

## IAEA SAFETY STANDARDS NS-G-3.2 INCLUDING CHANGES IN THE REVISION (DS529)

Asian Nuclear Safety Network (ANSN) Regional Workshop on Radiological Environmental Impact Assessment for Nuclear Installations Hosted by the Government of the Philippines through the Philippine Nuclear Research Institute (PNRI) Manila, Philippines, 24–28 October 2022

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## Outline



- Introduction
- Gap Analysis for IAEA Safety Standard No. NS-G-3.2, Dispersion of Radioactive Material in Air and Water and Consideration of Population Distribution in Site Evaluation for NPPs
- Content of DS529

## NS-G-3.2, Dispersion of Radioactive Material in Air and Water and Consideration of Population Distribution in Site Evaluation for AFA NPPs

- The objective of NS-G-3.2 is to provide guidance on the studies and investigations necessary for assessing the impact of a NPP on humans and the environment.
- It provides guidance on investigations relating to population distribution, and on the dispersion of effluents in air, surface water and groundwater.
- It is intended to help determine whether the site selected for a NPP satisfies national requirements and whether possible radiological exposure and hazards to the population and to the environment are controlled within the limits set by the regulatory body, with account taken of international recommendations.



IAEA SAFFT

STANDARDS

NO. NS-G-3.2 INTERNATIONAL ATOMIC ENERGY AGENCY

Dispersion of Radioactive Material in Air and Water and Consideration of Population Distribution in Site Evaluation for

Nuclear Power Plants



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Dispersion of Radioactive Material in Air and Water and Consideration of Population Distribution in Site Evaluation for Nuclear Power Plants

#### SAFETY GUIDE

No. NS-G-3.2

## Main issues to address in NG-G-3.1





Dispersion of Radioactive Material in Air and Water and Consideration of Population Distribution in Site Evaluation for Nuclear Power Plants

#### SAFETY GUIDE



#### General updating

- Published in 2002
- Links with other guidance
- Terminology

#### Improve usability

- Explain why information needs to be collected and how it will be used
- Reflect alternative methods where appropriate
- Expand scope
  - Introduce graded approach (types of installation)

Replace QA Programme with Application of Management System

Incorporate feedback from Member States

This Meeting

## **Updating – links with other guidance**

Since NS-G-3.2 was published in 2002:

- New Specific Requirements e.g. SSR-1, SSR-3, SSR-4
- New General Requirements e.g. GSR Parts 3, 4 & 7-4
- New Guidance e.g. GSG-9 and GSG-10

IAEA Safety Standards for protecting people and the environment	IAEA Safety Standards for protecting people and the environment	IAEA Safety Standards for protecting people and the environment		
Site Evaluation for Nuclear Installations	Safety of Research Reactors	Safety of Nuclear Fuel Cycle Facilities	IAEA Safety Standards for protecting people and the environment	IAEA Safety Standards for protecting people and the environment
Specific Safety Requirements No. SSR-1	Specific Safety Requirements No. SSR-3	No. SSR-4	Prospective Radiological Environmental Impact Assessment for Facilities and Activities	Regulatory Control of Radioactive Discharges to the Environment
			General Safety Guide No. GSG-10	General Safety Guide No. GSG-9



## **Updating – modern methods**



Reflect modern techniques, methods, and measurement instrumentation

- For example, Numerical Weather Prediction methods (if available) can be used instead of constructing meteorological towers
- Moderns atmospheric dispersion models may need different sets of data to those described in Guide

## **Improve Usability**



#### Current guide contains lists of information to be acquired

2.14. In order to provide a description of the meteorological conditions, data on the following should be obtained concurrently:

- wind vectors (i.e. wind directions and speeds),
- specific indicators of atmospheric turbulence,
- precipitation,
- air temperatures,
- humidity,
- air pressure.

3.5. The following properties and parameters should be estimated for radioactive discharges:

- (a) Radioactivity:
  - the rate of discharge of each important nuclide, and an estimate of the total activity discharged in a specific period and its fixation capacity on soils;
- (b) Chemical properties, including:
  - important anion and cation concentrations, and their oxidation states and complexing states (e.g. Ca<sup>2+</sup>, K<sup>+</sup>, Mg<sup>2+</sup>, Na<sup>+</sup>, NH<sub>4</sub><sup>+</sup>, HCO<sub>3</sub><sup>-</sup>, Cl<sup>-</sup>, SO<sub>4</sub><sup>-</sup>, NO<sub>2</sub><sup>-</sup>, NO<sub>3</sub><sup>-</sup>, PO<sub>4</sub><sup>-</sup>);
  - organic content;
  - pH;
  - the concentration of dissolved oxygen, and conductivity and concentrations of associated pollutants;
- (c) Physical properties of the liquid effluents discharged, including:
  - temperature;
  - density;
  - loads and granulometry of suspended solids;
- (d) Flow rates for continuous discharges, or volume and frequency for batch discharges;
- (e) The variation of the source term over the duration of the discharge, which is necessary to evaluate the concentrations due to long term releases;
- (f) The geometry and mechanics of discharges.

#### But doesn't really explain what data will be used for or how

## **Improve Usability**



## Guide says this information <u>should</u> be collected

- Is every item on the list needed in every circumstance?
  - Are there situations where some items are not needed?
- For some items collection of data might be a good idea for operational or other reasons but not for safety reasons
- Gives the impression all items are equally important
  - Introduce the graded approach where approximations can be made for example by using generic rather than site-specific data – at an early stage of where this parameter is not important in assessing the overall safety of the installation

## **GAP** Analysis



2.6¤	A detailed meteorological investigation should be carried out in the region. The calculations of the dispersion and concentrations of radioactive materials should show whether the radiological consequences of routine discharges and potential accidental releases of radioactive materials into the atmosphere are acceptable. The results of these calculations may be used to establish authorized limits for radioactive discharges from the plant into the atmosphere (see Ref. [5]).¶ [5]INTERNATIONAL ATOMIC ENERGY AGENCY, Regulatory Control of Radioactive Discharges to the Environment. Stafety Standards Series No. 'WS-G-2.3. IAEA. 'Vienna. (2000).¤	OK¶ Update·WS-G-2.3·to·GSG-9.¶ Include·other·references·e.g.·GSG-10¶ First-sentences·can·be·moved·to·new·section·3.¶ Keep·with·modifications¤	¤
2.7¤	The results of the meteorological investigation should be used to confirm the suitability of a site; to provide a baseline for site evaluation; to determine whether local meteorological characteristics have altered since the site evaluation was made and before operation of the plant commences; to select appropriate dispersion models for the site; to establish limits for radioactive discharges into the atmosphere; to establish limits for design performance (for example, containment leak rates and control room habitability); and to assist in demonstrating the feasibility of an emergency plan. <sup>III</sup>	Mention and link explaining the difference in- collecting data to determine extreme values and to determine the impact of the environment on the plant.¶ ¶ Could add some guidance somewhere on appropriate mean return periods ¶ Some part of this para should be moved Section 3.¶ X	¤
¤	SELECTION OF RELASE SCENARIOS FOR NORMAL AND ACCIDENTAL DISCHARGES	For·example,·reference·to·GSG·10,·SSG-2·and· SSG-4,·GSG-9·¤	Þ
¤	RADIOACTIVE SOURCE PARAMETERS FOR NORMAL AND ACCIDENTAL¶ DISCHARGES IN AIR¤	×	Þ
2.8¤	<ul> <li>2.8. The following properties and parameters should be estimated for radioactive sources;¶</li> <li>(a) Radioactivity:¶</li> <li>—the rate of discharge of each important nuclide and the total activity of each important nuclide released in a specified period;¶</li> <li>—variation of the rate of discharge of each important nuclide;¶</li> <li>(b) Chemical characteristics of the material released;¶</li> <li>(c) Physical properties of the material released;¶</li> <li>(d) Geometry and mechanics of the discharge.¤</li> </ul>	Describe-how·this-information·would·be·used· and·for·what·cases·it·might·not·be·necessary¤	д
2.9¤	Information should be collected on the background levels of activity in air due to natural and artificial sources.¤	Explain how this will be used and give more specific examples (for example sediment at discharge pipe outlet)¶ This para will be moved to new Section 3.X	¤

# DS529, Investigation of Site Characteristics and Evaluation of Radiation Risks to the Public and the Environment in Site Evaluation for Nuclear Installations

IAEA SAFEIY SI For protecting people and the	ANDARDS environment
	STEP 5: Preparing the draft
Investigation of Sit Evaluation of Radi	e Characteristics and ation Risks to the Public and the
Investigation of Sit Evaluation of Radi Environment in Sit Installations	e Characteristics and ation Risks to the Public and the te Evaluation for Nuclear
Investigation of Sit Evaluation of Radi Environment in Sit Installations DRAFT SAFETY GUI	e Characteristics and ation Risks to the Public and the te Evaluation for Nuclear DE No. DS 529

## **DS529: Objective**



- Provide recommendations and guidance on investigation of site characteristics and evaluation of radiation risks to the public and the environment for nuclear installations meeting the applicable safety requirements in SSR-1,SSR-3, SSR-4, GSR Part 3,....
- Intended for use by regulatory bodies, operating organizations or their contractors in conducting investigation of site characteristics and evaluation of radiation risks to the public and the environment for nuclear installations.

## DS529: Scope



- Cover investigation of site characteristics including population distribution, uses of land and water in the region of the nuclear installation site, background levels of radioactivity in the environmental media, meteorological, hydrological and hydrogeological characteristics of region of the nuclear installation site.
- Radiological environmental impact assessment (including analysis of dispersion of radionuclides in atmosphere, analysis of transport of radionuclides in surface and ground water and assessment of overall radiological impact)
- Extension of the scope from NPP to all nuclear installations
- The new information will include:
  - Updated methodologies based on the current state of practice,
  - Recommendations for a site with multiple facilities,
  - Assessment of overall radiological impact,
  - Application of management system.

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the enviroment     4       Identification of exposure pathways     7       General approach for assessment     11       Overall safety picture, severe accident and consequences     19       Site characterization and radiological environmental assessment     20       Significance and use of assessment of transport of radionuclides in the environment     20       Approach for the existing sites     20	7. ASSESSMENT OF OVERALL RADIOLOGICAL IMPACT       59         Summary of site characteristics       59         Compilation of analysis results       62         Identify the representative person / reference animal and plants       63         Calculation of dose / risk to the representative person and dose rates to refrence animal and plant       65         Determination of acceptability of impacts       65
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## Thank you! Questions?

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