



---

**A new gamma-ray spectrometry laboratory at  
IFE Kjeller to support nuclear decommissioning**

Alexander Muring  
NKS GammaSkill Seminar, 27.09.2023

# The Norwegian research reactors at IFE

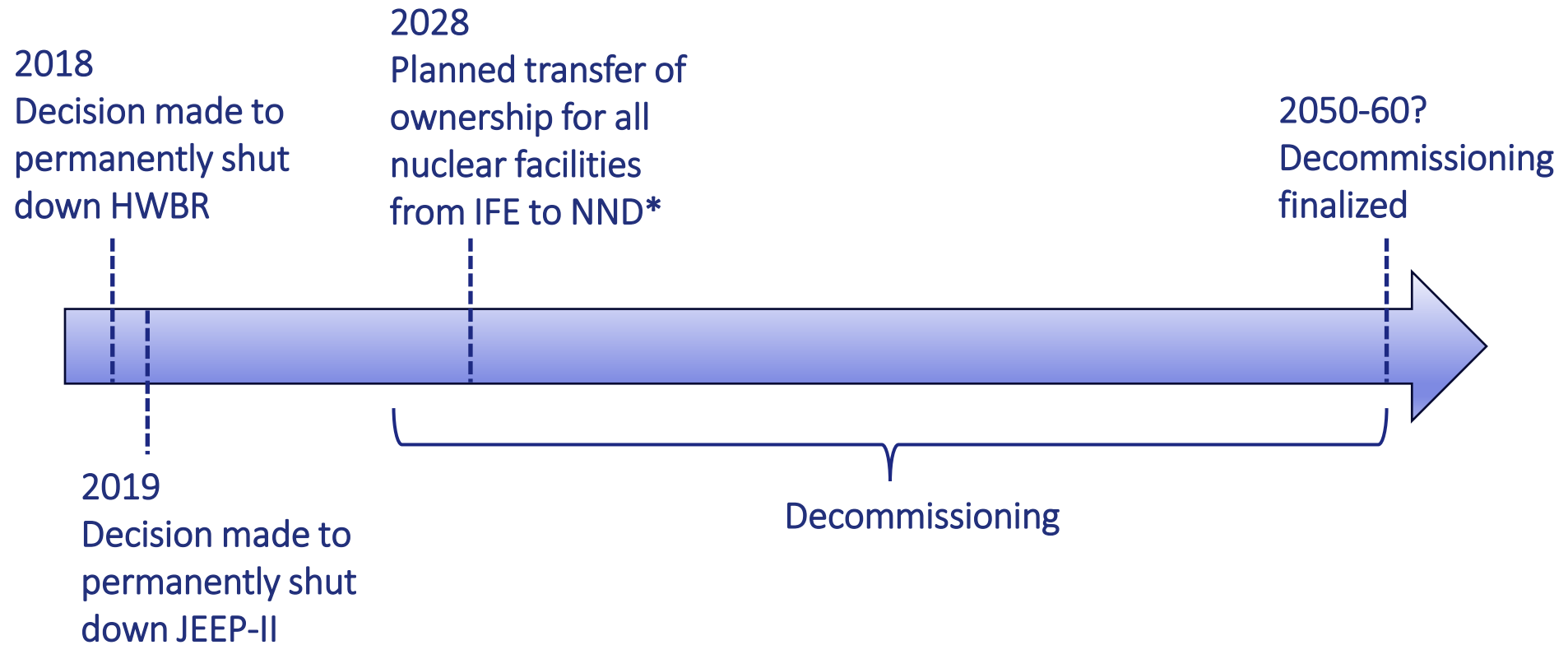
- Halden
    - HBWR: Operated from 1958 to 2018
  - Kjeller
    - JEEP I: Operated from 1951 to 1966
    - NORA: Operated from 1961 to 1968
    - JEEP II: Operated from 1967 to 2019
- } Have already been "decommissioned"



*JEEP II at Kjeller – Norway's last operating research reactor*



# Timeline of the decommissioning process



*\*NND = Norwegian Nuclear Decommissioning*

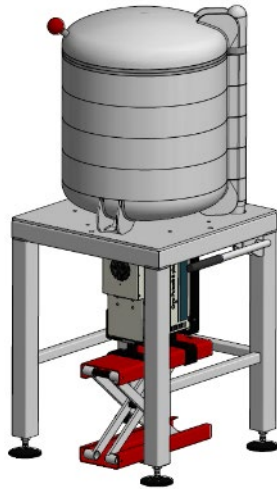
# Need for a new gamma-ray spectrometry laboratory

- Experience shows that decommissioning yields the need for (tens of) thousands of radioactivity analyses related to facility characterization and classifying future waste
- Gamma-ray spectrometry will be one of the most important measurement techniques throughout the whole decommissioning process, since it has the huge advantage that it can measure many radionuclides simultaneously with minimal sample preparation
- At this moment, there is no other laboratory in Norway with the capacity and facilities to handle the amount and type of samples expected during decommissioning

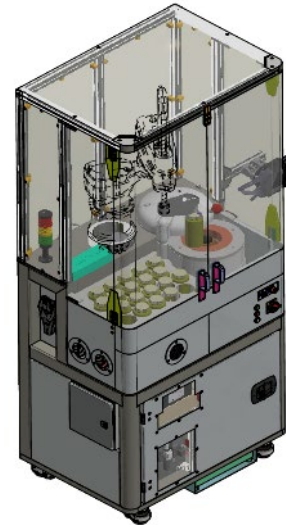
# Ongoing project "NUK-NND Gammalab"

- Establishment of a new gamma-ray spectrometry laboratory within the nuclear area at the IFE Kjeller site, primarily based on laboratory and portable HPGe systems:

Laboratory HPGe detector systems (electrical cooling)



Automated sample changer "Robocount"

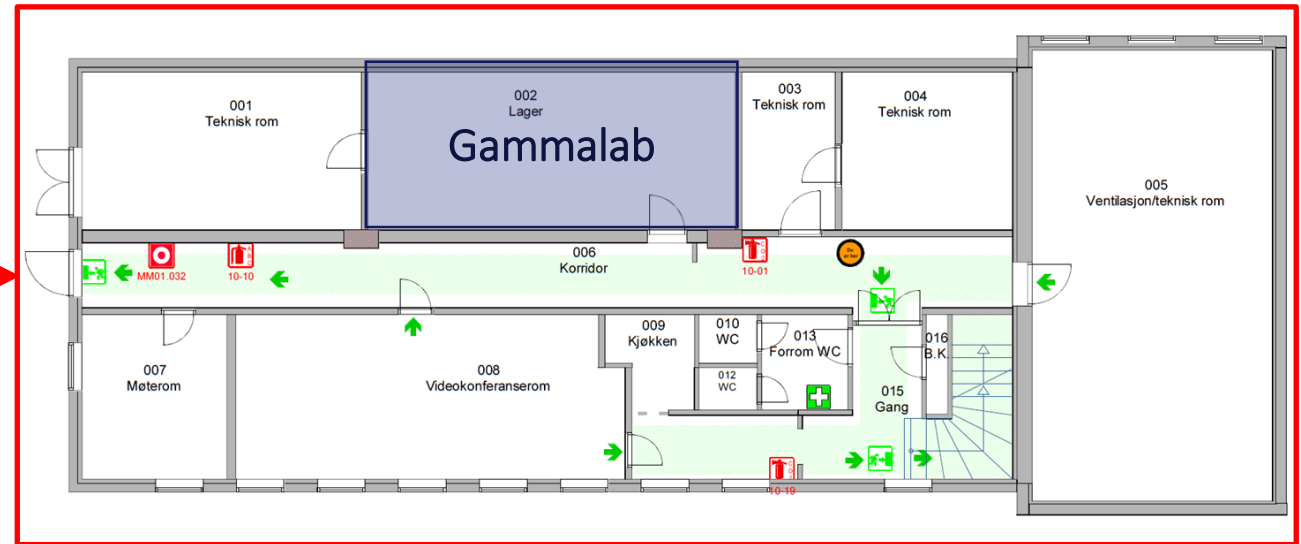
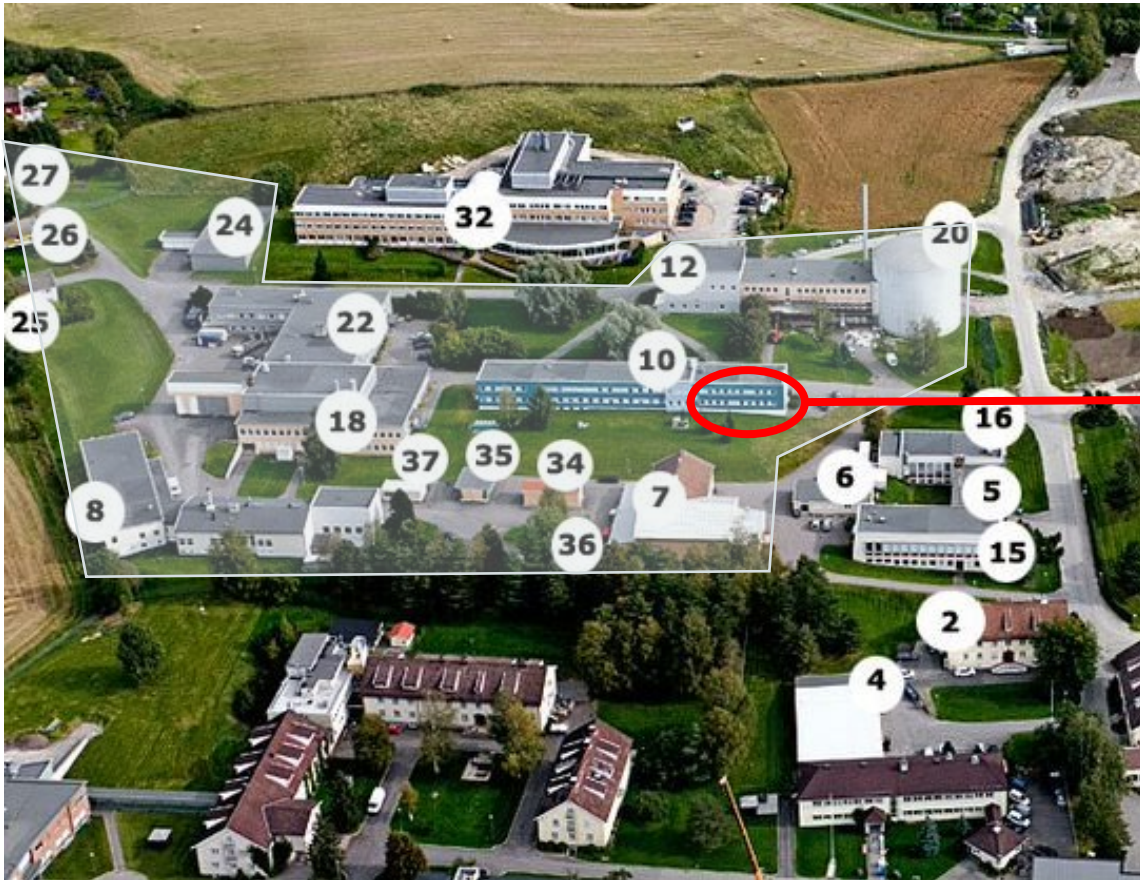


Portable "Aegis" detector system w/collimated cart

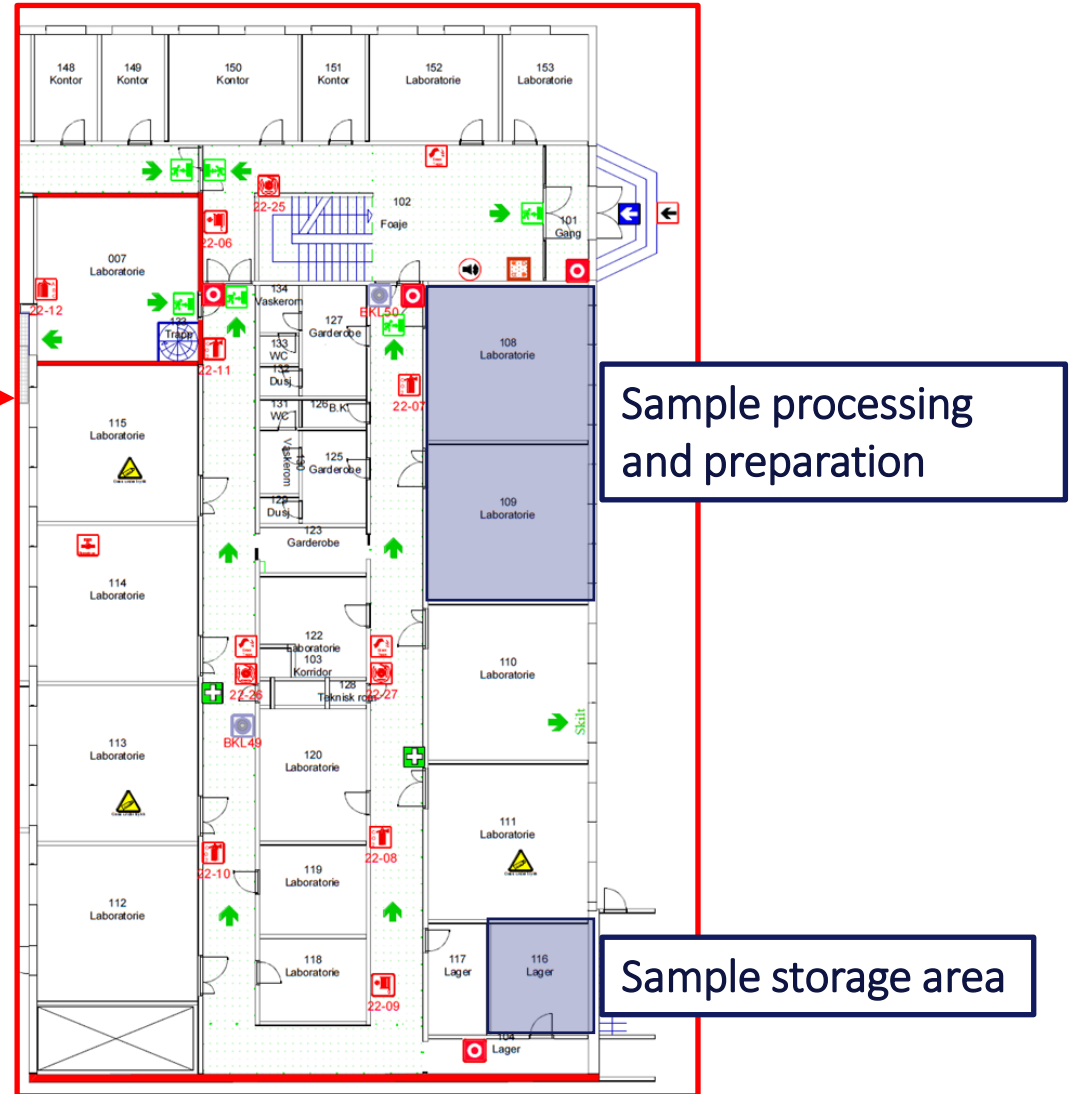
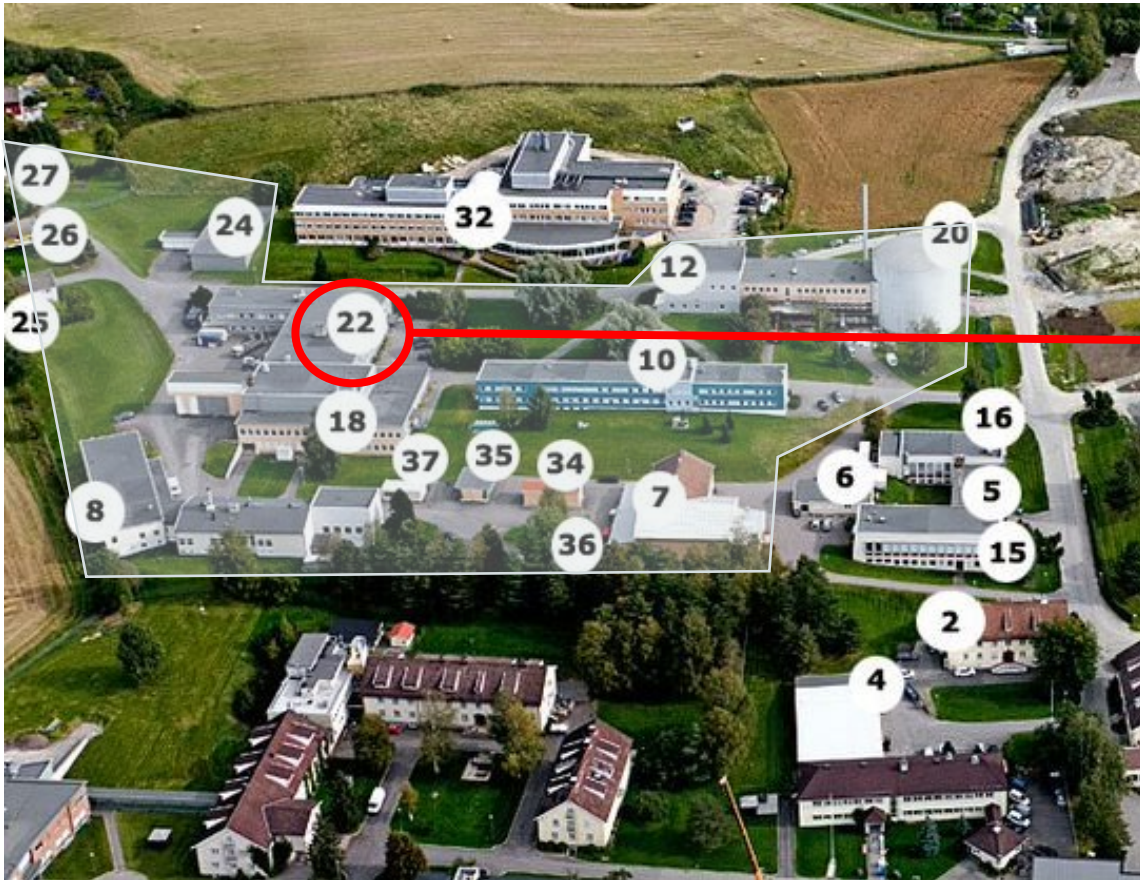


- The project includes planning, procurement, facility renovation, setup and calibration of the equipment, method development and validation, writing procedures, ...

# Location of the lab on the Kjeller site



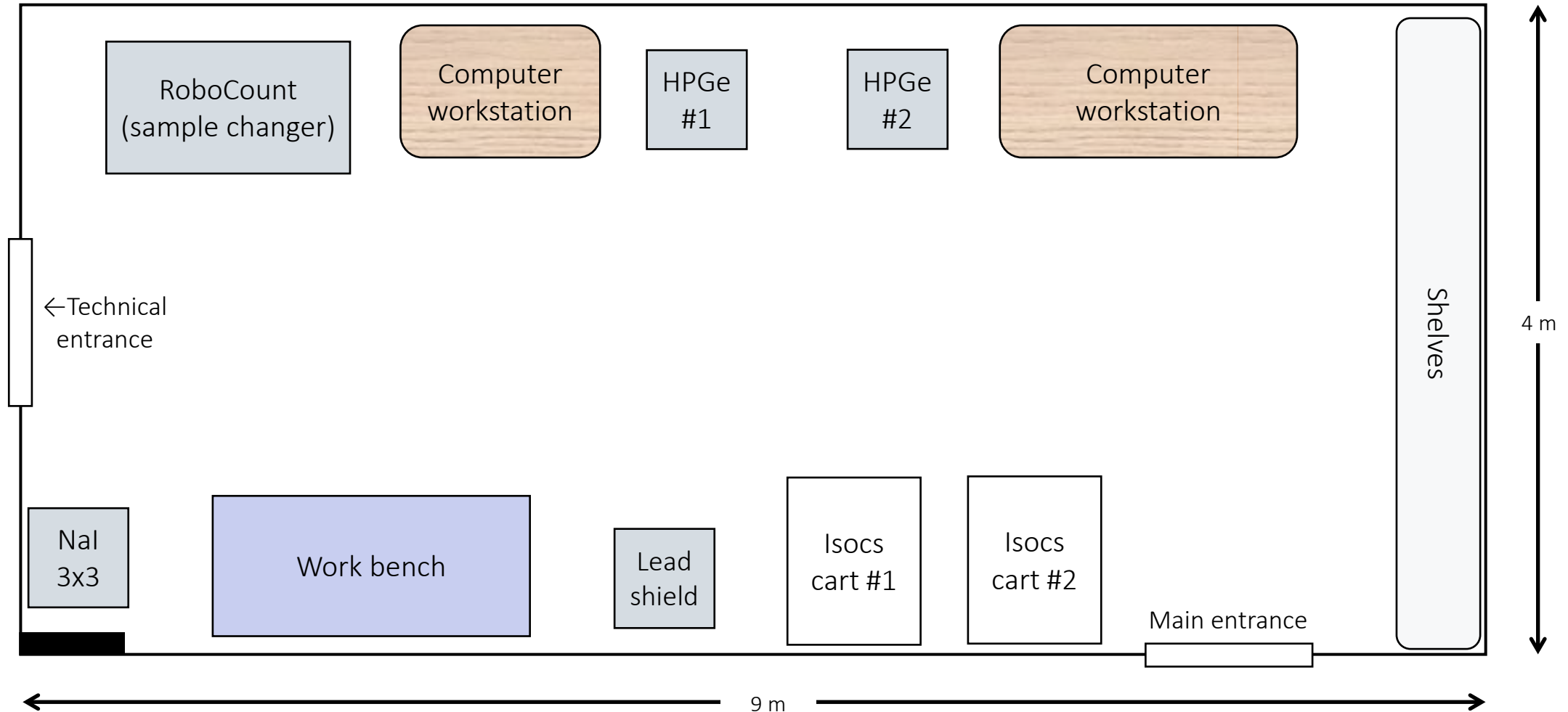
# Location of the lab on the Kjeller site



# Planned layout of the gamma spec. lab

0,5 x  
0,5

1 m x 1 m





# Current view of the gamma spec. lab





# Planned activities and timeframe

Project "GAMMALAB"	2022			2023				2024	
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
A1. Evaluate and decide on lab. premises	█			█					
A2. Prepare premises for use	█	█			█	█	█	█	
A3. Study visits to established labs	█	█							
A4. Procurement of equipment	█	█	█	█	█	█	█	█	
A5. Receiving and setup of equipment				█	█	█	█	█	█
A6. Method development				█	█	█	█	█	█
A7. Detector calibration				█	█	█	█	█	█
A8. Method validation								█	█
A9. Writing measurement procedures								█	█
A10. Training of laboratory personell								█	█
A11. Initiation of routine operation									█

Q4 2024?

# Measurement method & process development



## ISO 19017:2015

Guidance for gamma spectrometry measurement of radioactive waste

## ISO 20042:2019

Measurement of radioactivity — Gamma-ray emitting radionuclides — Generic test method using gamma-ray spectrometry

## ISO 18589-7:2013

Measurement of radioactivity in the environment — Soil — Part 7: In situ measurement of gamma-emitting radionuclides

## ISO 11929-1:2019

Determination of the characteristic limits (decision threshold, detection limit and limits of the coverage interval) for measurements of ionizing radiation —

- Methodologies based on latest international “best practice”
- Collaborations are very welcome!

**Radiation protection instrumentation - Measurement of discrete radionuclides in the environment - In situ photon spectrometry system using a germanium detector**

**Thank you for the attention!**

---

[Alexander.Mauring@ife.no](mailto:Alexander.Mauring@ife.no)