Division between NKS-B and NKS-R

Introduction

This paper is developed by the PC's in consultation with the NKS Chair as a reflection on the different views that were presented under the topic "Division between NKS-B and NKS-R" at the NKS Board meeting in Reykjavik on 18 January 2018.

The following suggestion on the division between NKS-B and NKS-R was noted at the January meeting:[1]
VTT: Critical evaluation of the division between NKS-B and NKS-R. It seems that in the future more and more topics may appear that could fit in either programme. Should the topical division between programmes be evaluated and perhaps redirected.

As pointed out by NRPA in an email sent on 12 February 2018, 'the division between R and B is primarily challenged when it comes to decommissioning and waste management proposals'. This viewpoint is supported by comments from reviewers of NKS CfP2018 proposals. Also, as discussed at the January Board meeting, the attention on decommissioning and waste management problem solutions would be expected to increase over the following years in the Nordic area, and more NKS activity proposals in this field are thus expected. An effort is particularly needed to draw clearer borders between the two NKS programmes in this context, whereas there seems to be a clear-cut and logical distribution of other current working areas between the two NKS programmes. IFE even suggested that the area of waste and decommissioning could become a separate NKS area in addition to R and B[1]. However, this would require considerable administrative changes in NKS, and at this time it does not seem to be justified by the number of related proposals. NRPA on 30 April 2018 supported the 'option 1' described in page 5 of this document, but wrote that a certain percentage of the CfP budget might be earmarked for decommissioning activities. As outlined in a separate discussion note[2], 'prioritised areas' for CfP's could be problematic for a number of reasons. 'SIS proposed more emphasis on management of radioactive waste from non-nuclear energy production, and STUK suggested a diversification into waste management and non-proliferation[1].

It was recently correctly pointed out by SSM that the 'B' programme is not limited to 'beredskap', although the letter 'B' originated from that word. Although it may be tempting to replace the letter 'B' with one that can easier be explained by the programme's content, it may be expected that a change of the established R & B approach (where the letters are now detached from their original meaning) could lead to some confusion and mistakes on the user side at least over the first years.

This paper is intended to provide input for further discussions on this topic at the next NKS Board meeting in Copenhagen in June 2018. A description is first given of the current definitions in our supporting texts (particularly the two Programme Framework Documents) in our website. Then an overview follows of characteristics of recent relevant activities. This leads to a section with possible solutions to the problems, particularly giving detailed descriptions of the implications of each of 3 identified options. Finally, the

[1] Draft minutes, Appendix A: "*Proposals and suggestions from reflections over NKS future directions by owners and board members" dated 17 January 2018 including "Conclusions – NKS Board 18 January*".
[2] "Reflections on prioritized areas", discussion note from the NKS Chairman to the NKS Board by email, 15 Feb. 2018.

changes required in connection with the recommended option are outlined together with those required from each of the two alternatives.

Current status:

NKS Guidance documents and texts

In the current NKS-R Framework, the research area 'Decommissioning, including decommissioning waste' is exemplified by the following topics:

- Decommissioning and dismantling of research reactors
- Involvement of the Nordic stakeholders
- Legal requirements in the Nordic countries on decommissioning projects
- Experiences from decommissioning projects

In the corresponding NKS-B Framework the research area 'W: Waste and Discharges' is exemplified by these topics:

- Waste and discharges from decommissioning activities
- Cost assessments of decontamination measures and remediation
- NORM waste from uranium mining and milling
- Interventions and clean-up operations
- Disposal of radioactive sources

There is an apparent overlap between R and B when it comes to waste from decommissioning, since there is an NKS-R area labelled 'Decommissioning, including decommissioning waste' but 'waste and discharges from decommissioning activities' is used as an example for B-activities in the area of 'W: Waste and Discharges'.

Moreover, the NKS-B programme comprises 'measurement strategy, technology and quality assurance' (e.g., 'radionuclide analytical techniques and intercomparisons') focusing on measurement processes rather than measurement purposes (which may for example be classification of decommissioning waste).

The following text related to decommissioning is taken from the NKS-B Framework:

'Issues related to decommissioning of nuclear installations will require increased attention in years to come. In this process, radioactive waste will be generated and in some cases releases of radioactivity may occur. Measurement, management and monitoring issues relating to decommissioning waste can be complex and require specialised developments. During the last 30 years or so, significant amounts of experience and knowledge regarding consequences of radioactive discharges, fallout and environmental radioactivity have been gained. The research has to a large extent focused on the behaviour of a few important radionuclides. This competence and knowledge must be maintained and further developed to include a wider range of relevant radionuclides'.

In the NKS-R Framework, the following text is found:

'Priority is given to activities in the area of operational reactor safety. Other operational or economic issues should be given lower priority. Ongoing national and international research (and cooperation with such programmes) will also be taken into account in assessing activities.

The nuclear industry and nuclear authorities have a number of current challenges that are of particular interest under the NKS-R programme. These include safety aspects of the modernisation of old plants, harmonisation of safety requirements and standards, power uprates, ageing issues, decommissioning and dismantling, waste disposal and new nuclear facilities'.

These categorisations and texts have not in the past led to conflicting treatments or questions from the applicant community, although they seem to have remained rather unchanged over more than 10 years. In connection with CfP2018 new interpretations of the unclear texts arose among the applicants (together with new proposal coordinators). The CARBTECH proposal on carbon-14 radiochemistry and measurement in connection with decommissioning was originally submitted to NKS-R, but the indicated research area was 'measurement strategy' which belongs to the NKS-B programme (neither NKS-R nor NKS-B supported the financing of this proposal).

The CfP 2018 proposal COCOS, on corrosion of copper canisters for repository of waste fuel, was submitted to NKS-B but not considered eligible since there were only two Nordic countries involved. Therefore, it was hastily resubmitted to NKS-R for evaluation under 'decommissioning incl. decommissioning waste'. The reviewers of NKS-R argued that this proposal belonged to the B programme under the 'waste management' heading, since it was dealing with another type of waste than decommissioning waste. However, historically a wider definition of waste has been applied in the NKS R programme (see below) and it can be discussed whether a proposal dealing with management of fuel waste from the nuclear industry belongs in the B programme.

Recent relevant NKS activities

The decommissioning related activities that have run in NKS over at least the latest 8 years seem to have largely fallen in two categories:

(i) B activities on **measurement** of 'difficult to measure' radionuclides, which particularly pose a problem in relation to decommissioning waste exemption procedures, some of which may equally well be used for other purposes such as emergency management, and some of which are directed more specifically at radionuclides and materials relevant to decommissioning.

(ii) R activities on essentially **all other** aspects of decommissioning than radionuclide analysis (over decades, the number of such activities has actually been rather limited, but both activity categories would be expected to increase in number with the current increasing interest for decommissioning issues).

Over the same period there has only been one proposal to NKS-B under the waste and discharges heading (SAFEBORE in CfP2018), and this was not funded, as some NKS reviewers found that the scope lay outside the working area of NKS.

A total of eleven activities on 'difficult to measure' radionuclides have run in the latest eight years. All proposals were submitted to NKS-B ('measurement strategy, technology and quality assurance') and all activities ran under NKS-B. A look at the organisations that have participated in these (Table 1) confirms that many of the organisations involved generally have much greater experience in measuring radionuclides than in decommissioning operations. By far most of the activities have been led by DTU.

Table 1. Organisations participating in min. 2 of the 11 'difficult-to-measure' NKS-B activities 2011-2018

Organisation	Number of activities
DTU	11
STUK	6
SSM	5
FOI	5
IFE	5
U. Helsinki	4
NMBU	3
NRPA	2
ALS Scandinavia	2
NPP's	2

It should also be noted that a search in the NKS report base under 'NKS-R decommissioning' shows some 50 NKS-R reports. About 40 of these are from the 1980's and 1990's and were made under a research area simply called 'waste'. The reports in this area deal with many types of waste, low and medium level waste, final repositories and sometimes include waste fuel and reactor waste from operation. A search under 'NKS-B decommissioning' shows 30 reports (dating back to 1993). The essential topic in all these is measurement techniques. A search under the NKS-B research area 'Management of radioactive waste and discharges' shows only 3 reports (2 old reports on measurement techniques and one more recent report on non-nuclear waste management – the task commissioned in 2015 by the Nordic Council of Ministers).

Possible solutions and their implications:

Various solutions to the problem may be envisaged:

One possible way of dealing with it, which has been suggested by VTT in a mail dated 12 February 2018, is that 'if the project aims at development of some new technology to be used e.g. in decommissioning, it should be part of the NKS-R. But, if the project aim is that it applies some already existing knowledge to solve some e.g. decommissioning procedure or process that has already radiation safety aspects, it should then be part of NKS-B'. However, it may well prove difficult for an applicant to judge, for example, which measurement techniques can be considered to be new and existing technology in this context. A very careful and more nuanced wording would be needed, and it seems currently not clear how to make the cut.

Another concern in setting the border between the two programmes in relation to decommissioning and waste treatment is that the distribution between proposals in NKS R and NKS B should ideally reflect the

available funding for each programme area. As shown in Table 2, we currently have an almost exact balance (over the latest 5 years) between the numbers of proposals received for each programme. The NKS-R activities are generally a bit more expensive, which means that a bit fewer R activities than B activities can actually be financed.

Table 2. Amounts of money applied for and number of NKS-R and NKS-B proposals 2014-2018

	MDKK applied for		Number proposals		Funded proposals		Budget, MDKK	
	R	B	R	B	R	B	R	B
2014	9.0	8.2	17	18	9	12	3.75	4.5
2015	7.8	5.1	16	13	8	10	3.4	3.4
2016	8.5	6.8	20	19	8	9	3.5	3.5
2017	6.9	6.4	14	16	7	8	3.1	3.1
2018	8.4	7.9	15	17	6	8	3.0	3.25
SUM	40.6	34.4	82	83	38	47	16.75	17.75

To clarify things and avoid confusion in the future, without affecting the balance that we have, three options were considered and analysed:

OPTION 1.

- Under the NKS-B heading 'Measurement strategy, technology and quality assurance' we add the following example: ***'techniques related to analysis of radionuclides in decommissioning waste samples'***. The expertise, both in terms of proposal applicants and reviewers, is here on the NKS B side.
- The NKS-R area 'Decommissioning, including decommissioning waste' becomes '***Decommissioning and reactor waste management (excluding measurements)***'. Decommissioning waste management (e.g., dimensioning of barriers) should be considered part of the nuclear energy production cycle and thus logically placed under the NKS-R programme. By adding 'reactor' this comprises both waste from decommissioning and fuel waste, but not waste that does not arise as an implication of nuclear power production. The COCOS proposal showed that fuel waste management proposals may be expected, although it was the first in recent times.
- As for the NKS-B heading 'Management of radioactive waste and discharges', no such activity has run in the latest 8+ years. There are five example points given in the framework program of what this heading comprises. These are: (i) Waste and discharges from decommissioning activities, (ii) Cost assessments of decontamination measures and remediation (iii) NORM waste from uranium mining and milling, (iv) Interventions and clean-up operations and (v) Disposal of radioactive sources. The first point is moved to the NKS-R programme. As for the 2nd point, cost assessments of decontamination measures and remediation, and the 4th point, interventions and clean-up operations, these are traditionally covered under emergency preparedness, and should really not be addressed in isolation (many NKS activity examples). If these are excluded (and we include TENORM in-line with the comments from SIS at the January meeting) we are left with **'management of non-nuclear radioactive waste including NORM/TENORM and disposal of radioactive sources'**, which could not possibly be confused with NPP waste management under NKS-R.

OPTION 2.
This option would be to include 'Decommissioning waste' in the B-area 'W: Waste and Discharges'. By doing so, all activities related to waste and analytical measurements would be covered by NKS-B. 'Decommissioning, except waste management and analytical measurements', would then belong to NKS-R. So far, the only thing that makes option 2 different from option 1 is that it places decommissioning waste repository construction and operation under NKS-B. Option 2 however so far does not implicitly offer a solution to the problem on where to place fuel waste management proposals. Placing this in the NKS-B programme together with all other waste management issues may look tempting, as it makes 'smooth' headings, but does construction and maintenance of facilities for nuclear fuel waste and decommissioning waste really belong in the NKS-B programme?

OPTION 3.
This option would be to have all activities related to decommissioning within NKS-R, including decommissioning waste and analytical measurements connected to decommissioning. NKS-B would then comprise 'measurement strategy, technology and quality assurance (except that related to decommissioning)'. Other waste issues would then still be associated with NKS-B ('NORM/TENORM waste management and disposal of radioactive sources'). It should be noted that as some measurement techniques may be used both in radioecological/emergency preparedness studies and in decommissioning studies, there may still be proposals that fall in both the R and the B area. Again, fuel waste management would need separate handling under a new area of the NKS-R programme. It should also be noted that this option, moving 'decommissioning waste measurement' proposals from NKS-B to NKS-R would be expected to increase the number of NKS-R proposals and equally reduce the number of NKS-B proposals, which is perhaps not what we need at this time.

Recommendations:

In short, the recommendation is to implement *Option1*:

(i) Changing the NKS-R work area 'Decommissioning, including decommissioning waste' to 'Decommissioning and reactor waste management (excluding measurements)'.
(ii) Clarifying in the framework text that the NKS-B work area 'Measurement strategy, technology and quality assurance' also comprises measurements on decommissioning waste samples.
(iii) Changing the NKS-B work area 'Management of radioactive waste and discharges' to 'management of non-nuclear radioactive waste including NORM/TENORM and disposal of radioactive sources'.

Alternatively, *Option 2* would be:

(i) Changing the NKS-R work area 'Decommissioning, including decommissioning waste' to 'Decommissioning excluding waste management and analytical measurements'
(ii) Including decommissioning waste in the NKS-B area.

(iii) Either creating a new NKS-R work area on fuel waste management, or putting fuel waste management under the same NKS-B heading as all other types of waste.

Option 3 would involve:

(i) Changing the NKS-B work area 'Measurement strategy, technology and quality assurance' to 'Measurement strategy, technology and quality assurance (excluding that related to decommissioning)'.
(ii) Including analytical measurements for decommissioning, as well as decommissioning waste management, in the NKS-R decommissioning work area.
(iii) Changing the NKS-B work area 'Management of radioactive waste and discharges' to 'NORM/TENORM waste management and disposal of radioactive sources'.
(iv) Creating a new NKS-R work area on fuel waste management.