Hanford Radiological Health and Safety Document
Forward

The Richland Operations Office (RL) and the Office of River Protection (ORP) have established a supplemental set of contractual requirements and an expectation that the contractor organizations establish the mechanisms necessary to maintain site consistency, optimize site-wide radiological programs to provide an overall benefit to the government, and support DOE in the management of long-term risks relative to radiological health and safety.

Terms used in this document are as defined in 10 CFR 835. In addition, certain other terms are defined in the attached glossary.

A. Organizational Mechanism

1. Each contractor which conducts activities in accordance with an RL or ORP approved Radiation Protection Program, as required by 10 CFR 835, shall participate in the development, maintenance and implementation of a set of site-wide radiological requirements that define the radiological practices that are in the best interests of the Hanford site. Accordingly, the participating contract organizations are expected to charter an organizational mechanism (i.e., the Hanford Radiological Control Forum) to address site-wide consistency issues, optimize radiological programs in a consistent manner to incorporate site-wide best practices, and ensure long-term management of radiological health and safety issues.

2. The chartered organization shall establish and maintain administrative protocols for the following elements:
   - Prioritization of potential issues or concerns relative to site needs,
   - Justification for decisions,
   - Cost-benefit analysis and other methods to decide between alternatives, as appropriate,
   - Submittal process to RL/ORP for review, and
   - Implementation schedule.

3. Site-wide radiological requirements derived from the above organization shall be consistent with all relevant statutory, regulatory, and contractual requirements, and shall be revised whenever necessary to ensure such consistency. Whenever there is a conflict, the applicable Radiation Protection Program takes precedence. RL/ORP shall be notified of any conflict identified by the contractor between this document and other requirements.

B. Key Radiation Protection Positions

1. The contractor shall identify those key radiation protection positions critical to effective management of the radiological health and safety program consistent with the guidance in DOE-STD-1107-97 Table 1, reaffirmed June 2005, Knowledge, Skills, and Abilities for Key Radiation Protection Positions at DOE Facilities, or equivalent.

2. The contractor shall ensure that individuals fulfilling key radiation protection positions identified above demonstrate technical competence and experience to establish, maintain, and
implement their applicable functional areas of the radiological control program, and possess the management skills to direct radiological control programs within their range of responsibility.

3. Personnel fulfilling key radiation protection positions shall be qualified in accordance with the criteria provided in Appendix A of DOE-STD-1107-97, reaffirmed June 2005, Knowledge, Skills, and Abilities for Key Radiation Protection Positions at DOE Facilities, or equivalent.

4. Staffing of the radiological health and safety organization shall be adequate to ensure safe operations.

C. Administrative Control Levels

1. A DOE maximum Administrative Control Level (ACL) of 2,000 mrem per calendar year per individual is established for all DOE activities on the Hanford Site. Approval by the applicable RL/ORP Site Manager shall be required prior to allowing an individual to exceed 2,000 mrem in a calendar year.

2. The contractor shall establish a corporate administrative control level. The specific value selected shall not exceed the DOE maximum administrative control level above.

D. Radiation Exposure to Minors

1. The contractor shall comply with the following minimum requirements for non-occupational radiation exposure to minors during access to the Hanford site:

   a. Minors are prohibited access to contamination areas (CAs), high contamination areas (HCAs), radiation areas (RAs), high radiation areas (HRAs), very high radiation areas (VHRAs), airborne radioactivity areas (ARAs), and soil contamination areas (SCAs).

   b. Minors may be permitted access to radiologically controlled areas (RCAs), radiological buffer areas (RBAs), radioactive material areas (RMAs), and underground radioactive material areas (URMAs) under the following conditions:

      1) The purpose for access to these areas is for education or contractor sponsored family days (e.g., tours of B Reactor, shadow days, “take your daughter/son to work” days).

      2) Written consent (e.g., parental consent and hold harmless clause) is granted by parent/guardian and paperwork requiring the minor’s signature is reviewed and signed by the parent/guardian.

      3) Minors entering RBAs and RMAs have completed the required orientation for escorted access.

      4) Minors are escorted by personnel trained in accordance with 10 CFR 835 and this document.

      5) Hanford dosimeters are issued for entries to RBAs and RMAs to document radiation dose in accordance with individual contractor implementing procedures.
6) For entry into an RBA for contamination control, the facility will take action to stop work that could spread contamination to the RBA during the visit and verify the accessible portion of the RBA is uncontaminated prior to entry by the visitors.
7) Handling or touching radioactive material labeled or controlled per 10 CFR 835 by the minor is prohibited.
8) Access to RBA and RMAs is prohibited in areas where whole body dose rates exceed 0.5 mrem/hr.

E. Radiological Posting, Labeling, Control and Equipment/Material Release

1. Criteria used for radiological posting and labeling shall be consistent between Hanford site contractors as members of the Hanford Radiological Control Forum.

2. The contractor shall establish radiological buffer areas for contamination control adjacent to any entrance or exit from a contamination, high contamination, or airborne radioactivity area. A radiological buffer area is not required for high contamination areas or airborne radioactivity areas that are completely within contamination areas or for inactive contamination, high contamination or airborne radioactivity areas (i.e., areas to which entry has been prohibited by postings or barricades).

3. The contractor shall establish radiological buffer areas for exposure control, as necessary, to limit whole body radiation doses to unmonitored individuals to less than 100 millirem per year.

4. The contractor shall establish soil contamination areas or underground radioactive material areas, as appropriate, for outdoor areas with known or suspect soil contamination or underground radioactive material.

5. The contractor shall ensure that postings of soil contamination areas contain the words “CAUTION, SOIL CONTAMINATION AREA” and instructions or special warnings to workers, such as “Consult With Radiological Control Organization Before Digging” or “Subsurface Contamination Exists”. In addition:

a. Any area in which the transferable contamination exceeds the appropriate “removable” levels in Appendix D, 10 CFR 835, shall be posted and controlled as either a contamination or high contamination area in accordance with the provisions of 10 CFR 835. Note, changes in environmental conditions can affect the transferability of the contamination.

b. If appropriate, direct or indirect measurement demonstrates that there is no radioactive contamination within the top 15 cm of soil for an area in which a direct contamination reading (above background) of the soil surface exceeds the appropriate “total” contamination levels in Appendix D, 10 CFR 835, then the area need not be posted or controlled as an SCA.

c. An area, which would otherwise be classified as an SCA, need not be posted and controlled as an SCA if the area is covered by a layer of impervious material, e.g., asphalt, concrete, but shall be posted at a minimum URMA.
6. The contractor shall ensure that any area within a soil contamination area or underground radioactive material area, in which an intrusive activity is performed, is posted as either a Radiological Buffer Area or a Contamination Area.

7. URMAs are exempt from the URMA posting requirements if all of the following are met:
   - The area meets the definition of a URMA as defined in the Glossary,
   - No accessible radiological hazards exist that would require other radiological posting,
   - The area has been released under an interim or final approved Record of Decision, and
   - Appropriate institutional controls have been established for the area such as:
     o specific controls included in the ROD are in place, and
     o the size, location and boundaries of the area are documented, maintained, and accessible.

8. The contractor shall ensure that members of the public shall not perform any intrusive activities within an URMA.

9. A radiological clearance (release) program shall be established to assure that real property, personal property, materials and equipment released from the Hanford Site fully comply with regulations and DOE requirements prior to radiological release of this property to the public.

10. Methods used to survey personal property, equipment and material for uncontrolled release must support a minimum statistical confidence of 67% for items determined unlikely to be contaminated and 95% for items determined likely to be contaminated.

11. Previously approved guidelines and limits (including the surface activity guidelines in Table 1) may continue to be applied and used as Pre-Approved Authorized Limits until they are replaced or revised under DOE O 458.1.
Table 1: Surface Activity Guidelines (DOE Order 5400.5 as Supplemented by DOE [1995])
Allowable Total Residual Surface Contamination (dpm/100 cm²)

<table>
<thead>
<tr>
<th>Radionuclides</th>
<th>Average c, d</th>
<th>Maximum e, f</th>
<th>Removable f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 - Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129</td>
<td>100</td>
<td>300</td>
<td>20</td>
</tr>
<tr>
<td>Group 2 - Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133</td>
<td>1,000</td>
<td>3,000</td>
<td>200</td>
</tr>
<tr>
<td>Group 3 - U-nat, U-235, U-238, associated decay products, and alpha emitters</td>
<td>5,000</td>
<td>15,000</td>
<td>1,000</td>
</tr>
<tr>
<td>Group 4 - Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90, tritium, and others noted above g</td>
<td>5,000</td>
<td>15,000</td>
<td>1,000</td>
</tr>
<tr>
<td>Tritium (applicable to surface and subsurface) h</td>
<td>N/A</td>
<td>N/A</td>
<td>10,000</td>
</tr>
</tbody>
</table>

a. As used in this table, disintegration per minute (dpm) means the rate of emission by radioactive material as determined by correcting the counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.
b. Where surface contamination by both alpha and beta-gamma emitting radionuclides exists, the limits established for alpha and beta-gamma emitting radionuclides should apply independently.
c. Measurements of average contamination should not be averaged over an area of more than 1 m². For objects of smaller surface area, the average should be derived for each such object.
d. The average and maximum dose rates associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h and 1.0 mrad/h, respectively, at 1 cm.
e. The maximum contamination level applies to an area of not more than 100 cm².
f. The amount of removable material per 100 cm² of surface area should be determined by wiping an area of that size with a dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wiping with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm² is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. It is not necessary to use wiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination.
g. This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90, which has been separated from the other fission products or mixtures where the Sr-90 has been enriched.
h. Property recently exposed or decontaminated, should have measurements (smears) at regular time intervals to ensure that there is not a build-up of contamination over time. Because tritium typically penetrates material it contacts, the surface guidelines in group 4 are not applied to tritium. The Department has reviewed the analysis conducted by the DOE Tritium Surface Contamination Limits Committee (Recommended Tritium Surface Contamination Release Guides [DOE 1991]), and has assessed potential doses associated with the release of property containing residual tritium. The Department recommends the use of the stated guideline as an interim value for removable tritium. Measurements demonstrating compliance of the removable fraction of tritium on surfaces with this guideline are acceptable to ensure that non-removable fractions and residual tritium in mass will not cause exposures that exceed DOE dose limits and constraints.
F. External Dosimetry

1. The following elements of the external dosimetry program shall be consistent between Hanford site contractors as members of the Hanford Radiological Control Forum:
   - The issuance, use and return of dosimeters by individuals.
   - The prescribed wear location for dosimetry.
   - The use of supplemental dosimeters.

2. The contractor shall ensure that individuals do not wear dosimeters issued by their organization while being monitored by dosimetry at another facility unless authorized by the resident radiological control manager. The contractor shall also ensure that individuals do not knowingly expose their dosimeters to non-occupational sources of radiation or to high temperatures.

3. The contractor shall participate in the development and maintenance of a Hanford site-wide external dosimetry technical basis document. The contractor’s external dosimetry program shall be performed in accordance with this technical basis document. Changes to the external dosimetry technical basis document shall be reviewed and endorsed by each Hanford contractor who conducts activities in accordance with an approved Radiation Protection Program.

4. The contractor shall perform a dose assessment for each instance in which a dosimeter issued to an individual becomes lost, damaged, or contaminated. This dose assessment shall become part of the individual’s radiation exposure monitoring records.

5. The contractor shall ensure that individuals that are likely to exceed the monitoring criteria established in 10 CFR 835.402 from all work performed at the Hanford site are monitored in accordance with 10 CFR 835.402, such that unmonitored exposure does not exceed the criteria in 10 CFR 835.402.

6. The contractor shall ensure that Department of Energy Laboratory Accreditation Program (DOELAP)-accredited neutron dosimetry is provided to and used whenever an individual is likely to meet or exceed any of the criteria in 10 CFR 835.402(a), and 10% or more of the dose is likely to be due to neutron exposure. The Hanford Combination Neutron Dosimeter (HCND) shall be used for personnel who are expected to receive neutron exposure on a regular basis. The contractors may use the Hanford Standard Dosimeter (HSD) for limited monitoring of neutrons where the anticipated neutron dose as read (prior to correction) is less than 100 mrem. When the HSD is to be used for limited monitoring of neutron dose, the contractor shall document the anticipated neutron energy, the likelihood of neutron energy variance and any correction factors used to adjust neutron dose in a technical assessment/basis.

7. The contractor shall ensure that individuals notify line management and the radiological control organization of pending off-site work involving expected occupational exposures to radiation or radioactive materials. If such work is authorized, records of off-site dose shall be submitted for inclusion into the individual’s radiation exposure monitoring records within 30 days upon receipt.
8. The contractor shall utilize only external dosimetry programs which have been DOELAP accredited through RL and in accordance with the site-wide external dosimetry technical basis document.

G. Internal Dosimetry

1. The contractor shall participate in the development and maintenance of a Hanford site-wide internal dosimetry technical basis document. The document shall include the technical basis for the methods and frequency of bioassay monitoring. Changes to the internal dosimetry technical basis document shall be reviewed and endorsed by each Hanford contractor who conducts activities in accordance with an approved Radiation Protection Program. The following elements of the internal dosimetry program shall be included in the internal dosimetry technical basis document:

   - Baseline bioassay monitoring requirements.
   - Routine and confirmatory bioassay monitoring requirements.
   - Follow-up bioassay monitoring requirements.
   - Termination bioassay monitoring requirements.

2. The contractor’s internal dosimetry program shall be performed in accordance with the Hanford site-wide internal dosimetry technical basis document.

3. The contractor shall ensure that appropriate bioassay monitoring methods, analytical procedures, and frequencies for the collection of bioassay samples, such as urine or fecal samples, and appropriate participation in bioassay monitoring, such as whole body or lung counting are established for personnel who are likely to receive intakes in a calendar year resulting in a committed effective dose greater than 100 mrem.

4. The contractor shall ensure that the internal dosimetry technical basis document addresses the interpretation of bioassay results and subsequent dose assessments including the following:

   a. Characteristics of the radionuclide(s), such as chemical and physical form.
   b. Bioassay results and the individual’s previous exposure history pertinent to the dose assessment.
   c. Exposure information, such as route of intake and time and duration of exposure.
   d. Biological models used for dosimetry of radionuclides.
   e. Models to estimate intake or deposition and to assess dose.

5. The contractor shall use air monitoring data to assess and assign internal dose when:

   a. The accumulated exposures to airborne radioactivity exceed 40 DAC-hrs in a calendar year, and,
   b. The minimum detectable dose for the applicable bioassay technology available at Hanford exceeds the anticipated dose (committed effective dose) from these exposures.

6. The contractor shall develop and maintain a technical basis document for the collection, analysis, and assessment of air monitoring data used to assess and assign internal dose.
7. The contractor shall utilize only direct and indirect radiobioassay programs which have been DOELAP accredited through RL.

H. Instrumentation

1. The contractor shall calibrate radiological measurement instruments and equipment with appropriate standards that are traceable to the National Institute of Standards and Technology (NIST) or equivalent international standards.

2. The contractor shall ensure that calibration of radiological measurement instruments/dosimetry is performed in accordance with one or more of the following standards, as applicable:

3. The contractor shall ensure that where an area radiation monitor is incorporated into a safety interlock system, the circuitry shall be such that a failure of the monitor either prevents entry into the area or prevents operation of the radiation-producing device.

4. The contractor shall evaluate the potential radiological consequences, and document any corrections to the original monitoring results, upon determination of the use of an out-of-calibration or failed radiation measurement instrument.

I. Radiation Safety Training

1. Individuals responsible for developing and implementing measures necessary for ensuring radiological health and safety compliance shall have the appropriate education, training, and skills to discharge these responsibilities.
At a minimum, this includes those individuals filling the following positions:

- Radiological Control Technicians
- Radiological Control Technician Supervisors
- Radiological Control Managers
- Radiological Engineers
- Radiological Control Technical Support Staff
- Designated Radiological Control Senior ALARA Committee Members
- Radiological Assessors
- Line managers responsible for radiological work activities
- Specialized radiological workers as specified in the Radiological Control Standard (e.g., containment installers, containment inspectors)

2. The contractor shall establish and maintain radiation safety training programs that utilize DOE standardized core training material to the maximum extent practical. The contractor shall supplement the radiation safety training programs with program-specific training material.

3. The contractor shall use examinations and performance demonstrations, appropriate to the level of training, for initial and requalification (not to exceed 24 months) of Radiological Worker I, Radiological Worker II, and Radiological Control Technician training.

4. The Hanford Radiological Control Forum shall ensure that radiation safety training programs, including course content, examinations, performance demonstrations, and re-qualification, for General Employee Radiological Training (GERT), Radiological Worker I (RWI), and Radiological Worker II (RWII), will be sufficiently consistent to maintain reciprocity of this training between contractors for core training materials and Hanford site-specific training.

5. The contractor shall ensure that individuals meet the applicable minimum radiation safety training requirements in Table 2 for access to areas requiring control for radiological health and safety.

6. The Hanford Radiological Control Forum shall develop and maintain a singular site radiological orientation to be presented to escorted, non-Hanford individuals prior to site access to Radiologically Controlled Areas or Radiological Areas. This orientation is to be a basic presentation that informs the escorted individual of the site-wide information needed for safe radiological access as well as meet knowledge requirements prior to occupational exposure, when appropriate. Demonstration of knowledge will not be required.

7. The Hanford Radiological Control Forum shall exercise paragraph 10 CFR 835.901(d) to the fullest extent, including the utilization of escorts for access to Radiologically Controlled Areas or Radiological Areas for short duration visits by non-Hanford individuals in lieu of training.
### Table 2.

**HANFORD SITE RADIOLOGICAL HEALTH & SAFETY MINIMUM TRAINING REQUIREMENTS MATRIX**

<table>
<thead>
<tr>
<th>AREA</th>
<th>UNESCORTED</th>
<th>ESCORTED (NON-HANFORD WORKER)</th>
<th>ESCORTED (HANFORD WORKER)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCA</td>
<td>GERT</td>
<td>ORIENTATION</td>
<td>ORIENTATION</td>
</tr>
<tr>
<td>RMA</td>
<td>GERT</td>
<td>ORIENTATION</td>
<td>GERT</td>
</tr>
<tr>
<td>URMA</td>
<td>NONE</td>
<td>NONE</td>
<td>NONE</td>
</tr>
<tr>
<td>SCA</td>
<td>GERT</td>
<td>ORIENTATION</td>
<td>GERT</td>
</tr>
<tr>
<td>RBA</td>
<td>RWI</td>
<td>ORIENTATION</td>
<td>GERT</td>
</tr>
<tr>
<td>RA</td>
<td>RWI</td>
<td>ORIENTATION</td>
<td>GERT</td>
</tr>
<tr>
<td>HRA</td>
<td>RWI plus HRA module or RWII</td>
<td>RWI plus HRA module or RWII</td>
<td>RWI plus HRA module or RWII</td>
</tr>
<tr>
<td>VHRA</td>
<td>RWI plus HRA module or RWII</td>
<td>RWI plus HRA module or RWII</td>
<td>RWI plus HRA module or RWII</td>
</tr>
<tr>
<td>CA</td>
<td>RWII</td>
<td>ORIENTATION</td>
<td>GERT</td>
</tr>
<tr>
<td>HCA</td>
<td>RWII</td>
<td>RWII</td>
<td>RWII</td>
</tr>
<tr>
<td>ARA</td>
<td>RWII</td>
<td>RWII</td>
<td>RWII</td>
</tr>
</tbody>
</table>
J. Radiological Records

1. The contractor shall manage radiological records through an established records management program(s) consistent with processes and requirements established by the contractor. The program(s) shall address the potential legal and technical use of the completed records, including long-term storage media requirements. This program(s) shall require records management of the following:

- Radiological Control Procedures.
- Individual Radiological Doses.
- Internal and External Dosimetry Policies and Procedures (including Bases Documents).
- Personnel Training (course records and individual records).
- Radiological Instrumentation Test, Repair and Calibration.
- Radiological Surveys.
- Area Monitoring Dosimetry Results.
- Radiological Work Permits.
- Radiological Incident and Occurrence Reports (and Critique Reports, if applicable).
- Sealed radioactive source accountability and control.
- Release of material to controlled areas.
- Reports of loss of radioactive material (required to be controlled and labeled in accordance with 10 CFR 835).
- Minor Consent Forms (see section D).

2. The contractor shall ensure that permanent radiological records are accurate and legible, and that all records are stored in a manner that ensures their integrity, retrievability and security.

3. The contractor shall ensure that completed records contain sufficient detail to be understandable to those that may utilize the record in the future (i.e., intelligible to a person with training and experience equivalent to that of a person with a B.S. in health physics; for the life of the record).

4. The contractor shall ensure that the following records are maintained:

a. Records of personnel radiation exposure monitoring in a centralized records database. Hanford site personnel radiation exposure monitoring records are currently maintained by the Hanford Radiological Records Program.

b. Records of radiological incidents and occurrences resulting in changes to, or conformation of, recorded exposures within personnel radiation exposure monitoring records. The contractor shall ensure that, when practicable, these records are retained in or cross-referenced to applicable personnel radiation exposure monitoring records.

c. Records of employee radiological safety concerns that have been formally investigated and documented.
d. Calibration records for the following equipment:

- Portable survey instruments.
- Bioassay measurement equipment.
- Laboratory, counting room, and fixed radiation measuring equipment.
- Process and effluent monitors and sampling equipment.
- Radiation area monitors.
- Portal monitors and other personnel contamination monitors.
- Pocket and electronic dosimeters.
- Air sampling equipment.
- Tool and waste monitoring equipment.
- Protective clothing and equipment monitors.
- Dosimetry processing instrumentation.
- Other devices used in radiation detection or measurement, as applicable.

5. The contractor shall ensure that monitoring and workplace records include sufficient information to clearly identify the location or facility, purpose, results, individual, and contractor performing the monitoring.

6. The contractor shall ensure that calibration records for instruments and equipment used for monitoring individuals, materials, and areas include frequencies, method, dates, personnel who performed the calibration, and traceability of calibration sources to National Institute of Standards and Technology or other acceptable standards.

K. Radiation Generating Devices (RGD)

1. The contractor shall maintain a current listing of RGDs. This listing shall identify the responsible individual for each listed RGD.

2. The contractor shall ensure that on-site operations of RGDs, conducted by off-site contractors, are approved by the cognizant site radiological control organization in coordination with the organization utilizing the off-site contractor. The contractor shall ensure that the off-site contractor possesses an approved DOE Radiation Protection Program, Nuclear Regulatory Commission license or Agreement State license or permit, and that operational and emergency procedures are current and available.

3. The contractor shall establish the radiological control and operational requirements for incidental electronic RGD devices such as electron microscopes, electron beam welders and field x-ray diffraction devices.
All terms used in this document are used as defined in 10 CFR 835 with the following additions:

**contamination:** The presence of residual or unwanted radioactive material resulting from a DOE activity in or on a material or property.

**direct contamination reading:** The apparent surface contamination level, expressed in disintegrations per minute per a given area, resulting when an appropriate contamination probe or detector is placed in close proximity (e.g., ~1/4 inch) to the surface, e.g., soil, in question. Appropriate efficiency and geometry correction factors should be applied to such a reading.

**dose assessment:** Process of determining radiation dose and uncertainty included in the dose estimate, through the use of exposure scenarios, bioassay results, monitoring data, source term information, and pathway analysis.

**fixed contamination:** Radioactive material that has been deposited onto a surface and cannot be readily removed by non-destructive means, such as casual contact, wiping, brushing, or laundraing. Fixed contamination does not include radioactive material that is present in a matrix, such as soil or cement, or radioactive material that has been induced in a material through activation processes.

**key radiation protection position:** A person specifically designated within the radiological health and safety organization to exercise discretionary authority and/or make independent judgments and decisions beyond those covered by established procedures concerning radiation protection issues associated with the design, construction, operation and maintenance, or decommissioning of facilities and/or activities.

**personnel dosimeters:** Devices designed to be worn by a single individual for the assessment of external equivalent dose such as film badges, thermoluminescent dosimeters (TLDs), and pocket ionization chambers.

**personnel monitoring:** Systematic and periodic estimate of radiation dose received by individuals during working hours. Also, the monitoring of individuals, their excretions, skin, or any part of their clothing to determine the amount of radioactive material present.

**radiation generating device:** A collective term for devices that produce ionizing radiation, including certain sealed sources that emit ionizing radiation, small particle accelerators used for single purpose applications which produce ionizing radiation (e.g., radiography), and electron-generating devices that produce x-rays incidentally. This term does not apply to video display terminals or other consumer products that only produce radiation considered to be background. Sealed radioactive sources that are capable of generating external radiation fields of 100 mrem/hr or greater at 30 cm from the accessible surface will be classified as an RGD.

**radioactive material:** Any material that spontaneously emits ionizing radiation (e.g., X- or gamma rays, alpha or beta particles, neutrons). The term “radioactive material” also includes
materials onto which radioactive material is deposited or into which it is incorporated. For purposes of practicality, 10 CFR 835 establishes certain threshold levels below which specified actions, such as posting, labeling, or individual monitoring, are not required. These threshold levels are usually expressed in terms of total activity or concentration, contamination levels, individual doses, or exposure rates.

**radiological buffer area (RBA):** An intermediate area established to prevent the spread of radioactive contamination and to protect personnel from radiation exposure.

**radiologically controlled area (RCA):** Any area to which access is managed by or for DOE to protect individuals from exposure to radiation and/or radioactive material. (Defined as “controlled area” in 10 CFR 835.)

**removable contamination:** Radioactive material that can be removed from surfaces by non-destructive means, such as casual contact, wiping, brushing, or washing.

**soil:** The upper layer of earth that can be tilled and in which vegetation may grow, and including organic material such as vegetation or animal wastes that are deposited or mixed into the soil, and rubblized construction or deactivation and decommissioning debris.

**soil contamination area (SCA):** An area in which radioactive material exists within the top 15 cm of soil such that:

1) A direct contamination reading of the soil surface exceeds the appropriate “total” contamination levels in Appendix D, 10 CFR 835, and  
2) The transferable contamination from the area does not exceed the appropriate “removable” levels in Appendix D, 10 CFR 835.

**soil intrusive activity:** Any human activity that disturbs the surface and/or subsurface of the soil which has a reasonable possibility of increasing the amount of transferable contamination within a soil contamination area or an underground radioactive material area.

**survey:** An evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation. When appropriate, such an evaluation includes a physical survey of the location of radioactive material and measurements or calculations of levels of radiation, or concentrations or quantities of radioactive material present.

**transferable contamination:** The total contamination levels, expressed in terms of disintegrations per minute per a given area, on items such as shoes, shoe covers, vehicle tires, tools, or other equipment which has come into contact with contaminated soils.

**underground radioactive material area (URMA):** An area that contains radioactive materials above DOE Order 458.1 Section 4.k (CRD Section 2.k) release/clearance levels below the top 15 cm of soil, or below any layer of impervious soil cover material, e.g., asphalt, concrete. Radioactive materials may include pipelines, radioactive cribs, covered ponds, covered ditches, catch tanks, inactive burial grounds, and sites of known, covered, unplanned releases (spills).
worker (Hanford): A “general employee” as defined in 10 CFR 835 who is either a DOE or DOE contractor employee assigned to the Hanford site; an employee of a subcontractor to a Hanford DOE contractor; or an individual who performs work for or in conjunction with DOE or utilizes DOE facilities on the Hanford site.

worker (non-Hanford): A “general employee” as defined in 10 CFR 835 who is not a Hanford worker.