10.0 GLOSSARY

Accessible Soils: Hanford soils that are not behind security fences must meet a 10 mrem/yr effective dose equivalent (EDE) limit from Hanford Site operations to the most exposed member of the public.

As Low As Reasonably Achievable (ALARA): The implementation of ALARA is described in HNF-PRO-1620, *ALARA Program Scope*. This concept applies to maintaining releases at or below prescribed regulatory limits.

Average Soil Contamination: Contamination generally dispersed through the soil. Numerically, the radioactivity content averaged over a suitable mass of soil.

Background Radiation: Refers to regional levels of radioactivity produced by sources other than those of specific interest (e.g., the nuclear activities at the Hanford Site).

Becquerel (Bq): The standard international unit of radioactivity. One Becquerel is one disintegration per second or: Bq = 2.7 E-11 Ci

Biological Transport: Means of biological transport may include one or more of the following processes:

- Movement of subsurface radioactivity to the surface by physiological vegetative processes.
- Dispersion of such vegetation by the wind.
- Contaminated urine and feces deposited by animals that have gained access to and ingested radioactive materials.
- Contaminated animals themselves that have ingested radioactive materials directly or ingested other contaminated animals or plants.
- Physical displacement of radioactive materials by burrowing animals.
- Nests built using contaminated materials.

Biota: The plant and animal life of a specific region.

Burial Ground: A land area specifically designated to receive contaminated solid or solidified liquid waste packages and equipment. The contaminated articles are usually placed in trenches and covered with overburden.

Byproduct: A material that is not one of the primary products of a production process and is not solely or separately produced by the production process. Examples are process residues such as slag or distillation column bottoms. The term does not include a coproduct that is produced for the general public's use and is ordinarily used in the form in which it is produced by the process.

Calibration: Determining the deviation of an instrument from a standard traceable to the National Bureau of Standards or other recognized agency and reporting the deviations and/or eliminating them by adjustment.

Chemical Processing: Chemical treatment of material to separate desired components selectively. At the Hanford Site, plutonium, uranium, and fission products were chemically separated from irradiated fuels.

Committed Dose Equivalent: The predicted total dose equivalent to a tissue or organ over a 50-year period after a known intake of a radionuclide into the body. It does not include contributions from external dose. Committed dose equivalent is expressed in units of rem (or sievert).

Committed Effective Dose Equivalent: The sum of the committed dose equivalents to various tissues in the body, each multiplied by the appropriate weighing factor. Committed effective dose equivalent is expressed in units of rem (or sievert).

Composite Sample: A number of random samples initially collected from a waste and combined into a single sample; this sample is analyzed for the contaminants of concern.

***Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA)**: Commonly known as "Superfund," CERCLA was enacted to respond to uncontrolled releases of hazardous substances to the environment, primarily at inactive sites that were not adequately addressed by the *Resource Conservation and Recovery Act of 1976* (RCRA). CERCLA also applies to actively managed facilities and any onshore or offshore facility.

Controlled Area: An area where access is controlled to protect individuals from exposure to radiation and/or radioactive materials.

Contamination Area: Any area where contamination levels are greater than the values specified in Chapter 2, Table 2-2, *PHMC Radiological Control Manual*, HNF-5173, but less than or equal to 100 times those values.

Crib: An underground structure designed to receive liquid waste that percolates into the soil directly or percolates into the soil after having traveled through a connected tile field.

Decommissioning: Actions taken to reduce the potential health and safety impacts of DOE-controlled contaminated facilities. Actions could include stabilizing, reducing, or removing radioactivity or demolishing the contaminated facilities.

Decontamination: The removal of radioactive or hazardous contamination from facilities, equipment, or soils by washing, heating, chemical or electrochemical treating, mechanical cleaning, or other techniques.

Derived Concentration Guide for Public Exposure (DCG-Public): The concentration of a radionuclide in air or water that, under conditions of continuous exposure for one year by one exposure mode (e.g., ingestion of water, submersion in air, or inhalation of air), would result in an EDE equal to the annual dose limit applicable to the group exposed. For exposure of the public, the DCG is the radionuclide concentration in air or water that would result in an EDE of 100 mrem (1 mSv) to a person having the characteristics of the reference manual.

Diffuse Source: A source or sources of radioactive or chemical contaminants released into the environment that do not have a defined point or origin of release (a nonpoint source). Such sources are also known as area sources.

Disposal Facility: Any facility or part of a facility where hazardous and/or radioactive waste is intentionally placed or where any land or water wastes will remain after closure.

Ditch: An open surface site for transport of liquid wastes to a pond or trench structure designed for percolation.

Ecology: The Washington State Department of Ecology.

Effective Dose Equivalent (EDE): The summation of the products of the dose equivalent received by specified tissues of the body and a tissue-specific weighing factor. This sum is a risk-equivalent value and can be used to estimate the health-effects risk of the exposed individual. The tissue-specific weighing factor represents the fraction of the total health risk resulting from uniform whole-body irradiation that would be contributed by that particular tissue. The EDE includes the committed EDE from internal deposition of radionuclides and the EDE caused by penetrating radiation from sources outside the body. EDE is expressed in units of rem (or sievert).

Effluent: An airborne or liquid discharge from a facility after all engineered waste treatment and effluent controls have been performed. The term includes onsite discharges to the atmosphere, lagoons, ponds, cribs, injection wells, French drains, or ditches. The term does not include solid waste stored or removed for disposal or waste that is contained in retention basins or tanks before treatment and/or disposal.

Emissions Unit: Regarding air pollutant emissions, any part of a stationary source that emits or would have the potential to emit any pollutant subject to regulation.

Environmental Monitoring Plan (EMP): A two-part document prepared for each site, facility, or process that uses, generates, releases, or manages significant pollutants or hazardous materials.

Environmental Sites Database (ESD): A database of environmental sites that is administered by the ERC.

External Radiation: Radiation originating from a source outside the body.

Facility: A processing plant, tank farm, shop, laboratory, powerhouse, or laundry. Including all contiguous land and structures, other appurtenances, and improvements on land used for recycling, reusing, reclaiming, transferring, storing, and treating of dangerous waste (including treatment, storage, and disposal sites as well as groundwater wells). (40 CFR 264, "Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Facilities," and WAC 173-303-040.)

Facility-Specific Environmental Monitoring: Routine environmental monitoring of all environmental media (air, biota, etc.) around facility parameters.

Field Blank: Aliquots of analyte-free water or solvents brought to the field in sealed containers and transported to the laboratory with the sample container. Field blanks include trip blanks and equipment blanks.

Field Duplicate: Field duplicates are collected at specified frequencies and are used to document precision. The field duplicate precision depends on the variance of waste composition, sampling techniques, and analytical technique.

Fugitive Emissions: Material that is generated incidental to an operation, process, or activity and that is released or dispersed into the open air. Fugitive emissions occur via pathways that do not allow routine measurement at the point of release.

Grab Sample: A single sample removed from a sample medium over a short time interval.

Groundwater: Water that exists below the water table, also referred to as the zone of saturation. However, the capillary fringe directly above can be completely saturated if the sediment is fine enough. To avoid this ambiguous term, the use of phreatic water, which is water that enters freely into wells under both confined and unconfined conditions is suggested. Phreatic water is a term originally applied only to water that occurs in the upper part of the zone of saturation under water table conditions (unconfined groundwater or well water), but has come to be applied to all water in the zone of saturation, thus making it an exact synonym of groundwater. Above the water table is the vadose zone, where water pressures are less than atmospheric pressure. This zone still contains water, but the water is held to the soil particles or other groundwater material by capillary force. Thus, while this water still can move within the vadose zone, it cannot move out of the zone into a well or other place is exposed to atmospheric pressure. The dividing line between water in the vadose zone and phreatic water is the atmospheric pressure between the two, with the pressure of vadose water being below atmospheric pressure and that of phreatic water (i.e., groundwater) above atmospheric pressure.

High-Efficiency Particulate Air (HEPA) Filter: To qualify as a HEPA filter, a filter must achieve an efficiency of 99.97% under laboratory conditions and 99.95% after installation for the removal of airborne particulates greater than 3 E-05 cm (0.3 microns).

High-Level Nuclear Waste: Spent nuclear fuel or radioactive waste resulting directly from the dissolution and reprocessing of spent nuclear fuel. Secondary waste streams resulting from the dissolution and reprocessing of spent nuclear fuel are not considered high-level waste.

Immobile Radionuclides: All those radionuclides that are sorbed onto Hanford Site soils and usually would not migrate through the vadose zone or the groundwater below the future control zone.

Inaccessible Soils: Areas from which the general public is excluded (by fences, posting, patrols, or distance), but that are still subject to meteorological effects, are subject to a 10 mrem/yr operational EDE limit.

Inactive Crib: A crib that has been designated as permanently out of service.

Inactive Radioactive Waste Site: Any waste site that is no longer needed for current operational programs and that is not currently an active waste disposal site.

Inactive Waste Sites: Inactive waste sites include units such as burial grounds, unplanned release sites, cribs, ditches, ponds, trenches, and basins, abandoned storage areas, drains, single-shell tank piping, transfer pits, and jumper boxes.

Less Than Detectable: An analytical term for a concentration in a sample that is lower than the minimum detection capabilities of that analytical equipment or process.

Low-Level Waste: Any gaseous, liquid, or solid radioactive waste not classified as high-level waste, transuranic waste, or spent nuclear fuel, as defined by DOE Order 435.1*, Radioactive Waste Management*.

Maximum Contaminant Level (MCL): The drinking water standards specified in 40 CFR 141, "National Primary Drinking Water Regulations." See Appendix C, "Maximum Contaminant Levels."

Mean: Average value of a series of measurements.

Minimum Detection Limit: Smallest amount or concentration of a radionuclide or nonradioactive element that can be reliably detected in a sample.

Mixed Waste: Dangerous waste that also contains enough radioactivity to be classified as radioactive waste.

Monitoring System: Instrumentation that provides measurement of an airborne or liquid waste stream parameters. The system includes a detector and associated readout components. A continuous monitoring system measures the stream parameters on a near-real-time basis or as specified in applicable Environmental Protection Agency regulations, 40 CFR 52, "Approval and Promulgation of Implementation Plans," Appendix E; 40 CFR 51, "Requirements for Preparation, Adoption, and Submittal of Implementation Plans," Appendix P, or as defined in

applicable American National Standards Institute standards. A radiation monitoring system is a system in which radiation or radioactivity is the measured parameter. An integrating monitoring system totals the instantaneously measured parameter over some time period. A sampling system does not measure or read out an instantaneous stream parameter.

Near Facility Environmental Monitoring: The collection and analysis of samples of air, water, soil, biota, and other media near nuclear facilities on DOE sites and their environs and the measurement of external radiation to demonstrate compliance with applicable standards and assess radiation exposures to employees and members of the public, and the near-field environment.

Nonroutine Activities: Any actions on a large-scale (>5 acres), including stabilization, soil removal, fixative or sealant application, other surface treatments, or other activities that could affect future remediation activities in an inactive waste site.

Not Detected: A reporting term which describes any or all of the following: the overall analytical error was greater than the radionuclide concentration itself; or, after allowing for the subtraction of the background level of the radionuclide, the resulting concentration was less than zero; or, no radio analytical peak was detected during the analysis.

Operations: In this report, this term loosely refers to Fluor Project Hanford activities including chemical processing, waste management, and decommissioning.

Pesticide: As defined in 40 CFR 162, the term pesticide covers all pest-control chemicals such as herbicides, rodenticides, and insecticides.

Plutonium Processing and Handling Facility: Any facility constructed primarily to process plutonium (including plutonium-238) and that handles in-process plutonium.

Plutonium Storage Facility: Any facility constructed to store strategic (category I) quantities of plutonium.

Point Source: A single defined point (origin) of an airborne release, such as a vent or stack.

Pond: A surface impoundment used to contain or percolate low-level liquid radioactive waste, mixed waste, or hazardous waste.

Quality Assurance (QA): A process designed to maintain the quality of the results of a program within established limits of acceptance.

Radiation Survey: Evaluation of an area or object with portable instruments to identify radioactive materials and radiation fields present.

Radioactive Byproduct: Any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or using special nuclear material. The nonradioactive hazardous component of the waste material will be subject to regulation under the RCRA.

Radioactive Liquid Effluent: A liquid effluent that has a reasonable potential for containing radioactive materials in quantities such that the annual average concentration is equal to or greater than the MCL.

Radiological Control Area: An area where access is controlled to protect individuals from exposure to radiation and/or radioactive materials. Radiological control areas include, but are not limited to, areas posted as Radiation Area, Surface Contamination, and Underground Radioactive Materials, to describe the radiological condition of the area within.

Radiological Posting: Information in the form of signs and barriers to inform people of radiological conditions that warrant avoidance or special precautions for entry.

Representative Sample: The average stream parameter being measured occurs in the sample in the same average proportion that it occurs in the environmental discharge.

Retired Waste Site: A waste site that is isolated and no longer available to receive waste in any form.

Routine Activities: Any actions on a small-scale (<5 acres), including radioactive hot-spot removal, vegetation removal, fencing, posting, herbicide spraying, stabilization, or immediate spill response) in an inactive waste site. In general, these routine actions shall not interfere with RCRA/CERCLA response or site investigations.

Sampling System: Instrumentation and equipment that remove a part of a liquid or airborne waste stream for subsequent quantitative determination of stream parameters. The system generally employs such devices as filters, other sample collection media, or effluent traps of some kind. A continuous sampling system removes a part of the stream continuously except during sample change, maintenance, repair, or other necessary outages. A grab sampling system removes an instantaneous part of the stream or removes a part of the stream over a time period.

Sediment Column: The sediment beneath a crib. It can mean either all the sediment beneath the bottom of the crib extending to the water table or all sediment beneath a crib contaminated by radioactive materials.

Site: The location of a significant event, a prehistoric or historic occupation or activity, or a building or structure (whether standing, ruined, or vanished) where the location itself maintains historical or archeological value, regardless of the value of any existing structure.

Soil at depth: Soil below 91 cm (36 in.).

Soil Contamination: Contaminated soil not releasable in accordance with DOE Order 5400.5.

Solid Waste: Any discarded material that is not excluded by WAC 173-303-017(2) or that is not excluded by a variance granted under WAC 173-303-017(5). Materials are solid waste if they are: (1) abandoned by being disposed of, burned, or incinerated, or (2) accumulated, stored, or treated (but not recycled) before (or in lieu of) being abandoned by being disposed of, burned, or incinerated. In addition, a solid waste includes any material considered to be inherently waste-like.

Speck Contamination: Single grains of soil, rust particles, feces, or pieces of vegetation.

Spot Contamination: A spot or quantity of contamination less than 1 cm^3 in volume, or areal contamination less than 15 cm^2 in area.

Stabilization: The process of covering surface contaminated areas with clean backfill or topsoil.

Standard: A specified set of rules or conditions concerned with the classification of components; delineation of procedures; definition of terms; designation of materials, performance, design, or operations; or measurements of quality in describing materials, products, systems, services, or practices. A standard is more general than a procedure or specification and more specific than a criterion.

Standard Deviation: A measure of the range of values about the mean.

Standard Error of the Mean: A measure of the uncertainty in the estimated mean of averaged values.

Surface Soil: Soil from 0 cm (0 in.) to 5 cm (2 in.) deep.

Surplus Facilities: Surplus facilities include all facilities that have been accepted into a decommissioning program.

Survey: A method to detect the release, disposal, or presence of radioactive materials or hazardous substances under a specific set of conditions to determine actual or potential hazards. Such an evaluation may include, but is not limited to, tests, physical examinations, and measurements of radiation or concentrations of materials.

Suspect Waste Site: A site, believed to have been previously unknown or undocumented, that, because of characteristics present at the site or historical information about the site, is suspected of containing waste (i.e., non-dangerous, hazardous, dangerous, mixed, and radioactive).

Tank Farm: An area of large underground tanks designed to store up to 1 Mgal each of high-level liquid waste.

Thermoluminescent Dosimeter: A chip or series of chips used for measuring external gamma radiation. It consists of a material capable of absorbing energy imparted by ionizing radiation, then emitting light as a result of thermal stimulation. A measure of that light is proportional to the radioactivity absorbed.

Topsoil: The soil used as a plant growth medium at the surface to a depth of 30 cm as measured at the restabilization site. Topsoil is added soil to support the stabilization of a retired disposal facility with the objective of controlling erosion, establishing the growth of perennial grasses, and preventing the growth of deep-rooted vegetation.

Total Analytical Uncertainty: All analytical measurements include some degree of uncertainty as a consequence of a series of unavoidable and unintentional inaccuracies related to the collection and analysis of samples. Examples of these inaccuracies can include errors associated with reading and recording results, sample handling and processing, instrument calibrations, numerical rounding, and randomness of radioactive decay. The total analytical uncertainty value implies that approximately 95% of the time a recount or reanalysis of the sample would give a value somewhere in the range between the initial reported value plus or minus the total analytical uncertainty.

Transuranic (TRU) Radionuclide: Any radionuclide having an atomic number greater than 92 (DOE Order 435.1).

Transuranic Waste: Without regard to source or form, radioactive waste that at the end of institutional control periods is contaminated with alpha-emitting transuranium radionuclides with half-lives greater than 20 years and concentrations greater than 100 nCi/g (3700 Bq/g). The Waste Isolation Pilot Plant, high-level waste, and spent nuclear fuel as defined by DOE Order 435.1 are specifically excluded from this definition.

Trip Blank: A type of field blank used to accompany sample containers to and from the field and to detect contamination or cross-contamination that occurs during sample handling and transportation.

Uncontaminated Soil: A soil or a land area that requires no controls or restrictions in any way for radiation protection purposes and/or meets the contamination limit specifications.

Underground Radioactive Material: A radiological posting status where subsurface radioactivity is present but where surface contamination does not exceed the soil standards.

Unity Rule: If more than one radionuclide is present, the sum of the fractions represented by each radionuclide concentration divided by its respective limiting concentration (administrative control value) shall not exceed unity. This rule could also apply to parameters other than radionuclide concentration.

Unplanned Release Site: An area that was contaminated by an unplanned release of radioactive contamination, making it a radiological control area.
Unrestricted Release: Values below which unrestricted release of soils will occur will be

defined in an applicable record of decision.

U.S. Environmental Protection Agency (EPA): The federal agency chartered with carrying out and monitoring the environmental regulations.

Waste Information Data System (WIDS): A database that identifies waste management units on the Hanford Site. It is a subset of the ESD.

Waste Management: The activity involved with storing, disposing of, shipping, handling, and monitoring all radioactive waste.

Waste Sites: Any facility used for the planned disposal of hazardous, radioactive, toxic, or nonradioactive/nontoxic waste.

Water Table: The upper boundary of an unconfined aquifer below which saturated groundwater occurs.

Table 10-1. Radionuclide Nomenclature.

Radionuclide	Symbol	Half-Life
Tritium	^{3}H	12.3 yr
Beryllium-7	^{7}Be	53.28 d
Carbon-14	^{14}C	5.72E+03 yr
Sodium-22	^{22}Na	2.6 yr
Potassium-40	^{40}K	1.26 E+09 yr
Argon-41	^{41}Ar	1.8 h
Chromium-51	^{51}Cr	27.7 d
Manganese-54	^{54}Mn	312 d
Cobalt-58	^{58}Co	71 d
Iron-59	^{59}Fe	45 d
Cobalt-60	^{60}Co	5.3 yr
Nickel-63	^{63}Ni	100 yr
Zinc-65	^{65}Zn	243.8 d
Krypton-85	^{85}Kr	10.7 yr
Strontium-89	^{89}Sr	50.5 d
Strontium-90	^{90}Sr	29.1 yr
Niobium-95	^{95}Nb	35.0 d
Zirconium-95	^{95}Zr	64.0 d
Technetium-99	^{99}Tc	2.12 E+05 yr
Ruthenium-103	^{103}Ru	39.4 d
Ruthenium-106	^{106}Ru	1.0 yr
Tin-113	^{113}Sn	115 d
Antimony-124	^{124}Sb	60 d
Antimony-125	^{125}Sb	2.7 yr
Iodine-129	^{129}I	1.7 E+07 yr
Iodine-131	^{131}I	8.0 d
Barium-133	^{133}Ba	10.53 yr

Radionuclide	Symbol	Half-Life
Cesium-134	^{134}Cs	2.1 yr
Cesium-137	^{137}Cs	30.3 yr
Cerium-141	^{141}Ce	32.5 d
Cerium-144	^{144}Ce	284.6 d
Promethium-147	^{147}Pm	13.4 min
Europium-152	^{152}Eu	13.5 yr
Europium-154	^{154}Eu	8.6 yr
Europium-155	^{155}Eu	4.7 yr
Thallium-208	^{208}Tl	3.1 min
Bismuth-212	^{212}Bi	60.6 min
Lead-212	^{212}Pb	10.6 h
Polonium-212	^{212}Po	0.3×10^{-6} s
Polonium-216	^{216}Po	0.15 s
Radon-220	^{220}Rn	55.6 s
Radium-226	^{226}Ra	1.60 E+03 yr
Radium-228	^{228}Ra	5.75 yr
Thorium-232	^{232}Th	1.40 E+10 yr
Uranium Total	U or Uranium	4.50 E+09 yr
Uranium-234	^{234}U	2.40 E+05 yr
Uranium-235	^{235}U	7.00 E+08 yr
Uranium-236	^{236}U	2.30 E+07 yr
Uranium-238	^{238}U	4.50 E+09 yr
Plutonium-238	^{238}Pu	87.7 yr
Plutonium-239/240	$^{239,240}Pu$	2.40 E+04 yr
Plutonium-241	^{241}Pu	14.4 yr
Americium-241	^{241}Am	433 yr

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