Swedish Radiation Safety Authority
Regulatory Code

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Swedish Radiation Safety Authority

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The Swedish Radiation Safety Authority's Regulations on Radiation Protection of Individuals Exposed to Ionising Radiation at Nuclear Facilities

Please note that translated versions of the Authority's regulations lack legal force and are for information purposes only.

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The Swedish Radiation Safety Authority's Regulations on Radiation Protection of Individuals Exposed to Ionising Radiation at Nuclear Facilities;[1]

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On the basis of Section 7 of the Radiation Protection Ordinance (1988:293), the Swedish Radiation Safety Authority hereby issues[2] the following regulations.

Application and definitions

Section 1 These regulations are applicable to radiation protection of individuals at nuclear facilities.

Section 2 Terms and concepts used in the Radiation Protection Act (1988:220) and the Act on Nuclear Activities (1984:3) have the same meanings in these regulations.

Section 3 In these regulations the following concepts are used with the meanings specified here.

effective dose:	weighted radiation dose regarding the biological effects of the type of radiation as well as the sensitivity of various organs
external exposure:	exposure to a source situated outside the human body
external contamination:	radioactive substances on the human body or on clothing
whole body counting:	measurement of the content of radioactive substances in the human body using one or more detectors

[1] These regulations were issued previously in the Swedish Radiation Protection Authority's Regulatory Code (SSI FS 2000:10).
[2] Cf. Council Directive 96/29/Euratom of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation. OJ L 159, 29/06/1996, p. 1 (Celex 31996L0029).

committed effective dose:	the total effective dose, integrated over 50 years, after an intake of radioactive substances into the human body
internal exposure:	exposure to radioactive substances within the human body
internal contamination:	radioactive substances in the human body after an intake by inhalation, through the digestive system or through the skin
calibration:	measures in order to determine, under specified conditions, the relationship between the reading of an instrument and the corresponding true value of a quantity
collective dose:	the mean radiation dose to a group of individuals multiplied by the number of individuals in the group
individual dose:	a generic term for effective dose and committed effective dose
individual dose meter:	an instrument containing one or more detectors used for individual monitoring of external exposure

Optimisation of radiation protection

Section 4 Work activities at a nuclear facility shall be performed in such a way that doses to individuals are kept as low as reasonably achievable, with economic and societal factors being taken into account. For this purpose, the licence holder shall ensure that goals and needed means for control are defined and documented and that the necessary resources are available.

Section 5 The goals and means for control shall be adapted with respect to the prerequisites of the plant and be defined to take into account both daily and long-term radiation protection. All individuals who are exposed to radiation in their work or who are decision-makers in matters that may affect the individual doses of workers shall have knowledge regarding the relevant goals and means for control to the extent this is pertinent to them.

The work activities, including goals and means for control, shall be followed up and evaluated with respect to the provisions of Section 4. Such evaluation shall be conducted at least once a year. Documentation on the evaluation shall be sent to the Swedish Radiation Safety Authority.

Information and training

Section 6 All personnel, including the plant's own personnel as well as outside workers, shall be informed about radiation protection prior to work within a supervised or controlled area.[3] Refresher courses on the relevant information shall be held thereafter at least once every third year.

The information shall include a survey of the risks related to work with ionising radiation, how to act in the event of an alarm, the local instructions and routines at the plant and practical aspects of radiation protection.

In addition to the information on radiation protection mentioned in the first and second clauses, special training may in certain cases be required. The scope and focus of such training shall be adapted with respect to the kind of work and to the environment where the work is to be performed.

Section 7 All personnel working with matters related to radiation protection, the plant's own personnel working in the area of operation or maintenance as well as outside workers holding posts as foremen, shall have undergone an in-depth training programme which, for example, encompasses the fundamental principles of radiation protection.

The training programme shall be adapted with respect to the kind and extent of the work as well as the environment where the work is to be performed.

Refresher courses on radiation protection shall be held to the extent necessary.

Section 8 Details on the latest occasion when information or training was provided relating to radiation protection to each individual shall be documented with respect to the extent and date of such information or training.

Medical examination[4]

Section 9 A medical examination of a worker from a country outside the European Union, performed in a foreign country, may be accepted if the outcome of such examination can be verified.

Local radiation protection instructions

Section 10 The licence holder shall ensure that local radiation protection instructions are established.

These shall at least comprise the plant's internal instructions and routines for:

1. categorisation of workers,
2. controlled areas,

[3] See the Swedish Radiation Safety Authority's regulations (SSMFS 2008:51) concerning basic provisions for the protection of workers and the general public in practices involving ionising radiation.
[4] Ibid.

3. training on radiation protection,
4. monitoring of individual doses,
5. contamination checks,
6. calibration and checks of instruments and equipment,
7. handling and transport of radioactive substances within the plant,
8. visitors within a controlled area,
9. documentation, and
10. reporting.

Controlled areas

Section 11 Within a controlled area, premises and places where the risk of receiving a yearly effective dose exceeding 50 mSv is not negligible shall be especially marked. Admittance shall be especially restricted to this type of location.

Section 12 Within a controlled area, food consumption and smoking shall be forbidden. Water shall only be available from a drinking fountain or be served within special areas according to the provisions of Section 13. Prior to the establishment of such an area, a description of the area and its intended use, including a programme for contamination checks, shall be sent to the Swedish Radiation Safety Authority for consideration.

Section 13 The following conditions shall apply when serving beverages in a special area

a) Before entrance to the area, all persons shall be checked for contamination and must be free from external contamination according to the requirements stipulated in Section 20.

b) Beverages shall only be served in a disposable package or in a disposable cup filled directly from a machine.

c) The surface contamination within the area must not exceed 40 kBq/m² as summed up for the most common beta- and gamma-emitting nuclides, or must not exceed 4 kBq/m² for alpha-emitting nuclides. The surface contamination must be verified regularly by means of contamination checks in the area.

Section 14 For the purpose of showing that the provisions concerning categorisation of workplaces are met, monitoring of the environment outside the controlled area shall be performed by:

1. measuring gamma radiation with the aid of stationary dosimeters, and
2. checking for surface contamination of a sample of floor and ground, performed at least once a year.

Visitors

Section 15 Visitors from the general public are only permitted in a controlled area if guided by an authorised person and if a pre-approved plan is followed. It shall be the radiation protection manager who decides which persons are authorised and which persons have the authority to approve plans.

Section 16 Visitors from the general public must be at least 14 years old to be allowed admittance to a controlled area. School classes of at least the eighth school year may be allowed admittance as visitors regardless of the age of the pupils.

Monitoring of individual doses

External exposure

Section 17 All personnel, both the plant's own personnel as well as outside workers, shall, when present within a controlled area, carry an individual dose meter that fulfils the requirements as stipulated in the Swedish Radiation Safety Authority's regulations (SSMFS 2008:51) concerning basic provisions for the protection of workers and the general public in practices involving ionising radiation.

When present in areas with radiation levels where there is a risk of a dose limit being exceeded, an instrument shall be carried that immediately indicates the accumulated dose and which is provided with an alarm function, regardless of other kinds of individual dose meter to be carried. If, in addition, there is a risk of rapid changes in the dose rate, the instrument shall have an alarm function regarding dose rate.

Section 18 Visitors within a controlled area shall carry an individual dose meter.[5] In a guided group of visitors, it is sufficient if two persons in the group carry individual dose meters. The recorded dose shall be valid for all individuals in the group. The individual dose meters may be of a type that gives an immediate reading.

External and internal contamination

Section 19 All persons within a controlled area which is classified with respect to surface or air contamination shall undergo contamination checks before leaving the area.

[5]Not within the scope of the Swedish Radiation Safety Authority's regulations (SSMFS 2008:51) concerning basic provisions for the protection of workers and the general public in practices involving ionising radiation in terms of monitoring and reporting of radiation doses.

Section 20 An individual shall be regarded as free from external contamination if the surface contamination, calculated as the mean over an area of 0.01 m², does not exceed 40 kBq/m² as summed up for the most common beta- and gamma-emitting nuclides and does not exceed 4 kBq/m² for alpha-emitting nuclides. Checks for alpha-emitting nuclides are not needed when exiting the area if there are other means to verify that alpha contamination is very unlikely.

Section 21 If there are reasons to suspect that individuals have been internally contaminated, or if internal contamination is confirmed, they shall undergo whole body counting.

Whole body counting shall be performed on a sample of individuals who have worked in environments where it is considered that there is a particular risk of intake of radioactive substances. Thus, at least one individual from each team shall undergo whole body counting at the end of the working period or after the work has been completed. In the case of long-term work, such measurement shall be performed at least once a month. If an intake that is calculated to imply a committed effective dose of 0.25 mSv or more is found, the whole team shall be measured.

Whole body counting shall be performed for a reference group, in the first instance consisting of own personnel mainly working within a controlled area. The sample for the reference group shall be representative for the practice and the individuals in the group shall be measured at least four times a year.

Section 22 Whole body counting shall be performed according to a documented procedure approved by the Swedish Radiation Safety Authority. The documentation shall show:

1. the measurement equipment and routines for its use,
2. the competence of the personnel performing the measurements,
3. methods used for calculating the intake and the committed effective doses,
4. routines for evaluating and assessing the measurement results obtained, and
5. routines for calibrations and checks of the measurement equipment.

Instruments and equipment

Section 23 Instruments and equipment used for measurements of:

1. individual doses from external exposure,
2. contamination (external, internal or on surfaces),
3. dose rate,
4. airborne activity, and
5. smear tests

shall be calibrated and undergo function checks at regular intervals.

Section 24 Instruments intended for measurements of dose rate shall be calibrated towards a reference source. The dose rates in the calibration set-up shall, at least every second year, be checked against an instrument that is calibrated at a test house that is accredited for ionising radiation. Alternatively, the instrument may be calibrated directly at an accredited test house.

Section 25 Calibrations and checks of equipment for determining internal contamination shall be performed for the nuclides expected to be present. The measurement tolerances, limits of detection and the geometry used in measurements shall be documented.

Section 26 Written instructions for the use, calibration and checks of all types of instruments and equipment mentioned in Section 23 shall be established.

Transport within the plant

Section 27 Transports of radioactive substances within one's own plant but outside a controlled area shall, to the most practical extent, be performed in accordance with the applicable provisions concerning transport of hazardous goods on public roads as regards the requirements concerning dose rate, surface contamination and packaging.[6]

Work with irradiated fuel elements

Section 28 Work with dismounting of irradiated fuel elements at a nuclear power reactor where single fuel rods are handled must not commence earlier than five days after the reactor has been placed in 'cold shutdown mode'.[7] During work with the single fuel rods, only persons directly involved in the work may be present.

Section 29 Air monitoring shall be performed continuously at the working position during the work involving fuel dismounting. The equipment used for monitoring shall be designed to enable checking for any leakage from the fuel and be provided with an alarm. The working position shall be protected by an air flow directed away from the position.

Section 30 Documented instructions for the alarm and evacuation procedures for the premises shall be available. These instructions shall be well known to all persons working in the premises.

[6] For transport of radioactive substances, regulations issued by the Swedish Rescue Services Agency apply on the basis of the Transport of Hazardous Goods Act (2006:263). ADR applies to transport by public road.

[7] As defined by the respective nuclear power plant's Operational Limits and Conditions ('STF').

Fuel damage

Section 31 A documented policy for dealing with fuel damage shall be established at all plants where nuclear power reactors are involved. The policy shall include a description of the plant's strategy for avoiding fuel damage as far as possible. A strategy shall also be in place for dealing with a situation should fuel damage occur.

Reporting

Section 32 The provisions of Chapter 5, Section 3 and Sections 9 to 11 of the Swedish Radiation Safety Authority's regulations (SSMFS 2008:51) concerning basic provisions for the protection of workers and the general public in practices involving ionising radiation shall not apply to nuclear facilities, but are replaced by Sections 33 to 39 of these regulations.

Section 33 An annual written report shall be submitted to the Swedish Radiation Safety Authority containing a compilation of the radiation doses to the personnel as well as the results of the radiation surveillance performed outside the controlled area. The report shall be submitted not later than two months after the turn of the calendar year covered by the report. The scope and structure of this report are decided by the Swedish Radiation Safety Authority.

Section 34 Work activities where the total collective dose is expected to exceed 100 millimansievert (mmanSv) shall be notified in advance, in writing, to the Swedish Radiation Safety Authority. The following procedures apply:

a) The Swedish Radiation Safety Authority shall be notified four months before the work commences. The information shall comprise a survey of the work and an estimation of the expected radiation doses to the personnel.

b) Advance notification shall be sent to the Swedish Radiation Safety Authority four weeks before the works commence. Such notification shall comprise a forecast of doses in terms of the entire scope of work, the different steps of the work and the doses to particularly exposed groups of workers. Such notification shall also include an account of the considerations made concerning radiation protection.

c) If significant changes take place in relation to the plans presented in the notification, a revised version shall be sent to the Swedish Radiation Safety Authority as soon as possible.

Section 35 Not later than three months after the work is finished and where the total collective dose has exceeded 100 mmanSv, a written report shall be sent to the Swedish Radiation Safety Authority comprising the experiences gained in terms of radiation protection matters.

Section 36 Any internal contamination occurring at one single event which is calculated to give a committed effective dose of 5 mSv or more shall be reported in writing to the Swedish Radiation Safety Authority. The report shall comprise the type of intake, the calculated committed effective dose and the basis for these calculations, as well as the cause and circumstances of the internal contamination. The report shall be sent as soon as possible after the contamination has been found.

Section 37 The Swedish Radiation Safety Authority shall be informed about events or observations that are significant from a radiation protection point of view.

If an event has occurred which has implied, or could have implied, that any given dose limit is exceeded,[8] a report shall be sent to the Swedish Radiation Safety Authority as soon as possible.

Documentation and filing of measurement data

Individual doses

Section 38 Primary data on evaluations of individual doses due to external as well as internal exposure shall be kept at least one year after the calendar year when the measurements were conducted.

Section 39 The final results from the evaluation of individual doses due to external as well as internal exposure shall be able to relate to every single person and be available in a central register approved by the Swedish Radiation Safety Authority.

The final results from the evaluation of individual doses due to external exposure do not need to be recorded if the monthly doses, or alternatively, doses within periods of four weeks, are less than 0.1 mSv.

Other situations

Section 40 The results from the radiation surveillance outside controlled areas according to Section 14 shall be documented and kept at least one year after the end of the calendar year when the measurements were conducted.

Section 41 The results of the latest performed calibration and subsequent checks according to Sections 23 to 25 shall be documented and kept at least one year after the end of the calendar year when the calibration results were most recently used.

[8] The Swedish Radiation Safety Authority's regulations (SSMFS 2008:51) concerning basic provisions for the protection of workers and the general public in practices involving ionising radiation.

Exemptions

Section 42 If there are particular grounds, the Swedish Radiation Safety Authority may grant exemptions from these regulations if this can be done without circumventing the aim of the regulations.

These regulations enter into force on 1 February 2009.

SWEDISH RADIATION SAFETY AUTHORITY

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