Statens strålskyddsinstitut
Swedish Radiation Protection Institute

SSI FS 2000:10

The Swedish Radiation Protection Institute's Regulations on Radiation Protection of Workers Exposed to Ionising Radiation at Nuclear Plants;

issued on May 26, 2000.

On the basis of § 7 of the Radiation Protection Ordinance (1988:293) the Swedish Radiation Protection Institute has issued the following regulations.[1]

§ 1 These regulations are applicable to radiation protection of workers exposed to ionising radiation at nuclear plants.

Definitions

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

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

Effective dose:	weighted radiation dose regarding the biologic 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 the clothes,
whole body counting:	measurement of the content of radioactive substances in the human body using one or more detectors,
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, orally or through the skin,

[1] Cf. Council Directive 96/29/Euratom of May 13, 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 L159, 29.6.1996, p. 1. (Celex 396L0029).

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 (calculated by summing up the individual doses),
instrument check:	investigation in order to see if an instrument meets the specified requirements with respect to one or more characteristics,
controlled area:	an area that, for radiation protection reasons, is clearly defined, supervised and to which admittance is limited,
individual dose:	a generic term for effective dose and committed effective dose,
personal dose meter:	an instrument containing one or more detectors in order to measure the individual personal dose due to external exposure.

Optimisation

§ 4 The work shall be performed in such a way that human exposures are limited as far as reasonably achievable, social and economical factors taken into account. For this purpose the licence-holder shall ensure that goals and needed actions for control are established and documented and that needed resources are available.

§ 5 The goals and actions of control shall be adjusted with respect to the prerequisite of the plant and be drawn up to take care of the daily as well as the long term radiation protection. All individuals that are exposed to ionising radiation or are decision-makers in matters that affect the individual doses shall have the knowledge of concern regarding the goals and the means of control.

The practice, including the goals and actions of control, shall regularly be followed up and evaluated with respect to what is stated in section 4. Such evaluations shall be performed at least once a year. Documentation on the evaluation shall be sent to the Swedish Radiation Protection Institute.

Information and education

§ 6 All personnel, the permanent as well as external workers, shall be informed about radiation protection prior to work within a controlled[2] area. Repetitive information shall thereafter be given at least every third year.

[2] See the Swedish Radiation Protections Institute's Regulations (SSI FS 1998:3) on Categorisation of Workplaces and Workers at Work with Ionising Radiation;

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

In addition to the information mentioned in the first and second clauses, special education may be needed. The scope of such education shall be adjusted with respect to the kind of work and to the environment where it is performed.

§ 7 All persons who are working with matters related to radiation protection or the operation and maintenance, as well as external workers holding posts as foremen shall have gone through an education programme, among others including the fundamental principles of radiation protection.

The education shall be adjusted with respect to the kind and extent of the work as well as the environment where it is performed.

Repetitive education shall be given to the extent needed.

§ 8 Information on the latest event of information or education given to each individual shall be recorded with respect to the extent and date.

Medical examination[3]

§ 9 A medical examination of an external worker, performed in another country, may be accepted, if the outcome of the examination can be shown.

Local radiation protection instructions

§ 10 The licence-holder shall ensure that local radiation protection instructions are established. These shall at least comprise the internal instructions and routines for

1. categorisation of workers,
2. controlled area,
3. education on radiation protection,
4. personal dose monitoring,
5. contamination checks,
6. calibration and check 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 area

§ 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 and the admittance especially restricted.

[3] See the Swedish Radiation Protection Institutes regulations (SSI FS 1998:6) on medical examinations for work involving ionising radiation.

§ 12 Within a controlled area, consumption of food and smoking shall be forbidden. Water may be had from a drinking-fountain or be served within special areas according to what is stated in section 13.

Prior the establishment of such an area, a description of the area and its use, including a programme for contamination check shall be sent in advance to the Swedish Radiation Protection Institute for judgement.

§ 13 For a special area, mentioned in section 13, the following conditions shall apply.

a) Before entrance of the area all persons shall be checked regarding contamination and must be free from external contamination according to the requirements in section 20.

b) Beverage must be served only by a disposable package or a disposable cup filled directly from an automatic machine.

c) The surface contamination within the area must not exceed 40 kBq/m^2 as summed up for the most common beta- and gamma emitting nuclides, or must not exceed 4 kBq/m^2 for alpha emitting nuclides. The conditions of contamination shall be regularly verified by measurements.

§ 14 For the purpose of showing that the requirements on categorisation of working places are met, monitoring of areas outside the controlled area shall be performed by

1. measurements of gamma radiation with the aid of stationary dose-meters and
2. checks of surface contamination of a sample of floor and ground, performed at least once a year.

Visitors

§ 15 Visitors from the general public in a controlled area must only be permitted if guided by a competent person and if a prearranged plan is followed. It shall be the radiation protection manager who decides which persons are competent and which persons have the authority to approve the plans.

§ 16 A visitor in a controlled area must be at least 14 years old. School classes of the eighth form, as lowest, may be allowed regardless of the age of the pupils.

Personal dose monitoring

External exposure

§ 17 All personnel, the permanent as well as external workers, shall at work within a controlled area, carry an individual dose meter that meets the requirements as stated in the Swedish Radiation Protection Institute's regulations (SSI FS 1998:5) on monitoring and reporting of individual radiation doses.

Being within an area with high radiation levels, an instrument shall be carried that shows, on line, the accumulated dose and is provided with an alarm function, regardless of other kinds of dose meters to be carried. If, in addition, there is a risk of rapid changes of the dose rate, the instrument shall have an alarm function regarding dose rate.

§ 18 Visitors within a controlled area shall carry one (or more) dose meters.[4] In a guided group of visitors it is sufficient if two persons in the group carry dose meters. The recorded dose shall be valid for all individuals in the group. The dose meters may be of a directly readable type.

[4] Not within the scope of the Swedish Radiation Protection Institute's regulations (SSI FS 1998:5) on monitoring and reporting of individual radiation doses.

External and internal contamination

§ 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.

§ 20 An individual shall be regarded free from external contamination if the surface contamination, calculated as the mean over an area of 0.01 m^2, does not exceed 40 kBq/m^2 as summed up for the most common beta and gamma emitting nuclides and does not exceed 4 kBq/m^2 for alpha emitting nuclides. Check of alpha emitting nuclides is not needed, if there are other means to show that alpha contamination is unlikely.

§ 21 If there are reasons to expect that individuals have been internally contaminated, or if internal contaminations are confirmed, all those individuals shall undergo whole body counting.

Whole body counting shall be performed on a sample of individuals working in environments where a particular risk of intake of radioactive substances is considered to exist. At least one individual from each team shall be measured at the end of the working period. If there is 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 exceeding 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 place consisting of individuals mainly working within a controlled area. The sample shall be representative for the practice and the individuals in the group shall be measured at least 4 times a year.

§ 22 Whole body counting shall be performed according to a documented procedure that is approved by the Swedish Radiation Protection Institute. The documentation shall show

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

Instruments and equipment

§ 23 Instruments used for the measurements of

1. individual doses by external exposure,
2. contamination (external, internal or at surfaces),
3. dose-rate,
4. air-borne activity and
5. smear tests

shall be calibrated and undergo function checks at regular intervals.

§ 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 towards 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.

§ 25 Calibrations and checks of instruments for determining internal contamination shall be performed for the nuclides that are expected to exist. The measurement tolerances, limits of detection and the geometry used in measurements shall be documented.

§ 26 Written instructions for the use, calibration and checks of equipment mentioned in section 23 shall be established.

Transport within the plant

§ 27 Transports of radioactive substances within the plant but outside a controlled area shall, to the most practical extent, be performed in accordance with the regulations in force on transport of hazardous goods on roads[5] when it comes to the requirements on dose-rate, surface contamination or the package.

Work with irradiated fuel elements

§ 28 Work with dismounting of irradiated fuel elements at a reactor, where single fuel rods are handled, must not take place earlier than five days after that the reactor is turned into cold shut down mode[6]. During work with the fuel rods only persons directly involved in the work may be present.

§ 29 Air monitoring shall be performed continuously during the work at the working position for fuel dismounting. The equipment used for monitoring shall be adjusted to be able to check leakage from the fuel and be provided with an alarm. The working position shall be protected by air flow directed away from the position.

§ 30 Documented instructions for alarm and evacuation of the premises shall be available. These instructions shall be well known by all persons working in the premises.

Policy in case of fuel damage

§ 31 A documented policy in case of fuel damage shall be established at all plants where nuclear reactors are involved. The policy shall include a description of the plant's strategy for avoiding fuel damages to the most reasonable extent,. In addition there shall be a strategy to handle a situation if a fuel damage should occur.

Reporting

§ 32 The requirements in the sections 5 and 11-13 of the Swedish Radiation Protection Institute's regulations (SSI FS 1998:5) on monitoring and reporting of individual radiation doses shall not apply, but be replaced by the sections 33-39 of these regulations.

[5] For transport of radioactive substances, regulations by the Swedish Rescue Services Agency apply, given on the basis of the Law (1982:821) on transport of hazardous goods. In this respect ADR is in force on transport by road.

[6] According to the plant's definition on safety conditions of operation (STF).

§ 33 An annual written report shall be sent to the Swedish Radiation Protection Institute which contains a compilation of the radiation doses to the personnel as well as the results of the radiation surveillance outside the controlled area. The report shall be sent in not later that two moths after the turn of the year. The scope and structure of the report is decided by the Swedish Radiation Protection Institute.

§ 34 A work by which the total collective dose is expected to exceed 100 millimansievert (mmanSv) shall in advance be reported, in writing, to the Swedish Radiation Protection Institute. The following procedures apply.

a) The Swedish Radiation Protection Institute shall be informed not later than four months before the work starts. The information shall comprise a survey of the work and an estimation of the expected radiation doses to the personnel.

b) A report shall be sent to the Swedish Radiation Protection Institute not later than four weeks before the works starts. The report shall comprise a prognosis of doses regarding the complete work, the different moments of the work and the doses to especially exposed groups of workers. In addition there shall be an account of what considerations have been made concerning radiation protection.

c) If there are significant changes in the presented plans, a revised report shall be sent to the Swedish Radiation Protection Institute as soon as possible.

§ 35 Not later than three months after the work is finished where the total collective dose has exceeded 100 mmanSv, a written report shall be sent to the Swedish Radiation Protection Institute that comprises the obtained experiences on radiation protection matters.

§ 36 Any occurred internal contamination, at one single event, which is calculated to give a committed effective dose exceeding 5 mSv shall be reported to the Swedish Radiation Protection Institute. The report shall comprise the type of intake, the calculated committed effective dose and the basis for those 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.

§ 37 The Swedish Radiation Protection Institute shall be informed about events or observations which are significant from a radiation protection point of view.

If there has been an event which has implied, or could have implied, that any given dose limit[7] is exceeded, a report shall be sent to the Swedish Radiation Protection Institute as soon as possible.

Documentation and filing of measurement data

Individual doses

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

[7] See the Swedish Radiation Protection Institute's regulations (SSI FS 1998:4) on dose limits at work with ionising radiation.

§ 39 The final results from the evaluation of individual radiation 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 which is approved by the Swedish Radiation Protection Institute.

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

Others

§ 40 The results from the radiation surveillance outside controlled areas according to section 14 shall be kept at least one year after the calendar year when the measurements were done.

§ 41 The results of the latest performed calibration and checks afterwards according to the sections 23-25 shall be documented and kept at least one year after the calendar year when the calibration results were used.

Exception

§ 42 If special grounds exist, the Swedish Radiation Protection Institute may grant exceptions from these regulations.

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These regulations enter into force on October 1, 2000, when the Swedish Radiation Protection Institute's regulations (SSI FS 1994:2) on radiation protection of the personnel at nuclear plants shall cease to apply.

On behalf of the Board of the Swedish Radiation Protection Institute

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