

Radiation Protection Program

Nuclear Secured / Radiation Safety

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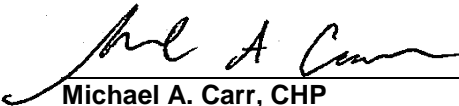
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History and Approvals

History

Revision	Intent Y/N	Purpose description
0	Y	For Issue (Rebranded CS-RS-PG-001)

Approvals

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1. Purpose and Scope

1.1. Purpose

This Program procedure outlines the Radiation Protection (RP) standards and controls that shall be implemented, as applicable, for Nuclear Secured (NS) using our mobile NRC license in accordance with 10CFR20 and Agreement State regulations. The purpose of this Program is to establish the basic health and safety requirements and Program elements for all NS field operations during the handling of radioactive materials (RAM) and the conduct of radiological work during field projects using the NS Radiation Protection Program (RPP). Based on 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 Reasonably Achievable (ALARA). These implementing procedures in conjunction with this Program procedure constitute the NS RPP.

For work under the jurisdiction of the DOE or other regulatory agency, the NS RPP shall be modified as necessary (i.e., blue sheeted) to satisfy any differences in regulatory requirements.

1.2. Scope

This RPP shall be used by all Nuclear Secured and subcontractor personnel at temporary job sites where the NS mobile NRC License has been implemented as approved by the applicable regulating body maintaining jurisdiction over the project site. As authorized by the NS mobile NRC license, the specific license activities that are permitted include, but are not limited to, the following:

- General handling and control of radioactive materials;
- Sealed source removal and/or handling;
- 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 clients RPP does not address certain Program elements that are required to perform work at the project site. In the event where both the NS 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 the existing Program does not meet the minimum NS requirements, the NS Program elements as applicable shall be implemented while ensuring the requirements for the existing RPP are met.

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2. References

- 2.1. 10CFR19, *Notices, Instructions and Reports to Workers: Inspection and Investigation.*
- 2.2. 10CFR20, *Standards for Protection Against Radiation.*
- 2.3. 29CFR1910. *Occupational Safety and Health Standards*
- 2.4. AE-SH-PR-002, *Incident Reporting and Notification*
- 2.5. NS-RS-PG-002, *Respiratory Protection Program*
- 2.6. NS-RS-PG-003, *ALARA Program*
- 2.7. NS-RS-PR-100, *Radiation Safety Committee*
- 2.8. NS-RS-PR-101, *Personnel Training Requirements*
- 2.9. NS-RS-PR-102, *Project Records Management*
- 2.10. NS-RS-PR-301, *Unrestricted Release of Tools, Equipment and Materials*
- 2.11. NS-RS-PR-500, *Personnel Monitoring*

3. General

3.1. Definitions

- 3.1.1. *Administrative Limit* - A radiation dose limit established by Nuclear Secured for the purpose of maintaining radiation dose below regulatory limits and maintaining personnel dose ALARA.
- 3.1.2. *ALARA (As Low As Reasonably Achievable)* – Making every reasonable effort to maintain exposures to radiation as far below the dose limits as is practical consistent with the purpose for which licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to the state of technology, the economics of improvements in relation to benefits to public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest.
- 3.1.3. *Annual Limit on Intake (ALI)* - The derived limit for the amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year. ALI is the smaller valued of intake of a given radionuclide in a year by reference man that would result in a committed effective dose equivalent of 5 Rems (0.05 Sv) or a committed dose equivalent of 50 Rems (0.5 Sv) to any individual organ or tissue.

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- 3.1.4. *Authorized User (AU)* – An individual as listed on the mobile radioactive materials license or as approved by the Radiation Safety Committee to oversee the on-site implementation of the mobile radioactive materials license.
- 3.1.5. *Committed Dose Equivalent (CDE) ($H_{T,50}$)* - The dose equivalent to organs or tissues of reference (T) that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.
- 3.1.6. *Committed Effective Dose Equivalent (CEDE) ($H_{E,50}$)* - 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. $H_{E,50} = \sum W_T * H_{T,50}$
- 3.1.7. *Contamination* – Deposition of radioactive material in any place where it is not desired, particularly where its presence may be harmful. Contamination can take the form of:
- *Loose or Removable* - Contamination which can be removed from surfaces by smears or swipes and may contribute to airborne radioactivity and/or personnel contamination from routine activities.
 - *Fixed* - 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.
 - *Total (Direct)* - The total fixed and loose contamination on an object or surface.
- 3.1.8. *Contamination Area* - Any area accessible to personnel with loose surface contamination greater than 1,000 dpm per 100 cm² β-γ, 20 dpm per 100 cm² α, or greater than or equal to the site's regulatory guideline values.
- 3.1.9. *Control Point* – An access point to a Restricted Area.
- 3.1.10. *Effective Dose Equivalent (EDE)(H_E)* – The 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. $H_E = \sum W_T * H_T$
- 3.1.11. *Health Physics Personnel* – Project personnel including the Radiation Protection Supervisor, the Project Health Physicist, and Health Physics Technicians (also referred to as Radiological Control Technicians, Radiation Protection Technicians or Radiation Safety Technicians).
- 3.1.12. *High Radiation Area (HRA)* - An area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 100 mrem (1 mSv) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.

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- 3.1.13. *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 (i.e., Agreement State or NRC).
- 3.1.14. *National Voluntary Laboratory Accreditation Program (NVLAP)* – A National Institute of Standards and Technology (NIST) program which provides an unbiased third-party test and evaluation program to accredit laboratories in their respective fields to the ISO 17025 standard.
- 3.1.15. *Radiation Area (RA)* – An area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 5 mrem (0.05 mSv) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.
- 3.1.16. *Radiation Work Permit (RWP)* – An administrative mechanism used to establish radiological controls for intended work activities with radioactive materials.
- 3.1.17. *Restricted Area* - Any area to which access is limited by the licensee for the purpose of protecting individuals against undue risk from exposure to radiation and radioactive materials.
- 3.1.18. *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
- 3.1.19. *Very High Radiation Area (VHRA)* - An area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving an adsorbed dose in excess of 500 rads (5 Gray) in 1 hour at 1 meter from the radiation source or 1 meter from any surface that the radiation penetrates.
- 3.1.20. *Visitor* - Any non-NS employee or any NS employee or subcontractor not qualified as a Radiation Worker who requires access to a Restricted Area.

3.2. Responsibilities

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

3.2.1. NS Radiation Safety Officer

The NS Radiation Safety Officer (RSO) maintains and oversees the implementation of the NS RPP. The 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.

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3.2.2. Project Manager

The Project Manager (PM) is responsible for ensuring that the proper program 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 the NS RPP and client programs and procedures, as applicable, are available for use by project personnel.

3.2.3. Project Health Physicist

The Project Health Physicist (PHP) is responsible for assisting the 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 NS RPP 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 RSO.

3.2.5. Radiation Safety Committee

The Radiation Safety Committee (RSC) has the responsibility of overseeing the NS RPP in accordance with NS-RS-PR-100, *Radiation Safety Committee*.

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 as necessary and to bring any safety issues including radiation safety to the attention of the RPS, the PM, and/or the RSO.

3.3. Precautions and Limitations

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

3.3.2. For work outside Federal or Agreement State jurisdiction (i.e., DOE or DOD) or in conjunction with another licensee, this RPP may be implemented in whole or in part; following the agreed-on division of responsibilities established detailing those Program elements and work areas that fall under control of each respective licensee.

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- 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, an equivalency review shall be performed to ensure that all areas of regulatory compliance are addressed, and adequate practices are employed to minimize worker and public risk due to radioactive materials. Procedures will be revised (e.g., blue sheeted), as necessary, to address project specific conditions and requirements.

4. Pre-Requisites / Requirements

- 4.1. A radiation safety committee shall be established in accordance with NS-RS-PR-100, *Radiation Safety Committee* consisting of health physics and operational personnel to provide oversight of the NS RPP and to ensure that the RPP and associated procedures are consistent with regulatory requirements, client restrictions and company objectives.
- 4.2. Nuclear Secured shall obtain written approval for use of the NS mobile radioactive materials license and/or RPP by the applicable regulatory agency with jurisdiction at the temporary project site prior to implementing the NS RPP consistent with the authority's advance notification requirements.
- 4.3. While performing licensed activities under the NS mobile NRC license, an Authorized User (AU) of the license and/or RPS shall be present and available on site. These may be the same individual depending on the project size and personnel qualifications. If one is not present, site work may continue; however, activities involving licensed radioactive materials shall not be performed.
- 4.4. When implementing the NS mobile NRC license in conjunction with another site licensee (i.e., multiple licenses at a project site), NS 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.
- 4.5. When operating under the umbrella of a client's or other contractor's license and RPP, the PM, PHP and/or RSO shall perform a review of their Program to ensure that it is equivalent to the NS RPP and is adequate for the radiological protection of NS project personnel and subcontractors.

5. Procedure

5.1. Work Plans and Procedures

- 5.1.1. A project Work Plan or plans shall be established and should include the following as applicable depending on 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;

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- 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 planned disposition;
- List of applicable implementing procedures; and
- Other information determined necessary such as air monitoring requirements, free release limits, license termination criteria, etc.

5.1.2. Implementing procedures shall be established for the various RPP elements as outlined in this procedure as required by the scope of work and as detailed in the project Work Plan(s). A listing of the current available RPP implementing procedures is provided as Attachment 7.1.

5.1.3. Current copies of all Work Plans and RPP implementing procedures shall be provided on site and made available to all project personnel in either hard copy or electronic format.

5.1.4. All RPP implementing procedures shall be on a biennial review cycle to ensure they are maintained current and are in compliance with the current regulatory requirements and recommendations.

5.1.5. The PM and/or RPS shall ensure that all project Work Plans and procedures are the most recent revisions available. The most recent revisions of Work Plans and procedures shall be posted on an NS SharePoint site or have controlled copies issued by document control.

5.2. Training

5.2.1. Specific training requirements and exemptions for field projects are provided in NS-RS-PR-101, *Personnel Training Requirements*.

5.2.2. All personnel who are permitted unescorted access to the project site including Restricted Areas 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 Rad Training (GERT),
- Radiation Worker (RW-I and RW-II),
- Respiratory Protection,
- Authorized User for the radioactive materials license,

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- Radiation Protection Supervisor,
- DOT Hazmat Subpart H, and
- Pre-natal instruction.

5.2.3. Refresher training shall be performed on an annual basis with the exception of DOT certifications which are required every three years. 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 by the project manager and approved by the RSO on a case by case basis.

5.2.4. All personnel requiring unescorted access to the project site shall receive GERT training and understand the standard radiation protection rules, responsibilities, practices and site-specific radiological hazards as part of their job function. This should include:

- Site specific information including the location(s) of Restricted Areas and sources of radiation, the radionuclides of concern, personnel monitoring requirements and any applicable RWPs as required.
- The general hazards and risks associated with radiation exposure and the precautions and procedures utilized for maintaining exposures ALARA.
- 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.

5.2.5. Nuclear Secured and subcontractor personnel who directly work with radioactive materials and require routine access to a Restricted Area shall be qualified as a Radiation Worker.

5.2.6. In general, personnel who are not trained as a Radiation Worker should not be provided unescorted access to a Restricted Area. However, in the event that access is required for an individual that is not trained as a Radiation Worker, they shall have current GERT training and be briefed to the potential hazards present, obtain approval from the RSO, PHP or RPS 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.

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

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

5.2.7.2. The site visitors briefing shall be documented by signature and date and the record maintained on file.

5.3. Personnel (Occupational) Monitoring

5.3.1. Personnel monitoring shall be performed in accordance with NS-RS-PR-500, *Personnel Monitoring*.

5.3.2. Personnel exposure shall be limited to the NS administrative limits in the interest of maintaining personnel exposure ALARA in accordance with NS-RS-PR-500, *Personnel Monitoring*.

5.3.3. A prospective evaluation of personnel radiation exposure shall be performed by the RSO and/or PHP prior to project mobilization as applicable to determine the exposure pathways and the personnel monitoring requirements. Based on this evaluation, personnel monitoring may include:

- NVLAP accredited whole body thermo luminescent dosimeters (TLDs) or equivalent (e.g., optically stimulated luminescent dosimeters (OSLs),
- 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.

5.3.4. 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.

5.3.5. 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).

5.3.6. Administrative dose limit extensions may be obtained provided the proper approvals are obtained by the RSO and/or Senior Vice President of Nuclear Secured.

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- 5.3.7. Prior to personnel monitoring, the individual's current year to date exposure will be determined and documented to the maximum extent practical.
- 5.3.8. 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.
- 5.3.9. 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 50 mrem per month.
- 5.3.10. Declaration of pregnancy shall be performed and exposures to the embryo/fetus assessed at the time of declaration.
- 5.3.11. Declared pregnant women and non-Radiation Workers shall not be permitted to enter an Airborne Radioactivity or High Radiation Area.
- 5.3.12. Visitor exposure shall not exceed an accumulated limit of 100 mrem for the year across all NS projects for each individual without the approval of the RSO.
- 5.3.13. If an individual receives exposure at another facility other than NS, the individual shall report their exposure to the RPS, PHP and/or RSO so their exposure records can be updated.
- 5.3.14. Any individual having a medical procedure in which they are administered medical radioisotopes shall notify the PM, RPS, PHP and/or RSO.
- 5.3.15. Reports of individual monitoring results shall be made available to the individual on an annual basis or on request by the individual.
- 5.3.16. Minors shall not receive occupational exposure under NS policy.
- 5.3.17. Planned Special Exposures (PSE) are permitted in exceptional situations. NS employees may receive PSE doses separate from and in addition to the annual occupational dose limits provided (1) they receive prior written authorization from the RSO and/or President Nuclear Secured and (2) comply with all regulations.

5.4. Environmental (Public) Monitoring

- 5.4.1. Public monitoring shall be performed in accordance NS-RS-PR-500, *Personnel Monitoring*.
- 5.4.2. The exposure limit for an individual member of the public shall not exceed a TEDE of 100 mrem for the year.
- 5.4.3. 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.

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5.4.4. 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.

5.4.5. No individual shall be considered a member of the public while within a Restricted Area of the site.

5.4.6. 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 (i.e., direct radiation monitoring) and site effluent monitoring records as applicable to document the maximum exposure estimate to a member of the public in order to ensure the public exposure limit is not exceeded.

5.4.7. Occupancy factors may be used as necessary to demonstrate compliance depending on site controls and general site access made available to members of the public.

5.5. ALARA Program

5.5.1. All NS field projects shall be performed in a manner such that all personnel exposures are maintained ALARA.

5.5.2. All project work plans, procedures and permits shall be written such that the ALARA principles of time, distance and shielding are implemented as necessary to minimize personnel radiation exposure.

5.5.3. 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.

5.5.4. All radiological work shall be evaluated in accordance with NS-RS-PG-003, *ALARA Program* to assess the proper radiological controls and to ensure the proper work planning.

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5.6. Radiological Instrument Program

- 5.6.1. The instrument program and implementing procedures shall address instrument inventory and control, calibration and maintenance, general operation and quality control.
- 5.6.2. Instruments shall be identified and tracked by means of a serialized inventory system including the calibration and calibration due dates.
- 5.6.3. 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.
- 5.6.4. 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.
- 5.6.5. The instrument detection sensitivities shall be documented as necessary.
- 5.6.6. Instruments shall be calibrated on an annual basis, as well as following any instrument maintenance that could affect the calibration, or on failure of instrument response in accordance with the quality control parameters.
- 5.6.7. Depending on project duration limitations and to allow for instrument exchange, the RSO may approve the use of instruments beyond the calibration due date at the request of the RPS provided the instrument is still within established operational performance limits and that the grace period not exceed 3 months.
- 5.6.8. 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.
- 5.6.9. Instruments shall be calibrated by an approved vendor or following written procedures using National Institute of Standards and Technology (NIST) traceable sources or equivalent.
- 5.6.10. Instruments shall be response tested or source checked prior to use following established quality control parameters to ensure the instruments are operating properly and within established tolerances.

5.7. Radiation Work Permits

- 5.7.1. Radiation Work Permits (RWPs) shall be established for all work activities performed in or having the potential to create:
 - Radiation Area
 - High Radiation Area

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- Contamination Area
- Airborne Radiation Area

5.7.2. Work in a Very High Radiation Area is not permitted on an RWP.

5.7.3. 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 involving radioactive materials. These shall include and specify:

- Description of the authorized work
- Training requirements
- Safety Equipment to be worn (hard hat, 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

5.7.4. 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.

5.7.5. RWPs shall be approved by the RPS, PHP, RSO or designee.

5.7.6. The RWP should be posted at the access / egress location or control point to each applicable Restricted Area and/or centralized meeting location.

5.7.7. 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 the RWP when performing work.

5.7.8. As applicable, an ALARA Job Review shall be performed and dose goals established for the RWP in accordance with Section 5.5.

5.7.9. All RWPs shall be reviewed and revised on an annual basis or on changing conditions in the work area. Task specific RWPs should only be written for the duration of work not to exceed 30 days without revision.

5.8. Radioactive Material Control

5.8.1. Controls shall be established to maintain positive control of radioactive materials (RAM) and to prevent RAM release and to minimize personnel exposure.

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- 5.8.2. Clearly defined and marked boundaries and postings shall be established to control access to radioactive materials.
- 5.8.3. 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 on 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.
- 5.8.4. 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 restricted area and access requirements such as:
- Radioactive Materials Storage Area (RMA)
 - Radiation Area
 - High Radiation Area (HRA)
 - Very High Radiation Area
 - Contamination Area or Controlled Surface Contamination Area (CA / CSCA)
 - High Contamination Areas
 - Airborne Area
 - RWP Required for Entry
 - Contact HP for entry
- 5.8.5. The number of control points or locations of area access shall be limited.
- 5.8.6. HRAs shall be guarded or locked when not occupied to prevent inadvertent access and require full time Health Physics coverage when accessed.
- 5.8.7. Prior to securing an HRA, the area shall be inspected to ensure no-one remains in the area.
- 5.8.8. Radioactive materials should be labeled identifying them as radioactive or conspicuously marked using yellow paint or yellow and magenta tape.
- 5.8.9. 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.
- 5.8.10. Radioactive Materials shall be stored and maintained in designated areas away from non-radioactive materials and secured against unauthorized access or removal.

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- 5.8.11. An inventory, specifically of packaged waste, stored radioactive materials and sources shall be maintained by the RPS and or PHP and the RSO updated on a monthly basis as applicable to track the possession of material against the materials license.
- 5.8.12. At project completion, all radioactive materials shall remain on site or be transferred and/or shipped to another licensee.
- 5.8.13. Any transfer of radioactive materials to another licensee shall be documented in writing and verified that they are authorized to receive the material.
- 5.8.14. Any materials offered for transport over public roads shall be shipped by a qualified broker following all Department of Transportation (DOT) rules and regulations.

5.9. Contamination Control

- 5.9.1. Smoking, eating, drinking, chewing (tobacco, gum, etc) or placing any object in the mouth is strictly prohibited in a Restricted Area.
- 5.9.2. The size and number of contaminated areas should be minimized.
- 5.9.3. Routine surveys shall be performed of control points and Restricted Areas to ensure positive control of contamination and to ensure the proper radiological controls and PPE requirements.
- 5.9.4. Personnel Protective Equipment (PPE) or protective clothing (PCs) shall be worn by personnel as specified on the RWP when entering a Restricted Area.
- 5.9.5. Personnel shall monitor themselves on exiting a Restricted Area as required by the RWP.
- 5.9.6. All materials within a contaminated area shall be considered radioactive unless it has been released from the area by Health Physics personnel.
- 5.9.7. Radioactive materials shall be properly contained to prevent the spread of contamination during movement.
- 5.9.8. 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.
- 5.9.9. 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.
- 5.9.10. Perform periodic decontamination as necessary to keep levels of contamination ALARA.

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5.10. Radiological Surveys

- 5.10.1. 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.
- 5.10.2. A survey log shall be established to track the surveys performed at the project site using an alpha/numeric index.
- 5.10.3. Surveys shall be performed of the following as applicable:
- Radiologically posted or Restricted Area,
 - Control Points,
 - Posted boundaries,
 - Break areas and offices,
 - Site boundaries,
 - Site emissions,
 - Waste containers,
 - Shipping surveys,
 - Release of tools and equipment, and
 - Area release.
- 5.10.4. 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.
- 5.10.5. Surveys should be performed as applicable depending on 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.

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5.10.6. 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.

5.11. Unrestricted Release

5.11.1. The unrestricted release of equipment and materials shall be performed in accordance with NS-RS-PR-301, *Unrestricted Release of Tools, Equipment*.

5.11.2. All release surveys shall be performed by Health Physics personnel as directed by the RPS and/or PHP depending on the radionuclides of concern and to include contact dose rates and/or direct and removable surface activity measurements and sampling.

5.11.3. All release surveys shall be reviewed and approved by the RPS, PHP and/or RSO.

5.11.4. In general, equipment and materials should be released with no detectable activity unless approved by the PHP and RSO.

5.11.5. No material shall be released with activity in excess of Regulatory Guide 1.86 or the specific license requirements as applicable.

5.11.6. Equipment and materials with inaccessible surfaces shall not be released unless an evaluation of the item has been performed based on process knowledge or engineering evaluation along with measurement performed for contamination at representative locations as approved by the PHP and/or RSO.

5.11.7. Facilities and permanent structures shall be released in accordance with the license termination criteria as established by the appropriate regulatory agency and as evaluated by the PHP and/or RSO.

5.12. Respiratory Protection

5.12.1. Respiratory Protection shall be performed in accordance with NS-RS-PG-002, *Respiratory Protection Program*.

5.12.2. The Respiratory Protection Program shall include, personnel training, fit testing, selection and use of equipment and the inspection, maintenance and control of respirators.

5.12.3. Prior to donning any respiratory protection, personnel shall be trained and have a current fit test and medical evaluation.

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5.13. Notices and Reporting

- 5.13.1. 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.
- 5.13.2. 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
- 5.13.3. Any individual who discovers that any radioactive materials are lost, stolen or missing shall immediately notify the PM, RPS and RSO such that the proper notifications and reports may be initiated.
- 5.13.4. 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 RSO such that the proper notifications and reports may be initiated.
- 5.13.5. All personnel skin contaminations or uptakes shall be reported to the RPS, PHP and RSO and a First Notification submitted in accordance with AE-SH-PR-002, *Incident Reporting and Notification*.
- 5.13.6. An incident reports shall be generated in accordance with AE-SH-PR-002, *Incident Reporting and Notification* for any service, activity or condition that does not conform to applicable procedures, standards, regulations or instruction.
- 5.13.7. Notifications and Reports shall be made to the applicable regulatory body by the RSO as follows in accordance with 10CFR20, *Standards for Protection Against Radiation.*, specifically 20.2201 and 2202:
- Agreement State Contact Number (per State regulation)
 - US NRC Operations Center; 301-816-5100

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- 5.13.8. **Immediate Notification** shall be made to the applicable regulatory body via phone for the following conditions:
- On 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 10CFR20 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.
- 5.13.9. **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.
- 5.13.10. **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 10CFR20 or equivalent Agreement State regulation still remains missing.
- 5.13.11. A Written Report shall be prepared and submitted to the regulatory body within 30 days following any notification as listed above in accordance with 10CFR20.2201(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.

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6. Records

Radiation Protection Program Records shall be generated and maintained in accordance with the specific Program implementing procedures.

7. Appendices and Forms

7.1. RPP Procedure List

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Attachment 7.1
RPP Procedure List

Procedure Number	Title
Programmatic	
NS-RS-PG-001	<i>Radiation Protection Program</i>
NS-RS-PG-002	<i>Respiratory Protection Program</i>
NS-RS-PG-003	<i>ALARA Program</i>
Administrative	
NS-RS-PR-100	<i>Radiation Safety Committee</i>
NS-RS-PR-101	<i>Personnel Training Requirements</i>
NS-RS-PR-102	<i>Project Records Management</i>
NS-RS-PR-103	<i>Program Audit and Surveillances</i>
Operations	
NS-RS-PR-200	<i>Emergency Response</i>
NS-RS-PR-201	<i>Radiation Work Permits</i>
NS-RS-PR-202	<i>Radiological Postings</i>
NS-RS-PR-203	<i>Selection and Use of Personnel Protective Equipment (PPE)</i>
NS-RS-PR-204	<i>Personnel Frisking and Decontamination</i>
NS-RS-PR-205	<i>Contamination & Airborne Radiation Control</i>
NS-RS-PR-206	<i>Source Inventory and Control</i>
NS-RS-PR-207	<i>Radioactive Materials Control</i>
NS-RS-PR-208	<i>HRA / VHRA Access Controls</i>
ND-RS-PR-209	Reserved - Source Extraction and Handling
Radiological Surveys	
NS-RS-PR-300	<i>Performance of Radiological Surveys</i>
NS-RS-PR-301	<i>Unrestricted Release of Tools, Equipment and Materials</i>
NS-RS-PR-302	<i>Sample Collection</i>
NS-RS-PR-303	<i>Sample Chain of Custody and Control</i>
NS-RS-PR-304	Reserved - Design of MARSSIM Surveys
NS-RS-PR-305	Reserved - Design of MARSAME Surveys

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Procedure Number	Title
Instrumentation	
NS-RS-PR-400	<i>Instrument Inventory and Control</i>
NS-RS-PR-401	<i>Instrument Calibration and Maintenance</i>
NS-RS-PR-402	<i>General Operations of Portable Radiation Survey Instruments</i>
NS-RS-PR-403	<i>QA/QC of Radiation Survey Instruments</i>
NS-RS-PR-404	Reserved - <i>Operation of the Ludlum Model 2350-1</i>
NS-RS-PR-405	Reserved - <i>Calibration of the Protean Smear Counter</i>
NS-RS-PR-406	Reserved - <i>Operation of the Protean Smear Counter</i>
NS-RS-PR-407	Reserved - <i>Calibration of the Canberra Genie-2000 Gamma Spectroscopy System</i>
NS-RS-PR-408	Reserved - <i>Operation of the Canberra Genie-2000 Gamma Spectroscopy System</i>
NS-RS-PR-409	Reserved - <i>Quality Control of Gamma Spectroscopy Systems</i>
NS-RS-PR-410	Reserved - <i>Operation of the ISOCS In-Situ Gamma Spectroscopy System</i>
NS-RS-PR-411	Reserved - <i>Operation of the Trimble GPS System</i>
NS-RS-PR-412	Reserved - <i>Downloading Trimble GPS Data</i>
NS-RS-PR-413	Reserved - <i>Operation of the Portable X-Ray Fluorescent Spectrometer</i>
Exposure Monitoring	
NS-RS-PR-500	<i>Personnel Monitoring</i>
NS-RS-PR-501	<i>Air Sampling and Analysis</i>
NS-RS-PR-502	<i>Bioassay Sampling</i>
NS-RS-PR-503	<i>External Dose Assessments</i>
NS-RS-PR-504	<i>Internal Dose Assessments</i>
NS-RS-PR-505	<i>DAC-Hr Tracking</i>
NS-RS-PR-506	<i>ALARA Plans and Dose Modeling</i>
NS-RS-PR-507	<i>Public Dose Assessments</i>
Respiratory Protection	
NS-RS-PR-600	<i>Respirator Fit Testing</i>
NS-RS-PR-601	<i>Selection and Use of Respiratory Protection Equipment</i>
NS-RS-PR-602	<i>Inspection, Maintenance and Control of Respiratory Protection Equipment</i>

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Procedure Number	Title
Radioactive and Mixed Waste	
NS-RS-PR-700	<i>Radioactive/Mixed Waste Management</i>
NS-RS-PR-701	<i>Radioactive/Mixed Waste Profiling</i>
NS-RS-PR-702	<i>Radioactive/Mixed Waste Storage and Handling</i>
NS-RS-PR-703	<i>Shipment of Radioactive Waste</i>
NS-RS-PR-704	<i>Shipment of Mixed Waste</i>
NS-RS-PR-705	Reserved - <i>Shielding Design</i>
Increased Controls	
NS-RS-PR-800	<i>Access Control - RAMQC</i>
NS-RS-PR-801	<i>Site Security - RAMQC</i>
NS-RS-PR-802	<i>Transportation Security RAMQC (Cat 1)</i>
NS-RS-PR-803	<i>Transportation Security RAMQC (Cat 2)</i>