Recent Nordic research collaboration results obtained under the NKS-B programme

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www.nks.org

NKS in short

Nordic nuclear safety research

NKS (Nordic Nuclear Safety Research) is a forum for Nordic cooperation and competence in nuclear safety, including emergency preparedness, serving as an umbrella for Nordic initiatives and interests.

NKS runs joint activities of interest to financing organisations and other end users producing seminars, exercises, scientific articles, technical reports and other types of reference material.

Two Programmes running activities: NKS-R (nuclear reactor safety, etc.) and NKS-B (nuclear/radiological emergency preparedness, etc.)

Financing and support comes from Nordic authorities, companies and other organisations.

Results should be practical and directly applicable for use by participating organisations in their decision making processes and information activities.

Recent NKS-B activities (2018)

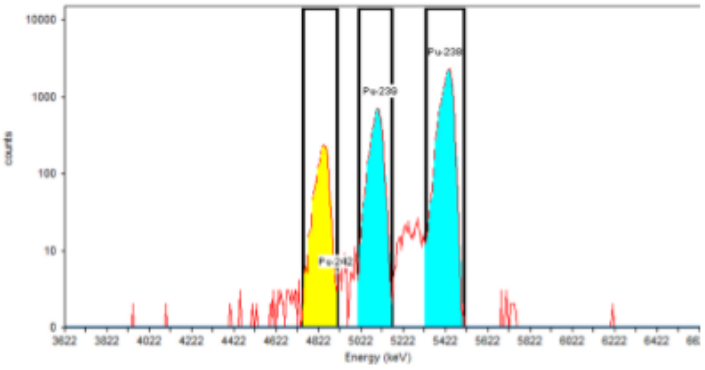
AUTOMORC - Improvement of automatic methods for identification of radioactive material out of regulatory control (MORC) by mobile gamma spectrometric search experiments.

The count rate versus time (the “intensity” curve) depends only on the distance to the source when the speed is fixed and the vehicle path is straight. This fact can be used to determine the distance to a source from a set of measurements. The problem can be solved with Bayesian statistical methods. A Bayesian based Markov chain Monte Carlo method was used to determine the location and activity of some of the point sources in an experiment.

OPTIMETHOD - Simultaneous Determination of Isotopes of Pu, Am and Cm in Reactor Water Samples

Aim to establish a Nordic optimal method for the determination of isotopes of plutonium, americium and curium in nuclear samples. The capacity and the analytical methods used in Nordic labs for determination of alpha emitters were reviewed and summarized. 11 Nordic labs participated in an intercomparison exercise with spiked water and a real reactor water.

Alpha spectra from OPTIMETHOD



Recent NKS-B activities (2018)

RADWORKSHOP - Workshop on Radioanalytical Chemistry for Nuclear Decommissioning and Waste Management

The workshop was 3-day invited lectures and presentations and 2-day lab practice by very experienced professionals. Talks were on different aspects in nuclear decommissioning and waste management with the focus on radioanalytical chemistry. Lab training: radiochemical analysis of alpha emitters (Pu-239, 240 and Am-241) and beta emitters (Fe-55, Ni-63) in nuclear decommissioning materials. 90 participants.

GAMMARAY - Seminar for users of gamma ray spectrometry

A two day seminar for users of gamma ray spectrometry. 34 participants from 20 organisations were present. Two lecturers were invited: I. Osvath from IAEA, who gave a presentation on the 2017 IAEA proficiency test with a focus on the sample with the more challenging short lived radionuclides, and M. Bruggeman from SCK-CEN, who gave a presentation on efficiency transfer for low-energy gamma-ray spectrometry. In addition, 14 participants presented development and experiences related to gamma-ray spectrometry.

DTU gamma laboratory

Recent NKS-B activities (2018)

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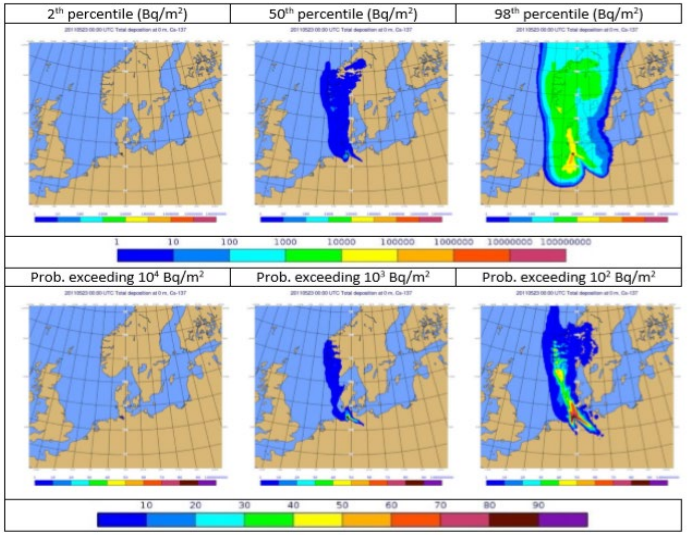
Nordic nuclear safety research

NORCO- Nordic freshwater ecosystem microcosms study

Multi-species model ecosystems (microcosms) were used to investigate effects of ionizing radiation on a model aquatic ecosystem including indirect effects caused by ecological interactions. Individual and population growth was measured for all species. Species interactions were measured in the form of grazing rates, whole ecosystem respiration and production were quantified. Measurements of ecosystem elements, nutrients status and cycling were made. Plant growth rates were generally lower in the irradiated cases. Several photosynthetic parameters were negatively affected by radiation. Descriptions were also made of requirements to conduct microcosm studies in a Nordic laboratory.

AVESOME – Added Value of uncertainty Estimates of SOurce term and Meteorology

A methodology has been developed for quantitative estimation of the variability of atmospheric dispersion modelling resulting from both sources of uncertainty. With modern supercomputing facilities available e.g. at national meteorological services, the proposed methodology is well suited for real-time assessments and implementation in decision support systems.



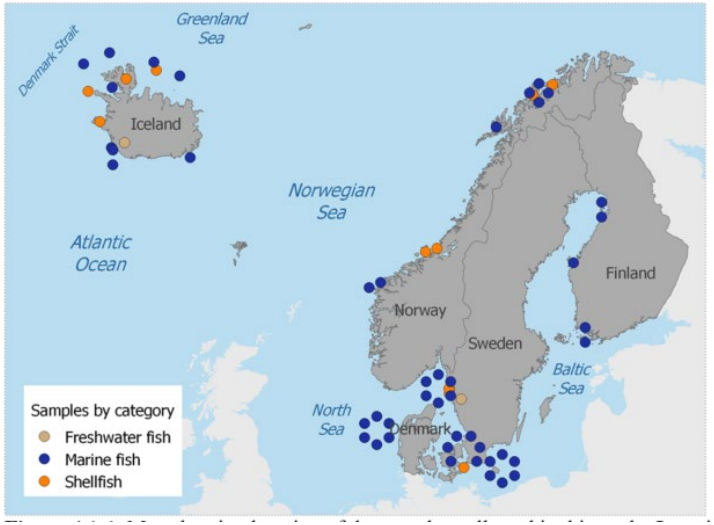
Recent NKS-B activities (2018)

RADSHIELD – Activity estimation of shielded or hidden radionuclides in emergency conditions: Impact of environmental conditions

Activity measurements of shielded sources were studied, including the contribution of source shielding. The work shows that activities of shielded sources can be measured with uncertainties that would be fit-for-purpose in e.g. a nuclear security event. Moreover, a thorough investigation of factors influencing the uncertainty of the activity measurements was done.

NANOD – Natural Radioactivity in Nordic Fish and Shellfish

Samples of commonly consumed fish and shellfish species from each of the Nordic countries were collected for analysis of ^{210}Po, ^{210}Pb, ^{226}Ra, and ^{228}Ra, as these radionuclides previously have been shown to be the main contributors to the ingestion dose. The results from analyses completed so far show ^{210}Po concentrations in wild fish ranging from 0.079 to 1.9 Bq/kg, and from 0.94 to 77 Bq/kg in shellfish.



Sampling locations (NANOD)

Annual NKS Call for Proposals for R&D projects

- Next call to be announced on 2nd of September 2019
- Deadline: 15th of October 2019
- Foreseen project start: January 2020 (one year contract at a time)
- Expected total NKS (R&B) project funding for 2020: 6 MDKK
- Final project reports and further information available for free on **www.nks.org**

Who can participate?

Organisations such as universities, research centres, institutes and companies in the Nordic countries can apply for NKS funding for research activities. The activity budget should distribute the NKS funding between participant organisations from at least 3 Nordic countries (in some special cases, involvement of only 2 Nordic countries has been accepted in the NKS-R programme). Non-Nordic participation in NKS activities is possible, but NKS funding of Non-Nordic organisations is not possible. The activity leader must come from a Nordic country (i.e. work for a Nordic organisation).

Further information

For further information on the two NKS programs please refer to the two new journal papers from NKS:

Christian Linde, Kasper G. Andersson, Sigurður M. Magnússon and Finn Physant: Nordic research and development cooperation to strengthen nuclear reactor safety after the Fukushima accident, Nuclear Engineering and Technology, Elsevier (2019).

Kasper G. Andersson, Christian Linde, Sigurður M. Magnússon and Finn Physant: Joint Nordic nuclear research to strengthen nuclear emergency preparedness after the Fukushima accident, Journal of Environmental Radioactivity, Elsevier (2019).

Thank you for your attention!

Do NOT forget to submit a new proposal for a NKS project!!!