
Commercial Services Radiation Protection Program

Revision 2

Authored By: Signature on File 10/8/2015
Michael A. Carr, CHP Date
Commercial Services Radiation Safety Officer

Reviewed By: Signature on File 10/8/2015
Ben Sklar Date
Director of Projects

Reviewed By: Signature on File 10/13/2015
Mark Ledoux Date
Corporate Radiation Safety Officer

Approved By: Signature on File 10/13/2015
Art Palmer, CHP Date
Director, Health Physics and Rad. Engineering

 Non-Proprietary Proprietary Restricted Information New Title Change Revision Rewrite Cancellation

Effective

Date Oct. 14, 2015

Table of Contents

1.0 PURPOSE AND SCOPE 3

 1.1 Purpose 3

 1.2 Scope 3

2.0 REFERENCES..... 4

3.0 GENERAL..... 5

 3.1 Definitions 5

 3.2 Responsibilities 6

 3.3 Precautions and Limitations 7

 3.4 Records 8

4.0 REQUIREMENTS AND GUIDANCE 8

 4.1 Program Administration 8

 4.2 Work Plans and Procedures 9

 4.3 Training 10

 4.4 Personnel (Occupational) Monitoring 11

 4.5 Environmental (Public) Monitoring 13

 4.6 ALARA Program 14

 4.7 Radiological Instrument Program 15

 4.8 Radiation Work Permits 16

 4.9 Radioactive Material Control 17

 4.10 Contamination Control 18

 4.11 Radiological Surveys 19

 4.12 Unconditional Release 20

 4.13 Respiratory Protection 20

 4.14 Notices and Reporting 20

5.0 ATTACHMENTS AND FORMS 22

1.0 PURPOSE AND SCOPE

1.1 Purpose

This Program procedure specifies the Radiation Protection (RP) standards and controls that shall be implemented, as applicable, for the *EnergySolutions* Commercial Services (CS) Division during field projects using our mobile NRC or applicable Agreement State radioactive material licenses in accordance with 10CFR20, Agreement State regulations and the *EnergySolutions* Corporate Radiation Safety Program. The purpose of this procedure is to establish the basic health and safety requirements and Program elements for all Commercial Services and subcontractor personnel during the handling of radioactive materials (RAM) and the conduct of radiological work during field projects using our Radiation Protection Program (RPP). Based upon these Program elements as outlined in this procedure, specific implementing procedures have been developed to help ensure compliance with the regulatory requirements and recommendations to maintain radiation exposures As Low As Reasonable Achievable (ALARA). These implementing procedures in conjunction with this Program procedure constitute the CS RPP.

1.2 Scope

This RPP shall be used by all Commercial Services and subcontractor personnel at temporary job sites where our mobile NRC or Agreement State licenses are implemented as approved by the applicable regulating body maintaining jurisdiction over the project site. As authorized by the *EnergySolutions* mobile NRC and Agreement State licenses, specific license activities that are permitted include, but are not limited to, the following:

- General handling and control of radioactive materials;
- Facility decontamination and decommissioning (D&D);
- Waste packaging or repackaging for shipment or disposal;
- Maintenance, repair, and decontamination of tools, equipment, and containers;
- Collection and analysis of radiological samples;
- Site characterization and surveys; and
- Radiation Protection training and instruction.

It should be noted that this RPP may also be implemented in full or in part under a client's radioactive materials license if the client's RPP does not address certain Program elements that are required to perform work at the project site. In the event that both the *EnergySolutions* radioactive materials license and another license are in effect at the same project site, an agreement shall be made regarding the division of responsibilities which details the specific Program elements for which each radioactive materials license holder has jurisdiction. In the event that *EnergySolutions* personnel are working under another RP Program, the CS Radiation Safety Officer, Project Health Physicist and/or designee shall perform an equivalency review of the Program to ensure it meets *EnergySolutions* RPP requirements. In the event that the existing Program does not meet

EnergySolutions' minimum requirements, the EnergySolutions Program elements as applicable shall be implemented while ensuring the requirements for the existing Program are met.

The following requirements herein are applicable only to those operations performed by Commercial Services under EnergySolutions jurisdiction.

2.0 REFERENCES

- 2.1** 10 CFR 19, *Notices, Instructions and Reports to Workers: Inspections and Investigations*
- 2.2** 10 CFR 20, *Standards for Protection Against Radiation*
- 2.3** 10 CFR 20 Subpart M, *Standards for Protection Against Radiation – Reports*
- 2.4** 10 CFR 30.50, *Rules of General Applicability to Domestic Licensing of Byproduct Material – Reporting Requirements*
- 2.5** 10 CFR 40.60, *Domestic Licensing of Source Material – Reporting Requirements*
- 2.6** 10 CFR 70.50, *Domestic Licensing of Special Nuclear Material – Reporting Requirements*
- 2.7** US NRC, NUREG 1556, Volume 18. *Consolidated Guidance About Materials Licenses, Program-Specific Guidance about Service Provider Licenses*
- 2.8** NRC Regulatory Guide 1.86, *Termination of Operating Licenses for Nuclear Reactors*
- 2.9** ES-RS-PG-001, *Radiation Safety Program*
- 2.10** ES-AD-PR-005, *First Notification*
- 2.11** ES-AD-PR-008, *Condition Reports*
- 2.12** ES-AD-PR-015, *Stop Work Order*
- 2.13** CS-RS-PG-002, *Commercial Services Respiratory Protection Program for Radionuclides – Commercial Services Projects*
- 2.14** CS-RS-PG-003, *ALARA and Dose Tracking Program*
- 2.15** CS-AD-PR-002, *Global Commercial Group – TES Services Project Records*
- 2.16** CS-RS-PR-003, *Commercial Services Field Project Training Requirements*
- 2.17** CS-RS-PR-006, *Unconditional Release of Tools, Equipment, and Waste Materials from Projects*
- 2.18** CS-RS-PR-007, *Commercial Services Radiation Safety Committee*
- 2.19** CS-RS-PR-010, *Personnel Monitoring for Exposure*

3.0 GENERAL

3.1 Definitions

- 3.1.1. *Administrative Limit* - A radiation dose limit established by EnergySolutions for the purpose of maintaining radiation dose below regulatory limits. If this limit is exceeded, it does not constitute a regulatory violation or non-compliance unless a regulatory limit is exceeded. Specific approvals are required to exceed any administrative limit.
- 3.1.2. *Annual Limit on Intake (ALI)* - The derived regulatory limit for the amount of radioactive material that can be taken into the body of an adult worker by inhalation or ingestion in a year.
- 3.1.3. *ALARA (As Low As Reasonably Achievable)* - The basic philosophy of radiation protection is to maintain radiation exposures ALARA below the regulatory requirements. "Reasonable" means the costs, benefits, and risks are considered in trying to keep doses low.
- 3.1.4. *Committed Effective Dose Equivalent (CEDE)* - The sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to these organs or tissues.
- 3.1.5. *Contamination* – Radioactivity or radioactive materials present in a location where they should not be. Contamination can take the form of:
- *Loose (Removable) Contamination* - Contamination which can be removed from surfaces by smears or swipes and may contribute to airborne radioactivity and/or personnel contamination from routine activities. Loose contamination may pose both an internal and external radiation hazard.
 - *Fixed Contamination* - Contamination that is not easily removable and may only be reduced by using approved decontamination techniques, procedures, and equipment. Fixed contamination does not readily contribute to airborne radioactivity and/or personnel contamination from routine activities. Fixed contamination may pose an external radiation hazard.
 - *Total (Direct) Contamination* - The total fixed and loose contamination on an object or surface.
- 3.1.6. *Contamination Area* - Any area accessible to personnel with loose surface contamination greater than 1,000 dpm/100cm² β-γ, 20 dpm/100cm² α, or greater than or equal to the site's regulatory guideline values.
- 3.1.7. *Control Point* – An access point to a Radiological Controlled Area.
- 3.1.8. *Effective Dose Equivalent (EDE)* – The sum of the products of the dose equivalent to the organ or tissue and the weighting factors applicable to each of the body organs or tissues that are irradiated.

- 3.1.9. *Health Physics Personnel* – Project personnel including the Radiation Protection Supervisor, the Project Health Physicist, and Health Physics Technicians (which also include Radiological Control Technicians, Radiation Protection Technicians and Radiation Safety Technicians).
- 3.1.10. *License Reciprocity* – Use of an approved NRC or Agreement State radioactive materials license at a temporary project site as authorized by and under the jurisdiction of another regulatory body (Agreement State or NRC).
- 3.1.11. *Mobile Radioactive Materials License* – A license issued by the NRC or an Agreement State that allows for work to be conducted at temporary job sites.
- 3.1.12. *Radiation Work Permit (RWP)* –An administrative mechanism used to establish radiological controls for intended work activities. The RWP informs workers of area radiological conditions and entry requirements to minimize worker exposure to radiation and radioactive materials during specific work activities.
- 3.1.13. *Radiological Controlled Area (RCA)* - Any area to which access is controlled and that is posted because of the presence of radiation or radioactive materials. Radiological Controlled Areas include Radioactive Materials Areas, Contamination Areas, High Contamination Areas, Radiation Areas, High Radiation Areas, Very High Radiation Areas, and Airborne Radioactivity Areas.
- 3.1.14. *Restricted Area* - An area having access control with the intent of preventing or controlling the radiation exposure to individuals.
- 3.1.15. *Total Effective Dose Equivalent (TEDE)* - The sum of the effective dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures). $TEDE = EDE + CEDE$
- 3.1.16. *Visitor* - Any non-EnergySolutions employee or any EnergySolutions employee or subcontractor not qualified as a Radiation Worker who requires access to Controlled Areas.

3.2 Responsibilities

Note: Depending upon personnel qualifications and the size of the project, project personnel may be assigned multiple roles and/or responsibilities.

3.2.1. Commercial Services Radiation Safety Officer

The Commercial Services Radiation Safety Officer (CS RSO) maintains and oversees the implementation of the CS Radiation Protection and Respiratory Protection Programs. The CS RSO shall ensure that radiation safety, radioactive materials management, and radiological operations procedures and programs are kept up to date such that they comply with current regulations and incorporate current and relevant industry practices and regulatory guidance.

3.2.2. Project Manager

The Project Manager (PM) is responsible for ensuring that the proper procedures and programs are implemented on the project site as required by customer agreements and contracts. The PM is responsible for ensuring that these programs and procedures are properly incorporated into project specific plans and procedures. The PM is responsible for ensuring that Commercial Services and/or client programs and procedures are available for use by field personnel.

3.2.3. Project Health Physicist

The Project Health Physicist (PHP) is responsible for assisting the CS RSO in providing health physics support to the PM and Radiation Protection Supervisor (RPS). This includes technical support to ensure procedural and regulatory compliance and to ensure that the project-specific Data Quality Objectives (DQOs) are met.

3.2.4. Radiation Protection Supervisor

The Radiation Protection Supervisor (RPS) is responsible for implementing the CS Radiation Protection and Respiratory Protection Programs and any project specific radiological requirements at the project location. The RPS manages and oversees the project personnel in regards to radiation and respiratory protection and reports directly to both the PM and the CS RSO.

3.2.5. Radiation Safety Committee

The Radiation Safety Committee (RSC) has the responsibility of overseeing the Commercial Services Radiation Protection Program as required by the Corporate Radiation Safety Program.

3.2.6. Project Personnel

All project personnel are responsible for safety at the project site including radiation safety and have the responsibility for maintaining exposures to themselves and their peers to ALARA. Each individual has the ability and responsibility to stop work in accordance with ES-AD-PR-015, *Stop Work Order* as necessary and to bring any safety issues including radiation safety to the attention of the RPS, the Project Manager, and/or the Commercial Services RSO.

3.3 Precautions and Limitations

3.3.1. This RPP is intended for the use at temporary project sites in which the EnergySolutions mobile NRC D&D license or applicable Agreement State license are implemented under the approval and jurisdiction of the NRC or an Agreement State.

3.3.2. For work outside these jurisdictions (i.e., DOE or DOD) or in conjunction with another licensee, this RPP may be implemented in whole or in part; however, an equivalency review shall be performed to

compare this RPP against the applicable regulations and existing RP Program(s) and/or a division of responsibilities established detailing those Program elements and work areas that fall under control of each respective licensee.

- 3.3.3. For instances where this RPP is not utilized while performing licensed operations under another licensee such as a licensed operating commercial nuclear power plant (NPP), the *EnergySolutions* administrative dose limits will still apply and appropriate actions must be taken to ensure that these limits are not exceeded while conducting operations under the licensee's RPP.

3.4 Records

- 3.4.1. Records pertinent to the safe decommissioning, remediation or other scope of work at each temporary job site shall be maintained. These include all regulatory correspondence and any records generated through the implementation of the CS RPP including the applicable implementing procedures.
- 3.4.2. The Project Manager and RPS shall maintain all license records generated at the project site throughout the project duration in accordance with the applicable *EnergySolutions* radioactive material license, this RPP and any regulatory requirements.
- 3.4.3. At project completion, all license records shall be organized and turned over to the Commercial Services RSO and/or designee for records maintenance in accordance with CS-AD-PR-002, *Global Commercial Group – TES Services Project Records*.
- 3.4.4. Copies of all records pertinent to the “as left” status of the job site shall be turned over to the applicable licensee for maintenance in accordance with 10 CFR 30.35(g), 10 CFR 40.36(f) and 10 CFR 70.25(g).

4.0 REQUIREMENTS AND GUIDANCE

The following radiation protection requirements and program elements are based upon regulatory requirements and recommendations.

4.1 Program Administration

- 4.1.1. While performing licensed activities under an *EnergySolutions* radioactive materials license, an Authorized User of the license and/or Radiation Protection Supervisor shall be present and available on site. These may be the same individual depending upon the project size and personnel qualifications. If one is not present, site work may continue; however, license activities may not be performed.
- 4.1.2. When implementing an *EnergySolutions* radioactive materials license in conjunction with another site licensee (i.e., multiple licenses at a project site), *EnergySolutions* shall establish, in writing, a division of responsibilities signed by the RSO of each applicable license detailing

those program elements, work areas and work tasks which will be covered by each applicable license.

- 4.1.3. When operating under the umbrella of a client's or other contractors license and RP Program, the PM, PHP and/or CS RSO shall perform and document a review of their Program to ensure that it is equivalent to the EnergySolutions RP Program and is adequate for the radiological protection of EnergySolutions personnel and subcontractors.
- 4.1.4. In the event that all or part of the EnergySolutions RP Program is implemented under the control of another licensee, a written agreement shall be established documenting those program elements that EnergySolutions shall implement.
- 4.1.5. A copy of the applicable radiation protection standards and regulations and a copy of the radioactive materials license shall be available on site either electronically or as a hard copy.

4.2 Work Plans and Procedures

- 4.2.1. A project Work Plan or plans shall be established and should include the following as applicable depending upon the scope of work:
 - A description of the facilities, equipment and work scope;
 - Types, quantities, physical and chemical form of radioactive materials to be handled;
 - Project organization including key personnel, responsibilities and qualifications;
 - Types of radiological instrumentation to be used and quality controls to be implemented;
 - Description of the types of personnel monitoring including both external and internal monitoring using dosimetry and bioassays as necessary;
 - Types and quantities of radioactive wastes which are anticipated to be generated including final disposition;
 - List of applicable implementing procedures; and
 - Other information determined necessary such as air monitoring requirements, free release limits license termination criteria, etc.
- 4.2.2. Implementing procedures shall be established for the various RP Program elements as outlined in this Program procedure as required by the scope of work and as detailed in the project Work Plan(s). A listing of the current available RP implementing procedures is provided as Attachment 5.1.
- 4.2.3. Copies of all Work Plans and RP implementing procedures shall be on site and made available to all project personnel in either hard copy format or electronically. Ensure that the working copies on site are the

most recent versions available as posted on the EnergySolutions IntraWeb or as obtained through document control.

- 4.2.4. All RP implementing procedures shall be on a biennial review cycle to ensure they are maintained current and are in compliance with the regulatory requirements and recommendations. Where applicable, procedures reviewed during the annual RPP assessment may be used to document procedural review.
- 4.2.5. All project Work Plans and procedures shall be controlled copies to ensure the most recent revisions are maintained on file with the project records with the exception of short term projects in which procedures may be obtained from the EnergySolutions IntraWeb.

4.3 Training

- 4.3.1. Specific training requirements and exemptions are provided in CS-RS-PR-003, *Commercial Services Field Project Training Requirements*.
- 4.3.2. All personnel who are permitted unescorted access to the project site including Radiological Controlled Areas (RCAs) shall receive instruction and training in radiation safety. The depth of instruction and training shall be commensurate with their job function(s) and the potential radiation safety hazards that they may encounter while on site or during work activities. Specific training may include the following as applicable:
 - Site Specific Training,
 - General Employee Radiological Training (GERT),
 - Radiation Worker,
 - Respiratory Protection,
 - Authorized User for the radioactive materials license,
 - Radiation Protection Supervisor,
 - DOT Hazmat Subpart H, and
 - Pre-natal instruction, NRC Regulatory Guide 8.13.
- 4.3.3. Refresher training shall be performed on an annual basis. To allow for training around project activities and field work assignments, current training shall have a grace period of 30 days as necessary. Longer extensions shall be requested and approved by the CS RSO on a case by case basis.
- 4.3.4. All personnel requiring unescorted access to the project site shall receive GERT training and understand the standard radiation protection rules and practices and site specific radiological hazards as part of their job function. As a minimum, this should include:
 - Site specific information including the location(s) of Radiological Controlled Areas and sources of radioactive materials, the

radionuclides of concern on site, personnel monitoring requirements and any applicable RWPs as required.

- The general hazards associated with radiation exposure and the precautions and procedures for minimizing exposure.
- Instruction on area radiological postings and controls.
- Instruction to emergency procedures in the event of a medical emergency and/or unusual event that may involve personnel exposure to radiation and radioactive materials.
- Instruction that all personnel are responsible for their own exposure as well as their peers and that they have the ability to stop work at any time for safety reasons.

4.3.5. EnergySolutions and subcontractor personnel who directly work with radioactive materials and require routine access to an RCA shall be qualified as a Radiation Worker.

4.3.6. In general, personnel who are not trained as a Radiation Worker should not be provided unescorted access to an RCA; however, in the event that access is required they shall have current GERT training and be briefed to the potential hazards present, obtain approval from the CS RSO or PHP, and be escorted by a qualified Radiation Worker at all times. At no time shall a non-Radiation Worker be allowed access to a posted Airborne Radioactivity or High Radiation Area unless required for response to a medical emergency.

4.3.7. All site visitors shall receive a general site briefing by the RPS or designee regarding the potential site hazards prior to gaining general site access. This shall include the identification of general area postings and boundaries, locations of Radiological Controlled Areas, general hazards and risks associated with radiation exposure and areas that they are authorized access.

4.3.7.1. Once briefed, all visitors shall be escorted by an assigned project employee while on site.

4.3.7.2. The site visitors briefing shall be documented by signature, date, signature of the individual providing the briefing, and record maintained on file.

4.4 Personnel (Occupational) Monitoring

4.4.1. Personnel monitoring shall be performed in accordance with CS-RS-PR-010, *Personnel Monitoring for Exposure*.

4.4.2. Personnel exposure shall be limited to the administrative limits as implemented by EnergySolutions and Commercial Services as provided in CS-RS-PR-010, *Personnel Monitoring for Exposure*.

4.4.3. A prospective evaluation of personnel radiation exposure shall be performed by the CS RSO and/or PHP prior to project mobilization as applicable to determine the exposure pathways and the personnel

monitoring requirements. Based upon this evaluation, personnel monitoring may include:

- Whole body thermo luminescent dosimeters (TLDs),
- Extremity TLDs,
- Backup dosimetry (self reading or electronic dosimeters: SRD and/or EDs),
- In-vivo bioassay or whole body counting,
- In-vitro bioassay (measurement of excreta), and/or
- Air sampling and DAC-hr tracking.

Depending upon the availability of information, this evaluation may be updated upon site arrival.

- 4.4.4. All personnel, anticipated to exceed 10% of the Federal exposure limits or 10% of the Annual Limit on Intake (ALI), are required to be monitored for exposure.
- 4.4.5. If it is determined that personnel monitoring is not necessary, the prospective evaluation must be documented with supporting information and maintained on site with the project records. This is typically addressed and incorporated as part of the project Work Plan(s).
- 4.4.6. Commercial Services projects using our RPP shall require personnel monitoring if any individual is anticipated to receive an EDE or DDE in excess of 50 mrem over the project duration; however, monitoring should be considered if the individual is anticipated to exceed an EDE or DDE of 10 mrem in one month.
- 4.4.7. Administrative dose limit extensions may be obtained provided the proper approvals are obtained from the Business Group President and the Corporate RSO.
- 4.4.8. Prior to personnel monitoring, the individual's current year to date exposure will be determined and documented in accordance with CS-RS-PR-010, *Personnel Monitoring for Exposure*
- 4.4.9. If the current year to date exposure cannot be determined, the individual shall be limited to a Total Effective Dose Equivalent (TEDE) of 100 mrem for the year.
- 4.4.10. Exposure to the embryo/fetus of a "declared" pregnant woman shall be limited to 400 mrem over the entire gestation period. Substantial variations in exposure should be avoided and administratively controlled by limiting exposure to less than 40 mrem per month.
- 4.4.11. Declaration of pregnancy shall be performed and exposures to the embryo/fetus assessed in accordance with CS-RS-PR-010, *Personnel Monitoring for Exposure* at the time of declaration.
- 4.4.12. Declared pregnant women and non-Radiation Workers shall not be permitted to enter an Airborne Radioactivity or High Radiation Area.

- 4.4.13. Visitor exposure shall not exceed an accumulated limit of 100 mrem for the year across all Commercial Services projects for that individual, without the approval of the CS RSO.
- 4.4.14. If an individual receives exposure at another facility other than *EnergySolutions*, the individual shall report their exposure to the RPS, PHP and CS RSO so their exposure records can be updated.
- 4.4.15. Any individual having a medical procedure in which they are administered medical radioisotopes shall notify the RPS, PHP and/or CS RSO in accordance with CS-RS-PR-010, *Personnel Monitoring for Exposure*.
- 4.4.16. Reports of individual monitoring results shall be made available to the individual on an annual basis or upon request by the individual.
- 4.4.17. Minors shall not receive occupational exposure under *EnergySolutions* policy.
- 4.4.18. Planned Special Exposures (PSE) are permitted only in exceptional situations separate from and in addition to the annual occupational dose limits. All PSEs shall (1) receive prior written authorization from the Business Group President and the Corporate RSO and (2) comply with all Federal and State regulations.

4.5 Environmental (Public) Monitoring

- 4.5.1. Public monitoring shall be performed in accordance with CS-RS-PR-010, *Personnel Monitoring for Exposure*.
- 4.5.2. The exposure limit for an individual member of the public shall not exceed a TEDE of 100 mrem for the year.
- 4.5.3. In the interest of ALARA, air emissions to the public shall be maintained such that an individual member of the public likely to receive the highest dose will not exceed a TEDE of 10 mrem for the year.
- 4.5.4. Public monitoring or dose evaluations may include the following:
 - Site boundary or perimeter TLDs (Quarterly exchange),
 - Site effluent monitoring,
 - Site perimeter surveys,
 - Site boundary or perimeter air sampling,
 - General Area occupational surveys and air sampling, and/or
 - Occupational exposure reports.
- 4.5.5. No individual shall be considered a member of the public while within a Restricted Area of the site.
- 4.5.6. At the end of the calendar year or the end of the project, a public dose assessment shall be performed through the assessment of public monitoring results or a dose assessment based upon site records to

document the maximum exposure estimate to a member of the public in order to ensure the public exposure limit is not exceeded.

- 4.5.7. Occupancy factors may be used as necessary to demonstrate compliance depending upon site controls and general site access that is made available to members of the public.

4.6 ALARA Program

- 4.6.1. All EnergySolutions field projects shall be performed in a manner such that all personnel exposures are maintained ALARA.
- 4.6.2. All project work plans, procedures and permits shall be written such that the ALARA principles of time, distance and shielding may be implemented as applicable.
- 4.6.3. Project personnel are responsible for their own exposures, as well as looking out for their peers. They shall be properly trained and to the best of their ability, reduce their exposure by minimizing exposure times through proper work planning, maximizing the distance between themselves and sources of radiation, using shielding as applicable and notifying others of any unusual conditions or safety concerns within the work area.
- 4.6.4. For specific project tasks or RWPs that are anticipated to exceed a total exposure in excess of 100 person-mrem or an individual dose of 50 mrem, an ALARA Job Review shall be performed in accordance with CS-RS-PG-003, *ALARA and Dose Tracking Program* by the RPS and/or PHP. Each review shall consider:
- Estimated task duration and staffing requirements
 - A review of existing radiological conditions (current surveys)
 - Applicable engineering controls that can be implemented
 - Remote handling equipment
 - Mock-up training
 - Dose reduction methods (shielding, moving sources, etc.)
 - Administrative controls
 - PPE requirements
- 4.6.5. A post job review should be performed by the RPS and/or PHP for all tasks requiring an ALARA Job Review with key personnel to document lessons learned and as a learning tool for future project work.
- 4.6.6. If the total exposures received exceed the estimates by more than 50% then a post job review shall be performed and reported to the CS RSO.
- 4.6.7. For projects in which the total project exposure is anticipated to exceed 1 person-Rem or 100 mrem to an individual, an ALARA Plan and dose goals shall be prepared by the RPS and/or PHP and approved by the CS RSO. The ALARA Plan shall include the following:

- Breakdown of the scope of work into major work and dose intensive tasks requiring an ALARA Job Review
 - Description and analysis of the work tasks to be performed
 - Review of existing radiological conditions
 - Estimates on the task durations and staffing requirements
 - Evaluation of engineering controls
 - Evaluation of administrative controls
 - Dose reduction techniques that will be implemented
 - Estimates on total and individual dose estimates per work task
 - Establishment of dose goals for tracking and performance purposes
- 4.6.8. For projects in which the total project exposure is anticipated to exceed 10 person-Rem or 1 Rem to an individual, the ALARA Plan shall be reviewed by the Radiation Safety Committee (RSC) and approved by the CS RSO and the CS Director of Radiological Engineering and Health Physics.
- 4.6.9. If the dose goals are exceeded by 50% or there are changing conditions that need to be addressed, the ALARA Plan shall be reviewed and revised as necessary.

4.7 Radiological Instrument Program

- 4.7.1. The instrument program and implementing procedures shall address instrument inventory, control, calibration, operation, response testing, maintenance, repair and quality control.
- 4.7.2. Instruments shall be identified and tracked by means of a serialized inventory system including the calibration and calibration due dates.
- 4.7.3. Radiological instruments in sufficient quantities to adequately perform the monitoring as required by the project work plans and work scope shall be available prior to beginning radiological work.
- 4.7.4. Instrumentation shall be adequate to detect the radionuclides of concern and at the detection levels and sensitivities as required by the project Work Plan(s) and scope of work.
- 4.7.5. The instrument detection sensitivities shall be documented as necessary.
- 4.7.6. Instruments shall be calibrated on an annual basis, as well as following any instrument maintenance that could affect the calibration, or upon failure of instrument response in accordance with the quality control parameters.
- 4.7.7. Any instrument requiring calibration and/or repair shall be removed from service and identified as such using a tagging system to ensure the instrument is not inadvertently used.

- 4.7.8. Instruments shall be calibrated by an approved vendor or following written procedure using National Institute of Standards and Technology (NIST) traceable sources or equivalent.
- 4.7.9. Instruments shall be response tested or source checked on a daily basis prior to use following established quality control parameters to ensure the instruments are operating properly and within established tolerances.

4.8 Radiation Work Permits

- 4.8.1. Radiation Work Permits (RWPs) shall be established for all work activities performed in an RCA.
- 4.8.2. The RWP is the work control document utilized in the field to document the specific work controls and access / egress requirements for the specific work tasks. These shall include and specify:
 - Description of the authorized work
 - Training requirements
 - Safety Equipment to be worn (hard had, steel toes, etc)
 - Personnel Protective Equipment (PPE)
 - Description of existing radiological conditions in the work area
 - Personnel monitoring requirements
 - HP Support
 - Air Sampling
 - Other requirements
- 4.8.3. RWPs shall either be generic for routine work such as general area access and surveys or specific for detailed work tasks like a system breach or opening waste containers.
- 4.8.4. RWPs shall be approved by the PHP, CS RSO or designee.
- 4.8.5. The RWP should be posted at the access / egress location or control point to each applicable RCA and/or centralized meeting location.
- 4.8.6. Project personnel authorized to work under the RWP shall be briefed to the RWP requirements, sign a briefing that they understand the RWP and sign in and out on a daily basis when entering the RCA to perform work under the RWP.
- 4.8.7. As applicable, an ALARA Job Review shall be performed and dose goals established for the RWP in accordance with Section 4.6, and CS-RS-PG-003, *ALARA and Dose Tracking Program*.
- 4.8.8. All RWPs shall be reviewed and revised on an annual basis or upon changing conditions in the work area. Task specific RWPs should only be written for the time of the evolutions not to exceed 30 days without revision.
- 4.8.9. Unexpected conditions that may prompt a “stop work” condition may be specified on the RWP. This may include higher than expected dose rates

or contamination levels, airborne contamination or any other condition that was not anticipated that would need to be re-evaluated prior to work continuing.

4.9 Radioactive Material Control

- 4.9.1. Controls shall be established to maintain positive control of radioactive materials (RAM) and to prevent RAM release and to minimize personnel exposure.
- 4.9.2. Clearly defined and marked boundaries and postings shall be established to control access to radioactive materials.
- 4.9.3. When possible, physical boundaries should be used such as existing walls; otherwise, yellow and magenta or yellow and black rope, tape or chain should be used. Depending upon the size area, particularly outdoor areas, alternate boundaries may be used such as chain link fence, snow fence, etc. For large exterior areas, fencing may not be practical. Posted signs with adequate frequency such as a sign on a post may be adequate.
- 4.9.4. All boundaries and access locations shall be posted using yellow signs with a magenta or black trefoil and inserts visible from all directions of approach identifying the type of controlled area or access requirements such as:
 - Radioactive Materials Storage Area (RMA)
 - Radiation Area
 - High Radiation Area (HRA)
 - Very High Radiation Areas
 - Contamination Area or Controlled Surface Contamination Area (CA / CSCA)
 - High Contamination Areas
 - Airborne Area
 - RWP Required for Entry
 - Contact HP for entry
- 4.9.5. The number of control points or locations of area access shall be limited.
- 4.9.6. HRAs shall be guarded or locked when not occupied to prevent inadvertent access and require full time Health Physics coverage when accessed.
- 4.9.7. Prior to securing an HRA, the area shall be inspected to ensure no-one remains in the area.
- 4.9.8. Radioactive materials should be labeled identifying them as radioactive or conspicuously marked using yellow paint or yellow and magenta tape.

- 4.9.9. Each container of radioactive material shall be labeled or marked identifying it as RAM and should identify the isotopes of concern, dose rates and activities.
- 4.9.10. Radioactive Materials shall be stored and maintained in designated areas away from non-radioactive materials and secured against unauthorized access or removal.
- 4.9.11. An inventory, specifically of packaged waste, stored radioactive materials and sources shall be maintained by the RPS and or PHP and the CS RSO updated on a monthly basis as applicable to track the possession of material against the proper radioactive materials license.
- 4.9.12. At project completion, all radioactive materials shall remain on site or be transferred and/or shipped to another licensee.
- 4.9.13. Any transfer of radioactive materials to another licensee shall be documented in writing and verified that they are authorized to receive the material.
- 4.9.14. Any materials offered for transport over public roads shall be shipped by a qualified broker following all Department of Transportation (DOT) rules and regulations.

4.10 Contamination Control

Note: Smoking, eating, drinking, chewing (tobacco, gum, etc) or placing any object in the mouth is strictly prohibited in an RCA.

- 4.10.1. The size and number of contaminated areas should be minimized.
- 4.10.2. Routine surveys shall be performed of control points and RCAs to ensure positive control of contamination and to ensure the proper radiological controls and PPE requirements.
- 4.10.3. Personnel Protective Equipment (PPE) or protective clothing (PCs) shall be worn by personnel as specified on the RWP when entering an RCA.
- 4.10.4. Personnel shall monitor themselves upon exiting an RCA as required by the RWP.
- 4.10.5. All materials within a contaminated area shall be considered radioactive unless it has been released from the area by Health Physics personnel.
- 4.10.6. Radioactive materials shall be properly contained to prevent the spread of contamination during movement.
- 4.10.7. Control measures such as containments, tents, bagging, covering, fixative or strippable coatings should be used to the maximum extent practical to minimize the spread of contamination.
- 4.10.8. Maintain good housekeeping practices, make full use of tools and equipment, and minimize the amounts of materials introduced to a contaminated area in order to minimize the generation of radioactive waste.

- 4.10.9. Perform periodic decontamination as necessary to keep levels of contamination ALARA.

4.11 Radiological Surveys

- 4.11.1. A survey program shall be implemented as applicable to monitor project personnel, maintain positive control of radioactive materials and to ensure the proper radiological controls are implemented.
- 4.11.2. A survey log shall be established to track the surveys performed at the project site using an alpha/numeric index.
- 4.11.3. Surveys shall be performed of the following as applicable:
- Posted RCAs,
 - Control Points,
 - Posted boundaries,
 - Break areas and offices,
 - Site boundaries,
 - Site emissions,
 - Waste containers,
 - Shipping surveys,
 - Release of tools and equipment, and
 - Area release.
- 4.11.4. Surveys shall be legible and completed in a timely manner and include:
- Survey ID,
 - Time, date and location of the survey,
 - List of instruments used, including the calibration date,
 - Detection sensitivities for the instruments used,
 - RWP number as applicable,
 - Reason for the survey,
 - Name of the surveyor and reviewer, and
 - Survey results.
- 4.11.5. Surveys should be performed as applicable depending upon the radionuclides of concern and the required information. These may include contact and general area dose rates, airborne contamination, removable and total surface contamination levels and sample analyses.
- 4.11.6. The frequency and the level of survey should be established by the RPS and/or PHP considering the likelihood of changing conditions, radiological hazards and the frequency of personnel access and occupancy. These include survey frequencies such as per event, each shift, daily, weekly, monthly, quarterly, or annually.

4.12 Unconditional Release

- 4.12.1. The unconditional release of equipment and materials shall be performed in accordance with CS-RS-PR-006, *Unconditional Release of Tools, Equipment, and Waste Materials from Projects*.
- 4.12.2. All release surveys shall be performed by Health Physics personnel as directed by the RPS and/or PHP depending upon the radionuclides of concern and to include contact dose rates and/or direct and removable surface activity measurements and sampling.
- 4.12.3. All release surveys shall be reviewed and approved by the RPS, PHP and/or CS RSO.
- 4.12.4. In general, equipment and materials should be released with no detectable activity unless approved by the PHP and CS RSO.
- 4.12.5. No material shall be released with limits in excess of Regulatory Guide 1.86 or the specific license requirements as applicable.
- 4.12.6. Equipment and materials with inaccessible surfaces shall not be released unless approved by the PHP and/or CS RSO depending upon process knowledge or an engineering evaluation.
- 4.12.7. Facilities and permanent structures shall be released in accordance with Regulatory Guide 1.86 or the license termination criteria as established and as evaluated by the PHP and/or CS RSO.

4.13 Respiratory Protection

- 4.13.1. Respiratory Protection shall be performed in accordance with CS-RS-PG-002, *Commercial Services Respiratory Protection Program for Radionuclides – Commercial Services Projects*.
- 4.13.2. The Respiratory Protection Program shall include, personnel training, fit testing, selection and use of equipment and the inspection, maintenance and control of respirators.
- 4.13.3. Prior to donning any respiratory protection, personnel shall be trained and have a current fit test and medical evaluation.

4.14 Notices and Reporting

- 4.14.1. Regulatory required postings shall be conspicuously posted in a sufficient number of places to permit employees to have access to a copy. The required postings, as a minimum, shall include:
 - NRC Form 3, Notice to Employees, or equivalent Agreement State notice
 - A copy of the applicable Radioactive Materials License
 - Any current Notices of Violation (NOVs) and responses to the notice(s) until which time that the violations are completely corrected.

- 4.14.2. Other postings or documents that should be conspicuously posted and/or made available to project personnel include:
- Emergency procedures and contact numbers
 - Transportation routes to emergency services (local hospital, medical clinic, etc)
 - Any First Notifications, open Condition Reports and corrective actions
- 4.14.3. Any individual who discovers that any radioactive materials are lost, stolen or missing shall immediately notify the PM, RPS and CS RSO such that the proper notifications and reports may be initiated.
- 4.14.4. Any individual who notices an unusual event or suspects a personnel over-exposure or site release of radioactive materials shall immediately notify the PM, RPS and CS RSO such that the proper notifications and reports may be initiated.
- 4.14.5. All personnel skin contaminations or uptakes shall be reported to the RPS, PHP and CS RSO and a First Notification completed in accordance with ES-AD-PR-005, *First Notification*.
- 4.14.6. Condition Reports shall be generated in accordance with ES-AD-PR-008, *Condition Reports* for any service, activity or condition that does not conform to applicable procedures, standards, regulations or instruction.
- 4.14.7. Notifications and Reports shall be made to the applicable regulatory body by the CS RSO as follows in accordance with 10 CFR 20 Subpart M, *Standards for Protection Against Radiation – Reports*, specifically 20.2201 and 2202:
- Agreement State Contact Number (per State regulation)
 - US NRC Operations Center; 301-816-5100
- 4.14.8. **Immediate Notification** shall be made to the applicable regulatory body via phone for the following conditions:
- Upon identification of any radioactive materials that are lost, have been stolen or are missing in excess of 1,000 times the quantities as specified in Appendix C to 10 CFR 20 or equivalent Agreement State regulation.
 - Any event involving radioactive materials that may have caused or threatens to cause:
 - An individual to receive 25 Rem TEDE
 - An individual to receive 75 Rem LDE
 - An individual to receive 250 Rad shallow dose equivalent to the skin or extremities

- Release of radioactive materials to an uncontrolled area such that an individual present for 24-hours may have received an intake of 5 times the ALI.
- 4.14.9. **24-hour Notification** shall be made to the applicable regulatory body via phone for the following conditions:
- Any event involving radioactive materials that may have caused or threatens to cause:
 - An individual to receive 5 Rem TEDE
 - An individual to receive 15 Rem LDE
 - An individual to receive 50 Rem shallow dose equivalent to the skin or extremities
 - Release of radioactive materials to an uncontrolled area such that an individual present for 24-hours may have received an intake of an ALI.
- 4.14.10. **30-day Notification** shall be made to the applicable regulatory body via phone for the following conditions:
- After the occurrence of any radioactive materials that has been lost, stolen or are missing in which an excess of 10 times the quantities as specified in Appendix C to 10 CFR 20 or equivalent Agreement State regulation still remains missing.
- 4.14.11. A **Written Report** shall be prepared and submitted to the regulatory body within 30 days following any notification as listed above in accordance with 10 CFR 20.2201(b), 2202(c) and (d), 2203 and 2205. In addition, a report shall be prepared and submitted to the applicable regulatory body in the event that it is determined through the public dose evaluation at the end of the year and/or field project that a member of the public received an exposure in excess of ALARA limit of 10 mrem TEDE for the year from airborne activity from license operations.

5.0 ATTACHMENTS AND FORMS

5.1 Commercial Services RPP Implementing Procedure List

**Attachment 5.1
Commercial Services RPP Implementing Procedure List**

Procedure Number	Title
CS-AD-PR-002	Global Commercial Group – TES Services Project Records
CS-FO-PR-001	Performance of Radiological Surveys
CS-FO-PR-002	Calibration and Maintenance of Radiological Survey Instruments
CS-FO-PR-003	Soil Surveys, Collection of Water, Sediment, Vegetation, and Soil Samples; and Chain-of-Custody
CS-FO-PR-004	QA/QC of Portable Radiological Survey Instruments
CS-FO-PR-005	General Operations of Radiological Survey Instruments
CS-FO-PR-006	Reserved
CS-FO-PR-007	Reserved
CS-IN-PR-003	Calibration of the Canberra Genie-2000 Gamma Spectroscopy System
CS-IN-PR-004	Operation of the Canberra Genie-2000 Gamma Spectroscopy System
CS-RS-PG-001	Commercial Services Radiation Protection Program
CS-RS-PG-002	Respiratory Protection Program for Radionuclides – Commercial Services Projects
CS-RS-PG-003	ALARA and Dose Tracking Program
CS-RS-PR-001	Selection and Use of Radiological Protective Clothing
CS-RS-PR-002	Personnel Survey and Decontamination
CS-RS-PR-003	Commercial Services Field Project Training Requirements
CS-RS-PR-004	Radioactive Work Permit Procedure
CS-RS-PR-005	Radiological Area Emergency Response for Field Projects
CS-RS-PR-006	Unconditional Release of Tools, Equipment, and Waste Materials from Projects
CS-RS-PR-007	Commercial Services Radiation Safety Committee
CS-RS-PR-009	Radioactive Source Inventory, Leak Testing, and Control at Field Projects
CS-RS-PR-010	Personnel Monitoring for Exposure
CS-RS-PR-011	Operation of the Portable X-Ray Fluorescent Spectrometer
CS-RS-PR-012	Respirator Fit Testing
CS-RS-PR-013	Selection and Use of Respiratory Protection Equipment
CS-RS-PR-014	Inspection, Maintenance and Control of Respiratory Protection Equipment
CS-RS-PR-015	Air Sampling and Analysis
CS-RS-PR-016	Bio-Assay Sampling
CS-RS-PR-017	External Dose Assessments
CS-RS-PR-018	Internal Dose Assessments
CS-RS-PR-019	Reserved

Procedure Number	Title
CS-WM-PG-001	Radioactive Materials Management Program for Commercial Services Projects
CS-WM-PR-001	Handling, Storage, and Characterization of Radioactive Material and LLRW
CS-WM-PR-002	Preparation of Radioactive Materials and LLRW for Transportation from Project Sites
CS-WM-PR-003	Handling, Packaging, Storage and Inspection of Mixed Waste