DRAFT

NKS(14)3
2014-05-14

Agenda for the board meeting in Copenhagen 10 June 2014

Place:
Park Inn by Radisson Copenhagen Airport, Engvej 171, DK-2300 København S

Time: 10:30 to 15:00

1 Opening

2 Practical remarks
- Meeting secretary.
- Information from chairman and host.

3 Approval of the agenda

4 Minutes of the last board meeting (Reykjavik 13 and 14 January 2014)
- See draft minutes NKS(14)1 dated 2014-02-18.
- Review, discussion and decision.

5 Accounts 2013
- See distributed material: Financial Statements 2013, NKS(14)2 and Long-Form Audit Report, both dated 2014-03-19.
- Presentation by the auditor and the secretariat, discussion and decision.

6 Financial status for the current year
- See distributed material: Financial status report and financial programme specification, both dated 2013-05-26.
- Presentation, discussion.

7 News since last board meeting

- Report from the owners group.
- News from the board members' organisations.
- Administrative news.

8 R-part: status

- See material from Karin Andgren: status report May 2014.
- Presentation by the programme manager.
- Discussion.

9 B-part: status

- See material from Kasper Andersson: status report May 2014.
- Presentation by the programme manager.
- Discussion.

10 NKS seminar on current trends in nuclear and radiological safety 2016

- Presentation by the coordination group.
- Discussion.

11 Information activities

- The website, NewsLetters, NewsFlashes etc.
- New pamphlet.
- NKS and social media – SOME.
- Article for Radiation Regulator.
- Discussion.

12 Research activities in 2015

- Call for Proposals.
- Preliminary budget 2015.
- Funding 2015.
- Discussion, decision.

13 Other issues

- Translation of Bo Lindell's books.
- Request from the Nordic Council of Ministers.
- Elforsk seminar.
- Any other business.

14 Next meeting

- Next meeting will be in January 2015 in Helsinki.

15 End of meeting

DRAFT
NKS(14)1
2014-02-18

Minutes of the board meeting in Reykjavik 13 and 14 January 2014

Present: Sigurður M. Magnússon (chairman), Jorma Aurela, Ole Harbitz, Steen Hoe, Finn Ugletveit, Nici Bergroth, Kaare Ulbak, Jens-Peter Lynov, Annelie Bergman, Olga German, Lars Gedda, Kaisu Leino, Karin Andgren, Kasper Andersson and Finn Physant (meeting secretary).
Apologies: Tarja Ikäheimonen, Timo Vanttola, Eva Simic and Atle Valseth.

1 Opening

The chair (and host) opened the meeting and welcomed all the participants. A special welcome was given to the new R-part programme manager Karin Andgren, Vattenfall and Lars Gedda, SSM, who in this meeting replaced Eva Simic due to her maternity leave. The chair asked Lars Gedda to pass on the best wishes to Eva Simic from the board.

2 Practical remarks

Practical remarks about the meeting were given by the chair. Finn Physant was appointed meeting secretary.

3 Approval of the agenda

The agenda was approved. The chair suggested that the second meeting day from start should focus on programme status, new activities and budget decision (items 8 to 10). All other agenda items should be handled in the agreed order from the beginning of meeting day one. Everyone agreed to this.

4 Minutes of last board meeting (Copenhagen, 28 May 2013)

The minutes were approved.

5 News since last board meeting

a. Presentation of the new R-part programme manager Karin Andgren, Vattenfall
Olga German presented and introduced to the board the new programme manager. Karin Andgren is working in Vattenfall's Radiation Protection Department as a R&D Engineer. Karin Andgren has a masters degree in engineering physics and a PhD in nuclear physics from KTH in Stockholm.

b. Report from owners group meeting
There has been no owners group meeting since the last board meeting.
c. News from board members' organisations
The members informed during dinner each other about relevant news.
d. Administrative news
Finn Physant informed the board that during the CfP 2014 the question had been asked if non-Nordic organisations could receive NKS funding. The coordination group has reacted by introducing the following sentence in the "Handbook for NKS applicants and activity leaders": "Activities involving cooperation with non-Nordic participants with own funding are welcomed". – Olga German wanted this sentence to state that it is possible for projects involving non-Nordic partners among others, to obtain NKS funding, but on conditions of their work is funded 100% from own budget. In other words, NKS accepts non-Nordic partners in projects, but will not finance their contribution. Other board members wanted this sentence to state that it is impossible for non-Nordic organisations to obtain NKS funding. – After some discussion it was concluded that the coordination group shall consider the sentence for the next board meeting. It was also concluded that the handbook should be updated so it is clear that the activity leader must come from a Nordic country (i.e. work for a Nordic organization).
The policy document "This is NKS" had been updated with some new 2013 figures and a new list of co-financiers. - Finn Ugletveit pointed out that the wording that NKS is an "..informal forum..." gives the reader a wrong impression of NKS. After some discussion it was concluded that the word "informal" shall be deleted and the coordination group shall consider the consequences for the wording in "This is NKS" for the next board meeting.
In connection with the start up of Karin Andgren as R-part programme manager a new pamphlet will be published soon. – Nici Bergroth wants more links to be included in the new pamphlet for instance in order to facilitate the access to the relevant documents for new activity applicants. The coordination group took note of this.
Finn Physant noted that the "NKS Administrative Handbook" is still valid and fully updated. The handbook will be updated if needed.

6 Financial status

Finn Physant presented the distributed material: Financial status report and financial programme specification, both dated 16 December 2013. The reserve just before the end of the fiscal year 2013 end of this month (January 2014) was estimated to approximately 2.93 MDKK. – The board took note of the positive financial situation.

7 Agreements

The following agreements were prepared for the board's decision:
-B-part programme manager 2014 with DTU Nutech
-secretariat until 30 June 2015 with FRIT and
-auditing for the accounts of 2013 with Dansk Revision.
All these agreements were approved.
The agreement for the R-part programme manager 2014 with Vattenfall is still under preparation and expected to be finalised soon by the contractual Swedish parties.

8 R-part: status and new activities

Kaisu Leino presented the status of the ongoing activities. All projects are progressing well. All 2013 activities have been started mainly on schedule. 9 final reports have been published

since the last board meeting. 3 seminars have been carried out in 2013 and one more is due in January 2014. Of the 10 activities granted in 2013 there were 5 new and 5 continued activities.
Karin Andgren presented the evaluation results and funding recommendation for CfP 2014 – a total of 17 proposals were received. After some discussion the board agreed to fund the following activities in 2014 (all amounts in kDKK):

DIGREL	300
ENPOOL	650
HUMAX	500
L3PSA	300
DECOSE	500
Nordic-Gen4	200
DPSA	400
ProCom	600
ATR	300

The total budget for these 9 activities is 3750 kDKK.

9 B-part: status and new activities

The PC-B presented a status report for ongoing activities. The activities are progressing well. All activities started before 2012 are finalised. Of the 2012 activities 7 of 9 are completed – the THYROID and PUBLUME activities are delayed. The 2013 activities are progressing as planned except one. 4 seminars have been carried out in 2013.
The PC-B presented the evaluation results and funding recommendation for CfP 2014 – a total of 18 (of them 1 continued) proposals were received. After some discussion the board agreed to fund the following activities in 2014 (all amounts in kDKK):

NORCON	600
FAUNA	260
NORMIN	450
MOBELRAD	510
GAMMAUSER	370
NOVE	330
RAPID-TECH	350
THYROIDSEM	230
SEMUNARS	200
STANDMETHOD	350
CONCORE	400
EFMARE	450

The total budget for these 12 activities will be 4500 kDKK. A special remark about the NORCON activity was expressed by the board: we are aware that SSM is concerned due to the involvement of Vattenfall in the project. Therefore the NKS board requests the project group to ensure that the roles and responsibilities in the project do not compromise the results to be achieved. Furthermore the board reserved 120 kDKK for the possibility that STUK becomes a NORCON participant.
The PC-B also presented the PC's answers to questions raised at the last board meeting:

a. It had been proposed to have activity specific presentations during future board meetings. The PC's suggestion was to test this proposal during the next board meeting in June 2014. The only concern expressed by the PC's to this was the possible prolongation of ½-1 hour of the meetings. The matter was discussed and the chair concluded that this question would not be taken any further. Furthermore the chair concluded that the time has come to consider the possibility of a joint R- and B-seminar with a large number of activity specific presentations. The coordination group will consider this and report back to the board at its next meeting.
b. The PC's were asked to look into the possibility of having training courses as activities. The PC's answered that the possibility already is present, and that such courses/workshops already have been part of earlier activities. Also if the board or PC's see the need for such activities, this may be addressed in CfP's or following board decisions.

10 Budget for 2014

Finn Physant presented the distributed budget proposal of 2 January 2014 from the coordination group. – All contributions were noted to and confirmed by the owners' and co-financiers' representatives. Ole Harbitz confirmed that the NRPA funding for 2014 contribution will increase and be 1.275.000 NOK. The budget approved by the board is attached in appendix A.

11 Information activities

Finn Physant informed the board about the status of the new website, which was opened in May 2012, NewsLetters etc. The new website is still considered quite flexible and user friendly (especially this was the fact for carrying out the Fukushima seminar in 2013). User statistics have now been obtained for more than a year and were presented. After some discussion about the interpretation of the statistics, it was decided to continue obtaining this. Five NewsFlashes and one NewsLetter have been distributed since the last board meeting including news on CfP 2014, new reports, upcoming seminars etc. There is now a list of more than 480 e-mail adresses, to which the electronic letters are sent. A new and updated version of the pamphlet "Nordic Nuclear Safety Research" will be published soon.
Three articles published in "Radiation Regulator" in 2013 and one abstract prepared for ICRER 2014 had been presented as meeting material for the board.
The work of promoting NKS through social media so far carried out by Kaisu Leino will now be taken over by Karin Andgren.

12 Other issues

a. The chair informed the board about the good progress of the translation of Bo Lindell's books. The first volume of four has been successfully translated.
Kasper Andersson informed the board about a proposal forwarded to NKS from the Nordic Council of Ministers (NCM). As agreed at the meeting between representatives of NCM and NKS at Risø on 2 December 2013, the proposal for NKS to execute a project to identify possible needs for further Nordic collaboration on radioactive waste issues (explicitly excluding wastes from the nuclear industry and emergencies) was presented to the board. The board in general responded positively to the proposal, which was considered interesting. After some discussion, however, the board agreed that the matter would be more suitable for the directors of the Nordic radiation safety authorities to address. The chair offered to convey the proposal to the group of directors, of which

the chair also is a member. If the decision of the group of directors is positive, a possible outcome could be that specialists representing the authorities in each Nordic country meet and provide an overview of the national situations and discuss whether there are needs for further collaboration. If needs are identified, proposals for new collaboration plans on specific sub-topics will be outlined. On the background of the results of the meeting, a short recommendation report will be written, including the national accounts as an appendix.

b. Karin Andgren informed the board that she had been contacted by Elforsk and asked if NKS would be interested in carrying out a seminar in co-operation with Elforsk. The topic should be possible research activities to be carried out at Barsebäck (before it is decommissioned). The board expressed its interest and Karin Andgren will obtain more information and report back at the board's next meeting.

c. A concern had been raised from the Norwegian board members that the share of continued NKS activities compared to new activities could become so big that it could become almost impossible in some years to get new activities started. This has in the latest years been more pronounced on the R than on the B side where only 1 out of 18 proposals for CfP 2014 was for a continued activity. However, leaders of 7 of the 12 B activities funded in 2014 have indicated that they will apply for continued financing in 2015. Following the limited number of good proposals for CfP 2013, it could also be seen as an asset (rather than a problem) for NKS to know in advance that some of the consortia supported in 2014 will send in an application for continued work in 2015. It was noted that ambitious activities may require more than one year to fulfil all objectives, but a final report for each activity year must always be submitted as stated in the "Handbook for NKS Applicants and Activity Leaders". This handbook makes it clear that "NKS contracts are generally for one year's work, and further continuation of activities is subject to submission and approval of a new proposal". There is thus by no means any guarantee that funded proposals will be continued the following year. There should always be open competition between "new" and "continued" proposals. In order to facilitate this, it was recognised that it is necessary to require that projects extending over more than one year, are planned and conducted in such a way that activities the first year produce distinct and discrete deliverables. The PC's will consider if text changes are needed in the call for proposals and/or the instructions for applicants (and elsewhere) before the next board meeting in June 2014.

13 Next meeting

Next meeting will be in Copenhagen 10 June 2014.

14 End of meeting

Many thanks for a good meeting were expressed by the chairman. Many thanks, with all the best wishes for the future, were given to Kaisu Leino for her co-operation and contributions to the work of the NKS.

Sigurður M. Magnússon
Chairman

Finn Physant
Meeting secretary

Appendices:
A: Budget decision for 2014
B: Actions from the board meeting

Appendix A - NKS budget decision for 2014 - 14 January 2014

Budgets	**Budget for 2014**	**Budget for 2014**	**Budget for 2013**
	EUR	**DKK**	**DKK**
R-part			
Activities	502.661	3.750.000	3.950.000
Fee PC	64.341	480.000	470.000
Travels PC	6.702	50.000	100.000
Coordination	6.702	50.000	100.000
Young scientists' travel	6.702	50.000	100.000
R total	**587.108**	**4.380.000**	**4.720.000**
B-part			
Activities	603.193	4.500.000	2.415.000
Fee PC	64.341	480.000	470.000
Travels PC	6.702	50.000	100.000
Coordination	6.702	50.000	100.000
Young scientists' travel	6.702	50.000	100.000
B total	**687.640**	**5.130.000**	**3.185.000**
Translation project			
Translation project	20.000	149.206	149.208
Translation total	**20.000**	**149.206**	**149.208**
Common			
Common various according to specification	33.511	250.000	250.000
Common total	**33.511**	**250.000**	**250.000**
Others			
Fee Secretariat	84.447	630.000	615.000
Fee Chairman incl. travels	60.319	450.000	440.000
Travels Secretariat	1.340	10.000	10.000
Others total	**146.107**	**1.090.000**	**1.065.000**
TOTAL	**1.474.365**	**10.999.206**	**9.369.208**
Expected incomes according to app. 1	**1.187.202**	**8.856.885**	**9.230.566**
Surplus	**-287.163**	**-2.142.321**	**-138.642**

Any deficits to be covered by the reserve available for the board, which according to the financial status report of 16 December 2013 is: ca. 2.930.000 DKK. Funding reserved for use in 2013, but not used, will amount to ca. 550.000 DKK. - Loss due to the development in exchange rates 2013-14: ca. - 450.000 DKK.

Old reservations from before 2010, not used, amount to ca. 250.000 DKK. Total reserve end of January 2014: ca. 1.140.000 DKK or ca. 153.000 EUR.

Specification of "Common" for 2014

	2014	**2014**	**2013**
	EUR	**DKK**	**DKK**
Common			
Reports, materials etc.	3.854	28.750	30.000
Postage, fees	1.005	7.500	7.500
Equipment	2.011	15.000	15.000
Internet	12.064	90.000	90.000
Auditing, consulting	7.875	58.750	57.500
Information material	4.021	30.000	30.000
Various expenses	2.681	20.000	20.000
Common total	**33.511**	**250.000**	**250.000**

Appendix 1 for budget decision 2014

Pledge for funding in 2014 - Incomes

	Budget for 2014	Budget for 2014	Actual for 2013
	EUR	**DKK**	**DKK**
SSM	509.628	3.801.980	3.964.870
TEM	340.000	2.536.502	2.536.536
BRS	57.400	428.221	428.227
GR	24.000	179.047	179.050
NRPA	151.319	1.128.885	1.270.875
Total EUR / DKK	**1.082.347**	**8.074.635**	**8.379.558**

SSM contribution SEK	4.550.000
NRPA contribution NOK	1.275.000

	EUR	**DKK**	**DKK**
Fortum	24.500	182.777	175.319
TVO	24.500	182.777	175.319
Fennovoima	7.500	55.952	52.223
IFE	11.500	85.793	85.795
KSU	0	0	90.868
Forsmark	12.770	95.268	95.269
Ringhals	12.000	89.524	89.525
OKG	12.085	90.158	86.690
Total EUR / DKK	**104.855**	**782.250**	**851.008**
Complete EUR / DKK	**1.187.202**	**8.856.885**	**9.230.566**

Exchange rates 2013/14:

NKS 2014:	
DKK	100,0000
EUR	7,4603
NOK	0,8854
SEK	0,8356
NKS 2013:	
SEK 2013	0,8714
EUR 2013	7,4604
NOK 2013	1,0167

Appendix B

Actions from the board meeting
(if nothing else is mentioned to be taken by the coordination group and reported back at the board's next meeting):

A. Ref. item 5: the sentence ”Activities involving cooperation with non-Nordic participants with own funding are welcomed” to be considered in the handbook for applicants and elsewhere. The handbook should also be updated so it is clear that the activity leader must come from a Nordic country (i.e. work for a Nordic organization).
B. Ref. item 5: the consequences of deleting ”informal” to be considered for the wording in ”This is NKS”.
C. Ref. item 5: new pamphlet to be published with more links.
D. Ref. item 9: the possibility of a joint R- and B-seminar to be considered.
E. Ref. item 12: Kasper Andersson will notify NCM about the board's response to NCM's proposal forwarded to NKS.
F. Ref. item 12: Karin Andgren will obtain more information about the Elforsk seminar.
G. Ref. item 12: the PC's will consider if text changes are needed in the call for proposals and/or the instructions for applicants and elsewhere to clarify the question concerning ”new” and ”continued” activities before the next board meeting in June 2014.

The Secretariat

2014-03-19
NKS(14)2

Financial statements

for

The Nordic Nuclear Safety Research Programme
NKS Secretariat

2013

19 March 2014
Finn Physant
FRIT

Statement by Management

The NKS Secretariat and Group of Owners have discussed and approved the annual report of The Nordic Nuclear Safety Research Programme (in the following referred to as 'NKS') for the financial year 1 January 2013 - 31 December 2013.

In our opinion, the financial statements provide a true and accurate picture of the organisation's assets, liabilities and equity, financial position as at 31 December 2013 and the results of the organisation's activities for the financial year 1 January 2013 - 31 December 2013.

In our opinion, the management's review includes a fair review of the matters dealt with in the management review.

We recommend the financial statement for approval by the Group of Owners.

Roskilde, 19 March 2014

NKS Secretariat:

Finn Physant

Copenhagen, 10 June 2014

Group of Owners:

Sigurður M. Magnússon
Chairman

Steen Cordt Hoe

Jorma Aurela

Ole Harbitz

Lars Gedda

Independent Auditors' Report

To the group of owners of NKS

Report on the Financial Statements

We have audited the financial statements of NKS for the financial year 1 January to 31 December 2013, which comprises accounting policies, income statement, balance sheet and notes, including Financial Programme Specifikation. The financial statements are presented in accordance with the agreements and the accounting policies, which is decided by the Management, and which is described at page 5.

Management's responsibility for the financial statements

The Management is responsible for the preparation of financial statements that give a true and fair view in accordance with the agreements and the accounting policies, which is decided by the Management. The Management is also responsible for such internal control as the Management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error, and selecting and applying an adequate accounting policies and the making of accounting estimates which are reasonable under the circumstances.

In addition, Management is responsible for the transactions covered by the financial statements are consistant with the contribution, laws and other regulations, agreements and generally accepted practices.

Auditor's responsibility and basis of opinion

Our responsibility is to express an opinion on the financial statements based on our audit. We conducted our audit in accordance with International Standards on Auditing and additional requirements under Danish Audit regulation as well as the public accepted auditing standards. This requires that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatements of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to NKS's preparation of financial statements that give a true and fair view. In order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of NKS's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by the Management, as well as the overall presentation of the financial statements.

The audit also involves an evaluation whether there are established procedures and internal controls that support the transactions, covered by the financial statements, which are consistant with the contribution, laws and other regulations, agreements and the accounting policies, which is decided by the Management.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

The audit has not resulted in any qualification.

Independent Auditors' Report

Opinion

In our opinion, the financial statements give a true and fair view of NKS's financial position at 31 December 2013 and of the results of NKS's operations for the financial year 1 January to 31 December 2013 in accordance with the agreements and the accounting policies, which is decided by the Management.

It is also our opinion that there are established procedures and internal controls that supports that the transactions are subject to the financial statements are consistent with the contributions, laws and other regulations, agreements and the accounting policies, which is decided by the Management.

Statement on the management's review

We have read the Management's review. We have not performed any further procedures in addition to the audit of the financial statements. On this basis, it is our opinion that the information provided in the Management's review is consistent with the financial statements.

Roskilde, 19 March 2014

Dansk Revision Roskilde
Godkendt revisionsaktieselskab

Palle Sundstrøm
Partner, State-Authorised Public Accountant

Statement by Management

2013 has been characterised by planned work/operation of the R (Reactor)-part and the B (Emergency Preparedness)-part.

In the course of 2013, the currency market for the Norwegian and Swedish currency has developed in a negative direction in comparison with the Danish currency and the EURO. The total foreign exchange loss at the end of the year is at DKK 476,203 / EURO 63,832.

The financial statements are presented in DKK, but the amounts are also stated in EURO in a separate column.

The financial statements show a profit of DKK 435,341 / EURO 58,354, which is consistent with decisions taken by the Board.

Subsequently, the equity as at 31 December 2013 constitutes DKK 9,213,842 / EURO 1,235,050.

In assessing the year's profit and equity as at 31 December 2013, consideration must be made of the contracts for the R and B parts of DKK 6,041,481 / EURO 809,817, where invoices have not yet been received or where the work has not yet been completed.

It may also be indicated that NKS in accordance with programme managers' statements has received external funding of around DKK 13,9 mio. / EURO 1,86 mio. in the form of un-charged contributions. The external funding is the work performed in connection with the implementation of activities for which invoices will not be sent.

Unused coordination and travel funds for programmes for the year 2012 are returned to the reserve as are unused common programme costs for a total of DKK 890,531 / EURO 119,369.

Sigurður M. Magnússon
Chairman

Accounting policies

The financial statements are presented in accordance with the agreements and the accounting policies, which is decided by the Management.

The financial statements are presented in accordance with the same accounting policies as last year.

Recognition and measurement
The association uses the ”open post”-principle, which means, that all expenses, which is paid in the period 1/2-2013 - 31/1-2014, are included in the financial statements.

Conversion of foreign currencies
Transactions in foreign currencies are in the course of the year translated to the exchange rate at the beginning of the financial year. Giro and bank accounts, receivables and payables in foreign currencies, are translated at the exchange rates at the balance sheet date.

Realised and unrealised exchange differencies are recognised in the income statement as financial income or financial expences.

The income statement

Revenue recognitions
Income include grants for the financial year from the owners and the additional funding.

Expenses
Expenses include paid expenses for the financial year’s approved projects for respectively the R- and the B-part, including common program expenses and travels, activity supports and fees. The association is not taxable for VAT and therefore the expenses of the association are recognized including VAT.

Interest income + other income - exchange adjustments
Interest income + other income - exchange adjustments include interest income and exchange rate adjustments.

Income taxes
The association is not liable to pay tax.

Balance sheet

Cash and cash equivalents
Cash and cash equivalents include bankdeposit in giro and bank accounts in Denmark, Finland, Norway and Sweden.

Received prepayments
Received prepayments are measured at the exchange rates at the balance sheet date.

Income statement 2013

				Rate
Grants and interest income				**7,4603**
Beredskabsstyrelsen DK	DKK	428.226,96	EURO	57.400,77
Arbets- och näringsministeriet FI	DKK	2.536.536,00	EURO	340.004,56
Geislavarnir ríkisins IS	DKK	179.049,60	EURO	24.000,32
Statens strålevern NO	DKK	1.270.875,00	EURO	170.351,73
Strålsäkerhetsmyndigheten SE	DKK	3.964.870,00	EURO	531.462,54
Additional funding	DKK	851.007,83	EURO	114.071,53
Distinct contribution	DKK	0,00	EURO	0,00
Interest income + other income - exch.adjustments	DKK	-396.074,27	EURO	-53.090,93
Total grants and interest income	**DKK**	**8.834.491,12**	**EURO**	**1.184.200,52**
Expenses				
R-Part	DKK	4.429.829,99	EURO	593.787,11
B-Part	DKK	2.526.294,93	EURO	338.631,82
Activity support	DKK	199.897,59	EURO	26.794,85
Fees	DKK	1.048.100,00	EURO	140.490,33
Common program expenses	DKK	188.271,79	EURO	25.236,49
Travels	DKK	6.755,91	EURO	905,58
Total expenses for the NKS programme	**DKK**	**8.399.150,21**	**EURO**	**1.125.846,17**
Income - Expenses	**DKK**	**435.340,91**	**EURO**	**58.354,34**

Balance sheet 2013

Assets:				**Rate**
				7,4603
Giro and bank accounts converted to DKK, Note 1				
DK/IS-giro 918-9297	DKK	969.756,36	EURO	129.988,92
FI-giro 800015-70837915	DKK	3.999.445,05	EURO	536.097,08
NO-giro 7874.07.06976	DKK	1.572.784,94	EURO	210.820,60
SE-giro 6 64 63-1	DKK	5.294.000,29	EURO	709.622,98
Giro and bank accounts total	DKK	11.835.986,64	EURO	1.586.529,58
Total Assets	**DKK**	**11.835.986,64**	**EURO**	**1.586.529,58**

Liabilities:				
Equity:				
Retained from previous years	DKK	8.778.501,38	EURO	1.176.695,49
Result of this year	DKK	435.340,91	EURO	58.354,34
Total equity	**DKK**	**9.213.842,29**	**EURO**	**1.235.049,84**
Statement for new financial year, Note 2	DKK	2.622.144,35	EURO	351.479,75
Total Liabilities	**DKK**	**11.835.986,64**	**EURO**	**1.586.529,58**

Notes

					Rate
Note 1:	**Giro and bank accounts:**				7,4603
	DK/IS-giro 918-9297:				
	Holding 31.01.2014	DKK	969.756,36		
	Holding	DKK	969.756,36	EURO	129.988,92
	FI-giro 800015-70837915				
	Holding 31.01.2014	EURO	536.097,08		
	Exchange equalisation		3.463.347,97		
	Holding	DKK	3.999.445,05	EURO	536.097,08
	NO-giro 7874.07.06976				
	Holding 31.01.2014	NOK	36.269,71		
	Giro deposits 31.01.2014		1.740.085,54		
	Exchange equalisation		-203.570,31		
	Holding	DKK	1.572.784,94	EURO	210.820,60
	SE-giro 6 64 63-1:				
	Holding 31.01.2014	SEK	6.335.567,60		
	Exchange equalisation		-1.041.567,31		
	Holding	DKK	5.294.000,29	EURO	709.622,98
	Total	**DKK**	**11.835.986,64**	**EURO**	**1.586.529,58**

Note 2: **Payment regarding the new financial year from <u>Arbets- och näringsministeriet, FI</u> and <u>additional funding from IFE, NO</u>:**

Owner contribution for 2014 - Paid 31.01.2014

Additional funding for 2014 - Paid 31.01.2014

Notes

Financial programme specification
31 January 2014

	DKK							EURO	Rate 7,4603	
Total	Budget from 12	Returned 12	Budget 13	Total budget 13	Payments made	Contracts signed	Rest budget	Payments made	Contracts signed	Rest budget
R-Part	2.343.131 1)	-256.881	4.720.000	6.806.250	4.429.830	2.125.732	250.688	593.787	284.939	33.603
B-Part	4.083.916	-574.444	3.185.000	6.694.472	2.526.295	3.915.749	252.428	338.632	524.878	33.836
Activity support	140.176	-535	149.208	288.849	199.898	0	88.951	26.795	0	11.923
Fees	-7.000	7.000	1.055.000	1.055.000	1.048.100	0	6.900	140.490	0	925
Common programme exp.	65.203	-65.203	250.000	250.000	188.272	0	61.728	25.237	0	8.274
Travels	468	-468	10.000	10.000	6.756	0	3.244	906	0	435
I alt	6.625.894	-890.531	9.369.208	15.104.571	8.399.151	6.041.481	663.939	1.125.846	809.817	88.996
	F_1	F_2	F_3	F	G	H_1	H_2	G	H_1	H_2

$F_1 + F_2 + F3 = F$

$F - G = H = H_1 + H_2$

1) In the budget 2012 figure of DKK 2.343.131 for the R-Part, an amount of DKK 100.000 of the B-Part's budget is included in the budget for the RASTEP activity.

Notes

Detailed financial programme specification
31 January 2014

	DKK							EURO	Rate 7,4603	
Specifikation:	Budget from 2012	Returned 2012	Budget 2013	Total budget 2013	Payments made	Contracts signed	Rest budget	Payments made	Contracts signed	Rest budget
R-Part: Common program.	396.970	-171.970	670.000	895.000	719.143	0	175.857	96.396	0	23.572
Activities	1.861.250	0	3.950.000	5.811.250	3.685.518	2.125.732	0	494.017	284.939	0
Travel young scientists	84.911	-84.911	100.000	100.000	25.169	0	74.831	3.374	0	10.031
B-Part: Common program.	409.931	-184.931	670.000	895.000	230.515	470.000	194.485	30.899	63.000	26.069
Preparedness	1.534.468	0	570.000	2.104.468	578.473	1.525.995	0	77.540	204.549	0
Measurement	1.125.004	0	965.000	2.090.004	1.014.250	1.075.754	0	135.953	144.197	0
Radioecology	505.000	0	880.000	1.385.000	661.000	724.000	0	88.602	97.047	0
Waste	120.000	0	0	120.000	0	120.000	0	0	16.085	0
CfP 2011 rest.	300.000	-300.000	0	0	0	0	0	0	0	0
Travel young scientists	89.513	-89.513	100.000	100.000	42.057	0	57.943	5.637	0	7.767
Website renewal	535	-535	0	0	0	0	0	0	0	0
Fukushima	139.641	0	0	139.641	50.690	0	88.951	6.795	0	11.923
Translation project	0	0	149.208	149.208	149.208	0	0	20.000	0	0
Fee Secretariat	-7.000	7.000	615.000	615.000	608.100	0	6.900	81.511	0	925
Fee Chairman incl. travels	0	0	440.000	440.000	440.000	0	0	58.979	0	0
Reports etc.	21.170	-21.170	30.000	30.000	12.708	0	17.292	1.703	0	2.318
Postage etc.	3.295	-3.295	7.500	7.500	9.250	0	-1.750	1.240	0	-235
Equipment	15.000	-15.000	15.000	15.000	0	0	15.000	0	0	2.011

Notes

	DKK							EURO	Rate 7,4603	
Specifikation:	Budget from 2012	Returned 2012	Budget 2013	Total budget 2013	Payments made	Contracts signed	Rest budget	Payments made	Contracts signed	Rest budget
Internet	5.469	-5.469	90.000	90.000	71.328	0	18.672	9.561	0	2.503
Auditing	0	0	57.500	57.500	57.500	0	0	7.707	0	0
Information material	7.535	-7.535	30.000	30.000	30.259	0	-259	4.056	0	-35
Various	12.734	-12.734	20.000	20.000	7.227	0	12.773	969	0	1.712
Travels Secretariat	468	-468	10.000	10.000	6.756	0	3.244	906	0	435
Diff.	0	0	0	0	-1	0	1	0	0	0
Total	6.625.894	-890.531	9.369.208	15.104.571	8.399.150	6.041.481	663.940	1.125.846	809.817	88.996
	F_1	F_2	F_3	F	G	H_1	H_2	G	H_1	H_2

$F_1 + F_2 + F3 = F$ $F - G = H = H_1 + H_2$

Dansk Revision Roskilde
Godkendt revisionsaktieselskab
Køgevej 46A
DK-4000 Roskilde
roskilde@danskrevision.dk
www.danskrevision.dk
Telefon: +45 44 53 77 44
Telefax: +45 44 53 77 04
CVR: DK 14 67 80 93
Bank: 9173 4783 428768

The Nordic Nuclear Safety Research Programme (NKS)

Long-form audit report of 19 March 2014 regarding Financial Statements for 2013

Long-form audit report of 19 March 2014 regarding Financiel Statements for 2013

Contents

Long-form audit report of 19 March 2014 regarding Financiel Statements for 2013

1 Audit of the financial statements

1.1 Introduction

As the appointed auditors for The Nordic Nuclear Safety Research Programme (NKS), we have audited the financial statements for the financial year 1 January 2013 - 31 December 2013 prepared by the NKS Secretariat.

The financial statements show the following results, assets and equity:

DKK / EUR	Current year	Last year
Result for the year	435,341 / 58,354	638,255 / 85,552
Equity	9,213,842 / 1,235,050	8,778,501 / 1,176,680

1.2 Conclusion on the executed audit - auditor's report

The audit performed has not given rise to significant remarks to the financial statements.

If the financial statements are carried in the existing form and if further, significant information does not appear during management's processing, we will provide the financial statements for 2013 with an unmodified audit opinion.

The audit has not included the management's review, but we have read through the management's review. This has not given rise to remarks. On this background, it is our opinion that the information in the management's review is in accordance with the financial statements.

1.3 Scope and execution of the audit

The purpose, planning and execution of the audit, the auditor's responsibility and reporting as well as the board's responsibility have remained unchanged, which is why we refer to our letter of engagement dated 30 March 2011.

As preparation for the audit of the financial statements for 2013, we have discussed the expectations to the financial development for 2013 with the Secretariat, including risks related to the association's activities. We have, furthermore, discussed risks connected to the presentation of accounts and the initiatives the board has initiated for the management hereof.

On this background, we have prepared our auditing strategy with a view to targeting our work at significant and areas of risk. We have identified the following items and areas to which, according to our opinion, special risks of significant errors and insufficiencies in the financial statements are associated:

- Grants
- Project expenses
- Giro and bank accounts
- Equity

Long-form audit report of 19 March 2014 regarding Financiel Statements for 2013

On other areas, the risk of error in the financial statements is assessed as normal and the execution of the audit has therefore had a lesser scope.

The audit was executed with a view to verifying whether the information and amount specifications in the financial statements are correct. Analyses, review and assessment of administrative procedures, internal control systems and control procedures have been performed as well as a review and assessment of bookkeeping items and documentation for this.

The audit has also included an assessment of whether the prepared financial statements fulfil the auditing regulations of legislation and articles of association. In this regard, we have assessed the selected accounting policy, the board's accounting opinion as well as, moreover, the information submitted by the board.

Furthermore, the audit has been planned and executed in accordance with the international auditing standards as well as generally accepted government auditing standards and, in addition to the financial audit, it also includes a review and assessment of whether due financial considerations have been taken with the administration of the funds covered by the accounts.

During the execution of the financial audit, we have checked whether the accounts are without significant errors and insufficiencies. We have also checked the financial statements' agreement with the underlying bookkeeping records as well as the financial statements' concordance with laws and regulations as well as with commenced agreements and the accounting policies, which is decided by the Management.

The performance audit has been executed as an integrated and parallel part of the financial audit and, among other things, has included random reviews of agreements and contracts, reports, analyses of expense and income items as well as an analysis of budget deviations.

The audit has been executed in connection with the preparation of the financial statements.

2 The executed audit

2.1 Administration

Similar to last year, The NKS Secretariat is managed by FRIT ApS.

Agreement has been entered into on an extension of the agreement until 30 June 2015.

2.2 Attestation procedures

We have performed a follow-up on NKS Secretariat's procedures and internal controls regarding attestation procedures and have found reason to state the following:

Long-form audit report of 19 March 2014 regarding Financiel Statements for 2013

Project expenses

We checked on a sample basis whether the supporting documentation is duly approved by the programme manager or by chairman, Sigurður M. Magnússon. This review has not given rise to any comments.

In addition, we have established that the Secretariat regularly sends programme status to the programme managers. The programme status is forwarded approximately every second month and at the latest on 31 January 2014. The programme status includes, for example, a ledger card for project expenses so that the programme manager can see the individual payments on the project for the current year.

Secretariat expenses

Remuneration for the Secretariat is controlled as per agreement and to the minutes of the board meeting. We checked on a sample basis whether the invoices has been approved by Sigurður M. Magnússon. This review has not given rise to remarks.

2.3 Authorisation to sign

The accounts manager, Finn Physant, owner of FRIT ApS, and chairman, Sigurður M. Magnússon, have authority to make withdrawals on NKS' giro and bank accounts jointly or individually together with Claus Rubin, who is a consultant for FRIT ApS.

Our assessment is that the above terms and conditions for authorisation to sign, in consideration of the few staff members, is appropriately organised.

2.4 Use of IT

In connection with our audit, we have performed a general review and assessment of the association's administrative use of IT, including of system, data and operation security.

Our assessment is that the association is dependent on IT in the daily business processes. However, the association's use of IT is not assessed as being a risk.

2.5 Non-corrected misstatements

Pursuant to the international auditing standards, we must account for non-corrected misstatements that are not insignificant, to the association's senior management.

We can inform, that we have asked the NKS Secretariat to make one single correction to the draft for the financial statements. The correction was related to an exchange rate adjustment at DKK 25,265.

So all amount errors and insufficiencies in the financial statements are corrected in cooperation with the NKS Secretariat.

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2.6 Discussions with management on fraud

During the audit we have enquired the Secretariat about the risk of fraud and the Secretariat has informed us that according to their assessment, there is no particular risk that the financial statements can contain significant erroneous information as a result of fraud.

The Secretariat has, furthermore, reported that they do not have knowledge of fraud or investigations in progress for assumed fraud.

During our audit we have not established conditions that could indicate or arouse suspicion of fraud of significance to the information in the financial statements.

3 Comments to the audit and financial statements 2013

For the individual items in the income statement and balance sheet we can supplement the presented financial statements for the year 2013 with the following:

3.1 Additional financiers

The additional financiers stated in the income statement may be analysed as follows:

	2013	2012	2011
Fortum Power and Heat Oy, Finland	175,319	167,270	162,804
TVO, Finland / Teollisuuden Voima Oyj, TVO	175,319	167,270	162,804
Fennovoima Oy, Finland	52,223	52,039	52,180
Forsmarks Kraftgrupp AB, Sweden	95,269	92,184	84,086
Kärnkraftsäkerhet och utbildning (KSU), Sweden	90,868	87,909	80,135
OKG Aktiebolag, Sweden	86,690	83,857	84,086
Ringhals AB, Sweden	89,525	87,909	80,135
IFE, Norway	85,795	81,776	80,135
Total additional financiers	851,008	820,214	786,365

The additional financiers are in accordance with the supporting documentation.

3.2 Interest income, exchange rate adjustments and other income

The item can be specified thus:

	2013	2012	2011
Interest income	80,129	114,601	124,641
Exchange rate adjustments	-476,203	231,168	-72,519
	-396,074	345,769	52,122

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The exchange rate adjustments are mainly the result of foreign currency amounts being registered at the rate on 31 December 2012 throughout 2013. This gives deviations between the utilised rate and the actual rate.

We can report that the principle used does not affect the overall results, but just the allocation of the individual items in the income statement.

3.3 Budget balances brought forward from one year to the next

In the financial survey for 2013, budget figures for all expenses are specified. In addition, an amount transferred from 2012 of, in total, DKK 5,735,363 - cf. the accounts pages 9 to 11, first two columns.

We draw attention to the fact that the remaining budget for joint programme expenses and joint trips, similar to previously, have not been transferred from 2012 to 2013 and are thus transferred to NKS' equity (reserve).

It is furthermore noted that the coordination and travel expenses as well as activity expenses granted to the programme managers for the year 2013 that are not used/allocated similar to last year will be transferred to equity. Thus, only the allocated activity expenses for R Part and B Part will be transferred from the one year to the next.

4 Performance audit

In accordance with generally accepted government auditing standards, we checked, for a number of selected areas, whether NKS has established business processes to ensure appropriate management of allocated funds. We performed our audit procedures to obtain limited assurance as to whether the management is conducted in a financially appropriate manner and whether the performance numbers disclosed are documented and adequate to cover NKS' operations in 2013.

According to our information, the grants (except for the grants contributed by Fortum Power and Heat Oy and TVO) are not earmarked for specific projects but for NKS' programmes as such. Based on this information, our audit was conducted on the basis of NKS' activities as a whole. During our audit, we checked that the grants from Fortum Power and Heat Oy and TVO have been employed as intended.

During our audit, we established that expenses incurred relate to individual projects and that the supporting documentation is duly approved. We noted that the programme and Secretariat budgets are kept. Finally, we checked on a sample basis whether reports have been prepared for completed projects.

As part of the performance audit, we must check whether the individual projects could be carried out in a more economical manner / efficiency. During our audit, no matters have come to our attention that cause us to believe that this is the case. However, we must state that our lack of technical expertise within nuclear safety means that we do not have the possibility to comment on this.

Long-form audit report of 19 March 2014 regarding Financiel Statements for 2013

4.1 Management of funds

We have previously recommended the placement of available funds in another way than in giro accounts in order to achieve greater rate of return.

The year's interest income is calculated at TDKK 80, which is a reduction of TDKK 35 compared to 2012. This is due to a reduction in the interest rate percentage and in the length of the period of commitment. On the date of the presentation of accounts, the rate of return on available cash accounts is the following:

Danske Bank, DK	0% p.a. on the entire deposit
Danske Bank, FI	Between 0.0% - 0.3% p.a. depending on the size of the deposit
DnB NOR, NO	Between 0.0% - 3.0% p.a. depending on the size of the deposit
Nordea, SE	Between 0.0% - 0.8% p.a. depending on the size of the deposit

4.2 Agreement between bookkeeping records and financial statements

We noted that there is agreement between the performed bookkeeping and the prepared financial statements for the year 2013.

Similar to previous years, all deposits and payments in January 2014 have been included in the accounts as if they were settled before 31 December 2013. This utilised accounting policy does not affect the accounting result. Only the size of the cash available, receivables and debt are affected.

5 Statutory information, etc.

We have ascertained that on all essential areas, the association complies with the Danish Bookkeeping Act, including regulations on the storage of accounting records.

It is our opinion that the requirements of legislation on bookkeeping and storage of accounting records have been complied with. We have furthermore agreed that our archive material will be stored for 10 years after the expiry of the relevant financial year.

6 Economic crime

In accordance with the Danish Act on Approved Auditors and Audit Firms, we are obliged to check whether any management member has committed significant economic crime and under certain circumstances we must report our findings to legislative and enforcing authorities (primarily the Serious Economic Crime Squad).

During our audit we have not come across conditions or indications that any management member have committed economic crimes.

Long-form audit report of 19 March 2014 regarding Financiel Statements for 2013

7 Other tasks

In this financial year we have provided the following other services to NKS:

- Assistance with the preparation of the financial statements

A fee for the audit of the financial statements has been agreed on, including assistance with the preparation of the financial statements, participation in accounting meetings and in board meetings as well as the translation to English of the accounts and long-form audit report, in the amount of DKK 47,000 excl. VAT. The amount has not been allocated as debt in the presented accounts.

8 Statements in connection with the audit

8.1 The managements representation letter

As part of the audit of the financial statements, we have obtained confirmation from management of the financial statements' completeness, including that they contain all information on mortgages, guarantees, related parties, court cases, events after the balance sheet date as well as other complex auditable areas.

Management has further declared that all errors that have been presented to management are rectified in the financial statements. We have ascertained that the rectifications are included.

8.2 Auditor's statement

In compliance with the law regarding the approved auditors and audit firms, we state that:

- We comply with the statutory requirements for independence, and
- during the audit carried out, we have received all the information we have requested.

Roskilde, 19 March 2014

Dansk Revision Roskilde
Godkendt revisionsaktieselskab

Palle Sundstrøm
Partner, state-authorised Public Accountant

Presented at the board meeting on 10 June 2014

Sigurður M. Magnússon — Steen Cordt Hoe — Jorma Aurela
Chairman

Ole Harbitz — Lars Gedda

Financial status - 26 May 2014

Incomes DKK

Expected incomes this year	8.856.885	A = B + C
Received until now	8.491.330	B
Additional payments	365.555	C
Cash balance	12.642.986	D
Available funds	13.008.541	E = C + D

Budget and expenses DKK

Total budget incl. transfer from earlier years	16.793.058	F = G + H
Paid until now	5.044.910	G
Rest budget incl. contracts	11.748.148	H

Available DKK

Reserve available for the board	1.260.393	I = E - H

Financial programme specification - 26 May 2014

	DKK							EURO		Rate 7,4603
Total	Budget from 13	Returned 13	Budget 14	Total budget 14	Payments made	Contracts signed	Rest budget	Payments made	Contracts signed	Rest budget
R-Part	2.376.420	-250.688	4.381.000	6.506.732	2.413.409	3.473.232	620.091	323.500	465.562	83.119
B-Part	4.168.177	-501.057	5.130.000	8.797.120	1.778.724	6.868.396	150.000	238.425	920.659	20.106
Activity support	88.951	-88.951	149.206	149.206	0	0	149.206	0	0	20.000
Fees	6.900	-6.900	1.080.000	1.080.000	757.500	0	322.500	101.537	0	43.229
Common programme exp.	61.728	-61.728	250.000	250.000	93.621	0	156.379	12.549	0	20.961
Travels	3.244	-3.244	10.000	10.000	1.656	0	8.344	222	0	1.118
I alt	6.705.420	-912.568	11.000.206	16.793.058	5.044.910	10.341.628	1.406.520	676.234	1.386.221	188.534
	F_1	F_2	F_3	F	G	H_1	H_2	G	H_1	H_2

$F_1 + F_2 + F3 = F$

$F - G = H = H_1 + H_2$

Detailed financial programme specification - 26 May 2014

	DKK							EURO	7,4603	
Specifikation:	Budget from 13	Returned 13	Budget 14	Total budget 14	Payments made	Contracts signed	Rest budget	Payments made	Contracts signed	Rest budget
R-Part: Common program.	175.857	-175.857	580.000	580.000	9.909	0	570.091	1.328	0	76.417
Activities	2.125.732	0	3.751.000	5.876.732	2.403.500	3.473.232	0	322.172	465.562	0
Travel young scientists	74.831	-74.831	50.000	50.000	0	0	50.000	0	0	6.702
B-Part: Common program.	664.485	-194.485	580.000	1.050.000	0	950.000	100.000	0	127.341	13.404
Preparedness	1.525.995	-138.629	1.800.000	3.187.366	618.000	2.569.366	0	82.838	344.405	0
Measurement	1.075.754	-110.000	1.800.000	2.765.754	407.250	2.358.504	0	54.589	316.141	0
Radioecology	724.000	0	900.000	1.624.000	753.474	870.526	0	100.998	116.688	0
Waste	120.000	0	0	120.000	0	120.000	0	0	16.085	0
Travel young scientists	57.943	-57.943	50.000	50.000	0	0	50.000	0	0	6.702
Fukushima	88.951	-88.951	0	0	0	0	0	0	0	0
Translation project	0	0	149.206	149.206	0	0	149.206	0	0	20.000
Fee Secretariat	6.900	-6.900	630.000	630.000	307.500	0	322.500	41.218	0	43.229
Fee Chairman incl. travels	0	0	450.000	450.000	450.000	0	0	60.319	0	0
Reports etc.	17.292	-17.292	28.750	28.750	8.797	0	19.953	1.179	0	2.675
Postage etc.	-1.750	1.750	7.500	7.500	2.124	0	5.376	285	0	721
Equipment	15.000	-15.000	15.000	15.000	0	0	15.000	0	0	2.011
Internet	18.672	-18.672	90.000	90.000	26.917	0	63.083	3.608	0	8.456
Auditing	0	0	58.750	58.750	43.750	0	15.000	5.864	0	2.011
Information material	-259	259	30.000	30.000	12.033	0	17.967	1.613	0	2.408
Various	12.773	-12.773	20.000	20.000	0	0	20.000	0	0	2.681
Travels Secretariat	3.244	-3.244	10.000	10.000	1.656	0	8.344	222	0	1.118
Diff.	0	0	0	0	0	0	0	0	0	0
Total	6.705.420	-912.568	11.000.206	16.793.058	5.044.910	10.341.628	1.406.520	676.234	1.386.221	188.535
	F_1	F_2	F_3	F	G	H_1	H_2	G	H_1	H_2

$F_1 + F_2 + F3 = F$ $F - G = H = H_1 + H_2$

nks

nordic nuclear safety research

DENMARK FINLAND ICELAND NORWAY SWEDEN

A common Nordic view

Nordic problems need Nordic solutions. NKS aims to facilitate a common Nordic view on nuclear safety and radiation protection including emergency preparedness. This requires common understanding of rules, practice and measures, which may vary between countries, as well as with time. The work builds on a foundation of over sixty years of Nordic collaboration on related issues. Non-Nordic participation may be allowed under certain circumstances. Please contact the secretariat for information.

Securing Nordic competence and knowledge building

Through collaborative NKS activities, Nordic competence and capabilities are maintained and strengthened, and solutions to Nordic problems are disseminated through a sustained informal network. NKS publications are available cost-free on the internet. A special effort is made to engage young scientists and students, to ensure knowledge and expertise for the future.

Strengthening response capacities

By maintaining vital informal networks between Nordic authorities, nuclear power companies, scientists and other stakeholders, the region's potential for a fast, coordinated and targeted response to urgent issues is strengthened. Thereby, problems can be tackled quicker, more efficiently and consistently and at lower cost than if they needed to be addressed on a national scale.

Addressing current societal questions

NKS keeps an open eye to societal changes and events that might influence requirements and perception of nuclear safety, radiation protection and emergency preparedness in the Nordic countries. For instance the Fukushima accident prompted the arrangement of an NKS joint reactor safety and emergency preparedness seminar on lessons learned and future implications for Nordic society.

NKS activities

These can take the form of research activities, test exercises or information collation/review exercises. Alternatively they can aim to harmonize approaches to common problems or spread and distribute knowledge and results through seminars, workshops and educational/training courses. Common to all NKS activities is that the results should be beneficial and made available to concerned end users in all Nordic countries. Aspects of nuclear safety, radiation protection and emergency preparedness may be combined in one activity.

Research areas

Areas of interest covered by NKS activities fall under two main programmes, NKS-R and NKS-B, which cover the following specified research areas.

NKS-R programme:

- Thermal hydraulics
- Severe accidents
- Risk analysis & probabilistic methods
- Organizational issues and safety culture
- Decommissioning
- Plant life management and extension

NKS-B programme:

- Emergency preparedness
- Measurement strategy, technology and quality assurance
- Radioecological assessments
- Wastes and discharges

nks

Nordic nuclear safety research

Some recent examples of NKS activities

Addressing off-site consequence criteria using Level 3 PSA

The Level 3 Probabilistic Safety Analysis (Level 3 PSA) activity is seeking to deepen Nordic understanding about the merits and limitations of probabilistic off-site consequence analysis for nuclear facilities. Risk metrics including health, environmental, and economic effects have been studied in the first year of the activity. The aim is to produce a guidance document for Level 3 PSA (NKS-R L3PSA).

Maximizing human performance in maintenance

Maintenance is a key safety function in any complex sociotechnical system, such as a nuclear power plant. Human performance tools are often used to prevent human errors. How well do these tools perform in reducing the number of maintenance-related errors? This activity will provide knowledge of the impacts of the human performance programmes and support the implementation of effective human performance tools in Nordic NPPs (NKS-R HUMAX).

Novel neutron detection methods for nuclear security

The activity compares conventional and novel techniques for detection of neutrons. Neutron detection capabilities in Nordic organizations have been analysed, and measurements have been performed in special field conditions. The activity thus provides a knowledge building platform and compares experimental results obtained with different techniques (NKS-B NOVE).

Consequences of severe radioactive releases to Nordic marine environment

The potential consequences of hypothetical accidental releases to the Baltic sea and the North Atlantic ocean were modelled. The highest estimated annual doses from consumption of sea food (from a local area) were found to potentially amount to tens to hundreds of millisieverts. Contributions from Cs-134, Cs-137 and I-131 were estimated to constitute some 96 % of this dose (NKS-B COSEMA).

How to apply

Nordic companies, authorities, organizations and researchers can submit proposals for NKS activities under the NKS-R and NKS-B programmes. Usually at least three of the five Nordic countries should participate in an activity. Activities submitted under annual calls for proposals are assessed according to criteria important to the objectives of NKS, with final funding decisions made by the NKS board.

Do you have suggestions for a nuclear safety or radiation protection related activity? Contact us via www.nks.org

Financing of NKS activities

NKS is mainly financed by Nordic authorities, with additional contributions from Nordic organizations that have an interest in nuclear safety. The budget for NKS in 2013 exceeded 9 million Danish kroner (€ 1.2 million). In addition to the funding sought from NKS, participating organizations are asked to provide a similar amount of in-kind contributions. This may take the form of working hours, travel expenses or laboratory resources. Without these in-kind contributions it would not be possible to carry out NKS activities.

Main financiers

- Danish Emergency Management Agency
- Ministry of Employment and the Economy, Finland
- Icelandic Radiation Safety Authority
- Norwegian Radiation Protection Authority
- Swedish Radiation Safety Authority

Co-financiers

- Fennovoima Oy, Finland
- Fortum Power and Heat Ltd, Finland
- TVO, Finland
- Institute for Energy Technology (IFE), Norway
- Forsmark Kraftgrupp AB, Sweden
- OKG AB, Sweden
- Ringhals AB, Sweden

The NKS website

On the NKS website (www.nks.org) information is available on funding opportunities, travel support for young scientists, current activities and upcoming seminars. Presentations from seminars held are available for download as are reports from all completed NKS activities. It is also possible to discover more information on NKS and the history of Nordic co-operation in nuclear safety. You can also reach the NKS website using the QR code.

How to apply for NKS funding

NKS email list

NKS sends out newsflashes and newsletters throughout the year providing information on call for proposals, upcoming seminars and published reports. If you wish to join the NKS email list please sign up at www.nks.org or scan the QR code.

NKS Mobile Reports

All NKS reports from all completed activities can be reached conveniently also with your mobile devices at mobile.nks.org or simply by scanning the QR code.

Contact

If you wish to learn more about NKS and NKS activities visit our website or contact the NKS secretariat.

nks@nks.org

Telephone +45 4677 4041

NKS Secretariat

P.O. Box 49

DK-4000 Roskilde, Denmark

Karin Andgren, NKS-R programme manager

Kasper Grann Andersson, NKS-B programme manager

Sigurður M Magnússon, NKS chairman

Finn Physant, NKS secretariat

nks

Nordic nuclear safety research

Reactor tank with fuel at Ringhals nuclear power plant, reactor 1. Photo: Börje Försäter

This is NKS

Nordic Cooperation Forum

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. It 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. The work is financed and supported by Nordic authorities, companies and other organisations. The results which should be practical and directly applicable are used by participating organisations in their decision making processes and information activities.

The Nordic Approach

The Nordic region comprises five countries, i.e., Denmark (including the Faroe Islands and Greenland), Finland, Iceland, Norway and Sweden. Building on the foundation of a common cultural and historical heritage and a long tradition of collaboration, NKS aims to facilitate a common Nordic view on nuclear and radiation safety. A common understanding of rules, practice and measures, and national differences in this context, is an essential requirement. Through collaborative efforts problems may be tackled quicker, more efficiently, more consistently, and at a lower cost.

Why Nordic Cooperation on Nuclear and Radiological issues?

One reason to maintain this collaboration between the Nordic countries is the common challenges in relation to nuclear installations. While nuclear power plants are in operation in Finland and Sweden, research reactors have been operated in Denmark, Finland, Norway and Sweden. Clearly, exchange of operational expertise and new ideas can be beneficial. Some of the Nordic research reactors have been closed down and the experience gained in subsequent decommissioning may be useful in connection with the planned decommissioning of Swedish nuclear power reactors. Also knowledge exchange between Sweden's nuclear fuel production plant and other Nordic nuclear installations may be beneficial. The Fukushima accident highlighted the need for an effective operational emergency preparedness for accidents at nuclear installations. By continuously improving detection, response and decision aiding tools while maintaining an informal collaborative network between relevant stakeholders in the Nordic countries, the capacity and capability to respond optimally to an emergency is enhanced. Experience has shown that nuclear and radiological challenges to society are far from static, and the response systems require continuous development. Radiological issues need to be addressed coherently and effectively in the Nordic countries, and some of these are on the NKS agenda. They range from exposure to naturally occurring radioactive material in the environment to the threat of malicious use of radioactive material. In addition to the NKS cooperation there is an extensive co-operation between the Nordic radiation safety authorities regarding general radiation safety issues.

Nordic and International Benefits

NKS with its program for nuclear safety including emergency preparedness is of common benefit for all five Nordic countries. The hallmark of NKS is a spirit of sharing – all results are available free of charge on the NKS web site (www.nks.org), not only to the NKS family but also worldwide providing an international benefit of the NKS work. When quoting NKS material, a reference to the source will be appreciated.

Two Program Areas

NKS activities are divided into two program areas:
NKS-R: Reactor physics and safety; Nuclear power plant life management and extension; Decommissioning and handling of generated waste; Organisational issues.
NKS-B: Nuclear and radiological emergency preparedness; Measurement strategy, technology and quality assurance; Radioecology and environmental assessments; Management of radioactive waste and discharges.

Owners and Financiers of NKS

The owners and main financiers are:
Danish Emergency Management Agency (DEMA, Denmark)
Ministry of Employment and the Economy (TEM, Finland)
Icelandic Radiation Safety Authority (GR, Iceland)
Norwegian Radiation Protection Authority (NRPA, Norway)
Swedish Radiation Safety Authority (SSM, Sweden)

The co-financiers are:
Fennovoima Oy (Finland)
Fortum Power and Heat Ltd. (Finland)
TVO (Finland)
Institute for Energy Technology (IFE, Norway)
Forsmark Kraftgrupp AB (Sweden)
OKG AB (Sweden)
Ringhals AB (Sweden)

Financial Contribution

In 2013 the contributions of the owners and additional financiers exceeded 9 million Danish crowns (1.2 million euros). To this should be added contributions in kind by participating organizations, worth approximately the same amount, without which this program would not be possible.

Nordic nuclear safety research

NKS(14)4
2014-05-09

HANDBOOK FOR NKS APPLICANTS AND ACTIVITY LEADERS

May 2014

TABLE OF CONTENTS

1 INFORMATION FOR APPLICANTS

1.1 Who can apply?

Organisations such as universities, research centres, institutes and companies in the Nordic countries can apply for NKS funding for research activities. The activity should involve 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. Please contact the secretariat for information. The activity leader must come from a Nordic country (i.e. work for a Nordic organisation).

1.2 What kind of work would be funded?

NKS funds work related to nuclear safety, including emergency preparedness, radioecology, measurement strategies and waste management, considered to be of importance to the Nordic community. The work should be of interest to the owners and financing organisations of NKS. The results must be of relevance, e.g., practical and directly applicable. The work can be in the form of scientific research, including experimental work, or joint activities producing seminars, workshops, courses, exercises, scientific articles, technical reports and other type of reference material. Examples of research topics can be found in the NKS-R framework document http://www.nks.org/en/nksr/call_for_proposals/nks-r_framework_2013.htm and NKS-B http://www.nks.org/en/nksb/call_for_proposals/nks-b_framework_2013.htm.

1.3 Criteria for NKS activities

The entire NKS program as well as the various activities shall fulfil the following criteria:

- Demonstrated compatibility with the current framework program
- A clear Nordic added value, including
  - creating and maintaining Nordic networks
  - dissemination and increase of Nordic competence within the program area in question
- Current interest in and high international standard of the technical/scientific work
- Comprehensive and transparent activities open to the widest possible range of participants, including young scientists
- Active participation of organisations in at least three Nordic countries in all major activities (occasionally, two countries may be acceptable)
- Distinct and measurable goals
- Relevance to financiers and end users
- The practical results shall be presented
  - at conferences, seminars, workshops etc
  - in technical reports and scientific articles in refereed journals
  - as recommendations, manuals, handbooks, checklists
  - in electronic form such as DVDs, CD-ROMs, websites
  - in the form of educational and information material
- Results for NKS activities are publicly available for free

1.4 What do I have to do in return for the money

The activity partners are expected to report for the work carried out each year. The most common type of output is a scientific report at the end of the year. A report with clear results is requested even if the activity continues the next year. Other forms of reporting can be for example presentations and proceedings from a seminar. All material produced must be available for publishing on the NKS webpage, where they are free to be downloaded by anyone.

1.5 How is the money paid?

The NKS funding is granted for one year at a time. The first 50% of the contribution is paid when an activity is started and the rest 50% when the final results of one year's work are available. The first part of the funding can be invoiced when a contract has been made between NKS and the activity leader.

1.6 Working language

The main working language in NKS is English. Applications for NKS funding as well as final reports and other material should be submitted in English. However, each working group determines its own language for meetings.

1.7 How do I apply 1 – the need for Nordic partners and how to find them

It is up to the applicants themselves to find collaboration partners in the Nordic countries. The programme managers can help with getting into contact with Nordic organisations. NKS seminars are good places for networking. More information on ongoing research and all the published reports are available on the NKS website.

1.8 How do I apply 2a – the practicalities of applying

NKS funding is announced in the annual Call for Proposals. It is usually organised in September - October. All the necessary information, material and instructions are distributed on the NKS website. The Call for Proposals is also announced in the NKS electronic newsletter. The applicant is requested to fill in an application form. A voluntary annexe with further details about the proposal may also be handed in. Detailed instructions on how to fill in the application form will be available when the Call for Proposal opens. The applicant is encouraged to read these instructions carefully.

1.9 How do I apply 2b - budgets

The applicants are expected to demonstrate that at least half of the necessary funding of the activity in question will be supplied by the participating organisations. In other words, the participants are expected to put in the same amount of money in the project as they are applying from NKS. These contributions may be work hours, travel expenses, laboratory resources etc. and should be clearly specified in the proposal form.

Please note that all funding by NKS includes possible VAT

1.10 What happens next

The proposals received before the deadline are evaluated by the NKS board members. The board members have the right to use the help of external experts in the evaluation process if needed. Each

proposal will be given marks based on how well the proposal fulfils the NKS criteria. Based on the evaluation results and the available budget, the programme manager makes a suggestion for the next year's programme. The suggestion is discussed at the January board meeting and the final decision of successful applicants is made by the board. The applicants are informed of the outcome as soon as possible after the board meeting.

1.11 Useful links for applicants

NKS webpage
Information about NKS
Owners and supporting financiers of NKS
The NKS-B programme
The NKS-R programme
Information about the Call for Proposals, NKS-B programme
Information about the Call for Proposals, NKS-R programme
NKS Seminars
NKS Reports
Travel support for young scientists: NKS-B, NKS-R

2 INFORMATION FOR ACTIVITY LEADERS

2.1 Contract

The Activity Leader will shortly after the Board's grant decision receive a contract template from the manager of the relevant NKS Programme, which is to be filled in with information on the activity deliverables or stages of work to be done, *always* including the submission of a final activity report (normally by the end of the funding year). In the contract template, the Activity Leader must also include a budget for each of the various activity partners, in line with the Board's decision. The contract is valid when signed by an authorised representative of the Activity Leader's organisation and by the Programme Manager. The NKS Programme Manager will have provided the contract template with a reference number (format: AFT/{R or B}({year}) {serial number}). This reference number is the identifier of the activity, and must be stated in all official management documents concerning the project (contracts, invoices, etc.). Contracts are generally for one year's work, and further continuation of activities is subject to submission and approval of a new proposal.

2.2 Invoices

When the contract is duly signed by both parties, the Activity Leader should inform the participants that they can invoice NKS for 50 % of their total contractual amount. When the work has been completed and the final report of the activity has been approved by the Programme Manager, the Activity Leader should inform the participants that NKS can be invoiced for the remaining 50 % of the amount. All invoices are to be addressed to the NKS Secretariat, but mailed to the relevant Programme Manager (NKS-R or NKS-B).

2.3 Activity progress reporting and communication

If deviations are foreseen from the agreed activity work schedule, the Activity Leader must immediately notify the Programme Manager so that any problems may be solved and contingency plans implemented if necessary. On request, the Activity Leader is also obliged to inform the Programme Manager of the state of progress at various stages of the activity.

2.4 Progress documentation if applying for continued funding

If participants in an activity wish to apply for funding for continuation of the activity, they should document significant progress with the ongoing work well in time before the NKS Board receives the application for continuation. The progress could ideally be summarised and referred to by the Activity Leader in an annexe file to the new application.

2.5 Advertisement of dissemination activities

Events like seminars, workshops, courses and exercises connected to NKS activities need to be advertised timely and efficiently to be successful. NKS Programme Managers can help Activity Leaders in advertising these, e.g., through NewsFlashes sent to subscriber lists and posted on the NKS internet site http://www.nks.org/en/news/subscribe_to_our_newsletter/. It is however the responsibility of the Activity Leader and partners to plan and execute all aspects of the activities. Seminars should generally be open and not held exclusively for a closed circle of participants.

2.6 Travel support for dissemination activities

NKS particularly encourages participation of young scientists in NKS events to maintain a high level of competence in the longer perspective, and can offer travel support for this purpose (http://www.nks.org/en/nksr/travel_assistance/). All other costs for NKS in connection with NKS activities are to be covered by the amount approved in the contract.

2.7 Final reporting of the activity

All NKS activities, regardless of their nature, must produce a final report that should be in the standardised NKS report format (see template/instructions: report template). Note that Activity Leaders must also supply a filled-in bibliographic datasheet (http://www.nks.org/en/this_is_nks/administration/) together with the final report. Final reports from research activities or exercises aimed at filling knowledge gaps or developing methodologies should be in line with standards expected for scientific publications. Final reports from exercise activities in the form of intercomparisons or proficiency tests should seek to address any discrepancies or problems highlighted by the exercise, to increase knowledge and competencies where necessary. Final reports from seminar or workshop activities should take the form of conference proceedings, containing extended abstracts from each presenter as well as a final overview of any discussions and conclusions. Presentation slides should not be presented in final reports. Final reports for educational and training courses should contain all course documents presented as well as feedback from participants. The conclusion of any NKS activity (and thus the final payment) is subject to the approval of the final report by the Programme Manager. In addition to the final report, activity participants are urged to disseminate activity results (with due credit to NKS) in scientific journal articles as well as at conferences, seminars and workshops. The Programme Manager in charge of the activity should be notified of any dissemination efforts.

2.8 Internet hosting of NKS activity material

All final reports of NKS activities are hosted on the NKS internet site (http://www.nks.org/en/nks_reports/). In connection with NKS events like seminars and workshops it is encouraged that the Activity Leader seeks the permission of the participants to publish presentations (slides) on the NKS internet site (http://www.nks.org/en/seminars/presentations/presentations.htm). Also information on other available software (e.g., as downloads) or hardware generated by NKS activities can be hosted on the NKS internet site (http://www.nks.org/en/nksb/supporting_material/). For further information contact the relevant Programme Manager.

NKS(12)3
2012-05-03

Nordic nuclear safety research

NKS Administrative Handbook

Introduction

This is the NKS Administrative Handbook. The Handbook is aimed at the coordination group for internal programme use. The Handbook describes the most important administrative functions and procedures within the programme. The overall objective is to document the procedures of NKS so that continuation can be maintained. It is also the objective to ensure uniformly efficient routines and thereby a streamlined administration of all parts of the programme. The Handbook is intended as a reference work and as a source of answers to practical questions. The attachments include examples of various documents, etc. The current version of the Handbook will be available on www.nks.org and will be updated by the Secretariat as required. In addition to the Administrative Handbook, you find the general presentations of NKS on http://www.nks.org/en/this_is_nks/ and the pamphlet “nks”.

Content:

10 NKS websites

11 NewsLetters

12 Areas of responsibility and work

13 The NKS Calendar Year

Attachments

1. Bibliographic data sheet
2. Example of NKS report front page
3. Information on seminars
4. NKS agreement with programme Managers' organisations

4.1 Attachment to Programme Manager agreement

5. Practical information about call for proposals
6. Contract check list
7. Areas of responsibility and work
8. The NKS Calendar year

1. Working language

The NKS working language is English.

2. Reporting

Currently, NKS is running two programmes/major activities: the R (reactor safety) Programme and the B (emergency preparedness) Programme. It is given high priority that the activity reporting reaches the largest number of stakeholders possible. Reporting on the activities takes the form of final reports, technical reports and status reports made by the Programme Managers for the Board. The Programme Managers determine the form in which the activities are to be finally reported. All reports must be submitted in appropriate electronic format by the author to the Programme Manager, who approves and forwards the report to the Secretariat. A bibliographic data sheet must be filled in by the author and submitted together with the report (see Attachment 1).

All reports being published under the auspices of NKS should contain an acknowledgement by NKS of the financing and participating organisations/persons. This may be worded as follows:

Acknowledgment:
NKS conveys its gratitude to all organisations and persons who by means of financial support or contributions in kind have made the work presented in this report possible.

The name of all participating organisations must be set clearly on the title sheet.

All reports being published under the auspices of NKS must contain a disclaimer, which may be worded as follows:

Disclaimer:
The views expressed in this document remain the responsibility of the author(s) and do not necessarily reflect those of NKS. In particular, neither NKS nor any other organization or body supporting NKS activities can be held responsible for the material presented in this report.

2.1 Final activity reports

- All activities must culminate in a suitable final report.
- For major activities a separate final report must be published.
- The publication of the final report and a number of the activity's technical reports in appropriate media must be considered (primarily the NKS website). During the programme, the Programme Manager should therefore store all relevant contributions to allow such publications.

A general guide:

It is practical to prepare a preliminary table of contents for the final report at an early stage in the programme and to use this outline when deciding on programme initiatives.

Content and target group
In the final report, the results of the work should be presented to a professionally qualified circle of stakeholders and an Executive Summary should be included for readers with a general interest in NKS's areas of activity. It must also be possible to utilise the final report in the promotion of the programme's results and NKS's activities. The report must include a complete list of publications published since the start of the activity. The target group should be both as large and international as possible.

Language and wording
The report must be written in English and include a summary. The report should be written in clear language. If needed reports must be proofread. The costs must be covered by the programme and be included in the activity budget already at the planning stage.

Illustrations
Good illustrations increase interest in the report. It must be ensured that illustrations are understandable and of high (graphic) quality.

Library routines
Reports are provided with an ISBN number by the NKS Secretariat. The activity manager is responsible for ensuring that the author completes the bibliographic data sheet (Attachment 1).

Printing and international distribution
If a report is to be printed, the Secretariat will assist in this process. A print-ready manuscript must be submitted to the Secretariat.
Special distribution lists must be prepared for each report. The Programme Manager should prepare distribution lists for stakeholders internationally. The lists should include those responsible for activities, activity participants, participating institutions and organisations, end users, sponsors and other involved parties. The library/information department in the author's organisation may also contribute its own distribution list.

General distribution
The Secretariat takes care of mandatory submission to The Royal Library in Denmark which handles registration in the national Danish bibliography. An agreement has also been entered into with Risø DTU's library on the submission of NKS publications to appropriate international databases. All reports are uploaded to the NKS website where they are fully searchable and available for download in PDF format.

Electronic newsletters
Information on any reports is sent out in the form of *NewsLetters* and *NewsFlashes* – see Section 11.

Coverage in magazines

The author should ensure that the programme is covered in relevant magazines which should also provide information on where the reports can be found.

2.2 Technical reports, etc.

Technical reports should be published under the auspices of NKS, but may in exceptional cases be published as part of the performing organisation's own series of reports. Documents should contain a reference to the NKS programme and be given an NKS number (see below). The report should be given an NKS front page (see Attachment 2). The Programme Manager should approve the report.
All reports must include a bibliographic data sheet (Attachment 1) which is to be completed by the author.
Complete collections of the programme's working documents, scientific publications, lectures, etc. must be kept by the Programme Manager who determines which documents should also be held by the NKS Secretariat. These documents are sent to programme participants, the Chairman and other stakeholders as required.
Technical reports should usually – as agreed orally with the Secretariat – be published in the special 'NKS series'. Usually, they are only published in electronic format. If the Programme Manager decides, that this is appropriate, a technical report may also be published in printed form. If so, the print-ready manuscript must be distributed together with address lists and a covering letter signed by the Programme Manager. Printing and dispatch costs are to be covered by the programme. Additional copies may be kept by the Secretariat.
The NKS Secretariat provides all technical reports, etc. with an ISBN number.

2.3 Status reporting

The Programme Managers present status reports at the board meetings. Status reports must include:

- a comparison between plans and results with an explanation of any deviations
- financial reporting – budget and results
- list of reports, articles, etc. that have been published
- list of seminars, major meetings, etc.

Contributions must be submitted electronically in accordance with the NKS Secretariat directive.

3. Numbering and layout of NKS documents, reports and contracts

3.1 The numbering system

All final and technical reports must be published in a common, numbered series. Other relevant documents like evaluations, history documents, etc. will also be published in this series. The number of each report is allocated by the NKS Secretariat. The report number consists of the letters 'NKS' plus a serial number.

Example: NKS-1

A uniform numbering system for joint documents (Board agendas, minutes, etc.) help to provide an overview and to refer to or find earlier documents and papers. The document number consists of the letters 'NKS' plus year and serial number, e.g. NKS(12)2. Joint agreements and contracts relating to Programme Managers, Secretariat, accounting, etc. are numbered by the Secretariat, e.g. NKS/AFT(12)3.

R and B Programme contracts with participating organisations are to be numbered by the respective Programme Manager, e.g. NKS/AFT/B(12)4. Other documents are not covered by the numbering system, but should be carrying the NKS logo, which can be downloaded from http://www.nks.org/en/this_is_nks/administration/nks_logo_download.htm.

3.2 Layout and logo

As mentioned NKS's logo can be found on the NKS website http://www.nks.org/en/this_is_nks/administration/nks_logo_download.htm. It should be used where practically possible. Only the official NKS logo may be used. The NKS Board has decided that Arial should be used as the title font. A green cover may only be used for publications/documents numbered by the Secretariat – please contact the Secretariat.

Reports – a standard report front page must be used (see Attachment 2). This will be provided by the Secretariat and can be placed as an additional front page in reports being published in the institutions' own series of reports.

4. Meetings and minutes

4.1 Meetings

The owners meet as required. Board meetings are called by the Chairman. The Programme Managers and the Secretariat participate in board meetings to report on their activities. Invitations containing agenda proposals are sent out by the Secretariat. Board meetings are usually held twice a year (in January and in May or June).

Coordination meetings with participation of the Chairman, the Programme Managers and the Secretariat are usually held twice a year in November/December and April/May. Agenda proposal is sent out by the Secretariat. The main objects for these meetings are budget and activity proposals for the Board in November/December and activity status and finalisation of last year's accounts in April/May.

Programme meetings are prepared by the Programme Manager or by a person appointed by the Programme Manager. The Programme Manager sends out the agenda to participants.

4.2 Minutes

A notetaker from the Secretariat is appointed to take the minutes of the Board meetings. The minutes are sent to the members of the Board by e-mail no later than two weeks after the meeting, and the members of the Board should then comment on the minutes within another two weeks. Based on the comments, amendments to the draft are prepared by the Chairman and the notetaker, if needed. A silent procedure of two weeks for further comments involving all members is then carried out. Following the silent procedure the draft should be ready for uploading on the open website. The Board will be informed by the Secretariat when the draft has been uploaded. "Draft" will be erased, when the Board approves the minutes during the following meeting. The chairman and notetaker sign the original minutes which are archived by the Secretariat.

For coordination meetings a secretary is appointed to take the decision minutes and distribute them to the participants for approval.

For programme meetings a secretary can be appointed to take the minutes and distribute them to participants.

5. Seminars, activity meetings, etc.

Each programme should organise a suitable number of seminars. NKS seminars should usually be open and not held exclusively for a closed circle of participants. The person responsible for any seminar should ensure that it is advertised on the NKS website under News. Non-Nordic participants must be approved by the Programme Manager in advance.

Purpose
The purpose of the seminars is, for example, to give the Programme Managers the opportunity to present their results to a circle of specialists: programme participants, Nordic safety authorities and other stakeholders who are not themselves involved in the activities/programme.

Practical questions
Suitable time should be set aside for discussion. This can be achieved by the seminar running for more than one day. It should be agreed with the speakers how detailed their talks should be. A detailed timetable for the seminar should also be in place.

Finance
The NKS programmes may cover the travel costs, transport, hotel expenses, etc. of invited participants/guest speakers. As a rule, other participants cover their own travel expenses. If a participant fee is charged, it should be collected in advance. The fee may include accommodation, food, local transport and contributions to other expenses, e.g. documentation and preparatory work. For the programme seminars the Programme Manager has access to free funds from the coordination account.

The Secretariat is able to assist to some degree in the organisation of seminars (see Attachment 3).

6. Administration and financial functions

6.1 Certification rules and authorisation
Certification rules and authorisations are prepared in partnership with NKS's accountant.

Activities, contracts and regular outgoings for e.g. travel, meetings and seminars:
The Programme Manager signs off on these. If the activity is carried out by the Programme Manager's own institution, the chief accountant carries out budget checks and certification.

Programme Managers, contracts and regular outgoings for e.g. travel, meetings and seminars:
The Chairman signs off on these. If the Programme Manager comes from the Chairman's own institution, the chief accountant carries out budget checks and certification.

The Secretariat, contract and daily operations:
The Chairman signs off on these, the chief accountant signs off on invoices related to the daily operations of the Secretariat if the invoice does not exceed DKK 20,000, e.g. postage, printing, telephone, etc.

Chairman:
The chief accountant carries out budget checks and certification.

The Chairman may delegate certification rights to the chief accountant in special circumstances, e.g. the Programme Managers' travel expenses.
The Secretariat manages the payment of certified invoices.
The Chairman and the Secretariat's chief accountant have the authority to withdraw funds from the NKS giro and bank accounts together or separately with one additional person appointed by the Board.

6.2 NKS grants
It is the Board that grants NKS funds to activities proposed by the Programme managers. Unused funds from current activities are usually

carried forward to the next financial year. Unused funds from completed activities are usually transferred to reserves and are allocated by the Board.

6.3 Agreement between NKS and the Programme Manager organisations

The Chairman or chief accountant enters into agreements on behalf of NKS with the Programme Managers' organisations to ensure that the Programme Managers are available and to determine the scope of and costs involved in their initiatives. A schedule for this is shown in Attachment 4. The cooperation agreement should be described in detail in an attachment to the agreement (Attachment 4.1). NKS's Chairman must be informed in due time by the Programme Manager's organisation if the Programme Manager due to leave or other planned absence will not be able to carry out his/her NKS work for a limited period. In the event of lengthy absence, the appointment of a new Programme Manager may be required.

6.4 New activities

Proposals for new activities are presented to the Programme Managers, usually in conjunction with the *Call for Proposals* (see Attachment 5 and www.nks.org). Proposals are assessed by the Programme Managers and Board members. The Programme Manager recommends them to the Board at its January meeting for a final decision. Approved activities must be commenced as soon as possible within six months and a first status report should be submitted to the Board at the next board meeting.

6.5 The Programme Managers' contracts for work funded by NKS

When entering into contracts for work, consultancy services, etc., the Programme Manager must ensure that NKS funding is used efficiently and services in kind are provided in accordance with Section 6.5. Applicable national/government rules must be followed.

Work is to be agreed when the Programme Manager enters into the contract with the performing person's organisation. The contract should include a detailed description of the project, the work, the anticipated results, deadlines, payment and reporting. Contracts may also cover participation in task group meetings, etc. (see Check List, Attachment 6). If NKS is to pay VAT, the amount must be clearly stated in the contract. For further information on VAT please contact the Secretariat.

The contract must state the year(s) it covers. On signing the contract, the programme Manager must oblige all programme participants to comply with the guidelines of the NKS Administrative Handbook.

The Programme Manager must either submit a hard copy of the signed contract to the Secretariat or file a hard copy and submit a copy to the Secretariat.

The Programme Manager may enter into similar agreements on programme initiatives which do not require NKS funding. The scope of these initiatives must form part of the Programme Manager's summary of all the initiatives contained in the programme.

Payment and transfer of funds

Payment should be made in the currency of the performing country.

The Programme Manager determines the payment terms. Standard payment terms for amounts exceeding approx. DKK 100,000 may be:

- 50% after acceptance and confirmation of the contract
- 50% when work has been finally approved by the Programme Manager

It is the Programme Manager who authorises the payment of funds from the programme budget. All invoices must be signed by the Programme Manager with the completion of a stamped table prior to submission to the Secretariat.

The Secretariat ensures the transfer of funds as directed by the Programme Manager. For NKS-funded participation in meetings, etc. the Programme Manager signs the invoice from the organisation concerned and forwards it to the Secretariat for payment.

All invoices must include information on activity/programme number and the applicable contract.

If the Programme Manager authorises payment to his/her own organisation, the payment must also be authorised by the Chairman or chief accountant.

The Secretariat ensures that funds are transferred to the participating organisation. Funds are mainly withdrawn from the NKS giro account in the participating organisation's country.

Programme Managers
The Programme Managers' administrative initiatives are invoiced in accordance with the instalments set out in the agreement between the Programme Manager's organisation and NKS. The Programme Manager's organisation sends the invoice to the Chairman or chief accountant for signature in accordance with the agreement after which the invoice is paid by the Secretariat.

The technical/scientific initiatives which the Programme Managers carry out themselves with NKS funding are covered by the activity budget, and the amount is entered as an independent item in the budget.

As it is the NKS Secretariat's bookkeeping which is officially applicable, it is in the Programme Managers' own interest and it is their responsibility at least quarterly to reconcile their own accounts with the Secretariat's. The NKS Secretariat provides the relevant documentation to make this reconciliation possible.

6.6 Services in kind and other contributions

Reporting
In connection with annual accounts reporting the Programme Managers each year report the amount of external funding received for the activities. An estimate is reported to the Secretariat, and this estimate is announced in the NKS annual financial statement under review of the year.

6.7 Travel expenses

Travel rules
Travel costs must be kept as low as possible. Travel expenses are usually covered by the participating organisations. Any exceptions to this must be agreed in advance by the Programme Manager concerned or (in the case of the Secretariat) with the Chairman. Travel expenses are usually calculated in accordance with the participant's national government rules. The Programme Manager may, however, determine other payment frameworks, e.g. when meetings include half or full board paid by the programme. NKS does not cover travel expenses for activities and seminar participants outside the Nordic countries unless participants have been specifically invited. Usually, NKS does not support business (activities, meetings, etc.) which take place outside the Nordic Countries. In exceptional circumstances, the Board or Chairman may approve seminars and meetings in the Baltic states.

As a rule, NKS refunds travel expenses through the participants' institution. If payment is to be made to a participant's private account, this must be agreed in advance with the Programme Manager concerned or the Chairman, and national government rules must be complied with and all receipts attached.

Programme participants

Travel expenses involved in programme work are mainly covered by national funds. Where this is not possible, they may be included in the programme budget. Where programme participants' travel expenses are covered by NKS funds, the sum must form part of the contract provided by the Programme Manager.

Travel expenses which have been authorised by the Programme manager in advance, but which are not included in an agreement on the work involved, are covered by the participant's organisation. This organisation submits an invoice (documentation/verification is not required) to the Programme Manager stating date and meeting location for each trip, activity number, purpose and total travel expenses. The Programme Manager approves the expenses by signing the invoice and forwarding it to the Secretariat for payment.

Programme Managers, Secretariat
Travel expenses incurred by the Programme Manager and the Secretariat which are to be covered by the NKS budget must be contained in the budget for the Programme Manager and Secretariat in accordance with Board decisions.

Others (owners, Board)
Travel expenses incurred by owners and members of the Board are not usually covered by NKS. This also applies to representatives of other financiers and other commercial organisations on the Board. Travel that has been authorised in advance by the Chairman to be covered by the Secretariat is to be settled by the meeting participant's organisation, unless otherwise agreed, submitting an invoice for the travel expenses stating the date and meeting location for each trip, programme/activity number, purpose and total travel expenses. The invoice is sent to the chief accountant who then authorises the amount for payment.

6.8 Other meeting expenses
For local expenses (meeting rooms, refreshments, etc.) related to meetings paid for by the programme an invoice is sent to the Programme Manager who signs off on the invoice and then forwards it to the Secretariat for payment. The invoice must include dates, purpose and names of all participants. The same rules apply to seminars, but the names of all participants are not required. The Programme Manager has a coordination account at his/her disposal to cover these expenses.

6.9 Financial summaries
The programme's bookkeeping is in DKK and the accounts are in DKK and EUR. Conversion is carried out by the Secretariat at the exchange rate applicable at the beginning of each calendar year. The current year's exchange rate can be found on
http://www.nks.org/en/this_is_nks/administration/currency.htm

NKS may, however, decide that conversion should take place every six months.

The Programme Manager retains an overview into allocated NKS funds and agreed national initiatives – partly through own notes and partly through material provided by the Secretariat.

The Secretariat regularly sends out statements for expenses paid and contracts. The Programme Manager reconciles the statement with his/her own summary.

6.10 Invoices and VAT
Different invoice and VAT practices apply. Please contact the Secretariat.

7. Central accounts, financial management

The Secretariat manages the funds that are made available to the programme, instructs invoices to be paid directly from the giro accounts set up by the owners and manages the overall accounts.

7.1 Transfer of funds

NKS has accounts in Denmark, Finland, Norway and Sweden. For Iceland, the Danish account is used. At the request of the NKS Secretariat, the owners and other financiers transfer funds to these accounts.
Funding requests are sent out in January immediately after the Board meeting at which the annual budget is determined and the exchange rate for the year is known.

A Programme Manager applies for funds by sending a signed invoice which includes programme/activity number to the Secretariat. The Secretariat checks that the budget is able to cover the amount and pays the amount as instructed by the Programme Manager. In the event that the programme goes over budget, the Chairman is informed by the Secretariat's chief accountant.

As regards Secretariat funds, these are authorised by the Chairman. The Chairman may delegate certification rights to the Secretariat's chief accountant as required.

As all the funds are deposited in giro accounts, all invoices should be marked with the giro number to which the funds are to be transferred. If the amount is required transferred to a bank account, the bank's full address and account number must be shown on the invoice.

The Secretariat allocates the funds in such a way as to ensure that expenses for currency exchange are avoided where possible.

The disbursed amount is credited in the applicable currency to the programme account and an exchange rate adjustment is booked on the same account which means that the sum of the two booked amounts corresponds to the sum in DKK.

7.2 Bookkeeping

The Secretariat is responsible for NKS's bookkeeping. This includes all the income and expenditure for which NKS funds are used. The bookkeeping also includes deposits in each account and financial liabilities that have been entered into, e.g. in the form of contracts. The Secretariat ensures that all documentation is kept for ten years. Copies of the documentation with certification of their authenticity can be made available to the owners.

The Secretariat prepares an account plan and keeps accounts for each programme. The account plan must reflect the Board's and the Programme Managers' requirement for a clear and practically usable submission of accounts.

Bookkeeping for the programme's running costs is in DKK while the national accounts are in the currency of the country concerned.

The Secretariat provides the owners with statements showing the disbursements made from the national accounts. These statements take the form of audited annual accounts. The audit is carried out by a state-certified accounting firm.

The Secretariat assists the Programme Managers by retaining a financial overview. At the beginning of each year, the Secretariat sets out the

exchange rates that are to apply throughout the year. At each Board meeting, the Secretariat prepares an financial overview for use in onward planning in NKS.

7.3 Closing of accounts
Accounts are closed at the end of the year and include only invoices dated and sent during the financial year. All other invoices are included in the new year.

Determination of the budget for the following year takes place as decided by the Board in January based on proposals from the Chairman and depends on the previous year's expenditure. Unused funds from on-going activities in the R and B Programmes will usually be carried forward to the following financial year. Unused funds from completed R and B activities and the Secretariat will usually be transferred to the reserves and be allocated by the Board.

7.4 Audits
NKS's accounts are subject to checks by the Danish Rigsrevisionen. Rigsrevisionen may wish to review the accounts. The NKS accounts are audited annually by a state-certified auditor on the basis of all documentation *(verifications)* and account statements. The auditors are entitled to unannounced inspection of the NKS Secretariat accounts.

At the auditors' request, the owners provide information about the amounts that have been transferred to the NKS accounts.

In the event that it is desirable to audit the use of national NKS funds in each country, this is done using the certified documentation *(verifications).*

Auditor's reports and annual accounts are discussed by the Board and approved by the owners. The original accounts and the long-form audit reports are kept by the NKS Secretariat.

8. Programme assessment
The owners or Board determine the criteria and dates for assessment of the programme or parts thereof.

9. List of addresses
The address list is available on an NKS password-protected web page. The NKS Secretariat must obtain the personal consent of each person on the address list.

The Secretariat maintains the address database for owners and Board while the Programme Managers regularly report changes relating to the programme participants in their own area. The Secretariat then updates the database.

10. NKS websites
NKS hosts a website which is updated by the Secretariat and the Programme Managers and run by the Secretariat. The URL is: www.nks.org. NKS also hosts a closed, password-protected website for internal use by programme participants – further information can be obtained from the Secretariat.

Some activities also have their own programme web pages. Instructions from the NKS Board on policy, content and execution must be complied with.

It is recommended that the websites be updated often.

11. NewsLetters

NewsLetters are sent out twice a year by the Secretariat, usually before the Board's biannual meetings and contain information on new reports, seminars, etc. The main recipients of the newsletters are the Board, financiers, libraries, programme managers, people responsible for activities, activity participants and their institutions and organisations as well as other interested parties who have signed up for the news group on the website. Additional newsletters (*NewsFlashes*) with topical news are sent out as required. Subscription to *NewsLetters* and *NewsFlashes* is free. Please contact the NKS Secretariat.

The Programme Managers put together the news material about the R and B Programmes and send it to the Secretariat which completes the newsletters and distributes them. The Chairman is the publisher responsible for the newsletters.

12. Areas of responsibility and work

The division of areas of responsibility and duties between NKS Owners, Board, Chairman, Secretariat and Programme Managers is described in Attachment 7.

13. The NKS Calendar Year

For reasons of overview and in order to facilitate continuation the main procedures and routines of NKS have been described in Attachment 8.

Attachment 1

Bibliographic Data Sheet **NKS-XXX**

Title	xx
Author(s)	xx
Affiliation(s)	xx
ISBN	978-87-7893-xxx-x
Date	xx
Project	NKS-xx
No. of pages	xx
No. of tables	xx
No. of illustrations	xx
No. of references	xx
Abstract max. 2000 characters	xx
Key words	xx

Available on request from the NKS Secretariat, P.O.Box 49, DK-4000 Roskilde, Denmark.
Phone (+45) 4677 4041, e-mail nks@nks.org, www.nks.org.

Attachment 2

NKS-261
ISBN 978-87-7893-333-1

Guidelines for reliability analysis of digital systems in PSA context - Phase 2 Status Report

Stefan Authén (1)
Johan Gustafsson (2)
Jan-Erik Holmberg (3)

1. Risk Pilot AB, Sweden
2. Royal Institute of Technology, Sweden
3. VTT, Finland

February 2012

Attachment 3

Things to consider when

ARRANGING SEMINARS, PROJECT MEETINGS, ETC.

A successful seminar is one of the best ways of disseminating information about the work NKS does and the results it achieves. But seminars require a great deal of planning and preparation. A list of tips can be found below.

- Produce a check list showing distribution of responsibilities and a realistic timetable: who does what when? Appoint someone with overall responsibility (preferably the person responsible for the activities). Update the list regularly.
- Define objective and target group.
- Choose a suitable title (catchy and relevant). Use a more detailed subtitle, if required.
- Determine content in broad terms (sub-areas, important key words). Determine whether the seminar should include
  - invited speakers
  - parallel sessions
  - poster session(s)
  - panel discussion(s)
  - group work
- Take into account experiences from previous seminars in the same or similar areas.
- Decide on dates:
  - Be in good time – major events may require planning up to a year in advance.
  - Coordinate with other, similar events, particularly within NKS.
  - Attempt to avoid clashes with competing events or major events which are already scheduled (e.g. audit periods at nuclear power stations).
- Choose a suitable location:
  - Think about where most of the participants will be coming from.
  - If it is a large conference: Visit a few conference facilities, assess their options, negotiate terms.
  - Is the conference facility able to handle the anticipated number of participants? Are the meeting rooms large enough? Are there enough group meeting rooms? Hotel rooms? Sufficient room for posters? Break rooms? Technical equipment? Support?
  - Choose conference facilities, sign agreement.
- Decide which of the tasks below should be handled by the central NKS Secretariat, by a local coordinator/co-organiser and (for larger events) by a professional conference organiser:
  - receipt and confirmation of registrations
  - creation of participant list
  - finance (participant fees, invoices, bookkeeping, etc.)
  - hotel reservations, room bookings, if applicable
  - maps, signage, decorations, etc.
  - secretariat services in general
  - handling any study visits
  - entertainment programme (e.g. conference dinner, entertainment and excursions)
  - transport
  - registration on the first day of the seminar
  - liaison with the conference facility about rooms, technical equipment, consumables, meals, coffee, etc.
  - copying/printing of materials for the seminar and any subsequent documentation
- Produce a budget outline as early as possible and revise it when costs become clearer. Include a reasonably large item for unforeseen expenses. Agree the budget with the Board as required.

- Try to find sponsors/co-financiers for the conference.
- Decide (as early as possible) how large the participant fee should be and the share of the costs to be covered by NKS funds and any sponsor funds or other contributions. Adjust the participant fee to the participants' circumstances, e.g. media representatives are often not able to pay very much.
- Determine how the participant fee should be paid. This should be done in advance. Cash payment on registration is not advisable. Use e.g. post giros, bank giros, bank account, cheque, payment order or credit cards. If payment is to be made on registration, credit cards are easiest, but the administrative fee charged by the credit card companies is relatively high.
- Produce a detailed seminar programme as soon as possible. Identify your meeting reporter, session facilitators, etc. and confirm in writing. Include a sufficient number of long breaks – they are an important part of the event as they generate contacts and represent an informal discussion forum.
- Send out invitations for the seminar:
  - Produce a detailed analysis of the target group and choose the people and organisations you wish to invite.
  - Attach the information required for participants to decide whether they want to register. Ensure that it is made clear that this is an NKS event.
  - Attach a comprehensible registration form (binding).
  - Upload the invitation, programme, background material and registration form on the NKS website. Update as soon as new material becomes available.
  - Decide on the highest and lowest number of participants. Determine the date you need to decide whether the seminar will go ahead.
- Contact the invited speakers, if appropriate:
  - Choose suitable candidates.
  - Agree well in advance their participation, subject and content of their presentations as well as financial and other terms for their participation. Confirm in writing.
  - Monitor and follow up on all speakers' preparations (e.g. abstracts, reports or lectures/papers).
  - Gather all advance material in one place.
- Does any prior information need to go out to local or other media, e.g. in the form of a press release? Appoint someone with media contacts to handle this.
- Decide whether evaluation and follow-up of the seminar is to be carried out:
  - Should participants leave their view of the seminar by completing a form (*questionnaire*)? If so, prepare a questionnaire.
  - Should an assessment/final report be written? How should it be shaped and who is responsible?
  - Should the seminar be reported to the Board? If so: by whom, when and how?
- On arrival at the conference facility:
  - Registration of the participants. Designate at least one person for this and allow approx. one minute per participant.
  - Distribution of conference material in the form of a map, binder, etc. (including programme and participant list).
  - If name tags are used: ensure that the name is printed clearly in large letters. The person's name is most important – not the seminar title or organiser's logo.
- Make sure you are as quick as possible in following up with any promised documentation, e.g. report from the conference or copies of images presented.
- Carry out the agreed follow-up/assessment of the seminar, and amalgamate the responses from the forms (*questionnaire*) for the benefit of the participants. Were the goals achieved? Were the budget and timetable kept to? What was good? What was less good? Lessons for the future? Etc.

Attachment 4

NKS/AFT(XX)X

Agreement

between XX (hereinafter called XX) and Nordic Nuclear Safety Research (hereinafter called NKS) for the period 1 January – 31 December XX

XX shall hereby undertake management responsibility for the NKS R/B Programme area as defined by the decision by the NKS Board in the period set out above. XX shall make XX available for this purpose as NKS's programme manager. Should she/he for any reason be unable to fulfil this task, XX shall find a qualified replacement to be made available to NKS at no additional cost to NKS. NKS shall approve the new programme manager. The Chairman of NKS shall be informed well in advance of any prolonged absence of the programme manager so that suitable measures may be taken. The responsibility and authority involved in this appointment shall be set out in the attachment to this agreement. XX shall thus undertake to comply with the rules and timeframes and the budget determined by the Board of NKS for the work as programme manager and the associated activities.

Fortum certifies that XX has accepted the job as programme manager for the NKS R/B Programme and that she/he is able to work on the R/B Programme for approximately 50% of a full-time position. The cost to NKS for her/his participation shall be

* DKK XX for the period 1 January – 31 December XX

This amount shall include any VAT and working hours and breaks, office services, expenses, etc. Travel expenses and subsistence shall not be included. A separate budget for work-related travel shall be determined separately by the Board of NKS.

The agreed remuneration shall be paid by NKS in the following instalments of the total annual sum on the presentation of an invoice from XX as follows:

* 50% after the signing of this agreement after the new year XX
* 50% after the Board's approval of the status report in January XX.

Invoices shall be submitted to NKS no later than 30 days after the date indicated by the payment plan above.

The present agreement shall apply from 1 January XX to 31 December XX (inclusive) on condition that the owners of NKS make sufficient funds available. The present agreement may be unilaterally terminated by either party with a notice period of six months. In the event of material breach of contract by either party, the agreement may be terminated unilaterally by the other party. NKS shall then pay remuneration for the period in which the programme manager worked up to the date of termination.

The present agreement shall be governed by Danish law.

The present agreement has been created in two original copies. Each party shall retain one original. XX shall undertake to ensure that XX is provided with a copy of the signed agreement and associated attachment.

For XX	For NKS
Date:.....	Date:.....
.....	.....
XX	XX Chairman

Attachment 4.1

Attachment to agreement NKS/AFT(XX)X:

Responsibility and authority for Programme Manager NKS R/B Programme in the period 1 January – 31 December XX

The programme manager must in her work comply with the terms of this agreement, the decisions made by the owners and Board of NKS and applicable parts of the latest edition of the policy document NKS(08)3 and the Administrative Handbook, NKS(11)4.

The programme manager is responsible for ensuring that:

- the programme and its activities are run in accordance with NKS objectives
- the programme's technical/scientific quality is assured
- information about the programme and its activities is disseminated to the appropriate people in an adequate way
- set timetables and cost levels are met
- current rules for planning, budgeting, status reports and final reports are complied with

Duties and responsibilities can be delegated, but the overall responsibility for the programme rests with the programme manager. The Chairman and person responsible in the home organisation must immediately be notified of any signs of significant deviation from the timetable and/or budget.

The job further involves that the programme manager

- participates in board meetings and reports directly to the NKS Board
- coordinates work with other programme managers and the Chairman
- informs the Chairman and NKS Secretariat well in advance about all major seminars, project meetings, etc. within the programme
- at the request of the Board or Chairman participates in meetings within the NKS programme framework
- keeps a record of the national initiatives in DKK or EUR and reports on the accumulated national financing in all status reports and – for each programme – in all final reports

The programme manager organises her/his own travels within the Nordic countries within a set budget frame. For travels outside the Nordic countries, oral approval is required in advance from the Chairman. All the programme manager's travel expenses must be signed by the programme manager and signed off by the Chairman or chief accountant before they can be reimbursed.

Current national government rules (or equivalent) for expenses and entertainment must be complied with both by the programme manager and other activity participants. Travel accounts must be produced by the traveller's employer or agreed with the programme manager in advance.

Attachment 5

Practical information about call for proposals

This attachment aims to describe and explain how a Call for Proposals (CfP) is carried out. The guidelines below reflect a combination of past experience and decisions and relate to an annual CfP held in the autumn. The financial framework is assumed to be determined by the Board.

The CfP year starts with the coordination meeting which is usually held in April / May before the May / June Board meeting. The timeframe for the CfP is determined at the April / May coordination meeting. The usual start date falls in the end of August or the beginning of September with the final application deadline in mid-October. Past experience shows that the final deadline should be mid-week as a final date on a Friday, for example, attracts enquiries about whether it is possible to submit on the Sunday night. Before the start of the CfP, the website is updated and the documents that were required for the latest CfP were:

- The framework programme for the respective B and R Programmes
- Application form
- Application instructions

Prior to CfP, the website will provide information about the opening date for applications. When CfP starts, links are provided to the documents, and when CfP opens, a NewsFlash is sent out to NKS stakeholders as a reminder of the start of CfP.

The naming and numbering of submitted applications follow a certain structure: NKS_(R or B)_(CfP year)_serial number, e.g. NKS_R_2010_85. The serial number is not managed centrally, but must be entered by the respective programme manager. Applications are only allocated a number once. This means that activities that run for several years retain their original number and that applications which have been rejected and are submitted the following year also retain their original number.

When applications are received, confirmations of receipt are sent out. When the application deadline has passed, applications are assessed. Since CfP 2010, this assessment has been carried out by NKS Board members using resources in their own organisations. The applications are uploaded to a home page where Board members are able to download the applications as well as assessment forms and instructions. The assessment must be ready prior to the coordination meeting in November / December which takes place before the January Board meeting.

After the assessment and at the Board meeting it is decided which proposals should be allocated funds. After the Board meeting, these decisions are communicated to stakeholders. The activities for which funds are allocated can be presented in a NewsFlash, if appropriate. The activities which are rejected are contacted directly by e-mail or telephone: mass e-mails about these decisions are not appropriate. Any available feedback on the assessment must be provided.

As soon as possible after the January Board meeting contracts are prepared and signed with the parties and coordinators concerned.

Attachment 6

Checklist for contracts, agreements etc.

All contracts / agreements should be written on the programme manager's NKS stationery; see the graphic profile.

- NKS activity number
- Date
- Name of the contracting party
- Activity title
- References (e.g. quotes, meetings, protocols)
- Activity/work description
- Responsible person(s)
- Milestones (e.g., work to be carried out before certain deadlines specified by exact dates) and deliverables
- Estimated total cost (national funding + NKS funding) in DKK or local currency
- Total cost for NKS in DKK or in local currency
- VAT guidelines and how to address and send invoices (contact the NKS Secretariat for details)
- Part payments to be defined
- Cancellation clause to be defined if milestones are not met
- Intellectual property rights

The following should be considered in all contracts/agreements:

The rules and practices stipulated in the current NKS policy document are to be followed by the activity leader and the activity participants.

Intellectual property rights
Copyright to any research results produced shall vest jointly and equally in (organisation) and NKS so that each of the parties may enjoy and exercise their rights independently of the other parties, including the right to modify the material, create derivative works, and publish it in any way, shape or form. Use of the NKS logo requires approval by the NKS programme manager or the NKS Secretariat. Similarly, NKS may not publish the material using the other parties' logo(s) without permission. The author(s) shall upon request to NKS have the first right of publishing the result in refereed journals or similar publications, and NKS shall in that event refrain from publishing said material before the author(s) do.

This order is valid when signed in two copies by the NKS programme manager and the contracting party.

_____	_____
NKS Programme Manager	The contracting party

Attachment 7

Areas of responsibility and duties

(From the policy document NKS(08)2: NKS policy, Framework and procedures)

Owners

- Regularly enter into written agreements on continued partnerships, their financing and other terms and conditions.
- Elect the Chairman of the Board and appoint other members of the Board, programme managers, assessors, etc.
- Are the top policy body.
- Determine guidelines for structure, work methods and general administrative issues.
- Secure the majority of the financing.
- Approve the accounts.
- Delegate projects and responsibilities at an appropriate level as required.
- Appoint the Chairman.
- Appoint the programme managers for a set period on terms set out in written agreements.

The Board

- Decides issues of prioritisation, programme, budget and activities.
- Puts forward proposals for policy changes to the owners and approves NKS's official policy document.
- Continuously monitors quality and efficiency, assesses the technical/scientific results of the activities and approves activities for which final reports have been submitted.
- Determines the general guidelines for external and internal information, communication and results dissemination and identifies the most important target groups.
- Carries out the tasks as instructed by the owners as well as tasks set out in the Administrative Handbook.
- Delegates projects and responsibilities at an appropriate level as required.
- Appoints the Secretariat for a set period on terms set out in a written agreement

The Chairman

- Appointed by the owners.
- Responsible for the NKS programme being carried out in accordance with set plan and budget.
- Calls meetings with the owners as required and keeps in regular contact with the owners and the Board.
- Part of the Board, chairs its meetings and monitors that its decisions are implemented.
- Acts as NKS's official spokesperson, is responsible for information and is the publisher and editor responsible for the newsletters and represents a shared resource for NKS as a whole.
- Follows the work in the various areas of the NKS programme, including international activities as well as administrative work, including accounts and auditing.
- Monitors the coordination of the programme areas and participates in coordination meetings with the programme managers and Secretariat as required and chairs these meetings.
- Ensures that

  - Board meetings are prepared and the required documentation for the Board is completed (budget proposals, annual accounts, audit protocol, evaluation directive and other bases for decisions)
  - NKS's structure and administrative routines are revised as required
  - the policy document and the Administrative Handbook are reviewed as required
- Enters into agreements as required, signs letters and signs off on certain invoices.
- Carries out other tasks as instructed by the owners and Board and the tasks set out in the Administrative Handbook.

The Secretariat

- Appointed by the Board for a set period on terms set out in a written agreement.

Regular duties

- Represents an administrative support function for NKS as a whole, participates in Board meetings and takes minutes at these meetings as required.
- Distributes material (reports, invitations to meetings, bases for meetings, etc.) to the Board, programme managers and others as required.
- Is responsible for financial management, handles bookkeeping and disbursements for the whole programme, orders auditing of the accounts, handles agreements, reservations, contracts, etc.
- Compiles financial reports to the owners, Board and programme managers.
- Handles filing of documents and bookkeeping documentation as well as organisation of reference library and library services.
- Requires funds from the owners and other financiers according to agreements.
- Processes and edits NKS reports such as technical reports, final reports and evaluation reports.
- Distributes both printed and electronic reports.
- Handles printing contacts, procures printing services, collects report material.
- Maintains and updates the NKS website and sends out the NKS electronic newsletters (Newsletter and NewsFlash).
- Participates in the review of administrative routines, including contract and VAT issues. Further develops the Administrative Handbook in partnership with the Chairman and programme managers. Creates and updates lists of addresses and other administrative documents. Participates in meetings with the Chairman and programme managers a couple of times a year. Participates in telephone conferences with the parties concerned as required.
- Assists in the work on minor seminars which are organised within the R and B Programmes (dispatch of information material, uploading and updating websites, etc.).
- Carries out various tasks which (within the framework of NKS) are required by the owners, the Board and the Chairman as well as tasks set out in the Administrative Handbook.

The following tasks are carried out as required and by separate agreement

- Participates in further development of the NKS website.
- Works on the publication of periodical material (DVDs, CD-ROMs, etc.).
- Participates in the work on NKS seminars (preparation, organisation, follow-up).
- Participates in the work on separate R and B seminars (preparation, organisation, follow-up).

The programme managers

- Appointed by the owners for a set period on terms set out in a written agreement.
- Expected to work part-time, the equivalent of approx. 50% of full-time.
- Manage and/or participate in activities and propose new activities to the Board.

- Ensure that the programme is implemented in accordance with the framework programme, other Board decisions and objectives and lead the work on *Call for Proposals* and propose new activities to the Board.
- Maintain active contact with relevant Scandinavian professional environments and end users to anchor NKS's work, bring actors and stakeholders together and identify requirements and trends at an early stage.
- Coordinate activities and maintain regular contact with the Chairman and Secretariat.
- Maintain regular contact with the persons responsible for the activities and ensure that the activities are implemented and reported on in compliance with set plans and lead and monitor information activities in the programme area concerned.
- Report directly to the Board and participate in Board meetings.
- Are responsible for dissemination of results to the parties concerned in the form of seminars, scientific articles, reports, documents, work materials, etc. in accordance with the guidelines set out in the Administrative Handbook.
- Disseminate information from the board meetings to persons and organisations concerned.
- Carry out various tasks (within the framework of NKS) required by the owners and the Board as well as the tasks set out in contract that have been entered into and orders, set programme and activity plans and the Administrative Handbook.

Attachment 8

The NKS Calendar Year

January: Board meeting early January – the Board approves the new year's activities and budget. – A NewsLetter is published approximately one week before the Board meeting, and a NewsFlash is published approximately one week after the meeting.

January/February: New programme activity agreements are signed, and the new activities start. End and start of NKS's fiscal year.

February/March/April: Preparation of last year's accounts.

March/April: A NewsFlash presentation of new programme activities including reports, seminars etc.

April/May: Coordination meeting with follow-up after the January Board meeting and preparation and planning of the upcoming May/June Board meeting.

May/June: Board meeting with status reports from the programmes and presentation and approval of last year's accounts. Plans are made for this year's call for proposals (CfP). – A NewsLetter is published approximately one week before the Board meeting, and a NewsFlash is published approximately one week after the meeting.

August/September: CfP for next year's activities is started with a combined website and NewsFlash release.

October: deadline for CfP.

October/November: Evaluation of new proposals.

November/December: Coordination meeting with preparation of the January Board meeting, new proposals/activities, new budget etc.

Nordic nuclear safety research

NKS-R STATUS REPORT

Karin Andgren
NKS-R Programme Manager
May 2014

Table of contents

1 Status summary

This report provides a short overview of the current status of the NKS-R programme. Since the last NKS Board meeting in January, final reports for six of the NKS-R activities started in 2013 have been published on the NKS website. New submission dates for the four final reports that are missing have been approved. Contracts have been agreed and signed for all activities started in 2014. All activities initiated earlier than 2013 have been finally reported.

1.1 Seminars

Four NKS-R seminars will be held within the 2014 activities: Nordic-Gen4 seminar (4-5th of September in Lappeenranta), DIGREL seminar for end users (15th of January in Stockholm), L3PSA seminar (20th of January) and a workshop within the ProCom activity (15th of November at IFE Halden).

1.2 Young scientist travel support

Requests have been received. However, none has been eligible for support. Requests have been for participation in project work and for travels to international seminars outside the Nordic countries.

1.3 Published reports

The following reports have been published within the NKS reports series since the last board meeting in January:

NKS-299	February 2014	NKS-R Decommissioning Seminar 2013	Decom-sem
NKS-300	February 2014	The expected and experienced benefits of Human performance tools in nuclear power plant maintenance activities – Intermediate report of HUMAX project	HUMAX
NKS-301	February 2014	Improving design processes in the nuclear domain. Insights on organizational challenges from safety culture and resilience engineering perspectives	SADE
NKS-302	March 2014	Guidelines for reliability analysis of digital systems in PSA context – Phase 4 Status Report	DIGREL
NKS-303	March 2014	Addressing off-site consequence criteria using Level 3 PSA – Phase 1 Status Report	L3PSA
NKS-304	March 2014	Software reliability analysis for PSA	DIGREL
NKS-305	March 2014	Evaluation of Existing Applications and Guidance on Methods for HRA – EXAM-HRA Phase 3a Summary Report	EXAM-HRA

The reports listed above are all final reports for work done in 2013 within the respective activities. Most of the activities result in one joint final report. However, participants in some

of the activities prefer to submit separate final reports. In addition, some of the activities are divided into sub-activities which provide separate reports. E.g. the DIGREL activity produced two final reports for 2013 (one overall DIGREL report and one software reliability report). Project reports (overall DIGREL report and software reliability report) for the entire period of the activity will be published in 2015.

2 Activities initiated in 2013

Ten activities were initiated in 2013. Five of the activities were continuing activities and five were new. Four final reports are still missing. An overview of the status of 2013 NKS-R activities is presented in table 1.

Table 1. NKS-R 2013 activities

Activity	Description	First invoice	Report	Second invoice	Report number
Decom-sem	Decommissioning seminar 2013	x	x	x	NKS-299
DECOSE	Debris coolability and steam explosion	x	-	-	
DIGREL	Guidelines for reliability analysis of digital systems in PSA context	x	x	2/3	NKS-302 NKS-304
DPSA	Deterministic-probabilistic safety analysis methodology	x	-	-	
ENPOOL	Experimental and numerical studies on suppression pool issues	x	-	-	
Exam HRA	Evaluation of existing applications and guidance on methods for human reliability analysis (HRA)	x	x	x	NKS-305
HUMAX	Maximizing human performance in maintenance	x	x	2/3	NKS-300
L3PSA	Addressing off-site consequence criteria using Level 3 PSA	x	x	3/4	NKS-303
POOLFIRE	Predictive analysis of pool fires in enclosures by means of CFD models for risk assessment of nuclear power plants	x	-	-	
SADE	Safety culture in design – improving resilience throughout the life-cycle of nuclear power plants	x	x	x	NKS-301

3 Activities initiated in 2014

Nine activities were started in 2014. Seven of these are continuing activities and two are new. Contracts have been signed for all activities. In this chapter short descriptions are given for the activities. For more detailed status reports see attachments.

3.1 ATR

Impact of Aerosols on the Transport of Ruthenium in the primary circuit of nuclear power plant.

Previous experiments have shown that the fraction of gaseous ruthenium transported through the primary circuit of an experimental setup at VTT was higher than what would be expected in thermodynamic equilibrium calculations. Focus of the ATR project is to study the impact of aerosols on the transport of ruthenium in the containment air of a BWR. Some of the most radiotoxic elements that may be released from the fuel into the containment's atmosphere during a severe accident are iodine and ruthenium. In 2014, the impact of aerosols on the transport of ruthenium, especially gaseous Ru species, will be studied in primary circuit conditions. Different aerosol species (e.g. Ag, CsI and RuO2), will be injected to the gas flow together with the volatilized RuO4. Thereafter the impact on the transport of ruthenium will be studied. A better understanding of the containment atmosphere composition during a severe accident will lead to improved strategies for reducing the risk of ruthenium release to the environment.

Activity leader: Christian Ekberg, Chalmers

NKS-R funding: 300 kDKK

Milestones:

1) Experimental facility ready by the end of April
2) Experiments/tests done at VTT by the end of June
3) Experiments/tests done at Chalmers by the end of September/October
4) Analysis of samples ready by the end of November/December

Status

The construction of the experimental facility is ready. The testing of the facility is ongoing and the experimental work will be initiated during the last part of May. There are no deviations to the original plan.

3.2 DECOSE

Debris coolability and steam explosion

Uncertainties in assessment of (i) debris bed properties and coolability, (ii) steam explosion impact in BWRs will be reduced by experimental and analytical studies. The experimental part of the project will investigate key physical phenomena of the debris bed formation and coolability. Experimental data will be validated using simulation tools, leading to more reliable predictions of the debris bed coolability in case of an accident with a severe core damage. An analytical approach will be utilized to improve the prediction of coolability and to assess the uncertainties in modelling of steam explosion impact. The project is almost half way and is scheduled for another three years.

Activity leader: Pavel Kudinov, Kungliga Tekniska Högskolan

NKS-R funding: 500 kDKK

Deliverables:

1) Report on COOLOCE experiments and coolability analysis and simulations carried out by VTT
2) Report on experimental and analytical work carried out by KTH on debris bed formation and coolability
3) Report on analysis of steam explosion in Nordic type BWRs by KTH and VTT

Status
There are no major deviations between plans and results except for:

- VTT Task 8 (Analysis of steam explosion in a BWR containment) is a bit delayed due to change of the personnel. VTT has now recruited a diploma thesis worker who is learning to use the FCI codes and will continue with the task. A research visit with KTH scientists is possible. Final report is expected to be submitted at the end of May 2014.

3.3 DIGREL

Guidelines for reliability analysis of digital systems in PSA context
Practical guidelines for analysis and modelling of digital systems in probabilistic safety assessment (PSA) for nuclear power plants are developed within the DIGREL activity. The activity comprises three interrelated activities. Firstly, a taxonomy for failure modes of digital I&C systems has been developed by a task group of OECD/NEA Working Group RISK. Secondly, in a parallel Nordic activity, a fictive digital I&C PSA-model has been developed for the demonstration and testing of reliability modelling approaches. The third activity has been to develop a method for the quantification of software reliability in the context of PSA. The interim results of the project have been published annually in NKS report series (NKS-230, NKS-261, NKS-277, NKS-302 and NKS-304). In 2014, the three activities will be finalized and a guidelines report will be prepared for the nuclear industry.

Activity leader: Jan-Erik Holmberg, RiskPilot

NKS-R funding: 300 kDKK

Tasks, milestones and deliverables

Start	**1.1.2014**
T + 3 M	WGRISK/DIGREL task group meeting, finalisation of the failure modes taxonomy report
T + 6 M	PSAM12 conference paper presentations
T + 10 M	Final draft of the NKS report and (covering all activities 2010–14)
T + 12 M	DIGREL seminar (15th January 2015)
T + 13 M	NKS final report on guidelines of reliability analysis of digital I&C systems in PRA

Status
There are no deviation to the original plan. The task group meeting was held in Paris March 3-4 and a final draft of the WGRISK report has been prepared. The overall progress of the activity is 20 %.

3.4 DPSA

Deterministic-probabilistic safety analysis methodology
The goals of the project are (i) to develop DPSA modelling approaches for scenarios where timing of the events, including PSA Level 1 and recovery actions, has significant effect on the results, and (ii) to develop methods for improving PSA and DSA using DPSA generated data. The project started one year ago and is scheduled to run for another four years.

Activity leader: Pavel Kudinov, KTH

NKS-R funding: 400 kDKK

Tasks:

1) To develop further the methodology for application of IDPSA with PSA/DSA to the Nordic nuclear energy industry and regulatory needs;
2) To address further in-depth following issues of risk importance for different severe accident scenarios.
    a. Relocation of the core melt to the lower plenum, as initial conditions for the melt-vessel structure interactions, melt release and ex-vessel steam explosion and debris bed coolability in Nordic BWRs;
    b. The influence of timing in PSA level 1 sequences and possible recovery actions on the amount and properties of the melt in the lower head;
3) To suggest improved approaches to modelling of steam explosion and coolability risks in PSA, considering information provided from IDPSA analysis.

Status
There are no major deviations between plans and results.

3.5 ENPOOL

Experimental and numerical studies on suppression pool issues
Steam injections into the pressure suppression pool of a boiling water reactor and their effects are studied within this project. Short term dynamic phenomena may cause pressure loads on pool structures and long term thermal transients following the steam injection may influence the pool's pressure suppression capacity, which is why this is an important area of research. Experiments and numerical analyses of steam injections through blowdown pipes into the suppression pool are carried out and the main objective is to develop computational models which can be used to simulate the effects of steam injection. In 2013, the experiments concentrated on the dynamics of the free water surface in a blowdown pipe to provide data on mixing of a thermally stratified pressure suppression pool and on direct contact condensation. The experiments carried out with the test facility provide a representative database for numerical studies and modeling, which are carried out under the ENPOOL activity. This activity started in 2011 and continues in 2014.

Activity leader: Timo Pättikangas, VTT

NKS-R funding: 651 kDKK

Deliverables of VTT:

1) CFD calculations of blowdown with model of a sector of BWR containment

2) FEM calculations of chugging loads in BWR containment
3) Summary report on the CFD and FEM methods developed in the project

Deliverables of KTH:

1) Further development of the Effective Heat Source and Effective Momentum Source models
2) Validation of the models against latest available PPOLEX data
3) Pre- and post-test simulations of the new series PPOOLEX tests
4) Report on development, implementation, and validation of the Effective Heat Source (EHS) and Effective Momentum Source (EMS) models for prediction of thermal stratification and mixing in the pressure suppression pool

Deliverables of LUT:

1) Execution of the experiment series with a sparger
2) Reporting of the sparger experiments
3) Execution of the experiment series on DCC
4) Reporting of the DCC experiments
5) Delivery of relevant experiment data to the simulation partners

Status
The beginning of the test series at LUT is delayed by two months due to the problems with the PIV system. Resource problems have delayed the progress of the project at VTT. “Situation improves in June, when one member of the project team returns from leave of absence.”

3.6 HUMAX

Maximizing human performance in maintenance
Maintenance is a key safety function in any complex sociotechnical system, such as a nuclear power plant. The aim of the activity is to enhance understanding on how to maximize human performance in maintenance activities of nuclear power plants. In 2013, the use of specific tools, or lack thereof, has been analysed for three Nordic nuclear power plants (NKS-300). Interviews have been made with maintenance workers and those responsible for developing human performance programs on their opinions on the human performance tools. The project will be finalized in 2014 and the aim is to provide recommendations on how to design and implement effective human performance tools.

Activity leader: Maren H. Rø Eitrheim, IFE

NKS-R funding: 500 kDKK

Tasks and milestones:

Tasks	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Planning activities in 2014											
Conclude data analysis of the case studies at Nordic NPPs and draft 1-2 scientific papers											
Suggest what activities HPTs may best support vis-à-vis other socio-technical solutions											
Develop recommendations on how to design and implement effective HPTs											
Disseminate findings: Continuous dialogues with the power companies											
Final report											

Status
Overall, the project progresses according to plan. Analyses of data obtained in the three case studies at Nordic plants (TVO, Loviisa and Ringhals) are in their final phases. Data collection in the international survey has been completed, and data analysis is currently ongoing. Project coordination is carried out using regular video-meetings, where ongoing research activities are discussed.

3.7 L3PSA

Addressing off-site consequence criteria using level 3 PSA
The aim is to deepen the Nordic understanding about the merits and limitations of probabilistic off-site consequence analysis for nuclear facilities. The project began in 2013, and is in its second year of a planned three years. The project's first year focused on the development and analysis of an industrial survey about Level 3 PSA, which included several workshops and meetings with Nordic utilities, regulators, and safety experts. Level 3 PSA risk metrics including health, environmental, and economic effects have been researched and discussed in the first year's project report (NKS-303). The project has generated significant interest internationally and has interfaced with international organizations including the IAEA and the American Nuclear Society. The ultimate goal of the project is to produce a guidance document for Level 3 PSA in Nordic countries.

Activity leader: Andrew Wallin-Caldwell, LRT

NKS-R funding: 300 kDKK

Tasks and milestones:

1) Final report of appropriate risk metrics and regulation, guides and standards
2) Detailed project plan for a pilot application including tools for dispersion and consequence analysis
3) Outline of the guidance document
4) Seminar in January 2015

Status
"The project is proceeding as planned in the project plan that was developed during 2013. It must be noted that the budget for the project is limited. Thus far, the working group, stakeholders, and parties interested in the project have been quite enthusiastic and ambitious in what can be accomplished under the Task 3 guidance document and the Task 4 pilot project. It is important to be mindful of the resources and scope of the project, and continue to be mindful of scope creep and analysis limitation throughout the duration of the project."

3.8 Nordic-Gen4

Nordic nuclear forum for generation IV reactors
The objective of this forum is to promote communication and interaction between Nordic researchers in the generation IV reactor area. The network has existed since 2009. Originally the focus was on material issues, but now the scope is wider. The main activity has been to organise seminars with participants from academia (senior researchers and students) and industry. A two-day seminar will take place in Lappeenranta 14-15th September 2014, where both invited speakers from Europe and PhD-students will have a chance to present and discuss their research. Other activities of the network include smaller meetings, students visits as well as maintaining the website http://nordic-gen4.org/.

Activity leader: Mattias Thuvander, Chalmers

NKS-R funding: 200 kDKK

Tasks and milestones:
1) Organize a two-day conference 14-15th September in Lappeenranta
2) Update and extend the Nordic Gen-IV web page
3) Other networking activities, including meetings between VTT, IFE, Chalmers and DTU

Status
The work is proceeding in accordance with the plan.

3.9 ProCom

Measuring procedure competence
Exstensive research has been performed by different organisations to identify the functions that enable reliable and resilient procedures. Measuring these functions reliably presents its own set of challenges. These are mainly (i) identifying reliable markers for each competence and (ii) developing guidance so that observers can reliably assess the crew's degree of proficiency on each competence. Institute for Energy Technology, IFE, in Halden has acsess to a huge amount of data from simulator studies of complex emergency scenarios, that can be used for identifying procedure competence. The activity is a one year project ending in december 2014.

Activity leader: Michael Hildebrandt, IFE

NKS-R funding: 600 kDKK

Tasks, milestones and deliverables:

	Date
T1: Identification of behaviours that indicate procedure competences (all)	01/05/2014
T2: Pilot test of method (lead: IFE & KSU)	01/08/2014
T3: Review of the method (lead: VTT)	15/09/2014
T4: Development of a video illustrating procedure following problems and strategies (lead: IFE)[1]	15/09/2014
T5: Summary of lessons learned on the use of eye tracking for studying procedure use (lead: IFE)	15/09/2014
M1: Development of handbook completed (lead: IFE)	01/10/2014
M2: Draft report (lead: IFE)	01/11/2014
Workshop (all)	15/11/2014
T6: Review of report (lead: Ålesund)	01/12/2014
D1: Final report	31/12/2014
D2: Procedure use video	31/12/2014

Status
The project is progressing as planned, and according to the time schedule indicated in the NKS contract.

4 Overview of all NKS-R activities 2010-2013

It is seen from the table below that all activities started in 2012 and earlier have been finalised. An activity is considered to be started at the January board meeting, and ended when the final report has been delivered.

Activity	NKS number	Started	Ended
Decom-sem	NKS_R_2010_83	01/2010	12/2010
DIGREL	NKS_R_2010_86	01/2010	12/2010
IACIP	NKS_R_2008_61	01/2010	12/2010
INCOSE	NKS_R_2009_75	01/2010	05/2011
MOSACA10	NKS_R_2008_69	01/2010	01/2011
NROI	NKS_R_2008_70	01/2010	04/2011
POOL VTT	NKS_R_2007_58	01/2010	05/2011
POOL KTH	NKS_R_2007_58	01/2010	06/2011
POOL LUT	NKS_R_2007_58	01/2010	03/2011
AIAS	NKS_R_2011_98	01/2011	12/2012
DIGREL	NKS_R_2010_86	01/2011	01/2012
ENPOOL	NKS_R_2011_90	01/2011	03/2012
ENPOOL	NKS_R_2011_90	01/2011	05/2012

ENPOOL	NKS_R_2011_90	01/2011	05/2012
MoReMO	NKS_R_2011_95	01/2011	02/2012
NOMAGE4	NKS_R_2008_63	01/2011	11/2011
POOLFIRE	NKS_R_2011_96	01/2011	02/2012
SADE	NKS_R_2011_97	01/2011	03/2012
RASTEP	NKS_R_2010_87	06/2011	09/2012
AIAS	NKS_R_2011_98	01/2012	06/2013
DECOSE	NKS_R_2012_100	01/2012	07/2013
DIGREL	NKS_R_2010_86	01/2012	02/2013
ENPOOL VTT	NKS_R_2011_90	01/2012	04/2013
ENPOOL LUT	NKS_R_2011_90	01/2012	03/2013
ENPOOL KTH	NKS_R_2011_90	01/2012	05/2013
MoReMO	NKS_R_2011_95	01/2012	03/2013
Nordic-Gen4	NKS_R_2012_103	01/2012	11/2012
POOLFIRE	NKS_R_2011_96	01/2012	02/2013
RASTEP	NKS_R_2010_87	01/2012	10/2013
SADE	NKS_R_2011_97	01/2012	03/2013
Decom-sem	NKS_R_2013_106	01/2013	02/2014
DECOSE	NKS_R_2012_100	01/2013	unfinished
DIGREL	NKS_R_2010_86	01/2013	03/2014
DPSA	NKS_R_2013_107	01/2013	unfinished
ENPOOL	NKS_R_2011_90	01/2013	unfinished
Exam HRA	NKS_R_2013_110	01/2013	03/2014
HUMAX	NKS_R_2013_108	01/2013	02/2014
L3PSA	NKS_R_2013_109	01/2013	03/2014
POOLFIRE	NKS_R_2011_96	01/2013	unfinished
SADE	NKS_R_2011_97	01/2013	02/2014

Attachments

A1. Status report ATR

Status report NKS ATR2, Contract no AFT/NKS-R(14)111/1

The construction of the experimental facility is ready. It is mainly similar to the set-up which was used in the previous experiments at VTT (T. Kärkelä et al. "Experiments on the behavior of ruthenium in air ingress accidents – final report", VTT-R-01252-07 (2007)). It includes an inlet section with mass flow controllers to adjust the carrier gas (air) flow rate accurately. The air flow is directed to the high temperature tubular flow furnace (alumina tube) and the source of ruthenium as RuO2 powder is located there. The ruthenium source is heated to 1000 °C – 1500 °C in an oxidizing airflow (5 l/min) and the formation of gaseous ruthenium oxides takes place. Downstream the furnace, the reaction products are cooled down in a stainless steel tube. Aerosol particles are collected on a plane filter and gaseous ruthenium is trapped with a NaOH solution.

As a significant difference to the previous set-up, an atomizer has been added to the inlet of the facility in order to produce various seed particles. One of the main objectives of this work is to study the effect of seed particles on the transport of gaseous ruthenium.

For the online monitoring of aerosol products, the facility is equipped with Electrical Low Pressure Impactor (ELPI), Scanning Mobility Particle Sizer (SMPS), Condensation Particle Counter (CPC) and Tapered Element Oscillating Microbalance (TEOM) devices. Thus information on the particle number size distribution, particle number concentration and particle mass concentration will be gathered. Samples of particles in a gas phase will be collected with a vacuum aspiration sampler on microscope grids for the further analysis on particle morphology and elemental composition.

Gaseous and aerosol samples will be analysed with several techniques, e.g. ICP-MS, INAA, Raman, XPS, SEM-EDX, TEM-SAED.

The testing of the facility is ongoing and the experimental work will be initiated during the last part of May.

A2. Status report DECOSE

STATUS REPORT OF DECOSE-NKS PROJECT IN 2014
May 06, 2014

Work at Royal Institute of Technology (KTH), Division of Nuclear Power Safety
DECOSE-NKS and APRI-8

Pavel Kudinov, Sergey Yakush, Simone Basso, Dmitry Grishchenko, Alexander Konovalenko, Sachin Thakre, Weimin Ma, Aram Karbojian.

1. Joint analytical activity on debris bed coolability which will include: code–to–code comparison, development of recommendations and best practice guidelines for simulations, defining reference cases for coolability analysis in plant accident conditions, post-test analysis and code validation against COOLOCE data and pre-test analysis to determine conditions for the future COOLOCE experiments (Tasks 7).
Validation of the DECOSIM code against existing COOLOCE data is ongoing. The tests with cylindrical (with impermeable walls), conical debris beds, and cylindrical debris bed with permeable walls, conical bed on a cylindrical base are under consideration. Code performance (convergence, time step limitations) has been improved significantly. Validation to be continued as new data will become available from COOLOCE, POMECO-HT and POMECO-FL facilities.
Definition of reference cases for coolability analysis in plant accident conditions is ongoing. Code–to–code comparison for the selected cases and development of recommendations and best practice guidelines for simulations is planned.
A set of surrogate models for computationally efficient prediction of the onset of debris bed dryout and post-dryout debris bed coolability are under development.

2. Investigation of particulate debris spreading, PDS-C tests and pre-test analysis to determine COOLOCE test conditions and procedure, PDS-P (pool) tests on particulate debris spreading in a pool (Task 4).
Experiments in PDS-C (Particulate Debris Spreading – Closures) facility with different types of particles (stainless steel cylinders, spheres, their mixtures, gravel, and zirconia-silica beads) have been carried out and the post-processing of new data is ongoing. A scaling approach has been developed for characterizing empirical closures for the particulate debris flux in non-dimensional variables. A model for prediction of particulate debris spreading based on the proposed scaling approach has been developed. The model is used for pre-test analysis of COOLOCE experiment with particulate debris spreading and further analysis of prototypic severe accident scenarios with uncertainty quantification. PDS-P facility is under preparation for the set of new tests with different particles and gas injection flow rates.

3. Investigation of the effect of the particle size on the DHF in POMECO-HT and POMECO-FL (Task 1d).
Investigation of the effect of particle size and morphology on the DHF is ongoing.

4. DEFOR-A series of tests with corium simulant material on debris bed formation (Task 2).
DEFOR-A tests and post-test analysis with corium melt simulant materials are ongoing. High temperature melt release through a plate with lower melting temperature material immersed under water is investigated in order to assess ablation of the hole. Both axial and radial ablation are investigated in the tests. A surrogate model for prediction of the debris agglomeration mass fraction is under development.

5. Application of MC3D and TEXAS-V to analysis of steam explosion in a BWR containment (Task 8).
The steam explosion calculations in the flooded drywell of Nordic BWR have been carried out using MC3D and TEXAS-V codes. The sensitivity study to the scenario and modeling parameters have been carried out for melt jet diameter, jet velocity, triggering time, material properties, fragmentation model,

mesh size, system pressure, etc. Morris diagrams was used to characterize sensitivity of the explosion impulse to the input parameters for TEXAS code. Some values for the reference input are selected based on MC3D calculations: specifically cell diameters in 1D TEXAS model are chosen to be representative of the premixing region predicted in MC3D calculations. A surrogate model for prediction of the explosion impulse is under development to be used in comprehensive uncertainty/sensitivity analysis.

6. Reporting of the POMECO-FL, POMECO-HT and PDS experiments and code development results.
Final report for 2013 is under development.
Reporting for 2014 has not been started yet.

7. Delivery of relevant experimental data to the simulation partners.
Not started yet.

Work at VTT
DECOSE-NKS and SAFIR2014:

Eveliina Takasuo, Veikko Taivassalo, Mikko Ilvonen, Ville Hovi, Tuomo Kinnunen, Stefan Holmström, Anna Nieminen, Ilona Lindholm

1. COOLOCE experiment with a representative geometry: truncated cone (Task 1.a.)
The COOLOCE test facility has been modified and prepared for the experiment with truncated cone, e.g. new heaters have been installed. The experiment is scheduled in the end of May.

2. Development of the test procedure for COOLOCE test on particulate debris spreading (Task 4).
No activities yet.

3. Pre- and post-test analyses of the truncated cone geometry using MEWA and the CFD approach (Task 7).
The pre-test simulations for the truncated cone using MEWA have been completed. The post-test simulations will be conducted after the experiment.

4. Modelling of the key debris bed geometries using the CFD approach as part of post-test analyses and code validation (Task 7).
A new version of the MEWA code has been distributed to VTT by Stuttgart University. Simulations of conical and cylindrical test beds as well as some simple drag force tests have been conducted using the new code version, and comparisons to the previous version have been made. In addition, a literature study concerning the possibility to improve the drag force models in the case of multi-dimensional flooding is on-going.

5. Joint analytical activity on debris bed coolability including: code–to–code comparison, development of recommendations and best practice guidelines for simulations, defining reference cases for coolability analysis in plant accident conditions (Task 7).
The modeling work comprises of the pre- and post-test simulations of the experiments with different test bed geometries and flow modes and the development of the full-3D CFD approach to the problem. MEWA post-test simulations have been completed for the following debris bed geometries: cylindrical with open top and sidewall, cylinder with cake simulant and the cone on a cylindrical base. The results of the 2D and 3D simulations have been presented in a SAFIR2014 report which will be submitted as a deliverable of 2013. A short researcher visit from VTT to KTH is being planned.

6. Application of MC3D and TEXAS-V to analysis of steam explosion in a BWR containment (Task 8).
A new diploma thesis worker has started working on the task using MC3D.

7. Reporting of the COOLOCE experiments.
The reporting of the experiment with a truncated cone will be done after the experiment. The reporting of the previous experiments is completed within SAFIR2014 and the report will be submitted as a deliverable of 2013.

8. Delivery of relevant experimental data to the simulation partners.
No activities yet.

Overall Project Summary

Comparison between plans and results with explanation of any deviations:
There are no major deviations between plans and results except for:

- VTT Task 8 (Analysis of steam explosion in a BWR containment) is a bit delayed due to change of the personnel. VTT has now recruited a diploma thesis worker who is learning to use the FCI codes and will continue with the task. A research visit with KTH scientists is possible.

Expected submit date of the final report

- Expected date for submitting the report for 2013 is end of May 2014.

Any issues you would like the board to know

- No issues with the project.

A3. Status report DIGREL

22-002 / DIGREL – Reliability analysis of digital systems in PSA context

Status May 2014/Jan-Erik Holmberg, Risk Pilot AB

Task	Status
WGRISK activity (task group) focusing on the development of best practice guidelines on failure modes taxonomy for reliability assessment of digital I&C systems for PSA	Task Group meeting in Paris March 3–4, 2014. Status reported to OECD/NEA WGRISK Paris March 4, 2014. Final draft of the report prepared. Paper prepared to PSAM12 conference. Progress 90%
Development of the generic digital I&C system example and associated demonstration PSA-model	Working meeting in Stockholm April 25, 2014. Detailed working plan made for 2014 tasks. Progress 15%
Finnish-Swedish-German collaboration specifically on software modelling and quantification	Phone meeting organised April 4, 2014. Detailed working plan made for 2014 tasks. Paper prepared to PSAM12 conference. Progress 15%
Nordic end user workshop	NKS/DIGREL seminar will be organised on January 15, 2015 in Stockholm. Progress 5%
Final reports (public NKS report) - overall DIGREL report - software reliability report	Outlines of the reports prepared. Final versions will be ready in January 2015 Progress 20%

No deviation to the original plan

Overall progress 20%

A4. Status report DPSA

STATUS REPORT OF NKS-DPSA PROJECT IN 2014
May 06, 2014

Work at Royal Institute of Technology (KTH)
Pavel Kudinov, Viet-Anh Phung, Sergey Galushin, Kaspar Kööp, Yuri Vorobyev.

Task 1. To develop further the methodology for application of IDPSA with PSA/DSA to the Nordic nuclear energy industry and regulatory needs.
Status: Development of approaches to identification and characterization of failure domains using Integrated DPSA (IDPSA) data is ongoing. Development of conceptual approaches for establishing connections between PSA-L2 and failure domains which can be identified with IDPSA for the debris bed coolability and steam explosion issues is ongoing in collaboration with LRC.
Task completion: 15 %

Task 2. To address further in-depth following issues of risk importance for different severe accident scenarios: 2.1. Relocation of the core melt to the lower plenum, as initial conditions for the melt-vessel structure interactions, melt release and ex-vessel steam explosion and debris bed coolability in Nordic BWRs; 2.2. The influence of timing in PSA level 1 sequences and possible recovery actions on the amount and properties of the melt in the lower head.
Status: PSA-L1 scenarios have been grouped according to different vessel failure sequences (early/late, high/low pressure). Identification and analysis of scenarios in Nordic type BWR severe accidents sensitive to timing of events for (i) in-vessel stage, (ii) vessel failure modes, and (iii) ex-vessel accident progression analysis is ongoing. Analysis of the influence of failure and recovery timing of ADS, ECCS, Auxiliary Feedwater, and residual heat removal systems on core relocation sequences is ongoing. MELCOR code coupled to GA-IDPSA with scenario classification and clustering approach is used in the analysis in order to establish connections between timing in scenarios and configurations of the debris in the Reactor Pressure Vessel lover head. These configurations provide input for analysis of further accident progression, vessel failure and melt release modes. Clarification of the cliff-edge effect obtained in the analysis with regards to the mass of relocated core materials to the lower plenum (either large relocation masses (> 100 tons) or very small mass) is ongoing.
Development of approach to comparison of MELCOR and MAAP results for prediction of accident scenarios and core degradation sequences is ongoing.
Task completion: 15 %

Task 3. To suggest improved approaches to modelling of steam explosion and coolability risks in PSA, considering information provided from IDPSA analysis.
Status: Areas for potential improvement of PSA-L2 modeling of in-vessel and ex-vessel accident progression taking into account timing of the events and physics of the phenomena are under consideration in collaboration with LRC.
Task completion: 15 %

Deliverable 1. Report on development and application of IDPSA to analysis of core melt relocation to the lower plenum, as initial conditions for the melt release and ex-vessel steam explosion and debris bed coolability in Nordic BWRs, taking into account the influence of timing in PSA level 1 sequences and possible recovery actions.
Status: Report for 2014 has not been started yet.

Deliverable 2. Report on improved approaches to modelling of steam explosion and coolability risks in PSA, considering information provided from IDPSA analysis.
Status: Report for 2014 has not been started yet.

Work at VTT

Ilkka Karanta, Taneli Silvonen.

Task 1. To develop further the methodology for application of IDPSA with PSA/DSA to the Nordic nuclear energy industry and regulatory needs.
Status: Feasibility of different approaches to data exchange between PSA and DPSA tools is under investigation.
Task completion: 15 %

Task 2. To address further in-depth following issues of risk importance for different severe accident scenarios: 2.1. Relocation of the core melt to the lower plenum, as initial conditions for the melt-vessel structure interactions, melt release and ex-vessel steam explosion and debris bed coolability in Nordic BWRs; 2.2. The influence of timing in PSA level 1 sequences and possible recovery actions on the amount and properties of the melt in the lower head.
Status: Steam explosion case study using IDPSA methodology has been performed last year for Olkiluoto NPP units 1&2 in Finland. Knowledge obtained from MELCOR simulations were implemented into a probabilistic containment event tree model of the plant constructed with SPSA. Emphasis of the study was on the probabilistic side of the analysis. This year the already existing analyses are supplemented by performing case specific ex-vessel steam explosion simulations using MC3D code. The analysis cases are derived from those scenarios analyzed with MELCOR last year which resulted in vessel melt-through. The possible different vessel failure modes are taken into account as well. Explosion strength depends on e.g. parameter values used in premixing calculations and the time when explosion trigger occurs, and these factors are looked into in a brief sensitivity analysis. Results on explosion strength are compared to values used in last year's event tree model and literature (e.g. SERENA project)

Task completion: 75 %

Task 3. To suggest improved approaches to modelling of steam explosion and coolability risks in PSA, considering information provided from IDPSA analysis.
Status: The ex-vessel debris coolability issue is taken into account by examining literature of analytical treatment of ex-vessel debris coolability. The ultimate goal is to obtain an improved risk-informed approach to debris coolability problem for level 2 PRA purposes using IDPSA methodology.

Task completion: 40 %

Deliverable 1. Report on development and application of IDPSA to analysis of core melt relocation to the lower plenum, as initial conditions for the melt release and ex-vessel steam explosion and debris bed coolability in Nordic BWRs, taking into account the influence of timing in PSA level 1 sequences and possible recovery actions.
Status: Nearly all MC3D simulations of ex-vessel steam explosions in a BWR plant, including a brief sensitivity analysis, have been performed and interpretation of results is underway. Reporting has been started.

Deliverable 2. Report on improved approaches to modelling of steam explosion and coolability risks in PSA, considering information provided from IDPSA analysis.
Status: Literature of analytical treatment of ex-vessel debris coolability has been collected and reporting has been started.

Work at Lloyd's Register Consulting

Yvonne Adolfsson, Ola Bäckström

Task 1. To develop further the methodology for application of IDPSA with PSA/DSA to the Nordic nuclear energy industry and regulatory needs.
Status: Feasibility of different approaches to data exchange between DSA and DPSA tools is under investigation. Development of conceptual approaches for establishing connections between PSA and IDPSA has been started in collaboration with KTH. Investigation of feasibility of using cut-sets for such exchange between PSA and IDPSA is ongoing.
Task completion: 15 %

Task 2. To address further in-depth following issues of risk importance for different severe accident scenarios: 2.1. Relocation of the core melt to the lower plenum, as initial conditions for the melt-vessel structure interactions, melt release and ex-vessel steam explosion and debris bed coolability in Nordic BWRs; 2.2. The influence of timing in PSA level 1 sequences and possible recovery actions on the amount and properties of the melt in the lower head.
Status: MAAP code analysis of core relocation scenarios for relevant sequences is ongoing with the goal of comparison to MELCOR predictions and identification of the major sources of uncertainties in prediction of the effects of timing of events on severe accident progression. Identifications of need for model adjustments and need for complementing MELCOR with additional systems is also on-going. A Master Thesis study within this field has started in cooperation with KTH.
Task completion: 15 %

Task 3. To suggest improved approaches to modelling of steam explosion and coolability risks in PSA, considering information provided from IDPSA analysis.
Status: Work on summary of current PSA-2 modeling approaches and suggestions for improvements for a reference Nordic type BWR design for (i) in-vessel stage, (ii) vessel failure modes, and (iii) ex-vessel accident progression analysis is ongoing and coordinated with a utility.
Task completion: 15 %

Deliverable 1. Report on development and application of IDPSA to analysis of core melt relocation to the lower plenum, as initial conditions for the melt release and ex-vessel steam explosion and debris bed coolability in Nordic BWRs, taking into account the influence of timing in PSA level 1 sequences and possible recovery actions.
Status: Report for 2014 has not been started yet.

Deliverable 2. Report on improved approaches to modelling of steam explosion and coolability risks in PSA, considering information provided from IDPSA analysis.
Status: Report for 2014 has not been started yet.

Overall Project Summary

Comparison between plans and results with explanation of any deviations:
- There are no major deviations between plans and results.

Expected submit date of the final report
- Draft version of the report for 2013 has been developed. Expected date for submitting the final version of the report is mid of May 2014.

Any issues you would like the board to know
- No issues with the project.

A5. Status report ENPOOL

STATUS of NORTHNET RM3 and ENPOOL-NKS ACTIVITIES, May 7th, 2014

Work at LUT, Markku Puustinen, Jani Laine, Antti Räsänen, Lauri Pyy and Joonas Telkkä

Deliverable 1: Execution of the experiment series with a sparger
Design of the sparger model to be used in the tests is under discussion. The test series will be done in autumn. A detailed test plan will be agreed with KTH.

Deliverable 2: Reporting of the sparger experiments
No progress. Expected submit date of the report is November 30th, 2014.

Deliverable 3: Execution of the experiment series on DCC
Facility preparations for the tests are under way. The DN100 blowdown pipe and the new three high speed cameras will be used in the tests. The laser of the PIV measurement system is being repaired by the manufacture. The test series will start as soon as the PIV laser has returned to LUT.

Deviation: The beginning of the test series is delayed by two months due to the problems with the PIV system.

Deliverable 4: Reporting of the DCC experiments
No progress. Expected submit date of the report is September 30th, 2014.

Deliverable 5: Delivery of relevant experiment data to the simulation partners.
No progress.

Work at VTT, Timo Pättikangas, Antti Timperi and Jarto Niemi, VTT

Deliverable 1: CFD calculations of blowdown with model of a sector of BWR containment
Implementation and improving "The large interface model" in Fluent has been continued. Some numerical problems in the implementation of the large interface tracking model still exist. Resource problems have delayed performing of the subtask. One project team member returns from leave of absence in June, which improves the resource situation. Final simulations with the model will be started in August.

Deliverable 2: FEM calculations of chugging loads in BWR containment
Modelling of pressure pulse in water has been studied with the Star-CCM+ CFD code by using different time steps and time discretizations as well as single- and double-precision solutions. FSI calculations using coupling of Star-CCM+ CFD and Abaqus FEM codes have been started. The bi-directional explicit and implicit FSI couplings have been so far briefly tested in a simplified test case.

The final calculations of the BWR containment have been delayed until August.

Deliverable 3: Summary report on the CFD and FEM methods developed in the project
This subtask will be started in August.

Deviation: Resource problems have delayed the progress of the project. Situation improves in June, when one member of the project team returns from leave of absence.

Work at Royal Institute of Technology (KTH), Hua Li, Walter Villanueva and Pavel Kudinov

Deliverable 1: Further development of the Effective Heat Source and Effective Momentum Source models for spargers and RHR nozzles
Pre-test analysis with proposed designs of sparger and RHR nozzles is ongoing. The final designs of the sparger and RHR nozzles will be agreed with LUT.

Deliverable 2: Validation of the models against latest available PPOOLEX data
Validation of EHS/EMS models against recently concluded PPOOLEX MIX-07 to MIX-12 tests has been performed.

Deliverable 3: Pre- and Post-test simulations of the new series PPOOLEX tests
No progress.

Deliverable 4: Report on the model development and validation
No progress.

A6. Status report HUMAX

Project: Maximizing Human Performance in Maintenance (HUMAX)

The purpose of the HUMAX project is to provide recommendations on how to improve the effectiveness of Human Performance Tools (HPTs) in maintenance work. The recommendations will be developed based on insights from three case studies at Nordic nuclear power plants (Ringhals, TVO and Loviisa), an international questionnaire survey, and a literature review.

Overall, the project is progressing according to plan.

Project Group in 2014: Pia Oedewald (VTT), Teemu Reiman (VTT), Kaupo Viitanen (VTT), Christer Axelsson (RAB), Rossella Bisio (IFE) and Ann Britt Skjerve (IFE, co-ordinator).

Milestones:

No.	Activities	Duration (planned)	Status
1	Literature review	January-Mach 2013	Completed in 2013
2	Conclude analyses of the three case studies, and write 1-2 scientific papers based on the results obtained.	March-November 2014	The preliminary results of the three case studies were documented in the intermediate report, January 2014. Abstract accepted for presentation at WOS.net 2014 (details below).
3	Conclude analysis of the international survey.	March-November 2014	On-going
4	Develop recommendations on how to design and implement HPTs.	March-April 2014 and August-October	On-going
5	Disseminate findings.	Continuous dialogues with the power companies	
6	Final report	December 2014	

Overall status:

Overall, the project progresses according to plan.

Analyses of data obtained in the three case studies at Nordic plants (TVO, Loviisa and Ringhals) are in their final phases. Data collection in the international survey has been completed, and data analysis is currently ongoing.

Project coordination is carried out using regular video-meetings, where we discuss and coordinate the ongoing research activities.

Status on the individual activities:

Ad 1) Literature review (2013)
A literature review has been carried out and documented *complete draft* format. The scope of the review was to provide project members with a summarised presentation of the main assumptions and characteristics of the human performance programme movement.

Ad 2) Conclude analyses of the three case studies, and write 1-2 scientific papers based on the results obtained
The project comprises three case studies at Nordic plants. Data was collected during 2013.

- **The Ringhals case:** Data collection has been completed: 9 interviews (2 engineers and 1 group leader from the mechanical, electrical and I&C maintenance departments, respectively) and a web-based survey administered to maintenance staff (337 persons).
- **The TVO case:** Data collection has been completed: 15 interviews (12 maintenance workers and supervisors, 3 control room operators) and a couple of survey questions concerning human performance tools were added at TVO's regular safety culture survey.
- **The Loviisa case:** Data collection has been completed: 22 interviews (maintenance supervisors and managers) and regular meetings have been arranged where the findings have been discussed.

The preliminary results of the three case studies were documented in: Oedewald, P., Skjerve, A.B., Axelsson, C., Viitanen, K., Pietikäinen, E., Reiman, T., 2014. The expected and experienced benefits of Human performance tools in nuclear power plant maintenance activities. Intermediate report of HUMAX project. Nordic nuclear safety research, NKS-300, Roskilde, Denmark.

Abstract accepted for presentation at Wos.net 7th international conference, 30 September - 03 October 2014 Glasgow, Scotland, UK: Oedewald, P., Skjerve, A.B., Axelsson, C. Viitanen, K., Reiman, T: Expected and experienced benefits of Human Performance Tools in nuclear power maintenance activities. In this paper, we will expand on the topics addressed in the intermediate report.

Ad 3) Conclude analysis of the international survey
The purpose of the international survey was to gain better understanding on the expected and measured benefits of using Human Performance Tools, as well as insights into success factors associated with their implementation. The survey was designed based on the insights obtained from the three case studies, and distributed to 1055 respondents, identified based on participation in international meetings focusing on various aspects of Human Performance Programs. The survey received 135 responses from at least 47 organisations (many of the respondents did not indicate where they came from) mainly from North America and Europe. The analysis of data obtained in is currently ongoing.

Ad 4) Develop recommendations on how to design and implement HPTs

A scheme has been developed to facilitate documentation of and dialogues about potential recommendations, identified based on the findings in the study. The goal of this activity is to generate a list containing 15-25 recommendations, which may be of generic use to Nordic plants by December 2014.

Ad 5) Disseminate findings

The preliminary outcome from the case studies on Nordic plants was presented at the Working Group on Human and Organisational Factors (WGHOF) meeting in Paris, 26th March. Parts of the lessons learned about safety management in the HUMAX project have been included in a paper to be presented in a Technical Meeting at IAEA, 10-13 June 2014.

Expected submit date of the final report:
We expect to submit the *final report* 31, December 2014.

A7. Status report L3PSA

Lloyd's Register Consulting

Working together for a safer world

Memo

NKS-R L3PSA - Addressing off-site consequence criteria using Level 3 PSA : Spring 2014 status report from NKS-R L3PSA

To:	NKS	**Cc:**	
From:	Andrew Wallin Caldwell	**Date:**	6 May 2014
Project no:	211593		

1 Summary

Progress of the activity

The first year activities, which included an industrial survey, an investigation of appropriate risk metrics, and participation in the development of guidelines and standards, are mostly completed. The next phase of the project will primarily focus on the pilot project and the guidance document.

The pilot project is split amongst a Finnish Project, and a Swedish Project. The Finnish project has been underway since 2013, while the Swedish project is starting in earnest this year (2014). A significant amount of the work that has been performed on both pilot projects to date is the pilot project planning. This includes outlining the project goals, required inputs, definition of the steps required for performing such a study and the reports that will be produced.

The guidance document work is also in the planning stages. The larger share of the 2014 resources will be allocated toward the pilot study, while a larger share of the 2015 funds are planned to be applied to the guidance document development.

A comparison between plans and results with explanation of any deviations

The project is proceeding as planned in the project plan that was developed during 2013.

It must be noted that the budget for the project is limited. Thus far, the working group, stakeholders, and parties interested in the project have been quite enthusiastic and ambitious in what can be accomplished under the Task 3 guidance document and the Task 4 pilot project. It is important to be mindful of the resources and scope of the project, and continue to be mindful of scope creep and analysis limitation throughout the duration of the project.

Expected submission date for Phase II of project

The second year seminar will be held on January 20th, 2015. The second year report will be completed immediately following that meeting (approximately middle of February 2015), incorporating the findings from the seminar.

2 Introduction

The Level 3 Probabilistic Safety Analysis (Level 3 PSA) project is seeking to deepen Nordic understanding about the merits and limitations of probabilistic off-site consequence analysis for nuclear facilities. The project began in 2013, and is entering its second year of a planned three years. The project's first year focused on the development and analysis of an industrial survey about Level 3 PSA,

which included several workshops and meetings with Nordic utilities, regulators, and safety experts. Level 3 PSA risk metrics including health, environmental, and economic effects have been researched and discussed in the first year's project report. The project has generated significant interest internationally and has interfaced with international organizations including the IAEA and the American Nuclear Society. The ultimate goal of the project is to produce a guidance document for Level 3 PSA in Nordic countries.

3 Progress of the activity

After completing a large survey, an investigation of appropriate risk metrics, and being directly involved in international drafting guides and working groups in the first year of the project, the second year will be focused on performing Level 3 PSA and formulating guidance based on the previous year's work and the progress completed during this year.

3.1 Project funding

This project is partly funded by NKS and partly by Nordic and Finnish utilities and the Swedish regulator SSM. The work is being performed by Scandpower in cooperation with (ÅF) ES-konsult (Sweden), Risk Pilot (Sweden) and VTT (Finland). The Finnish participation is funded also by the SAFIR program.

3.2 Project timeline, distribution and deliverables

The total project is divided in three phases, phase 1 representing the scope of work to be conducted during 2013, and phase 2 and 3 covers scope of work for 2014 and 2015 respectively. The distribution of the total work is outlined in the Table 1. The project deliverables are summarized in Table 2.

Table 1. Distrubtion of project tasks over duration of the project.

Task	2013	2014	2015
Task 0 – Industry Survey	100%	-	-
Task 1 – Appropriate Risk Metrics	75%	25%	-
Task 2 – Regulation, guides and standards	75%	25%	-
Task 4 – Pilot application and tools	-	50%	50%
Task 3 – Guidance document	-	33%	67%
Project management	33%	33%	33%

Table 2. List of project deliverables.

Deliverable	Date
Detailed project plan	May 2013 (complete)
Reference group meeting	May. 2013 (complete)

Project seminar 1	Jan. 2014 (complete)
First year report	Jan. 2014 (complete)
Major Sub-report Survey of Level 3 PSA Industrial Purpose/Application Status of Task 1 - Risk Metrics (~75%) Status of Task 2 - Regulation & Standards (~75%) Status of Pilot Application (SAFIR/PRADA – VTT)	
Project seminar 2	Jan. 2015
Second year report	Jan. 2015
Major Sub-reports Level 3 PSA Risk Metrics Report Level 3 PSA Regulation, Guides and Standards Report Status of Pilot Application (33%)	
Final report (Following year 3)	Jan. 2016
Major Sub-report Level 3 PSA Guidance document Input from previous tasks including pilot application Including: 1. Recommendations for Level 1 and 2 PSA 2. Methodology guidance	

3.3 Project setup

One challenge presented in this work is the coordination of several organizations within the working group. Since there are several organizations that are working in the project a project set-up meeting was held in the spring of 2013 where it was discussed which organization will take lead in which tasks during 2013. Leading organizations for different tasks are given in Table 3. LR Consulting is acting as project coordinator.

Table 3. Task coordination.

Task	Leading org.
Task 0 – Industry Survey	ÅF (ES-konsult)
Task 1 – Appropriate Risk Metrics	Risk Pilot
Task 2 – Regulation, guides and standards	LR Consulting

Task 4 – Pilot application and tools	VTT
Task 3 – Guidance document	All
Project management	LR Consulting

The funding organizations is also composed of several organizations, and have been involved in the project as stakeholders:

- Swedish NPPs: OKG, RAB and FKA
- Swedish regulator: SSE
- Finnish NPPs (through SAFIR): TVO, Fortum and Fennovoima
- Finnish regulator (through SAFIR): STUK

Other stakeholders have also been identified, e.g. insurance companies, but since they are not part of the funding organizations they are not listed here. They are however of relevance for the project when it comes to Task 0 (see below)

During the project the following meetings have been held that involve above listed stakeholders:

- 2013-05-08: WebEx meeting with stakeholders to discuss project plan and involvement of stakeholders.
- 2013-10-02: NPSAG Autumn Seminar - Presentation of project status and general discussions with Swedish stakeholders

More detailed information about project progress is given below.

4 First year activities (2013)

There were many highlights from the previous year's work. Some of the accomplishments from last year's work are summarized in this section. The activities that are on going this year (2014) are summarized in Section 5.

Task 0 – Questionnaire

The purpose of the questionnaire was to collect base information about current international practices and motivations of utilities and regulators for Level 3 PSA. Even though Level 3 PSA is required only in a few countries, the interest is broader. The results from the questionnaire will contribute to the scope and contents of the Task 3 guidance document and the development of the Task 4 Pilot project.

The results of the questionnaire highlighted many varied insights, interests, and concerns for Level 3 PSA.

The possible advantages of Level 3 PSA were summarized as follows:

- Facilitate communication with insurance companies and the analysis could lead to better insurance possibilities
- Facilitate communication with the society in large and thereby create higher acceptance for nuclear power in society
- Better understanding of societal risks of commercial nuclear power and thereby improve preparedness work
- Provide better design and siting considerations for new construction projects
- Cost benefit metric for plant retrofits

- Improve and extend earlier levels of PSA, Level 1 and 2, in creating a more holistic point of view (this is not a unified opinion).

The respondents cited that the main challenge to Level 3 PSA are the uncertainties involved in the calculation, which themselves may be difficult to quantify. Since the challenges to Level 3 PSA are still somewhat undefined further study into the capability of Level 3 PSA is warranted.

Task 1 – Risk Metrics

Task 1 defined three categories of metrics

- Health effects
- Environmental effects
- Economic effects

It was determined that Health effects need to be a focus of the pilot project as it is fundamental to what one thinks of when discussing Level 3 PSA. Environmental effects are almost as fundamental. This could be essential when discussing filtered venting for example. Economics may not be "necessary" but is of high interest.

A risk metric has two components: 1) probability metric and 2) consequence (or impact) metric. Regarding the probability metric, it is a matter of choosing the normalization unit for risk comparison purposes. The consequence metric is associated with the impacts that are quantified in the consequence assessment part of Level 3 PSA.

Consequence metrics were categorized into health effects, environmental impact, and economic impacts. Health effects and environmental impact are rather similar impact metrics from the estimation and purpose point of view. The assessment of these impact metrics should be of interest for all stakeholders. It could be expected that even internationally the stakeholders could agree on which metric to use and risk criteria to be applied. At least for health effects, there are references for safety goals and associated numerical criteria. For the environmental impact, numerical criteria may not be necessary.

There are a number of open issues to be further explored, e.g., how far in time and place the estimations need to be done, i.e., what is the time frame for the risk metrics and how far away from the plant should the impact be accounted for? The pilot study, which is planned within the project, should elaborate more on these risk metrics when the scope of the study is determined. The pilot study should also elaborate how level 2 PSA release category related risk metrics could be used as surrogates for level 3 PSA criteria.

Task 2 – Regulations, guides, standards

International work in Level 3 PSA is ongoing. During the past year significant work was performed at the IAEA. In previous years there was significant progress in the ANS Standard on Level 3 PSA, however, last year little work was performed on the Level 3 PSA standard.

The IAEA work is planned to continue with TECDOC meeting May 2014.

The work in the Task 2 area will continue through 2014. The focus on the continuation of these activities will be the development of the IAEA Level 3 PSA TECDOC, which will have several Consultant meetings over the coming years.

Internationally, there is a significant amount of work being done in Level 3 PSA. Countries such as the Netherlands and South Africa continue to maintain Level 3 PSA models as it is part of their regulatory requirements. A Large scale USNRC study is underway and preliminary results will begin to be discussed and later published in the coming years. Development of a possible replacement to the COYSMA program is underway and being discussed. There is also significant interest in this NPSAG / NKS project on Level 3 PSA and the next year seminar shall be planned at least 6 months in advance to accommodate the international participants.

Task 3 – Guidance document

Work on the guidance document will begin during this year, however, the focus of the work this year will be the pilot project.

Task 4 – Pilot project

- The Finnish project began during 2013. The Swedish part of the project will being during 2013.
- The Finnish pilot project will investigate the Fukushima scenario.
- Currently, the pilot project plan is out for Finnish stakeholder comments
- The plan to continue further with the technical work is March 2014.

The main result of Task 4 in the first year is a plan for a pilot study. In it, the IDPSA methodology will be applied to the Fukushima Daiichi NPP disaster. It seems that this is the first time when IDPSA is applied on level 3, and therefore valuable experience on the application may be obtained.

There are several issues concerning Fukushima. The first is that there were several source terms at different times from different sources (reactors and used fuel storage). Significant sources of uncertainty include source terms and the amount of population in the affected area. All of these issues have to be addressed computationally in the pilot study.

5 Development of current year activities (2014)

The working group has held two meetings following the first year seminar which took place on January 21st 2014. A brief description of the meetings is provided in Table 4. The first year seminar marked the completion of *Task 0 – Industrial Survey* and *Task 1 – Appropriate Risk Metrics*. The activities within *Task 2 – Regulations, guides, and standards* are ongoing and summarized in Section 5.3.

Table 4. 2014 Project meetings.

Meeting / Date	Description
First Year Seminar – January 21st, 2014	Description to stakeholders and all interested in attending about the activities performed during the first year of the project
Phase II planning meeting – February 27th, 2014	Develop detailed plan and actions for Task 3 guidance document, and Task 4 Pilot project described in Sections 5.1 and 5.2, respectively.
Spring update meeting – April 23rd, 2014	Working group meeting, discussing the progress of each of the members on the actions outlined in the Phase II planning meeting.

5.1 Swedish pilot project

The pilot project will be the primary focus of the 2014 activities within the project.

The tools and methods used for performing the analysis will be limited to those that are available and the where the working group has experience. This means that the study will be based on the thesis work by Andrew Caldwell[1].

1 Caldwell, A.2012. "Addressing Off-site Consequence Criteria Using Level 3 Probabilistic Safety Assessment". M.Sc. Thesis, KTH Royal Institute of Technology, Stockholm. ISSN 0280-316X

To date, much of the focus has been on planning the pilot project and collecting input data.

5.1.1 Goals of the pilot project

The project group outlined a list of goals during the first planning meeting. Goals were formulated on a relatively high level. The final list of goals ended up being rather lengthy, as well as, quite optimistic. The budget of the project is quite limited, but the working-group will do everything possible to meet the following list of goals:

- Clarify what insights that can be gained from a Level 3 PSA
  - Demonstrate what additional can be gained in addition to Level 2 PSA (e.g. when threshold criteria are imposed on nuclear releases what if threshold is exceeded marginally or substantially)
- Demonstrate the resources required to perform a Level 3 PSA
- Clearer understanding of what the key uncertainties are
- How the existing release category structure fits-in to off-site consequence needs
- Gain insight in the application of the risk metrics proposed in Task 1
- Support the guidance document and provide practical background to the guidance
  - Demonstrate and capture lessons learned and applied/communicated in Guidance Document.
- Identify development needs and future work
- Provide additional, practical insight, for contributing to external organizations e.g. IAEA
- What is the risk importance of the filter system
  - could be key to include environmental / contaminated area
- To what level of detail can certain conclusions be drawn, how well do "shortcuts" and surrogates provide insight to off-site consequence analysis?

5.2 Swedish pilot project organization

Three reports will be developed over the course of the pilot project:

- Level 3 PSA Pilot Study input specification
  - Based on LENA requirements / assumptions what inputs are need
  - what formats are required
  - What limitations have been found
  - What additional information could be (could have been) useful.
  - Complete before Summer semester
- Scope of analysis
  - Satisfy as many of the goals we prescribed in the previous meeting with the resources available
  - Countermeasures
  - Results
  - Uncertainties
  - Complete by year end
  - Start concurrently with Input specification
- Methodology specification
  - Describe LENA
  - Complete by year end
  - Application and result interpretation specification
  - Complete by first half 2015

Lloyd's Register Consulting

Working together for a safer world

5.3 Guidance document

The guidance document represents the central deliverable of the project. A general/draft outline has been formulated for the guidance document.

5.4 Task 2 – Regulations, guides, and standards

Progress on the Level 3 PSA standard has been modest over the past year. The Standard writing committee began work on the standard in 2004, and progress has been somewhat un-even over the past several years. The standard has had periods of significant progress, and periods of somewhat slow development. Judging based on the current status of the Level 3 PSA standard, the related Level 2 PSA standard, and the relatively modest progress of each during the past year, the completion of the ANS/ASME guidance on Level 2 and Level 3 PSA will take several more years.

The IAEA work will continue the next several years. The IAEA TECDOC is in the very early stages of development, and several more Consultant Meetings will be required to continue and eventually complete it. The IAEA has also discussed the possibility of additional regional workshops, but it is possible that there will be no additional regional workshops.

5.5 Comparison between planned and actual progress

The project is proceeding as planned in the project plan that was developed during 2013. In fact, more of the project was completed during 2013 than was earlier planned, which provides additional resources for 2014, specifically for the pilot project and guidance documents.

It must be noted that the budget for the project is limited. Thus far the working group, stakeholders, and the parties interested in the project have been quite enthusiastic and ambitious in what can be accomplished under the Task 3 guidance document and the Task 4 pilot project. It is important to be mindful of the resources and scope of the project.

The next meeting will be a stakeholder meeting held on June 2nd, 2014. This meeting will share the progress which is summarized in this report with the project stakeholders.

6 Expected date for final report

The second year seminar will be held on January 20th, 2015. The second year report will be completed immediately following that meeting, incorporating the findings from the seminar.

7 Other issues for information to NKS/NPSAG

There are no outstanding issues.

A8. Status report Nordic-Gen4

Activity Report
Nordic-Gen4, Nordic Nuclear Forum for Generation IV Reactors
AFT/NKS-R(14)103/12

The purpose of the activity is to promote networking and interaction between research organizations in the Nordic countries within the field of generation IV nuclear reactors. The following actions have been performed or are planned.

1. A student from DTU Nutech is currently undertaking a simulation project at Chalmers, under the supervision of Prof. Demaziere. The project is partly financed from the NKS-R activity.

2. The website nordic-gen4.org has been updated.

3. A new logo has been designed.

4. There will be a meeting at Arlanda airport on June 12 with participants from Chalmers, DTU, VTT, IFE, UU and hopefully KTH. The purpose of the meeting is to update each other on the ongoing research at the different universities/institutes and to do some planning of the upcoming seminar in Lappeenranta.

5. There will be a seminar in Lappeenranta September 4-5, see info on nordic-gen4.org. The seminar is a joint activity between Nordic Gen4 and Gen4Finland.

The final report will be sent no later than 31 January 2015.

The work is proceeding in accordance with the plan.

There are no particular issues to communicate to the NKS-R board.

2014-05-07/Mattias Thuvander, Chalmers

A9. Status report ProCom

Institute for Energy Technology

Note

To: NKS att. Karin Andgren

From: Maren H. Rø Eitrheim

Copy:

Date: 2014-05-06

Measuring Procedure Competence, ProCom, AFT/NKS-R(14)112/13

The NKS project Measuring Procedure Competence utilizes experiences from two areas of work in the international research program at IFE Halden (HRP):

(1) Training of Control Room Operators: Assessment and Improvement
Development of a Team Self-Assessment Tool (TESA)

The Team Self-Assessment Tool (TESA) has been developed to allow control room crews assess their own level of competences. The TESA tool includes basic technical competences and teamwork competences during normal operation, emergencies and outage. A subset of the basic technical competences during emergencies has been selected as a starting point for development of the procedure competence tool.

(2) Resilient Procedure Use

Resilient Procedure Use is a study of staffing and support tools for knowledge-based operator actions in complex scenarios. The simulator study in HAlden Man-Machine LABoratoy (HAMMLAB) provides rich examples of how emergency operator procedures are applied in complex and unexpected situations. We're utilizing simulator runs from this study to test and refine the procedure competence tool. Snapshots from the simulator runs will also be utilized to illustrate the procedure competences in a practitioner's handbook.

Procedure competence and behavioural markers

In this project we look at how control room crews apply emergency operating procedures. By procedure competence, we mean their ability to combine procedure skills, knowledge and attitudes *in practice* to handle emergency situations in an effective and efficient manner, and according to specified plant standards (IAEA, 2006). These competencies may be developed through a combination of education, experience, and training.

To measure procedure competence, an external observer will have to look at the actual performance of the crew. For the 'non-observable' aspects of performance, the observer need to draw conclusions based on the verbal exchange and reflections in the crew, in addition to the actual activities performed. For example, the ability to choose an optimal procedure strategy might be observed through the actual procedure applied and discussions of its purpose and appropriateness in the crew. These are the *behavioural markers* of the procedure strategy competence of the crew, i.e., the concrete, observable behaviours that will be rated by the observer.

IFE, P.O. Box 173, NO-1751 Halden, Norway

IFE

The current version of the procedure competence tool

In the current version of the procedure competence tool, we have suggested four competence areas: procedure planning, procedure execution, utilization of backgrounds, and adaptability. For each of these competence areas, we have specified rating factors (e.g., Ensure sufficient progress) and related behavioural markers (e.g., Major action steps are discussed and given high attention; Briefings are performed if steps are unclear). The rating factors are organized according to a typical time sequence of a scenario (planning, execution, verification etc.). The tool content and language has been evaluated by several process experts and researchers at IFE. The tool has been tested in a number of scenarios in the Resilient Procedure Use study, both online and by use of a Video analysis tool post hoc.

In the current version of the tool, the observer rates each behavioural marker on a 5-point scale (1 is very weak - 5 is very strong). The scores for each of the behavioural markers are then applied for calculating overall competence grades on procedure planning, execution etc. The observer is also encouraged to make comments on observations throughout the session.

Procedure Competence Rating Crew: Scenario: Date: Observer:

No	Competence	Rating factor	Behavioural markers	Weight	Score	Weight X Score	Comp grade	Observations
1	Procedure planning	Choose optimal procedure strategy	The applicability of the procedure strategy is discussed					
		Understand procedure purpose	Procedure goal and main actions explained in own words					
2	Procedure execution	Ensure sufficient progress	Major action steps discussed and given high attention	3				
			Minor steps timely and safely executed	1				
			Briefings performed if steps are unclear	2				
			Look ahead and prepare subsequent procedure steps	2				
		Apply fold out pages	Changes of criteria in fold out pages timely announced	3				
		Monitor Critical Safety Functions (CSF)	Changes of CSF timely alerted and actions started	3				
		Correct transfer to other procedures	Transfer to a new procedure is explained	2				
			SUM					
3	Utilization of backgrounds	Apply additional background information	Relevant background information explained					
			If background applicable, steps are executed accordingly					
		Handle Key Utility Decision Points (KUDP)	KUDP used for decision making when needed					
4	Adaptability	Flexible execution of procedure	If step(s) not applicable, alternative actions performed	3				
		Evaluate procedure effectiveness	Discuss if current procedure brings plant to safe state	3				
		Anticipate possible outcomes	Discuss and predict long term consequences	2				
		Independent thinking	Compare different procedure strategies and main actions	2				
			Agree on final goal and start actions to achieve safe state	2				
		Monitor goal achievement progress	Discuss strategy progress and effectiveness	2				
			SUM					

The current version of the procedure competence tool

On-going test application at KSU Ringhals

The procedure competence tool is currently being tested at KSU Ringhals. Representatives from KSU Ringhals and IFE will have a meeting 8th of May to discuss experiences from using the tool during simulator training and possible improvements to the tool. The tool will then be revised, and a new version released before the summer.

IFE

Progress of the activity

The project is progressing as planned, and according to the time schedule indicated in the NKS contract:

	Activity	Date	Status	Comments
T1	Identification of behaviours that indicate procedure competences (IFE)	01/05	Behavioural markers are identified; a first version of the tool is ready.	
T2	Pilot test of the method (KSU, IFE)	01/08	Ongoing, meeting 08/05	
T3	Review of the method (VTT)	15/09	VTT work will start when the updated version of the tool is ready (before the summer).	VTT will compare the tool with their theoretical model and provide a separate chapter to the final report.
T4	Development of a video illustrating procedure following problems and strategies (IFE)	15/09		
T5	Summary of lessons learned on the use of eye tracking for studying procedure use (IFE)	15/09		
M1	Development of handbook completed (IFE)	01/10	Topics and issues are identified during the tool development.	
M2	Draft report (IFE)	01/11		
	Workshop (all)	15/11	The preliminary plan is to organize a seminar at IFE Halden in September, but we haven't decided dates and agenda yet.	Invite instructors, process experts and researchers to discuss procedure competence rating in HAMMLAB. Eye-tracking possibilities and lessons learned.
T6	Review of report (Ålesund)	01/12		
D1	Final report	31/12		Expected submit date of the final report is 31/12.
D2	Procedure use video	31/12		

Nordisk kernesikkerhedsforskning
Norrœnar kjarnöryggisrannsóknir
Pohjoismainen ydinturvallisuustutkimus
Nordisk kjernesikkerhetsforskning
Nordisk kärnsäkerhetsforskning
Nordic nuclear safety research

NKS-B Status Report

Kasper G. Andersson
NKS-B Programme Manager
May 2014
Technical University of Denmark

Status summary

Overall the work in NKS-B is progressing well. Since the last NKS-B status report was made to the NKS-Board in January 2014, 4 new final reports from completed NKS-B activities have been published on the NKS website. All of the delayed NKS-B activities that commenced prior to 2012 are completed. One activity from 2012 (PUBPLUME) is still delayed. All of the 7 NKS-B activities commencing in 2013 have been completed. Of the 12 NKS-B activities that started in 2014, contracts have been agreed and signed with all. Activities that started in 2014 are all currently on schedule.

NKS-B reports

The following NKS-B reports have been published on the NKS website since the last NKS-Board meeting.

NOVE
P.Holm et al.
Novel neutron detection methods for nuclear security

THYROID
A. Nyander Poulsen et al.
Assessment of accidental uptake of iodine-131 in emergency situations

EMSEM
S.E. Pálsson et al.
Nordic sharing of experience from radiation emergency preparedness exercises

COSEMA
M. Iosjpe et al.
Consequences of severe radioactive releases to Nordic Marine environment

MUD
J. Havskov Sørensen et al.
Meteorological uncertainty of atmospheric dispersion model results MUD. Final report of the NKS-B MUD activity

NKS-B activities from 2012 (January)

PUBPLUME

Preparedness Organization at Nuclear Power Plants in the Nordic countries
Activity Leader: Jan Erik Dyve (NRPA)

NKS-B funding: **150 kDKK**

Milestones defined in contract:
1. Workshop/meeting
2. Final report

Status
Videoconferences were held late in 2012 for coordination of national efforts for the final report (minutes received). Due to heavy work load up to a big international exercise on 14 March 2013, the final report was first delayed until 1st of June 2013. By the end of May 2013, it became apparent that the activity leader would not be able to deliver the final report at the agreed time, and a new revised time plan was agreed on, according to which the activity would be finalised by the 1st of November 2013. The activity leader was consulted up to this deadline, but explained that he had been busy with other, internal tasks in the autumn. However, he said that not very much was missing, but he would also like to include a newly approved 'Flagbook' for the acute phase. The new agreed revised plan was to produce the final report by the end of 2013. A rough draft version was delivered by this time, and commented on. It seems the activity leader has had difficulties – also in the spring of 2014 – getting contributions from partners to the report. He says he shares our concern and has decided to finish the work with internal resources instead. He says he has scheduled work with the report up to the Board meeting.

NKS-B activities from 2014 (January)

NORCON
Nordic nuclear accident consequence analysis
Activity leader: Mark Dowdall (NRPA)

NKS-B funding: **600 kDKK**

Milestones defined in contract:
1. Kick-off meeting
2. Source term derivation - report
3. Dispersion and transport – report
4. Mid term meeting and final report of 1st year of the activity

Status
Contract signed. Kick off meeting held and partner roles agreed. The work will focus on a German reactor and Ringhals. Progress on schedule.

FAUNA
Fukushima accident: Uncertainty of atmospheric dispersion modelling
Activity leader: Jan Havskov Sørensen (DMI)

NKS-B funding: **260 kDKK**

Milestones defined in contract:
1. Kick-off meeting
2. Literature study on source term estimates and atmospheric dispersion regarding the Fukushima Daiichi accident. The source term will be selected from this study for use by the atmospheric models.
3. HIRLAM meteorological forecast model ensembles generated for Japan and surroundings for the period covering the main atmospheric release of radionuclides from the accident. Corresponding meteorological analyses carried out for the periods of concern.

4. Status meeting
5. Selection of scenarios for which the atmospheric dispersion models will be applied, employing the meteorological ensembles, and uncertainty estimates will be derived.
6. Final report

Status
Contract signed. Progress on schedule. Kick-off meeting held, to agree on who does what and when. Minutes received. At the 2014 MetNet meeting, both the FAUNA activity and results from the MUD activity were presented. MetNet started as an NKS-B activity, and has since then continued as an activity in the Nordic Meteorological collaboration NordMet.

NORMIN
NORM related mining in the Nordic countries: Legislation, practices and case studies
Activity leader: Dina Solatie (STUK)

NKS-B funding: **450 kDKK**

Milestones defined in contract:
1. Literature review, summer 2014.
2. Environmental sampling, summer 2014
3. Sample analysis, autumn 2014
4. Sampling and analysis results, Final report by end of 2014

Status
Contract signed. Progress on schedule.

MOBELRAD
Mobile measurement: Field exercise in fallout mapping in the Belarussian exclusion zone
Activity leader: Mark Dowdall (NRPA)

NKS-B funding: **510 kDKK**

Milestones defined in contract:
1. Complete list of team members from each partner
2. Production of information material for the participants covering practicalities etc. Provision of technical information as to what equipment will be transported etc. for each team.
3. All visas, permits and such to be in place for all teams
4. Exercise and workshop in Belarus
5. Production of final report on the exercise
6. Production and submission of peer reviewed paper on the exercise

Status
Contract signed. Activity leader was early in 2014 strongly advised by Belarussian contacts to postpone the expedition to Belarus until the political situation involving the Ukraine, EU, Russia and the United States improves. A new signal from the activity leader is ‘The situation remains unclear but in the absence of a drastic worsening of the situation, I am assuming it will go ahead.

GAMMAUSER 2014
Workshop for users of gamma spectrometry
Activity leader: Òskar Halldórsson Holm (IRSA)

NKS-B funding: **370 kDKK**

Milestones defined in contract:

1. Planning meeting in March
2. First announcement of seminar /intercomparison in March/April
3. Seminar held in the late summer/early fall of 2014
4. Final report delivered in December 2014

Status
Contract signed. Planning meeting held (minutes received). Seminar announced in NewsFlash and on NKS website. Seminar will take place in Helsinki on 7-8 October 2014. Progress on schedule.

NOVE (continued)
Novel neutron detection methods for nuclear security – dynamic testing
Activity leader: Kari Peräjärvi (STUK)

NKS-B funding: **330 kDKK**

Milestones defined in contract:

1. Preliminary local testing, e.g., local preparations for the dynamic intercomparison measurements to be organized at the Finnish Radiation and Nuclear Safety Authority, STUK.
2. Dynamic neutron intercomparison measurements at STUK using well characterised Cf-252 and Am/Be sources.
3. Seminar at the NRPA: 'Outcome of the intercomparison measurements at STUK'.
4. Report on the intercomparison measurements and conclusions. Minutes of the seminar will be attached to the final report as appendix.

Status
Contract signed. Progress on schedule. The dynamic measurements exercise will be held at STUK in September/October (over a two weeks period). The seminar in Norway is scheduled for November. Since the work will produce some results that are too sensitive for public disclosure (or reporting), participation in the seminar will be by invitation only and thus not announced through the normal channels. Of course all Nordic authorities are welcome.

RAPID-TECH
Application of rapid and automated techniques in radiochemical analysis
Activity leader: Jixin Qiao (DTU)

NKS-B funding: **350 kDKK**

Milestones defined in contract:

1. Kick-off meeting and planning.
2. Exchange experiences and summarise challenges.
3. Experimental device and material purchase

4. Summarise experimental experience and progress
5. Final report of first year

Status
Contract signed. Progress on schedule.

THYROIDSEM
Seminar: Assessment of accidental uptake of radioiodine in emergency situations
Activity leader: Asser Poulsen / Henrik Roed (NIRP/SIS)

NKS-B funding: **230 kDKK**

Milestones defined in contract:
1. Invitation of speakers and relevant stakeholders.
2. Distribution and collection of data from questionnaires
3. Seminar day with invited speakers, discussion on THYROID report results, questionnaire outline
4. Proceedings of the seminar

Status
Contract signed. Initial planning work done. The seminar will take place in Copenhagen on the 29th of September 2014. Seminar announcement in NewsFlash and on NKS website is imminent. Progress on schedule.

SEMUNARS
Seminar on unmanned radiometric systems
Activity leader: Magnus Gårdestig (Linköping Univ.)

NKS-B funding: **200 kDKK**

Milestones defined in contract:
1. First call for participants
2. Second call for participants
3. Deadline for abstracts and registration, September
4. The seminar, October, organised by LiU with support from STUK and NRPA
5. Seminar report, December, jointly edited by LiU, STUK and NRPA

Status
Contract signed. Progress on schedule. Seminar announced twice in NewsFlash and on NKS website. Seminar will take place in Linköping on 2-3 October, 2014.

STANDMETHOD
Seminar: Standardisation of radioanalytical methods for determination of important radionuclides for environmental assessment and waste management in Nordic nuclear industry
Activity leader: Xiaolin Hou (DTU)

NKS-B funding: **350 kDKK**

Milestones defined in contract:

1. Initial project meeting
2. Evaluation of the present methods used in the Nordic labs
3. Intercomparison of radioanalytical methods for determination of Ni-63 in water samples
4. Establishment of Nordic network in radioanalysis
5. Project meeting for evaluation of intercomparison results
6. Journal article on present status of radioanalysis in Nordic countries
7. Final report

Status
Contract signed. Progress on schedule. Kick-off telephone meeting held on 27 March (minutes received). A sample intercomparison is being organised.

CONCORE
Characterisation of NORM contaminated objects: reliable and efficient
Activity leader: Charlotte Nielsen (NIRP/SIS)

NKS-B funding: **400 kDKK**

Milestones defined in contract:
1. Initial project meeting. April 2014
2. All samples retrieved. April 2014.
3. Analytical start-up. April 2014
4. Second project meeting: presentation and discussion of results, Sept. 2014
5. Public Nordic NORM guidance. Existing guide revised in accordance with project results, Dec. 2014
6. Communication plan for oil/gas industry established (to be communicated to all relevant stakeholders during 2015), Dec. 2014
7. Final report, Dec. 2014

Status
Contract signed. Progress essentially on schedule. Contaminated pipes were delivered somewhat late, but this slight delay will be overcome over summer.

EFMARE
Effects of dynamic behaviour of Nordic marine environment to radioecological assessments
Activity leader: Mikhail Iosjpe (NRPA)

NKS-B funding: **450 kDKK**

Milestones defined in contract:
1. Work report on development and implementation of a modelling approach and computer code for description of the ingestion of selected radionuclides by marine organisms
2. Work report on testing of the modelling approach from stage 1 on the basis of the hypothetical severe nuclear NPP and submarine reactor cases, analysed in the previous COSEMA activity of the NKS-B research program for the Baltic Sea, the Iceland and Faroese coastal waters.
3. Final report with contributions from all partners

Status
Contract signed. Kick-off meeting held in Oslo, 17-18 March 2014. Progress on schedule.

Working title: NKS seminar on current trends in nuclear safety and emergency preparedness

(Joint NKS R and B)

Venue: Location depends on VIP priorities to be indicated (e.g., by Board and NEP Group members). The choice of a Nordic capitol will simplify travelling. Proposed duration: 1½ (or 2?) days. Proposed time: June 2015 or January 2016.

Planning: The task given to the NKS Coordination Group at the January 2014 Board meeting was to consider possibilities for a Joint R and B Seminar with many activity specific presentations. In view of the success of the January 2013 NKS Fukushima Seminar arrangement, it is proposed to also start this seminar with a suite of 3-4 specially selected international key speakers (perhaps to be committed through our Chairman). It would also seem logical to pick up on key issues presented at the Fukushima Seminar and assess and discuss how the development has since then been in relation to these, and what this implies for Nordic Nuclear and Radiological Safety as it is today and in the future. The weighting of the various issues should be discussed thoroughly (how do we want to focus?). For the activity specific presentations, speakers should be selected carefully to balance the programme wrt., e.g., topics, coordinator countries, and quality/novelty of the work done, and activities should be reasonably new (from the latest perhaps 2 years).

In the following an example list is given of possible general topic (session) headings for the activity presentations. These have been compiled to give approximately equally large blocks wrt. the number of activity reports published by NKS on each topic. The sessions are mixed wrt. R and B, so as to keep the whole audience seated. An attempt has been made to give a logical sequence of topic (session) headings ('bridges' are indicated in brackets). It should be stressed that this is just an example aimed at provoking useful discussion, so we can get an arrangement process started. A Program Committee for the further arrangement would be useful to have (as shown in connection with the Fukushima seminar arrangement).

Reactor physics and thermal hydraulics (R)
(many issues in NKS are closely related to reactor techniques, so this could form a reasonable starting point)
Examples from 2012-14: DECOSE (12/13/14), ENPOOL (12/13/14), POOLFIRE (12/13)

Emergency Preparedness I: experiments, exercises and information (B)
(reactor related issues are crucial in designing measures to improve the preparedness knowledge base on emergencies)
Examples from 2012-14: MOBELRAD (14), SEMUNARS (14), THYROIDSEM (14), GASMAT (13), THYROID (12)

Risk analysis and severe accidents (R)
(on site accident descriptions govern the consequences off site)
Examples from 2012-14: DIGREL (12/13/14), DPSA (13/14), L3PSA (13/14), AIAS-2 (12), RASTEP (12/13)

Emergency Preparedness II: harmonised decision support (B)
(decision support needs both on site and off site parameters)
Examples from 2012-14: FAUNA (14), PUBPLUME (12-?), MUD (12/13), EMSEM/NORDEX-12 (12/13)

Safety culture and plant ageing (R)
(such aspects are important in considering if/when a future emergency might occur)
Examples from 2012-14: HUMAX (13/14), PROCOM (14), MOREMO (12), SADE (12/13), NORDIC-GEN4 (12/14)

Measurement strategy, technology and QA (B)
(measurements are required in planning safety as well as in optimising response)
Examples from 2012-14: CONCORE (14), GAMMAUSER (14), NOVE (13/14), RAPID-TECH (14), STANDMETHOD (14), GAMMATEST (14), RADIOANALYSIS (13), MOMS (12), GammaWorkshops 2012 (12)

Decommissioning and waste management (R)
(decommissioning requires many measurements and environmental assessments)
Examples from 2012-14: DECOMSEM (13) (this session could be made shorter and an other R session longer)

Radioecology and environmental assessments (B)
(radioecology is needed in emergency preparedness as well as in decommissioning)
Examples from 2012-14: EFMARE (14), NORMIN (14), BERMUDA (13/14), COSEMA (13/14)

The comments we got from the attendants of the Fukushima seminar could be useful to take into account. These included:

- 'More time for questions'
- Many requested 'more time for discussion' (however perhaps not so needed for activity specific presentations)
- 'Fewer and a bit longer presentations' (does not seem possible this time due to focus on NKS activities). Others wanted shorter presentations…
- 'A better balance of Nordic vis-à-vis global interests'

The following is an example of how the program might be laid out for a 1½ day seminar. The intention is to give a better feeling of how many presentations it would be possible to accommodate, given that they each have a certain length, but everything is of course highly elastic, and can be weighted entirely differently. The weighting would also depend on the types of activities that will run in 2015 (a largely unknown parameter). The Fukushima element could be strengthened through selection of some of the quite many Fukushima related activities that have run since the Fukushima seminar (especially on the B side). Note that for the latest NKS R/B joint summary seminar in 2009, the allocated time for each of the 23 activity-specific presentation was 25 minutes (incl. questions). In the example below we have 16 activity-specific presentations, each lasting 20 minutes (incl. questions).

Day 1:

12:30 – 13:00 Registration

13:00 – 13:15 Opening, welcome, seminar objectives and topics

13:15 – 15:15 Opening session with international key speakers on the present and future of nuclear and radiological safety

15:15 – 15:45 Coffee

15:45 – 16:25 Two activity presentations on topic 1

16:25 – 17:05 Two activity presentations on topic 2

17:05 – 17:45 Two activity presentations on topic 3

18:00 – 20:30 Mingling buffet reception ?

Day 2:

09:00 – 09:40 Two activity presentations on topic 4

09:40 – 10:20 Two activity presentations on topic 5

10:20 – 10:50 Coffee

10:50 – 11:30 Two activity presentations on topic 6

11:30 – 12:10 Two activity presentations on topic 7

12:10 – 13:10 Lunch

13:10 – 13:50 Two activity presentations on topic 8

13:50 – 14:30 Fukushima specific update on R related issues (speaker(s) and discussion). New developments and related influences and requirements for Nordic areas

14:30 – 15:00 Coffee

15:00 – 15:40 Fukushima specific update on B related issues (speaker(s) and discussion). New developments and related influences and requirements for Nordic areas

15:40 – 16:00 Final discussion and conclusions

Short note on status of the website, NewsLetters etc.

Finn Physant

The NKS Secretariat

Website

- The new version of the website was opened in May 2012 and has so far proven quite flexible and user friendly - especially for carrying out the Fukushima Seminar January 2013.
- For the new sites we started obtaining statistics from a Google site starting November 2012. Here you have some main monthly figures for the first one and a half year:

nks.org user statistics

Date:	Dec. 12	Jan. 13	Feb. 13	Mar. 13	Apr. 13	May. 13	June 13	July 13	Aug. 13	Sep. 13	Oct. 13	Nov. 13	Dec. 13
Visitors:	771	2.110	841	727	1.030	815	623	577	643	1.249	967	742	578
Unique visitors:	562	1.342	642	550	718	562	459	415	481	803	628	546	459
New visitors:	536	1.226	539	474	584	448	374	348	406	648	511	461	397
Returning visitors:	235	884	302	253	446	367	249	229	237	601	456	281	181
Average visit time:	02:54	02:36	02:25	02:32	02:40	03:20	02:50	02:32	02:26	03:33	03:20	02:49	03:35
Video page views					344	92	55	58	27	48	22	17	19

nks.org user statistics

Date:		Jan. 14	Feb. 14	Mar. 14	Apr. 14	May 14
Visitors:		878	1011	969	722	
Unique visitors:		672	763	771	581	
New visitors:		380	370	296	203	
Returning visitors:		498	641	673	519	
Average visit time:		02:36	02:09	02:11	02:31	
Video page views		15	11	11	12	

NewsLetters and NewsFlashes

- Since the last board meeting three NewsFlashes have been distributed.
- January 21: summary report from the January board meeting with the result of CfP 2014.
- February 18: upcoming seminars and new reports etc.
- April 28: upcoming seminars and new reports etc.
- A NewsLetter will be prepared for distribution a week before the board meeting June 2014.

- There is a list of more than 480 e-mail addresses, to which our electronic letters are forwarded.

Other kinds of info material – new pamphlet

- A new and updated English version of the pamphlet “Nordic Nuclear Safety Research” has just been published.

New and recently finalised activities within the NKS Programmes for Nordic cooperation on nuclear reactor safety and emergency preparedness

Karin Andgren[1,2], Kasper G. Andersson[1,3], Sigurður M. Magnússon[1,4] & Finn Physant[1,5]

[1] NKS, Roskilde, Denmark
[2] Vattenfall, Solna, Sweden
[3] DTU Nutech, Roskilde, Denmark
[4] Icelandic Radiation Safety Authority, Reykjavik, Iceland
[5] FRIT, Roskilde, Denmark

Abstract

Over the years, NKS has provided funding for hundreds of research activities in fields comprising reactor safety, decommissioning, nuclear and radiological emergency preparedness, and management of radioactive waste. Advanced technologies and methods developed under the NKS framework have been used within the Nordic countries as well as internationally. Two programme areas are defined under the NKS platform: The NKS-R programme on nuclear reactor safety and the NKS-B programme on emergency preparedness. Three articles, giving an introduction to NKS and its two programmes, were published in Radiation Regulator last year. This paper is aimed at providing a total overview of the NKS activities running in 2013 and 2014.

Introduction

After the annual call for proposals for new activities, members of the NKS board evaluate the proposals with respect to how well they meet the key objectives of NKS. Among these key objectives are: To maintain and strengthen Nordic competence, to develop Nordic cooperation, and to support work, which is relevant to Nordic authorities, organisations, industries and university departments. A funding decision for one year is then made at a board meeting in the beginning of each year. Although more than one million euros was available for NKS to support activities in 2014, this year's decision was unusually difficult because of the large number of high quality proposals. Many NKS activities running in 2013 have very recently been concluded, and all final activity reports are available cost-free on the NKS website. A number of the activity consortia from 2013 have requested and received funding from NKS for additional studies in 2014 with an expanded scope, and also a number of completely new activities have commenced in 2014. This paper gives short descriptions of each of these activities.

NKS-B activities in 2013/2014

Only one of the NKS-B activities in 2014 is a continuation from 2013. No activities related to management of radioactive waste and discharges have been carried out in the latest few years. Brief descriptions of the activities are given below under the headings of the four different research areas of NKS-B:

- *Emergency Preparedness*
- *Measurement Strategies, Technologies and Quality Assurance*
- *Radioecological Assessments*
- *Management of Radioactive Waste and Discharges*

Emergency Preparedness

EMSEM

Nordic cooperation on emergency preparedness issues is useful on many levels, e.g., in developing and conducting exercises and sharing results from national exercises, especially where specific issues of common relevance to Nordic areas are examined. A main task for the EMSEM activity, which ran in 2013, was to address the results of Nordic participation in the recent large Swedish REFOX exercise, and facilitate inter-Nordic cooperation to derive learning points. This was accomplished through the arrangement of a seminar held in Stockholm in August 2013. Seminar sessions included presentations of results from a range of different REFOX exercise scenarios (e.g., carborne search for sources in the environment, suspected dirty bomb area examination, fallout measurements), as well as group discussions on ideas for future improvement of Nordic emergency preparedness, also taking into account results of other recent Nordic exercises.

MOBELRAD

Mobile measurement capacity is an important resource in mapping and addressing widespread contamination scenarios following a nuclear power plant accident or radiological incident. The provision of mobile measurement assets to other countries is a viable means of providing international support. However, mobile measurement teams would be faced with a number of challenges when removed from the resources of the host country. Further, high contamination levels can also lead to special challenges. To strengthen the Nordic capability to conduct mobile measurement strategies under realistic challenging conditions, the newly started MOBELRAD activity will provide an exercise opportunity in the provision of mobile measurement support to a third country following a contaminating event. This will enable participating Nordic organisations to test their equipment, technical and logistical capacities and personnel skills in making measurements in an environment with high contamination levels. The practical part of the activity is planned to be executed in the Belarussian exclusion zone contaminated by the Chernobyl accident.

MUD

The MUD activity examines the uncertainties of atmospheric dispersion model predictions due to meteorological uncertainties, and investigates how these could best be presented to decision makers. Hypothetical releases have been modelled from four nuclear power plants, either in or close to Nordic territory. The releases generally involve emissions over a period of 6 hours of the radionuclides Cs-134, I-131, Xe-135 and Pu-239. Four different meteorological scenarios with full forecast series of 54 hours have been defined. The Danish atmospheric dispersion model DERMA and the Norwegian atmospheric dispersion model EEMEP have been run for each release scenario from the nuclear power plants and each of the four meteorological scenarios, each involving 25 ensemble members of the DMI meteorological ensemble prediction systems. The dispersion model results have in some cases been found to vary considerably across the ensemble.

FAUNA

The newly started FAUNA activity builds on the lessons learned and ensemble statistical methodologies developed in the MUD activity, by applying these to the Fukushima Daiichi nuclear power plant accident scenario. The activity addresses real-time forecasting of atmospheric dispersion and deposition of radionuclides released from a nuclear power plant considering the associated meteorological uncertainties. The MUD activity demonstrated that

these uncertainties may under some weather conditions be considerable, leading to large uncertainties in dispersion modelling results. The FAUNA activity will carry out investigations of the meteorological uncertainties on real-time assessments of geographical areas affected by radioactivity from the Fukushima accident. The predictions will be made available to the ARGOS decision support system for illustration and dose modelling.

NORCON

The NORCON activity, which runs in 2014, will highlight the Nordic capabilities for assessment of dispersion and migration of radioactive contamination after a nuclear power plant accident in the Nordic region, and the associated long term consequences to humans, the environment and society. The participating organisations will conduct assessments based on a common source term (primarily a hypothetical release from the Ringhals facility in Sweden) and conditions that would be considered realistic if an accident occurred in a Nordic country. Each participating country will on the basis of their own scenario modelling make an assessment of the situation in-line with what would be done in case of a severe accident. Methods of assessment, outputs and the implications for the associated decision making process will be examined and compared, enhancing the understanding of how the Nordic countries respond to nuclear accidents, both individually and on the regional level.

PUBPLUME

This activity addresses the question of how to communicate results of atmospheric dispersion modelling of radioactive contaminants to the public. Following the Fukushima accident there was a considerable demand from media as well as from other Nordic authorities for information showing the dispersion of the release. The question was which products would serve the purpose best, and how to format the information. This activity brings together experts on emergency response, atmospheric dispersion modelling and public communication with the goal of jointly issuing Nordic recommendations on how to produce and present different dispersion products to the public. If such recommendations are adopted, it should be faster and easier to publish dispersion products, and the quality of the information given can be optimized. Factors to be taken into account include relevant types of accidents and incidents, target groups for the information, timing issues, types of dispersion products to publish, layout and design, and responsibility and quality assurance.

SEMUNARS

As reflected in the amount of Nordic publications on the topic, there is currently a fruitful collaboration between the Nordic countries in relation to mobile gamma-ray spectrometry. Steps have also been taken in some Nordic countries to investigate the possibilities of employing unmanned systems in radiological assessments, but so far no joint Nordic activities have been carried out in this context. However, the technological development of unmanned systems has now reached a level of maturity that would allow exploitation in various safety and security related applications. The existing experience needs further dissemination and attention, and it is the objective of the SEMUNARS activity to facilitate this through the arrangement of a seminar on unmanned radiometric systems, which is to be held in Linköping, Sweden, on 2-3 October 2014. Thematic topics for presentations and discussions include platforms, detectors, air sampling using unmanned systems, envisaged applications/scenarios, methods and strategies, calibration/validation, demonstrations, joint exercises and future Nordic collaboration. Further information on the seminar can be found on the NKS website.

THYROID
Reliable and rapid quantification of radioiodine uptake in thyroid glands may be needed in different types of emergency scenarios. For instance, following the Fukushima accident, a large fraction of the children in Fukushima Prefecture experienced thyroid exposure to radiation. On the background of such measurements, persons significantly exposed to radioiodine, either through inhalation or ingestion, can be identified, and further measurement needs and needs for medical measures can be planned. In the THYROID activity calibration of thyroid monitoring equipment in the Nordic countries was harmonized. A total of 38 sites in the Nordic region were identified, which have equipment that can be used for thyroid screening for radioiodine contamination. Altogether, 93 instruments were calibrated in the activity. The harmonized calibration effort provides a common Nordic traceability chain, facilitating evaluation of the impact of exposure of large groups and associated risks.

THYROIDSEM
Following up on the establishment in the THYROID activity of a Nordic regional inventory of measurement capabilities for radioiodine measurement in thyroids, a seminar will be held in 2014 to discuss the results and conclusions of the calibration work carried out in 2013. The focus will be on the role of thyroid measurements in preparedness, and the overall goal will be to further strengthen dose assessment competences and give recommendations on measurement procedures and instrument requirements. Key speakers and a range of stakeholders will receive special invitations, and participants will be asked to answer a questionnaire, which will form the basis for a discussion of key issues. The seminar will be announced in NKS NewsFlashes as well as on the NKS website.

Measurement Strategies, Technologies and Quality Assurance

CONCORE
On and off shore gas producers are currently main producers of technically enhanced naturally occurring radioactive material (NORM) and associated waste in the Nordic region. The amounts of materials that are categorized as NORM contaminated equipment and waste may to some extent reflect the procedures and measurement techniques applied. Different procedures are currently followed for NORM categorization, e.g., by Nordic operators in the North Sea. Various parameters may affect the measurement accuracy and cause wrong material categorization. The new CONCORE activity aims to develop a common scientifically based Nordic recommendation set for practicable and reliable characterization of NORM contaminated objects. Experimental work in the activity will address challenges in measuring low level radionuclide contents in a matrix with, e.g., varying water content and density.

GAMMATEST
Acknowledging a great common need within the Nordic countries for gamma ray spectrometric assessments for various purposes, including emergency preparedness, and due to the sparse common Nordic interaction in earlier years, a NKS seminar on the topic was held in 2009, where gamma analysts could inspire each other and exchange experiences. Due to the great interest and attendance, a follow-up NKS seminar was also arranged the following year. On the recommendation of participants from the seminars it was decided in 2011 to arrange a series of workshops on practical issues in gamma ray spectrometry. The follow-up activity in 2012 included practical exercises on real field spectra. The GAMMATEST activity that ran in 2013 included expert lectures on Monte Carlo simulations for detector efficiency calculations

and calculation of correction factors for, e.g., coincidence summing. In 2013, GAMMATEST also comprised a measurement intercomparison exercise.

GAMMAUSER

This activity, which runs in 2014, is the latest in the series of NKS activities dedicated to heightening the standard of gamma spectrometric capabilities in the Nordic countries. Since many young scientists and students attend the Nordic gamma ray spectrometry activities, they also serve as an important resource to maintaining Nordic competence in the future. The format of the 2014 activity is envisaged to be in-line with that in 2013: there will be invited speakers on issues for which specific interest has previously been expressed, and intercomparison exercises. The focus in 2014 will closer match the unique set of challenges that each group of attending users faces (e.g., nuclear power plant analysts, regulatory specialists, radiation emergency experts, academic researchers, industrial application developers). How each group deals with their specific challenges will be instructive for other groups to see. The event will take place in the autumn of 2014, and will be announced in NKS NewsFlashes as well as on the NKS website.

NOVE

Radioactive and nuclear substances may appear in a number of ways, where they may constitute threats to society. For instance through a malicious dispersion act, large inhabited areas may become contaminated, potentially creating a health risk while also causing considerable disruptive effects on the affected society. Illicit trafficking of radioactive and nuclear materials is thus a societal problem, and not all problematic sources are easily detected. Plutonium can be detected via neutrons generated through spontaneous fission, if neutron detection capability is secured. The NOVE activity, which started in 2013 and continues in 2014, has the objective of comparing conventional and novel techniques for detection of neutrons. Neutron detection capabilities of the participating Nordic authorities have been presented, and measurements have been performed in special field conditions. The activity thus contributes both in the form of a knowledge transfer platform and through generation of experimental results. In 2014, the focus will be on dynamic testing, where sources will be automatically moved in a controlled way using a 16 m long remote controlled track. A seminar on the topic is also scheduled for 2014 (in Norway), and will be announced through NKS NewsFlashes as well as on the NKS website.

RADIOANALYSIS

This workshop, which took place in Denmark in September 2013, focused on measurement of pure beta and particularly pure alpha emitting radionuclides, which are not easily assessed, since they have to be isolated from matrix and interfering radionuclides prior to application of for instance radiochemical analysis methods. To maintain and strengthen the Nordic competence in this context a workshop programme was put together, which contained 3 days of tutored hands-on laboratory practice, as well as 1½ days with lectures given by radioanalytical experts from different research fields, and a ½ day with presentations by young participants. A total of 49 persons participated in the RADIOANALYSIS workshop. Both the book of presentation abstracts (NKS-290), the presentation slides and the final report on the activity (NKS-292) can be found on the NKS website.

RAPID-TECH

To save critical time and enable quick sample analysis with high sample throughput, while reducing labour consumption and costs, rapid sample processing techniques, including automation through flow-injection, high performance liquid chromatography and vacuum box

on-line detection may be attractive, both in emergency preparedness, environmental monitoring, nuclear plant decommissioning and nuclear/radiological waste management. Although some Nordic laboratories have engaged in the development and optimization of such techniques, the area is still novel and merits further examination. The RAPID-TECH activity, which runs in 2014, will screen the current needs and problems in this context, and experimental work will be carried out to shed new light on developments. Also a Nordic experimental intercomparison exercise is scheduled.

STANDMETHOD

Environmental safety of Nordic nuclear installations is a sensitive issue to the public as well as to responsible authorities. This is reflected in recent additions to environmental consequence surveillance programmes. An example is that a range of radionuclides, which are not easily measured, have been added to routine monitoring procedures for discharges and circulation water (e.g., C-14, Ni-63 and Fe-55). Radiochemical analysis methods currently applied by Nordic industry and research organisations need quality control and validation. An obstacle is the lack of suitable reference materials. The STANDMETHOD activity, which has just been initiated, aims to establish close collaboration between the Nordic key organisations in validating currently applied methods through intercomparison exercises, and to standardize Nordic analytical techniques for routine analysis. New industrial demands will be identified and new radiochemical analysis techniques will be developed as required.

Radioecological Assessments

BERMUDA

Some Nordic households consume tens of kilogrammes of wild mushrooms and berries each year. The contents in these food items of natural radionuclides were however not well known. Also information on transfer factors of naturally occurring radionuclides from soil to wild mushrooms and berries was sparse. The two-year BERMUDA activity, which was finalized in 2013, carried out a survey of the contents of natural radionuclides in Nordic wild berries and mushrooms, and estimated transfer factors as well as effective doses to populations consuming these produces. Also contents of anthropogenic radionuclides in the samples were examined for reference. The most significant contributions to dose from consumption of mushrooms were found to be from Po-210 and Cs-137. Effective doses from consumption of wild mushrooms and berries were estimated to amount to less than 100 µSv per year.

COSEMA

The COSEMA activity, which modelled the potential consequences of severe radioactive releases to Nordic marine environments (the Baltic sea and the North Atlantic ocean), was initiated in 2012 and completed in 2013. A hypothetical source term from a 3000 MW_{th} nuclear reactor accident was defined for the Baltic sea studies. The highest estimated annual doses from consumption of sea food (from a local area) were found to potentially amount to tens to hundreds of millisieverts. Contributions from Cs-134, Cs-137 and I-131 were estimated to constitute some 96 % of this dose. North Atlantic incident consequence analyses involved hypothetical nuclear submarine accidents. Model validation was carried out through comparison of calculation results with available experimental data.

EFMARE

This new activity builds on the lessons learned in COSEMA on doses from marine releases, but goes in further detail with features of radioecological assessment and evaluates the

environmental sensitivity of the Nordic marine environment. The dispersion of radionuclides in water and sediment and associated doses through consumption of marine food items will be evaluated using three different Nordic models, which will be improved as required through modelling of seasonality, bioaccumulation of radionuclides in marine organisms, and biota movements.

NORMIN
Also NORMIN is a new activity starting in 2014. It aims to describe situations and practices in relation to Nordic uranium mining and mining generating enhanced concentrations of naturally occurring radioactive materials. It is planned that transfer factors and concentrations of radionuclides in NORM-containing ores and old mining wastes will be assessed in different situations in Nordic countries, and resultant radiation risks will be examined. Experimental radioecological case studies will be conducted at relevant sites in each country participating in the activity. The activity also plans to carry out a literature study of the integration of environmental protection issues in Nordic radiation legislation.

NKS-R activities in 2013/2014

Many of the NKS-R activities which have been funded in 2014 are continuing from 2013. In addition, two new activities are funded this year. Brief descriptions of the activities are given below under the headings of the six different research areas of NKS-R:

- *Thermal Hydraulics*
- *Severe Accidents and Reactor Physics*
- *Risk Analysis*
- *Organisational Issues and Safety Culture*
- *Plant Life Management and Life Time Extension*
- *Decommissioning*

Thermal Hydraulics

ENPOOL
Steam injections into the pressure suppression pool of a boiling water reactor and their effects are studied within this project. Short term dynamic phenomena may cause pressure loads on pool structures and long term thermal transients following the steam injection may influence the pool's pressure suppression capacity, which is why this is an important area of research. Experiments and numerical analyses of steam injections through blowdown pipes into the suppression pool are carried out and the main objective is to develop computational models which can be used to simulate the effects of steam injection. In 2013, the experiments concentrated on the dynamics of the free water surface in a blowdown pipe to provide data on mixing of a thermally stratified pressure suppression pool and on direct contact condensation. The experiments carried out with the test facility provide a representative database for numerical studies and modelling, which are carried out under the ENPOOL activity. This activity started in 2011 and continues in 2014.

POOLFIRE
The three year project ended in 2013 and focuses on development and validation of prediction models for pool fires in enclosures using pyrolysis models in a CFD model. Pool fire is one of the major fire accident types in nuclear power plants, together with cable and hydrogen fires.

The model can be utilized in risk assessments for nuclear power plants and the final report will be published on the NKS website in the spring.

Severe Accidents and Reactor Physics

ATR
Previous experiments have shown that the fraction of gaseous ruthenium transported through the primary circuit of an experimental setup at VTT was higher than what would be expected in thermodynamic equilibrium calculations. Focus of the ATR project is to study the impact of aerosols on the transport of ruthenium in the containment air of a BWR. Some of the most radiotoxic elements that may be released from the fuel into the containment's atmosphere during a severe accident are iodine and ruthenium. In 2014, the impact of aerosols on the transport of ruthenium, especially gaseous Ru species, will be studied in primary circuit conditions. Different aerosol species (e.g. Ag, CsI and RuO_2), will be injected to the gas flow together with the volatilized RuO_4. Thereafter the impact on the transport of ruthenium will be studied. A better understanding of the containment atmosphere composition during a severe accident will lead to improved strategies for reducing the risk of ruthenium release to the environment.

DECOSE
Uncertainties in assessment of (i) debris bed properties and coolability, (ii) steam explosion impact in BWRs will be reduced by experimental and analytical studies. The experimental part of the project will investigate key physical phenomena of the debris bed formation and coolability. Experimental data will be validated using simulation tools, leading to more reliable predictions of the debris bed coolability in case of an accident with a severe core damage. An analytical approach will be utilized to improve the prediction of coolability and to assess the uncertainties in modelling of steam explosion impact.

Risk Analysis

DIGREL
Practical guidelines for analysis and modelling of digital systems in probabilistic safety assessment (PSA) for nuclear power plants are developed within the DIGREL activity. The activity comprises three interrelated activities. Firstly, a taxonomy for failure modes of digital I&C systems has been developed by a task group of OECD/NEA Working Group RISK. Secondly, in a parallel Nordic activity, a fictive digital I&C PSA-model has been developed for the demonstration and testing of reliability modelling approaches. The third activity has been to develop a method for the quantification of software reliability in the context of PSA. The interim results of the project have been published annually in NKS report series (NKS-230, NKS-261, NKS-277, and two upcoming reports that covers the achievements of 2013). In 2014, the three activities will be finalized and a guidelines report will be prepared for the nuclear industry.

DPSA
DPSA stands for deterministic-probabilistic safety analysis methodology. The goals of the project are (i) to develop DPSA modelling approaches for scenarios where timing of the events, including PSA Level 1 and recovery actions, has significant effect on the results, and

(ii) to develop methods for improving PSA and DSA using DPSA generated data. The project started one year ago and is scheduled to run for another four years.

L3PSA

The Level 3 Probabilistic Safety Analysis (Level 3 PSA) project is seeking to deepen Nordic understanding about the merits and limitations of probabilistic off-site consequence analysis for nuclear facilities. The project began in 2013, and is entering its second year of a planned three years. The project's first year focused on the development and analysis of an industrial survey about Level 3 PSA, which included several workshops and meetings with Nordic utilities, regulators, and safety experts. Level 3 PSA risk metrics including health, environmental, and economic effects have been researched and discussed in the first year's project report. The project has generated significant interest internationally and has interfaced with international organizations including the IAEA and the American Nuclear Society. The ultimate goal of the project is to produce a guidance document for Level 3 PSA in Nordic countries.

EXAM-HRA

Are there actual differences in plant features that explain why human reliability analysis (HRA) results differ between plants for similar action or is this merely a result of differences in the HRA with respect to choice of method, analyst judgment, PSA scope, resources spent, etc.? Identifying discrepancies in HRA applications is the first step in finding these answers. EXAM-HRA is a Nordic, Swiss and German project which assesses HRA applications in existing probabilistic safety analysis (PSA) studies. The overall project objective is to provide guidance for a state of the art HRA for purposes of PSA, to ensure that plant specific properties are properly taken into consideration in the analysis. The project results provide insights to improve the experience feedback on actual plant features based on HRA and PSA results.

Organisational Issues and Safety Culture

HUMAX

Maintenance is a key safety function in any complex sociotechnical system, such as a nuclear power plant. The aim of the NKS-R activity HUMAX is to enhance understanding on how to maximize human performance in maintenance activities of nuclear power plants. In 2013, the use of specific tools, or lack thereof, has been analysed for three Nordic nuclear power plants. Interviews have been made with maintenance workers and those responsible for developing human performance programs on their opinions on the human performance tools. The project will be finalized in 2014 and the aim is to provide recommendations on how to design and implement effective human performance tools.

ProCom

Exstensive research has been performed by different organisations to identify the functions that enable reliable and resilient procedures. Measuring these functions reliably presents its own set of challenges. These are mainly (i) identifying reliable markers for each competence and (ii) developing guidance so that observers can reliably assess the crew’s degree of proficiency on each competence. Institute for Energy Technology, IFE, in Halden has access to a huge amount of data from simulator studies of complex emergency scenarios, that can be used for identifying procedure competence. The activity is a one year project ending in december 2014.

SADE
A number of design flaws have been contributing to major industrial accidents. However, design activities are still a fairly understudied subject in human and organisational factors or safety culture studies. The three-year project on safety culture in design has now been finalised. One of the main conclusions of the study was that design-related challenges in the nuclear domain are mainly inter-organisational. Hence, safety management and safety culture approaches should be improved with respect to the inter-organisational nature of the work process in design. The study provides a set of recommendations to the nuclear community to support and improve the design process and to anticipate emerging risks.

Plant Life Management and Life Time Extension

Nordic-Gen4
The objective of this forum is to promote communication and interaction between Nordic researchers in the generation IV reactor area. The network has existed since 2009. Originally the focus was on material issues, but now the scope is wider. The main activity has been to organise seminars with participants from academia (senior researchers and students) and industry. A two-day seminar in Lappeenranta is planned for September 2014, where both invited speakers from Europe and PhD-students will have a chance to present and discuss their research. Other activities of the network include smaller meetings, students visits as well as maintaining the website http://nordic-gen4.org/.

Decommissioning

DECOM-SEM
A seminar on decommissioning of nuclear facilities was held on 6-7th November 2013 in Halden, Norway. It was arranged by IFE together with ndcon, NRPA, Danish Decommissioning and Fortum. The seminar provided an opportunity to meet and exchange experiences from completed and on-going decommissioning projects as well as discuss the future. There were 36 participants, from the Nordic countries, representing almost every branch in decommissioning, including operators and regulators. Three topical sessions covered issues related to:

1) Decommissioning and dismantling of nuclear facilities
2) Release of materials, facilities and soil (site)
3) Management and final disposal of waste from decommissioning projects

In total 16 presentations were given in addition to round table discussions. The presentations and proceedings are available at http://projects.hrp.no/nks-decom-2013/.

Conclusion

Summarised information has been provided on the objectives, plans and findings to date for each NKS-R and NKS-B activity that ran in 2013 or/and in 2014. The diversity in research topics is considerable, and even activities grouped under the same overall research type category often deal with very different topics and societal challenges. The paper illustrates the current trends and needs in Nordic nuclear and radiological safety and preparedness planning, and demonstrates that new ideas thrive in a region where cross-border collaboration has been nourished over decades on a joint platform.

Authors (left to right): Karin Andgren (NKS-R Programme Manager), Kasper G. Andersson (NKS-B Programme Manager), Sigurður M. Magnússon (NKS Chairman), Finn Physant (NKS Chief Accountant).

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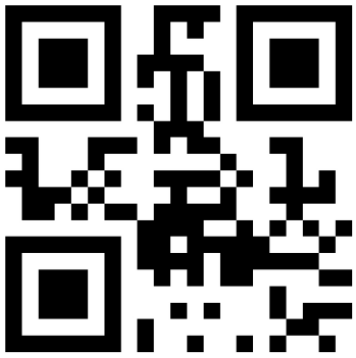

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