANS 58.2)

moderate-energy line. Any line, or portion of a line, where neither the maximum operating pressure exceeds 275 psig nor the maximum operating temperature exceeds 200°F during normal plant operating conditions. All piping not classified as high energy shall be classified as moderate energy lines.
(ANS 56.4-83)(ANS 56.10-87)

modification. 1 A change in the physical design or functional characteristic of a component or system.
(ANS 3.2-93);
2 Any change to software.
(ANS 10.2-88)

module. A program subset which performs a specific function. (ANS 10.5-79)

monitor. Instrumentation and hardware consisting of an appropriate sampler plus a channel or channels. (ANS 6.8.2-86)

motive power failure. A loss of actuating power. (ANS 56.2-84)

motor-driven clean lube oil transfer pump. The clean lube oil transfer pump delivers oil from the clean lube oil storage tank to the lube oil sump or sump tank. (ANS 59.52-93)

motor-driven keep warm pump. While the diesel generator is in standby, the keep warm pump operates to maintain the engine passages in a warmed and lubricated state. (ANS 59.52-93)

motor driven oil pre-lube pump. A motor driven pump used to supply oil to engine bearing surfaces prior to a planned maintenance or start of surveillance. (ANS 59.52-98)

motor-driven pre-lube pump. Prior to maintenance engine starts, the pre-lube pump can be operated to provide lubrication per manufacturer recommendations. (ANS 59.52-93)

movable storage racks. Structures designed to store spent fuel and capable of being moved while containing stored fuel assemblies. (ANS 57.3)(ANS 57.7-92)

moving squall line. A line or narrow band of active thunderstorms having a pressure jump with the cold front providing the initial piston-like impetus, and a mature instability line that is located in the warm sector of a wave cyclone about 50 to 200 miles in advance of the cold front usually oriented roughly parallel to the cold front and moving in about the same direction and speed as the cold front. (ANS 2.8-92)

MPC-Hours. A concept which sums airborne radioactive concentration times the time that concentration exists. In the case where $f_{MPC}(t)$ is a fraction or multiple of a Maximum Permissible Concentration (MPC) for a given radioisotope at a given time, and dt is the time over which that airborne concentration continues to exist, MPC-hours is given by:

$$\int_t f_{MPC}(t)^* \, dt$$

where: t is the time of interest in hours. For purposes of this standard, MPC's for various isotopes shall be those concentrations as listed in 10 CFR 20, Appendix B, Table 1, Column 1. MPC-hours is not defined for $f_{MPC}(t) < 1$, nor for $t < 0.1$ hour. (ANS 6.8.2-86)

multi-person facility. A facility where it is mandatory that more than one qualified individual be present in the

control room or other specified control areas when the reactor is operating. (ANS 3.4-87)

mutually exclusive. Two or more events which cannot physically occur simultaneously. (ANS 2.12-78)

N.

name spread rating. The numbers or classifications obtained according to NFPA 2551972, "Method of Test of Surface Burning Characteristics of Building Materials." (ANS 59.4)

National Warning System (NAWAS). A full period private line voice telephone network. (ANS 3.7.2-79)

natural hazard. 1 A natural phenomenon that has the potential for causing damage to the safety-related structures, systems, or components (SSC) of a plant. (ANS 50.1-94);
[revises (ANS 51.1/ 52.1-93);

Variant form: {ANS 56.5-87) (ANS 2.12-78)(ANS 2.19.89)

natural phenomena. Those conditions of the environment external to a plant that are not manmade. (Note: The natural phenomena accommodated by nuclear power plant design criteria are termed natural hazards). (ANS 50.1-94)
[revises ANS 51.1/52.1-93]
Environmental conditions, some examples of which are earthquakes, tornadoes, flooding, lightning, hurricanes, snow, and ice. (ANS 57.2-99) (ANS 57.3-93)

Variant form: (ANS 57.2-92) (ANS 57.3-93)(ANS 59.1)

neutrons. (1) Fast Neutrons. Neutrons of kinetic energy greater than some specified value. This value can vary over a wide range and will be dependent upon the application. In concrete shield analyses, the specified value is normally 0.1 MeV when calculating tissue doses and 1 MeV when determining radiation damage to materials.
(2) Intermediate Energy Neutrons. Neutrons greater in energy than thermal neutrons and less than the energy associated with fast neutrons. This range also includes the resonance neutron energy range in which many nuclides exhibit strong neutron absorption, referred to as resonance absorption.
(3) Thermal Neutrons. Very low energy neutrons that are in thermal equilibrium with the atoms, or molecules, of the medium in which they are present at a temperature of 20°C, thermal neutrons having an average velocity of 2,200 meters/second and a corresponding energy of 0.025 eV. (ANS 6.4-85)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

neutron and gamma-ray cross sections. Microscopic cross sections for the interactions of neutrons and gamma rays with matter including cross

sections for emission of neutrons and gamma rays as well as cross sections for the material effects of neutrons and gamma rays. The cross sections may be averaged over energy intervals (i.e., groups) for purposes of application.
(ANS 6.1.2-89)

neutron multiplication (multiplication). Neutron multiplication signifies a neutron counting rate that is sensitive to reactivity change. This rate is often normalized to the counting rate that would result if there were no fissions. In other contexts, this term has a different meaning.
(ANS 8.6-83)

new fuel. A nuclear fuel assembly that has not been used for power generation. It may contain fissile transuranic isotopes. (ANS 57.3)
(ANS 57.3-93)

new fuel elevator. Equipment, usually installed in the spent fuel pool, to allow new fuel to be introduced from a shipping container or new fuel storage racks, and lowered for transfer to the fuel storage racks or transfer canal.
(ANS 57.1-92)
Equipment usually installed in the spent fuel pool to allow new fuel, from either a shipping container or the new fuel storage racks, to be lowered for handling by the fuel handling equipment. (ANS 57.3-93)

Variant form: (ANS 57.1)
(ANS 57.3)

new fuel storage rack enclosure. The boundary structures of the new fuel storage facility that protects the new fuel from the environment and from damage, theft, and sabotage. It may consist of a vault around the racks, a covered storage room or an open storage pit housed in a building, or an entire building in which the new fuel is being stored.
(ANS 57.3-93)

no loss of nuclear safety function. preferred usage is 'no loss of safety-related function.'

no loss of operability. The capability of unit structures, systems, and components (SSCs) to accomplish nuclear safety functions required to accommodate normal operations or a specified event within applicable nuclear safety criteria. (ANSI/ANS-51.10-02)
no loss of safety function. preferred usage is 'no loss of safety-related function.'

no loss of safety-related function. The capability of an item to accomplish safety-related functions required to accommodate a design basis event within applicable nuclear safety criteria.
(ANS 50.1-94)

Variant form: (ANS 51.1/52.2) (ANS 54.1-89) (ANS 51.10)

node volume. The geometric subdivision assumed in the analysis for which pressures and temperatures are computed.
(ANS 56.10-87)

non-accessible instruments.

Variant form: (ANS 2.10)

non-capable fault. A non-capable fault is one that is not capable of surface rupture. Primary criteria for determining non-capability are that the fault exhibits the following three characteristics:
(1) Has had no displacement at or near the ground surface in the past 35,000 years and no recurring displacements in the past 500,000 years, (2) has had no directly relatable seismicity of tectonic origin, and, (3) has structural relationship to a capable fault such that displacement on one might be accompanied by displacement on the other.
(ANS 2.7-89)

non-combustible material. A material which in the form in which it is to be used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors, when subjected to fire or heat. Material that has passed the test of the American Society of Testing Materials (ASTM) E 136-1973, "Standard Method of Test for Non-Combustibility of Elementary Materials shall be considered a non-combustible material. (ANS 59.4-79W83)

non-conformance. A deficiency in characteristic, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate. (ANS 3.2-93)

non-essential systems. Those systems which are neither engineered safety feature systems nor systems which accomplish a function similar to an engineered safety feature system. (ANS 56.2-84)

non-fuel-bearing components (NFBC). All components of a spent fuel assembly except the fuel rods (e.g., end fittings, spacer grids, control rod guide tubes, water rods,springs).
(ANS 57.10-93)

non-interruptible. Once required to operate, cannot be cut off by an event external of the site.
(ANS 57.3)(ANS 57.7-92)

Non-Nuclear Safety (NNS) Classification of structures, systems, or components (SSCs) that are not in Safety Classes 1, 2, or 3.
(ANS 51.1/52.1)(ANS 59.2-85)

non-safety-related to non-nuclear safety-related. Classification of structures, systems, or components (SSCs) that are not in Safety Classes 1,2 or 3 and, therefore, are not classified as an engineered safety feature.
(ANS 59.2-92)

non-nuclear safety class equipment. Equipment that has been classified as non-nuclear safety based upon the normal plant safety analysis. Equipment classification is not dependent on its use for station blackout.
(ANS 58.12-85)

non-nuclear safety-related. Those requirements, not considered to be nuclear safety-related, whose goal is equipment reliability, unit availability, industrial safety, or good engineering practice. (ANS 2.13-79)

non-safety-related. Classification applied to an item that is neither safety-related nor supplemental grade. (ANS 50.1) [Developed for ANS 58.14-93]

non-tectonic ground disruptions. Ground disruptions due to landslides, subsidence or uplift caused by man's activities, solution activity, differential settlement, or ice shove. (ANS 2.11-78)(ANS 2.19-89)

normal natural phenomena. Conditions that may reasonably be expected to occur during a few plant life times. They include high and low water level, snow and ice, wind, and earthquake. (ANS 56.2)

normal operation. Plant operation consisting of design basis events that are within the operational modes as defined in the Technical Specifications (e.g., refueling, shutdown [hot and cold] and power operation), with normal operational systems in use and with structures, systems and components (SSCs) within Technical Specification operational limits. (Normal operations consists of PC-1 design basis events.) (ANS 50.1-94)

Variant form: (ANS 54.1-89) (ANS 56.7)

normal plant operating conditions. Any condition (excluding testing) in the course of system startup, operation in the design power range, hot standby, and system shutdown. (ANS 58.2)

normal shutdown and cooldown. A shutdown and cooldown in which normal operational systems can be used, the fuel and reactor coolant pressure boundary conditions are within technical specification operational limits, and no automatic actuation of any engineered safety feature is required. (ANS 51.1/52.1)(ANS 50.1-94)

normalized inputs. The design basis values for a plant of specific power rating. (ANS 55.1-92)

no solo operation. Operation of or directing the operation of the controls, during all modes of operation including emergency conditions with another qualified person present in the control room or in other specified control areas, such as the refueling console. (ANS 3.4-94)

Nuclear Air Treatment System (NATS). Synonym for Air Cleaning Systems. A system designed to remove radioactive gaseous (i.e., adsorption) and/or particulate contaminants (i.e., filtration). Such a system contains one or both of the high efficiency gas cleaning components referred to as High

Efficiency Particulate Air (HEPA) filters and nuclear-grade absorbers. (ANS 59.2-92)

nuclear criticality safety. Protection against the consequences of an inadvertent nuclear chain reaction, preferably by prevention of the reaction. (ANS 8.1-83) (ANS 8.9-87) (ANS 57.7-92)

nuclear facility. Structures, buildings, and systems provided which utilize or process fissionable material (i.e., nuclear power plant, reprocessing plant). (ANS 57.9-92)

variant form: (ANS 57.7-92]

nuclear power plant. A nuclear power plant is any plant using a nuclear reactor to produce electric power, process heat, or space heating. (ANS 3.4-87)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

Variant form: (ANS 3.1-87 (ANS 3.2)

nuclear power plant experience. Experience acquired in the pre-operational and startup testing activities, maintenance, or operation of nuclear power plants. (ANS 3.1-87)

nuclear power unit. One or more nuclear power reactors and associated equipment necessary for electric power generation, including those structures, systems, and components (SSCs) required to provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public. (ANS 54.1-89)

Variant form: (ANS 3.1-87)

nuclear reactor. Any assembly of fissionable material which is designed to achieve a controlled, self-sustaining neutron chain reaction. (ANS 3.4-87)

nuclear reactor operator. An individual who manipulates the controls or directs others to manipulate the controls. (ANS 3.4-87)

nuclear safety function (see safety-related function). Any function that is necessary to ensure:
a. The integrity of the reactor coolant pressure boundary,
b. The capability to shut down the reactor and maintain it in a safe shutdown condition, or
c. The capability to prevent or mitigate the consequences of Plant Conditions that could result in potential offsite exposures that are comparable to the guideline exposures of 10 CFR 100, "Reactor Site Criteria."
(ANS 51.1/52.1)(ANS 56.6-86) (ANS 57.7-92)

Variant form: (ANS 54.1-89) (ANS 59.3-92)

Nuclear safety-related (NSR) (see safety-related). Of significance or importance because it applies to:

a. Structures, systems, or components (SSCs) designed to perform a nuclear safety function,
b. Drawings, specifications or procedures, analyses, and other documents used to determine or describe parameters affecting structures, systems, or components (SSCs) that are designed to perform a nuclear safety function, or
c. Services to design, purchase, fabricate, handle, ship, store, clean, erect, install, test, operate, maintain, repair, refuel, and modify structures, systems, or components that are designed to perform a nuclear safety function.
(ANS 51.1/52.1)(ANS 54.1-89) (ANS 59.3-92)

Variant form: (ANS 2.13-79)

nuclear safety-related control air system. (see safety-related control air system) Those portions of the control air system which perform a nuclear safety-related function. (ANS 59.3-92)

nuclear safety-related equipment. Equipment that has been classified as safety-related based upon the normal plant safety analysis (e.g., per ANSI/ANS 51.1-1983 or ANSI/ANS 52.1-1983).
(ANS 58.12-85)

numerical benchmark. Specification of composition and geometry of bulk material and radiation sources, and of the objects of calculation in a detail that is required to determine the accuracies of various calculation methods, usually by comparison with an accepted method.
(ANS 6.1.2-89)

O.

objective evidence. Any documented statement of fact, other information, or record, either quantitative or qualitative, pertaining to the quality of an item or activity, based on observations, measurements, or tests which can be verified.(ANS 3.2-93)

off-normal condition procedures. Written procedures which specify operator actions for restoring an operating variable to its normal controlled value when it departs from its range or to restore normal operating conditions following a transient. Such actions are invoked following an operator observation or an annunciator alarm indicating a condition which, if not corrected, could degenerate into a condition requiring action under an emergency procedure.
(ANS 3.2)

offsite All areas not onsite. (ANS 3.7.1-95)(ANS 3.8.1-93) (ANS 3.8.2-93)(ANS 3.8.3-93) (ANS 3.8.4-93)(ANS 3.8.5-92) (ANS 3.8.6-94) (ANS 3.8.2-95) (ANS 3.8.4-95) (3.8.3-95)

Variant form: (ANS 3.7.2-79)
offsite personnel. Those personnel providing technical and operational support but not reporting directly to the Plant Manager. These personnel may be located onsite or offsite.(ANS 3.1-87)

once through circulating water system. A system in which water is used one time before it is returned to the environment. (ANS 2.13-79)

onsite. Areas within the exclusion area. (ANS 3.7.1-92)(ANS 3.7.2-79)

That area surrounding the reactor in which the licensee has the authority to control all activities including exclusion or removal of personnel and property. (ANS 3.7.1-95)(ANS 3.8.1-93)(ANS 3.8.2-93) (ANS 3.8.3-93)(ANS 3.8.4-93) (ANS 3.8.5-92)(ANS 3.8.6-94) (ANS 3.8.2-95) (ANS 3.8.4-95) (ANS 3.8.3-95)

onsite operating organization. Onsite personnel concerned with operation, maintenance and certain technical services. (ANS 3.2)

onsite personnel. Those personnel that are assigned to the site as their normal work location reporting to the Plant Manager. (ANS 3.1-87)

on-the-job training. Participation in nuclear power plant startup, operation, maintenance, or technical services as a trainee under the direction of experienced personnel. (ANS 2.13-W98)

operable. **(See operational;).** Having the capability of performing the safety function(s) specified for a system or component. Implicit in this definition shall be the assumption that all necessary attendant instrumentation, controls, normal and emergency electric power sources, cooling or seal water, lubrication, or other auxiliary equipment that are essential for the system or component to perform its safety function(s) are also capable of performing their related support functions. (ANS 58.4-W90)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

operating. Performing an intended action in the required manner. (ANS 50.1-94)(ANS 51.1/52.1;

Variant form. (ANS 4.1)

operating activities. Work functions associated with normal operation and maint-enance of the plant, and technical services routinely assigned to the onsite oper-ating organization. (ANS 3.2)

operating basis earthquake (OBE). The earthquake that, considering the regional and local geology and seismology, and specific characteristic of local subsurface material, could reasonably be expected to affect the plant site during the operating life of the plant. It is that earthquake that produces the vibratory ground motion for which those safety-related items of the nuclear power plant, necessary for subsequent operation without undue risk to the health and safety of the public are designed to remain functional.

(ANS 50.1-94)(ANS 51.1/52.1)

(ANS 57.2-99)

Variant form:
(ANS 56.6-86)(ANS 57.2-92)
(ANS 57.3-93)(ANS 2.10-90)
(ANS 2.12-78)(ANS 2.2-02)

operating floor. For BWR's, this term is defined as the refueling floor for MKIII containment and the grating level at the personnel hatch just above the drywell floor for MKI containment. For PWR's this term is defined as the floor at the same level as the personnel hatch. (ANS 56.5)

operating organization. The onsite organization concerned with operation, maintenance, and certain technical services. This organization may include offsite personnel who provide operational support. (ANS 3.1-87)

operating procedures. Written procedures defining the normal method, means and limits of operation of a nuclear power plant, a plant system or systems, or processes, including actions to be taken by operating personnel for removal from and return to service of equipment on which maintenance is to be or has been performed (see also maintenance and modification procedures). (ANS 3.2-06)

operating range. The range of values over which a parameter, indicative of environmental conditions, is stated to vary during the expected life of a material as it performs its intended function. (ANS 6.4.2-85)

operational. Capable of performing intended action upon command from measured variables or operator action. (ANS 4.1)

Variant: (ANS 56.5-87)

operational phase. That period of time during which the principal activity is associated with normal operation of the plant. This phase of plant life is considered to begin formally with commencement of fuel loading, and to end with plant decommissioning. However, this standard recognizes that certain operational type activities begin prior to fuel loading. (ANS 3.2-93)

operational transient. Transients included in the Conditions of Design I and II groupings. Condition of Design Ii is also defined in Section 2, "Definitions," and Table 3-1 of ANSI/ANS 52.1. (ANS 56.7-Historical)

operating floor. For BWR's, this term is defined as the refueling floor for MKIII containment and the grating level at the personnel hatch just above the drywell floor for MKII containment. For PWR's this term is defined as the floor at the same level as the personnel hatch. (ANS 56.5-87)

operator. An individual licensed under 10 CFR 55 to manipulate the controls of a facility and to direct the licensed activities of licensed operators.

(ANS 3.4-94)

operator error. In the context of the single failure criterion, a human error comprised of a single incorrect or omitted manipulation by a human operator attempting to perform a necessary action in response to an initiating occurrence. (ANS 50.1-94) (ANS 51.1/52.1) In the context of the single failure criterion, a single incorrect or omitted action by a human operator attempting to perform a nuclear safety-related manipulation in response to an initiating occurrence. (ANSI/ANS-51.10-02)

Variant form: (ANS 58.8-92) (ANS 51.10)(ANS 58.9-94)

optimal (optimum) moderation. The moderation condition that yields the highest effective multiplication factor. (ANS 57.3-93)

ordinary concrete. There are many different types of ordinary concrete. The differences are due to a variation in the mix proportions and elemental composition of the cement, sand, coarse aggregate and water. In the context of this standard, ordinary concrete means Type 04 concrete having a theoretical density of 2.35 g/cm^3. This type of designation is based on the elemental composition as defined in ANL-6443. Type 04 ordinary concrete is described in Section 5, Characterization of concrete. Argonne National Laboratory compilation ANL 6443 "A Summary of Shielding Constants for Concrete", describes other types of ordinary concrete as well. (ANS 6.4-85)

orderly shutdown and cooldown. A shutdown and cooldown in which the fuel and reactor coolant pressure boundary conditions are within technical specification operational limits. Automatic actuation of an engineered safety feature may be required. (ANS 50.1-94)(ANS 51.1/52.1) (ANSI/ANS 51.10-02);

Variant form (ANS 59.1)

original seismic design bases. The seismic design criteria for which the plant was actually designed. Included, for example, are allowable seismic stress levels, seismic displacements, seismic loads, peak accelerations, etc. (ANS 2.10-03)

other defined basis. A method of meeting the requirements of the General Design Criteria 55 and 56 for specific classes of lines where the arrangements differ from the explicit requirements of the General Design Criteria. (ANS 56.2-84)

other operator actions Operator actions that are not required by plant emergency procedures following a DBE. Such actions also include those that do not improve safety performance, but that may be performed by the operator to improve a safety-related system's performance

beyond the acceptable minimum. (ANS 58.8-92)

outdoor controlled area wastes. Liquids from diked areas outside plant buildings but within the controlled area of the plant. (ANS 55.6-93) (ANS 55.6-99)

outer zone. That portion of the impact area outside the low population zone. (ANS 2.6-81)

overall integrated leakage rate. The total leakage through all tested leakage paths including containment welds, valves, fittings and components that penetrate the primary containment, expressed in units of weight percent of contained air mass at test pressure per 24 hours. (ANS 56.8-02)

owner. The holder as defined in 10 CFR 50.2 "Definitions," of a construct-ion permit or the holder of an operating license as defined in 10.35, "Issuance of Const-ruction Permits" or 10 CFR 50.57, "Issuance of Operating License." (ANS 2.10-90)

owner-controlled area. The area external and contiguous to a protected area which may be controlled by the owner organization for security purposes. (ANS 3.3-88)

owner organization. The organization, including the onsite operating organization, which has overall legal, financial, and technical responsibility for the operation of one or more nuclear power plants. (ANS 3.1-87)

The person, group, company, agency, or corporation who has overall legal, financial and technical responsibility for the operation of a nuclear power plant. (ANS 3.2-93)

P.

P_a (psig or kPa). The calculated peak containment internal pressure related to the design-basis loss-of-coolant accident (LOCA). (ANS 56.8-02)

packaging. Any material or structure covering the surface of a waste such as a plastic bag, drum, concrete cask, etc., but exclusive of a coating or surface treatment. (ANS 16.1-03)

packer test. A method of isolating a section of a borehole by inserting one or more expandable glands (i.e., packers) in order to measure hydraulic conductivity or water quality in the section. (ANS 2.9-89)

19 paleoseismic: Referring to the history of seismic events that is determined by looking at the layers of rock and soil beneath the surface or landforms at the surface and how they have been shifted by earthquakes that have occurred in the past. (ANS-2.27-2008)

parameter. 1 As used in this standard, a parameter is a set or part of a set of physical

properties whose values determine the characteristics or behavior of a system. (ANS 2.11-78)(ANS 2.19-89); 2 Any specific parameter or value affecting or describing the theoretical or measurable characteristics of a unit being considered which behaves as an independent variable or which depends upon some functional interaction of other quantities in a theoretically determinable manner. (ANS 3.8.1-93)(ANS 3.8.2-93); (ANS 3.8.2-95)

part. A basic element of a structure, system, or component (SSC) that ordinarily cannot be, or would not be, disassembled further for procurement or maintenance purposes, and might have a part-level plant unique identification code. (ANS 50.1-94) [Developed for ANS 58.14-93]

partial reflector. A neutron reflector that contributes reactivity to a column with intersecting arms not exceeding that reactivity corresponding to the presence of a 2m square room having 30cm-thick concrete walls and floor, in which the fissile material is more than 30 cm from any concrete surface. (ANS 8.9-87)

particle fluence. The quotient of dN by da where dN is the number of particles incident on a sphere of cross-sectional area da.

- = dN/da

The area da must be perpendicular to each particle's direction. A sphere arranges this in the simplest manner. Alternatively, may be defined as particle track length per unit volume, or, in the case of neutrons, as nvt, where n is the (volume) density of neutrons, v is their velocity, and t is the time of passage through the volume. (ANS 6.1.1-91)

participation. To take an active role in the duties and responsibilities relative to the function for which the candidate is being considered. Simple observation is not considered participation. (ANS 3.1-87)

partition coefficient. The dimensionless ratio of the iodine concentration in the liquid phase to the iodine concentration in the gaseous phase at equilibrium based on volume. (ANS 56.5-87)

passive component. 1 A component that is not an active component (e.g., pipe, resistor and heat tracing) (ANS 50.1-94)(ANS 51.1/52.1) (ANS 56.1-85)

Variant form: (ANS 56.2-84) (ANS 56.5-87)

passive failure. A failure that is not an active failure (e.g., the blockage of a process flowpath or failure of a component to maintain its structural integrity or stability, such that it cannot provide its intended function upon demand).

(ANS 50.1-94)(ANS 58.11-93) The blockage of a process flow path or failure of a component to maintain its structural integrity or stability, such that it cannot provide its intended nuclear safety function upon demand. (ANSI/ANS-51.10-02)

Variant form: (ANS 56.1-85)(ANS 56.5-87) (ANS 57.7-92)(ANS 51.1/52.1) (ANS 56.4-83)(ANS 56.10-87) (58.9-94)

passive function. A function that is not an active function (e.g., the pressure retaining function of a valve that is not required to change its position). Passive functions can be either safety-related or non-safety related. See B.6 in Appendix B for further discussion. (ANS 58.14-93)

Variant form: (ANS 50.1-94)

passive malfunction. Those failures which do not become evident to the control room operator until the affected system is called upon to function. (ANS 3.5-85)

part-task simulator. A simulator incorporating detailed modeling of a limited number of specific reference plant components or subsystems. Such a simulator demonstrates expected response of those components or subsystems. (ANS 3.5-85)

pathway. A leakage path from the primary containment. Note: An individual penetration can have more than one pathway. (ANS 56.8-02)

PC frequent. (See plant condition II).

PC infrequent. (See plant conditions III and IV).

PC limiting. (See plant condition V)

PC normal. (See plant condition I)

P_d (psig or kPa). The containment design pressure. ANS 56.8-02)

peak accelerograph. An instrument requiring no power source, having the capability of permanently recording peak acceleration. (ANS 2.10-90)

Peak ground acceleration - Maximum absolute value of acceleration displayed on an accelerogram; the largest ground acceleration produced by an earthquake at a site. (ANS-2.29-Rev.8)

Peak Ground Displacement - The largest ground displacements produced by an earthquake at a site. (ANS-2.29-Rev.8)

Peak Ground Velocity - The largest ground velocity produced by an earthquake at a site. (ANS-2.29-Rev.8)

peer review. The review and concurrence of the basis and findings of a document or paper by more than one individual recogniazed as knowledgeable in the specific technical area. (ANS 5.10-98)

penetration assembly. An assembly that allows fluid lines or electric circuits to pass through a single aperture

(e.g., nozzle or other opening) in the containment. (ANS 56.2-84)

performance-based test interval. Type A, Type B, or Type C test interval whose duration is determined in part by the performance history of the containment or the component. (ANS 56.8-02)

personnel monitoring. The means by which dose rate and estimation of the effective dose equivalent of ionizing radiation which an individual has received is determined, usually through use of survey instruments, dosimeters or personnel monitoring badges. (ANS 3.7.1-95)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

personnel monitoring badge. A device worn by personnel containing film, thermo-luminescent, or other material used to evaluate the dose equivalent which a person has received. (ANS 3.7.1D92)

phased isolation. The sequential isolation of groups of fluid systems penetrating the reactor containment. The actuation of containment isolation is by different values of, or different combinations of measured parameters based on the ability of their fluid system to mitigate the consequences of an accident or their usefulness in maintaining the plant in safe configuration. (ANS 56.2-84)

photoneutron. Neutron released from an atomic nucleus in a photonuclear reaction with a gamma ray of sufficiently high energy. The threshold energy required of the gamma ray is approximately 2 Mev for beryllium and deuterium, but greater that 8 Mev for other elements. (ANS 6.4.2-85)

phreatic surface (water table). Boundary between the zone of saturation and the zone of aeration where the pressure is atmospheric. (ANS 2.19-89)

physical barrier. (1) fences constructed of No. 11 American wire gauge, or heavier wire fabric, topped by three or more horizontal strands of barbed wire or similar material on brackets angled upward and outward between 30° and 45° from the vertical with an overall height of not less than eight feet including a one-foot barbed topping. (2) building walls constructed of stone, brick, cinder block, concrete, steel or comparable material (e.g., openings in which are secured by grates, doors, or covers of construction and fastening of sufficient strength such that the integrity of the wall is not compromised by any opening), not a part of a building, provided with a barbed topping described in (1), with a total height of not less than eight feet (a seven-foot wall with one foot of barbed topping). (3)

ceilings and floors constructed to offer resistance to penetration equivalent to that of building walls described in [2].
(4) any other physical obstruction constructed in a manner and of materials suitable for the purpose for which the obstruction is intended. (ANS 3.3-88)

physical security plan. A document prepared pursuant to requirements of 10 CFR 50, "Domestic Licensing of Production and Utilization Facilities," Section 50.34(c) that de-scribes the means by which the owner organization shall establish a security program with the objective of high assurance protection against radiological sabotage.

(ANS 3.3-88)

20 piezometer: A nonpumping well generally of small diameter or device (tube or pipe) for measuring the elevation of a water table. (ANS-2.27-2008)

pipe rupture. The loss of pressure integrity of a piping run in the form of a circumferential break, longitudinal break or through-wall crack. (ANS 58.2)

pipe rupture whip. The dynamic movement of a pipe due to postulated pipe rupture forces. (ANS 58.3)

pipe whip. Uncontrolled motion of a ruptured pipe. (ANS 58.2)

pipe whip restraint. A device, including its anchorage, utilized for preventing a pipe whip, or otherwise controlling the pipe motion within acceptable bounds following a pipe rupture. (ANS 58.2)

pipeline accident. Rupture of a pipeline carrying a gas or liquid under pressure which can explode or ignite or create a toxic gas cloud or environment which incapacitates personnel or degrades equipment operation. (ANS 2.12-78)(ANS 2.19-89)

plain. Excluded are surfaces or zones along which there has been displacement related to surficial or near surface processes such as glacial-shove features, landslides, karst terrain, or related to activities of man such as mining, or withdrawal or addition of subsurface fluids. (ANS 2.19)

plant area. All areas of the plant, except the containment, within the exclusion area as defined for the purpose of 10 CFR 100, “Reactor Site Criteria”.
(ANS 5.6.1-90)

plant condition (PC) Categorization of design basis events in terms of their likelihood of occurrence. (ANS 50.1-94)(ANS 58.11-93)

Variant form: (ANS 51.1/52.1) (ANS 58.9-92) (ANS 59.2-85) (deleted from ANS 59.2-D92)

The purpose of categorizing Plant Conditions (PC) is to

provide a means of establishing design requirements to satisfy operational and safety criteria of the facility. These are: defined by normal operation (PC 1), classified on the basis of expected frequency of occurrence (PC II and III), or postulated because their occurrence may result in the maximum potential impact on the immediate environs (PC IV and V). Evaluation of the consequences of any such event can then be used to specify the performance requirements of the systems and subsystems within the facility.

1. plant condition I

a. Definition. PC I events are those events that are expected to occur regularly or frequently in the course of normal operation at the facility.

b. Examples

(1) Fuel handling

(2) Spent fuel shipping

(3) Storage of leaking fuel that resulted in up to ten percent of the Technical Specification limit for Reactor Coolant activity during power operation.

(4) Inspection of fuel within the storage facility

(5) Storage of new fuel in the spent fuel facility.

2. plant condition II

a. Definition. PC II events are those events with a best estimate of frequency of occurrence (F)>10^{-1}/reactor year.

b. Examples

(1) Loss of a pump in the spent fuel pool cooling system

(2) Spurious operation of an active element; e.g. relief valve, control valve.

(3) Single error of an operator

(4) Full core removal

(5) Single failure in the electrical or control system

(6) Loss of normal spent fuel cooling up to eight (8) hours

(7) Storage of leaking fuel that resulted in up to 25 percent of the Technical Specification limit for Reactor Coolant activity during power operation

(8) Minor pool liner leakage in an amount that can be handled by the radwaste system on a continuous basis.

c. The facility shall be designed so that a PC II event shall not cause a loss of function of the reactor coolant system, reactor containment barriers or any other engineered safety features system or component.

3. plant condition III

a. Definition. PC III events are those events with a best estimate frequency of occurrence (F) such that 10^{-1}>F•10^{-2}/reactor year

b. Examples.

(1) A passive failure of a radioactive liquid retaining boundary that prevents the affected system from performing its design function

(2) A loss of offsite power for up to eight (8) hours

(3) Drop of a fuel assembly with its associated handling tool onto the racks from its normal operating height

(4) Storage of leaking fuel that resulted in up to 100% of the Technical Specification limit for

Reactor Coolant activity during power operation

(5) Overfilling of the pool

(6) Loss of non-Seismic Category I portion of the Spent Fuel Pool Cooling System

(7) Loss of air supply to seals on gates, resulting in leakage from the pool

(8) Operating Basis Earthquake (OBE)

(9) Drop of the spent fuel cask from controlled normal height.

4. plant conditions IV and V

a. Definition. PC IV and V consist of that set of possible events that are not expected to occur during the life of the facility, but are postulated because their consequences would include the potential for the release of significant amounts of radioactive material. These faults are the most severe that must be designed against, and thus represent the limiting design case. Best estimate frequency of occurrence (F) per year is $10^{-2}>F>10^{-6}$

b. Examples

(1) Rupture of all fuel rods in a spent fuel assembly

(2) Inadvertent opening of a gate (cask loading isolation or transfer canal isolation) when the adjoining area is empty resulting in reduced shielding

(3) Effect of facility design basis natural phenomena

(4) Drop of the spent fuel cask from maximum achievable height

(5) Safe Shutdown Earthquake (SSE)

(6) Loss of offsite power for up to seven (7) days. (ANS 57.2-D92) (ANS 57.2-99)

plant (nuclear). (See station (nuclear).

plant operating organization. Site personnel responsible for operation, maintenance, and certain technical and support services. (ANS 3.2-93)

Pleistocene: The time period between about 10,000 years before present and about 1,800,000 years before present. As a descriptive term applied to rocks or faults, it marks the period of rock formation or the time of most recent fault slip, respectively. (ANS-2.27-2008)

plume EPZ. An area of approximately 10-mile radius surrounding a nuclear power plant where the principal exposure sources would be whole body external exposure to gamma radiation from the plume and deposited material, and inhalation exposure from the passing radioactive plume. (ANS 3.8.2-93)(ANS 3.8.3-93) (ANS 3.8.5-92)(ANS 3.8.6-94) (ANS 3.8.2-95)

pool. A single isolable body of water with a free surface. Examples are the spent fuel storage pool, the cask handling pool, the fuel transfer canal, and reactor refueling cavity (or well). (ANS 57.1-92)(ANS 57.2-93) (ANS 57.3-93) (ANS 57.2-99)

pore velocity, seepage velocity (LT^{-1}) The average rate of flow in the pores of a

given medium. This is approximated by dividing the flux by the effective porosity. (ANS 2.17-89)

porosity. The property of containing interstices. Total porosity is expressed as the ratio of the volume of interstices to total volume. Effective porosity refers to the porosity through which flow occurs.
(ANS 2.9-89)(ANS 2.17-89)

portability. The ability of a computer program to be transferred from one hardware/ software configuration and implemented on another with little or no modification, such that the capability of the program is not altered during the transfer.
(ANS 10.2-88)

positive acting check valve. A check valve which can also be remote manually closed when isolation is required.
(ANS 56.2-84)

post-accident environment. In the context of this standard, the temperature, pressure, humidity, radiation, chemistry, and contamination levels of a containment after an accident (ANS 56.5-87)

postulated accidents. Those events which, although not expected to occur, are selected, in addition to normal and anticipated operational occurrences, for establishing design bases of systems, components and structures or selection of Exclusion Distance and Low Population Zone for the reactor site, or both, as defined in the 10 CFR 100.11, "Determination of Exclusion Area, Low Population Zone, and Population Center Distance". They represent bounding events which envelop variations in the types of accidents considered and are the upper bound design basis events. Postulated accidents together with normal operation, including anticipated operational occurrences, represent the total spectrum of design basis events.
(ANS 54.1-89)

postulated pipe rupture. A postulated circumferential break, longitudinal break, through-wall crack, or leakage crack. These definitions are explained in detail in ANS 58.2-1988. (ANS 56.11-88)

potentiometric surface. An imaginary surface representing the static head of ground water and defined by the level to which water will rise in a series of wells.(ANS 2.11–W99)

An imaginary surface representing the static head of ground water in a confined aquifer and defined by the level to which water will rise in a well. (ANS 2.19-89)

power failure. A loss of actuating (i.e., motive) power. (ANS 56.2)

power level. The power level is the power production in units of thermal megawatts. In the context of this standard, the user is cautioned pertaining to scaling by power level in that

specific sources of gamma radiation may not exhibit a linear relationship with power level, due to the influence of other parameters such as coolant flow rate, etc. (ANS 6.6.1-79)

power operated valve. A valve actuated by means of a power operator. (ANS 56.2-84)

power operator. A device which uses air (i.e., air operator), electric (e.g., motor or solenoid operator), hydraulic power or spring force for mechanical actuation of the valve. (ANS 56.2-84)

power plant experience. Experience acquired in the testing, operation, and maintenance of power generating facilities. Experience in design and construction may be considered applicable power plant experience and should be evaluated on a case-by-case basis. (ANS 3.1-87)

practical sustained yield. The rate at which ground water can be continuously withdrawn without lowering water levels to critical stages or causing undesirable changes in water quality. (ANS 2.9-89)

precision. The degree of agreement of repeated measurements of a variable. (ANS 6.8.1-81)(ANS 6.8.2-86)

preferred power supply. That power supply which is preferred to furnish electric energy under accident or post-accident conditions. (From IEEE Standard Criteria for Class IE Electric Systems for Nuclear Power Generating Stations, IEEE Std. 308-1974). (ANS 4.1 - Historical)

pressure boundary. Those portions of closed systems, components, or structures that are designed to contain a fluid and prevent or limit its leakage. (ANS 56.4-3) (ANS 58.9-92)

pressure suppression. A means to reduce containment pressure by condensation of the steam through contact with water, ice, or other cooling surfaces. (ANS 56.5-87)

pressurized gas storage tank system. A system using tanks, operating at pressures above 1.5 atmospheres absolute, for the holdup of gaseous radioactive waste prior to release or reuse. (ANS 55.1-92) (ANS 55.4-93) (ANS 55.4-99)

pressurized water reactor coolant pressure boundary. (As defined in American National Standard Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants, N18.2-1973 [ANS-51.1], N18.2a-1975 [ANS 57.8]. The reactor coolant pressure boundary is defined as:
1) The reactor vessel indicating control rod drive mechanism housing
2) The reactor coolant side of the steam generators used to transfer reactor coolant system heat to the secondary system
3) Reactor coolant pumps

4) A pressurizer including heating and cooling provisions
5) Relief piping up to and including relief and safety valves (piping and associated tanks to receive discharges are considered outside the reactor coolant pressure boundary)
6) The piping, valves, and fittings needed between the principal components listed above in order to provide appropriate interconnections and flow control
7) Portions of the piping, fittings, and valves, leading to connecting systems up to and including: the outermost reactor containment isolation valve in system piping which penetrates the reactor containment; and the second of two valves normally closed during normal reactor operation in system piping which does not penetrate the reactor containment.
(ANS 56.3-86)

primary calibration. A procedure which is followed on each area monitor channel using sources or instruments, or both, that have been standardized, using a measurement system traceable to NIST to ensure that the response of the channel is accurate within certain prescribed limits.
(ANS 6.8.1-81)

primary containment. (Also, primary reactor containment).
(ANS 56.1-85)(ANS 56.6-86);

The principal enclosure that acts as a leakage barrier, after the reactor coolant pressure boundary, to control the release of radioactive material from the fuel in the reactor core under DBA conditions. It consists of:

(1) the primary containment structure, including access closures, penetration closures, and appurtenances;
(2) those valves, pipes, closed systems, and other pressure-retaining components used to effect isolation of the primary containment atmosphere from the outside environs;
(3) those systems or portions of systems that, by their system functions, extend the primary containment structural boundary.

This does not include the "secondary containment,""containment enclosure building," or "reactor building" surrounding some containment systems, whose function is to control primary containment leakage.

(ANS 50.1-94)(ANS 58.14-93);

Variant form: (ANS 56.4-83) (ANS 56.6-86)(ANS 56.8-02) (ANS 51.1/52.1)

primary containment atmosphere. The portion of the net free volume contained within the primary containment pressure boundary made up of steam and non-condensible gases and, following an accident, water droplets.
(ANS 56.4-83)

primary coolant boundary (PCB) (Applicable to GTCR only) The pre-stressed concrete reactor vessel (PCRV) liner, including

all cavity and penetration liners which are exposed to primary coolant, in conjunction with the pre-stressed concrete structure, forms the primary coolant boundary and includes:
1. All primary closures that seal penetrations in the PCRV liner.
2. All system piping within the PCRV liner cavity that contains primary coolant and penetrates the PCRV liner or PCRV closures, up to and including the second isolation valve.
3. All system piping within the PCRV liner cavity that is exposed to primary coolant and is not covered in 2.
4) The PCRV overpressure protection system, up to and including the second pressure relief device (e.g., rupture disc or relief valve).
5) Coolant retaining parts of mechanical components, such as shaft seals on helium circulators. (58.4-W90)

primary criticality control (See primary method of criticality control) A control parameter on which principal reliance is placed in assuring that sub-critical conditions are maintained. (ANS 57.7-92);

Variant form: (ANS 8.5-86)

primary design function. A principle function of a structure, system or component (SSC) for which it was included in the plant design. (i.e., the emergency core cooling systems are included in the plant design to perform the primary design function of providing coolant to the reactor vessel during or following a LOCA.) (ANS 50.1-94) [Developed for ANS 58.14-93]

primary method of criticality control. (See primary criticality control) A control parameter on which principal reliance is placed in assuring that sub-critical conditions are maintained. (ANS 8.10-83)

primary reactor containment. (See primary containment) The preferred term is primary containment. (ANS 50.1-94) (ANS 51.1/52.1)

The design feature, that acts as the principal leakage barrier, after the reactor coolant pressure boundary, to prevent the release under all conditions of design, of quantities of radioactive material that would have undue radiological effect on the health of the public. The system is composed of:
(1) the containment structure, including access openings, penetrations, and appurtenances;
(2) those valves, pipes, closed systems, and other components used to effect isolation of the containment atmosphere from the outside environs; and,
(3) those systems or portions of systems that by their functions, extend the containment structure boundary to include their system boundary. This does not include the "secondary containment," "containment enclosure building," or "reactor building"

surrounding some containment systems, whose function is to control containment system leakage. (ANS 56.8-02)

Variant form: (ANS 56.1-85) (ANS 56.5-87)(ANS 56.7) (ANS 56.10-87)

primary shielding. The primary shielding is the shielding provided to attenuate the neutron and gamma-ray radiation emanating from the reactor pressure vessel. (ANS 6.3.1-87)

primary source. An assured source of water capable of supplying water throughout a hot standby period of at least four hours, during which time a decision regarding the necessity of cooldown is reached, plus a cooldown period sufficient to reduce plant temperature to levels where low-temperature low-pressure decay heat removal equipment can be used assuming the concurrent loss of off-site power. This source may consist of more than one structure. Where hot standby is required to be maintained for extended periods, the primary source shall have additional capacity to meet this requirement. (ANS 51.10-08)

primary test instrumentation. Instruments whose recorded values are used directly in the calculation of any values compared against test acceptance criteria. (ANS 56.8-02)

probabilistic seismic hazard analysis (PSHA): A procedure used to develop seismic hazard curves and uniform hazard response spectra for determining the ground motion at a site to be used for seismic design. Aleatory variability and epistemic uncertainty are captured in a PSHA. Criteria and guidance for conducting a PSHA are provided in ANS-2.29-2008. (ANS-2.27-2008)

probability of exceedence - The probability that a specified level of seismic hazard will be exceeded at a site or in a region during a specified exposure time. (ANS-2.29-Rev.8)

probability of occurrence. The mean annual rate of occurrence of a hazard parameter within a range of values. The limits of this range are indicated by the definition of the event. These limits can be specified to consistently cover the entire spectrum of parameter values as illustrated in Appendix A. For example, a 100-year wind means the probability of exceeding this wind speed in a year is 1/100. For purposes of this standard, all hazards have their parameter values[1] divided into segments which are characterized by discreet design events (e.g., Safe Shutdown Earthquake [SSE]). Parameter value characterizes an event as to its intensity, e.g. wind velocity for a tornado, or elevation of a flood. (ANS 2.12-78)

probable maximum flood (PMF). The hypothetical flood (i.e., peak discharge, volume, and hydrograph shape) that is considered to be the most severe reasonably possible, based on comprehensive hydrometerological application of probable maximum precipitation and other hydrologic factors favorable for maximum flood runoff such as sequential storms and snow melt.
(ANS 2.8-92)

probable maximum gradient wind. A probable gradient wind of a designated duration above the surface friction layer, of which there is virtually no risk of being exceeded. The event may be considered to have a probability of occurrence comparable to that of a probable maximum precipitation. (ANS 2.8-92)

probable maximum hurricane (PMH) A hypothetical hurricane having that combination of characteristics that makes it the most severe that can reasonably occur in the particular region involved. The hurricane approaches the point under study along a critical path and at an optimum rate of movement which results in most adverse flooding.
(ANS 2.8-92)

Variant form: (ANS 2.13-79)

probable maximum precipitation (PMP). The estimated depth of precipitation for a given duration, drainage area, and time of year for which there is virtually no risk of exceedance. The probable maximum precipitation for a given duration and drainage area approximates the maximum that is physically possible within the limits of contemporary hydrometeorological knowledge and techniques. (ANS 2.8-92)

probable maximum windstorm (PMWS). A hypothetical extratropical cyclone that might result from the most severe combination of meteorological storm parameters that is considered reasonably possible in the region involved. The windstorm approaches the point under study along a critical path and at an optimum rate of movement which will result in most adverse flooding. (ANS 2.8-92)

Variant form: (ANS 2.13-79)

probable minimum flow. The hypothetical minimum rate of stream flow that can occur from the most severe combination of reasonably possible hydrometeorological and geomorphic factors.
(ANS 2.13-79)

probable station blackout response facilities. The added capability beyond the assured capability to withstand station blackout, which are identified in developed response scenarios and emergency procedures. These facilities might serve as alternative contingency methods of providing station blackout response functions, or extend capabilities beyond the time frame for which complete application of this

standard is justified. (ANS 58.12-85)

procedure. A document that specifies or describes how an activity is to be performed. (ANS 3.2-88)

process area. An area in which fissionable material is handled, stored, or processed. (ANS 8.3-91)

process control program (PCP). A set of procedures used to ensure a consistent waste form is produced that meets all applicable regulatory and disposal site requirements. (ANS 55.1-92)

process monitor. Instrumentation used to determine the level of radioactivity in a stream for the purpose of evaluating the status and performance of selected plant processes. (ANS 6.8.2-86)

process piping. Piping used to collect process and discharge liquid radioactive wastes. This does not include instrumentation and sampling lines beyond the first root valves. (ANS 55.6-93) (ANS 55.6-99)

procurement document. Purchase requisitions, purchase orders, drawings, contracts, specifications, or instructions used to define requirements for purchase. (ANS 3.2-88)

program development. The processes which are involved in producing a computer program and its documentation. They are:

Problem definition;
Model development;
Algorithm formulation;
Program design;
Programming;
Verification;
Validation; and,
Modification. (ANS 10.5-79)

programmable digital computer. A device that can store instructions and is capable of the execution of a systematic sequence of operations performed on data that is controlled by internal stored instructions. (ANS 7-4,3.2)

population projection. A population projection is a calculation of the future size of a population if a given set of assumptions such as the behavior of births, deaths, and migration hold. (ANS 2.6-81D)

protected area. An area encompassed by physical barriers to which access is controlled. (ANS 3.3-88)(ANS 59.51-89) (ANS 59.52-93)
The area within the site security fence and controlled under the security plan. (ANS 3.8.2-95) (ANS 3.8.6-95)

reserve lubricating oil storage tank. A vessel which supplies a reserve supply of lubricating oil for one or more EDG engines. (ANS 59.52-98)

reserve lubricating oil transfer pump. A motor driven pump used to transfer oil from the clean luvbricating oil storage tank to the

lubricating oil sump or sump tank. (ANS 59.52-98)

A designated area to which personnel access is controlled. (ANS 59.52-98)

Variant form: (ANS 3.8.1-87) (ANS 3.8.6-94)

protection. The design of plant features such as distance, orientation, barriers, enclosures, restraints and hardening, in order to limit the consequences of a particular event/hazard to within acceptable limits for that event/hazard. (ANS 58.3)

protection system. That part of the sense and command features involved in generating those signals used for the reactor trip system and engineered safety features.
(ANS 51.1-94)(ANS 52.1/50.1)

Variant form: (ANS 4.1) (ANS 56.2-84)

protective action. An action taken to avoid or reduce projected dose to individuals. (ANS 3.8.1-87)(ANS 3.8.6-94) (ANS 3.8.2-95) (ANS 3.8.4-95)

Variant form:(ANS 3.7.2-79) (ANS 4.1)

protective action guide (PAG). Those specified dose levels which, if projected to be exceeded for individuals in the population, cause pre-established protective actions to be recommended. (e.g., see Environmental Protection Agency (EPA) Manual EPA-520/1-75.001, 21 CFR 1090, "Food and Drugs," EPA Manual of Protective Action Guides and Protective Actions for Nuclear Incidents, EPA 400-R-92-001. (ANS 3.8.6-94)
(e.g., see EPA 400R-92-001 [1] and Title 21, "Food ad Drugs" Code of Federal Regulations, Part 1090, "Accidental Radioactive Contamination of Human and Animal Feeds" [2]). (ANS 3.8.1-1995) (ANS 3.8.2-95)
A document that sets forth specific dose levels which, if projected to be exceeded for individuals ithe population, require pre-established protective actions to be recommended (e.g., see *Manual of Protective Action Guides and Protective Actions for Nuclear Incidents,* EPA-400[1][1] and Title 21, "food and Drugs," Code of Federal Regulations, Part 1090, "Accidental Radioactive Contamination of Human and Animal Feeds" (21 CFR 1090) [2]) (ANS 3.8.6-95) (ANS 3.8.3-95)
Variant form: (ANS 3.8.1-87)

protective active recommendation (PAR) A recommendations to implement protective actions.
(ANS 3.8.6-94) (ANS 3.8.2-95)

Protected area. The area within the site security fence and controlled under the security plan. (ANS 3.8.1-1995

protective function. The function necessary to limit the safety consequences of a design basis event (e.g., rapid reduction of reactor

power, isolation of the reactor coolant system from possible leak paths, removal of heat from the core). (ANS 4.1)

protective (mitigating) features. Passive and active features used to limit the effects of flooding to ensure all required functions are maintained. (ANS 56.11-88)

Q.

quadrant. The region on the surface of a section bounded by any two perpendicular planes intersecting along the axis of the section. (ANS 8.9-87)

qualification. The combination of knowledge, skill and ability required to meet specific job performance criteria. (ANS 3.1-87)

qualified seal system. A system that is capable of sealing the leakage with a liquid at a pressure no less than 1.1 P_a for at least 30 days following the DBA. (ANS 56.8-02)

quality assurance (QA) All those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component (SSC) will perform satisfactorily in service. (ANS 3.2-93)

Variant form: (ANS 56.7) (ANS 59.1)

quality control. (Also see quality assurance)

quality factor (Q). A factor that approximately accounts for the effect of the microscopic distribution of absorbed energy on biological detriment. It is defined as a function of the collision stopping power (L) in water at the point of interest. Values of Q as a function of L can be obtained from a full logarithmic interpolation of data in Table 1.

The data given in this standard are based on the L-Q relationship given in Table 1. They do not account for the position taken by the ICRP in its Statement from the 1985 Paris Meeting of the International Commission on Radiological Protection, ICRP Publication 45, in which an immediate increase by a factor of two is recommended in the quality factor for neutrons. This recommendation is under review by national and international commissions on radiation protection and is subject to change during the projected life of this standard. (ANS 6.1.1-91)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

Quaternary: The geologic period comprising about the past 1,800,000 years.(ANS-2.27-2008)

R.

raceway. Any channel that is designed and used expressly for supporting or enclosing

wires, cable, or busbars. Raceways consist primarily of, but are not restricted to, cable trays and conduits. (ANS 59.4-79W83)

rack. A structure supporting an assembly of cells. (ANS 56.3)(ANS 57.2-93) (ANS 57.3-93) (ANS 57.2-99)

radiation area. Any area, accessible to personnel, in which there exists radiation at such levels that major portion of the body could receive in any one hour a dose equivalent in excess of five mrem, or in any five consecutive days a dose equivalent in excess of 100 mrem. (ANS 6.8.1-81)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

radiation base point (RBP). Radiation base points (RBPs) are numbered locations at which measurements are to be made and always recorded throughout the test programs. (ANS 6.3.1-87)

radiological emergency response plan(Plan). A licensing document that describes the licensee's overall emergency response functions, organization, facilities, and equipment,{as well as appropriate government agency plans. The radiological emergency response plan is implemented by specific procedures} (3.8.6-95) as well as emergency response plan. It is implemented by specific procedures. (ANS 3.8.1-93)(ANS 3.8.2-93) (ANS 3.8.3-93)(3.8.4-93) (ANS (3.8.6-94)

A licensing document that describes the licensee's overall emergency response functions, organization, facilities, and equipment, as well as appropriate government agency plans. The radiological emergency response plan is implemented by specific procedures. (ANS 3.8.2-95) (ANS 3.8.4-95) ANS 3.8.3-95)

radiological sabotage. Any deliberate act directed against a plant or component of a plant that could directly or indirectly endanger the public health and safety by exposure to radiation. (ANS 3.3-88)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

raising or lowering (hoisting). Motion in a vertical direction. (ANS 57.1-92)(ANS 57.3-93)

randomness: See "aleatory uncertainty."(ANS-2.27-2008) (ANS-2.29-2008)

rankine vortex. A two-dimensional circular flow in which a circular region about the origin is in solid rotation:

$$V/R = \text{constant}.$$

Where: V is the tangential speed and R the distance from the origin; and the region outside is free of vorticity,

the speed being inversely proportional to the distance from the origin,
VR = constant.
(ANS 2.3-83)

raschig ring (ring). A small, hollow, borosilicate-glass cylinder having approximately equal length and diameter. (ANS 8.5-86)

rate. The first time derivative of the current value. (ANS 4.5)

reactivity. A quantity proportional to k_{eff}-1/k_{eff}, where: k_{eff} is the effective neutron multiplication factor. The reactivity of a sub-critical fissile assembly is a negative quantity indicating the degree of sub-criticality. The reactivity of a critical assembly is zero. (ANS 8.6-83)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

reactivity addition. A modification of a fissile assembly that results in a positive incremental change of reactivity. (ANS 8.6-83)

reactor containment. (Also, primary containment; primary reactor containment: the preferred term is primary containment).
(ANS 50.1-94)(ANS 51.1/52.1);

The principal design feature of a unit that acts as the principal barrier, after the reactor coolant pressure boundary or primary coolant boundary, to control the release of radioactive material under all plant conditions. It includes: (1) the containment structure and its access openings, penetrations and pertinences; (2) those valves, pipes, closed systems and other components used to effect isolation of containment atmosphere from the environment; and (3) those systems or portions of systems that, by their functions, extend the containment structure boundary (e.g., in a PWR, the boundaries of the secondary side of the steam generator and the connecting steam and feed water piping). (ANS 59.1)

Variant form: (ANS 56.2)
(ANS 54.1-89)

reactor coolant boundary. Those components which form a leak tight barrier against the release of reactor coolant up to and including the second of two valves normally closed (a freeze seal might be shown to be acceptable as an alternate to one of the closed valves) or capable of automatic actuation during normal reactor operation.
(ANS 54.1-89)

reactor coolant normal makeup. Makeup to the reactor coolant pressure boundary by the system(s) relied upon to main-tain reactor coolant inventory during normal operation.
(ANS 51.1/52.1)(ANS 56.4-83)

reactor coolant pressure boundary (RCPB). All pressure-containing components

of light water reactor nuclear power plants, such as pressure vessels, piping, pumps, and valves, which are:
(1) part of the reactor coolant system; or
(2) connected to the reactor coolant system up to and including any or all of the following:
a) the outermost primary containment isolation valve in system piping that penetrates the primary containment;
(b) the second of two valves normally closed during normal reactor operation in system piping that does not penetrate primary containment; or
(c) the reactor coolant system safety and relief valves.

For a direct-cycle boiling water reactor, the reactor coolant system extends to and includes the outermost primary containment isolation valve in the main steam and feed water piping. (See 10 CFR 50.2) (ANS 50.1-94)(ANS 58.14-93)

Variant form:
(ANS 58.4)(ANS 56.4-83)
(ANS 59.1)(ANS 51.1/52.1)
(ANS 56.2-84)(ANS 56.7)(G)

Reactor Coolant System (RCS). Those items relied upon to (1) for a pressure-retaining boundary to contain the reactor coolant; (2) transfer heat during normal operation from the reactor core to the power conversion system or to the shutdown heat removal systems; or (3) provide system pressure relief.

For a boiling water reactor (BWR), the RCS might include:

(a) the reactor vessel including appurtenances such as nozzles and control rod drive housings;
(b) main steam and feed water lines out to and including the outermost primary containment isolation valve;
(c) safety and relief valves;
(d) recirculation piping, pumps, and valves;
(e) other components, such as the relief valve discharge piping and the main steam drain lines out to and including the outermost primary containment isolation valves, and
(f) supports of other RCS components.

For a pressurized water reactor (PWR), the RCS might include:
(a) the reactor vessel including appurtenances such as nozzles and the control rod drive mechanism housings;
(b) the primary side of the steam generators used to transfer reactor heat to the power conversion system;
(c) reactor coolant loop piping, pumps, and valves;
(d) the pressurizer, including heating and cooling provisions;
(e) relief piping including relief and safety valves and associated tanks that receive discharges;

(f) the piping, valves, and fittings needed between the principal components in order to provide appropriate flow paths and flow control; and
(g) supports of other RCS components. (ANS 50.1-94) (ANS 58.14-93)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

Variant form: (ANS 54.1-89)

reactor cover gas boundary. Those components which form a leak-tight barrier against the release of reactor cover gas up to and including the second of two valves normally closed or remotely isolable during normal reactor operation. (ANS 54.1-89)

reactor makeup quality wastes. Liquids, which originate from reactor or reactor auxiliary closed systems, and are normally processed and reused as reactor coolant makeup. (ANS 55.6-93) (ANS 55.6-99)

reactor protection. That function which is performed by systems designed to: initiate automatically the operation of appropriate systems including the reactivity control systems, to assure that specific acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences; and sense accident conditions and initiate the operation of systems and components important to safety. (See 10 CFR 50, "Licensing of Production and Utilization Facilities: Appendix A, General Design Criteria for Nuclear Power Plants." (ANS 58.3)

reactor-year. One calendar year per nuclear power reactor unit. (ANS 51.1/52.1)(ANS 50.1-94)

real time. Simulation of dynamic performance in the same time base relationships, sequences, durations, rates and accelerations as the dynamic performance of the reference plant. (ANS 3.5-85)

rebar. The reinforcing steel bars placed in concrete to increase the structural strength. American National Standard Code Requirements for Nuclear Safety Related Concrete Structures, ANSI/ACI 349-1980 includes a discussion of this reinforcing steel. Owing to the fact that it is not homogeneously spaced throughout the shield, but rather is made up of discrete steel bars, it would require complicated shielding analysis and hence is not usually considered as part of the attenuating property of the shield. Rebar is, however, considered as a potential source of secondary gamma radiation when the shield is a combined neutron and gamma-ray shield. (ANS 6.4-85)

rechanneling. Removal and replacement of fuel channels for BWR fuel assemblies. (ANS 57.192)(ANS 57.3-93)

recharge. The process of water addition to the

saturated zone or the volume of the water added by this process.
(ANS 2.9-89)(ANS 2.17-89)

recirculation mode. In the context of this standard, that configuration of the containment spray system, in which water is taken from a containment sump and returned to the containment atmosphere. (ANS 56.5-87)

recombiner. Equipment designed to accomplish the controlled reaction of hydrogen and oxygen by catalytic or thermal means.
(ANS 55.4-93) (ANS 55.4-99)

recorded data. The output from a time-history accelerograph, a peak accelerograph, or a response spectrum recorder.
(ANS 2.10-90)

recorder. An instrument capable of recording the data versus time from acceleration sensor or sensors.(ANS 2.2-02)

recovery. Actions taken after the plant has been brought to a stable or shutdown condition,(ANS 3.8.6-94) including those taken to mitigate the emergency and ultimately return the plant to normal operation. (ANS 3.8.1-93) (ANS 3.8.4-95)
(ANS 3.8.3-93)(ANS 3.8.4-93)

recovery action. An action taken to return to the normal situation. {ANS 3.7.2-79)

recovery period. The period of time from when either offsite power or onsite emergency AC power is recovered, to when normal safe shutdown is achieved.
(ANS 58.12-85)

recurrence interval: The mean time period between earthquakes of a given magnitude. (ANS-2.27-2008)

recycled fuel. A new fuel assembly containing, in whole or in part, fissile material from reprocessed fuel. Its chemical composition may consist of mixed oxides of uranium and plutonium.
(ANS 57.3-93)

redundant component, system or subsystem. (See also redundant structure, system or component) A component, system or subsystem that independently duplicates the essential function of another identical component, system or subsystem.
(ANS 57.2-D93)(ANS 59.1)
(ANS 59.3-93)(59.4-79W83)
variant form: (ANS 56.7)
A component, system or subsystem that independentlyduplicatesthefunction of another component, system or subsystem. (ANS 57.2-99)

redundant equipment or system. Equipment or system(s) that duplicate(s) the essential function of other equipment or system(s) to the extent that either may perform the required function regardless of the state of operation or failure of the other.
(ANS 59.3)

redundant structure, system, or component. A structure,

system or component (SSC) that independently duplicates the function of another component, system, or subsystem. (ANS 56.5-87)(ANS 51.1/52.1) (ANS 59.4) (ANS 50.1-94) (ANS 58.14-93)(G)

Variant form: (ANS 56.2-84)(ANS 54.2-85) (ANS 57.1-92)

redundant system. (See redundant structure, system or component; and redundant component, system or subsystem).

reference data. Published and readily available tables of values of physical constants. These data may be available in the form of computer readable media. (ANS 6.1.2-89)

reference plant. The specific nuclear power plant from which the simulator control room configuration, system control arrangement and simulator data base is derived. (ANS 3.5-85)

reflection. A process in which radiation enters a region through a surface and partially returns through the same surface. (ANS 6.4-85)

refueling machine. Any equipment operating over the reactor refueling cavity, or well, and fuel transfer canal and designed for handling fuel and control components. (ANS 57.1-92)

refueling shutdown. The cold shutdown condition in which the reactor coolant system is depressurized for the purpose of replacing fuel, consistent with technical specification operational limits. (ANS 50.1-94)(ANS 51.1/52.1] (ANS 58.6-92)

related technical training. Formal training beyond the high school level in technical subjects associated with the position in question, such as acquired in training schools or programs conducted by the military, industry, utilities, universities, vocational schools, or others. Such training programs shall be of a scheduled and planned length and include text material and lectures. (ANS 3.1-99)

release fraction. As used in this standard, this term is defined as the fraction of the non-decayed inventory that resides in the gap (i.e., free volume outside of the fuel pellet but inside of the fuel rod cladding). For stable nuclides, this fraction is the total release divided by the total production; for radioactive nuclides, decay must be taken into account. (ANS 5.4-W92)

release, accidental. A release of radioactivity that is uncontrolled and unplanned. (ANS 2.17-89)

release, routine. A release of radioactivity that is either continuous (e.g., leakage from a cooling pond containing trace quantities of radioactivity), or a periodic controlled release of low-level radioactive liquids. (ANS 2.17-89)

reliability. The probability that a device or system will perform a required function under stated conditions during a stated period of time. (ANS 4.1-Historical)

relief pressure. That pressure value above which the air system or portion thereof is relieved to the atmosphere for protection of system pressure integrity. (ANS 59.3-02)

relocatable components. A generic term meant to include items within the reactor vessel, excluding the vessel internals, which must be handled or shifted in position during, preparing for or recovering from fuel loading or refueling. Some examples are: control rods, flow limiting orifices, and shields. (ANS 54.2-85)

remaining fraction. Unity minus cumulative fraction leached (i.e., the fraction still remaining with the specimen or waste form after leaching) assuming no decay of the radioactivity. (ANS 16.1-03)

remote. Any location not at or adjacent to the detector. (ANS 6.8.1-81)

remote indicating instrument. Instrument whose output is transmitted to a location separate from the sensor. (ANS 2.2-02)

remote manual actuation. Initiation of a power operated component by a discrete manual action such as operation of a control switch predominantly in response to intelligence or signals indicating requirement of such action. (ANS 56.2-84)

repair. The process of restoring a non-conforming characteristic to a condition such that the capability of an item to function reliably and safely is unimpaired, even though that item still does not conform to the original requirement. (ANS 3.2-93)

repair or adjustment. Any action performed on the primary containment that affects its leakage characteristics. (ANS 56.8-02)

repeatability. The closeness of agreement among a number of consecutive measurements of the output for the same value of the input under the same operating conditions, approaching from the same direction for full range traverses. (ANS 56.8-02)

required function. A function which, following any initiating event resulting in flooding, is necessary to assure safe plant shutdown, maintain core cooling capability consistent with the minimum requirements of Appendix A, "General Design Criteria for Nuclear Power Plants," of 10 CFR 50, "Domestic Licensing of Production and Utilization Facilities," or maintain offsite radiological consequences below the guideline exposures of 10 CFR 100.

required structures, systems, and components (SSCs). Those structures, systems, and components (SSCs) which are used to accomplish the required functions following postulated flooding events. These include the protective and mitigating features, such as detection, isolation, barriers, sumps and pumps. (from ANSI/ANS 58.2-1988 and equivalent to NUREG-0800 Sections 3.6.1 and 3.6.2) (ANS 56.11-88)

reservoir. As used in this standard, a reservoir is an artificial impoundment or a lake with a controlled outlet. (ANS 2.13-79)

resident population. Those persons whose usual place of abode, as defined by the U.S. Bureau of the Census, is in the area. In general, this is the place where the persons live or sleep most of the time and is not necessarily the same as the place of legal residence. (ANS 2.6-81)

residual heat. The total heat source remaining in a shutdown reactor, including after-heat (See American National Standard Glossary of Terms in Nuclear Science and Technology, N1.1-1976 (ANS 58.3)
The total heat source remaining in a shut down reactor, including after-heat (i.e., heat from radioactive decay of fuel plusheatstored in structural components). (See "Glossary of Terms in Nuclear Science and Technology" [5].)

residual liquid. Free liquid present in the specimen container at the time the specimen is removed from the container.
(ANS 16.1-03)

resolution. The degree to which equal values of a quantity can be discriminated by the device. (ANS 56.8-02)

respirable fraction (RF). The fraction of material made airborne, present in particulate form, that could be transported through the air, inhaled, and be deposited in the deep lung. (ANS 5.10-98)

response force. An onsite team that includes guards, and may include other armed response individuals, with the duty to provide initial response, follow-up response or reinforcement for the purpose of neutralizing a security threat. (ANS 3.3-88)

response spectrum: A curve calculated from an earthquake accelogram that gives the value of peak response in terms of acceleration, velocity, or displacement of a damped linear oscillator, with a given damping ratio, as a function of its period, or frequency of vibration. (ANS-2.27-2008) (ANS-2.29-2008)

response spectrum recorder. An instrument having the capability of sensing motion and permanently recording the spectral acceleration at specified frequencies and damping. (ANS 2.10-90)

response spectrum switch. An instrument having the capability of providing a signal that specified pre-set spectral accelerations have been exceeded. (ANS 2.10-90)

response time. The time required for the output to reach 90 percent of the final output value in response to a step input. (ANS 4.5)

restricted area. An area to which public access is controlled for the purpose of protection of individuals from exposure to radiation and radioactive materials. (ANS 8.10-83)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

retaining structure failure. Failure of a dam, levee, breakwater, seawall, or similar confining structure, due to causes other than flood, earthquake or tsunami (since the retaining structure failure consequences must be included in the consideration of these natural hazards). (ANS 2.12-78)
variant form: (ANS 2.19.89)

rework. The process by which an item is made to conform to original requirements by completion or correction.[3] (ANS 3.2-93)

rock quality designation (RQD). An expression in percentage of intact core recovered during drilling operation. Rock quality designation (RQD) as defined by Deere (1963), p. 16.
RQD in % = 100 x length of core in pieces

4 in. and longer
length of core run

RQD (%)
Exceeding 90
90-75
75-50
50-25
less than 25

Quality Description
Excellent
Good
Fair
Poor
Very poor

Breakage due to drilling techniques or exposure to air should not be considered as natural breaks. (ANS 2.11-78)(ANS 2.19-89)

rod. Those items of a spent fuel assembly which are long, thin walled tubes closed by end caps. A rod may either contain fuel (e.g., uranium, plutonium and fission products) or non-fuel material. (ANS 57.10-93

rod consolidation. The process of reducing the spacing between rods. [ANS 57.9-92]
(See also rod reconfiguration) (ANS 57.10-93)

rod removal. Pulling or pushing a rod out of a spent fuel assembly. Rods can be removed from a spent fuel assembly singularly, in groups, in rows, or all simultaneously.

(ANS 57.10-93)

rotation. Angular motion about a fixed axis. (ANS 57.1-92)

S.

safeguard (See engineered safety feature; the preferred term is engineered safety feature). (G)

safeguards information. Information not otherwise classified as National Security Information or Restricted Data which specifically identifies an owner organization or applicants detailed, (1) security measures for the physical protection of special nuclear material, or (2) security measures for the physical protection and location of certain plant equipment vital to the safety of production or utilization facilities. (ANS 3.3-88)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

safe shutdown. A unit shut-down with: (1) the reactivity of the reactor kept to a margin below criticality consistent with technical specifications; (2) the core decay heat being removed at a controlled rate sufficient to prevent core or reactor coolant system thermal design limits from being exceeded; (3) radioactive material releases controlled to keep doses within prescribed limits; and (4) items necessary to maintain these conditions, operating within their design limits. (ANS 50.1-94)(ANS 58.14-93) (ANS 51.1/52.13)

Variant form: (ANS 5.6.1-90) (ANS 58.9-94)(ANS 56.11-88) (ANS 58.2)(ANS 58.3)(ANS 59.1) (ANS 59.4-W83)(ANS 58.6-91)

safe shutdown earthquake (SSE). An earthquake that is based upon evaluation of the maximum earthquake potential, considering regional and local geology and seismology and specific characteristics of local sub-surface material. It is the earthquake that produces the maximum vibratory ground motion for which safety- related structures, systems, and components (SSCs) are designed to perform their safety-related function. (ANS 50.1-94) (ANS 51.1/52.1-93);

Variant form: (ANS 56.6-86)(ANS 57.1-92 (ANS 57.2-93) (ANS 57.2-99) 57.3-93) (ANS 56.6-86)(ANS 8.3) (ANS 2.9-89)(ANS 2.13-79) (ANS 2.12-78)

safety. In the context of nuclear power plant design practice and standards, the quality of averting or not causing undue radiological effect on the health of the public. (ANS 56.10-87)

safety analysis. An analysis that simulates the integrated response of the plant to a design basis event (DBE) in order to confirm the functions

of structures, systems and components are accomplished within their design basis and the nuclear safety criteria and safety analyses acceptance requirements are satisfied for the DBE. (ANS 50.1-94)

Variant form:
(ANS 58.4-W90)(ANS 58.8-92)

safety class. Classification structures, systems, or components (SSCs) based on their safety function. Safety classes are given in American National Standard Nuclear Safety Criteria for the Design of Stationary - Pressurized Water Reactor Plants, ANSI/ANS-51.1-1983, for PWR's; and Nuclear Safety Criteria for the Design of Stationary Boiling Water Reactor Plants, ANSI/ANS 52.1-1983, for BWRs. (56.2-84)

Variant form: (ANS 56.4-83)
(ANS 59.2-85)(ANS 59.3)
(ANS 2.9-89)(ANS 2.17-89)(G)

safety classification. Classification of items into a safety-related or a non-safety-related category based on their functions.
(ANS 50.1-94)
Components shall be classified as Safety Class 3 or as Non-Nuclear Safety (NNS) in accordance with definitions set forth in section 3.3 of American National Standards Nuclear Safety Criteria for the design of Stationary Pressurized Water Reactor Plants, ANSI/ANS-51.1-1983[1], and Nuclear Safety Criteria for the Design of Stationary Boiling Water Reactor Plants, ANSI/ANS-52.1-1983 [2]. (ANS 57.2-99)

Variant form: (ANS 57.1-92)
(ANS 57.2-D93)(ANS 57.3-93)
Components shall be classified as Safety 2, Safety Class 3, or as Non-Nuclear Safety (NNS) in accordance set forth in American National Standards Nuclear Safety Criteria for the design of Stationary Pressurized Water Reactor Plants, ANSI/ANS-51.1-1983[1], and Nuclear Safety Criteria for the Design of Stationary Boiling Water Reactor Plants, ANSI/ANS-52.1-1983 [2]. A single system may hae components in more than one class.)(ANS 57.3-93)

safety division. The terms division, train, and separation group, when used in this context, are interchangeable. The designation applied to a given system or set of nuclear safety-related components that enable the establishment and maintenance of physical, electrical, and functional independence from other components.
(ANS 59.4-79W83)

safety function. Any function that is necessary to assure: (1) the integrity of the reactor coolant pressure boundary or primary coolant boundary, (2) the capability to shut down the reactor and maintain it in a safe shutdown condition, or (3) the capability to prevent or mitigate the consequences of conditions of design which could result in potential offsite exposures that are a significant fraction of 10 CFR 100,

"Reactor Site Criteria", guideline exposures.
(Footnote references ANS 51.1/52.1 for functions associated with each safety class)
(G)(ANS 2.9-89)(ANS 2.17-89)
(ANS 56.6)(ANS 58.2)
(ANS 58.9-94)

safety, non-nuclear. (see non-nuclear safety [NNS]).

safety-related (Q). Classification applied to:
(1) an item relied upon to remain functional during or following a design basis event to ensure a safety-related function; or
(2) documented information that specifies or establishes parameters required to ensure a safety-related function of an item; or
(3) services (to design, purchase, fabricate, handle, ship, store, clean, erect, install, inspect, test, operate, maintain, repair, refuel, and modify) that ensure a safety-related function of an item.
(ANS 50.1)(ANS/51.1/52.1-93)
(ANS 58.14-93)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

Variant form:
(ANS 2.9-89)(ANS 2.11-78)
(ANS 2.17-89)(ANS 57.1-92)
(ANS 57.2-93)(ANS 57.3-93)
(ANS 59.2-89)(ANS 59.3)(G)

safety-related air-operated device. An air-operated device which is relied upon to ensure or support the operation of safety systems as defined in N18.2-1973, Section 2.2: additional guidance on definitions of safety systems has been formulated and exists in draft form. (ANS 59.3)

safety-related control air system. An air supply system which distributes instrument quality control air to Type "A" safety related devices.

The safety-related control air system may also supply Type "B" and non-safety-related devices provided that the performance of all Type "A" devices relative to their safety functions is not jeopardized under design basis events.

Safety-related air-operated devices are here further categorized by: (1) Type "A"--Those safety-related air operated devices which require the continued presence of supply air in order to accomplish their safety-related function;(2) Type "B"--Those safety-related air operated devices which do not require the continued presence of supply air in order to accomplish their safety-related function. These devices are fail safe relative to the loss of the air supply. A safety-related air-operated device is further defined to include the operator, i.e., diaphragm, air motor, cylinder, and accessories such as tubing, solenoid pilot, etc.
(ANS 59.3)

safety-related intake. An intake which is part of the system that delivers water

from the ultimate heat sink to the plant. (ANS 2.13-79)

safety-related function. A function that is relied upon during or following a design basis event to ensure[1]:
(1) the integrity of the reactor coolant pressure boundary;
(2) the capability to shut down the reactor and maintain it in a safe shutdown condition; or
(3) the capability to prevent or mitigate the consequences of accidents that could result in potential off-site exposures comparable to the guideline exposures of 10 CFR 100.11.
(See 10 CFR 21, 10 CFR 50.49, and Appendix A of 10 CFR 100.)
([1]) Parts (1) and (2) and (3) are the three basic safety-related functions.
(ANS 50.1-94)(ANS 58.11-93) (ANS 51.1/52.1-93)(58.14-93);

Variant form: (ANS 56.2-84) (ANS 58.8-92)

safety-related operator action. A manual action required by plant emergency procedures that is necessary to cause a safety-related system to perform its safety-related function during the course of any DBE. A safety-related operator action can involve one or more discrete manipulations or steps. In addition, its successful performance can require that the discrete steps be performed in a specific order. An example of a safety-related operator action is the initiation of safety-related cooling water flow. An example of a safety-related operator action that requires more than one discrete manipulations or steps to be accomplished in a specific order is the initiation of safety-related cooling water flow to an isolated heat exchanger for which operation is required to accomplish a safety-related function. (ANS 58.8-93)

safety supporting systems. Safety supporting systems are those systems which provide the services necessary to a safety-related fluid system to enable that system to complete its intended safety function.

Examples of safety supporting systems for the emergency core cooling system include the component and process cooling system, the electric power supply system, and the emergency core cooling system equipment ventilation system. (ANS 58.9-04)

Variant form: (ANS 4.1)

safety system. (see safety class system; the preferred term is safety class system.)

safety systems (IEEE Std 603) Those systems that are relied upon to remain functional during and following design basis events to ensure: (i) the integrity of the reactor coolant pressure boundary; (ii) the capability to shut down the reactor and maintain it in a safe shutdown condition; or, (iii) the capability to prevent or mitigate the consequences of accidents that could result in

potential offsite exposures comparable to the 10 CFR 100 guidelines.

NOTE: In this standard, safety systems are equivalent to the definition of safety related systems as defined in ANSI/ANS 51.1-1983, Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants, and ANSI/ANS 52.1-1983, Nuclear Safety Criteria for the Design of Stationary Boiling Water Reactor Plants.
(ANS 7-4.3.2)

sampler. That portion of the monitoring system that provides a representative sample of the fluid stream for the detector to monitor.
(ANS 6.8.2-86)

sampling station radioactive waste. Liquids originating from operation of centralized reactor and reactor auxiliary system sampling stations.
(ANS 55.6-93) (ANS 55.6-99)

s**cattered gamma rays.** Conversely, the term scattered gamma rays is used to describe all gamma rays which have undergone scattering inter-actions in transit between the source volume and receptor locations. This category includes air scattering, ground scattering, and scattering through or off any intervening structures or shields. (ANS 6.6.1-79)

SCRAM. Safety Control Rod Axe Man – a sudden shut down of a reactor, typically by the rapid insertion of control rods.
(An Exceptional Nuclear Glossary – can be found at http://www.nuclearglossary.com/abcs/nuclearglossary_S.html)

sealed closed isolation valve. A valve that is in a closed position by administrative controls by any of the following methods:
(1) A mechanical device sealing or locking the valve in the closed position; and,
(2) A normally closed valve with a seal or lock on any manual override if present and a seal or lock on the power breaker or power source in a manner that prevents power from being supplied to the valve. (ANS 56.2-84)

seasonal population. The seasonal population of an area consists of those people occupying "seasonal housing units" as defined by the U.S. Bureau of the Census. Briefly, these are units intended for occupancy only during a season of the year.
(ANS 2.6-81)

secondary alarm station (SAS). A continuously manned station, not necessarily on site, equipped with alarm monitoring and communications equipment that provide a backup capability for the central alarm station functions.
(ANS 3.3-88)

secondary calibration. A procedure which is followed periodically after a primary calibration on each area monitor channel to ensure that the response of the channel

remains accurate within certain prescribed limits. (ANS 6.8.1-81)

secondary containment. The structure, or structures, that acts as a barrier, after the primary containment, so that radioactive material leakage from the primary containment or engineered safety features during or following design basis accidents can be collected and processed before release to the external environment. It might include the reactor building, access closures, and penetrations of systems that directly communicate with the secondary containment atmosphere. (ANS 50.1-94)(ANS 58.14)

Variant form: (ANS 56.4-83) (ANS 2.2-88)(ANS 51.1/52.1-93)

secondary containment atmosphere. The gaseous portion of the net free volume contained within the secondary containment pressure boundary and outside the primary containment pressure boundary. (ANS 56.4-83)

secondary criticality control. A method of criticality control that supplements a primary criticality control and provides backup for the unlikely case where the primary control fails. (ANS 8.5-86)

secondary design function. A function of a structure, system or component (SSC) that is not a primary design function but is required because of its position within the plant design. (e.g., a system that was included in the plant design to perform a primary design function such as emergency core cooling might also be required to perform secondary design functions such as reactor coolant pressure boundary integrity and primary containment isolation.) (ANS 50.1-94)(ANS 58.14-93)

secondary reactor containment. (See secondary containment: The preferred term is secondary containment.) (ANS 51.2/52.1-93) (ANS 50.1-94) The structure surrounding the primary reactor containment that acts as a further barrier to control the release of radioactive material. (ANS 2.2-88) (ANS 51.1)(ANS 52.1)(ANS 56.4-83) (G)

Variant form: (ANS 56.7)

secondary shielding. The secondary shielding is the shielding in the reactor building provided to attenuate the gamma=ray radiation and neutron radiation, if present, emanating from the primary coolant system external to the reactor vessel. The secondary shielding typically includes the crane wall in pressurized water reactors (PWRs) the drywell wall in boiling water reactors (BWRs) and the reactor building walls. (ANS 6.3.1-87)

secondary system. Equipment in the condensate, feedwater, and steam cycle of the plant. Secondary system does not

include condenser cooling water systems. (ANS 55.6)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

section. Any arbitrary 0.5 m length of a column. (ANS 8.9-87)

security force. An onsite subentity of the security organization, which includes guards and may include watchmen and armed response individuals, directly responsible for performing operational requirements pursuant to the physical security plan. (ANS 3.3-88)

security organization. Personnel who perform physical security management or operational requirements pursuant to the physical security plan. (ANS 3.3-88)

seiche. Oscillations of enclosed or semi-enclosed water bodies in response to a disturbing force such as pressure changes, wind stress and seismic motions. (ANS 2.19-89)

Variant form:
(ANS 2.12-78)(ANS 2.13-79)

seismically-analyzed piping. Piping, which is not required to be Seismic Category I, but has been determined to be able to accommodate seismic loadings. See also definition of "seismically analyzed B31.1 piping" in ANSI/ANS 58.2-1988. (ANS 56.11-88)

seismic Category I. The classification of an item that is designed to perform at least one function (i.e., safety-related or non-safety-related) during or following a safe shutdown earthquake (SSE)[2] (ANS 50.1-94)(ANS 58.14-93]
([2]) See EPRI ALWR Utility Requirements Document and Regulatory Guide 1.29.
The category of nuclear safety related structures, systems, and components that are required to perform their nuclear safety function during or after an SSE as necessary to accommodate any event involving an SSE. (ANS 57.2-99)
The category of structures, systems, and components that are designed to performa t least one function during or after a safe shutdown earthquake (SSE).

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

Variant form:
(ANS 2.9-89)(ANS 2.13-79)
(ANS 51.1/52.1)(ANS 54.2-85)
(ANS 56.1-85)(ANS 56.5-87)
(ANS 56.6-86)(ANS 56.7)
(ANS 57.1-92)(ANS 57.2-93)
(ANS 58.2)(ANS 59.2-92)

seismic category I structure. A structure that is designed to remain functional during and following the safe shutdown earthquake (SSE). (ANS 58.3)

seismic category II. The classification of an item that is not Seismic Category I but is designed to prevent at

least one failure mode during or following an SSE[3].
(ANS 50.1-94)(ANS 58.14-93)
([3]) See EPRI ALWR Utility Requirements Document and Regulatory Guide 1.29;

seismic data retrieval. An instrument having the capability of sensing motion and permanently recording the spectral acceleration at specified frequencies and damping. (ANS 2.10-90)

seismic design category (SDC): A category assigned to an SSC that is a function of the severity of adverse radiological and toxicological effects of the hazards that may result from the seismic failure of the SSC on workers, the public, and the environment. SSCs may be assigned to SDCs that range from 1 to 5. For example, a conventional building whose failure may not result in any radiological or toxicological consequences is assigned to SDC 1; a safety-related SSC in a nuclear material processing facility with a large inventory of radioactive material may be placed in SDC 5. In this Standard, the term SDC has a different meaning than in the International Building Code. ANSI/ANS-2.26-2004[1] provides guidance on the assignment of SSCs to SDCs. (ANS-2.27-2008) (ANS-2.29-2008)

seismic source: Faults or volumes within the earth where future earthquakes are expected to occur. In a PSHA, all seismic sources with a potential to contribute significantly to the hazard are considered. (ANS-2.27-2008) (ANS-2.29-2008)

seismic source characteristics: The parameters that characterize a seismic source for PSHA, including source geometry, probability of activity, maximum magnitude, and earthquake recurrence. (ANS-2.27-2008) (ANS-2.29-2008)

seismic switch. An instrument capable of providing a signal that a specified preset acceleration has been exceeded. Seismic switches set at low g levels (i.e., 0.01 - 0.02 g) are used to activate time-history accelerographs; in this function they are referred to as seismic triggers. (ANS 2.10-90)

seismic trigger (S/T). A device that starts the time-history accelerograph (T/A) after a preset acceleration has been exceeded. (ANS 2.2-02)

seismogenic crust: The brittle portion of the earth’s crust capable of generating earthquakes. (ANS-2.27-2008)

seismotectonic: Rock-deforming processes and resulting structures and seismicity that occurs over large sections of the earth’s crust and upper mantle. (ANS-2.27-2008) (ANS-2.29-2008)

seismotectonic province. A region characterized by a relative consistency of geologic structures and

associated earthquake activity. (ANS 2.19-89)

semi-infinite medium. A body of which the outer boundary is considered to be effectively at an infinite distance from the inner region. (ANS 16.1-03)

Senior Seismic Hazard Analysis Committee SHHAC. A committee sponsored by the NRC, DOE and EPRI to assess the amount and origins of differences between various PSHA methods of analysis. SSHAC **[1]** concluded that most of the differences were consequences of differences in the process of elicitation of the information from experts. SSHAC made recommendations on the process, which are now almost uniformly adopted by analysts worldwide. (ANS-2.29-Rev.8)

senior operator. An individual licensed under 10 CFR 55 to manipulate the controls of a facility and to direct the licensed activities of licensed operators. (ANS 3.4-94)

sensitivity. 1 The capability of sensor to respond to change.

2 The ratio of the change in output magnitude to the change of the input which causes it after the steady state has been reached. It is expressed as a ratio with the units of measurement of the two quantities stated (e.g., cpm/μCi/ml). The ratio is constant over the range of a linear device. For a nonlinear device, the applicable input level must be stated. (ANS 6.8.2-86)

service conditions. The combination of normal and abnormal operations and the design basis events for which the control air system is relied upon to provide, or maintain its capability to provide, its nuclear safety function. (ANS 59.3-83)

service environment. The aggregate of conditions (e.g., temperature, pressure, humidity, radioactivity, and chemical) surrounding the components while performing functions as required by the conditions of design. (ANS 56.6-86)

service life. The total accumulated operating time of a system or component including all occurrences that are part of its design basis such as testing and maintenance or transient conditions. (ANS 56.1-D85)

severe environmental load. Load that could infrequently be encountered during the operating life of a nuclear power plant. (ANS 2.12-78)

severe natural phenomena. Those conditions postulated as the most severe that can reasonably be derived from the history and properties of the site and surroundings (e.g., probable maximum flood, probable maximum hurricane, tornado, tsunami, seiche,

earthquake, minimum water availability). (ANS 56.2-84)

shall. Denotes a requirement. (ANS 56.2-84)(ANS 3.3-88) (ANS 16.1-03) (ANS 57.8-93)(ANS 58.8) (ANS 58.2)(ANS 50.1-94)

shall, should and may. The word "shall" is used to denote a requirement; the word "should" to denote a recommendation; and the word "may" to denote permission, neither a requirement nor a recommendation. (ANS-2.27-2008) (ANS-2.29-2008) (ANS 2.2-02)(ANS 2.9-89) (ANS 2.10-90)(ANS 3.1-87) (ANS 3.2-93)(ANS 3.4-87) (ANS 3.4-94)(ANS 3.5-85) (ANS 3.7.1-95)(ANS 3.7.2-79) (ANS 3.7.3-79) (ANS 3.8.2-95) (ANS 3.8.4-95) (ANS 5.6.1-D90) (ANS 5.10-98) (ANS 3.11-00) (ANS 6.1.2-89(ANS 6.7.1 85) (ANS 54.1-89) (ANS 55.4-93) (ANS 55.4-99) (ANS 55.6-93) (ANS 55.6-99)(ANS 56.11-88) (ANS 57.5) (ANS 57.5-96) (ANS 58.4-W90) (ANS 58.3) ANS 58.3-98) (ANS 58.6-94) (ANS 58.9-94) (ANS 59.52-93) (ANS 59.52-98)
Included: In order to comply with this standard, the design shall conform to its requirements, but not necessarily with its recommendations. (ANS 57.2-99) (ANS 57.3-93)

Variant form: (ANS 55.1-92)(ANS 54.2-85) (ANS 57.2-92)(ANS 6.6.1-79) (ANS 6.3.1-87)(ANS 6.8.1-81) (ANS 8.3-91)(ANS 8.5-86) (ANS 8.6-83)(ANS 8.7-75) (ANS 8.9-87)(ANS 8.10-83) (ANS 8.11-75)(ANS 56.8-02) (ANS 57.1-92) (ANS 57.3-93) (ANS 55.1-92) (ANS 55.6) (ANS 56.2)(ANS 57.9-92) (ANS 58.3-92)(ANS 58.11-93) (ANS 58.14-93)(ANS 59.3-83) (ANS 57.7-92)(ANS 57.10-93) (ANS 51.1/52.1-93) (ANS 59.3-83) (ANS 3.8.1-93) (ANS 3.8.2-93)(ANS 3.8.3-93) (ANS 3.8.4-93)(ANS 3.8.5-D92) (ANS 2.11-78)(ANS 2.17-89) (ANS 4.1)(51.1)(ANS 56.3-86) (ANS 56.6-86)(ANS 56.8-02) (ANS 59.1) (ANS 59.3) (ANS 59.4-79W83)(ANS 2.6-81D) (ANS 59.4)(ANS 2.8.92) (ANS 58.12-85)(ANS 59.51-89) (ANS 56.10-87)(ANS 2.19-89) (ANS 2.7-89)(ANS 2.13-79)

short-lived isotopes. Radionuclides with half-lives of less than eight days. (ANS 55.1-92)

short term. In the context of the single failure criterion, that period of time that a safety-related system must operate up to 24 hours following the initiating event. For purposes of design of the emergency core cooling and containment spray systems, the short term might terminate upon transfer of these systems from the short term cooling mode. The concept of short term and long term does not apply to electrical systems or components. (ANS 50.1-94) (ANS 51.1/52.1-93)

Variant form: (ANS 51.7)(G) (ANS 56.5-87) (ANS 56.10-87)

(ANS 58.9-94)

should. Denotes a recommendation. (ANS 16.1-03) (ANS 50.1-94)(ANS 57.8-93) (ANS 56.2-84)(ANS 3.3-88) (ANS 58.8-92)

shutdown. The procedure of making a nuclear reactor sub-critical (i.e., shutdown) or the state of a nuclear reactor after being made sub-critical (i.e., shutdown). (ANS 51.1/52.1-93)(ANS 59.1)

[For the NRC definition, see www.nrc.org/reading-rm/basic-ref/glossary/full-text.htm]

shutdown heat removal system. A system that removes residual decay and sensible heat from the reactor coolant system when the reactor is shutdown. (ANS 58.11-93)

shut down the reactor. Insert negative reactivity into the reactor core to make it sub-critical. (ANS 50.1-94) (ANS 58.14-93)

shutdown, safe (See safe shutdown.) (G)

sigma phi (σ_ϕ) The standard deviation of the vertical wind direction. (ANS 3.11–00)

sigma theta (σ_θ). The standard deviation of the horizontal wind direction. (ANS 3-11.00)

significant. A level of anticipated impact on or change of a parameter or result which is or would be sufficient to prompt a change in facility design or operation because the integrity, reliability, function, or sufficiency of a system, component, or structure would not fulfill its intended purpose. (ANS 56.10-87)

Variant form: (ANS 56.4-83)

simple check valve. A valve which closes upon reverse fluid flow only. (Note: Includes testable check valves.) (ANS 56.2-84)

simulator data base. The "simulator data base" may be predicted data, plant design data, or it may include actual reference power plant performance data. (ANS 3.5)

single failure. A random failure (e.g., single component failure or operator error) and its consequential effects, in addition to an initiating occurrence, which result in the loss of capability of a component to perform its intended function.

Fluid and electrical systems are considered to be designed against an assumed single failure if neither: (1) a single failure of any active component (assuming passive components function properly), nor (2) a single failure of any passive component (assuming active components function properly) results in a loss of the capability of the system to perform its nuclear safety function(s). For functional clarification,

refer to ANSI/ANS-58.9-1981 (R1987)
(ANS 50.1-94)(ANS 51.1/52.1) (ANS 56.6-86)(ANS 59.2-92);

Variant form:
(ANS 54.1-89)(ANS 51.10) (ANS 51.1/52.1-93)(ANS 58.11-93)(ANS 51.7)(ANS 56.7)(ANS 56.10-87)(ANS 56.4-83)(ANS 58.3)(ANS 58.9-94)(ANS 59.1)(ANS 59.3)(G)

single failure criterion. The basis of design founded on the assumption of "...an occurrence which results in the loss of capability of a component to perform its intended safety functions. Multiple failures resulting from a single occurrence are considered to be a single failure. Fluid and electric systems are considered to be designed against an assumed single failure if neither:
(1) a single failure of any active component (assuming passive components function properly) nor;
(2) a single failure of a passive electrical component (assuming active components function properly), results in a loss of the capability of the system to perform its safety functions. ("10 CFR 50, "Licensing of Production and Utilization Facilities," Appendix A, "General Design Criteria for Nuclear Power Plants.") Criteria on single failure as applied to safety related PWR plant systems, have been formulated and exist in American National Standard "Single Failure Criteria for PWR Fluid Systems," N658-1976/ANS-51.7. Criteria on a single failure as applied to Class IE electrical systems have been formulated and exist in IEEE Standard, "Application of the Single Failure Criterion To Nuclear Power Generating Station Class IE Systems," IEEE Std. 379-1977 (ANS 58.4-W90)

variant form: (ANS 59.51)

site. 1 The property on which the nuclear power plant structures are to be built or are built. (ANS 2.11-78)

2 The property on which the ISFSI is to be built or is built. (ANS 2.19-89)

site response (amplification): The amplification (i.e., increase or decrease) of earthquake ground motion by rock and soil near the earth's surface in the vicinity of the site of interest. Topographic effects, the effect of the water table, and basin edge wave propagation effects are sometimes included under site response. (ANS-2.27-2008) (ANS-2.29-2008)

site seismology. Refers to pertinent geologic and seismic data used in establishing the Safe Shutdown Earthquake (SSE) and Operating Basis Earthquake (OBE) for the site. See 10 CFR 100, Appendix A, for definitions for SSE and OBE. (ANS 2.10)

slurry wastes. Liquid radioactive wastes of high insoluble solids content (i.e., greater than 0.1 percent solids by weight).

(ANS 55.1-92)(ANS 55.6-93) (ANS 55.6-99)

snapshot. The instantaneous storage of existing conditions at any selected point in time. The stored condition then becomes a temporary initialization point and may be called up repeatedly. (ANS 3.5-85)

software. computer programs and data.
(ANS 7-4.3.2) not in 93 draft

software accuracy. The software attribute that provides a quantitative measure of the magnitude of error. (ANS 7-4.3.2)

software consistency. The software attribute that provides uniform design and implementation techniques and notation. (ANS 7-4.3.2)

software error tolerance. The software attribute that provides continuity of operation under postulated non-nominal conditions. (ANS 7-4.3.2)

software modularity. The software attribute that provides a structure of highly independent computer program units that are discrete and identifiable with respect to compiling, combining with other units, and loading. (ANS 7-4.3.2)

software tools. (IEEE Std 610.12) A computer program used in the development testing, analysis or maintenance of a program or its documentation. Examples include comparator, cross reference generator, decompiler, driver, editor, flow charter, monitor, test case generator, timing analyzer.
NOTE: In this standard, software tools include compilers.
(ANS 7-4.3.2)

software validation. A process that evaluates the functional characteristics of the software, and certifies the achievement of acceptable comparisons with objective evidence. (ANS 3.2-93)

software verification. The process that confirms that the performance of the software is unchanged from that demonstrated by validation. (ANS 3.2-93)

solidify. To immobilize by a method which converts the liquid or slurry waste to a solid. The immobilized substance shall be monolithic with a definite volume and shape, bounded by a stable surface of distinct outline on all sides (i.e., free-standing).
(ANS 55.1)

solidification agent. Material which, when mixed in prescribed proportions with liquid or slurry waste, can form a free-standing product with no free liquid.
(ANS 55.1-92)

solidify. To immobilize by a method which converts the liquid, slurry or finely divided dry waste to a solid that is monolithic with a definite volume and shape and

bounded by a stable surface of distinct outline on all sides (i.e., free-standing). (ANS 55.1-92)

solo operation. Operation of the controls, including monitoring of instrumentation during steady station operations, with no other qualified person in the control room or other specified control areas, such as the refueling console. (ANS 3.4-87)

sorption. All mechanisms, including ion exchange, that remove ions from the fluid phase and concentrate them on the solid phase of the medium. (ANS 2.17-89)

source term. The amount of radioactive material available for release from confinement if a leak were to occur at the confinement boundary. (ANS 5.10-98)

spacer grid. Components which maintain the rods in a specific array in spent fuel assemblies and are axially located between the end fittings. The function of the spacer grids is to restrain the rod laterally from bowing and vibrating. (ANS 57.10-93)

special event. An event that is part of the plant design basis, but is not a design basis event.
(Note: Special events are identified in the plant licensing basis documentation (LBD) and typically include anticipated transients without scram, fire, station blackout, shutdown without control rods, and shutdown from outside the main control room). (ANS 50.1-94)(ANS 58.6-92)(ANS 58.14-93)

special test exception (STE). A provision in the technical specifications which allows a temporary deviation from particular technical specification s for the performance of a necessary test which could not otherwise be performed. (ANS 58.4)

s**pecial uses of direct and scattered categories.** Due to the limitations of some computer programs (e.g., some point kernel approaches) it may not be possible to compute direct and scattered gamma-ray components as defined above. It the user of this standard requires a special use of the terms direct and scattered, this special use shall be clearly identified, and definitions appropriate to the specific calculation procedure should be provided by the analyst. (ANS 6.6.1-79)

specific gravity. For purposes of this standard, specific gravity is considered numerically equal to density. (ANS 6.4.2-85)

spectral acceleration. The acceleration response of a linear oscillator with prescribed frequency and damping. (ANS 2.10-90)
Pseudo-absolute response spectral acceleration, given as a function of period or frequency and damping ratio (typically 5%). It is equal to the peak relative

displacement of a one degree of freedom linear oscillator of frequency f attached to the ground,
times the quantity (2□f)2. It is expressed in units of gravity (g) or m/second2. (ANs-2.29-Rev.8)

spectral analysis of surface waves (SASW): An in situ seismic method for determining shear wave velocity profiles. It uses the dispersive characteristics of surface waves to determine the variation of the shear wave velocity (i.e., shear modulus) of layered systems at depth. (ANS-2.27-2008)

spent fuel assembly. A single fabricated unit of fuel rods and support structures discharged from a light water power reactor, still in the same mechanical configuration in which it was irradiated, and meets the criteria for post-irradiation decay of this standard. It contains recoverable uranium, plutonium and fission products. (ANS 57.7-92)(ANS 57.9-92) (ANS 2.19-89)

Variant form: (ANS 57.10-93)

spray subsystem. That portion of the containment spray system which is specifically designed to deliver water to the post-accident containment atmosphere. (ANS 56.5)

spray thermal effectiveness. The ratio of heat transferred from the containment atmosphere to the spray, to that heat transfer corresponding to thermal equilibrium:

$$E_t = \frac{h_{sf} - h_{si}}{h_{ca} - h_{si}}$$

where:

h_{sf} = spray enthalpy after being heated by the containment atmosphere.

h_{si} = enthalpy of the spray water at thermal equilibrium with the containment atmosphere (ANS 56.5)

spillage. Spillage to the primary containment sump following a LOCA is of two types:
(1) Liquid overflow (not entrained by discharging steam) out the break which occurs when the RCS is refilled above the break elevation; and,
(2) Direct spillage from the ECCS line if the break is postulated at the ECCS nozzle. (ANS 56.4-83)

s**pray thermal effectiveness.** The ratio of heat transferred from the containment atmosphere to the spray, to that heat transfer corresponding to thermal equilibrium

$e_t = h_{sf} - h_{si}/h_{ca} - h_{si}$ where:

h_{sf} = spray enthalpy after being heated by the containment atmosphere.

h_{si} = spray water enthalpy nozzles.

h_{ca} = enthalpy of the spray water at thermal equilibrium

with the containment atmosphere. (ANS 56.5-87)

spray subsystem. That portion of the containment spray system which is specifically designed to deliver water to the post-accident containment atmosphere. (ANS 56.5-87)

stability. 1 The lack of sudden incapacitation. (ANS 3.4-94)

2 Refers to a waste form that meets the requirements established for structural stability in order to meet 10 CFR 61 requirements. A stable waste form will generally maintain its physical dimensions and its form under the expected disposal conditions. NRC waste form technical position provides guidance on acceptable methods to demonstrate waste stability. (ANS 55.1-92)

standard conditions. Standard atmospheric conditions referred to by this standard will be these conditions: pressure 14.6959 psia (101.325 kPa), temperature 68°F (527.67° R 20°C, 273.15 K), dry air density 0.07517 lbm/ft^3 (1.2041 kg/m^3). (ANS 56.8-02)

standard cubic foot (SCF). 1 A volume of gas occupying one cubic foot at a temperature of 60° F and a pressure of one atmosphere (absolute). (ANS 55.1-92)(ANS 55.4-93); As used in this standard, an amount of gas occupying one cubic foot at a temperature of 60°F and a pressure of one atmosphere (absolute). (ANS 55.4-99)

2 One cubic foot of gas at standard conditions of 14.6959 psia and 32°F. (ANS 56.1-D85)

standard cubic meter. One cubic meter of a gas at standard conditions of 101325 N/M^2 and 273.15°K. (ANS 56.1-D85)

standard of care. The minimum accepted level of emergency care to be provided as may be set forth by law, administrative orders, guidelines published by emergency care organizations and societies, local protocols and practice, and what has been accepted as precedence. Each state or locality has its own standard of care. (ANS 3.1.7-95)

standard project flood (SPF). The hydrograph representing runoff from the standard project storm (or snow melt, or both), as specified by the U.S. Army Corps of Engineers. (ANS 2.12-78)

standard project hurricane (SPH) or standard project windstorm (SPWS). A hypothetical hurricane or windstorm that is intended to represent the most severe combination of hurricane or windstorm parameters that is reasonably characteristic of a specified geographical region, excluding extremely rare combinations. (ANS 2.13-79)

standard reference data. Reference data which have been reviewed by a standards organization and found to meet

minimum requirements for specified purposes. For purposes of this standard, standard Evaluated Data Sets and standard Group Averaged Data Sets are standard reference data. (ANS 6.1.2-89)

standby. The diesel generator engine is not operating but is capable of automatic start and subsequent uninterrupted operation. (ANS 59.52-93)

The condition n which the EDG is not operating but is capable of automatic start and subsequent uninterrupted operation. (ANS 59.52-98)

standby air compressor. A backup or emergency air compressor which serves safety related air operated devices. (ANS 59.3)

standby component or system. A component or system that can perform the function of a similar operating component or system. (ANS 56.7)

standby diesel generator. A diesel generator unit designed in accordance with IEEE-387-1972 [1] and installed to provide a standby power supply in accordance with Criteria for class IE Power Systems for Nuclear Power Generating Stations IEEE-308-1974 (ANS 59.51)

standby power supply. The power supply that is selected to furnish electric energy when the preferred power supply is not available. (From IEEE Std. 30801974) (ANS 4.1)

start of pre-operational testing. That time when construction of the first safety related system is complete for performance/ integrated system testing (Note: not component testing). (ANS 3.1-87)

starting threshold. The minimum wind speed above which the measuring instrument is performing within its minimum specification. (ANS 3.11-00)

startup testing. Commences following the receipt of the unit NRC operating license which allows fuel loading, initial criticality, low power testing and the power ascens-ion test program. (ANS 3.1)

station blackout. A loss of all electrical power supplies except nuclear safety-related station batteries. (ANS 54.1-89)

station blackout occurrence. Complete loss of AC power to the essential and non-essential station switchgear busses for some period of time. The sources of AC power which are not available include the unit generator, offsite power and the onsite emergency AC power sources (i.e., diesel generators) normally capable of feeding the essential station switchgear busses). This occurrence does not include the independent loss of various special purpose diesel generators, such as those associated with diesel driven fire protection equipment or BWR HPCS systems, unless their failure is caused by the

station blackout occurrence. (ANS 58.12-85)

station (nuclear). A facility wherein electric energy is produced from nuclear energy by means of a suitable apparatus. The station may consist of one or more units located on a contiguous site, which may or may not share common auxiliaries. (ANS 51.1)(ANS 52.1) (ANS 59.1)

station (nuclear power) (See plant (nuclear power), the preferred term is plant (nuclear power). (ANS 50.1)

storage array (array). A regular arrangement of storage cells. (ANS 8.7-75)

storage capacity. The minimum required quantity of lube oil for engine operation. (ANS 59.52-93)

storage cell (cell). A volume having defined boundaries within which a storage unit is positioned. (ANS 8.7-75)

storage coefficient. The volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head. (ANS 2.9-89)(ANS 2.17-89)

storage concepts. The following definitions are based on the major characteristics of each concept, namely the predominant heat transfer path, shielding, portability, location with respect to grade, degree of independence of individual storage cells, and the storage structure:

(1) cask (silo). Above-ground, portable, or nonportable structures containing one or more individual storage cavities. Each cavity could contain one or more fuel units. Shielding is provided primarily by structural material such as steel cast iron, or concrete. Heat removal is by conduction through the structural shielding material to the atmosphere.

(2) drywell (caisson). Stationary, below ground, lined, individual storage cavities containing one or more fuel units. Shielding is provided by the surrounding earth and a shield plug. Heat removal is by conduction through the earth to the atmosphere.

(3) Vault (canyon). Above- or below-ground, reinforced concrete structures containing an array of storage cavities. Each cavity could contain one or more fuel units. Shielding is provided by the structure surrounding the stored fuel units. Heat rejection to the atmosphere is either direct or via a secondary cooling system. (ANS 57.9-92)

storage unit (unit). A mass of fissile material considered as an entity. The material may be of any shape, and a unit may consist of separate pieces. (ANS 8.7-75)

storm surge. A rise above normal water level on the lake, open sea or coast, due to the action of wind and atmospheric pressure.

(ANS 2.12)(ANS 2.19-89)

stratigraphy. The branch of geology that deals with the definition and description of major and minor natural divisions of soil and rock, and the interpretation of their significance in geologic history; specifically, the form arrangement, geographic distribution, chronologic succession, classification, and correlation and mutual relationships. (ANS 2.11-78) (ANS 2.19-89)

stray rod. A rod in any one of the following conditions during the rod consolidation process:
(a) partly inserted into a canister; or,
(b) in a position not normal for the process.
(ANS 57.10-93)

streaming. The penetration of radiation through gaps, voids, or ducts existing in the shield structure.
(ANS 6.4-85)

stuck rod. Any rod which cannot be removed from the spent fuel assembly during the normal operation of rod removal. (ANS 57.19-93)

structural integrity test (SIT). A pneumatic test that demonstrates the capability of a primary containment to withstand a specified internal design pressure load. (ANS 56.8-02)

Variant form: (ANS 56.2-84)

structural seismic model Mathematical representation of all Seismic Category I structures and interconnected non-seismic category structures used to predict the dynamic response. (ANS 2.10)

structure, system, or component (SSC): A *structure* is an element, or a collection of elements, to provide support or enclosure, such as a building, free-standing tanks, basins, dikes, or stacks. A *system* is a collection of components assembled to perform a function, such as piping, cable trays, conduits, or Heating Ventilation and Air Conditioning (HVAC). A *component* is an item of mechanical or electrical equipment, such as a pump, valve, or relay, or an element of a larger array, such as a length of pipe, elbow, or reducer. (ANS-2.27-2008)(ANS-2.29-2008)

structures. Civil constructions (e.g., buildings), portions of civil constructions (e.g., doors, hatches, or walls) or supports for items. These might have system-level or component-level plant unique identification codes.
(ANS 50.1-94)(ANS 58.14-93)

sub-compartment. A fully or partially enclosed sub-division of primary or secondary reactor containment or other building structures. A sub-compartment may consist of one or more node volumes.
(ANS 56.10-87)

sub-critical flow. (See critical flow.) (ANS 56.4-83) (ANS 56.10)(ANS 56.10-87)

sub-critical limit (limit). The limiting value assigned to a controlled parameter that results in a sub-critical system under specified conditions. The sub-critical limit allows for uncertainties in the calculations and experimental data used in its derivation but not for contingencies (e.g., double batching or failure of analytical techniques to yield accurate values). (ANS 8.1-83)

sump. A structure in the containment provided to collect water after an accident, for the recirculation mode. The sump may also be a pressure suppression pool (BWR). (ANS 56.5-87)

sump or sump tank. The sump refers to the lube oil collection point in a wet sump type engine. The sump tank refers to the lube oil collection point in a dry sump type engine. Either provides a collection point to which all lube oil drains and from where the lube oil pumps take suction. (ANS 59.52-93)
A collection point to which all lubricating oil drains and from which the lubricating oil pumps take suction. (ANS 59.52-98)

supervision. Direction of personnel activities or monitoring of plant functions by an individual responsible and accountable for the activities he/she directs or monitors. (ANS 3.2-93)

supporting systems. Systems and equipment not a part of, but required by the safety-related control air system for the performance of its safety functions shall have Safety Class 3 components. (ANS 59.3)

supplemented grade (S). Classification applied to an item that does not perform a safety-related function, but to which a significant licensing requirement or commitment applies. (ANS 50.1-94)(ANS 58.14-93)

Variant form: (ANS 59.2-D92)

suppression pool. In a water pressure suppression (WPS) primary containment, a pool of water into which steam resulting from a LOCA is directed and condensed to reduce the pressure in the primary containment. (ANS 5.4-83)

surface Design Dose Equivalent rate. The design dose equivalent rate at a location directly on the surface of the component or shield. For components covered with insulation or other materials, the "surface dose equivalent rate" is at a location directly on the covering surrounding the component. This definition is for design purposes and may differ from measured contact dose equivalent rates. (

surface design dose rate. A design dose rate at a location directly on the surface of the component or shield. For components covered with insulation or other materials,

the "surface dose rate" is at a location directly on the covering surrounding the component. This definition is for design purposes and can differ from measured contact dose rates. (ANS 5.6.1-D90)

surface vehicle explosion. Accidental explosion of land or water vehicles, including ship, barge, truck and railroad car. (ANS 2.12-78)(ANS 2.19-89)

surface vehicle impact. Accidental impact of a surface vehicle with or near a safety-related plant structure, system, or component (SSC) caused by an out-of-control vehicle due to operator error, vehicle failure, or due to natural hazards such as a flood. (ANS 2.12-78)

Surface contamination. Radioactive material on the surface of solid objects. (ANS 5.10-98)

surface vehicle impact. Accidental impact of a surface vehicle with or near an ISFSI. (2.19-89)

surveillance. The act of monitoring or observing to verify whether an item or activity conforms to specified requirements. (ANS 3.2-93)

variant form: (ANS 4.1)

surveillance testing. Periodic testing to verify that structures, systems and components (SSCs) continue to function or are in a state of readiness to perform their functions. (ANS 3.2-93)

suspension mechanism. The type and level of force/energy input defined and utilized for analysis of a given postulated accident for the process or operation performed. (ANS 5.10-98)

symptomatic data. Refers to data on variables which are well enough correlated with population size so that a change in value of the variable can reasonably be taken to mean a change in size for the population generating the value. (ANS 2.6-81)

system. A group of physically interconnected components that together perform a specified design function. (Systems are normally designated by a system-level plant unique identification code). (ANS 50.1-94)(ANS 58.14-93)(ANS 3.11-00)

system accuracy. The accuracy to which a system provides the true value of the measured quantity as measured by a traceable National Institute of Standards and Testing (NIST) calibration system. (ANS 3.11-00)

system and equipment wastes. Liquid from radioactive components, equipment or systems, and component cooling systems. (ANS 55.6-93)

systems approach. An analytical and interdisciplinary method used to evaluate the fire hazards and select fire prevention and

protection systems in a manner acceptable to management and independent reviewers.

Additional definitions or discussions of terms commonly used in the fire protection industry may be found in the National Fire Protection Association (NFPA) "Fire Protection Handbook," Fourteenth edition. (ANS 59.4-79W83)

system and equipment wastes. Liquid from controlled leakage and drains from radioactive components, equipment or systems, and component (SSC) cooling systems. (ANS 55.6) Liquid from radioactive components, equipment, or systems, and from component cooling systems. (ANS 55.6-99)

system calibration. An operation which determines the system accuracy and allows for correction of bias differences to meet the specifications in this standard. (ANS 3.11-00)

system important to safety. A system whose function is required to meet the general criteria of 4.1; for example, this includes those systems required to shut down the reactor (and maintain shutdown), cool the core, limit damage to the core, cool another safety system, or after an accident cool the containment, control combustible concentrations in the containment, or that contains, controls or reduces radioactivity released in an accident. Only those portions of a system are included that are designed to accomplish one of the above functions or whose failure could prevent accomplishing one of the above functions. (ANS 58.3)

system testing (IEEE Std 610.12). Testing conducted on a complete, integrated system to evaluate the system's compliance with its specified requirements. (ANS 7-4.3.2)

T.

t**anks**. All tanks used to support diesel generator operation; where used without modifiers, it includes day, integral, and supply tanks.

(1) day tank. A fuel oil tank or tanks which provide fuel directly to its associated diesel generator or integral tank.

(2) integral tank. A fuel oil tank furnished by the diesel generator manufacturer and mounted on the diesel engine.

(3) supply tank. A separate fuel oil tank for storage of fuel, which supplies a day tank or integral tank. (ANS 59.51-89)

target performance goal: Target mean annual frequency of an SSC exceeding its specified Limit State. Target performance goals of 1 x 10^{-4}/year, 4 x 10^{-5}/year, and 1 x 10^{-5}/year are used in ASCE/SEI 43-05 [2] for SSCs defined at SDC-3 or higher. (ANS-2.27-2008) (ANS-2.29-2008)

task. A well defined unit of work having an identifiable beginning and end and is a measurable function of the job

duties and responsibilities. (ANS 3.1-87)

task analysis. The systematic process to identify conditions, standards, elements, and required skills or knowledge to perform a task. (ANS 3.1-87)

technical specifications (TS). As defined in 10 CFR 50.36, "Technical Specifications." (ANS 1.10)

terminal end. That section of piping originating at a structure or component (e.g., a vessel or component nozzle or structural piping anchor) that acts as an essentially rigid constraint to the piping thermal expansion. Typically, an anchor assumed for the piping code stress analysis would be a terminal end. The branch connection to the main run is one of the terminal ends of a branch run, except for the special case where the branch pipe is classified as part of a main run (see paragraph (b) of definition for branch run). (ANS 58.2)

Tertiary: The geologic period from 1,800,000 years before present to 63,000,000 years before present. (ANS-2.27-2008)

test connection or test vent. Connection to valves or connecting piping which is provided so that isolation valves can be tested for leakage tightness. (ANS 56.2-84)

test, aquifer. The effect of pumping a well as measured in the pumped well and in one or more observation wells, for the purpose of determining aquifer properties. (ANS 2.9-89)(ANS 2.17-89)

test, packer. A method of isolating a section of a borehole by inserting one or more expandable glands (packers) in order to measure hydraulic conductivity or water quality in the section. (ANS 2.17-89)

test, well. The withdrawal of water from or addition of water to a well in measured rates or amounts, in order to measure the response with time of the water level. (ANS 2.9-89)

testing. An element of verification for the determination of the capability of an item to meet specified requirements by subjecting the item to a set of physical, chemical, environmental, or operating conditions. (ANS 3.2-93)

thyroid blocking agent. A material introduced into the body that minimizes uptake of radioiodine into the thyroid by saturating the thyroid with stable iodine. (ANS 3.8.1-93)(ANS 3.8.2-93) (ANS 3.8.3-93)(ANS 3.8.6-94) (ANS 3.8.2-95)

Variant form: (ANS 3.8.5-D92)

time-history accelerograph. An instrument capable of measuring and permanently recording acceleration versus

time. (ANS 2.10-90)(ANS 2.2-02)

time interval. (ANS 58.8) The elapsed time between two sequential, time points Specific time intervals include:

(1) indication -- ($TI_{INDICATION} = t_{IND} - t_{ST}$). The time interval between the start of the DBE and the first indication of the DBE. For some DBEs, this time interval might be zero.

(2) dead (TI_{DEAD}) The time interval allowed in the analyses in which the operator is not required to take action during the course of a DBE. A TI_{DEAD} always precedes T_{MAI} and follows T_{ECA} for the first operator action and follows T_{SFC} for subsequent operator actions in the analyzed sequences. (ANS 58.8-92)

(3) diagnosis -- ($TI_{DIAGNOSIS} = t_{ECA} - t_{IND}$). The time interval between the first indication of the DBE and the earliest time for which credit can be taken for initiation of safety-related operator actions. During this interval, it is assumed that the operator verifies automatic responses, observes plant parameters, and plans subsequent actions.

(4) operator response -- ($TI_{OPERATOR} = t_{SAC} - t_{MAI}$). The time interval during which the operator completes a safety-related action.

(5) process response -- ($TI_{PROCESS} = t_{SFC} - t_{SAC}$). The time interval between the completion of a safety-related operator action and the receipt of the indication that the corresponding safety-related function is completed through the response of the mitigating equipment and the response of the process. For some DBEs this time interval may be zero.

(6) safety -- ($TI_{SAFETY} = (t_{LIM} - t_{SFC}$). The time interval between the completing of the last safety-related function and reaching the design requirement limit. (ANS 58.8-92)

tornado. A violently rotating column of air whose circulation reaches the ground, pendant from the base of a convective cloud, and often observable as a condensation funnel attached to the cloud base, or as a rotating dust cloud rising from the ground. (ANS 2.3-83)

Variant form: (ANS 2.12-78)

tornado-generated missile. Tornado-generated missiles are objects that either become airborne, or tumble along the ground, or both, as the result of the wind pressure forces of a tornado and the aerodynamic characteristics of the objects. (ANS 2.3-88)

trace element. An element found in small quantities (i.e., usually less than 1%) within a material.(ANS 6.4.2-85)

trace radioactivity. Radioactivity due to trace amounts of naturally occurring radioisotopes contained within a material. (ANS 6.4.2-85)

traceability. The documented ability to trace the history, application, or location of an entity. In a calibration sense, traceability relates measuring equipment to national and international standards, primary standards, basic physical constants and properties, or reference materials. In a data collection sense, it relates calculations and data generated throughout the process back to the requirements for quality for the project. (ANS 3.11-00)

train. Any set of required equipment dependent on a single emergency onsite power source. (ANS 5.11-88)

training. Instructional program designed to develop or improve on-the-job performance. (ANS 3.1-87)

transfer machine. The equipment required to move the fuel units between the fuel handling area and the storage area. It may include a shielded confinement enclosure, transport vehicle, and handling equipment. (ANS 57.9-92)

transient population. Includes persons who routinely spend substantial portions of their time in the area, but do not sleep there. Does not include persons merely passing through the area.[2]

[2]Sometimes the term "transient population" is defined to include persons passing through the area. However, U.S Nuclear Regulatory Commission Regulatory Guide 4.7 excludes such persons in its usage of the term and that definition prevails for this Standard. (ANS 2.6-81)

translation. Motion in a horizontal plane. (ANS 57.1-92)(ANS 57.3-93)

transport. That component of dispersion that addresses the trajectory of the released material. (ANS 3.8.6-94)(ANS 3.8.6-95)

transportation package. A container used to transport spent fuel to or from an ISFSI. It may, in particular, consist of one or more receptacles, spacing structures, radiation shielding, and devices for cooling or for absorbing mechanical shocks. The vehicle, tie-down system, and auxiliary equipment may be integral parts of the container. 10 CFR 71, "Packaging and Transportation of Radioactive Material," provides regulatory requirements for packaging and transporting of spent fuel beyond the confines of the ISFSI site. (ANS 57.9-92)

treatment. Any method, technique or process, including neutralization, designed to change the physical, chemical or biological character or

composition of any hazardous material, or to recover energy or material resources from the waste, or to render the waste non-hazardous or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage or reduced in volume. (ANS 55.1-92)

trend. The general tendency of the current value (i.e., increasing, constant, or decreasing). (ANS 4.5)

triaxial. Able to measure a variable in three mutually orthogonal components (directions), one of which is vertical; applies to description of the function of an instrument or group of instruments. (ANS 2.2-02)

tsunami. A series of long period waves generated by the displacement of water by a submarine or coastal earthquake, volcanic eruption, or landslide. (ANS 2.19-89)

Variant form: (ANS 2.12-78)

turbine building wastes. Liquids from steam, feed water and condensate system, and from sampling, maintenance and testing operations in the turbine building. (ANS)

type A test. A test to measure the containment system overall integrated leakage rate under conditions representing DBA containment pressure and systems alignments. (ANS 56.8-02)

Type A test performance criterion. Criterion used for establishing Type A test intervals. The sum of the measured Type A test upper confidence limit (UCL) and the as-left MNPLR from all Type B and Type C pathways isolated during the Type A test. The sum is required to be less than L_a for a Type A test to pass the performance criterion. (ANS 56.8-02)

Type B test. A pneumatic test intended to detect or measure leakage across pressure-retaining or leakage-limiting boundaries other than valves, such as: (1) containment penetrations whose design incorporates resilient seals, gaskets, sealant compounds, expansion bellows, or flexible seal assemblies; (2) seals, including door operating mechanism penetrations which are part of the primary containment; (3) doors and hatches with resilient seals or gaskets except for seal-welded doors. (ANS 56.8-02)

type C tests. A pneumatic test to measure leakage rates from containment isolation valves, which are potential gaseous leakage pathways from containment during a design-basis LOCA. (ANS 56.8-02)

U.

ultimate heat sink. The means of heat dissipation from the plant to the environment, including the necessary retaining structures (e.g., a dammed lake, cooling tower) and any connecting canals or conduits.

(ANS 51.1/52.1-93)
(ANS 50.1-94)

Variant form: (ANS 54.1-89)
(ANS 59.1)(ANS 2.12-78)

uncertainty: See "variability," "epistemic uncertainty," and "aleatory variability." (ANS-2.27-2008) (ANS-2.29-2008)

unclassified. Designation applied to an item that has not been classified.
(ANS 50.1-94)(ANS 58.14-93)

uncontrolled access. Access to areas which are not under direct control for purposes of radiation protection.
(ANS 5.6.1-D90)

Variant form: (ANS 6.7.1-85)

uniform hazard response spectrum (UHRS): A response spectrum derived such that the annual probability of exceeding the spectral quantity (i.e., spectra acceleration, spectral displacement, etc.) is the same for all oscillator frequencies. A UHRS is determined in accordance with ANS-2.29-2008) [3]. (ANS-2.27-2008) (ANS-2.29-2008)

unit. One nuclear power reactor, all items required for electrical power generation, and all items require to provide reasonable assurance that the nuclear power reactor can be operated without undue risk to the health and safety of the public. Items that are shared between units are part of each unit.
(ANS 59.1-94)(ANS 50.1-94)

Variant form: (ANS 59.1)
(ANS 56.4)(ANS 58.9-R87)
(ANS 51.1/52.1-93)

units of measurement. The special unit of measurement of exposure to x-rays or gamma rays is the roentgen (R). The common unit of exposure rate is milliroentgen per hour (mR/hr). For purposes of this standard, the terms milli-roentgen and millirem are used interchangeably.
(ANS 6.8.1-81)

unlimited air. The storage atmosphere that does not limit the availability of oxygen as a design feature of the ISFSI.
(ANS 57.9-92)

upender. Handling equipment rotating about a fixed horizontal axis used to move fuel assemblies from a vertical to other than a vertical position and vice versa. (ANS 57.1-92)

upper bounding. (See lower bounding).
(ANS 56.4-83)(ANS 56.10-87)

upper confidence limit (UCL). A calculated value constructed from test data that places a statistical upper bound on the true leakage rate (%/24h). (Note: UCL is calculated at 95% confidence level in this standard. (ANS 56.8-02)

upper probability limit for damage. The threshold probability value for design consideration. If the probability of an event is equal to or less than the

Upper Probability Limit for Damage, its consequences need not be evaluated. (ANS 58.3)

upscale bias. A method of supplementing the exposure rate indication of an area monitor channel, either by means of a radioactive source placed on or near the detector, or by means of an input signal to the detector or electronic readout module. (ANS 6.8.1-81)

Use-as-is. A disposition permitted for a nonconforming item when it can be established that the item is satisfactory for its intended use. (ANS 3.2-93)

user. A person who applies a program to perform a specific task. (ANS 10.5-79)

V.

validated computational methods. A calculation method that has been tested, by comparison with experimental data or previously validated calculations, to establish the reliability of results obtained when the method is applied to conditions of interest.
(ANS 57.7-92)

Variant form: (ANS 8.7-75) (ANS 8.1-87)(ANS 8.9-83

validation. The test and evaluation of the integrated computer system to ensure compliance with the functions, performance and interface requirements. (ANS 7-4.3.2-W00)

valve closure time. Time it takes for a power operated valve to be in the fully closed position after the actuation power has reached the operator assembly. This does not include instrument delay time. (ANS 56.2-84)

variability: See "epistemic uncertainty" and "aleatory variability." (ANS-2.27-2008)

variable. A quantity or condition that is subject to change or a quantity that can assume any of a given set of values. (ANS 8.3.1-87)

variable types. Type A Those variables to be monitored that provide the information required to permit the control room operator to take the preplanned manual actions to accomplish and maintain safe plant shutdown for design basis accident events.

NOTE: Type A may include, but is not limited to, variables required to initiate planned manual actions associated with radioactive material releases from: (1) spent fuel, (2) equipment located outside the primary reactor containment and needed during the accident for recirculation of reactor coolant, and (3) waste gas storage vessels.

Type B Those variables to be monitored that provide to the control room operator information to assess the process of accomplishing or maintaining critical safety functions, i.e., reactivity control, core cooling, reactor coolant system integrity,

primary reactor containment integrity and radioactive effluent control.

Type C Those variables to be monitored that provide to the control room operator information to monitor (1) the extent to which parameters, which have the potential for causing a breach of the primary reactor containment, have exceeded the design basis values, or (2) that the in-core fuel clad, the reactor coolant system pressure boundary or the primary reactor containment may have been breached. (ANS 4.5)

verifiable count. The term means that the counting process shall be documented well enough so that independent audits of all parts of the process can be performed. (ANS 2.6-81D)

verification. The act of reviewing, inspecting, testing, checking, auditing, or otherwise determining and documenting whether items, processes, services, or documents conform to specified requirements. (ANS 3.2-93)

verification test. A test intended to confirm the capability of the Type A test method and equipment to measure L_a. This test is performed by inducing a known leakage rate from containment, measuring the resulting combined leakage rate, and comparing this measurement against the expected result. (ANS 56.8-02)

verification and validation (V&V)(IEEE Std 610.12). The process of determining whether the requirements for a system or component are complete and correct, the products of each development phase fulfill the requirements or conditions imposed by the previous phase, and the final system or component complies with specified requirements.
NOTE:
In this standard, the phrase V&V, and its usage is considered as equivalent to the term verification, and its usage from ASME NQA-1-1989, Quality Assurance Program Requirements for Nuclear Facilities.
(ANS 7-4.3.2-W00)

verify - To determine that a particular action has been performed in accordance with the rules
and requirements of this standard, either by witnessing the action or by reviewing records. (ANS-2.29-Rev.8)

visually simulated hardware. Hardware which is present on the reference plant control panels but has no dynamic interface with the real time simulation (e.g., square root converters, summers) and is present on simulated hardware for visual orientation only. (ANS 3.5-85)

vital area. 1 An area that contains vital (e.g., nuclear safety related) equipment, which is any plant equipment, system, or device required to protect core integrity and whose failure could directly or indirectly endanger public

health and safety by exposure to radiation. (ANS 59.51-89) (ANS 59.52-93)
2 Any area that contains vital equipment. The Central Alarm Station, although not containing vital equipment, shall be considered a vital area. (ANS 3.3-88)
An area that contain nuclear safety-related equipment. (ANS 59.52-98)

Variant form: (ANS 5.6.1-D90)

vital equipment. Any plant equipment, system or device, required to protect reactor core or spent fuel integrity the failure or destruction of which could directly or indirectly endanger public health and safety by exposure to radiation. (Note: Security equipment is not vital equipment.) (ANS 3.3-88)

volumetric source zone: A volume of the earth's crust within which future seismicity is assumed to have distributions of source properties and locations of energy release that do not vary in time and space. (ANS-2.27-2008) (ANS-2.29-2008)

vortex. A vortex is any closed circulation flow. (ANS 2.3-83)

W.

wash-off. Liquid containing the mobile surface contamination removed from the specimen by immersing it in demineralized water for 30 s. (ANS 16.1-03)

water pressure suppression (WPS) primary containment. A WPS primary containment consists of a drywell, suppression pool, and wetwell. In the event of a reactor coolant pressure boundary break in the drywell, reactor coolant energy is transferred from the drywell to the suppression pool by the vent system connecting the drywell and wetwell. The reactor coolant energy and decay heat are removed from the suppression pool by Residual Heat Removal (RHR) heat exchanges. (ANS 56.4-83)

watchman. An individual, not necessarily uniformed or armed with a firearm, who may perform other duties in the course of providing protection a plant. (ANS 3.3-88)

waves. Surface motion in an ocean or large body of water caused by winds, barometric pressure anomalies (e.g., squall lines, etc.) and seismic disturbances. For floating nuclear plants, waves can induce plant motion which must be considered in plant design. Waves increase the effective water depth to be considered in the design of a plant sited on or near a large body of water. The dynamic effects of waves are considered in the definitions of floods in American National Standard "Standards for Determining Design Basis Flooding at Power Reactor Sites," N170-1976 (ANS-2.8) (ANS 2.12-78)

wetwell. In a water pressure suppression (WPS) primary

containment, the structure which forms the boundary of the suppression pool and the vapor space contiguous to it. (ANS 56.4-83)

Wind direction. The direction from which the wind os blowing. Wind direction data should be reported in degrees azimuth measured clockwise from true north and range from 0° to 360° (e.g., north is 0° or 360°, east is 90°, etc.). See also "sigma theta. (ANS-3.11-00)

X.

Y.

yield, specific. The ratio of the volume of water which the rock or soil, after being saturated, will yield by gravity to the volume of the rock or soil. (ANS 2.9-89)(ANS 2.17-89)

Z.

zero period acceleration. The acceleration level in a response spectrum at frequencies where the response curve is asymptotic to a line perpendicular to the acceleration axis. This usually corresponds to accelerations at frequencies greater that 33 cycles per second for the horizontal direction, and 50 cycles per second for the vertical direction and is identical to the maximum acceleration in time history (accelerogram). (ANS 2.2-02)

zone. A classification of plant areas that have similar dose rate limitations based on accessibility requirements and design precautions. A zone starts at the access door or gate. Unless separately zoned, labyrinth entrances to an area are considered part of that area and are assigned the same zone designation. (ANS 5.6.1-D90)

zone design dose rate. Maximum expected surface design dose rate in the areas of the zone that can be physically reached by an individual without the use of portable ladders, scaffolding, or other special equipment. (ANS 5.6.1-D90)

APPENDIX