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## APPENDIX L GLOSSARY

### **Activation**

The process of making a radioisotope by bombarding a stable element with neutrons or protons.

### **Agreement State**

A state that has signed an agreement with the Nuclear Regulatory Commission under which the state regulates the use of by-product, source and small quantities of special nuclear material within that state.

### **Air sampling**

The collection of samples of air to measure the radioactivity or to detect the presence of radioactive material, particulate matter, or chemical pollutants in the air.

### **ALARA**

Acronym for "As Low As Reasonably Achievable," means making every reasonable effort to maintain exposures to ionizing radiation as far below the dose limits as 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 (see 10 CFR 20.1003).

### **Alpha particle**

A positively charged particle ejected spontaneously from the nuclei of some radioactive elements. It is identical to a helium nucleus that has a mass number of 4 and an electrostatic charge of +2. It has low penetrating power and a short range (a few centimeters in air). The most energetic alpha particle will generally fail to penetrate the dead layers of cells covering the skin and can be easily stopped by a sheet of paper. Alpha particles are hazardous when an alpha-emitting isotope is inside the body.

### **Anion**

A negatively charged ion.

### **Atom**

The smallest particle of an element that cannot be divided or broken up by chemical means. It consists of a central core of protons and neutrons, called the nucleus. Electrons revolve in orbits in the region surrounding the nucleus.

### **Atomic energy**

Energy released in nuclear reactions. Of particular interest is the energy released when a neutron initiates the breaking up or fissioning of an atom's nucleus into smaller pieces (fission), or when two nuclei are joined together under millions of degrees of heat (fusion). It is more correctly called nuclear energy.

1 **Attenuation**

2 The process by which the number of particles or photons entering a body of matter is reduced by  
3 absorption and scattered radiation.  
4

5 **Background radiation**

6 Radiation from cosmic sources; naturally occurring radioactive materials, including radon  
7 (except as a decay product of source or special nuclear material) and global fallout as it exists in  
8 the environment from the testing of nuclear explosive devices. It does not include radiation from  
9 source, byproduct, or special nuclear materials regulated by the Nuclear Regulatory Commission.  
10 The typically quoted average individual exposure from background radiation is 360 millirem per  
11 year.  
12

13 **Becquerel (Bq)**

14 The unit of radioactive decay equal to 1 disintegration per second. 37 billion (3.7E+10)  
15 becquerels = 1 curie (Ci).  
16

17 **Beta particle**

18 A charged particle emitted from a nucleus during radioactive decay, with a mass equal to 1/1837  
19 that of a proton. A negatively charged beta particle is identical to an electron. A positively  
20 charged beta particle is called a positron. Large amounts of beta radiation may cause skin burns,  
21 and beta emitters are harmful if they enter the body. Beta particles may be stopped by thin sheets  
22 of metal or plastic.  
23

24 **Bioassay**

25 The determination of kinds, quantities or concentrations, and in some cases, the locations, of  
26 radioactive material in the human body, whether by direct measurement (in vivo counting) or by  
27 analysis and evaluation of materials excreted or removed (in vitro) from the human body.  
28

29 **Biological half-life**

30 The time required for a biological system, such as that of a human, to eliminate, by natural  
31 processes, half of the amount of a substance (such as a radioactive material) that has entered it.  
32

33 **Biological shield**

34 A mass of absorbing material placed around a reactor or radioactive source to reduce the  
35 radiation to a level safe for humans.  
36

37 **Boiling water reactor (BWR)**

38 A reactor in which water, used as both coolant and moderator, is allowed to boil in the core. The  
39 resulting steam can be used directly to drive a turbine and electrical generator, thereby producing  
40 electricity.  
41

42 **British Thermal Unit (Btu)**

43 A British thermal unit. The amount of heat required to change the temperature of one pound of  
44 water one degree Fahrenheit at sea level.  
45

1 **Byproduct**

2 Byproduct is (1) any radioactive material (except special nuclear material) yielded in, or made  
3 radioactive by, exposure to the radiation incident to the process of producing or using special  
4 nuclear material (as in a reactor); and (2) the tailings or wastes produced by the extraction or  
5 concentration of uranium or thorium from ore (see 10 CFR 20.1003).  
6

7 **Calibration**

8 The adjustment, as necessary, of a measuring device such that it responds within the required  
9 range and accuracy to known values of input.  
10

11 **Cask**

12 A heavily shielded container used to store and/or ship radioactive materials. Lead and steel are  
13 common materials used in the manufacture of casks.  
14

15 **Cation**

16 A positively charged ion.  
17

18 **Charged particle**

19 An ion. An elementary particle carrying a positive or negative electric charge.  
20

21 **Cladding**

22 The thin-walled metal tube that forms the outer jacket of a nuclear fuel rod. It prevents corrosion  
23 of the fuel by the coolant and the release of fission products into the coolant. Aluminum,  
24 stainless steel, and zirconium alloys are common cladding materials.  
25

26 **Clearance**

27 Removal of material that meets certain release criteria from regulatory control.  
28

29 **Collective dose**

30 The sum of the individual doses received on a given period of time by a specified population  
31 from exposure to a specified source of radiation.  
32

33 **Committed dose equivalent**

34 This is the dose to some specific organ or tissue that is received from an intake of radioactive  
35 material by an individual during the 50-year period following the intake (see 10 CFR 20.1003).  
36

37 **Committed effective dose equivalent**

38 The committed dose equivalent for a given organ multiplied by a weighting factor (see 10 CFR  
39 20.1003).  
40

41 **Compact**

42 A group of two or more States formed to dispose of low-level radioactive waste on a regional  
43 basis. Forty-two States have formed nine compacts.  
44

1 **Condenser**

2 A large heat exchanger designed to cool exhaust steam from a turbine below the boiling point so  
3 that it can be returned to the heat source as water. In a pressurized water reactor, the water is  
4 returned to the steam generator. In a boiling water reactor, it returns to the reactor core. The heat  
5 removed from the steam by the condenser is transferred to a circulating water system and is  
6 exhausted to the environment, either through a cooling tower or directly into a body of water.  
7

8 **Containment structure**

9 A gaslight shell or other enclosure around a nuclear reactor to confine fission products that  
10 otherwise might be released to the atmosphere in the event of an accident.  
11

12 **Control room**

13 The area in a nuclear power plant from which most of the plant power production and emergency  
14 safety equipment can be operated by remote control.  
15

16 **Controlled area**

17 At a nuclear facility, an area outside of a restricted area but within the site boundary, access to  
18 which can be limited by the licensee for any reason.  
19

20 **Cooling tower**

21 A heat exchanger designed to aid in the cooling of water that was used to cool exhaust steam  
22 exiting the turbines of a power plant. Cooling towers transfer exhaust heat into the air instead of  
23 into a body of water.  
24

25 **Core**

26 The central portion of a nuclear reactor containing the fuel elements, moderator, neutron poisons,  
27 and support structures.  
28

29 **Cosmic radiation**

30 Penetrating ionizing radiation, both particulate and electromagnetic, originating in outer space.  
31 Secondary cosmic rays, formed by interactions in the earth's atmosphere, account for about 45 to  
32 50 millirem of the 360 millirem background radiation that an average individual receives in a  
33 year.  
34

35 **Counter**

36 A general designation applied to radiation detection instruments or survey meters that detect and  
37 measure radiation. The signal that announces an ionization event is called a count.  
38

39 **Crud**

40 A colloquial term for corrosion and wear products (rust particles, etc.) that become radioactive  
41 (i.e., activated) when exposed to radiation. Because the activated deposits were first discovered  
42 at Chalk River, a Canadian nuclear plant, "crud" has been used as shorthand for Chalk River  
43 Unidentified Deposits.  
44

1 **Cumulative dose**

2 The total dose resulting from repeated exposures of ionizing radiation to an occupationally  
3 exposed worker to the same portion of the body, or to the whole body, over a period of time (see  
4 10 CFR 20.1003).

5  
6 **Curie (Ci)**

7 The basic unit used to describe the intensity of radioactivity in a sample of material. The curie is  
8 equal to 37 billion (3.7E+10) disintegrations per second, which is approximately the activity of 1  
9 gram of radium. A curie is also a quantity of any radionuclide that decays at a rate of 37 billion  
10 disintegrations per second. It is named for Marie and Pierre Curie, who discovered radium in  
11 1898.

12  
13 **Daughter products**

14 Isotopes that are formed by the radioactive decay of some other isotope. In the case of  
15 radium-226, for example, there are 10 successive daughter products, ending in the stable isotope,  
16 lead-206.

17  
18 **Decay, radioactive**

19 The decrease in the amount of any radioactive material with the passage of time due to the  
20 spontaneous emission from the atomic nuclei of either alpha or beta particles, often accompanied  
21 by gamma radiation.

22  
23 **Decommission**

24 The process of closing down a facility followed by reducing residual radioactivity to a level that  
25 permits the release of the property for unrestricted use (see 10 CFR 20.1003).

26  
27 **Decon**

28 A method of decommissioning in which the equipment, structures, and portions of a facility and  
29 site containing radioactive contaminants are removed and safely buried in a low-level radioactive  
30 waste landfill or decontaminated to a level that permits the property to be released for  
31 unrestricted use shortly after cessation of operations.

32  
33 **Decontamination**

34 The reduction or removal of contaminating radioactive material from a structure, area, object, or  
35 person. Decontamination may be accomplished by: (1) treating the surface to remove or decrease  
36 the contamination, (2) letting the material stand so that the radioactivity is decreased as a result  
37 of natural radioactive decay, or (3) covering the contamination to shield or attenuate the radiation  
38 emitted (see 10 CFR 20.1003 and §20.1402).

39  
40 **Derived air concentration (DAC)**

41 The concentration of radioactive material in air and the time of exposure to that radionuclide, in  
42 hours. An NRC licensee may take 2,000 hours to represent one ALI, equivalent to a committed  
43 effective dose equivalent of 5 rem (0.05 sievert).

1 **Detector**

2 A material or device that is sensitive to radiation and can produce a response signal suitable for  
3 measurement or analysis. A radiation detection instrument.

4  
5 **Deterministic effect**

6 The health effects, the severity of which varies with the dose and for which a threshold is  
7 believed to exist. Radiation-induced cataract formation is an example of a deterministic effect  
8 (also called a non-stochastic effect) (see 10 CFR 20.1003).

9  
10 **Dose**

11 The absorbed dose, given in rads (or the international system of units, grays), that represents the  
12 energy absorbed from the radiation in a gram of any material. Furthermore, the biological dose or  
13 dose equivalent, given in rems or sieverts, is a measure of the biological damage to living tissue  
14 from the radiation exposure.

15  
16 **Dose equivalent**

17 The product of absorbed dose in tissue multiplied by a quality factor, and then sometimes  
18 multiplied by other necessary modifying factors at the location of interest. It is expressed  
19 numerically in rems or sieverts (see 10 CFR 20.1003).

20  
21 **Dose factor**

22 Multiplier used to convert radionuclide concentrations to dose.

23  
24 **Dose rate**

25 The ionizing radiation dose delivered per unit time. For example, rem or sieverts per hour.

26  
27 **Dose, absorbed**

28 The amount of energy deposited in any substance by ionizing radiation per unit mass of the  
29 substance. It is expressed numerically in rads or grays.

30  
31 **Dosimeter**

32 A small portable instrument (such as a film badge, thermoluminescent or pocket dosimeter) for  
33 measuring and recording the total accumulated personnel dose of ionizing radiation.

34  
35 **Dosimetry**

36 The theory and application of the principles and techniques involved in the measurement and  
37 recording of ionizing radiation doses.

38  
39 **Effective dose**

40 The quantity obtained by multiplying the equivalent dose to various tissues and organs by a  
41 weighting factor appropriate to each and summing the products.

42  
43 **Effective half-life**

44 The time required for the amount of a radioactive element deposited in a living organism to be  
45 diminished 50% as a result of the combined action of radioactive decay and biological  
46 elimination.

1 **Electromagnetic radiation**

2 A traveling wave motion resulting from changing electric or magnetic fields. Familiar  
3 electromagnetic radiation range from x-rays (and gamma rays) of short wavelength, through the  
4 ultraviolet, visible, and infrared regions, to radar and radio waves of relatively long wave length.  
5

6 **Electron**

7 An elementary particle with a negative charge and a mass 1/1837 that of the proton. Electrons  
8 surround the positively charged nucleus and determine the chemical properties of the atom.  
9

10 **Entomb**

11 A method of decommissioning in which radioactive contaminants are encased in a structurally  
12 long-lived material, such as concrete. The entombment structure is appropriately maintained, and  
13 continued surveillance is carried out until the radioactivity decays to a level permitting  
14 decommissioning and ultimate unrestricted release of the property.  
15

16 **Exclusion area**

17 That area surrounding the reactor, in which the reactor licensee has the authority to determine all  
18 activities, including exclusion or removal of personnel and property from the area.  
19

20 **Exposure**

21 Being exposed to ionizing radiation or to radioactive material.  
22

23 **External radiation**

24 Exposure to ionizing radiation when the radiation source is located outside the body.  
25

26 **Fiscal Year**

27 The 12-month period, from October 1 through September 30, used by the Federal Government in  
28 budget formulation and execution. The fiscal year is designated by the calendar year in which it  
29 ends.  
30

31 **Fissile material**

32 Although sometimes used as a synonym for fissionable material, this term has acquired a more  
33 restricted meaning. Namely, any material fissionable by thermal (slow) neutrons. The three  
34 primary fissile materials are uranium-233, uranium-235, and plutonium-239.  
35

36 **Fission (fissioning)**

37 The splitting of a nucleus into at least two other nuclei and the release of a relatively large  
38 amount of energy. Two or three neutrons are usually released during this type of transformation.  
39

40 **Fuel assembly**

41 A cluster of fuel rods (or plates). Also called a fuel element. Many fuel assemblies make up a  
42 reactor core.  
43

44 **Fuel cycle**

45 The series of steps involved in supplying fuel for nuclear power reactors. It can include mining,  
46 milling, isotopic enrichment, fabrication of fuel elements, use in a reactor, chemical reprocessing

1 to recover the fissionable material remaining in the spent fuel, re-enrichment of the fuel material,  
2 refabrication into new fuel elements, and waste disposal.

3  
4 **Fuel reprocessing**

5 The processing of reactor fuel to separate the unused fissionable material from waste material.

6  
7 **Fuel rod**

8 A long, slender tube that holds fissionable material (fuel) for nuclear reactor use. Fuel rods are  
9 assembled into bundles called fuel elements or fuel assemblies, which are loaded individually  
10 into the reactor core.

11  
12 **Full-time equivalent**

13 A measurement equal to one staff person working a full-time work schedule for 1 year.

14  
15 **Gamma radiation**

16 High-energy, short wavelength, electromagnetic radiation emitted from the nucleus. Gamma  
17 radiation frequently accompanies alpha and beta emissions and always accompanies fission.  
18 Gamma rays are very penetrating and are best stopped or shielded by dense materials, such as  
19 lead or depleted uranium. Gamma rays are similar to x-rays.

20  
21 **Gas Centrifuge**

22 A uranium enrichment process that uses a large number of rotating cylinders in a series. These  
23 series of centrifuge machines, called trains, are interconnected to form cascades. In this process,  
24 UF<sub>6</sub> gas is placed in a rotating drum or cylinder and rotated at high speed. This rotation creates  
25 a strong gravitational field so that the heavier gas molecules (containing U-238) move toward the  
26 outside of the cylinder and the lighter gas molecules (containing U-235) collect closer to the  
27 center. The stream that is slightly enriched in U-235 is withdrawn and fed into the next higher  
28 stage, while the slightly depleted stream is recycled back into the next lower stage. Significantly  
29 more U-235 enrichment can be obtained from a single unit gas centrifuge than from a single unit  
30 gaseous diffusion barrier.

31  
32 **Gaseous Diffusion Plant**

33 A facility where uranium hexafluoride gas is filtered, uranium-235 is separated from  
34 uranium-238, increasing the percentage of uranium-235 from 1 to about 3 percent. The process  
35 requires enormous amounts of electric power.

36  
37 **Geiger-Mueller counter**

38 A radiation detection and measuring instrument. It consists of a gas-filled tube containing  
39 electrodes, between which there is an electrical voltage, but no current flowing. When ionizing  
40 radiation passes through the tube, a short, intense pulse of current passes from the negative  
41 electrode to the positive electrode and is measured or counted. The number of pulses per second  
42 measures the intensity of the radiation field. It was named for Hans Geiger and W. Mueller, who  
43 invented it in the 1920s. It is sometimes called simply a Geiger counter or a G-M counter, and is  
44 the most commonly used portable radiation instrument.

1 **Gigawatt**

2 One billion watts.

3  
4 **Gigawatthour**

5 One billion watt-hours.

6  
7 **Graphite**

8 A form of carbon, similar to the lead used in pencils, used as a moderator in some nuclear  
9 reactors.

10  
11 **Gray (Gy)**

12 The international system (SI) unit of absorbed dose. One gray is equal to an absorbed dose of 1  
13 Joule/kilogram (one gray equals 100 rads) (see 20.1004).

14  
15 **Half-life**

16 The time in which one half of the atoms of a particular radioactive substance disintegrates into  
17 another nuclear form. Measured half-lives vary from millionths of a second to billions of years.  
18 Also called physical or radiological half-life

19  
20 **Half-life, biological**

21 The time required for the body to eliminate one half of the material taken in by natural biological  
22 means.

23  
24 **Half-life, effective**

25 The time required for a radionuclide contained in a biological system, such as a human or an  
26 animal, to reduce its activity by one-half as a combined result of radioactive decay and biological  
27 elimination.

28  
29 **Head, reactor vessel**

30 The removable top section of a reactor pressure vessel. It is bolted in place during power  
31 operation and removed during refueling to permit access of fuel handling equipment to the core.

32  
33 **Health physics**

34 The science concerned with the recognition, evaluation, and control of hazards to health and the  
35 environment that may arise from the use and application of ionizing radiation.

36  
37 **Heat exchanger**

38 Any device that transfers heat from one fluid (liquid or gas) to another fluid or to the  
39 environment.

40  
41 **Hot**

42 A colloquial term meaning highly radioactive.

43  
44 **Hot spot**

45 The region in a radiation/contamination area in which the level of radiation/contamination is  
46 significantly greater than in neighboring regions in the area.

1 **Impacted Area**

2 An area with some reasonable potential for residual radioactivity in excess of natural background  
3 or fallout levels.  
4

5 **Ion-exchange**

6 A common method for concentrating uranium from a solution. The uranium solution is passed  
7 through a resin bed where the uranium-carbonate complex ions are transferred to the resin by  
8 exchange with a negative ion like chloride. After build-up of the uranium complex on the resin,  
9 the uranium is eluted with a salt solution and the uranium is precipitated in another process.  
10

11 **Isotope**

12 Any two or more forms of an element having identical or very closely related chemical properties  
13 and the same atomic number but different atomic weights or mass numbers.  
14

15 **Kilovolt**

16 The unit of electrical potential equal to 1,000 volts.  
17

18 **Leachate**

19 An often toxic liquid that forms as water seeps down through waste in a landfill and collects  
20 contaminants from the waste.  
21

22 **Light water**

23 Ordinary water as distinguished from heavy water.  
24

25 **Light water reactor**

26 A term used to describe reactors using ordinary water as coolant, including boiling water reactors  
27 (BWRs) and pressurized water reactors (PWRs), the most common types used in the United  
28 States.  
29

30 **Loop**

31 In a pressurized water reactor, the coolant flow path through piping from the reactor pressure  
32 vessel to the steam generator, to the reactor coolant pump, and back to the reactor pressure  
33 vessel. Large PWRs may have as many as four separate loops.  
34

35 **Low-level waste**

36 A general term for a wide range of wastes having low levels of radioactivity. Industries,  
37 hospitals and medical, educational, or research institutions; private or government laboratories;  
38 and nuclear fuel cycle facilities (e.g., nuclear power reactors and fuel fabrication plants) that use  
39 radioactive materials generate low-level wastes as part of their normal operations. These wastes  
40 are generated in many physical and chemical forms and levels of contamination (see 10 CFR  
41 61.2). Low-level radioactive wastes containing source, special nuclear, or byproduct material are  
42 acceptable for disposal in a land disposal facility. For the purposes of this definition, low-level  
43 waste has the same meaning as in the Low-level Waste Policy Act, that is, radioactive waste not  
44 classified as high-level radioactive waste, transuranic waste, spent nuclear fuel, or byproduct  
45 material as defined in section 11e.(2) of the Atomic Energy Act (uranium or thorium tailings and  
46 waste). See also High-level waste.

1 **Material-independent dose factors**

2 Dose factors that consider the most conservative dose factor for each radionuclide, regardless of  
3 the material.

4  
5 **Material-specific dose factors**

6 Dose factors based on the most limiting scenario.

7  
8 **Megacurie**

9 One million curies.

10  
11 **Megawatt (MW)**

12 One million watts.

13  
14 **Megawatt hour (MWh)**

15 One million watt-hours.

16  
17 **Metric ton**

18 Approximately 2,200 pounds in the English system of measurements (Note: in the international  
19 system of measurements, 1 metric ton = 1000 kg.)

20  
21 **Microcurie**

22 One millionth of a curie. That amount of radioactive material that disintegrates (decays) at the  
23 rate of 37 thousand atoms per second.

24  
25 **Mill tailings**

26 Naturally radioactive residue from the processing of uranium ore into yellowcake in a mill.  
27 Although the milling process recovers about 93 percent of the uranium, the residues, or tailings,  
28 contain several naturally-occurring radioactive elements, including uranium, thorium, radium,  
29 polonium, and radon.

30  
31 **Millirem**

32 One thousandth of a rem (0.001 rem).

33  
34 **Mixed oxide fuel**

35 A mixture of uranium oxide and plutonium oxide used to fuel a reactor. Mixed oxide fuel is often  
36 abbreviated as "MOX." Conventional nuclear fuel is made of pure uranium oxide.

37  
38 **Monitoring of Radiation**

39 Periodic or continuous determination of the amount of ionizing radiation or radioactive  
40 contamination present in a region, as a safety measure, for the purpose of health or environmental  
41 protection. Monitoring is done for air, surface, & ground water, soil & sediment, equipment  
42 surfaces, and personnel (for example, bioassay or alpha scans).

43  
44 **Nanocurie**

45 One billionth (10<sup>-9</sup>) of a curie.

46

1 **Natural uranium**

2 Uranium as found in nature. It contains 0.7 percent uranium-235, 99.3 percent uranium-238, and  
3 a trace of uranium-234 by weight. In terms of the amount of radioactivity, it contains  
4 approximately 2.2 percent uranium-235, 48.6 percent uranium-238, and 49.2 percent  
5 uranium-234.

6  
7 **Neutron**

8 An uncharged elementary particle with a mass slightly greater than that of the proton, and found  
9 in the nucleus of every atom heavier than hydrogen.

10  
11 **Nonpower reactor**

12 Reactors used for research, training, and test purposes, and for the production of radioisotopes for  
13 medical and industrial uses.

14  
15 **Nuclear energy**

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

17  
18 **Nuclear power plant**

19 An electrical generating facility using a nuclear reactor as its heat source to provide steam to a  
20 turbine generator.

21  
22 **Nuclear waste**

23 A particular type of radioactive waste, that is produced as part of the nuclear fuel cycle, i.e.,  
24 those activities needed to produce nuclear fission, or splitting of the atom. These include  
25 extraction of uranium from ore, concentration of uranium, processing into nuclear fuel, and  
26 disposal of byproducts. Radioactive waste is a broader terms that includes all waste that contains  
27 radioactivity. Residues from water treatment, contaminated equipment from oil drilling, and  
28 tailings from the processing of metals such as vanadium and copper, also contain radioactivity  
29 but are not "nuclear waste" because they are produced outside of the nuclear fuel cycle. NRC  
30 generally regulates only those wastes produced in the nuclear fuel cycle (uranium mill tailings,  
31 depleted uranium, spent fuel rods, etc).

32  
33 **Nucleon**

34 Common name for a constituent particle of the atomic nucleus. At present, applied to protons and  
35 neutrons, but may include any other particles found to exist in the nucleus.

36  
37 **Nucleus**

38 The small, central, positively charged region of an atom. Except for the nucleus of ordinary  
39 hydrogen, which has only a proton, all atomic nuclei contain both protons and neutrons. The  
40 number of protons determines the total positive charge or atomic number. This number is the  
41 same for all the atomic nuclei of a given chemical element. The total number of neutrons and  
42 protons is called the mass number.

43  
44 **Nuclide**

45 A general term referring to all known isotopes, both stable (279) and unstable (about 2,700), of  
46 the chemical elements.

1 **Parent**

2 A radionuclide that upon radioactive decay or disintegration yields a specific nuclide (the  
3 daughter).

4  
5 **Parts per million (ppm)**

6 Parts (molecules) of a substance contained in a million parts of another substance (or water).  
7

8 **Personnel monitoring**

9 The use of portable survey meters to determine the amount of radioactive contamination on an  
10 individual, or the use of dosimetry to determine an individual's occupational radiation dose.  
11

12 **Photon**

13 A quantum (or packet) of energy emitted in the form of electromagnetic radiation. Gamma rays  
14 and x-rays are examples of photons.  
15

16 **Picocurie**

17 One trillionth (10<sup>-12</sup>) of a curie.  
18

19 **Pig**

20 A colloquial term describing a container (usually lead or depleted uranium) used to ship or store  
21 radioactive materials. The thick walls of this shielding device protect the person handling the  
22 container from radiation. Large containers used for spent fuel storage are commonly called casks.  
23

24 **Point source**

25 Any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch,  
26 channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal  
27 feeding operation, landfill leachate collection system, vessel or other floating craft from which  
28 pollutants are or may be discharged. This term does not include return flows from irrigated  
29 agriculture or agricultural storm water runoff. (See 40 CFR 122.3).  
30

31 **Potentially Clearable Material**

32 Solid materials that originate in restricted or impacted areas of NRC/Agreement State-licensed  
33 facilities, and have no, or very small amounts of, radioactivity resulting from licensed operations.  
34

35 **Power reactor**

36 A reactor designed to produce heat for electric generation, as distinguished from reactors used for  
37 research, for producing radiation or fissionable materials, or for reactor component testing.  
38

39 **Pressure vessel**

40 A strong-walled container housing the core of most types of power reactors. It usually also  
41 contains the moderator, neutron reflector, thermal shield, and control rods.  
42

43 **Pressurized water reactor (PWR)**

44 A power reactor in which heat is transferred from the core to an exchanger by high temperature  
45 water kept under high pressure in the primary system. Steam is generated in a secondary circuit.  
46 Many reactors producing electric power are pressurized water reactors.

1 **Proton**

2 An elementary nuclear particle with a positive electric charge located in the nucleus of an atom.

3  
4 **Quality Factor**

5 Factor by which the absorbed dose (rad or gray) is to be multiplied to obtain a quantity that  
6 expresses, on a common scale for all ionizing radiation, the biological damage (rem or sievert) to  
7 an exposed individual. It is used because some types of radiation, such as alpha particles, are  
8 more biologically damaging internally than other types.

9  
10 **Rad**

11 The special unit for radiation absorbed dose, which is the amount of energy from any type of  
12 ionizing radiation (e.g., alpha, beta, gamma, neutrons, etc.) deposited in any medium (e.g., water,  
13 tissue, air). A dose of one rad means the absorption of 100 ergs (a small but measurable amount  
14 of energy) per gram of absorbing tissue (100 rad = 1 gray).

15  
16 **Radiation (ionizing radiation)**

17 Alpha particles, beta particles, gamma rays, x-rays, neutrons, high-speed electrons, high-speed  
18 protons, and other particles capable of producing ions. Radiation, as used in 10 CFR Part 20,  
19 does not include non-ionizing radiation, such as radio- or microwaves, or visible, infrared, or  
20 ultraviolet light (see also 10 CFR 20.1003).

21  
22 **Radiation area**

23 Any area with radiation levels greater than 5 millirem (0.05 millisievert) in one hour at 30  
24 centimeters from the source or from any surface through which the radiation penetrates.

25  
26 **Radiation source**

27 Usually a sealed source of radiation used in teletherapy and industrial radiography, as a power  
28 source for batteries (as in use in space craft), or in various types of industrial gauges. Machines,  
29 such as accelerators and radioisotope generators, and natural radionuclides may be considered  
30 sources.

31  
32 **Radiation standards**

33 Exposure standards, permissible concentrations, rules for safe handling, regulations for  
34 transportation, regulations for industrial control of radiation, and control of radioactive material  
35 by legislative means.

36  
37 **Radiation Survey**

38 In the context of the GEIS, "radiation survey" is used to define various types of surveys  
39 conducted to assess levels of residual radioactivity in or on material and equipment. Such  
40 surveys include the use of conventional radiation detection instrumentation, and sample  
41 collection and sample analysis using appropriate types of analytical equipment and procedures.  
42 The use of any one method or combination of methods are mandated by the type of material,  
43 radionuclide distributions and their relative mix, and detection limits in comparison to allowable  
44 dose criteria.

1 **Radiation, nuclear**

2 Particles (alpha, beta, neutrons) or photons(gamma) emitted from the nucleus of unstable  
3 radioactive atoms as a result of radioactive decay.

4  
5 **Radioactive decay**

6 Large unstable atoms can become more stable by emitting radiation. This process is called  
7 radioactive decay. This radiation can be emitted in the form of a positively charged ALPHA  
8 particle, a negatively charged BETA particle, or GAMMA RAYS or X-RAYS.

9  
10 **Radioactivity**

11 The spontaneous emission of radiation, generally alpha or beta particles, often accompanied by  
12 gamma rays, from the nucleus of an unstable isotope. Also, the rate at which radioactive material  
13 emits radiation. Measured in units of becquerels or disintegrations per second.

14  
15 **Radioisotope**

16 An unstable isotope of an element that decays or disintegrates spontaneously, emitting radiation.  
17 Approximately 5,000 natural and artificial radioisotopes have been identified.

18  
19 **Radionuclide**

20 A radioisotope.

21  
22 **Reaction**

23 Any process involving a chemical or nuclear change.

24  
25 **Reactivity**

26 A term expressing the departure of a reactor system from criticality. A positive reactivity  
27 addition indicates a move toward supercriticality (power increase). A negative reactivity addition  
28 indicates a move toward subcriticality (power decrease).

29  
30 **Reactor coolant system**

31 The system used to remove energy from the reactor core and transfer that energy either directly or  
32 indirectly to the steam turbine.

33  
34 **Reactor, nuclear**

35 A device in which nuclear fission may be sustained and controlled in a self-supporting nuclear  
36 reaction. The varieties are many, but all incorporate certain features, including fissionable  
37 material or fuel, a moderating material (unless the reactor is operated on fast neutrons), a  
38 reflector to conserve escaping neutrons, provisions of removal of heat, measuring and controlling  
39 instruments, and protective devices. The reactor is the heart of a nuclear power plant.

40  
41 **Reference man**

42 A person with the anatomical and physiological characteristics of an average individual which is  
43 used in calculations assessing internal dose (also may be called "Standard Man").

1 **REM**

2 The acronym for Roentgen Equivalent Man is a standard unit that measures the effects of  
3 ionizing radiation on humans. The dose equivalent in rems is equal to the absorbed dose in rads  
4 multiplied by the quality factor of the type of radiation (see 10 CFR 20.1004).  
5

6 **Restricted area**

7 Any area to which access is controlled for the protection of individuals from exposure to  
8 radiation and radioactive materials.  
9

10 **Risk-informed regulation**

11 Incorporating an assessment of safety significance or relative risk in NRC regulatory actions.  
12 Making sure that the regulatory burden imposed by individual regulations or processes is  
13 commensurate with the importance of that regulation or process to protecting public health and  
14 safety and the environment.  
15

16 **Rubblization**

17 A decommissioning technique involving demolition and burial of formerly operating nuclear  
18 facilities. All equipment from buildings is removed and the surfaces are decontaminated.  
19 Above-grade structures are demolished into rubble and buried in the structure's foundation below  
20 ground. The site surface is then covered, regraded and landscaped for unrestricted use.  
21

22 **Runoff**

23 Water from precipitation or irrigation that flows over the ground and does not infiltrate the  
24 ground surface. It may collect pollutants from the land and carry them into receiving water  
25 bodies.  
26

27 **Sealed source**

28 Any radioactive material or byproduct encased in a capsule designed to prevent leakage or escape  
29 of the material.  
30

31 **Secondary radiation**

32 Radiation originating as the result of absorption of other radiation in matter. It may be either  
33 electromagnetic or particulate in nature.  
34

35 **Sievert (Sv)**

36 The new international system (SI) unit for dose equivalent equal to 1 Joule/kilogram. 1 sievert =  
37 100 rem.  
38

39 **Somatic effects of radiation**

40 Effects of radiation limited to the exposed individual, as distinguished from genetic effects,  
41 which may also affect subsequent unexposed generations.  
42

43 **Source material**

44 Uranium or thorium, or any combination thereof, in any physical or chemical form or ores that  
45 contain by weight one-twentieth of one percent (0.05%) or more of (1) uranium, (2) thorium, or  
46 (3) any combination thereof. Source material does not include special nuclear material.

1 **Special nuclear material**

2 Plutonium, uranium-233, or uranium enriched in the isotopes uranium-233 or uranium-235.

3  
4 **Spent (or depleted) nuclear fuel**

5 Fuel that has been removed from a nuclear reactor because it can no longer sustain power  
6 production for economic or other reasons.

7  
8 **Steel slag**

9 A solid made of the silicate and oxide components found in iron, which are considered  
10 undesirable in steel. It is a by-product formed during the removal of excess quantities of carbon  
11 and silicon from iron in the production of steel.

12  
13 **Stochastic effects**

14 Effects that occur by chance, generally occurring without a threshold level of dose, whose  
15 probability is proportional to the dose and whose severity is independent of the dose. In the  
16 context of radiation protection, the main stochastic effects are cancer and genetic effects.

17  
18 **Storm water discharge associated with industrial activity**

19 Discharge from any conveyance that is used for collecting and conveying storm water and that is  
20 directly related to manufacturing, processing or raw materials storage areas at an industrial plant  
21 (see 40 CFR 122.26(b)14).

22  
23 **Survey meter**

24 Any portable radiation detection instrument especially adapted for inspecting an area or  
25 individual to establish the existence and amount of radioactive material present.

26  
27 **Terrestrial radiation**

28 The portion of the natural background radiation that is emitted by naturally occurring radioactive  
29 materials, such as uranium, thorium, and radon in the earth.

30  
31 **Thermal neutron**

32 Neutrons that have been slowed to the degree that they have the same average thermal energy as  
33 the atoms or molecules through which they are passing. The average energy of neutrons at  
34 ordinary temperatures is about 0.025 eV, corresponding to an average velocity of  
35  $2.2 \times 10^3$  m s<sup>-1</sup>.

36  
37 **Thermal power**

38 The total core heat transfer rate to the reactor coolant.

39  
40 **Thermal reactor**

41 A reactor in which the fission chain reaction is sustained primarily by thermal neutrons. Most  
42 current reactors are thermal reactors.

43  
44 **Transuranic Element**

45 An artificially made, radioactive element that has an atomic number higher than uranium in the  
46 Periodic Table of Elements such as neptunium, plutonium, americium, and others.

1 **Transuranic Waste**

2 Waste containing more than 100 nCi/g of alpha-emitting transuranic isotopes per gram of waste,  
3 with half-lives greater than 20 years.

4  
5 **Turbine**

6 A rotary engine made with a series of curved vanes on a rotating shaft, usually turned by water or  
7 steam. Turbines are considered the most economical means to turn large electrical generators.

8  
9 **Turbine generator (TG)**

10 A steam (or water) turbine directly coupled to an electrical generator. The two devices are often  
11 referred to as one unit.

12  
13 **Unrestricted area**

14 The area outside the owner-controlled portion of a nuclear facility (usually the site boundary). An  
15 area in which a person could not be exposed to radiation levels in excess of 2 millirem in any one  
16 hour from external sources (see 10 CFR 20.1003).

17  
18 **Uranium fuel fabrication facility**

19 A facility that (1) manufactures reactor fuel containing uranium for any of the following (I)  
20 preparation of fuel materials; (ii) formation of fuel materials into desired shapes; (iii) application  
21 of protective cladding; (iv) recovery of scrap material; and (v) storage associated with such  
22 operations; or (2) conducts research and development activities.

23  
24 **Uranium hexafluoride production facility**

25 A facility that receives natural uranium in the form of ore concentrate; processes the concentrate  
26 and converts it into uranium hexafluoride (UF<sub>6</sub>).

27  
28 **Waste, radioactive**

29 Radioactive materials at the end of a useful life cycle or in a product that is no longer useful and  
30 should be properly disposed of.

31  
32 **Watt**

33 An electrical unit of power. 1 watt = 1 Joule/second. It is equal to the power in a circuit in which  
34 a current of one ampere flows across a potential difference of one volt.

35  
36 **Watt-hour**

37 An electrical energy unit of measure equal to 1 watt of power supplied to, or taken from, an  
38 electrical circuit steadily for 1 hour.

39  
40 **Whole-body counter**

41 A device used to identify and measure the radioactive material in the body of human beings and  
42 animals. It uses heavy shielding to keep out naturally existing background radiation and  
43 ultrasensitive radiation detectors and electronic counting equipment.

1 **Whole-body exposure**

2 For purposes of whole body exposure includes at least the external exposure, head, trunk, arms  
3 above the elbow, or legs above the knee. Where a radioisotope is uniformly distributed  
4 throughout the body tissues, rather than being concentrated in certain parts, the irradiation can be  
5 considered as whole-body exposure (see also 10 CFR 20.1003).  
6

7 **Wipe sample**

8 A sample made for the purpose of determining the presence of removable radioactive  
9 contamination on a surface. It is done by wiping, with slight pressure, a piece of soft filter paper  
10 over a representative type of surface area. It is also known as a "swipe or smear" sample.  
11

12 **X-rays**

13 Penetrating electromagnetic radiation (photon) having a wavelength that is much shorter than  
14 that of visible light.  
15

1  
2  
3  
4

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