

# **ALARA Program**

## Nuclear Secured / Radiation Safety

### NS-RS-PG-003, 0

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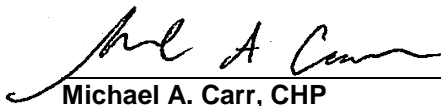
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## History and Approvals

### History

Revision	Intent Y/N	Purpose description
0	Y	For Issue (Rebranded CS-RS-PG-003)

### Approvals

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Approver:  8/14/2019  
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## 1. Purpose and Scope

The basis for maintaining personnel exposure to radioactive materials as low as reasonably achievable (ALARA) is the linear no threshold hypothesis which assumes that any radiation exposure carries some risk and potential for adverse effects. As a result, all reasonable efforts (to the extent practical) shall be considered to minimize occupational and public exposure to radioactive materials.

### 1.1. Purpose

This Program procedure specifies the use of administrative and engineering controls to ensure occupational doses and dose to the public are maintained ALARA. This will be accomplished by performing proper work planning and the implementation of procedures incorporating the ALARA principles of time, distance and shielding as well as administrative and engineering controls to either eliminate or minimize radiological hazards in order to comply with the regulations as laid out in 10CFR20.1101.

### 1.2. Scope

This Program is for the exclusive use of Nuclear Secured (NS) and subcontractor personnel at temporary job sites where the NS Radiation Protection Program (RPP) is implemented and/or NS has the primary role in controlling exposures to on-site personnel.

## 2. References

- 2.1. 10CFR20, *Energy - Standards for Protection Against Radiation.*
- 2.2. US NRC Regulatory Guide 8.8, *Information Relevant to Ensuring That Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable*
- 2.3. US NRC Regulatory Guide 8.10, *Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable*
- 2.4. NS-RS-PG-001, *Radiation Protection Program*
- 2.5. NS-RS-PG-002, *Respiratory Protection Program*
- 2.6. NS-RS-PR-100, *Radiation Safety Committee*
- 2.7. NS-RS-PR-101, *Personnel Training Requirements*
- 2.8. NS-RS-PR-103, *Program Audit and Surveillances*
- 2.9. NS-RS-PR-200, *Emergency Response*
- 2.10. NS-RS-PR-201, *Radiation Work Permits*

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- 2.11. NS-RS-PR-202, *Radiological Postings*
- 2.12. NS-RS-PR-208, *HRA-VHRA Access Controls*
- 2.13. NS-RS-PR-300, *Performance of Radiological Surveys*
- 2.14. NS-RS-PR-500, *Personnel Monitoring*
- 2.15. NS-RS-PR-506, *ALARA Plans and Dose Modeling*

### 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. *Dose* – Generic term that means adsorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, or total effective dose equivalent.
- 3.1.4. *High Radiation Area (HRA)* – An area, accessible to an individual, 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.
- 3.1.5. *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.
- 3.1.6. *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.
- 3.1.7. *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 absorbed dose in excess of 500 rads (5 Gray) in 1 hour at 1 meter from the source or 1 meter from any surface that the radiation penetrates.

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### 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.

#### 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.

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### 3.3. Precautions and Limitations

- 3.3.1. Internal exposure should be maintained at a minimum; however, dose is dose whether internal or external. An ALARA evaluations should be performed when assessing the use of respiratory protection in accordance with NS-RS-PG-002, *Respiratory Protection Program* to weigh potential internal exposure vs. external exposure as a result of reduced worker efficiency and safety in order to minimize overall exposure.
- 3.3.2. Personnel dose should be tracked in order to ensure no administrative dose limits are exceeded without the proper approvals in accordance with NS-RS-PR-500, *Personnel Monitoring*.

## 4. Pre-Requisites / Requirements

- 4.1. An annual assessment of the RPP including the ALARA Program shall be performed in accordance with NS-RS-PR-103, *Program Audit and Surveillances*.
- 4.2. Project personnel shall be properly trained commensurate to their job requirements in accordance with NS-RS-PR-101, *Personnel Training Requirements* to ensure their understanding of the radiological hazards and how to properly manage their dose.
- 4.3. Access to restricted areas shall be controlled by Radiation Work Permit in accordance with NS-RS-PR-201, *Radiation Work Permits* specifying the radiological controls and monitoring requirements.
- 4.4. Restricted areas shall be posted in accordance with NS-RS-PR-202, *Radiological Postings* to properly communicate the radiological hazards.
- 4.5. Access to High Radiation and Very High Radiation Areas (HRA/VHRA) shall be controlled in accordance with NS-RS-PR-208, *HRA-VHRA Access Controls*.
- 4.6. Routine surveys of restricted areas, area boundaries and site perimeters shall be performed in accordance with project work plans and NS-RS-PR-300, *Performance of Radiological Surveys* in order to assess working conditions and to verify area radiological postings, radiological controls, monitoring requirements and the locations of established boundaries.
- 4.7. If any personnel exposure limits are exceeded or suspected to have been exceeded, the proper notifications shall be made in accordance with NS-RS-PR-200, *Emergency Response*.

## 5. Procedure

### 5.1. General

- 5.1.1. All NS field projects shall be performed in a manner such that personnel exposures (occupational and public) are maintained ALARA.

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- 5.1.2. 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.
- 5.1.3. Engineering controls shall be implemented to the maximum extent practical in order to eliminate or minimize personnel exposure and exposure to the public.
- 5.1.4. 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.

## 5.2. ALARA Job Reviews

- 5.2.1. For specific project tasks or RWPs that are anticipated to exceed a total exposure in excess of 500 person-mrem or an individual dose of 100 mrem, an ALARA Job Review shall be performed by the RPS and/or PHP in accordance with NS-RS-PR-506, *ALARA Plans and Dose Modeling*. 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, and/or
  - PPE requirements
- 5.2.2. 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.
- 5.2.3. If the total exposures received exceed the estimates by more than 100% then a post job review shall be performed and reported to the RSO.

## 5.3. ALARA Plans

- 5.3.1. For projects in which the total project exposure is anticipated to exceed 5 person-rem or 500 mrem to an individual, an ALARA Plan and dose goals shall be prepared in accordance with NS-RS-PR-506, *ALARA Plans and Dose Modeling* by the RPS and/or PHP and approved by the RSO. The ALARA Plan shall include the following:



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- 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, and
- Establishment of dose goals for tracking and performance purposes

5.3.2. 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 RSO and the Senior Vice President Nuclear Secured.

## **5.4. Dose Goals and Dose Tracking**

- 5.4.1. If an ALARA Plan is required, the Project Manager shall establish dose goals approved by the RSC as part of the ALARA Plan in accordance with NS-RS-PR-506, *ALARA Plans and Dose Modeling*.
- 5.4.2. Dose goals may be established even if an ALARA Plan is not required at the discretion of the Project Manager, RSO or RSC.
- 5.4.3. The RPS or PHP shall actively monitor personnel exposure results including estimated dose (i.e., Daily SRD and/or ED readings) and actual dose of record (i.e. TLD data to date) as available and track personnel exposures against the dose goals and administrative exposure limits.
- 5.4.4. Dose tracking results should be tabulated and reported to the RSO or designee on a monthly basis in order to track both overall personnel exposures and project goals.
- 5.4.5. The RSO may require more frequent reporting if an individual's dose is approaching an administrative dose limit.
- 5.4.6. If the dose goals are exceeded by more than 50%, the RPS or PHP shall notify the RSO and the RSC. This shall include a comparison of actual doses vs dose goal estimates and assumptions including any explanation for the deviation.
- 5.4.7. If the basis for the dose goals (e.g., the work scope, work area dose rates, etc.) change during the course of a project, the RPS or PHP shall inform the RSO as soon as possible and review and revise the ALARA Plan as necessary to provide revised goals.

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## 6. Records

- 6.1. ALARA Job Review
- 6.2. ALARA Plan
- 6.3. Radiation Work Permits
- 6.4. Training Documents
- 6.5. Exposure Results and Reports
- 6.6. Surveys

## 7. Appendices and Forms

- 7.1. None