

Elaborated BiO 27.05.08

Earlier Radiation safety coordinator:

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Approved:

Kjetil Taskén

Date : 18.08.14

Converted: 17.02.17

1. Working area:

- ✓ All work with radioactive sources must take place in designated areas/workplaces or in special labs (isotope-lab type C).
- ✓ The isotope-lab and **all other areas** where radioactive work is carried out have to be clearly labelled with the symbol for ionizing radiation.
- ✓ Within this area the benches must be covered with bench-coat, and all work must be performed behind proper shielding: Plexiglas for ^{32}P and ^{35}S . NCMM has no proper shielding for ^{125}I and ^{131}I . All work with volatile substances must always be done in a hood or a LAF- security cabinet providing protection for both person and product.

2. Log:

- ✓ The user of the isotope-lab has to sign in and out in the logbook for the isotope-lab.

3. Equipment for radiation protection:

- ✓ As a general rule all personnel working with radioactive sources must wear a dosimeter in supervised area (lab C;E3). Exceptions are work with low energy isotopes which could not be detected (e.g.H-3, C-14, or S-35), if only working outside lab C. Everybody must use monitor, gloves, lab-coat and, and if ^{32}P is used, also protection glasses.
- ✓ It is not allowed to eat, drink, or put on any cosmetics during the stay in a protected area (or in any other lab)

4. Monitoring control:

- ✓ When starting the work the area must be checked with an appropriate monitor to look for radioactive contamination from previous users.
- ✓ The same control must be performed after the present work is finished.
- ✓ After working with tritium or ^{14}C , a "sweep-test" checked by scintillation counting must be performed. ^{14}C can be detected with a Geiger-Counter or a Micro- Count (adjusted for β - γ).

5. Storing/disposal of radioactive material.

- ✓ Everything stored in the isotope-lab must be labelled with name of the user, isotope and approximate volume/activity together with the date.
- ✓ When radioactive compounds are not in use they have to be stored in a secure location approved by the HSE division (or by the Norwegian Radiation Protection Authority)
- ✓ The storage (a special room, a hood, a fridge) has to be designated for the radioactive compounds, properly labelled and with a covering which gives proper shielding against radiation in such a way that the exposure rate is less than 7,5 $\mu\text{Sv/t}$.
- ✓ The storage must not be publicly accessible.

6. Dealing with radioactive waste.

- ✓ Solid radioactive waste is thrown in the yellow risk-containers behind the Plexiglas in the isotope-lab.
- ✓ Water-soluble high energy waste (hot probes and hybridization solutions) is contained in properly closed screw-cap tubes behind Plexiglas. Short-lived ^{32}P has to decay for minimum six months (radioactive half-life: $T_{1/2} * 10$) in a designated location. ^{35}S ($T_{1/2}$: 87,4d) is kept for 2 years. The waste is always monitored before being sent for incineration.
- ✓ Long-lived, low-beta energy ^3H from the Cell Harvester is labelled with the kind of isotope, approximate nuclide activity and date. This waste is transported by a ADR-competent IFE person to the Institute for Energy Technology.
- ✓ Use the reserved plastic bins for liquid scintillation solutions containing ^3H and ^{14}C . Scintillation samples containing ^{14}C and ^3H are sent to IFE. Remember to declare for other chemical hazards if necessary.
- ✓ Due to new regulations in 2005 UiO has permission from the Norwegian Radiation Protection Authority for only little radioactive release per year, further reduced in approval 2010 and 2012. Very low energy liquid waste can be poured into the sink followed by a lot of water, but limited to only declared values: Total release per year at the University of Oslo are limited to: 4 MBq for ^{32}P , 80 MBq for ^{35}S , 7 MBq for ^{14}C and 35 MBq for ^3H . This restrict the release to 0 MBq for NCMM, E2;E3;D3
- ✓ The sink, all the equipment, and the working area should always be monitored before and after the work.

7. Contamination/ decontamination

- ✓ Contamination is radioactivity remaining on a person, within an area or on equipment where it should not occur after a working operation. A contamination exists if detected with the monitor or in any other way.
- ✓ Decontamination: In this instruction, removing/cleaning of the radioactive contamination. Contaminated bench paper is removed and all the equipment is cleaned with water or, if necessary, 5-10% Deconex, until the decontamination is reduced to less than 40 Bq/cm².
- ✓ Remedial actions in case of an accident. A contaminated area has to be labelled with a warning tape for radioactivity

8. Warning: Local responsible/ leader of the laboratory and the HES division.

- ✓ If the area can not be sufficiently decontaminated. (item 13)
- ✓ If skin or clothes/ shoes are contaminated and can not be satisfactory decontaminated with water and (if necessary) soap.

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- ✓ If your skin is damaged while working with radioactivity.
- ✓ If radioactive compounds are inhaled or taken in orally.
- ✓ If a serious contamination occurs, also the Norwegian Radiation Protection Authority has to be notified.

9. Pregnancy:

- ✓ In general, women who are pregnant or planning a pregnancy should not work in the isotope-lab, and it is absolutely forbidden for these persons to work with high activities (i.e., activities used for iodination of proteins, labelling of probes, or methods requiring high activities, such as cellular or metabolic labelling or nuclear transcription analyses).
- ✓ The fetus is especially sensitive for ionizing radiation. The sensitivity to radiation is especially high in week 8-16 of pregnancy. In case of performing volunteer work, this requires appropriate shielding, which must be sufficient to keep the occupational supplementary radiation within the variation in the levels of background radiation.
- ✓ For pregnant women the dose to the fetus should not exceed 1mSv for the rest of the pregnancy, after the pregnancy is stated. (2003-11-21: § 21.kap IV). Guidance concerning risk assessment is given in: REG 1985-06-14 §3, §6, together with comments to the paragraphs. (Available from Jorun and Liv, or at www.Lovdata.no).

10. Cystostatica and ionising radiation.

- ✓ For employees working with both ionizing radiation and regularly with cytostatic, the group leader must write a separate working instruction describing the protocol, how to carry out the work and accompanying safety requirements (REG 1985-06-14 §7, with comments).

11. Self protection and training – New staff.

If a person for the first time is going to work with radioactive isotopes, the person concerned:

- ✓ Has to participate in the UiO course of radiation protection, if no proof of any other course is presented. The course is free and is arranged once per semester.
- ✓ Must be properly instructed and trained by the closest superior or another competent person in every aspect of practical work with radioactive isotope. The contact for radiation safety has to be notified before the training starts.
- ✓ Must review the routines for decontamination with the radiation safety contact and the use of radioactivity in different areas in the isotope-lab.
- ✓ Has to keep the workplace tidy.