

# Whole Body Counting resources in the Nordic Region

overview

The following NKS/B reports have been published.

The **Secretariat** can – free of charge – provide printed copies of some reports.

NKS	Date	Author(s) and title	NKS activity	Abstract	Full text
<b>About NKS-B</b>					
<b>Current activities</b>		dsmo, Jan Porsmyr, Espen Nysted: <i>Organisations at Nordic nuclear Power</i>	PONPP	<a href="#">NKS-250_a</a>	<a href="#">NKS-250.pdf</a>
<b>Call for Proposals</b>					
<b>Travel Assistance</b>		n: <i>NKS-B NordRisk II: Nuclear risk from dispersion in Northern Europe - Summary</i>	NordRisk II	<a href="#">NKS-244_a</a>	<a href="#">NKS-244.pdf</a>
<b>Reports</b>					
NKS-243	May 2011	Lindis Skipperud et al: <i>Method-MS, final report</i>	METHOD-MS	<a href="#">NKS-243_a</a>	<a href="#">NKS-243.pdf</a>
NKS-242	April 2011	Ulrik Smith Korsholm et al: <i>NKS NordRisk II: Atlas of long-range atmospheric dispersion and deposition of radionuclides from selected risk sites in the Northern Hemisphere</i>	NordRisk II	<a href="#">NKS-242_a</a>	<a href="#">NKS-242.pdf</a>
NKS-238	February 2011	Lilián del Risco Norrlid et al: <i>In-vivo whole body measurement of internal radioactivity in the Nordic countries</i>	PIANOLIB	<a href="#">NKS-238_a</a>	<a href="#">NKS-238.pdf</a>
NKS-232	January 2011	Carita Lindholm, Andrzej and Alicja Jaworska: <i>Biological dosimetry following exposure to neutrons in a criticality</i>	BIONCA	<a href="#">NKS-232_a</a>	<a href="#">NKS-232.pdf</a>

# Number of Facilities

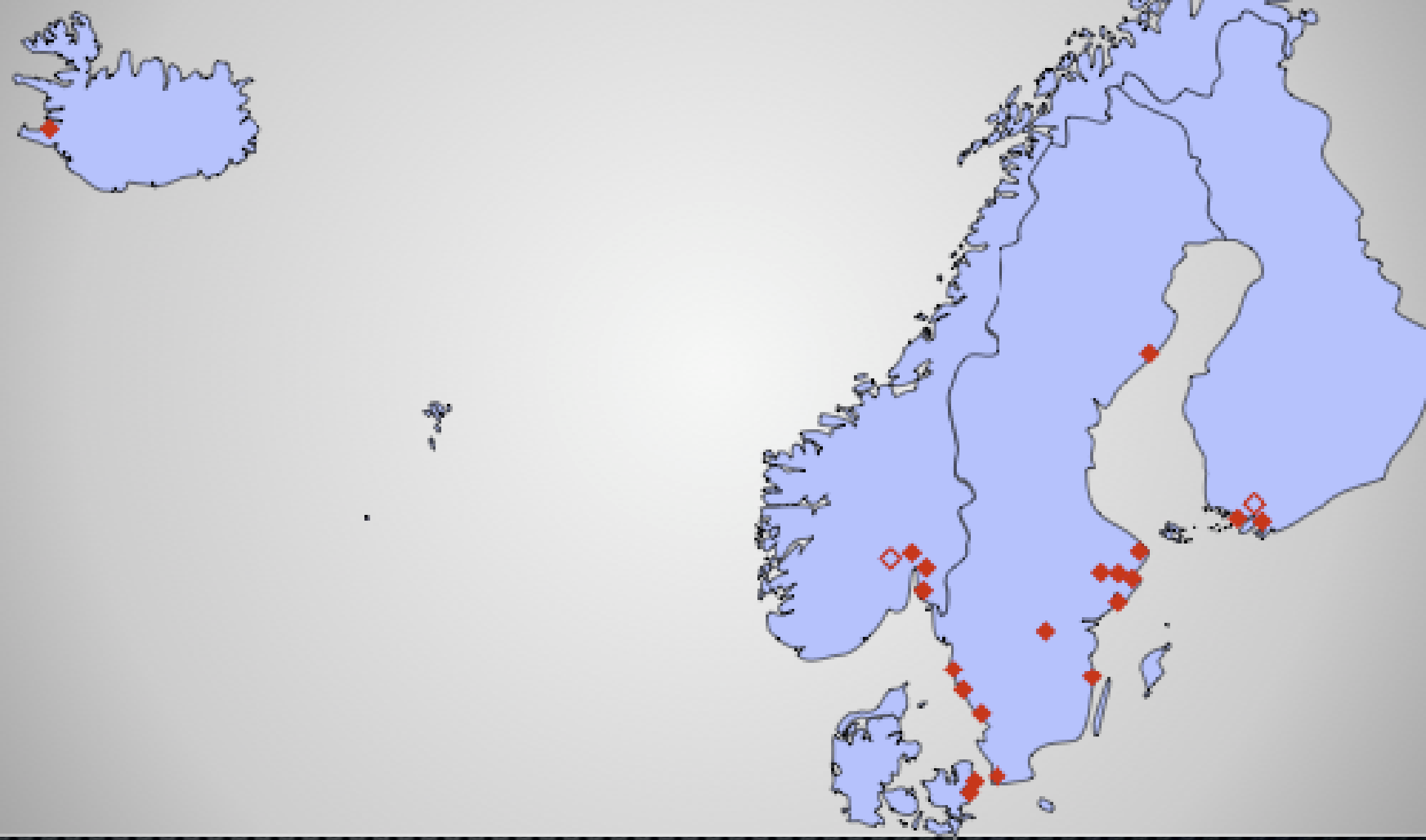
**Denmark:** 2 WBCs @Rigshospitalet

**Finland:** 2 WBCs @STUK + 1 @ Helsinki University

**Iceland:** 1 NaI WBC @Reykjavík University/Univ.  
Hospital

**Norway:** 2 WBCs @IFE + 2 @NRPA

**Sweden:** 12 facilities ...



Locations of facilities

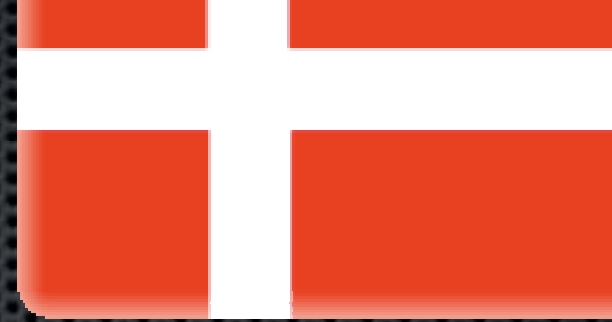
# Denmark



## Rigshospitalet WBC-1: Plastic scintillator bed



# Denmark



Rigshospitalet WBC-1: Plastic scintillator bed

Rigshospitalet WBC-2: NaI bed



# Finland



STUK: Stationary WBC, HPGe

+ mobile WBC HPGe

(See Jussi Huikari's presentation tomorrow)

University of Helsinki: Stationary NaI WBC

# Finland cont.



TUK: Stationary lab



STUK: Mobile lab

# Finland cont.



# celand



Lack of societal driver

No routine measurements -> Little experience

Interest and competence:

- Gammaspectrometry
- Equipment



# Iceland cont.



## Stationary NaI WBC @ University of Reykjavík.



# Iceland cont.



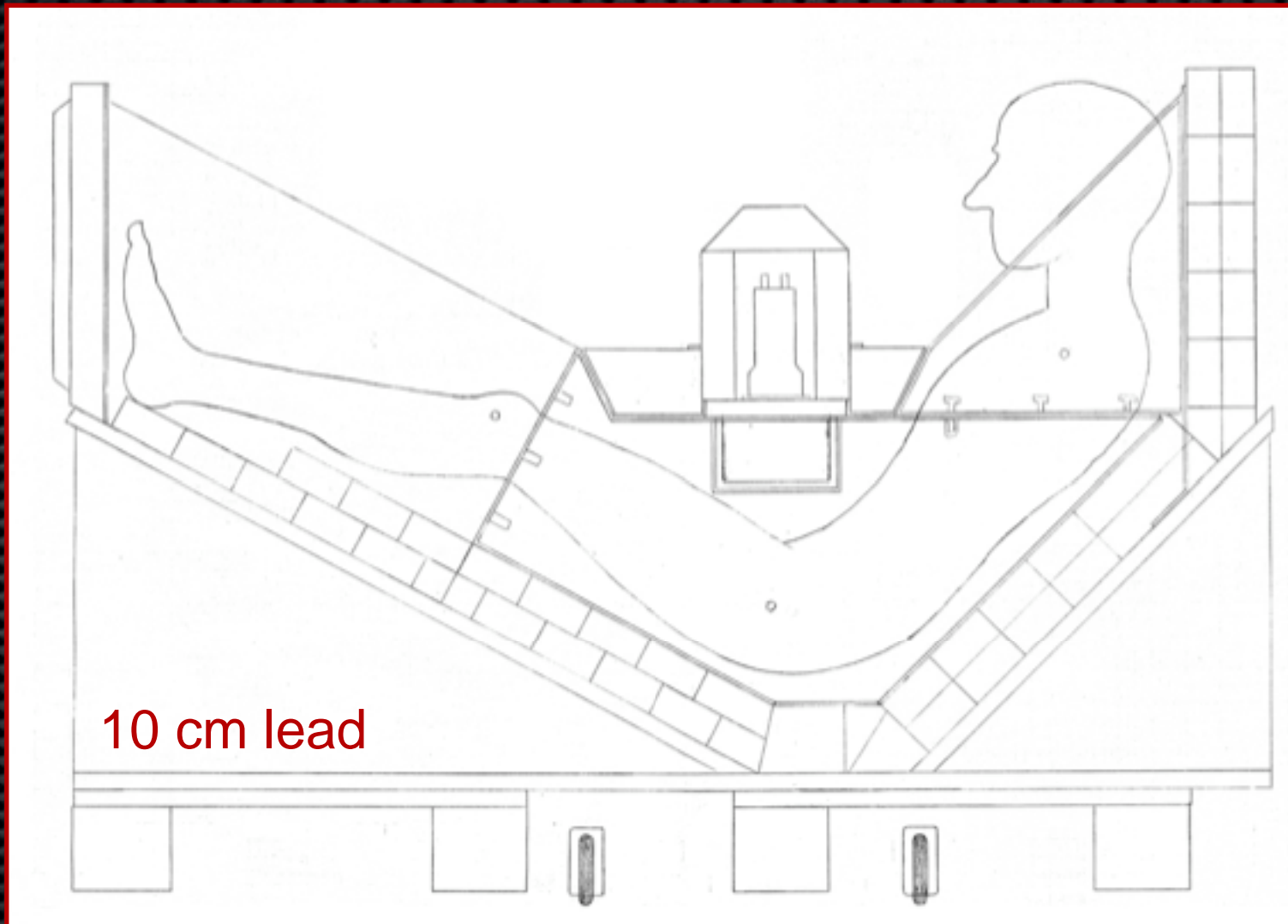
## Stationary NaI WBC @ University of Reykjavík.



# Iceland cont.



## Stationary NaI WBC @ University of Reykjavík.



Iceland cont.



Stationary NaI WBC @ University of Reykjavík.



# Iceland cont.



Stationary NaI WBC @ University of Reykjavík.



# Iceland cont.



## Stationary NaI WBC @ University of Reykjavík.

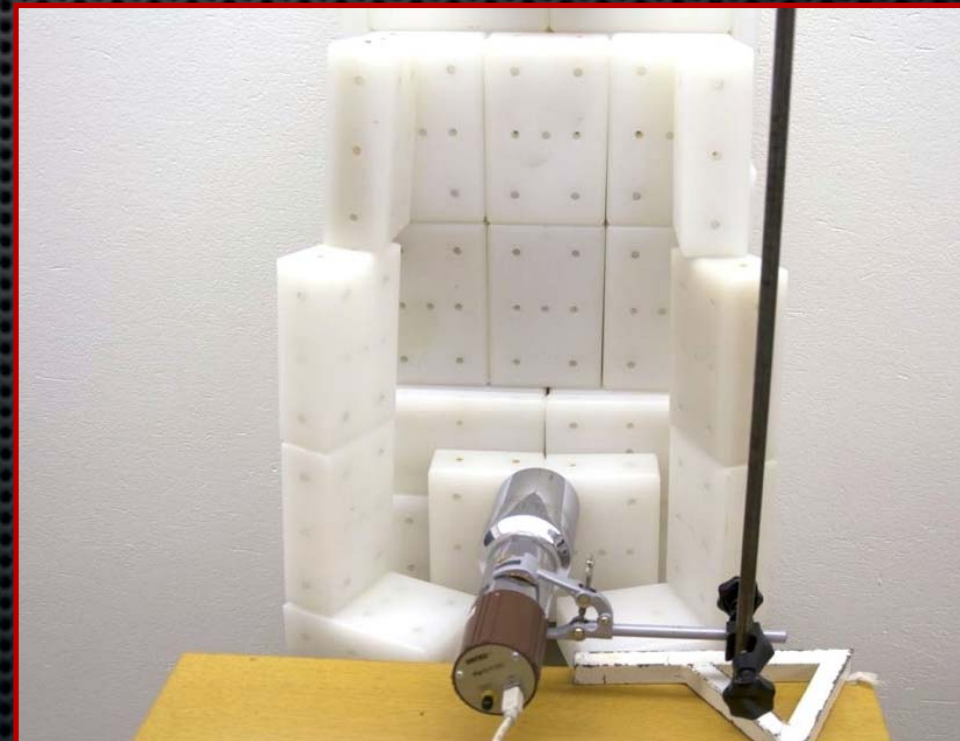


# Iceland cont.



Stationary NaI WBC @ University of Reykjavík.

Mobile detector (NaI, sitting/Palmer geometry)



# Iceland cont.



- One fixed facility (at the University of Reykjavík)
- Mobile detector (NaI, sitting/Palmer geometry)
- In development, imminent equipment replacement

# Norway



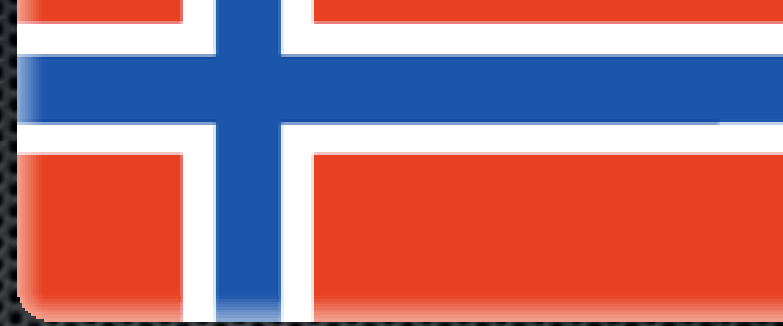
NRPA: HPGe field lab WBC, sitting geometry

+ Stationary lab (?)

IFE, Kjeller: NaI WBC, sitting geometry

IFE, Halden: NaI WBC, sitting geometry

# Norway



# Norway



# Sweden



Finnmark

Low background

Stationary  
Sitting

1 HpGe 53%

10 mm

Empty and  
blank 14 h

Genie 180



Westinghouse

Low background

Stationary  
lung  
counter  
Bed, static  
detection

3 HpGe 50%

60 mm

Blank 1 days

$^{14}\text{C}$

In house  
method



Ringshals

Low background

Stationary  
Sitting

1 NaI 3x3"  
(thy)

8 mm

Empty  
100000 s

$^{131}\text{I}$

GammaVision

1 HpGe 66%

$^{60}\text{Co}$ ,  $^{137}\text{Cs}$ ,  
 $^{228}\text{Ac}$ ,  $^{228}\text{Th}$ ,  
 $^{232}\text{Th}$



Örskovshamn

Low background  
Collimated  
detectors

Stationary  
Dedicated  
chair

1 NaI 1x  
1.5" (thy)

10 mm

Empty 60 h

$^{131}\text{I}$ ,  $^{137}\text{Cs}$

Genie 2000

WBC 6000

2 HpGe 70%

10 mm

$^{40}\text{K}$ ,  $^{54}\text{Mn}$ ,  
 $^{60}\text{Co}$ ,  $^{137}\text{Cs}$ ,  
 $^{228}\text{Ac}$ ,  $^{228}\text{Th}$ ,  
 $^{232}\text{Th}$ ,  $^{235}\text{U}$



Stadsverk

Low background

Stationary  
Sitting

1 Coaxial Ge  
50 %

10 mm

Empty 14 h

$^{137}\text{Cs}$ ,  $^{137}\text{Ba}$ ,  
 $^{137}\text{La}$ ,  $^{137}\text{Ce}$

Genie 2000



Low

Stationary

1 HpGe 55

10 mm

Empty 10 h

$^{137}\text{Cs}$ ,  $^{137}\text{Ba}$

GammaVision

# Sweden cont.








# Sweden cont.



# Sweden cont.



 Umeå	Collimated detectors	Field lab Max geom. efficiency	1 NaI 2x2" (thy)	1000 uar 1000 bec	Empty and blank 15 h	$^{131}\text{I}$ , $^{133}\text{Ba}$ $^{45}\text{Ca}$ , $^{40}\text{K}$ , $^{59}\text{Co}$ , $^{137}\text{Cs}$	GammaVision on
 Lund University Malmö U11	Low background	Stationary Bed, stahr detectors	11 HpGe 50% 1 NaI plastic	1000 uar	Empty and blank	$^{45}\text{Ca}$ , $^{40}\text{K}$ , $^{59}\text{Co}$ , $^{137}\text{Cs}$	Maestro and in house method
 Uppsala Uppsala universitet Uppsala	Collimated detectors	Stationary Scanning: stahr bed with scanning detectors	2 NaI	30 - 60 min	Empty	$^{55}\text{Fe}$ , $^{137}\text{Cs}$ , $^{131}\text{I}$	In house
 Stockholm University	Low background Collimated detectors	Stationary Scanning bed with stahr detectors	6 NaI	20 min	Blank 1 h	$^{40}\text{K}$	In house
 Göteborg University Göteborg	Low background	Stationary Scanning: stahr detector stahr bed	2 NaI 5x4" 1 NaI 5x14" 4 NaI plastic 91x76x24 cm	varying	Empty	$^{40}\text{K}$ , $^{55}\text{Fe}$ , $^{226}\text{Ra}$ , $^{137}\text{Cs}$ , $^{60}\text{Co}$	Accuspec and in house manual calculation

# Sweden cont.



# Sweden



# Sweden cont.



# Sweden



Sweden NNM

Law  
background

Stationary  
Sitting in  
reclined  
position

1 NaI (thy)

30 min

Empty Blank  
IRINA neck 30  
min

$^{131}\text{I}$ ,  $^{132}\text{Ba}$

In-house  
MAESTRO-  
based code

3 NaI 5x4"

30 min

Empty  
Blank  
IRINA 30  
min

$^{137}\text{Cs}$ ,  $^{132}\text{K}$ ,  
 $^{132}\text{Co}$

1 HpGe for  
use in  
emergency  
situations

30 min

Blank  
Layertone  
30 min

Nucleic ID  
purposes  
based on  
 $^{137}\text{Eu}$  cal.

Gene 2000

# Sweden

