

**STRATEGIES AND GUIDANCE FOR ESTABLISHING A PRACTICAL
RADIOLOGICAL PROTECTION CULTURE IN EUROPE IN CASE OF LONG TERM
RADIOACTIVE CONTAMINATION AFTER A NUCLEAR ACCIDENT**

**MINUTES OF THE FIFTH "SAGE" COORDINATION MEETING
17 March 2005, Paris**

Participants

SAGE Partners:

- BB-RIR (Brest Branch of the Research Institute of Radiology, Belarus):
Alexandre SUDAS, Alexandre ZAITSAU
- BELRAD (Radiation Safety Institute, Belarus):
Vassili NESTERENKO
- CEPN (Nuclear Protection Evaluation Centre, France):
Jacques LOCHARD, Pascal CROÛAIL
- GSF (Radiological Protection Institute, Germany):
Irene FIEDLER, Gaby VOIGT
- NRPB (National Radiological Protection Board, United Kingdom):
Anne NISBET

Guest:

- Stéphane BAUDÉ (Mudadis, Paris, France)

Summary: *This last co-ordination meeting was mainly devoted to the finalisation of the three remaining SAGE project deliverables among which are the proceedings of the final SAGE Workshop (Work Package 1) that was organised the two days before.*

1. Introduction and agenda of the meeting

J. Lochard introduced the meeting saying that the SAGE project has been a long and fruitful adventure. Vassili Nesterenko apologised for the absence of his son Alexei who is again hospitalised in Minsk.

J. LOCHARD presented the agenda of the meeting.

Finalisation of the three last deliverables:

- WP1: Debriefing of the workshop; discussion about content of the proceedings (Deliverable no 5)
- WP4: Final comments on the handbook before the issuing (Deliverable no 3)
- WP5: Presentation of the synthesis report on stakeholders panels running and feedback (A. Nisbet) (Deliverable no 4)

Update of the SAGE Website

Miscellaneous

All participants agreed on the agenda.

2. Deliverables

2.1. *The SAGE dissemination workshop*

The SAGE workshop "*Radiation monitoring and radiation protection culture for people living in long-term contaminated areas*" was held in Paris on 14-15 March 2005.

The workshop was kindly hosted by the Conservatoire National des Arts & Métiers. It was partly sponsored by the French Nuclear Safety and Radiation Protection Authority (DGSNR) and by the French National Institute of Radiation Protection and Nuclear Safety (IRSN). It was also supported by the French Embassy in the Belarus Republic. The other costs were directly supported by CEPN. The workshop gathered a sixty of participants (radiation protection authorities, health professionals, representatives of international organisations, public stakeholders from the WP5 panels, NGOs...) from about 10 European countries (Austria, Belarus, Belgium, Germany, Norway, Slovakia, Spain, Switzerland, United Kingdom, France...). At the beginning of the workshop, a dozen of people entered the conference room and aggressed the participants (see press articles: *Le Figaro*- 15 and 16 March 2005, *Libération*- 15 March 2005, *Le Monde*- 15 March 2005). Nevertheless, this event did not prevent the participants from sharing their experience and from dealing with the issue of long-term contamination in Western Europe and Belarus (see the programme hereafter).

The programme of the workshop was as follows (following the event mentioned above and the lost of time, the specific session devoted to topical working groups was cancelled):

FIRST DAY

Session 1: Introduction to the project

- Welcome address by the Deputy Director of the French authority of Nuclear Safety and Radioprotection (Michel Bourguignon)
- Introductory address by the general coordinator of the SAGE project (Jacques Lochard)
- Video presentation “The rehabilitation of living conditions in contaminated territories: the ETHOS Project in Belarus” (Sylvaine Dampierre)
- Paper n° 1: Management of the contaminated territories in Norway since the Chernobyl accident (Tone Bergan, NRPA, Norway)

Session 2: Results of the SAGE Project (Chair person: Michel Hugon, Scientific Officer, European Commission)

- Paper n° 2 –The Chernobyl radiation monitoring system in Belarus today (Vassily Nesterenko, BELRAD, Belarus)
- Paper n° 3 – Post accident radiation monitoring management in France, Germany and UK : strengths and weaknesses (Irene Fiedler - GSF, Germany)
- Paper n° 4 – Dynamics of stakeholder involvement in the development of a handbook on practical radiation protection for areas contaminated for prolonged periods (Anne Nisbet, NRPB, UK)
- Paper n° 5 – Presentation of the SAGE Handbook: "*Practical radiation monitoring and radiation protection culture for people living in a long-term contaminated area*" (Pascal Croüail, CEPN, France)

SECOND DAY

Session 3: The way forward (Chair person: Michel Hugon, Scientific Officer, European Commission)

- Paper n° 6 – A non-governmental organisation’s perspective on citizen vigilance (Jean-Claude Autret, ACRO, France)
- Paper n° 7 : Dealing With Chemically Contaminated Land: The Welsh Experience (Mark Temple - National Public Health Service, Wales)
- Paper n° 8 : Implementation of an inclusive radiation monitoring system in the Bragin District in Belarus (Tatiana Kotlabai, "Sprout of Life" NGO, Belarus)
- Intervention of stakeholders:
 - Anita Villers (French group)
 - Sarah Harrison (British group)
 - Raissa Misiura (Belarus group)

Session 4 (Chair person: Anne Nisbet, NRPB, UK)

- Round table: the way forward

The table below presents the main tasks that were accomplished during the preparation phase of the workshop as well as the tasks to be accomplished for the preparation of the proceedings.

Table 1. Planning for the SAGE Workshop

Work	Deadline	Action by	deadline / performed (date)
<i>Letters to GSF, NRPB (seeking for sponsoring)</i>	<i>End of December 2003</i>	<i>CEPN</i>	<i>April 2004</i>
<i>Confirm location & date</i>	<i>End of January 2004</i>	<i>CEPN</i>	<i>June 2004</i>
<i>Letters to potential sponsors (presentation)</i>	<i>Beginning 2004</i>	<i>GSF, NRPB, CEPN</i>	<i>April 2004</i>
<i>Provisional Programme and confirmation of speakers</i>	<i>on the way</i>	<i>All</i>	<i>Winter 2005</i>
<i>1st Announcement (website,...)</i>	<i>Summer 2004</i>	<i>CEPN</i>	<i>September 2004</i>
<i>Finalisation of the Programme</i>	<i>Summer 2004</i>	<i>CEPN</i>	<i>February 2005</i>
<i>Seeking for chair persons</i>	<i>ASAP</i>	<i>Programme Committee</i>	<i>January 2005</i>
<i>Letters to invite journalists</i>	<i>Autumn 2004</i>	<i>Programme Committee</i>	<i>January 2005</i>
<i>Registration forms (sent and receipt)</i>	<i>End Summer 2004 - Winter 2005</i>	<i>Organisation Committee</i>	<i>Winter 2005</i>
<i>Book of abstracts</i>	<i>February 2005</i>	<i>Programme Committee</i>	<i>In preparation</i>
<i>Workshop</i>	<i>14-15 March 2005</i>		<i>14-15 March 2005</i>
<i>Proceedings</i>	<i>End of May 2005</i>	<i>CEPN</i>	

2.2. WPI: Proceedings of the workshop

The participants agreed to elaborate a first report for the European Commission with the following content:

- An executive summary of the seminar that will present the key results of the discussions,
- The eight abstracts of the papers,
- The corresponding PowerPoint presentations,
- The entire round table typewriting.

This report will be delivered to the European Commission for the end of May 2005 (**Action: CEPN**).

Afterwards, a second report will be elaborated. The participants wish indeed to elaborate a more complete file. They plan to gather the eight papers of the presentations (not only the abstracts) and to include the papers of Anita Villers, Sarah Harrison and Raissa Misiura as well. These three ladies are stakeholders from the French, British and Belarus groups and took part actively in the workshop. They intervened to explain why the engagement of stakeholders was important and how the handbook could be used (**Action: CEPN**).

It was decided not to deal with the incident that happened at the beginning of the workshop. Only the links to the press articles will be available.

Anne Nisbet asked if it will possible to make individual publications on the SAGE project. It was decided that it will be OK only if the author referenced the SAGE project with an official sentence (found on the CORDIS website).

2.3. *WP4: Handbook on Practical Radiation Protection Culture*

The last draft version of the handbook now entitled “*Guidance on Practical Radiation Protection for People Living in Long-Term Contaminated Territories*” was presented during the SAGE workshop by P. Croüail. This last version exists in an electronic format and a paper version.

Followings the recent modifications of structure and contents by CEPN, it was decided that all partners will make a full review of the handbook and that they will send their comments before the first of April to CEPN (**Action: GSF, NRPB, BELRAD, BB-RIR**). Otherwise, following the strong involvement of the NRPA in the SAGE workshop, it was also decided that the handbook would also be sent to NRPA for comments (**Action: CEPN**).

CEPN will also have to integer all comments and to prepare a final version for the end of April. The deadline for the European Commission is the 31st of May 2005. CEPN will have to write the foreword of the handbook. The foreword will highlight the participative approach and will clearly indicate the objectives and the limits of the document (**Actions: CEPN**).

The group discussed about the authors of the handbook and the persons who will take responsibility for the document. The members of the stakeholder panels (especially in France) had noticed that they did not support all what has been written in the document and that their participation did not question their convictions and their commitments. They had also submitted that CEPN would take responsibility for the handbook but that a text would mention the participation of all stakeholders. This proposal was studied and it was decided that the five partners of the project will take responsibility for the document and will be regarded as authors:

- Irene Fiedler and Gaby Voigt for GSF
- Anne Nisbet and Julie Mercer for NRPB
- Alexandr Sudas, Alexandre Zaitsou, Ludmilla Zhukovskaya for BB-RIR
- Vassily Nesterenko and Alexei Nesterenko for BELRAD
- Jacques Lochard, Pascal Croüail, Samuel Lepicard et Céline Bataille for CEPN

Besides, a specific part of the document will be devoted to the acknowledgements to all the stakeholders. Nevertheless, each stakeholder will be asked if he wants to be cited in an explicit way (name and association) (**Action: All**).

GSF asked if it would be possible to translate the document into German. They were answered that the SAGE budget did not plan translation and that the only possibility for them was to do it on their

own funds. It was thus noticed that CEPN has made a translation of the handbook into Russian under its own funds.

During the SAGE workshop, Edward Lazo from OCDE/EAN highlighted the value of the handbook. He was very enthusiastic to have it and explained that such a document will be still valuable. He explained that having a generic "template" sort of book showing the areas to be addressed in case of a large-scale contamination was a very good idea. Because he has always liked the authoritative and tutorial publications that the NRPB has done on specific topics over the years (radon, x-rays, etc.), he would support the handbook as part of this type of series. As such, he considers that short reports on specific aspects, such as pregnancy and infant protective measures, would also be quite helpful. He believes that it would help to increase the visibility as well as the usefulness of the handbook if the document could be prefaced by a short, policy-relevant executive summary, giving an idea of the "order of magnitude" of the problem.

2.4. *WP5: Running of Western Europe Stakeholder Panels*

Stakeholders

The French Stakeholder Panel met for the fifth time in Paris at the Conservatoire National des Arts et Métiers (01 December 2004). The first part of the meeting was devoted to comments on the last version of the practical handbook on radiation monitoring and protection. The stakeholders particularly identified the limits of the documents and asked that an introduction explains clearly the objective of their work and their contribution. During the second part of the meeting, the group worked on a proposal of flyer that would give recommendations to the affected population in case of long-term contamination. The programme of the final workshop was presented and the participation of the French stakeholder panel was studied. Finally, each stakeholder was asked to give its point of view on the achieved work and on possible followings to the SAGE project.

During the third meeting of the German Stakeholder Panel (19 October 2004), the members were informed about the last SAGE coordination meeting in Minsk (summer 2004). The preliminary programme of the workshop that will finalize the SAGE project in Paris was presented. The stakeholders were asked to take part in the workshop and to contribute presentations. But a main problem will be the costs of their participation.

The stakeholders discussed a questionnaire about "Elements for developing a Handbook on radiation monitoring and protection in case of contamination of the environment" that was created by the partners of NRPB. One remark in this context was that the proposed system of "radiation monitoring and protection" does not fit at the present time in Germany since the number of experts in this area will be more and more reduced in the future.

The version 5 of the handbook was discussed. The stakeholder panel proposed to add a glossary with all abbreviations and to use only abbreviated units in tables. All members were asked to review the handbook once more thoroughly and to give their final comments.

The next meeting is planned in spring 2005.

The core group of the UK stakeholder panel met in London for a third time on 6 October 2004. The main aim of this meeting was to discuss feedback from the satellite groups on the SAGE Handbook and how such an initiative might be taken forward in the UK. The satellite groups comprised health professionals from various regions of the UK, a number of experts in risk communication from five UK Universities as well as several interested members of the public. An additional consultation is planned with a headmaster took place at the end of December 2004.

Feedback from stakeholders was recorded in a standardised format, under the following broad topic areas:

- * General applicability of the handbook to the UK
- * Practicability and appropriateness of information/guidance provided
- * Adapting the handbook for use in the UK
- * Format of the handbook

Overall, it was felt that the system proposed is not currently practicable in the UK but with 'political will' and funding it would be valuable, complimenting the existing UK public health system. There are several areas in which the handbook could be further improved, namely in the translation of the document from French to English and in the type of language used - in some places it is too simplistic in others too technical. If the Handbook is to be developed further, consideration should also be given to having separate handbooks and/or leaflets for each type of audience.

The UK panel is now keen to take forward the concepts presented in the SAGE handbook. There are two target audiences: members of the public and health professionals. Consideration is being given to pre-preparing leaflets for members of the public. A set of recommendations may also be produced that outline the mechanisms that would need to be put in place to train health professionals, provide monitoring equipment etc in the case of long-term contamination. The 'trainers' could be trained in advance and a draft handbook for health professionals could be pre-prepared. It is likely that there will also be a generic top-level handbook for health professionals covering radiological and chemical contaminants.

WP5 Final Report

In January 2005, GSF and CEPN sent to NRPB interim reports on the contribution of stakeholder panels to the SAGE project. At the beginning of February, A. Nisbet has proposed a first draft for the final WP5 report (Deliverable N° 4). CEPN and GSF have provided her with comments and the final version will be ready at the beginning of April (**Action: NRPB**).

In particular, positions papers of the French associations that took part in the SAGE project (EDA, ACRO) will be put in annex. CEPN has to send electronic copies of these papers as quickly as possible to NRPB (**Action CEPN**).

2.5. *SAGE website (<http://www.ec-sage.net/>)*

The content of the SAGE website was discussed. It was decided that the website will be refreshed (workshop and deliverables) (**Action: CEPN**).

The participants agreed that the website will live two years after the end of the project.

2.6. *6-months report, Progress report, cost statements*

P. Croüail sent the fourth 6-months management report as well as the second annual technical report to the EC the 17th of December 2004. These delays had been negotiated by email with Mr Hugon (EC Scientific Officer). The second periodic cost statement was sent at the beginning of December 2004. The deadline for the third one is the 31st of March 2005.

2.7. *Summary of actions and reporting schedule*

Table 2. Summary of actions

no	Actions	By	Deadline	Status
1	Finalize deliverable N°2 (WP3)	BELRAD CEPN BB-RIR	ASAP (will depend on when A.N. will recover)	<i>Completed</i>
2	Update SAGE website (WP1)	CEPN	ASAP	<i>Completed</i>
3	Post the .pdf version of deliverable N°1 (WP2 report) on the SAGE website (WP2)	CEPN	August 2004	<i>Completed</i>
4	Check the availability of speakers for the SAGE workshop (WP1)	SWPCM	August 2004	<i>Completed</i>
5	Prepare a first budget of the SAGE workshop (WP1)	CEPN	Summer 2004	<i>Completed (September 2004)</i>
6	Finalise the programme and announcement (website) of the SAGE workshop (WP1)	CEPN	Summer 2004	<i>Completed</i>
7	5th draft version of the handbook (WP4)	CEPN	End Summer 2004	<i>Completed</i>
8	Prepare cost statements	All	September 2004	<i>Completed</i>
9	Provide material for the annual report	All	September 2004	<i>Completed</i>
10	Select some "strengths and weaknesses" of the national	CEPN	September 2004	

	organisations in a long-term post-accidental situation (collected by GSF) (WP2)	NRPB GSF		
11	Find chair persons for the SAGE workshop (WP1)	SWPCM	Summer-Autumn 2004	<i>Completed</i>
12	Write a paper for the SAGE workshop (WP2)	GSF	Autumn 2004	<i>Completed (Winter 2005)</i>
13	Write a paper for the SAGE workshop (WP3)	BELRAD CEPN	Autumn 2004	<i>Completed (Winter 2005)</i>
14	Complete the section " <i>Improvement options</i> " of the handbook (WP4)	CEPN BB-RIR	Autumn 2004	<i>Completed (Autumn 2004)</i>
15	Prepare interim reports on the running of stakeholder panels (collected by NRPB) (WP5)	NRPB GSF CEPN	Autumn 2004	<i>Completed</i>
16	Discuss/modify the handbook with stakeholders (WP4-WP5)	CEPN	Autumn 2004 - Winter 2004-2005	<i>Completed</i>
17	Write a final version of the handbook (WP5)	CEPN	Spring 2005	
18	Write a draft version of the report on stakeholder panels (WP5)	NRPB	Winter 2005	<i>Completed</i>
19	Circulate GSF paper before the workshop (WP2)	CEPN NRPB GSF	Winter 2005	<i>Completed</i>
20	Issue proceedings of the workshop (WP1)	CEPN	Spring 2005	
21	Write a final version of the report on stakeholder panels (WP5)	NRPB	Spring 2005	

ASAP= As soon as possible; SWPCM = Members of the SAGE Programme Committee (J. Lochard, A. Nisbet, G. Voigt, A. Nesterenko, A. Soudas)

Table 3. Reporting schedule (updated July 2004)

Date	At	Product (to be provided by)	Status - Comments
2002.10.01	T_0	Official launching date of SAGE	OK
2002.11.15	$T_0 + 1$	1 st Coordination Meeting, in Paris	OK (held in Paris on November 14-15, 2002)
2002.12.15	$T_0 + 2$	1 st Meeting Minutes (CEPN as coordinator)	OK (sent to the EC on December 13, 2002)
2003.04.01	$T_0 + 6$	1 st six-months Management Report (CEPN as coordinator)	OK (sent to the EC on July 23, 2003)
2003.06.26	$T_0 + 9$ To be confirmed	2 nd Coordination Meeting, in Pinsk	OK (held in Pinsk on June 26-27, 2003) + 1st BY Stakeholders panel (27 June 2003)
2003.07.31	$T_0 + 10$ To be confirmed	2 nd Meeting Minutes (CEPN as coordinator)	OK (sent to the EC on August 1, 2003)
2003.10.01	$T_0 + 12$	1 st Periodic Cost Statement (CEPN as coordinator)	OK (sent to the EC on December 2, 2003)
2003.10.01	$T_0 + 12$	2 nd six-months Management Report (CEPN as coordinator)	OK (sent to the EC on December 2, 2003)
2003.10.01	$T_0 + 12$	1 st Annual Technical Report (CEPN as coordinator)	OK (sent to the EC on December 9, 2003)
2003	between $T_0 + 9$ & $T_0 + 14$	Organisation of stakeholders Panels in the UK, France, Germany and Belarus – Year 1	June 19, 2003: 1 st F Stakeholders panel June 27, 2003: 1 st BLR Stakeholders panel July 1, 2003: 1 st UK Stakeholders panel October 20, 2003: 2 nd F Stakeholders panel November 10, 2003: 1 st G Stakeholders panel
2003.11.27	$T_0 + 14$	3 rd Coordination Meeting, in Paris	OK (held in Paris on November 27-28, 2003)
2003.11.28	$T_0 + 14$	Milestone 1 (BB RIR, BELRAD as WP3 partners): “Evaluation of the Lessons Learnt from the Belarus Experience”	Draft Report (BELRAD contribution) available in July 2003, revised in December 2003. Draft Report (BB-RIR contribution) available in December 2003.
2004.01?	$T_0 + 15$	3 rd Meeting Minutes (CEPN as coordinator)	OK
2004.01.01	$T_0 + 15$	Mid-Term Report (CEPN as coordinator)	OK sent to the EC month 16: 27 February 2004
2004.01.01	$T_0 + 15$	Deliverable 1 (prepared by GSF as WPL of WP2, co-edited by CEPN as WPL of WP1): “Review of Infrastructures in Western Europe” (End of WP2)	Draft Report (CEPN contribution) available on June 26, 2003. English contribution sent to GSF during Summer 2003. Deliverable edited by GSF month 18 (14 April 2004), sent by CEPN to the Commission M20 (15 June 2004).
2004.01.01	$T_0 + 15$	Deliverable 2 (prepared by BB RIR as WPL of WP3, co-edited by CEPN as WPL of WP1): “Feedback Experience in Belarus” (End of WP3)	Corrections sent to BELRAD by CEPN month 19. New draft report submitted by BELRAD month 21. Issuing of the report postponed to M24
2004.01.01	$T_0 + 15$	Announcement of the Dissemination Workshop, one year before	Search for sponsoring began month 18. Answer that no extra funding will be received from the EC, received at M19. Draft programme available at M21.
2004	between $T_0 + 15$ & $T_0 + 27$	Organisation of stakeholders Panels in the UK, France, Germany and Belarus – Year 2 and 3	January 26, 2004: 3 rd F Stakeholders panel March 4, 2004: 2 nd G Stakeholders panel May 3, 2004: 4 th F Stakeholders panel May 11, 2004: 2 nd UK Stakeholders panel July 9, 2004 2 nd BY Stakeholders panel (December 1, 2004 5 th F Stakeholders panel)
2004.01.01	$T_0 + 18$	Milestone 2 (all as WP4 partners): Draft Version of the Handbook, giving Guidelines for an Operational System of Measurements	OK: 1 st draft version available month 11, 2 nd version available month 14, 3 rd version available month 16, 4 th version available month 20.
2004.04.01	$T_0 + 18$	3 rd six-months Management Report (CEPN as coordinator)	OK: sent to the Commission month 20 (15 June 2004).
2004.07.07	$T_0 + 21$	4 th Coordination Meeting, in Minsk (instead of Pinsk)	OK: held in Minsk on July 7-8, 2004
2004.08.01	$T_0 + 22$	4 th Meeting Minutes (CEPN as coordinator)	OK: sent to the commission (04 August 2004)
2004.10.01	$T_0 + 24$	2 nd Periodic Cost Statement (CEPN as coordinator)	OK sent to the commission month 27
2004.10.01	$T_0 + 24$	4 th six-months Management Report (CEPN as coordinator)	OK: sent to the commission month 27 (17 December 2004)
2004.10.01	$T_0 + 24$	2 nd Annual Technical Report (CEPN as coordinator)	OK: sent to the commission month 27 (17 December 2004)

SAGE Reporting schedule (Part 2)

2005.01.??	T ₀ + 27	Milestone 3 (NRPB, GSF, CEPN as WP5 partners): “Evaluation of the outcomes of the European Stakeholders Panels”	<i>OK: sent to NRPB by GSF and CEPN month 29</i>
2005.03.11	T ₀ + 30	5 th Coordination Meeting, in Paris	<i>OK: held in Paris 16 March 2005</i>
2005.03.14	T ₀ + 30	DISSEMINATION WORKSHOP , in Paris	<i>Paris (Conservatoire des Arts & Métiers) 14-15 March 2005</i>
2005.03.31	T ₀ + 30	Deliverable 3 (prepared and edited by CEPN as WPL of WP4): “Handbook on Practical Radiation Protection Culture”	
2005.03.31	T ₀ + 30	Deliverable 4 (prepared by NRPB as WPL of WP5, co-edited by CEPN as WPL of WP1): “Feedback Report on Stakeholders Panels”	
2005.03.31	T ₀ + 30	Deliverable 5 (CEPN as WPL of WP1): “Proceedings of the Dissemination Workshop”	
2005.03.31	T ₀ + 30	5 th Meeting Minutes (CEPN as coordinator)	
2005.03.31	T ₀ + 30	3 rd Periodic Cost Statement (CEPN as coordinator)	
2005.03.31	T ₀ + 30	5 th six-months Management Report (CEPN as coordinator)	
2005.03.31	T ₀ + 30	eTIP: Final Technical Report (all , edited by CEPN as coordinator)	
2005.03.31	T ₀ + 30	Technological Implementation Plan	
2005.03.31	T ₀ + 30	Official end of the contract	

2.8. Possible followings of the project

This last coordination meeting was a good opportunity to discuss about perspectives and followings of the SAGE project. Several themes were identified that could be develop with the French authorities or others (Norwegian, Swiss). Among them, we can indicate:

- Study on intervention levels for foodstuffs
- Screening of the Belarus population (not only the children)
- Study on strontium-90. Vassily Nesterenko explained that the Chernobyl Committee has planned to equip several districts with whole body counters dedicated to the measurements of strontium-90 but that the measurements are very expensive and need qualified and trained operators.