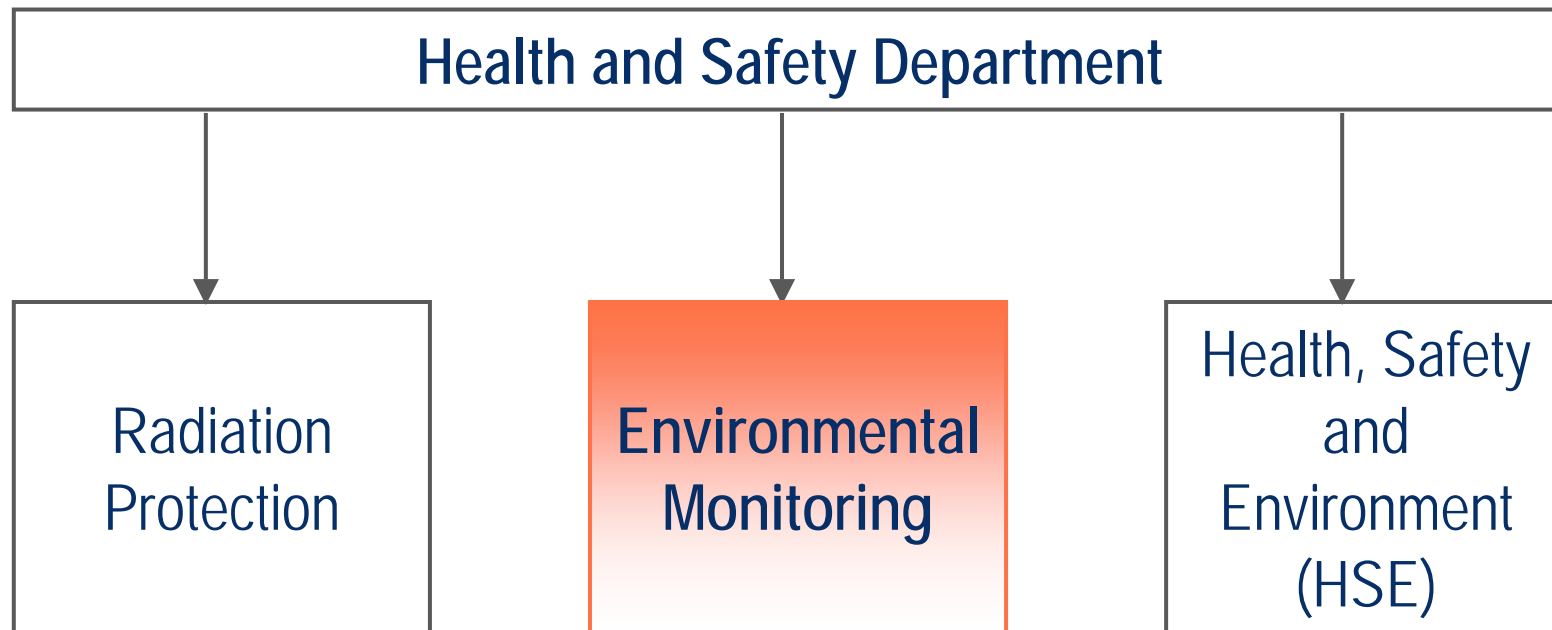


# Gamma spectrometry at IFE

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# Environmental Monitoring Section



# Detectors and software

- Six nitrogen cooled HPGe detectors (4 low energy)
- GammaVision
- Detectors calibrated using certified mixed sources
- Individual calibration for each geometry



# Nitrogen cooling



# Shielding



# QA

- Energy-efficiency calibration when a detector is bought
- 2 backgrounds a year
- QA tests on background, efficiency and energy at least every second week
- Libraries are based on data from Laboratoire National Henri Becquerel

# Quality assurance

- Quality assurance manual
- Regular participation in intercomparison exercises
  - IAEA, NIST, NPL, NKS...
- Qualified member of the IAEA ALMERA network
  - ALMERA = Analytical Laboratories for the Measurement of Environmental Radioactivity
  - Regular proficiency test for all qualified laboratories
- Internal revisions
- External revisions





Approx 15 different geometries...



# Gamma analysis

- Monitoring of discharges of radioactivity
- Internal control samples
- Monitoring of the local environment around IFE
- Commercial services



# Through put so far this year...

- Gamma analysis: 850 samples
- Self-absorption corrections: 360 samples
- QA etc...: 170 samples

# Treatment of samples

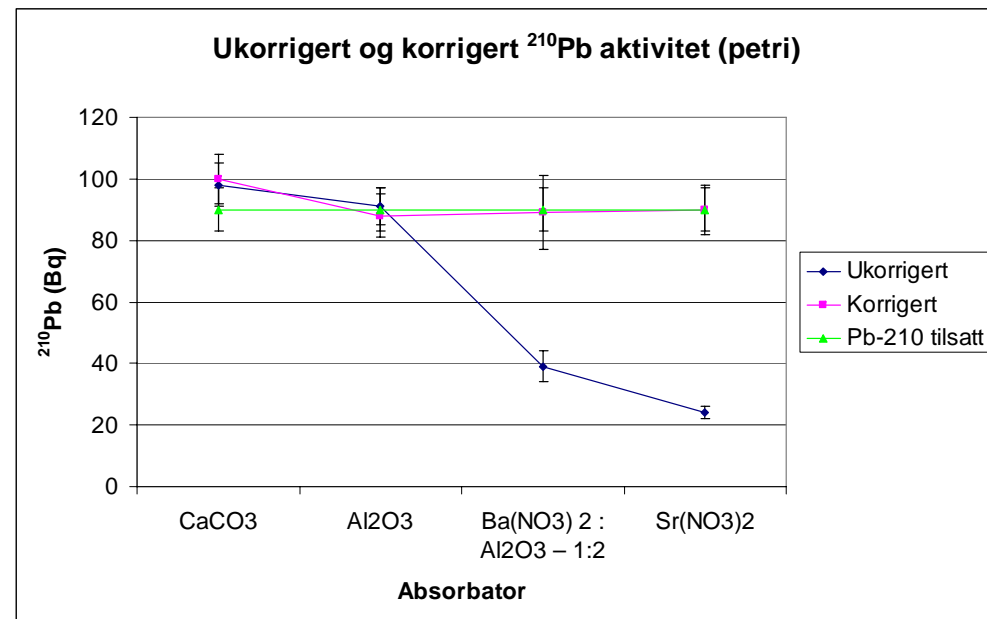
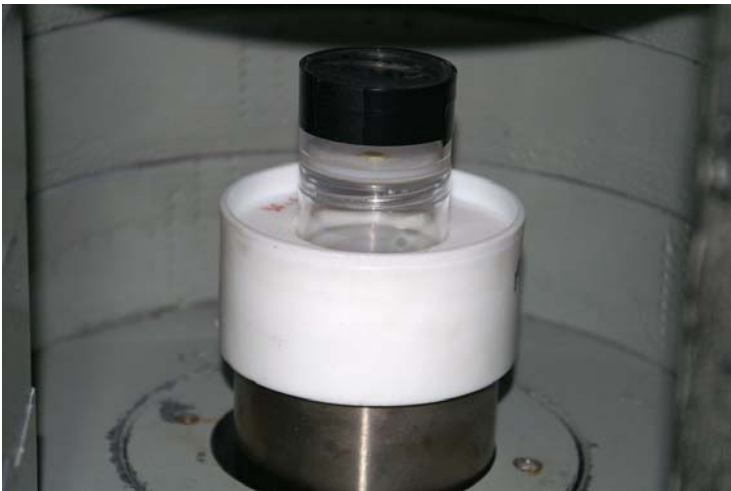
- Volatile radionuclides (e.g. iodine, noble gasses) are analysed in fresh samples
- Other radionuclides are commonly analysed in pre-concentrated samples (evaporation, drying, ashing, precipitation etc.)

# $^{226}\text{Ra}$ , $^{228}\text{Ra}$ and $^{210}\text{Pb}$

- LSA scale: Homogenization and packing into petri
- Produced water: Treatment of the water with acid and oxidizing agents and co-precipitation with  $\text{Ba}(\text{Pb})\text{SO}_4$
- $^{210}\text{Pb}$  and  $^{226}\text{Ra}$  – direct analysis
- $^{228}\text{Ra}$  via  $^{228}\text{Ac}$

# Self-absorption correction

- Cutshall et al. 1983



# Challenges

- Wide variety of radionuclides, activities and sample matrix
- New demands require analysis of new radionuclides...building, tweaking and tuning of new libraries
- Lower detection limits
- QA

# Challenges...

- TCC....should we incorporate it?
- Visual control of spectra and peak-fit to verify the software results
- Automatic software output versus complicated user control
- No certified solutions or intercomparison materials available for short-lived radionuclides



Thank you!