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

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Safety and security man	ager	Instructions		
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Professional services/safety & security		Head of administration	on, safety & security	
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		radiation protection	assistant, research group	
		leader/core facility m	leader/core facility manager, head of	
		department, export o	control coordinator	
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Clarification of role descriptions, audit of export controls				

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 storage of nuclear materials at KI.

Purpose

The 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 (Euratom) No 302/2005 on the application of Euratom Safeguards
- Recommendation on general advice for the application of No 302/2005 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

KI's 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

Nuclear safeguards cease at a concentration of 1 kg of nuclear material per tonne, i.e. parts per thousand (ppt). In this case, only instructions for radiation safety at KI apply. 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 applies.

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 broken down by agreement code and element category. The radiation protection expert also coordinates the annual inventory of nuclear materials.

Radiation protection representative

Radiation protection representative coordinates operational issues concerning the building where nuclear materials are stored and handled. 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.

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 head of department and 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".

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) exceeding tenths of a gram. The radiation protection expert shall update KI's register of nuclear materials and notify the Euratom Safeguards (safeguards-reporting@safeguards.ec.europa.eu) with a copy to SSM (rapport.safeguard@ssm.se) within three days of 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 register for nuclear materials and report transfer to retained waste (code TW) through an ICD to the Euratom Safeguards (safeguards-reporting@safeguards.ec.europa.eu) with a copy to SSM (<u>rapport.safeguard@ssm.se</u>). The nuclear material is then removed from the local PIL but still in the local register of KI.

Exceptions apply to waste solutions with a concentration of less than 1 milligram of nuclear material per gram of waste solution. These waste solutions shall be exempted from nuclear material control and handled as chemical waste or radioactive chemical waste (after assessment by the

radiation protection expert) in accordance with the instructions for radiation safety at KI. The radiation protection expert shall update the register for nuclear materials and report discard to the environment (code TE) through an ICD to the Euratom Safeguards (safeguardsreporting@safeguards.ec.europa.eu) with copy to SSM (rapport.safeguard@ssm.se). The nuclear material is then removed from the local PIL and the local register of KI.

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 31 January at the latest to the Euratom Safeguards (safeguards-reporting@ec.europa.eu) with copy to SSM (rapport.safeguard@ssm.se). Reporting of the PIL takes place as described in Annex I-G to Regulation 302/2005. Reporting takes place even if no change in holdings occurred during the year.

Archiving

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