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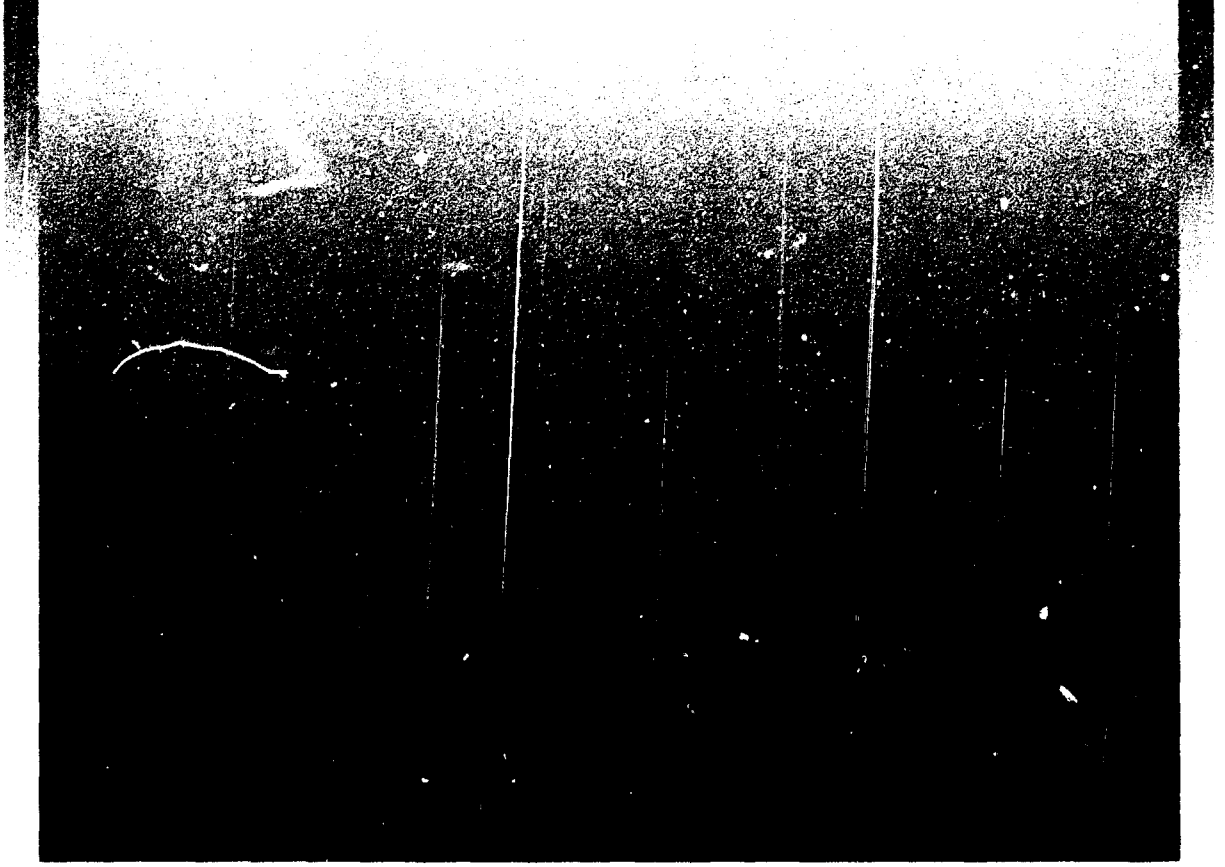
Monitoring of radiation exposure and registration of doses



Säteilyturvakeskus
Strålsäkerhetscentralen
Finnish Centre for Radiation and Nuclear Safety
PL-P.O.BOX 268, SF-00101 Helsinki, Finland
P. (90)708 21, Tel. +358 0 70821

FINNISH CENTRE FOR RADIATION
AND NUCLEAR SAFETY
ST 1.6 16 Dec. 1992

Monitoring of radiation exposure and registration of doses

This ST Guide takes effect on 1 February 1993 and will remain in force until further notice. It replaces SS Guide 5.5, "Monitoring of personal radiation doses", issued on 7 September 1989.

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Authorization

Under section 70, paragraph 2, of the Radiation Act (592/91), the Finnish Centre for Radiation and Nuclear Safety issues general instructions, known as Radiation Safety Guides (ST Guides), concerning the use of radiation and operations involving radiation.

The Radiation Act stipulates that the party running a radiation practice is responsible for the safety of the operations. The responsible party is obliged to ensure that the level of safety specified in the ST Guides is attained and maintained.

The instructions given in the ST Guides on actions and procedures are not absolutely binding, but if the responsible party intends to use a procedure or method differing from those presented in an ST Guide, he must be able to prove that the procedure or method chosen ensures the same level of safety as that specified in the ST Guide.

Radiation Protection Guides (SS Guides) issued before 1992 and listed at the end of this guide remain in force until further notice. SS Guides will be replaced by ST Guides whenever the need arises to alter their contents.

Translation. Original text in Finnish.

1 General

By section 32 of the Radiation Act (592/91), the responsible party shall organize monitoring of the radiation exposure and related working conditions at the place of work to whatever extent is required by the nature and scope of the practice. Exposure shall also be monitored when an activity involving exposure to natural radiation is classified as radiation work. The responsible party, when applying for a safety license, shall describe how the monitoring of the exposure and the related working conditions is to be organized. If the work is radiation work, monitoring shall be individual monitoring.

This guide defines the concepts relevant to the monitoring of radiation exposure and working conditions and provides guidelines for determining the necessity of monitoring and subsequently organizing it. In addition, instructions are given for reporting doses to the Dose Register of the Finnish Centre for Radiation and Nuclear Safety (STUK), and procedures are described for situations leading to exceptional exposures.

Measurement quantities and the application of maximum values are described in ST Guide 1.2. Personal dosimetry in nuclear power plants is dealt with in YVL Guide 7.10, also published by STUK.

2 Definitions and concepts

Monitoring means the measurement of doses caused by external irradiation, the determination of radioactive materials that have entered the body, and, where necessary, interpretation of the results of the measurements. Monitoring is divided into monitoring of radiation exposure and monitoring of working conditions.

Monitoring of radiation exposure means individual monitoring and registration of doses. It also involves comparison of doses with the doses obtained earlier in different places and jobs. Monitoring of radiation exposure usually* requires the use of a personal dosimeter or the determination of radioactive materials that have entered the body.

Monitoring of working conditions means the control of exposure or of various factors affecting exposure in the workplace, with the purpose of verifying exposure, preventing unnecessary exposure or ascertaining the need for individual monitoring.

A controlled area means an area to which access is controlled and restricted and where measures are required to reduce the hazards of ionizing radiation and to prevent the spread of radioactive materials. For controlled area, see also ST Guides 1.5 and 3.6.

The responsible party shall classify as controlled areas at least those areas where the effective dose from external and internal irradiation is or may be higher than 5 mSv in a year. In defining a controlled area, also the possibility of an event leading to an exceptional exposure shall be taken into account.

For example, the room in a medical clinic or hospital where there is a fixed installation of fluoroscopic equipment shall be classified as a controlled area. A room reserved for the control panel and only partly shielded shall also be classified as a controlled area. When a fluoroscopic C-arm with low power is used, the controlled area may be limited to the area immediately next to the patient. When unshielded sources are used the cor-

* It is not necessary to use a personal dosimeter or to determine the radioactive materials that have entered the body in those special cases where it can be shown a dose estimated by other means is as reliable as a result of a measurement.

trolled area shall include inter alia the rooms set aside for the handling of radiopharmaceuticals and storage of radioactive materials and the rooms reserved for patients treated with isotopes.

A supervised area means an area where working conditions are monitored but where there is no requirement for monitoring of radiation exposure or for the other special arrangements required in controlled areas. Supervised areas shall be defined to consist of areas that lie outside a controlled area and where the effective dose due to the use of radiation is or may be higher than 1 mSv a year.

Radiation work means:

- work in which the effective dose due to the use of radiation or nuclear energy is or may be higher than 5 mSv a year. In deciding whether an activity is radiation work, it shall be taken into account that exposure may occur due to failure, accident or disaster as well.

- work which, by section 28 of the Radiation Decree (1512/91), is classified as radiation work because of the exposure to natural radiation.

Work shall be classified as radiation work and subject to monitoring of radiation exposure, if a single organ or part of the body is or may be exposed to radiation to such an extent that the equivalent dose to this bodil, organ or part exceeds three tenths of the annual dose limit.

Regular work in a controlled area shall be classified as radiation work. Work is regarded as regular when a worker is continuously exposed to radiation, or when the exposure is periodic but with only short intervals in between. The shortness of an interval is determined separately in each case by the quality of the radiation sources, protective arrangements, and the nature and duration of the work. Thus, the frequency of exposure may vary, e.g. from daily exposure to a few exposures per month.

The personal data of workers engaged in radiation work and the doses they have been exposed to shall be reported to STUK for inclusion in the Dose Register. The health surveillance of the workers shall be organized according to ST Guide 1.7.

Work in a supervised area is not radiation work.

3 Maximum values for and limitations on radiation exposure

By section 37 of the Radiation Act, the lower age limit for a person employed in radiation work is eighteen. A younger person can take part in radiation work only if it is necessary for training purposes.

By section 3 of the Radiation Decree, the effective dose caused by radiation work to a worker shall not exceed 20 mSv annually as an average over five years, or 50 mSv in any single year. In assessing the effective dose, doses due to internal and external irradiation shall be added together. In addition, the annual equivalent dose in the lens of the eye shall not exceed 150 mSv, and the annual equivalent dose at any point on the skin, hands or feet shall not exceed 500 mSv.

By section 4 of the Radiation Decree, the equivalent dose to the surface of the lower trunk of a pregnant woman shall not exceed 2 mSv once the pregnancy has been declared, and the effective dose caused by radionuclides that are liable to be hazardous to the foetus shall not exceed 1 mSv upon entering the body. To determine the need to protect

the foetus, and then to protect it a woman shall inform her employer about the pregnancy as soon as possible once the pregnancy has been declared.

A pregnant woman shall not do work placing her at risk of a large radiation dose. Such work includes inter alia interventional radiology, assisting the immobilization of a patient in radiologic examination and work, where there is considerable risk for contamination with radioactive materials. A nursing mother shall not do work that places her at risk for contamination with radioactive materials.

4 Things to be monitored

By section 9 of the Radiation Decree, monitoring of radiation exposure required by the nature of the operations shall be performed in such a way that the exposure of each person engaged in radiation work can be determined.

Monitoring and, if necessary, monitoring of radiation exposure shall be organized for casual workers according to the same principles as for regular workers if in the radiation work there is risk within a short time of receiving a radiation dose that requires registration.

4.1 Monitoring of radiation exposure

Monitoring of radiation exposure to external irradiation is required in the following instances:

- medical or veterinary x-ray examination, when a person doing radiography or fluoroscopy works near the primary beam
- radiation therapy
- handling of patients treated with isotopes, unless the handling is of only short duration or the patient has been treated with radioactive pharmaceuticals emitting only beta radiation
- handling of unshielded radioactive materials
  - if the product of the photon energy released in one nuclear decay and the activity of gamma sources handled at one time is 20 MBq MeV or larger (see the example, Appendix A, item 3).
  - if the activity of beta sources handled at one time is 5 MBq or larger and the maximum beta energy is 0.3 MeV or larger
- industrial radiography
- use of diffraction, fluorescence or comparable equipment if the radiation beam is directed outside the equipment
- use of radiation sources, the failure of which may cause an effective dose larger than 5 mSv
- any installation, repair and servicing of radiation sources for which a safety license is required
- other operations with radiation sources, when monitoring of radiation exposure is required by the terms of a safety license or other document
- work on a research reactor or a particle accelerator.

Monitoring of radiation exposure from internal irradiation is necessary in the following instances:

- work in a laboratory of type A
- work in a laboratory where ^{125}I or ^{131}I labellings are done
- monitoring is required by the terms of a safety license or other document.

4.2 Monitoring of working conditions

Monitoring of radiation exposure is not required in a supervised area. However, the use of a personal dosimeter is recommended for monitoring of working conditions and to reveal the need for monitoring of exposure from external irradiation. In some cases, a dosimeter related to a certain job and shared by several people may be used (a group dosimeter).

Monitoring of radiation exposure is not necessary in the following instances:

- radiography, when the operator of the x-ray equipment is in a separate control room, which is well shielded and has not been classified as a controlled area
- dental radiography as part of a dentist's normal work
- work in areas where the radiation equipment or sources are so well shielded that an annual dose near the equipment does not exceed 1 mSv (e.g. radiometric equipment).

Surface contamination shall be monitored by regular measurements in places where unshielded sources are used. To ascertain the need for monitoring of exposure to internal irradiation it is recommended that the amount of radioactive materials in inhaled air be monitored through sampling or calculation. Exposure to internal irradiation does not need to be monitored in laboratories of type B and C, where there are no radioactive materials in gaseous or easily volatile form.

5 Organization of monitoring

By section 12 of the Radiation Decree, the methods and equipment used for monitoring of radiation exposure and the relevant working conditions are subject to approval by STUK. Equipment shall be properly calibrated. Appendix A gives some examples of the organization of monitoring.

5.1 External irradiation

Personal doses caused by external irradiation are usually determined by film badges or thermoluminescence (TL) dosimeters. With films and TL dosimeters the maximum length of the monitoring period is three months. Depending on the dose the length of the period may also be shorter than this. To monitor the dose to a foetus a new monitoring period shall immediately commence once the pregnancy has been declared.

An alarm dosimeter or an alarming survey meter shall be used, in addition to a dosimeter, in industrial radiography and irradiation plants. Similar alarm devices shall be used in installation and repair work if the nature of the work imposes a risk for a large dose in a short period.

The quantities depth dose and surface dose are recommended for use in personal dosimetry but, for the time being, whole body dose and skin dose may be used as well. ST Guide 1.2 clarifies the measurements of radiation doses, the application of maximum values and the quantities to be used.

Exposure of hands

The doses to worker's hands may be notable in interventional radiology, in some repair and servicing jobs and when a radioactive pharmaceutical is injected into a patient. Assessment of the doses to hands (fingers) is especially important when new working methods or radioactive substances are taken into use and when the exposure they occasion is insufficiently known.

The doses to hands are usually measured by finger dosimeters containing a suitable TL material. Measurement of the doses to fingers is often difficult and needs to be done carefully because the dose differs in various fingers and parts of the fingers. When a hypodermic syringe is used, for example, the measured values may vary up to fivefold depending on the measurement point. It is important to place the dosimeter on the finger so that the largest dose is likely to be measured.

It will often be sufficient if the doses to hands are measured during a typical working week, a few times a year. Monitoring of the exposure of hands shall be instituted if the exposure is so large that the work is considered equivalent to radiation work.

Use and storage of dosimeters

A dosimeter shall be placed on the body so that it is not shaded by any part of the body and so that it is maximally perpendicular to the direction of the incidence of the radiation. Usually the best place is the chest of the worker, and attached to work clothes. If it is not necessary to measure beta radiation (e.g. in industrial radiography), the dosimeter can, for practical reasons, equally well be placed in the breast pocket of the work clothes. The front side of the dosimeter should always be facing the incidence of radiation.

Part of the body is shielded from radiation when a protective apron or other personal protective devices and clothing are used. Because the dose limit to the lens is usually the first to be exceeded, the dosimeter shall be placed outside the protective clothing. However, in this case the reading of the dosimeter will be considerably larger than the effective dose. If the dose, accumulated over a three-month period exceeds 5 mSv, the effective dose shall be determined by ascertaining the conditions of exposure and the methods applied when using the protective devices if this has not been done earlier.

In addition to an ordinary dosimeter, a pregnant woman shall wear an extra dosimeter under her protective clothing. The equivalent dose to the surface of the lower trunk can thus be estimated.

When not in use, dosimeters shall be stored in a place where they are not exposed to any radiation except background radiation. The temperature and humidity of the storage place shall not essentially deviate from those of normal room air. Dosimeters shall also be shielded from ultraviolet radiation and intense light.

5.2 Radioactive materials used as unshielded sources

In the handling of unshielded sources, radioactive materials can enter the body through lungs, mouth, skin and wounds. Adequate ventilation, proper use of protective devices and proper choice of working methods shall therefore be attended to. If, in addition, contamination in the workplace is regularly measured, it is not necessary, except in some special cases, to determine radioactive materials in the body.

Radioactive materials such as ^{3}H, ^{14}C, and ^{35}S, which emit beta radiation with low maximum energy (E_{max} < 300 keV), effectively cause exposure only when they enter the body. Monitoring shall thus be based on samples such as urine. If unshielded sources are used, attention shall also be paid to skin contamination and the dose resulting from this.

The activity of gamma emitters in the body can be determined with appropriate equipment such as a thyroid monitor, gamma camera or whole body counter. The activity can also be estimated from the activity concentration of inhaled air.

5.3 Natural radiation

By section 28 of the Radiation Decree, measures shall first be taken to reduce the exposure if the effective dose from natural radiation at work is liable to exceed 5 mSv a year. If, following these measures, the effective dose at work is still liable to exceed 5 mSv, the work shall be classified as radiation work.

The exposure to radiation in underground mines and excavations shall be estimated on the basis of work hour registers and the radon concentrations measured at the workplace or reliably estimated from measurement results at nearby workplace. In mines and excavations radon is usually measured by equipment showing a short time average of radon concentration. The principles of moni-

toring are the same at other workplaces as in mines and excavations, except that radon concentrations are usually measured by using an integrating method.

In the handling of materials rich in naturally occurring radionuclides, the total dose may be due to several different sources, e.g. external gamma radiation, radon emitted from materials, and radionuclides in dust in inhaled air. Here the need for monitoring is always considered separately for each case. Monitoring of the radiation exposure from natural radiation is described in more detail in ST Guides 1.2 and 12.1.

6 Dose Register

By section 34 of the Radiation Act, the Dose Register maintained by STUK shall contain the data needed to determine the total radiation exposure of every worker engaged in radiation work. In addition, the Register shall contain the data on those radiation workers whose dose is below the registration threshold.

6.1 Reporting to the Dose Register

When a person begins to do radiation work, his or her personal data, the nature of the work and the date of commencement shall be reported by the employer to the STUK Dose Register. Likewise, the employer shall report the termination of the work. The reports shall be given at maximum within one month of the event. A user of the STUK dosimeter service may report the start of radiation work at the time the dosimeters are returned to STUK. Report sheets, with instructions for filling them in, are available from STUK. If an employer has organized monitoring in some other way, information on radiation work and doses shall be reported to the Dose Register immediately at the termination of the monitoring period.

Monitoring shall also be organized in accordance with to this Guide, when a Finnish citizen is working abroad. A Finnish employer may use a Finnish dosimeter service. If a foreign dosimeter service has been used, the worker shall report doses obtained abroad to the STUK Dose Register, when he or she begins to do radiation work in Finland.

The competent authorities in Finland and Sweden have agreed that the doses obtained in the nuclear power plants of either country shall every month be reported to the dose register of the worker's home country. Thus, in this case it is not necessary for workers in Swedish nuclear power plants to themselves report the doses to the STUK Dose Register.

6.2 Information to be reported

For every monitoring period, the following personal dosimetry information shall be reported to the Dose Register:

- identification code of the worker
- dose
- dosimeter type or method of measurement
- first and last dates of the monitoring period
- date of contamination
- employer
- nature of work
- type of radiation exposure

Registered doses are of the following type:

- doses (whole body dose and skin dose, or depth dose and surface dose, and, where necessary, dose to the lens of the eye) from external irradiation, obtained in the use of radiation and nuclear energy production and measured by personal dosimeters. The dose from background radiation is subtracted from the measured dose
- effective dose from internal irradiation, determined by measurement or by other means
- dose from natural radiation, measured or estimated by calculation

- finger doses measured by finger dosimeters
- dose estimated from chromosomal analysis or by other means (in special cases, e.g. in exceptional conditions of exposure, if personal dosimeter results are not available).

The registration threshold for external doses is 0.1 mSv per month for those working in nuclear power plants and 0.3 mSv per three months for others. When measured values fall below the registration threshold, this fact is also noted in the Register.

Laboratories carrying out labellings with ^{125}I or ^{131}I shall keep a register of the measurements of thyroid activity. If the thyroid activity exceeds 10 kBq, the measured value shall be reported to the Dose Register.

6.3 Parties entitled to get information from the Dose Register

By Section 34 of the Radiation Act, personal information in the Register may be given without a person's consent to the following:

- a party reponsible for the practice that causes exposure to radiation, when this is necessary for the purpose of monitoring of radiation exposure
- the health care authorities
- a person in charge of health surveillance of the worker, or one conducting an examination to determine radiation exposure and its effects.

The employer shall inform the worker of the measured doses.

7 Measures required in situations liable to lead to exceptional exposure

When it is noticed or suspected that a worker or some other person has been exposed to an exceptionally large dose of radiation, or a workplace or environment has been severely contaminated with radioactive materials, the following shall be done, in addition to the other safety measures at the workplace:

- radiation exposure shall immediately be reduced to a minimum and the radiation safety officer shall be informed of the incident. The spread of radioactive materials shall be prevented by cordoning off and cleaning the contaminated area. If there is doubt about the best way to do the cleaning, STUK shall be consulted for more information. Cleaning of a contaminated area shall never be attempted without sufficient expertise.
- the radiation safety officer, or some other person present, shall as soon as possible inform the Department of Radiation Safety at STUK of the incident. Outside office hours STUK can be contacted by telephone at the alarm numbers given in Appendix B to this Guide.
- the dosimeters of the persons exposed to radiation shall immediately, by courier, express delivery or other means be sent to be measured. Any relevant additional information concerning the exposure shall be enclosed
- if it is suspected that radioactive material has entered the body, the Laboratory for Radiation Hygiene at STUK shall be contacted in order to have the internal dose determined by whole body counting or some other method

- if it is suspected that a person has been exposed to an exceptionally large dose of radiation, a blood sample should be taken for chromosomal analysis. The Laboratory of Radiobiology at STUK shall be contacted for fuller information. More information on the subject is given in ST Guide 1.7
- a report shall be written describing the details of the incident, including exposure to radiation, the spread of radioactive materials and the measures taken. A handwritten document, signed by the writer, is sufficient as a preliminary report. The report shall be sent to STUK by the radiation safety officer or his or her stand-in.

8 Bibliography

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APPENDIX A

ORGANIZATION OF MONITORING - EXAMPLES

1. Medical x-ray examination and fluoroscopy

Monitoring of radiation exposure shall be organized for workers who work near the primary x-ray beam in the examination room. The dosimeter shall not be placed under the protective clothing. A good place is the collar or sleeve of the work clothes, depending on the direction of the incidence of radiation.

When a person is working near the primary beam in DSA, cine angiography or interventional radiology, his or her dose may be very much larger than the dose obtained in ordinary fluoroscopy. In many of these examinations it may be necessary to use extra protective devices besides a protective apron. Otherwise the dose limits may be exceeded.

A person helping to immobilize the patient during an examination shall use protective apron and gloves. Monitoring of radiation exposure shall be organized for a regular assistant. Monitoring of the dose to the eyes is of primary importance. Thus, a good place for a dosimeter is the collar of the work clothes. Because radiation is scattered from the patient, it is important that the dosimeter be worn on the side of the worker's body facing the patient. A patient escort under 18 years of age shall not assist in the immobilization.

This practice is also applicable to veterinary x-ray examinations where an animal must be immobilized during the examination.

2. Use of unshielded radioactive materials

In laboratories where unshielded radioactive sources are used, doses caused by both external and internal irradiation shall be monitored as necessary. Monitoring of an exposure to internal irradiation shall be organized separately in each case, according to the activity and volatility of the radionuclide handled and the nature of the work.

Exposure due to external irradiation shall be monitored if, at one time, radionuclides are handled to such an extent that the following activity limits are exceeded (the product of activity and photon energy is 20 MBq MeV):

Radionuclide	Activity limit (MBq)
^{51}Cr	600
^{55}Fe	12 000
^{59}Fe	15
^{60}Co	10
^{67}Ga	130
^{99m}Tc	160
^{123}I	120
^{125}I	500
^{131}I	50
^{133}Xe	450
^{137}Cs	30
^{201}Tl	200

The examples below show how the activity limit is calculated.

Example 1.

In the decay of ^{60}Co, photon energies 1.173 MeV and 1.33 MeV are emitted, with proportions in one decay of 0.99 and 1.00. The total photon energy is $0.99 \cdot 1.173$ MeV + $1.00 \cdot 1.33$ MeV = 2.5 MeV. Thus, the activity limit is 20 MBq MeV/2.5 MeV = 8 MBq ≈ 10 MBq.

Example 2.

The gamma energy of ^{125}I is $3.549 \cdot 10^{-2}$ MeV with a proportion of $6.67 \cdot 10^{-2}$. The product of these is about $2.4 \cdot 10^{3}$ MeV, which corresponds to the gamma energy emitted in one decay. In addition, characteristic x-radiation of ^{125}Te is emitted as a result of electron capture with a proportion of 1.4 in one decay and a total energy of $3.96 \cdot 10^{-2}$ MeV.

Total photon energy is $2.4 \cdot 10^{-3}$ MeV + $3.96 \cdot 10^{-2}$ MeV = $4.2 \cdot 10^{-2}$ MeV. Thus, the activity limit is 20 MBq MeV/($4.2 \cdot 10^{-2}$ MeV) = 476 MBq ≈ 500 MBq.

Example 3.

In laboratories where labellings with ^{125}I or ^{131}I are made, the monitoring of radiation exposure is organized as follows:

- workers shall wear dosimeters suitable for determining doses from external irradiation if the activity of ^{125}I is larger than 500 MBq and that of ^{131}I larger than 50 MBq

- if the labelling work is regular and carried out more often than once a month, the activity of the thyroid shall be measured every two weeks by a thyroid monitor or a gamma camera

- if the labelling work is irregular the activity of the thyroid shall be measured after every labelling event. It is recommended that the measurement be done within one day of the labelling

- a register shall be kept of the results of the activity measurements of thyroid. If the activity found in the thyroid is greater than 10 kBq, the result shall be reported to the STUK Dose Register.

In addition, contamination of the workplace and the workers shall be measured after every labelling event.

3. Installation, testing and servicing of radiation sources

Monitoring of radiation exposure will usually be necessary in work involving installation, testing and servicing of radiation sources for which a safety licence is required. In addition, such work requires a survey meter showing the dose rate, or an alarm dosimeter. The licensee shall also organize monitoring for foreign workers doing repairs and servicing. However, monitoring is not necessary if the foreign worker has a dosimeter of his or her own.

In the following cases monitoring is not necessary because the dose is smaller than the registration threshold (0.3 mSv in three months).

Example 1.

A person adjusts the detectors of process control equipment on the side of the silo opposite to the radiation source. He does this once a week or less frequently. The dose rate at this spot is about 0.01 mSv/h and the work takes a few minutes each time. There is no need for monitoring.

Example 2.

A person maintains equipment in a place where the dose rate is about 0.25 mSv/h. The work is done five times a year and does not include disassembling of the radiation source or its shielding. The maintenance work takes about 10 min each time. The dose from one service operation is 0.17 h x 0.25 mSv/h = 0.04 mSv. It is sufficient to ascertain the radiation safety beforehand, by measuring the dose rate with a suitable survey meter before the work is begun.

APPENDIX B

CONTACT INFORMATION

Personal dosimeters and Dose Register

Finnish Centre for Radiation and Nuclear Safety (STUK)
Department of Radiation Safety
Personal Dosimetry
P.O. Box 268
00101 HELSINKI

Street address
Kuortaneenkatu 1
7th floor
00520 HELSINKI

Telephone +358-0-70821
Telefax +358-0-708 2246

Chromosomal analysis

Finnish Centre for Radiation and Nuclear Safety (STUK)
Department of Research
Laboratory of Radiobiology
P.O. Box 268
00101 HELSINKI

Street address
Elimäenkatu 25 A
4th floor
00510 HELSINKI

Telephone +358-0-70821
Telefax +358-0-708 2245

Measurements of internal exposure

Finnish Centre for Radiation and Nuclear Safety (STUK)
Department of Research
Laboratory for Radiation Hygiene
P.O. Box 268
00101 HELSINKI

Street address
Konalankuja 1 - 3 A
00390 HELSINKI

Telephone +358-0-70821
Telefax +358-0-708 2416

Emergency numbers outside office hours, for accidents requiring urgent measures

Command and Control Room of the Helsinki Administrative District

Telephone+358-0-394 61
+358-0-394 6324

ST(SS) GUIDES

General Guides

ST 1.2 Application of maximum radiation exposure values and monitoring of radiation exposure, 31 March 1992 (in English, Finnish and Swedish)
ST 1.3 Safety signs denoting radiation sources, 9 April 1992 (in Finnish and Swedish)
ST 1.4 Organization for the use of radiation, 24 October 1991 (in Finnish and Swedish)
ST 1.5 Maximum values and classification of radionuclides, 26 November 1991 (in English, Finnish and Swedish)
ST 1.6 Monitoring of radiation exposure and registration of doses, 16 December 1992 (in English, Finnish and Swedish)
ST 1.7 Health surveillance of persons engaged in radiation work, 19 December 1991 (in English, Finnish and Swedish)

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ST 2.1 Quality assurance of radiotherapy equipment, 13 January 1993 (in Finnish)
SS 2.8 Radiation protection requirements for radiotherapy equipment and rooms. High-energy radiotherapy equipment, 21 December 1989 (in English, Finnish and Swedish)
SS 2.9 Radiation protection requirements for radiotherapy equipment and rooms. X-ray therapy equipment (25 kV ... 400 kV), 21 December 1989 (in Finnish and Swedish)
SS 2.10 Radiation protection requirements for radiotherapy equipment and rooms. Afterloading therapy equipment, 21 December 1989 (in Finnish and Swedish)

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SS 3.1 Dental X-ray equipment: type inspection and technical requirements, 25 February 1987 (in English, Finnish and Swedish)
SS 3.2 Radiation safety requirements for mammographic equipment, 17 February 1987 (in English, Finnish and Swedish)
ST 3.3 Diagnostic X-ray equipment and its use, 27 August 1992 (in English, Finnish and Swedish)
ST 3.4 Quality control of X-ray image-intensifier television chains, 24 October 1991 (in Finnish and Swedish)
ST 3.5 Quality control of diagnostic X-ray equipment and film processing, 3 December 1991 (in Finnish and Swedish)
ST 3.6 Radiation shielding of X-ray examination rooms, 20 December 1991 (in English, Finnish and Swedish)

Measurement of Radiation

ST 4.2 Radiation meters for civil defence, 6 June 1991 (in English and Finnish)

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ST 5.1 Radiation safety of sealed sources and equipment containing them, 27 August 1992 (in English, Finnish and Swedish)
ST 5.3 Use of ionizing radiation in the teaching of physics and chemistry, 14 December 1992 (in English, Finnish and Swedish)
SS 5.4 Import and export of and trade with radioactive materials and equipment containing them, 9 January 1989 (in English, Finnish and Swedish)
SS 5.6 Radiation safety in industrial radiography, 6 January 1989 (in English, Finnish and Swedish)
SS 5.8 Installation, repair and maintenance of radiological equipment used for medical purposes, 28 March 1988 (in English, Finnish and Swedish)
SS 5.9 Transport of radioactive materials, 16 May 1989 (in Finnish)

Unsealed Sources and Radioactive Wastes

ST 6.1 Radiation safety requirements for radionuclide laboratories, 30 May 1991 (in English, Finnish and Swedish)
ST 6.2 Radioactive wastes and discharges, 20 December 1991 (in English, Finnish and Swedish)

Non-Ionizing Radiation

SS 9.1 Radiation safety requirements and type inspection of solarium equipment and sun lamps, 1 September 1989 (in Finnish and Swedish)

ST 9.2 Radiation safety of pulsed radars, 11 December 1991 (in Finnish)

ST 9.3 Radiation safety during work on masts at FM and TV stations, 9 April 1992 (in Finnish)

Natural Radiation

ST 12.1 Radiation safety in mining and underground excavation, 27 August 1992 (in Finnish and Swedish)

ST 12.2 Radioactivity of building materials, fuel peat and peat ash, 2 February 1993 (in Finnish)

SS Guides will be converted into ST Guides wherever necessary.

Erweko Painotuote Oy
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