Instructions for how to apply nuclear safeguards on nuclear materials at Karolinska Institutet

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Karolinska Institutet

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Decision:	Document type:
Safety and security manager	Instructions
Handled by department/unit:	Preparation with:
Professional services/safety & security	Safety & security manager, radiation protection representative

Revision with respect to:
According to recommendations from the Swedish Radiation Safety Authority

Introduction

These instructions describe required actions for work and research involving nuclear materials (Uranium and Torium) at Karolinska Institutet (KI). The instructions reflect both national and international requirements for holding, usage and waste storage of nuclear materials at KI.

Purpose

These instructions, in combination with courses and annual reconciliation with KI's radiation protection expert, form the basis for KI to meet the applicable requirements for nuclear safeguards.

Nuclear safeguards rules

Instructions for nuclear safeguards at KI are based on legislation, ordinances and regulations from the Swedish Radiation Safety Authority (Strålsäkerhetsmyndigheten, SSM).

- The Nuclear Activities Act (1984:3),
- Ordinance (1984:14) on nuclear activities and the Swedish Radiation Safety Authority's regulations (SSMFS 2008:3) and general advice on the control of nuclear material, etc.
- The Swedish Radiation Safety Authority's regulations (SSMFS 2018:3) on exemptions from the Radiation Protection Act and on the clearance of materials, building structures and areas

The instructions are also adapted to international requirements, as listed below.

- Euratom VII for nuclear materials
- Regulation No 974/2025 on the application of Euratom Safeguards
- Recommendation on general advice for the application of No 974/2025 on the application of Euratom Safeguards

KI has been assigned a unique code for KI's material balance area (MBA). Due to the small holding of nuclear materials, KI is entitled to membership of

a Catch-All-Material Balance Area (CAM) which simplifies reporting of nuclear materials. The CAM id shall be used in communication with the Euratom Safeguards.

- MBA code: W290
- CAM id: SW0290CA

Internal audit

The KI radiation protection expert shall revise these instructions every five years or earlier when there is a special need for an audit.

Exceptions to these instructions

Nuclear material concentration below ppt level
Waste solutions of a concentration of less than 1 kg of nuclear material per tonne, i.e. parts per thousand (ppt), can be assessed to be withdrawn from nuclear safeguards. Assessment shall be done by the KI radiation protection. Examples of PPT concentrations:

- 1 kg/tonne, i.e. 1 kg/1000 kg
- 1 mg/g, i.e. 0.001 g/g
- 1 ug/mg, i.e. 0.001 mg/mg

Other radioactive substances
For radioactive materials that do not fall within the scope of nuclear safeguards, the instructions for radiation safety at KI shall be applied.

Export control
Any transfer of nuclear material within the European Community or export of said nuclear material shall be subjected to export control policy for nuclear material.

Organization, management and governance

Safeguards organization

KI's organization for nuclear safeguards (see Figure 1) is designed according to KI's radiation protection organization, also in line with decision-making procedures and delegation rules for KI. Contact information can be found on KI's staff portal.

Three roles are of particular interest for the nuclear safeguards:

- safety and security manager,
- radiation protection expert,
- radiation protection representative,
- radiation protection assistant.

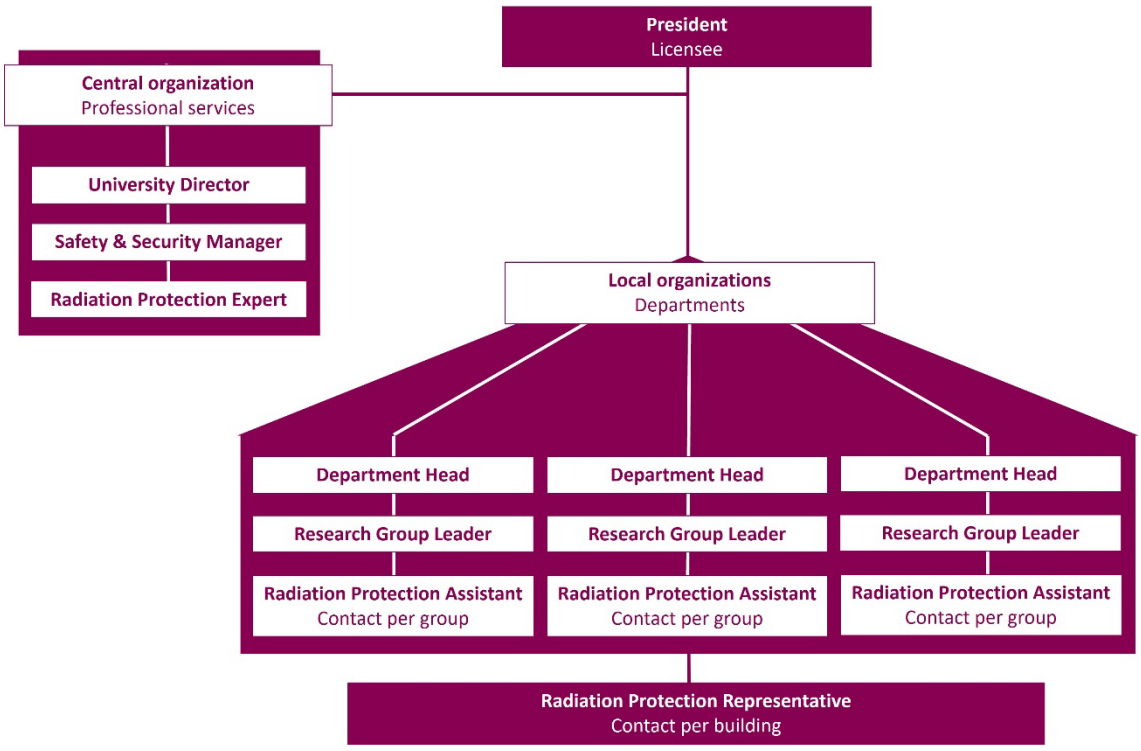

Figure 1 KI's organizational sketch for nuclear safeguards.

Role descriptions

Safety and security manager
The safety and security manager is accountable for a security protection analysis regarding nuclear holding at KI.

Radiation protection expert
The radiation protection expert is KI's contact with the relevant authorities regarding the control of nuclear material and ensures that the Physical Inventory Listing (PIL) for KI's nuclear material holdings is kept up to date, including the amount of nuclear material in grams by agreement code and element category. The radiation protection expert also coordinates the annual inventory of nuclear materials and make sure that the correct forms are sent to the authorities.

Radiation protection representative
Radiation protection representative coordinates operational issues, for example storage of nuclear waste from the laboratories. If there is no appointed radiation protection representative, coordination is handled by the radiation protection expert.

Radiation protection assistant
Radiation protection assistant for each research group/core facility with holdings of nuclear materials ensures to

- coordinate operational issues for the research group/core facility concerned,
- act as a contact between the research group leader/core facility manager and the radiation protection expert and radiation protection representative,
- record changes in grams of the holdings in a local log list for each container,
- update the research group's holdings in KI's chemical inventory system,
- inform the radiation protection expert without delay if any change in total holding,
- report holdings annually (December) to KI's radiation protection expert.

Allocation of inspection tasks

Before the inspection

The radiation protection expert informs the radiation protection representative, radiation protection assistant, research group leader and head of department about the inspection without delay with a copy to SSM and ensures that meeting rooms are booked.

In the event of an unannounced inspection, the radiation protection expert ensures that all interested parties are informed of the inspection without delay. If an inspector/investigator from SSM is not present, the radiation protection expert informs SSM's Nuclear Control Department without delay.

During the inspection

KI's radiation protection expert, radiation protection representative, radiation protection assistant and research group leader/core facility manager participate during the inspection and ensure that inspectors are granted access to all premises concerned.

After the inspection

The radiation protection expert ensures that the inspection report is notified to the radiation protection assistant, radiation protection representative, research group leader/core facility manager, head of department and safety manager. KI's president is informed at the annual radiation safety review, unless there are special reasons for the president to be involved earlier. The radiation protection expert ensures that the inspection report is archived.

The research group leader/core facility manager ensures that required measures are implemented. KI's radiation protection expert monitor the implementation of measures.

Safeguards systems

Identification och verification

Labelling

Holdings of nuclear material shall be recorded for both the original container and the waste container. Each container shall be individually labelled. The waste container shall preferably be marked with the same inventory number as the original container with the suffix “waste”. The label must be unique, which means that several waste containers originating from the same holding need additional suffixes in the form of numbering.

Register

Nuclear materials, quantity, and specific ID number are specified in KI's chemical register by the radiation protection assistant. Additionally, the radiation protection expert shall keep a nuclear material register specifying the above and contact information, detailed storage description etc.

Quantity control of nuclear material

Logbook

Changes in the weight of nuclear material shall be recorded by the radiation protection assistant in individual logbooks for each container, both for holding and waste. If the amount of waste increases, the holding is expected to decrease by the corresponding amount; the total amount of nuclear material is expected to remain constant provided that the concentration of nuclear material is not below a certain concentration level, hence enabling disposal in KI's regular waste stream (see section Waste management).

Inventory change

The radiation protection assistant shall inform the radiation protection expert without delay if any inventory change (of total holdings, see section Logbook). The radiation protection expert shall update KI’s register of nuclear materials and notify

- the Swedish Radiation Safety Authority (rapport.safeguard@ssm.se) by the form for an Inventory Change Document (ICD) at latest three days after the inventory change.

- the Euratom Safeguards (safeguards-reporting@safeguards.ec.europa.eu) by the form for an Inventory Change Report (ICR) with a copy to SSM (rapport.safeguard@ssm.se) at latest on the 15th in the following month after the inventory change.

When any information requires correction, reference shall be made to the previous transaction number, contract code and Inventory Change code (IC code) specified in the local PIL. When receiving from another Swedish nuclear facility, the sender's transaction number shall be used.

Waste management

In the case of a full waste container, transport shall take place to KI's waste room for nuclear materials awaiting national disposal. Transport shall be coordinated by the radiation protection assistant in consultation with the radiation protection expert and the radiation protection representative. The radiation protection expert shall update KI's local register for nuclear materials and PIL respectively. The radiation protection expert shall report transfer to retained waste (code TW) through an

- ICD to SSM (rapport.safeguard@ssm.se) at latest three days after the inventory change,
- ICR to the Euratom Safeguards (safeguards-reporting@safeguards.ec.europa.eu) with a copy to SSM (rapport.safeguard@ssm.se) at latest on the 15th in the following month after the change.

When a waste solution reaches a concentration of less than 1 milligram of nuclear material per gram of waste solution, the waste can be assessed for exemption from nuclear control. Assessment shall be done by the radiation protection expert. The waste should be handled as radioactive waste in accordance with the instructions for radiation safety at KI. The radiation protection expert shall remove the waste from both KI's local register for nuclear materials and the PIL. The radiation protection expert shall report a discard to the environment (code TE) through an

- ICD to SSM (rapport.safeguard@ssm.se) at latest three days after the inventory change,

- ICR to the Euratom Safeguards (safeguards-reporting@safeguards.ec.europa.eu) with a copy to SSM (rapport.safeguard@ssm.se) at latest on the 15th in the following month after the change.

Annual inventory
The radiation protection expert shall initiate an annual inventory on 1 December. The radiation protection assistants concerned shall report their holdings to the radiation protection expert by 31 December by latest. The radiation protection expert shall update KI's register of nuclear materials and report outgoing inventory by

- PIL to the Euratom Safeguards (safeguards-reporting@ec.europa.eu) with copy to SSM (rapport.safeguard@ssm.se) at latest on the 31 January.

Reporting of the PIL shall be done as listed in Annex I-N to Regulation 974/2025. Reporting shall be done even if no change in holdings has occurred during the year.

Basic Technical Characteristics
The basic technical description shall be kept up to date. Changes shall be notified to the European Commission with a copy to SSM using a special template Basic Technical Characteristics (BTC) according to Articles 3-5 and Annex I-N of Commission Regulation (Euratom) 2025/974.

Archiving

Documentation concerning nuclear safeguards shall be archived by KI's radiation protection expert. The documents shall be marked for non-deletion.