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ČR
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Radioactive waste management at IOCB

The management of **IOCB Radioactive waste (RW)** is provided by staff of Synthesis of Radiolabeled Compounds (Dr. Břetislav Brož, Dr. Gabriela Nováková in charge, line 269).

- Proper segregation of RW results in savings of disposal expenses.
- Minimize waste generation.
- Never mix radionuclides/chemicals – such behavior can lead to **unsafe** work conditions and **very high disposal costs**.

The RW must be sorted according to the instructions given bellow:

Very short-lived waste is sorted according to nuclide type – ^{32}P , ^{33}P , ^{125}I , ^{35}S – and then to following groups:

- solid waste (plastics, cotton wool, tissues, filter papers, glass, aluminum foil etc.)
- water solutions (containing less than 5% of organic material)
- organic liquids and their mixtures
- scintillation cocktails

Low/high level waste – ^3H , ^{14}C – is sorted into following categories:

- solid waste (plastics, cotton, filter paper)
- organic liquids and their mixtures
- water solutions (containing less than 5% of organic material)
- scintillation cocktails

All categories of solid RW collected at the workplace in PE bags are labelled with the "Radiation hazard" symbol and indication of the type of radionuclide (Figure 1).

The "Radiation hazard" label on **very short-lived** waste must be removable because after decline of radioactivity bellow “discharge level” this waste will be disposed as a municipal solid waste.

Liquid **RW** is collected at the workplace in PE canister (up to 5 L volume) labelled with the "Radiation hazard" symbol. The category (water solution, organic liquid, scintillation cocktail) and type of radionuclide must be indicated on the PE canister label (Figure 1).

The **RW** transferred for disposal to the buffer stock (room B.1.0, Figure 2) must be accompanied with the **Radioactive Waste Sheet** form available on <https://inraweb.uochb.cas.cz/radiochemie-609.html?lang=en> or in ANNEX I. The total activity of the liquid waste should be assayed by LSC. The activity of the solid waste must be approximated from the known activity taken into the experiment(s).



Figure 1: Proper collecting and sorting of radioactive waste in the IOCB radioactive waste buffer stock, B.01.01)

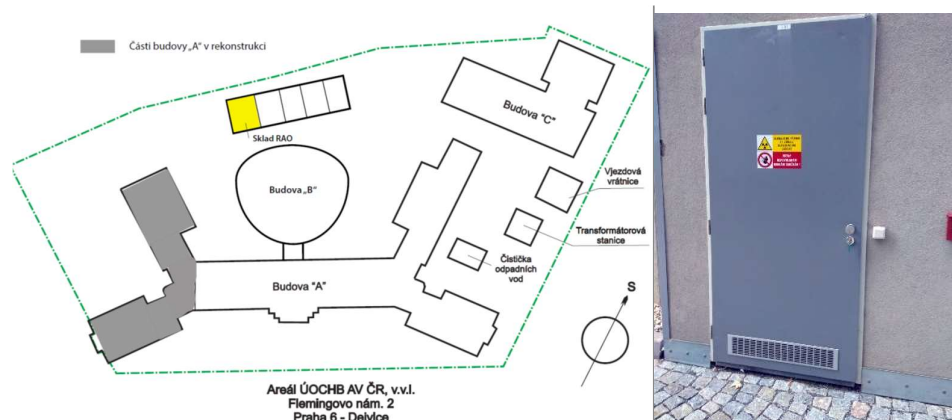


Figure 2: IOCB radioactive waste buffer stock (B.01.01, opposite site to the chemical warehouse)

The material contaminated with radionuclide of activity below its “**discharge level**” is not considered as a radioactive waste. In such case, the material is handled as an ordinary waste. Discharge levels for most frequently used radionuclides are tabulated in **ANNEX II**. Water solutions having volume activity lower than the discharge level indicated in **ANNEX II** can be disposed directly to the laboratory sink.

In Prague, January 2nd 2023

Written by:

Ing. Aleš Marek, Ph.D.
IOCB Radiation Safety Officer

ANNEX I



RADIOACTIVE WASTE - The Cover Letter

SOLID WASTE, SHORT-TERM

Isotope	Weight [kg]	Activity	Number of bags
¹²⁵ I			
³² P			
³⁵ S			

SOLID WASTE, LONG-TERM

Isotope	Weight [kg]	Activity	Number of bags
³ H			
¹⁴ C			

Notes [OPTIONAL]

Name [REQUIRED]

Signature [REQUIRED]

Date [REQUIRED]

LIQUID WASTE, AQUEOUS

Isotope	Volume [L]	Activity	Number of cans
¹²⁵ I			
³² P			
³⁵ S			
³ H			
¹⁴ C			

LIQUID WASTE, ORGANIC

Isotope	Volume [L]	Activity	Number of cans
¹²⁵ I			
³² P			
³⁵ S			
³ H			
¹⁴ C			

SCINTILLATION COCKTAIL

Isotope	Volume [L]	Activity	Number of cans
³ H			
¹⁴ C			
³⁵ S			

ANNEX II

Discharge levels of radionuclides for legal releasing to the environment

radionuclide	solid waste		liquid waste ³⁾	
	weight activity ¹⁾	surface activity ²⁾		
	[kBq/kg]	[Bq/100 cm ²]	[MBq/m ³]	<i>h_{ing}</i> [Sv/Bq]
³ H (tritiated water)	1 000 000	40	555.6	1.8E-11
³ H (labeled mat.)			238.1	4.2E-11
¹⁴ C	10 000	40	17.2	5.8E-10
³² P	1000	40	4.2	2.4E-09
³³ P	100 000	40	41.7	2.4E-10
³⁵ S (organic)	100 000	40	13.0	7.7E-10
³⁵ S (inorganic)			76.9	1.3E-10
¹²⁵ I	1000	40	0.7	1.5E-08
⁵¹ Cr	1000	40	270.3	3.7E-11
⁵⁴ Mn	10	40	14.1	7.1E-10
⁵⁵ Fe	10 000	40	30.3	3.3E-10
⁶³ Ni	100 000	40	66.7	1.5E-10
⁶⁵ Zn	10	40	2.6	3.9E-09
⁹⁰ Sr	100	40	0.4	2.8E-08
¹³⁷ Cs	10	40	0.8	1.3E-08
²¹⁰ Pb	10	40	0.0	6.9E-07
⁹⁹ Mo	100	40	16.7	6.0E-10
^{99m} Tc	100	40	454.5	2.2E-11
⁹⁹ Tc	10 000	40	15.6	6.4E-10
¹³³ Ba	100	40	6.7	1.5E-09
U _{přir}	1	40	0.0	5.0E-07
1) Materials with activity dispersed evenly. (Annex No. 7 Bylaw 422/2016 Sb.). 2) Activity must not exceed 0.4 Bq/cm ² on any surface of 300 cm ² on the disposed item. 3) Maximal permissible released activity per volume. (Annex No. 3 Bylaw No. 422/2016 Sb.)				