Radiation and Nuclear Safety Authority Regulation on Releases of Radioactive Substances from Nuclear Facilities

Content

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In accordance with the Radiation and Nuclear Safety Authority's decision, it is issued, by virtue of Section x, Subsection x of the Nuclear Energy Act (x/x):

1 § Scope

This regulation shall apply to the releases of radioactive substances from nuclear facilities. Separate provisions shall be issued regarding the releases of radioactive substances from recovery plants of nuclear material.

2 § Definitions

For the purposes of this regulation:

1) *Representative person* shall refer to a person representative of the individuals most exposed to a specific radiation source.

2) *Best available techniques* (BAT) shall refer to advanced and effective production and purification methods that are technically and economically feasible. They shall also refer to methods for the design, construction, maintenance and operation of facilities that prevent or reduce releases of radioactive substances into the environment as effectively as possible.

3) *Emission potential* shall refer to the potential for radioactive substances to be released into the environment via the release routes of a nuclear facility.

3 § Determining the emission potential

SYT-5823 – The emission potential of a nuclear facility shall be determined before construction begins. Emission potentials shall be determined by taking into account normal operation, operational occurrences and accidents.

SYT-5824 – To determine the emission potentials, the release routes by which radioactive substances are discharged into the environment, or otherwise enter it, shall be identified for the nuclear facility. Release routes shall be classified according to their significance. The following classification shall be used:

1. main release routes, through which releases are primarily discharged from the facility
2. other significant release routes, through which minor releases are normally discharged into the environment or through which significant discharges may occur

in the event of an accident
3. minor release routes, through which small releases are discharged into the environment.

SYT-5822 – When determining emission potentials, the following shall be taken into account:
1. the amount and distribution of radioactive substances released via different routes, taking into account the planned release limitation procedures
2. identification of the radionuclides released into the environment via the release routes that are significant in terms of environmental impact.

4 § Limiting the releases of radioactive substances

SYT-5840 – The design of a nuclear facility shall demonstrate that best available techniques are being used to minimise radioactive releases. The choice of solutions employed for limiting the releases of radioactive substances shall be justified.

SYT-5834 – The best available techniques shall be reviewed regularly.

SYT-5836 – Radioactive substances may only be discharged into the sewer system in such a way that the radiation dose to the representative person under consideration does not exceed 0.01 mSv/a.

5 § General requirements for the measurement of releases of radioactive substances

SYT-5852 – Measurements of releases of radioactive materials from nuclear facilities shall form a whole that is appropriate and well suited for the detection of releases. If significant changes in emission potential are identified, the suitability of the release measurements for their intended purpose shall be reviewed and, if necessary, changes shall be made.

SYT-5853 – The release routes specified in Section 3 above shall be monitored using appropriate measures. Reliable measurement arrangements suitable for determining and monitoring the releases of different radionuclides, and suitable for their intended use, shall be used. These arrangements shall also be sufficiently accurate for the purpose of the measurement. Before the nuclear facility is put into operation, the suitability of the measurement and sample collection arrangements for their intended use shall be proven.

SYT-5850 – Real-time monitoring of releases from the nuclear facility shall use measurement data from the main and other important release routes.

6 § Sporadic and minor releases of radioactive substances

SYT-5851 – If the release of sporadic or minor amounts of radioactive substances along routes other than those identified in accordance with Section 3 is justified for the purpose of optimising radiation protection, it must be possible to reliably assess the magnitude of such releases.

7 § Monitoring of radiation exposure of members of the public

SYT-5848 – With regard to radiation doses to the population, the radiation dose received by a representative individual as a result of the release of radioactive materials from a nuclear facility shall be determined. Additionally, the collective dose received by the population shall be considered. When determining radiation exposure, significant dispersion and exposure routes of radioactive substances shall be taken into account.

SYT-5849 – The radiation doses received by members of the public during the normal operation and decommissioning of a nuclear facility shall be assessed against the dose limits for members of the public set out in Section xx of the Nuclear Energy Decree.

8 § Limit values for release of radioactive substances

SYT-5854 – The limit values for releases of radioactive materials, as referred to in Part III, Chapter 2, Section 8 of the Nuclear Energy Act, shall be determined separately for all radionuclide groups or key radionuclides, in terms of importance to radiation exposure, over a calendar year. When determining the release limit values, sufficient margins shall be used to take account of uncertainties.

SYT-5855 – However, it is not necessary to set a limit value for releases of radioactive substances for radionuclides or groups of radionuclides where it is reasonable to assume that releases will always remain below a certain level.

9 § Target values for releases of radioactive substances

SYT-5862 – The target values for releases of radioactive substances referred to in 53 of the Nuclear Energy Act shall be set for radionuclides or groups of radionuclides on the basis of which it is possible to verify the planned operation of the facility and the effectiveness of release reduction measures.

SYT-5863 – The up-to-date nature of the target values for the release of radioactive substances shall be assessed against actual releases and plant events. The values shall then be updated as necessary.

10 § Monitoring of releases of radioactive substances along the main release routes

SYT-5860 – In order to identify and determine releases of radioactive materials, the main release routes of a nuclear facility shall be monitored reliably. Even in exceptional situations and regardless of individual equipment failures, it must be possible to monitor the composition of releases in a verified manner and in real time. Monitoring procedures shall be proportionate to the emission potential.

SYT-5861 – Monitoring shall be carried out using continuous radiation measurements and by taking representative samples from the release stream. The monitoring systems shall be capable of reliably and representatively taking samples, even in exceptional situations. Regardless of individual equipment failure, it shall be possible to reliably and representatively take samples from the release routes. Continuous sampling of radionuclides whose releases are independent of plant events does not need to meet the single fault criterion.

SYT-5858 – If necessary, based on the emission potentials of the nuclear power plant, the continuous monitoring of the release of radioactive iodine and aerosols through the exhaust air of the nuclear power plant unit is required. These measurements do not need to fulfil the single-fault criterion.

11 § Monitoring of releases of radioactive substances along other important release routes

SYT-5859 – In order to identify radioactive releases, other important release routes from the nuclear facility shall be monitored reliably. Where reasonably practicable, the ability to reliably monitor releases in real time, even in exceptional situations, is required. The monitoring procedures should be proportionate to the potential releases.

SYT-5856 – The monitoring activities referred to in Subsection 1 shall be carried out using continuous radiation measurements and measurements of representative samples taken from the release stream. However, if monitoring based on emission potential is sufficient, only one of these methods needs to be used. The monitoring systems shall be capable of reliably and representatively taking samples, even in exceptional situations.

SYT-5857 – If releases via the other significant release routes of a nuclear facility, as referred to in Section 3, Subsection 2, Paragraph 2, cannot be determined by direct sampling, the releases and their composition may be estimated indirectly.

12 § Monitoring of releases of radioactive substances along minor discharge routes

SYT-5868 – The minor release routes of nuclear facilities shall be monitored using sampling or radiation measurement techniques that are appropriate, reliable and proportionate to the emission potential.

13 § Continuous measurement of the release of radioactive substances

SYT-5869 – Any measuring equipment used to monitor radioactive releases shall be regularly calibrated and its condition checked.

SYT-5867 – If necessary, based on the results of continuous measurements and the action thresholds specified in the operational limits and conditions, it shall be possible to limit the release of radioactive substances through the main release routes. Continuous measurements shall be accompanied by alarm functions and, where necessary, control functions to detect exceptional situations and mitigate their effects.

SYT-5865 – Key processes and rooms in terms of a nuclear facility's releases shall be monitored using continuous radiation measurement devices to detect exceptional releases early.

14 § Continuous sampling equipment used to detect releases of radioactive substances

SYT-5866 – Any sampling equipment used to monitor the releases of radioactive materials shall be fit for purpose, and its condition shall be checked regularly.

SYT-5864 – All continuous sampling devices shall be fitted with an alarm function to detect malfunctions.

15 § Determining releases of radioactive substances

SYT-5875 – Releases of radioactive substances shall be monitored in such a way that they can be reliably detected, measured and reported. All regular analyses, whether based on measurements or sampling, shall be appropriate for the radionuclide in question. Determinations shall also be made in a representative manner if the composition or release rate of the release has changed, or is suspected to have changed, significantly.

SYT-5872 – Samples of liquid releases from the main release routes shall be taken on a batch-by-batch basis in advance, with a representative sample being taken automatically from the release line. Representative samples shall be taken for each release batch for other liquid release routes. If liquid releases are released from a nuclear facility in a continuous flow, the automatic sampling system on the release line shall remain operational despite individual equipment faults. However, it is not necessary to take samples for each release batch.

SYT-5873 – In accordance with the emission potential of a nuclear power plant's main release route, the radionuclide-specific release measurements of its release fractions shall under normal conditions meet the detection limit requirements specified in Appendix 1. If justified in terms of emission potential, the requirement level set out in Appendix 1 may be deviated from.

SYT-5870 – The detection limit requirements specified in Appendix 1 shall apply to the measurement of radioactive substances released from sources other than nuclear power plants. These requirements shall be applied with a sufficient sensitivity in accordance with the emission potential of the nuclear facility's release routes.

16 § Data concerning releases of radioactive substances

SYT-5871 – The measurement results relating to the release of radioactive substances shall be documented and verified in such a way that operating events and accidents at the plant can be analysed retrospectively.

17 § Entry into force and transitional provisions

SYT-5881 – This regulation shall enter into force on X X 202X and shall remain valid until further notice. Upon the entry into force, this regulation shall be applied to any pending matters.

Appendix 1

SYT-5882 – Table 1: Detection limit requirements for sample-based measurements.

Releases into the atmosphere	**Key radionuclide**	**Detection limit requirement**
Inert gases	Kr-85 Xe-133	1.0E+04 Bq/m3 2.5E+03 Bq/m3
Iodine isotopes	I-131	5.0E-03 Bq/m3
Particles** (iodine isotopes excluded)	S-35* Co-60 Sr-90 Cs-137 Alpha emitters total, Pu-239+Pu-240*** Am-241***	2.5E+00 Bq/m3 2.5E-03 Bq/m3 5.0E-03 Bq/m3 7.5E-03 Bq/m3 2.5E-03 Bq/m3 1.25E-03 Bq/m3 1.25E-03 Bq/m3
Other key nuclides	H-3 C-14	2.5E+02 Bq/m3 2.5E+00 Bq/m3
Liquid releases	**Key radionuclide**	**Detection limit requirement**
Tritium	H-3	5.0E+04 Bq/m3
Other radionuclides **(tritium excluded)	S-35* Co-60 Sr-90 Cs-137 Alpha emitters total, Pu-239+Pu-240*** Am-241***	7.5E+03 Bq/m3 2.5E+03 Bq/m3 2.5E+02 Bq/m3 2.5E+03 Bq/m3 5.0E+02 Bq/m3 1.5E+03 Bq/m3 1.25E+01 Bq/m3

* Gas-cooled reactors only.

** Sr-89 shall be determined in fuel leak situations where, in addition to gaseous substances, other substances are also released from the fuel.

*** Measurement needed only in connection with elevated total activity of alpha-emitting nuclides of instrumental origin (air > 1.0E-03 Bq/m3, water > 1.0E+03 Bq/m3).