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CODE OF RULES AND PROCEDURES FOR DISPOSAL OF RADIOACTIVE WASTE

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UMEÅ UNIVERSITET

Code of Rules and Procedures FOR DISPOSAL OF RADIOACTIVE WASTE	1
1. Description	3
2. Background	3
3. Equipment Containing Radioactive Substances	3
3.1. X-Ray Equipment.....	3
4. Disposal of Radioactive Waste	4
4.1. Weakly Contaminated Waste.....	4
4.2. Radioactive Waste	4
5. General Advice from the Staff in Charge of the Radioactive Waste Disposal Room..	6
6. Directions and Contact Information to the Waste Disposal Room.....	7

1. Description

This process description includes the regulations for disposal of radioactive waste.

2. Background

Waste from work involving radioactive substances must be managed in such a way that it does not cause harm or pose unnecessary risk. How to manage the waste depends primarily on the characteristics of the waste. Disposal of radioactive waste must follow the regulations issued by the Swedish Radiation Safety Authority (SSM).

3. Equipment Containing Radioactive Substances

Certain equipment used at the university contain radioactive substances. Before the equipment can be discarded, the radioactive source must be removed and stored according to radiation safety standards. The university has an agreement with Region Västerbotten, which stores and later disposes of the radioactive sources. Examples of equipment that might contain radioactive substances are: Liquid Scintillators; Eliminators; X-Ray Fluorescence Analyzers; Nuclear Thickness or Density Gauges. Other types of equipment not listed here might exist. It is important to note that the equipment listed here might have different names, as an example Liquid Scintillators are often named Beta Counters or Alpha Counters.

Before discarding equipment, it must be ascertained that it does not contain any radioactive substance. If the symbol to the right of this text appears on any side of the equipment, then it contains a radioactive substance which must be removed before the equipment can be discarded. Take notice that no hazard symbol on the equipment does not necessarily mean it does not contain any radioactive substances. To be sure, read the equipment manual. If you feel unsure, contact Umeå University's Radiation Safety Expert.



Figure 1. Hazard symbol - Ionizing radiation

The Radiation Safety Expert can also help with removing the radioactive source!

3.1. X-Ray Equipment

X-ray equipment that is no longer in use must be rendered unusable before being discarded. If you feel unsure, contact Umeå University's Radiation Safety Expert.



4. Disposal of Radioactive Waste

4.1. Weakly Contaminated Waste

This category of waste includes anything containing so small amounts of radioactivity that no specific measures regarding management and disposal must be taken due to radiation hygienic reasons. See the Swedish Radiation Safety Authority's regulations SSMFS 2018:1, Kap 8 and SSMFS 2018:3, appendix 1, for current activity limits to the respective radionuclides.

Solid Waste

An example of solid waste are single use materials (such as gloves, exam table paper, syringes, tubing, and containers) which have been used in connection to solutions containing radioactive isotopes. Solid waste with activity levels below the limits set in SSMFS 2018:3, appendix 1, is collected in a designated container equipped with a lid and a plastic bag on the inside. When full, the plastic bag is sealed and can then without any further measures be disposed of together with ordinary waste.

Liquid Waste

Liquid waste with activity levels below the limits set in SSMFS 2018:3, appendix 1, can be disposed of by pouring it out in a sink. Each time the activity must be below the set limit, and the total disposed activity over a calendar month must not surpass 10 times the set limit. Each time, make sure to amply flush with water. Note that the sink must be clearly marked with a sign that specifies that it is allowed to pour out radioactive waste there. Disposal of liquid waste through the sink should be limited to one sink per laboratory and two per floor.

Note! Scintillation fluid is not water solvent and must be deposited at the Umeå University Chem Shop. See exemptions from this rule under the headline 'disposal of liquid and water solvent waste with high activity and non-water solvent radioactive waste'.

4.2. Radioactive Waste

This category includes any waste that might contain high enough concentrations of radioactive substances and high enough activity, for it to be considered a radiation risk and thereby mandates a specific process for management and final disposal.

Solid Waste

Examples of solid waste are radioactive substances and sources with an activity that surpasses the limits set in SSMFS 2018:3, appendix 1. This could be a container for stem-cell solutions, exam table paper and other material used in connection with stem-cell solutions with high specific activity and which might be highly contaminating, as well as animal bodies, organs or cutter shavings from laboratory animals treated with radioactive substances.

UMEÅ UNIVERSITET

Solid Waste must be put in a specific container¹ designed for hazardous waste (see image below). When the container is full, it must be ascertained that it is correctly sealed with the lid. The container must be marked with a label patch, filled out according to 5. **Fel! Hittar inte referensälla..** Waste requiring frozen storage is not allowed to be mixed in with other waste.



Figure 2. Container for solid waste

If you have radioactive waste that you wish to dispose of, send an e-mail to cmts.avfall@regionvasterbotten.se to schedule a time for the disposal with the contact person. Deliver the waste under adequate conditions to the waste disposal room at the scheduled time. The waste disposal room is located in the culvert (floor -1), destination point QA, NUS building 27, room 27-1020.

Liquid and Water Solvent High Activity Waste and non-Water Solvent Radioactive Waste

Liquid waste with an activity surpassing the limits set in SSMFS 2018:3, Appendix 1, must be sent to the radioactive waste disposal room. In general, scintillation liquid is considered chemical waste instead of radioactive waste, with exceptions for solutions containing alpha emitting nuclides or if the activity exceeds the limits set in SSMFS 2018:3, Appendix 1. Liquid waste is delivered to the radioactive waste disposal room in sealed containers, labeled with:

1. Which isotope it contains.
2. Start date. The date the container was first used.
3. End date. The date the container was sealed.
4. Calculated activity, given in Bq.
5. Contact information.
6. Type of solvent.

¹ Container for hazardous waste can be ordered from <https://webshop.mediqsverige.se/>
Article number: 5583088 Dubbellock gul till SAN SAC
Article number: 5583085 Riskavfallsbox SAC Gul
Easiest way to find it is to do a Google search for the product.



UMEÅ UNIVERSITET

5. General Advice from the Staff in Charge of the Radioactive Waste Disposal Room

Note! Some low-level radioactive solutions should be treated primarily as chemical waste instead of radioactive waste. If you are unsure, contact Umeå University's radiation safety expert. Weakly contaminated waste (se 4.1 **Fel! Hittar inte referenskälla.**) or non-contaminated waste must not be mixed in with the radioactive waste dropped off at the waste disposal room.

Animal bodies

Animal bodies and other waste requiring frozen storage is not allowed to be mixed in with the radioactive waste dropped off at the waste disposal room.

Note! Animal bodies that have been in contact with ether must be aired before being packaged for storage, or else risk exploding during frozen storage.

Containers

Only yellow containers designed for hazardous waste are accepted by the waste disposal room. Containers made from cardboard is not accepted. **Make sure that the container is sealed correctly with the lid!** If the container is not correctly sealed, waste can fall out of the container as it is being lifted. Bottles or ampoules that contain or has contained stem cell solutions, sealed radioactive sources, calibration substances etc. is not allowed to be mixed in with the ordinary radioactive waste dropped off at the waste disposal room. These must be delivered separately and in the original protective containers (lead containers etc.) in which they were originally delivered. The staff at the waste disposal room retain the right to refuse radioactive waste that has been sorted sloppily or incorrectly or has been badly packaged. Radioactive waste of unknown activity might have to be sent to Cyclife or another third party for final disposal, which will then be payed for by the University.

Mixed isotopes

If possible, sort different isotopes into different containers.

Form for disposal of radioactive waste

For the waste to be accepted by the staff at the waste disposal room the form for disposal of radioactive waste must be filled out. The form can be downloaded from <https://www.aurora.umu.se/regler-och-riktlinjer/sakerhet/laboratoriesakerhet/farligt-avfall-och-farligt-gods/>

Make two copies of the form. Keep one copy at the department that turned in the waste as proof that the waste has been disposed of correctly and according to regulations.

6. Directions and Contact Information to the Waste Disposal Room



The waste disposal room is provided by Centrum för medicinsk Teknik och strålningsfysik (CMTS).

Contact

If you have radioactive waste that you wish to dispose of, send an e-mail to cmts.avfall@regionvasterbotten.se to schedule a time for the disposal with the contact person.

Building: 27, Destination point QA, Norrlands universitetssjukhus (NUS)

Floor: -1 (culvert)

Room: 27-1020 (sign outside says 'Radioaktivt avfall')

Directions

Walk towards destination point QA in the culvert (floor -1). (If you can't find it, walk first to destination point E and from there follow the signs to destination point QA) Once you have reached destination point QA continue down the corridor that turns slightly to the left. Pass below the sign that says 'F Klädbytesautomat 6-7' without turning, continue until the corridor ends. The radioactive waste disposal room is next to the elevator on your left side, marked with a sign that says 'Radioaktivt avfall'. The room is marked with an 'X' on the map below.



UMEÅ UNIVERSITET

