GLOSSARY

SECTION I – ABBREVIATIONS AND ACRONYMS

ACGIH – American Conference of Governmental Industrial Hygienists
AED – aerodynamic equivalent diameter
ALI – annual limit on intake
AM – areal mass
AMAD – activity median aerodynamic diameter
AMCCOM – U.S. Army Armaments, Munitions, and Chemical Command
AMTD – activity median thermodynamic diameter
ANSI – American National Standards Institute
APFSDS-T – armor-piercing fin stabilized discarding sabot with tracer
API – armor piercing incendiary
ARF – airborne release fraction
ARR – airborne release rates
BDAT – Battle Damage Assessment Team
BFV – Bradley Fighting Vehicle
Bq – bequerels
BR – breathing rate
C – centigrade
CDE – committed dose equivalent
CE – collection efficiency
CECOM – Communications-Electronics Command
CEDE – committed effective dose equivalent
CINDY – code for internal dosimetry
cm^2 – square centimeter
d_{ae} – particle aerodynamic size
D_g – geometric diameter
DAC – derived air concentration
DF – deposition fraction
DCF – dose conversion factor
DOD – Department of Defense
dpm – disintegrations per minute
dps – disintegrations per second
DQO – data quality objective
DOE – Department of Energy
DR – damage ratio
DU – depleted uranium
DUO_2 – DU dioxide
DUO_3 – DU trioxide
DU_3O_8 – tri DU octaoxide
EC/NBC – environmental control/nuclear, biological, and chemical
EDE – effective dose equivalent
EOD – explosive ordnance disposal

ERPG – emergency response guideline
f_b **–** fraction transferred to blood
f_k **–** fraction transferred to kidney
F – Fahrenheit
FCE – filter collection efficiency
FR – flow rate
g/cm^3 – gram per cubic centimeter
s_g **–** geometric standard deviation
GAO – General Accounting Office
GI – gastrointestinal
H – dose equivalent
HRA – health risk assessment
IAEA – International Atomic Energy Agency
ICRP – International Commission on Radiological Protection
IDLH – immediately dangerous to life or health
$K_{(t)}$ **–** resuspension factor
kg – kilogram
KEP – kinetic energy penetrator
km/hr – kilometer per hour
KPA – kinetic phosphorescence analysis
L/min – liter per minute
LAR – Logistics Assistance Representative
LB – lower bound
LPF – leakpath factor
LUDEP – Lung Dose Evaluation Program
μCi – microcurie
μg – microgram
μm – micrometer
MAR – material-at-risk
mg – milligram
mg/m^3 – milligram per cubic meter
MLV – most likely value
mm – millimeter
mrem – millirem
NBC – nuclear, biological, and chemical
NCRP – National Council on Radiation Protection and Measurements
NRC – Nuclear Regulatory Commission
ORNL – Oak Ridge National Laboratory
OSAGWI – Office of the Special Assistant for Gulf War Illnesses
OSHA – Occupational Safety and Health Administration
pCi – picocuries
PDF – probability distribution function
PEL – permissible exposure limit
PNNL – Pacific Northwest National Laboratory

PPE – personal protective equipment
Pr – protactinium
Pu – plutonium
Q – quality factors
RADCON – radiation control
RBD – radiological bioassay and dosimetry
RF – respirable fraction
SA – surface area
SI – small intestine
SIR – soil ingestion rate
SpA – specific activity
STEL – short-term exposure limit
STO – soft tissue component
Sv – seivert
t_{exp} – exposure time
T_b – biological half times
$T_{1/2}$ – solubility and dissolution half time
TEDE – total effective dose equivalent
TEEL – temporary emergency exposure limit
Th – thorium
TLV – Threshold Limit Value
TWA – time weighted average
UB – upper bound
UN – United Nations
UO_2 – uranium dioxide
UO_3 – uranium trioxide
U_3O_8 – tri-uranium octaoxide
USACHPPM – U.S. Army Center for Health Promotion and Preventive Medicine
USEPA – U.S. Environmental Protection Agency
UXO – unexploded ordnance
V – volume
VA – Veteran's Affairs
W_R –radiation weighting factors
W_T – organ or tissue weighting factor

SECTION II - TERMS

Absorbed Fraction – Fraction of energy emitted as a specified radiation, R, in a specified source tissue, S, which is absorbed in a specified target tissue, T. [AF (T←S)$_R$]

Absorption – Movement of material from compartment to blood regardless of the mechanism. In the respiratory tract, it applies to dissociation of particles and the uptake into blood of soluble substances and material dissociated from particles.

Absorption Type – Respiratory tract model developed in ICRP-66 replaces the ICRP-30 respiratory tract model. In ICRP-66, the term dissolution or absorption type was introduced to replace the clearance classes in ICRP-30. The absorption types are Type F for fast absorption, formerly called Class D; Type M for moderate absorption, formerly called Class W; and Type S for slow absorption, formerly called Class Y.

Accuracy – Comparison of a measurement to the true value of a parameter, a function of both bias and precision.

Activity - Number of nuclear transformations occurring in a given quantity of material per unit time (see curie).

Activity Median Aerodynamic Diameter - Diameter in an aerodynamic particle size distribution for which the total activity above and below this size are equal. A lognormal distribution of particle sizes is assumed. The AMAD refers to the entire distribution. The AMAD is the AED for which one-half of the radioactivity in a distribution has an AED smaller than the AMAD and one-half of the radioactivity in a distribution has an AED larger than the AMAD. The AMAD (along with the associated σ_g) is the most useful diameter for characterizing the behavior of the aerosol in air, in sampling instruments, and in the respiratory tract. A lognormal distribution of particle sizes is usually assumed.

Activity Median Thermodynamic Diameter - Particle diameter (thermodynamically classified) for which 50 percent of the activity in the aerosol is associated with particles of thermodynamic diameter greater than the AMTD. A lognormal distribution of particle sizes is usually assumed.

Acute Exposure - Length of exposure for battlefield conditions, which does not exceed one hour.

Aerodynamic Diameter - Diameter (μm) of a unit density (1 g/cm^3) sphere that has the same terminal settling velocity in air as the particle of interest. Same as AED.

Aerodynamic Equivalent Diameter - Diameter of a sphere, in μm, of unit density (1 g/cm^3) that has the same terminal settling velocity in air as the particle of interest (1 μm AED particle has 1000 times the volume of a 0.1 μm AED particle). The AED refers to an individual particle.

Aerosol - Suspension of fine solid or liquid particles in a gaseous medium.

Aerosolization - Process by which aerosols are produced during hard-target perforations or during fires. Synonymous with aerosol production.

Aerosol Production - Process by which aerosols are produced during hard-target perforations or during fires. Synonymous with aerosolization.

Agglomerates – Formation of clusters or cubes of aerosol particles that are formed from highly charged small particles such as those found in dense smoke or metal fumes.

Agglomeration - Process by which particles are composed of smaller particles that are attracted to and collide with larger particles or to each other and travel together in the atmosphere as a single particle.

Airborne Concentration - Amount of particulate matter or material in a unit volume of aerosol, usually expressed in $\mu Ci/cm^3$, $\mu Ci/mL$ or $\mu Ci/m^3$ (see mass concentration).

Airborne Release Fraction - Fraction of affected material that can be suspended in air and become available for transport as a function of time.

Airborne Release Rate - Fractional rate of affected material that is suspended into air and becomes available for transport as a function of time.

Alpha Particle - Positively charged particle ejected spontaneously from the nuclei of some radioactive elements (for example, U-238, U-234, TH-230, U-235 and Pa-231). The alpha particle is identical to the helium nucleus. It is comprised of two neutrons and two protons and has a mass number of 4 and an electrostatic charge of plus 2.

Annual Limit on Intake - Activity in μCi of a radionuclide which taken alone would irradiate a person represented by Reference Man, to a limit established by a regulatory agency for each year of occupational exposure.

Biokinetic Model - Set of mathematical relationships formulated to relate the intake of a material to the uptake, distribution, and retention of the material or radionuclide in various organs and tissues of the body. Some models include subsequent excretion from the body by various pathways.

Body Burden - Total amount of material present in a biological system or total body as is the case of radioactive material.

Breathing Zone - Region adjacent to a worker's nose and mouth from which air is drawn into the respiratory tract while performing the assigned work.

Central Tendency – Statistical descriptive measure that indicates where the center or most typical value of a data set lies. There are three measures of central tendency: the mean, the median, and the mode. The mean and median apply only to quantitative data, where the mode can be used with either quantitative or qualitative data. For a normal distribution, the mean, median, and mode are the same value.

Class - Respiratory tract inhalation classification scheme developed in ICRP-30 for inhaled material according to its rate of clearance from the pulmonary region of the respiratory tract. Materials are classified as D, W, or Y, which applies to a range of clearance half times: Class D (days) or less than 10 days; Class W (weeks) from 10 days to 100 days; and Class Y (years) greater than 100 days.

Clearance Pathway - Routes by which material deposited in the respiratory tract can move into the blood, lymph nodes, or bronchi.

Coagulation – Process where by aerosol particles collide with one another due to a relative motion between them and their adherence to forming larger particles. Aerosol coagulation is also known as aggregation or agglomeration. When the relative motion between particles is due to brownian motion, the process is called thermal coagulation. When the relative motion is caused by external forces such as gravity or electrical forces from aerodynamic effects, the process is called kinetic coagulation.

Committed Dose Equivalent ($H_{T,50}$) – Dose equivalent to organs or tissues (targets) of reference (T) that will be received from an intake of radioactive material by an individual during the 50-year period following the intake of DU.

Committed Effective Dose Equivalent ($H_{E,50}$) – Sum of the products of the tissue weighting factor and the radiation W_R or Q applicable to each of the body organs or tissues that are irradiated and the CDE to these organs or tissues. [$H_{E,50} = \Sigma w_t (H_{t,50})$].

Conservative – Application of a cautious approach to an analysis that is likely to produce an over estimate of the expected result. A conservative analysis involves the deliberate selection of parameter values that maximize the result.

Confidence Interval - Upper and lower boundary values of a range of statistical probability numbers.

Cooked Off – Reaction of munitions to high temperatures that result in the disassembly of the round.

Creatinine – Anhydride of creatine, being the end product of creatine metabolism, found in muscle and blood and excreted in the urine.

Curie – Unit of radioactivity equal to that quantity of radioactive material in which there are 3.7×10^{10} nuclear transformations per second or 3.7×10^{10} Bq. One µCi is equal to 3.7×10^{4} nuclear transformations per second or one-millionth part of a Ci. In the International System of Units, one Ci is equal to 3.7×10^{10} Bq.

Decay Products – New isotopes formed by the spontaneous nuclear transformation of some other radionuclide. The decay product may be either radioactive or stable.

Depleted Uranium – Uranium that is depleted in the isotope U-235 (less than 0.711 weight percent of uranium present); primary 99.8 weight percent U-238.

Deposition, Dry – Particles in the plume that are deposited on the ground surfaces by physical mechanism, such as impingement, trapping, electrostatic attraction, and chemical reactions.

Deposition Fraction - Fraction of the amount of a material inhaled that is deposited in a particular region of the respiratory tract. For an aerosol, this fraction is a function of the aerodynamic or thermodynamic diameter.

Deposition Velocity – Mass-transfer boundary at the air-surface interface, which is defined as the ratio of the deposition flux divided by the airborne contaminant concentration per unit volume at some source height.

Deposition, Wet – Particles in the plume that are leached/scavenged from atmosphere by precipitation. This is usually not significant if one is interested in long-term average results from continuous releases.

Derived Air Concentration – Concentration of a radionuclide in air that if breathed or inhaled alone for 1 work year (2000 hours) would irradiate Reference Man to the radiation safety limit for occupational exposure. The DAC equals the ALI of the radionuclide divided by the volume of air inhaled by Reference Man in a working year (that is, 2.4×10^3 m^3).

Detriment – Identification and where possible the quantification of all the deleterious effects of exposure to ionizing radiation. Total detriment is the sum of the contributions due to fatal cancers, non-fatal cancers, and severe hereditary disorders weighted for life lost.

Disintegrations per Minute – Rate of spontaneous emission of particles and energy from the unstable nucleus of an atom. The Ci is a unit of activity quantifying this process of radioactive decay.

Dissolution Rate – Rate of change of a solid into a liquid form by immersion in a fluid of suitable chemical composition or character.

Dose - Energy absorbed per unit mass of material. Also, synonymous with radiation absorbed dose.

Dose Assessment – Process of assessing/estimating the radiological dose and associated uncertainty, based on best available information. Included in this dose estimate are the use of exposure scenarios, source term data, bioassay results, monitoring or radiological survey data, and pathway analysis.

Dose Rate and Dose Rate Effectiveness Factor - Factor by which the slope of a pure linear model fitted to the data should be divided to give a lower initial slope at low doses (that is, the linear term in a linear-quadratic dose-response model).

Effective Dose Equivalent (H_E) - Sum of the products of the dose equivalent to the organ or tissue (H_T) and the weighting factors (W_T) applicable to each of the body organs or tissues that are irradiated ($H_E = \mathbf{E} W_T * H_T$).

Effective Half-Life – Time required for the amount of a contaminant deposited in a living organism to be diminished to 50 percent as a result of the combined action of radioactive decay and biological elimination. The effective half-life for U-234, U-235, U-236 and U-238 are 100 days for total body, 300 days for bone, and 15 days for kidneys.

Elimination – Removal of material from the body via urine, feces, sweat or exhalation. Excretion usually refers to elimination via urine or feces.

Enriched Uranium – Uranium that contains more U-235 than naturally occurring (greater than 0.711 weight percent of the uranium present), from 1 to greater than 90 weight percent U-235. Is not used in DOD KEPs.

Environmental control/nuclear, biological and chemical system – System found on both the Abrams Main Battle tank and the BFV that conditions air for breathing (filtering out NBC agents) as well as personal heating and cooling as required, while crewmembers are wearing protective suits and masks. The EC/NBC System on the Abrams tank also provides positive air pressure within the crew and driver's location to prevent diffusion of NBC contaminants.

Equilibrium, Radioactive – State that prevails in radioactive series when the ratios between the activities of two or more successive members of the series remains constant.

Equivalent Diameter – Diameter of the sphere that would have the same value of a particular physical property as that of the irregular particle.

Expert Judgment - Professional opinions of persons well informed in an area, which are incorporated into probability estimates. Synonymous with professional judgment.

Exposure – Event that occurs when there is contact at a boundary between a human being and a contaminant in the environment.

Exposure Assessment – Process of assessing/estimating the exposure to a contaminant and associated uncertainty, based on best available information. Included in this exposure estimate are the use of exposure scenarios, source term data, bioassay results, monitoring data, and pathway analysis.

Extrapolation - Estimation of unknown values by extending or projecting from known values.

Extrathoracic Deposition - Deposition of inhaled particles in the nose, mouth and throat. The amount of aerosol that is deposited will differ greatly between nose and mouth breathing.

Extrathoracic Fraction – Mass fraction of the inhaled particles, which do not or fail to penetrate beyond the larynx.

Fine Particle – A particle that is smaller than 2 μm AED.

Fratricide – Cause of casualties by "friendly fire", or friendly units firing on each other.

Friction Velocity – Square root of the quantity [shear stress, momentum transfer per second through a 1 cm^2 area parallel to the surface due to turbulent fluctuations divided by the density of the gas]. Units are cm/sec.

Fume - Aerosol consisting of small solid particles produced by the condensation of vapors or gaseous combustion products. The aggregate particle sizes are from 0.01 μm to 1 μm AED.

Geometric Standard Deviation – For a lognormal distribution, the exponential of the standard deviation of the associated normal distribution (always $\geq$ 1).

Health Effect - Adverse deviation in the normal function of an organ or tissue resulting from exposure and intake of a contaminant.

Half-life - Time in which one-half or 50 percent of the original amount is lost.

- Radioactive (physical) (Tp) - Time required for one-half or 50 percent of a particular radioactive material to transform or radioactively decay into another nuclear form. As used in this report this has shortened to half-life.

- Biological (Tb) - Time required for the human body to eliminate one-half or 50 percent of the material taken in by natural biological means. Synonymous with an older term, biological half time.

- Effective (Te) - Time required for a radionuclide contained in a biological system to be reduced by one-half or 50 percent as a combined result of radioactive decay and biological elimination.

$$Te \quad = \quad \frac{Tp \times Tb}{Tp + Tb}$$

Immediately Dangerous to Life and Health – Established by OSHA for compounds. Represents the maximum level that a person could escape in 30 minutes without any escape-impairing symptoms, or having irreversible health effects (TEEL-3).

Impact – Any evidence of a munition or projectile strike against any portion of the target. The projectile may not perforate the target.

Ingestion - Act or process of taking material into the body with absorption taking place in the digestive system.

- Ingestion, Direct - Act or process of taking foodstuffs, water, soil, or other substance via mouth and swallowing to GI tract.

- Ingestion, Indirect - Act or process of having material cleared from the respiratory tract via the mucociliary ladder and swallowed to GI tract.

- Ingestion, Secondary - Act or process of transferring material, that is on the hands-to-mouth and swallowing to GI tract.

Inhalability – Fraction of the suspended material in the ambient air that actually enters the nose or mouth with the inhaled volume of air.

Inhalable Fraction – Mass fraction of the total airborne particles inhaled through the nose and mouth.

Inputs – Quantities, which are factors, variables or parameters in a mathematical model.

Intake – Total amount of material that enters the body through the principal exposure routes of inhalation, ingestion (direct, indirect and secondary), or skin wounds.

- For inhalation, includes material that is immediately exhaled as well as the material retained and absorbed into the body. For small (< 1 μm AMAD) particles of Class D and Class W (or Types F and M, respectively) uranium or DU, about one-half of the intake will be absorbed by the body.

- For inhalation and ingestion of DU oxides that enter the GI tract, fraction of the material that passes from the GI tract to blood is termed the GI transfer coefficient. This depends on the solubility of the oxide. For Class D and W (or Types F and M, respectively) uranium or DU compounds, the value is 0.02. For Class Y (or Type S) uranium compounds, the value is 0.002. The GI transfer coefficients are applied to ingestion (direct, indirect and secondary) intakes of radioactive material.

Intermediate Exposure - Length of exposure, for battlefield conditions, which does not exceed a continuous 168 hours.

Isotope - One of two or more atoms having the same number of protons but different number of neutrons in their nucli. Isotopes have nearly the same chemical properties but often have different physical properties (for example, carbon-12 and carbon-13 are stable while carbon-14 is radioactive).

Kinetic Energy Penetrator – Ability of a penetrator to defeat armor because of its motion, not because of an explosive force. Both DU and tungsten penetrate armor because they possess kinetic energy. KEPs rely on perforation (mass and velocity) to defeat armor.

Likelihood - Statistical probability that a harmful effect or injury may occur as a result of exposure to a contaminant.

Lognormal Distribution – Distribution in which the logarithms of a variable (such as particle size) are normally distributed.

Long-Rod Penetrator – A KEP that resembles a 1.5 to 2 foot (0.5 meter to 0.6 meter) long, 10.8 pounds (4.8 kg) metal dart. These darts can achieve velocity up to Mach 4 when fired from a large-caliber tank gun. The long-rod penetrator defeats a tank's armor by the application of a large force to a very small area of the armor's surface. The M829A1/A2 series, 120mm and M900, 105mm DU munitions are examples of long-rod penetrators.

Lower Limit of Detection – Smallest amount of mass or radioactivity that statistically yields a net result above the laboratory method background.

Mass Concentration – Mass of particulate matter or material in a unit volume of aerosol, usually expressed in $\mu g/m^3$, mg/m^3, or g/m^3.

Mass Median Aerodynamic Diameter – Aerodynamic diameter of a particle having a median mass (that is, the masses of particles above and below this value are equal). The diameter that divides the graphical representation of the distribution of mass into two equal area segments also called the mass median diameter.

Mean – Sum of all measurements in a data set divided by the number of measurements in the data set. Also known as the Arithmetic Mean.

Median – Value in a set of measurements or probability density function such that half of the measured values are greater and half are less. For even numbers of data points, the average of the two points lying in the central position is the median.

Metabolic Model – Mathematical description of the behavior of inhaled or ingested radionuclides in the metabolic process of cells, tissues, organs and organisms (humans). Is most frequently used to describe its distribution among tissues/organs and elimination/excretion.

Micrometer – Unit of length. One micrometer (1 μm) is one millionth of a meter (1×10^{-6} meter).

Micron- Unit of length that has been replaced by the term micrometer. One micron (1 μ) is one millionth of a meter (1×10^{-6} meter).

Model – Set of constraints restricting joint values of several random variables. A hypothesis or system of belief about how a system works or response to changes in its input parameters.

Monte Carlo Simulation (or Technique) – Numerical random sampling method for generating a representative distribution of values for each of the inputs in a generic exposure (or intake) and dose equation to derive an output distribution of exposures (or intakes) and doses in a population.

Most Likely Value – Numerical value that best describes a range of data. The range has an upper-bound value and a lower-bound value. The maximum value in the range is defined, as the upper bound where as the smallest value in the range is the lower bound.

Non-Stochastic Effects – Effects for which the severity of the effect varies with the dose received and for which a threshold may exist. The following are examples of non-stochastic somatic effects that are specific to particular tissues: cell depletion in the bone marrow causing hematological deficiencies and gonadal cell damage leading to impairment of fertility. For these changes to occur, the severity of the effect depends of the magnitude of the dose received, and there is a threshold of dose below which no detrimental effects are observed.

Office of the Special Assistant to the Secretary of Defense for Gulf War Illnesses, Medical Readiness and Military Deployments – Created November 12, 1996, by the Deputy Secretary of Defense to investigate the possible causes of Gulf War Illnesses and to care for those who fought in the Gulf War.

Outlier – Values that fall well outside the overall pattern of distribution of the data.

Oxidation - Act or process of oxidizing.

Oxide - Binary chemical compound in which oxygen is combined with an element (for example, UO_2, UO_3, and U_3O_8 or DUO_2, DUO_3, and DUO_3O_8).

Parent – Radionuclide that, on nuclear transformation (disintegration), forms a specified nuclide either directly or as a later member of a radioactive series.

Particle Density – Mass of the particle itself per unit volume, usually expressed in g/cm^3, mg/m^3.

Particle Dissolution Rate – Rate at which the change of a particle from a solid to a liquid form takes place.

Particle Transport – Process that clears material from the respiratory tract to the GI tract and to the lymph nodes, and moves material from one part of the respiratory tract to another.

Percentile – Value associated with the probability that a random variable will assume values less than or equal to a given fractile. In many instances, an accumulative percentile is provided.

Perforation – Any rupture or penetration of the armored envelope caused by an impacting projectile, which results in behind-the-plate effect caused by the projectile or spall fragments. A perforation can occur only when the armor is defeated.

Precision – Repeatability or reproducibility of a measurement. Precise results have small random errors.

Probability Density Function – Graphical or tabular representation of the relative likelihood with which an unknown or variable quantity may obtain various values. The sum (or integral) of all likelihood must equal one for discrete (continuous) random variables.

Probabilistic Analysis – Analysis in which frequency (or probability) distributions are assigned to represent variable (or uncertainty) in quantities. The form of the output of probabilistic analysis is likewise a distribution.

Probabilistic Distribution – Mathematical description of the function relating probabilistics with specified intervals of values, for a random variable.

Progeny – Decay product or products resulting after a radioactive decay or a series of radioactive decays of the parent radionuclide. The progeny can also be radioactive, and the decay chain will continue until a stable nuclide is formed.

Rad - Special unit of absorbed dose. One rad is equivalent to an absorbed dose of 0.01 joule/kg or 0.01 gray.

Radioisotope - Unstable isotope that undergoes spontaneous nuclear transformation, emitting radiation.

Radionuclide - Radioactive nuclide that is characterized by the constitution of its nucleus (for example, neutrons and protons).

Random Variable – An uncertain quantity in which the value depends on chance. The likelihood of selecting any particular outcome is specified by a probability model.

Range – Difference between the largest and smallest values in a measurement data set.

Recycling Model – Particular type of biokinetic model in which the radionuclide being modeled can pass in both directions between the transfer compartment and the organs and tissues of interest. Feedback from the organs and tissues to the transfer compartment leads the possible time-related changes in the radionuclide distribution among the organs and tissues and elimination/excretion from the body.

Reference Man – Male individual who--

- Is between 20 to 30 years of age.
- Weights 154 pounds (70 kg).
- Is 5.6 feet (1.7 meters) in height.
- Lives in a climate with an average temperature of 50° Fahrenheit (F) to 68°F (10°C to 20°C).
- Has a lung mass of 1,000 grams and a kidney mass of 310 grams.
- Has a urinary daily excretion rate of 1.4 L/day.
- Is a North American in habitat and custom (ICRP-23; as updated by ICRP-66 and ICRP-70).

Rem - Special unit of any of the radiation quantities expressed as dose equivalent. The dose equivalent in rem is equal to the absorbed dose in rad multiplied by the quality factor or W_R. One rem equals 0.01 Sv. (1 mrem is 1/1000 of a rem.)

Representative Sample – Portion of the sampling medium that is of interest, or one or more separate constitutes from this medium, which has the same quality and characteristics as that possessed by the whole medium.

Respirable Fraction – Mass fraction of the inhaled particles that penetrate to the unciliated airways of the respiratory tract.

Respiratory Tract Clearance – Removal of material from the respiratory tract by particle transport and by absorption into blood.

Respiratory Tract Deposition – Initial process determining how much of the material in the inspired air that remains in the respiratory tract after exhalation. Deposition of material may occur during both inspiration and expiration.

Respiratory Tract (Lung) Model – Model that describes the behavior of particles in the respiratory tract of man. This model was developed by the ICRP's task group on lung dynamics and published in ICRP-30. This model was not used in the calculations presented in this report, because LUDEP uses the ICRP's new respiratory tract model published in ICRP-66 and ICRP-71.

Resuspension - Transport of particles from surfaces (inside and environmental) back into the atmosphere.

Retained Quantity - Amount of material which, after being taken into the body via inhalation, ingestion (direct, indirect and secondary), through an open wound, absorption through the skin, or through injection [fragment(s)], exist in the whole body, a compartment, an organ, or a tissue at a specified time.

Risk – Characterization of a situation or action wherein two or more outcomes are possible: the particular outcome that will occur is unknown and at least one of the possibilities is undesired. Risk is also the sum of the possible alternative numbers of injuries or fatalities weighted by their probabilities.

Risk Assessment - Systematic process for describing and quantifying the risk associated with a hazardous substance, processes, actions, or events. It may also be defined as a systematic process for calculating a probability distribution or similar quantification that describes uncertainty about the magnitudes, timing, or nature of the possible health or environmental consequences associated with possible exposure to specified substances, processes, actions, or events. Risk assessments consist of five interrelated but distinct steps: hazard identification, release assessment, exposure assessment, consequence/dose response assessment, and risk estimation/characterization.

Risk Characterization - Final phase of the risk-assessment process that involves evaluation and integration of the data and analysis involved in hazard identification, estimation of the source term, estimation of exposure and intake of a contaminant (upper and lower boundary). The upper-bound value is used to estimate the nature and likelihood of adverse human health effects as a result of exposure and intake of the contaminant.

Robust – Property of a decision, results or estimates such that it holds across a range of scenarios and conditions. For example, if the results from competing models lead to similar decisions, then the decision may be called robust in the face of alternative theories.

Route of Exposure - Pathway by which a contaminant actually enters or contacts the human body, such as, inhalation, ingestion (direct, indirect and secondary), dermal contact, dermal absorption, wounds, and injection (fragments).

Sabot - Lightweight carrier designed to center a projectile of a smaller caliber. The sabot is normally employed to fire the smaller caliber projectile from a larger caliber main gun; it usually is discarded a short distance from the muzzle or gun tube.

Scenario – Combination of exposure pathways used to model conceptually the possible or potential conditions, events, and processes that result in exposure to individuals or groups of people.

Sensitivity Analysis – Sensitivity of the model prediction to selected perturbation of model parameters.

Simulation – Series of mathematical calculations that attempt to predict a value or outcome. Simulation is used to explore outcomes that are not observable under the conditions of interest, or outcomes in which occurrences are potentially of concern.

Slip Correction (Cunningham Factor) – Correction to the law of fluid-flow resistance for obstacles of the order of the mean free path of the fluid molecules.

Slope Factor - Age-averaged lifetime excess cancer incidence or morbidity rate per unit exposure or intake (or unit exposure for external exposure pathways) of a radionuclide. Unit for internal exposure is excess cancer incidence or morbidity per pCi of an intake of the specified radionuclide. It is used to estimate an upper-bound probability of an individual developing cancer as a result of lifetime (chronic) exposure to a particular level of a potential carcinogen. It is also a plausible upper-bound estimate of the probability of a response per unit intake of a chemical compound over a lifetime.

Solubility - Ability of a substance to form a solution with another substance. Normally lung or tissue fluid is considered the fluid of choice.

Source Term - Amount of radionuclide or chemicals released from a source or site to the environment over a specific period for use in dose assessment or exposure assessment.

Source Tissue – Tissue (which may be a body organ) that contains a significant amount of a radionuclide following an intake of that radionuclide into the body.

Spall – Parts or fragments of a tank's armor that are broken off and blasted into the interior by an anti-tank or artillery round. Spalling can occur even when the armor is not fully penetrated.

Specific Absorbed Fraction – Fraction of energy that is emitted as a specified radiation type (alpha, beta, electron or photons) in a source organ/tissue that is absorbed in 1 gram of a target organ/tissue.

Standard Deviation – A measure of the spread in a population that has the same units as the original measurements and as the mean. The standard deviation is the square root of the variance.

Standard Error of the Mean – Standard deviation divided by the square root of the sample size. The larger the sample size the smaller the standard error of the mean.

Stochastic Effect – Effects for which the probability of an effect occurring, rather than its severity, is regarded as a function of dose. Both hereditary effects and carcinogenesis are stochastic effects.

Stokes's Law – Law that predicts the frictional force on a spherical ball moving through a viscous medium.

Superbox – A State-of-the-Art containment facility at Aberdeen Proving Grounds, Maryland capable of withstanding detonations of 100 pounds trinitrotoluene-blast equivalency. The 84-foot diameter ($\cong 1.4$ x 10^4 ft^3) vessel can accommodate a fully loaded combat vehicle. Munitions can either be fired dynamically or statically into this facility. The facility has an air filtration system having 99.97 percent removal efficiency for particles greater than 0.3 µm AED. There is a four-inch thick steel fragment shield inside the vessel to ensure no target fragments penetrate the vessel wall.

Target Tissue – Tissue (which may be a body organ) in which radiation is absorbed or where a chemical compound accumulates.

Thermophoresis – Deposition of particles on the surfaces due to the thermal flux from a hot particle to a cold surface.

Thoracic Fraction – Mass fraction of the inhaled particles that penetrate beyond the larynx.

Total Effective Dose Equivalent – Sum of the deep-dose equivalent at 1 cm (for external exposure) and the CEDE from all pathways (for internal exposures).

Tracheobronchial Fraction – Mass fraction of the inhaled particles, which penetrate beyond the larynx but which do not or fail to penetrate to the unciliated airways of the respiratory tract.

Transfer Compartment – Compartment introduced (for mathematical convenience) into the biokinetic model to account for the translocation of radioactive material through the body fluids from where they are deposited in tissues or excreted.

Transfer Rate – Fractional transfer per unit time [1/day (or 1/d)] from a compartment. The total transfer rate from a compartment refers to the sum of transfer from that compartment to all other compartments or destinations in the body.

Translocation – Movement of material that has been deposited in the respiratory tract by dissolution and absorption into the blood.

Transportable Half Time – Amount of time for half of the contaminant to be transferred to a transfer compartment.

Transuranic – An element with an atomic number greater than that of uranium. Uranium has an atomic number of 92. Neptunium (Np) has an atomic number of 93, plutonium (Pu) has an atomic number of 94, and americium (Am) has an atomic number of 95. These transuranics are found as contaminants in DU metal from reprocessed nuclear fuel.

Triangular Distribution – Maximum entropy distribution used to represent variability and uncertainty when only upper and lower bounds and an MLV are known. When uncertainties are large and asymmetric, a logtriangular distribution may be more appropriate.

Type F Material - Deposited materials that are readily absorbed into body fluid from the respiratory tract. (Fast rate of solubilization.)

Type M Material - Deposited materials that have moderate rates of absorption into body fluid from the respiratory tract. (Moderate rate of solubilization.)

Type S Material - Deposited materials that are relatively insoluble in the respiratory tract. (Slow rate of solubilization.)

Uncertainty Analysis – Analysis of the uncertainty in model prediction. The production of a PDF that describes the confidence with which it can be claimed that some characteristic of risk (probability, severity, episodic frequency, or total number of effects) lies between two values.

Up-Loaded Tank – Tank carrying an operational or combat load and mixture of munitions.

Uptake – Quantity of material that is taken up or enters the body from the location of intake. The routes of entry into the body are from the respiratory tact, GI tract, absorption through the intact skin, injection, or via a wound.

Variable – Quantity that is subject to variability. The preferred terminology is "exposure model input".

Variance – Mean value of the square of such deviation taken over the whole population.

Weathering – Process by which the redistribution of deposited material via resuspension of material in the air and subsequent dispersal by the wind or the leaching of water-soluble material into the ground. (The action of the weather on exposed materials.)

Weighting Factors –

- Organ or tissue weighting factor (W_T) – Multiplication factor by which the CDE in an organ/tissue is multiplied to yield the CEDE. This factor represents the relative contribution of that organ or tissue to the total detriment due to these effects resulting from uniformed irradiation of the whole body. (The W_T values are those given in ICRP-26.)

- Radiation Weighting Factor (W_R) – A factor Q, which is dependent on the type and energy of the radiation and is independent of the exposed organ/tissue. As used in the calculation the average Q is used for both external and internal radiation. (The Q values are those given in ICRP No. 26.)

Worst Case – Refers to conditions or situations that are thought to produce the maximum or the upper bound of exposure to DU.

Wound Compartment – Compartment in a biokinetic model whose retained quantity is the amount of material/contaminant that has not moved from the wound area to the transfer compartment.