Public Dose Assessment

Nuclear Secured / Radiation Safety

NS-RS-PR-507, 0

Date Effective: 11 August 2019

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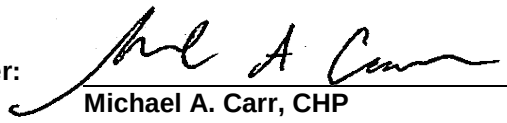
Refer to the Intraweb or the document control authority for the current revision.

History and Approvals

History

Revision	Intent Y/N	Purpose description
0	Y	For Issue

Approvals

Preparer:  8/8/2019

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1. Purpose and Scope

1.1. Purpose

The purpose of this procedure is to provide guidance for performing public dose assessments and documenting the results in accordance with Nuclear Regulatory Commission (NRC) regulations and recommendations.

1.2. Scope

This procedure applies to all Nuclear Secured (NS) field projected performed under the NS Radiation Protection Program (RPP).

2. References

2.1. Title 10 CFR, Part 20 *Energy – Standards for Protection Against Radiation, Subpart A-General Provisions*

2.2. Title 10 CFR, Part 20 *Energy – Standards for Protection Against Radiation, Appendix B*

2.3. AE-SH-PR-002, *Incident Reporting and Notification*

2.4. NS-RS-PG-001, *Radiation Protection Program*

2.5. NS-RS-PR-102, *Project Records Management*

2.6. NS-RS-PR-500, *Personnel Monitoring*

2.7. NS-RS-PR-501, *Air Sampling and Analysis*

2.8. NS-RS-PR-503, *External Dose Assessments*

2.9. NS-RS-PR-504, *Internal Dose Assessments*

3. General

3.1. Definitions

3.1.1. *Dose* - A generic term meaning absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or total effective dose equivalent, as defined elsewhere in this section.

3.1.2. *External dose* – The portion of the dose equivalent received from radiation sources outside the body.

3.1.3. *Internal Dose* – that portion of the dose equivalent received from radioactive material taken into the body.

3.1.4. *Monitoring* – The measurement of radiation levels, concentrations, surface area concentrations or quantities of radioactive materials and the use of these results and measurements to evaluate potential exposures and doses.

3.1.5. *Rad* - The special unit of absorbed dose. One rad is equal to an absorbed dose of 100 ergs/gram or 0.01 joule/kilogram (0.01 gray).

3.1.6. *Rem* - The special unit of any of the quantities expressed as dose equivalent. The dose equivalent in rems is equal to the absorbed dose in rads multiplied by the quality factor, Q (1 rem = 0.01 sievert).

3.1.7. *Sievert (Sv)* – The SI unit of any of the quantities expressed as dose equivalent. The dose equivalent in sieverts is equal to the absorbed dose in grays multiplied by the quality factor, Q (1 Sv = 100 rem)

3.1.8. *Whole body* – For the purposes of external exposure assessment, the whole body is considered the person's head, trunk (including male gonads), arms above the elbow, and legs above the knee.

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. The RSO is also responsible for the review of all personnel exposure records and to ensure exposures are maintained below regulatory and Atkins administrative limits as applicable.

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, such as the review of exposure records and the performance of external dose assessments, 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 ANS RPP at the project location and oversees project personnel in regards to radiation and respiratory protection and reports directly to both the PM and the RSO. The RPS shall support the PHP and the RSO in all external dose assessments as necessary and to provide the necessary supporting documentation.

3.3. Precautions and Limitations

3.3.1. The site effluent limits document in Title 10 CFR, Part 20 *Energy – Standards for Protection Against Radiation, Appendix B* are equivalent to the concentrations which, if inhaled or ingested continuously by a member of the public over the course of a year, would produce a total effective dose equivalent of 50 mrem. For airborne contaminants, this is 5 times the allowable exposure as summarized in Step 4.4 and as specified in NS-RS-PR-500, *Personnel Monitoring*.

3.3.2. Airborne effluent limits as provided in Title 10 CFR, Part 20 *Energy – Standards for Protection Against Radiation, Appendix B* should be divided by a factor of 5 to demonstrate compliance; otherwise, occupancy factors or time weighted averaging shall be used.

3.3.3. Use precautions when using occupancy factors to demonstrate compliance with public dose limits. Any justification for the use of occupancy factors must be documented and justified and approved by the PHP or Certified Health Physicist (CHP).

3.3.4. When monitoring public exposure, ensure to account for natural background to ensure the reported results are the result of site operations and not background.

4. Pre-Requisites / Requirements

4.1. Identify the exposure pathways for a member of the public such that all sources of exposure may be evaluated as necessary.

4.2. A public dose assessment shall be performed either at the end of the year or at the end of the project, whichever is sooner, and documented. All public dose assessments shall be reviewed and approved by the PHP and/or RSO.

4.3. Public dose shall be limited such that the maximum dose to an individual member of the public is less than 100 mrem/year.

4.4. In the interest of ALARA, the public dose to internal exposure (e.g., airborne exposure) shall be limited such that the maximum internal dose to an individual member of the public is less than 10 mrem/year.

5. Procedure

5.1. Direct Exposure

5.1.1. Use any and all available data in determining direct dose to the public. This includes the following:

- Perimeter monitoring devices (OSL or TLDs)
- Site perimeter surveys
- Occupational monitoring results

5.1.2. Use occupancy factors as necessary to demonstrate compliance as necessary.

5.1.3. Use NS-RS-PR-503, *External Dose Assessments* for guidance when determining any direct external exposure to the public.

5.2. Site Effluent (Internal Exposure)

5.2.1. Use any and all available data in determining direct dose to the public as a result of site effluent based on the potential exposure pathways. This includes the following:

- Perimeter air samples
- Downwind air samples
- Discharge air sampling results
- Perimeter water samples
- Downstream water samples

5.2.2. Use occupancy factors as necessary to demonstrate compliance as necessary.

5.2.3. Use NS-RS-PR-504, *Internal Dose Assessments* for guidance when determining any internal exposure to a member of the public.

5.3. Public Dose

5.3.1. Determine the total dose to the maximum exposed member of the public. The total dose is the sum of the direct dose and any dose from the inhalation or ingestion from site effluents.

5.3.2. Document the public dose assessment on Attachment 7.1, or equivalent.

5.3.3. All public dose assessments shall be reviewed and approved by the PHP, CHP and/or RSO.

6. Records

6.1. Site Perimeter monitoring records (OSL or TLDs and surveys)

6.2. Air sampling results

6.3. Water sampling results

7. Appendices and Forms

7.1. Public Dose Assessment

Attachment 7.1 **Public Dose Assessment**

Project:	**Calander Year:**	
Reason for Assessment:		
External Exposure Estimate:	**Internal Exposure Estimate:**	**Total Estimated Dose:**
External Exposure Summary:		
Internal Exposure Summary:		
Occupancy Factors:		
Basis and Method of Dose Assessment:		
Review and Approval		
Performed by:	**Signature/Date:**	
Reviewed by:	**Signature/Date:**	