

ECONOMIC COMMISSION FOR EUROPE

**Report**  
**on the Application of the**  
**UNECE Recommendations on**  
**Monitoring and Response Procedures**  
**for Radioactive Scrap Metal**



UNITED NATIONS

ECONOMIC COMMISSION FOR EUROPE

**Report**  
**on the Application of the**  
**UNECE Recommendations on**  
**Monitoring and Response Procedures**  
**for Radioactive Scrap Metal**



**UNITED NATIONS**  
**2009**

## NOTE

Symbols of the United Nations documents are composed of capital letters combined with figures. Mention of such a symbol indicates a reference to a United Nations document.

\* \* \*

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or areas, or of its authorities, or concerning the delimitation of its frontiers or boundaries. Mention of firm names and commercial products does not imply the endorsement of the United Nations.

## CONTENTS

	<u>Paragraphs</u>	<u>Page</u>
EXECUTIVE SUMMARY .....	1-5	2
I. INTRODUCTION .....	6-10	3-4
II. PRESENTATION OF THE RECOMMENDATIONS .....	11-12	4
III. SCOPE OF THE RECOMMENDATIONS.....	13-14	5
A. Data and reporting.....		5
B. Controls .....		5
C. Training and awareness-raising.....		5
D. Treatment and Disposal.....		5
E. Responsibilities .....		5
IV. ACTORS.....	15-17	6
V. CONTENT OF THE RECOMMENDATIONS .....	18-20	6-9
VI. CONSULTATION OF THE RECOMMENDATIONS .....	21	9-10
VII. PRACTICAL USE OF THE RECOMMENDATIONS AT A NATIONAL LEVEL .....	22-27	10-14
VIII. IMPACT OF THE RECOMMENDATIONS .....	28-33	14-16
A. On your work .....		14
B. On relationship with private sector .....		15
C. On incidents .....		16
IX. LESSONS LEARNT THANKS TO THE RECOMMENDATIONS.....	34	16-17
X. REACH OF THE RECOMMENDATIONS.....	35	17-18
XI. RECENT INCIDENTS INVOLVING RADIOACTIVE SCRAP METAL.....	36	18
XII. ADDITIONAL COMMENTS .....	37-38	19-20
XIII. FUTURE WORK.....	39-43	20-22
A. Reporting.....		20
B. Distribution .....		20
C. Best practices and examples.....		20
D. Liability and insurance companies.....		21
E. Transport regulations .....		21
XIV. CONCLUSIONS AND RECOMMENDATIONS .....	44-47	22-24
A. Updating the UNECE Recommendations.....		22
B. International Public-Private Partnership (Centre of Expertise) .....		23

## EXECUTIVE SUMMARY

1. In 2006 the UNECE Group of Experts on Radioactive Scrap Metal approved the UNECE Recommendations on Monitoring and Response Procedures for Radioactive Scrap Metal. These Recommendations were intended to provide governments, the private sector and any other interested party with information and advice on how best to prevent, detect and respond to incidents involving either radioactively contaminated scrap metal, activated scrap metal or scrap metal with radioactive source(s) or substances contained within it (all three defined as “radioactive scrap metal”).
2. Two years later it was deemed important to determine to what extent these Recommendations had been used and how they could be improved based on feedback from their practical application. For this purpose a detailed questionnaire was developed and circulated to 61 governments, seven intergovernmental organizations, seven companies and one NGO. This report provides an analysis of the 23 responses received by end of October 2008.
3. The analysis highlights the value of the UNECE Recommendations. Two broad conclusions can be extracted from this analysis:
  - (a) the UNECE Recommendations have played an important role to date and will continue to be a useful tool, and
  - (b) there is a role for an international public-private partnership or centre of expertise on radioactive scrap metal.
4. Some useful and concrete suggestions emerged on how to improve the UNECE Recommendations, notably including more best practices and photos, additional information in the fields of prevention, detection and response, and inclusion of additional actors such as insurance companies.
5. Future work may include the development of an international public-private partnership on radioactive scrap metal (or centre of expertise) that would serve to better integrate the key industry and government actors, allowing for an exchange of information and best practices, and for tackling the problem of radioactive scrap metal jointly and in a coordinated manner.

## I. INTRODUCTION

6. In 2006, the UNECE under the auspices of a group of experts, developed “Recommendations on Monitoring and Response Procedures for Radioactive Scrap Metal”. These Recommendations were intended to support all those involved in the metal recycling industry to better prevent, detect and respond to incidents involving radioactive scrap metal (defined as radioactively contaminated scrap metal, activated scrap metal and scrap metal with radioactive source(s) or substances contained within it).

7. Now, two years later, it seemed appropriate and timely to find out how useful these Recommendations have been, how they have translated into practice, what amendments are required, and to identify suggestions for improving them.

8. A questionnaire was circulated to 61 governments, seven intergovernmental entities, one NGO and seven companies active in the recycling of metal.

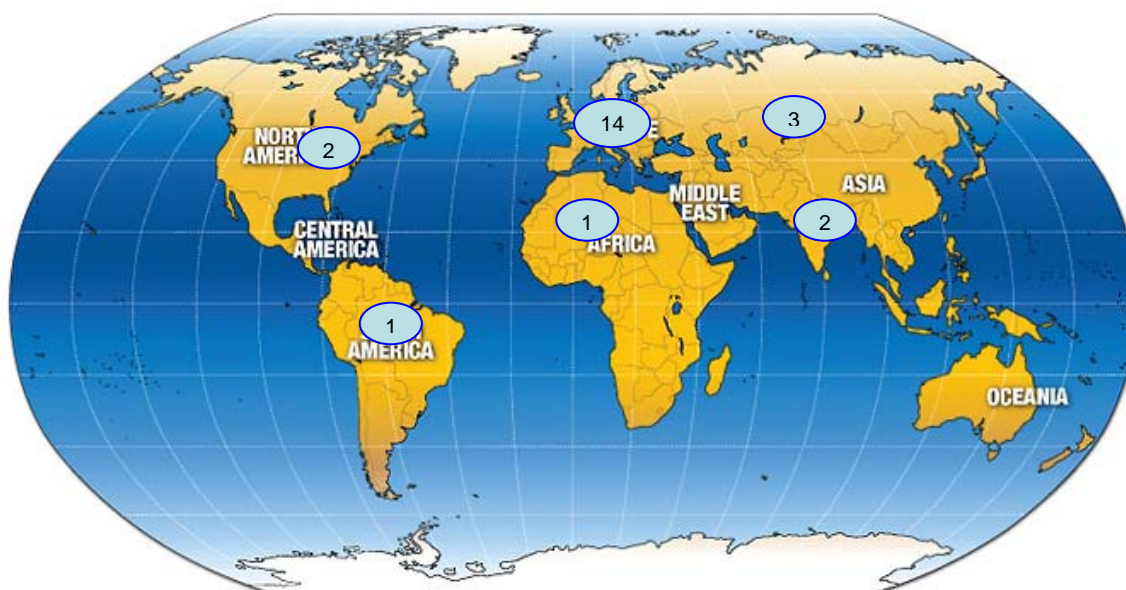
9. The questions were divided in the following sections:

- (a) Presentation of the Recommendations;
- (b) Scope of the Recommendations;
- (c) Content of the Recommendations;
- (d) Use and implementation of the Recommendations;
- (e) Impact of the Recommendations;
- (f) Next steps;
- (g) Other questions.

10. This report analyses the 23 responses received by the end of 2008:

<b>Table 1: RESPONDENTS</b>			
	<b>Name</b>	<b>Region</b>	<b>Sector</b>
1	Belarus	Central Asia	Government
2	Belgium	Europe	Government
3	Brazil	South America	Government
4	Bulgaria	Europe	Government
5	Canada	North America	Government
6	Czech Republic	Europe	Government
7	Finland	Europe	Government
8	Iceland	Europe	Government
9	India	Asia	Government
10	Ireland	Europe	Government
11	Latvia	Europe	Government
12	Lithuania	Europe	Government
13	Luxembourg	Europe	Government
14	Morocco	Africa	Government and research institute
15	Romania	Europe	Government
16	Russian Federation	Central Asia	Government and research institute
17	Serbia	Europe	Government
18	Slovakia	Europe	Government
19	Tajikistan	Central Asia	Government
20	United Kingdom of Great Britain and Northern Ireland	Europe	Government
21	USA	North America	Government
22	Vietnam	Asia	Government
23	ELG Haniel	Europe	Private sector

Figure 1 **Respondent universe (number of respondents per region)**



## II. PRESENTATION OF THE RECOMMENDATIONS

11. A majority of respondents (83%) felt that the format of the UNECE Recommendations was very good and seventeen respondents also felt that the style was very good.

12. The following comments and proposed improvements to the style, format and presentation of the Recommendations were made:

- (a) Respondents generally felt that the information is easy to locate and the format is very effective. The text is clear and well written and the categorisation by stakeholder is very user friendly. The highlighted summaries after each section make locating information easy and it was also felt that keeping the paragraphs relatively short and concise was a positive thing. Respondents also felt that the references to other national information were very helpful.
- (b) It was noted that it may be more helpful to have the higher level sections divided by target audience with sub-categories on prevention, detection and response for each audience.
- (c) A suggestion was made to have a web version that would include hyperlinks and be searchable electronically (in addition to the PDF format that is currently available on the web).
- (d) It may be more helpful to ensure that the explanation text and the specific recommendation attached to it are on the same page.
- (e) One respondent suggested including a more concise chart of objectives categorized by level of priority.
- (f) Additional examples and photos would liven up the Recommendations.

### **III. SCOPE OF THE RECOMMENDATIONS**

13. Eleven countries (Brazil, Bulgaria, Iceland, India, Ireland, Lithuania, Luxembourg, Morocco, Serbia, Slovakia and Tajikistan) felt that the scope of the Recommendations was adequate.

14. Other respondents made specific suggestions for additional areas to cover:

#### **A. Data and reporting**

It was suggested (Belgium) to provide more direction on how to collect and share data and national experiences notably on economic and financial aspects of the issue, as well as harmonization of international reporting and harmonization of response procedures with international transport regulations.

#### **B. Controls**

Latvia suggested that there was a need for more details on options for optimizing border controls. Romania on the other hand felt that it would be helpful to have further recommendations for the nuclear authorities to perform checks at facilities that are not nuclear but that process scrap metal (scrap yards, smelters), in order to verify their conformity with legal provisions.

#### **C. Training and awareness-raising**

Belarus and Canada felt that there was a need for more details on training, specifically on dealing with instrumentation, their calibration and on the limitations and the theory of operation of these instruments. Belarus also felt that more information on the identification of sources would be helpful. The United Kingdom of Great Britain and Northern Ireland (UK) felt that there was a need for more information, awareness-raising and training.

#### **D. Treatment and Disposal**

A number of respondents felt that more information was needed on how to treat and dispose of a contaminated consignment. For instance the Czech Republic emphasised the importance of determining whether the load should be melted, stored or diluted. The Russian Federation felt that more guidance was needed on how to decontaminate and recycle radioactive scrap metal. The UK felt that more could be said about what happens to a consignment that is returned to the consignor. The USA saw this issue as requiring greater collaboration between the industry and government.

#### **E. Responsibilities**

While the section on responsibilities was considered useful by a large number of respondents, many also felt that this was an area where more could be said. Belgium highlighted for instance the question of liability in case of severe incidents. Finland felt that there should be more focus on clear contracts between suppliers at different levels from the small one-person scrap shop to the large foundries and mills. The company, ELG Haniel, felt a need for greater government responsibility for orphan sources which emerged from regulatory control and also for more financial and technical support for the scrap industry to detect and dispose of radioactive scrap including orphan sources.



#### IV. ACTORS

15. Fourteen countries (Brazil, Bulgaria, Czech Republic, Finland, India, Ireland, Latvia, Lithuania, Luxembourg, Morocco, Russian Federation, Serbia, Slovakia and Tajikistan) felt that the Recommendations addressed all the right actors.

16. Other respondents suggested that the following actors should be included:

- (a) **The waste treatment/management sector** - radioactively contaminated scrap may also be found in public waste treatment facilities as well as landfills (Belgium, Canada, USA).
- (b) **The police** - there may be a role to play for the police (Iceland).
- (c) **Manufacturers/importers of consumer goods** - in the UK there have been several instances where contaminated metal has been used in consumer goods (handbags, nails) and other manufactured industrial goods (industrial washing machines). Manufacturers who have used the contaminated, radioactive metals to make products may therefore need to be included as actors (UK).

17. Inclusion of these actors would require additional sections within the detailed recommendations.

#### V. CONTENT OF THE RECOMMENDATIONS

18. The respondents were asked to go through each of the four main sections and provide feedback on particularly useful sub-sections, sub-sections to add and sub-sections to remove.

19. The sections which were considered particularly useful were:

##### A. Under Part I: General Provisions

- 1. section on “Responsibilities and coordination” (Belgium, Iceland, Latvia, Morocco, Russian Federation, Serbia, Tajikistan, USA);
- 2. definitions (Czech Republic, Russian Federation);
- 3. References to clearance values (UK).

##### B. Under Part II: Fields of action

- 4. The entire section was considered very useful (Belgium, Bulgaria, India, Latvia, Morocco, USA);
- 5. The information on mapping likelihood and size of incidents as a preparation for coordination and for response preparedness was considered particularly useful (Iceland);
- 6. The sections on detection and response were most useful as an aid to what is required (Ireland);
- 7. The section on detection was considered particularly useful (Russian Federation).

**C. Under Part III: Additional provisions**

8. The section on training (Belgium, Czech Republic, Latvia, USA);
9. The idea of information exchange is very important and should be implemented at all levels (USA).

**D. Under Part IV: Annexes**

10. All the annexes were considered useful, with individual respondents considering different annexes more useful than others depending on their particular needs and stage of progress on the issue.

20. Suggestions for information to add or update included:

**A. Under Part I: General Provisions**

1. Belarus would like to see pictures of sources included;
2. National actions and actions by industry need updating (Belgium);
3. Include additional good practice examples (Lithuania and UK);
4. To include more information on the most dangerous radioactive spent sources and also some information about typical concentrations of Naturally Occurring Radioactive Material (NORM) - the most probable material to be found in scrap (Brazil);
5. Under subsection D “Guidance & international legal instrument” add a paragraph stating that once a radioactive substance has been detected, the movement or storage of the substance may be subject to national (or international) regulations (Canada);
6. Include something on options for making decommissioning easier/cheaper (Iceland);
7. More detailed procedures and responsibilities in transboundary shipment of radioactive scrap (Latvia).

**B. Under Part II: Fields of action**

1. Some options for the remote identification of sources would be helpful (Belarus);
2. It would be useful to include more information on detectors, related specifically to their sensitivity and also on different countries’ clearance levels (Brazil);
3. On item B (Detection) a lot of important information can be added related to the passage of a load through a detector, for example on the necessity to limit the velocity of the truck, the average density of the scrap in the truck, the position of the radioactive source in the truck etc (Brazil);
4. Additional information on NORM and separate annexes containing some information on radiation measurement equipment and some photos of radioactive sources and containers (Bulgaria);
5. More examples of systems that have been developed for monitoring and emergency preparedness and management (India);

6. Data on the latest advances in detection systems (Latvia);
7. Reference to denial of shipment – the UK has had a number of incidents, in which the shipping company which brought the manufactured products into the UK has refused to take them back after radiation has been detected (UK);
8. Successive incentive programmes to ensure that there is a clear benefit rather than a disincentive for workers and facilities to report any incidents of radioactive scrap metal (USA).

**C. Under Part III: Additional provisions**

1. Minimal requirements for personnel and how to measure their performance (Belarus);
2. Section B (information exchange) should be more developed (Belgium);
3. More information on NORM and on informing the general public (Bulgaria);
4. Training courses that are available and list of documents that are used as a standard reference (India);
5. A training programme specifically tailored to customs staff (Tajikistan);
6. For the electronic version of the Recommendations, hyperlinks to available training documents, programmes would be very helpful (USA).

**D. Under Part IV: Annexes**

1. Information on radiation measurement equipment and photos of radioactive sources and containers (Bulgaria);
2. Include a copy of the calibration date/certificate for the instruments used to monitor scrap (Ireland).

**E. Additional comments**

1. **Belgium** noted, based on experience, that it is difficult to evaluate the credibility of some “Certificates of shipment monitoring”.
2. **India** suggested that some examples from their country could be included in the Recommendations.
3. **Luxembourg** noted that the issue extends also to chemical contamination and maybe some more information on general quality assurance for scrap metals could be useful.
4. The **Russian Federation** remarked that it is good to have clear definitions for the first time separating radioactive substances from radioactive material and radioactive scrap metal.
5. **Tajikistan** noted that the Recommendations were particularly helpful in harmonising their own programmes with international standards.
6. The **UK** noted that visual monitoring is unlikely to be useful in finding a source in a pile of scrap. They also noted that if a source is found, it should be examined for a serial number, to try to trace the owner.

7. The **USA** noted that information exchange sometimes ends up in a “black hole” in government files that are not accessible by those who need it, ie: the industry. Better information exchange, particularly between the private and public sectors, should therefore be a priority.

## VI. CONSULTATION OF THE RECOMMENDATIONS

21. Respondents were asked how often they had consulted the Recommendations. Over half (57 per cent) have consulted the Recommendations occasionally and 26 per cent have consulted them regularly (see Figure 2). The responses can be found in Table 2 below:

Table 2 Consultation of Recommendations

	Never	Once	Occasionally	Regularly	Other
Belarus				X	
Belgium				X	
Brazil				X	
Bulgaria				X	
Canada					X <sup>1</sup>
Czech Republic			X		
Finland			X		
Iceland			X		
India			X		
Ireland		X			
Latvia			X		
Lithuania			X		
Luxembourg			X		
Morocco			X		
Romania			X		
Russian Federation			X		
Serbia				X	
Slovakia			X		
Tajikistan		X			
UK	X				
USA				X	
Vietnam			X		
ELG Haniel			X		
<b>TOTAL</b>	<b>1</b>	<b>2</b>	<b>13</b>	<b>6</b>	<b>1</b>

<sup>1</sup> The CNSC is currently in the process of reviewing its requirements covering the detection of radioactive substances within the scrap metal and waste industry and used the Recommendations as one of the referenced documents.

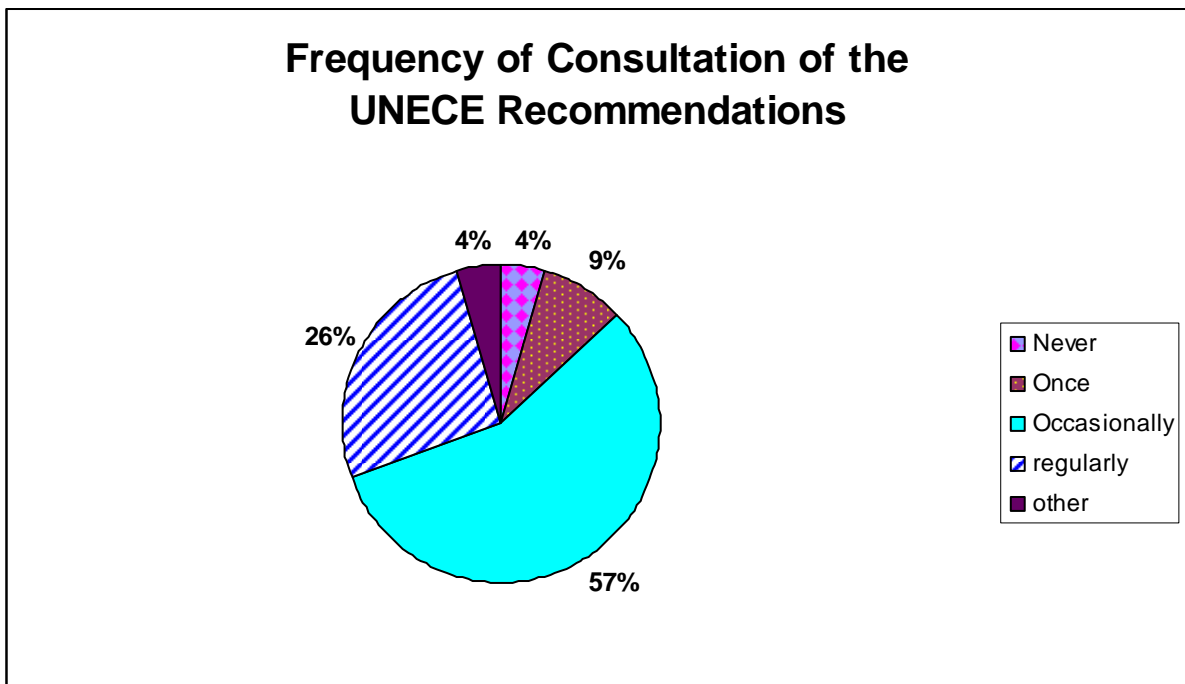


Figure 2

## VII. PRACTICAL USE OF THE RECOMMENDATIONS AT A NATIONAL LEVEL

22. Respondents were asked to identify how they used the Recommendations. Table 3 below identifies responses (a respondent may have provided more than one answer to this question).

Table 3 Use of Recommendations at the National Level

Use of Recommendations	Respondents
As general background information	Belarus, Belgium, Bulgaria, Canada, Czech Republic, Finland, Ireland, Luxembourg, Morocco, Romania, Serbia, Slovakia, Tajikistan, USA, ELG Haniel
For technical input	Belgium, Brazil, Latvia, Lithuania, Luxembourg, Romania, Tajikistan, Vietnam
For references	Belarus, Belgium, Brazil, Bulgaria, India, Lithuania, Romania, Russian Federation, Serbia, Tajikistan, USA, Vietnam, ELG Haniel
For policy formulation	Belarus, Brazil, Bulgaria, Iceland, Morocco, Russian Federation, Tajikistan, USA, Vietnam
For capacity building/training	Belarus, Latvia, Lithuania, Russian Federation, Tajikistan, USA, Vietnam, ELG Haniel
Other	Belgium, Serbia

23. In summary, 15 countries used the Recommendations as general background information, 8 for technical input, 13 for references, 9 for policy formulation and 8 for training (see Figure 3).

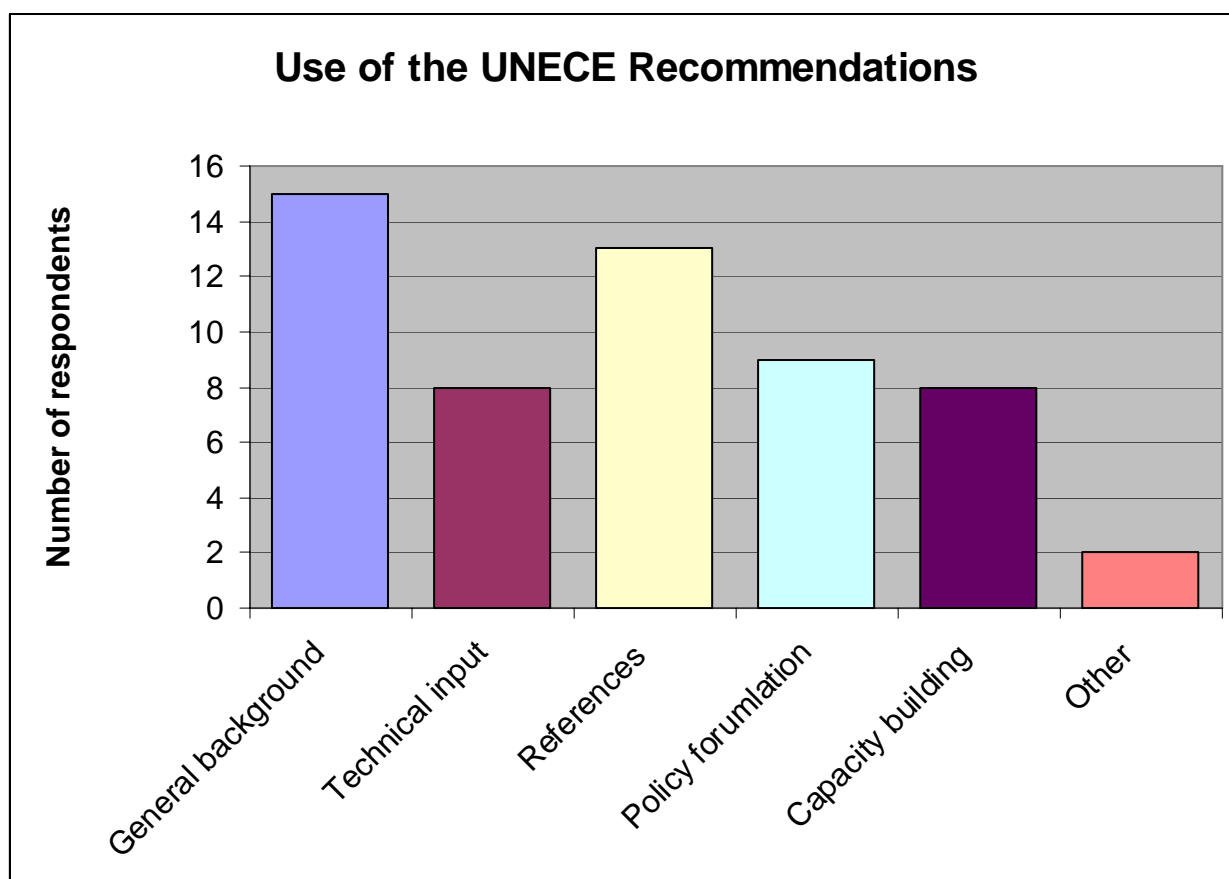


Figure 3

24. Because of the Recommendations:

- (a) Three (3) countries developed new laws (Belgium, the Czech Republic and Romania);
- (b) Six (6) countries developed new training programmes (Belgium, Bulgaria, Finland, Lithuania, Russian Federation and the USA);
- (c) Eleven (11) countries and a company developed new procedures (Belarus, Belgium, Brazil, Bulgaria, India, Latvia, Luxembourg, Romania, Tajikistan, USA, Vietnam and company ELG Haniel);
- (d) Three (3) countries developed new safeguards (Belarus, Russian Federation and the USA);
- (e) Four (4) countries developed new partnerships (Belgium, Finland, Morocco and the USA);
- (f) The USA also developed a new institution (see Figure 4).

25. In addition, seven respondents (Belarus, Bulgaria, Canada, Czech Republic, Iceland, Ireland and the UK) noted “other” on this question. Essentially, these respondents noted that they were undertaking relevant activities but these happened in parallel to the Recommendations so they are difficult to attribute to the Recommendations.

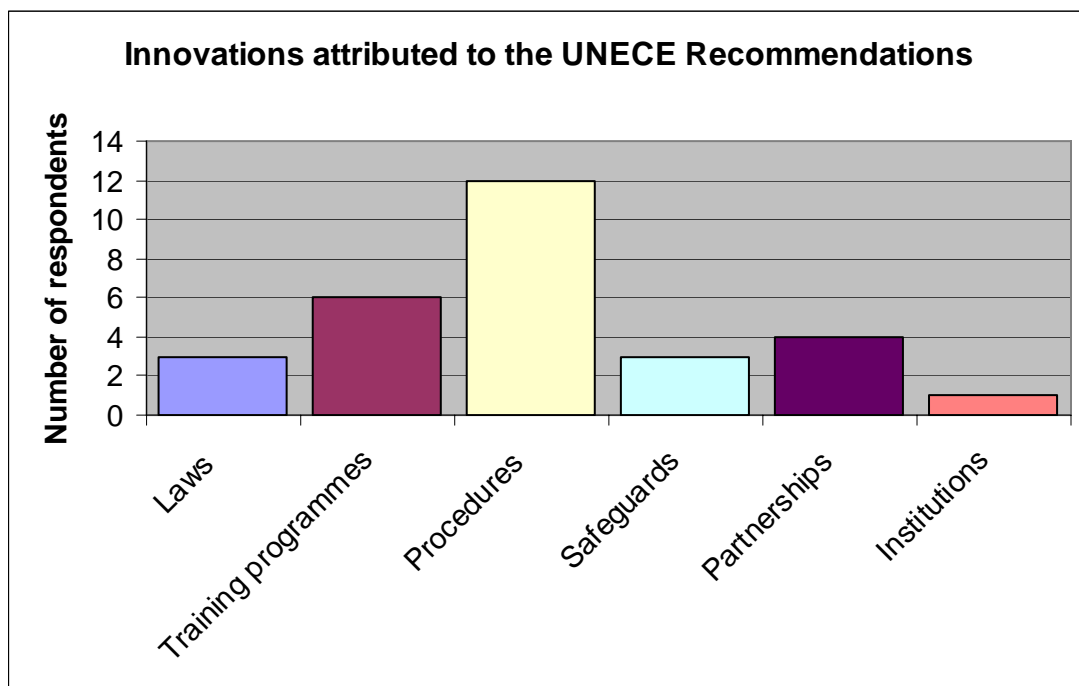


Figure 4

26. At least three countries are planning new proposals (Iceland) or procedures (Ireland and Luxembourg) based on the Recommendations.

27. Below are some examples of practical application of the UNECE Recommendations to date:

- (a) In **Belarus** the Recommendations provided methodological information in preparing materials for different state programmes. They helped to improve coordination among different state departments on detection of sources;
- (b) In **Belgium** the Recommendations provided legitimacy to the Federal Agency for Nuclear Control (FANC) when it came to organizing a national coordination body with Belgian stakeholders;
- (c) Based on this document the Waste Management Department of the **Brazilian** Nuclear Energy Commission is developing a **Brazilian Protocol** to improve the control and response in the case of detection of radioactive scrap metal to be applied in the country's main melting companies;
- (d) In **Bulgaria** the Recommendations were used to develop and adopt a national document called "Guidelines for prevention, detection and response to radiation emergency in case of discovery of radioactive material in scrap metal" and to develop new training programmes for interested parties;
- (e) In **Canada** the Recommendations were used to provide information about the subject to other officials and as one of the reference documents for the review of the requirements covering the detection of radioactive substances in scrap metal;
- (f) **Finland** started co-operation with the metal manufacturers regarding the issue of orphan sources and scrap metal;

- (g) **Iceland** noted that while it had not made a practical use of the Recommendation until now, it is expecting to do so in the near future;
- (h) **Ireland** is hoping to use the Recommendations to form the basis for capacity building/training in 2009/2010;
- (i) **India** and **Tajikistan** used the Recommendations for documentation and training;
- (j) In **Latvia** the Recommendations contributed to a more comprehensive approach to the whole management cycle for orphan sources found in scrap metal;
- (k) The Recommendations were used to develop training programmes in **Lithuania** (for workers of scrap yards and scrap reprocessing plants);
- (l) While **Lithuania** already had developed an effective system of control of radioactive contamination and preventative measures in scrap yards before the Recommendations were published, they proved useful as examples of good practice;
- (m) In **Luxembourg** the Recommendations helped to improve existing procedures;
- (n) In **Morocco** the Recommendations provided a framework to begin engaging with the relevant authorities (customs, regulatory body, security forces, the most important private companies in charge of scrap metal) in order to improve controls of radioactive scrap metal;
- (o) The Recommendations were used in **Romania** to elaborate a specific regulation on shipment, import, export, transit and monitoring of scrap metal;
- (p) In the **Russian Federation** the Recommendations were used for training of staff involved in monitoring scrap metal;
- (q) In **Serbia** the Recommendations were used to advance control of radioactivity of scrap metal and to establish adequate procedures. More specifically, they helped to set up procedures for monitoring of radioactive material in scrap metal by scrap collectors and also at border crossings;
- (r) In **Tajikistan** the Recommendations were used to develop expert documents;
- (s) In the **USA** the Recommendations were disseminated to the Institute of Scrap Recycling Industries (ISRI)<sup>2</sup> Radiation Task Force which is now utilizing them in the development of its training programmes and to define responses to found sources. ISRI hired a Certified Health Physicist to assist in the technical writing of the programme, using the UNECE Recommendations as a guide. The new training programme will be rolled out prior to year-end in 2008, and again at the ISRI Annual National Convention in Las Vegas in April, 2009. The Recommendations were presented to Chinese import/export officials by the Environment Protection Agency's (EPA) Assistant Administration for Enforcement and Compliance Assurance during a trip to China in 2007. EPA is finalizing an agreement with China to exchange technical import/export information between the two countries. Partnerships have been developed with the Conference of Radiation Control Program Directors, Inc (CRCPD) working

---

<sup>2</sup> ISRI is a private, non-profit trade organization that represents 1600 private scrap recycling companies at more than 3,000 facilities. Eighty percent of these facilities are in the U.S. and range in size from small family-owned businesses to large multi-facility companies.



directly with ISRI and the scrap industry. The US Department of Energy has begun, in some states, to assist the scrap industry in disposition of found sources. This programme, through work of the E-40 committee is planned for much greater implementation across the US. The UNECE Recommendations are an integral part of these activities;

- (t) In **Vietnam** the Recommendations were used to develop regulations for the recovery and handling of orphan radioactive sources (Governmental Decision 146/QD-TTg) and for developing training materials for metal/steel producers;
- (u) The company **ELG Haniel** used the Recommendations as a benchmark for their own group policy and for reference purposes in training and education efforts as well as in general discussions with suppliers and customers.

### VIII. IMPACT OF THE RECOMMENDATIONS

28. This section assesses responses related to the impact the Recommendations have had on respondents' daily work, on their relationship with the private sector and on minimising incidents.

#### A. On your work

Table 4 Assessment of impact of the Recommendations on people's work

	Country	Total
Made no difference to your work	Czech Republic, Ireland, UK	3
Made a small difference to your work	Finland, Iceland, Latvia, Lithuania, Luxembourg, Morocco, Slovakia, Tajikistan, ELG Haniel	9
Made a big difference to your work	Belarus, Brazil, Romania, Russian Federation, USA, Vietnam	6
Other	Belarus, Belgium, Bulgaria, Canada, India, Serbia	6

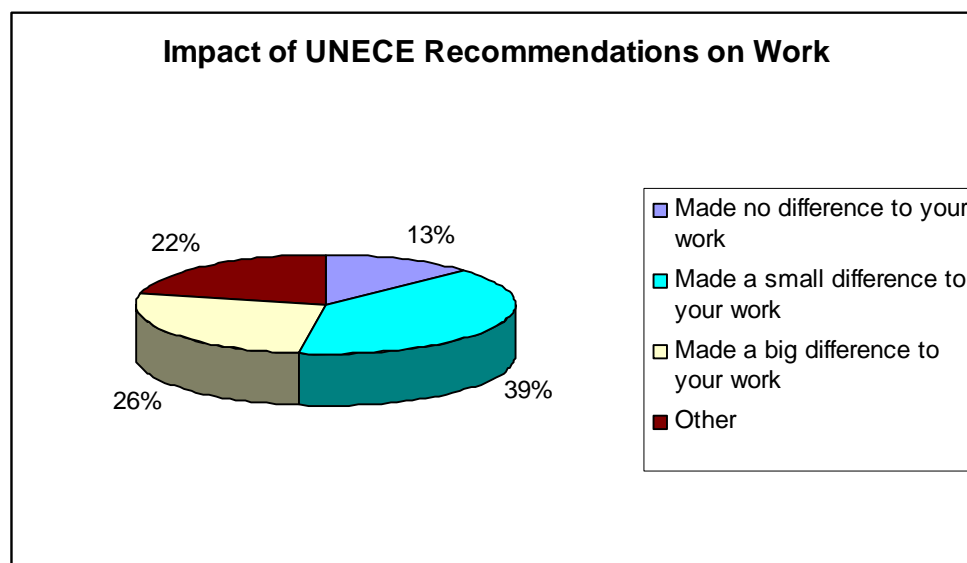


Figure 5

29. With the Recommendations only being two years old we could not expect them to cause major changes in people's work. Nevertheless some respondents were able to provide information on how the Recommendations did influence their work, specifically:

**1. Providing legitimacy to ongoing efforts and to engage actors**

For example, respondents from Belgium and from the company ELG Haniel felt that the Recommendations helped to provide added weight to their ongoing efforts and to their discussions with other stakeholders. The USA felt that it gave them the necessary backing to engage major actors such as the ISRI.

**2. Providing an overarching framework and direction**

For example, Bulgaria felt that the Recommendations gave them a reference point to help determine whether their efforts were in the right direction and to see how they fit within a broader international framework.

**3. Provide direct technical input**

For example, both India and Vietnam felt that the Recommendations offered them with important technical input and contributed to improving their overall procedures on the issue.

**B. On relationship with private sector**

30. The Recommendations provide a comprehensive framework which reaches out to government and private sector alike. Respondents were asked to assess whether the Recommendations helped them to engage with the private sector (and in the case of the private sector, the question referred to their engagement with government).

31. Below are some sample responses to this question:

- (a) In **Belgium** the Recommendations were presented as one of the contextual reasons for Belgium's national negotiations with multiple stakeholders. They helped to set the international framework and provided justification to efforts undertaken by the FANC;
- (b) In **Bulgaria** the Recommendations strengthened the relationship between the private sector and the government (BNRA), as well as contributed to confidence building;
- (c) In **Ireland** the Recommendations will be discussed with relevant actors in the scrap metal industry to develop jointly the necessary procedures for dealing with radioactive scrap metal;
- (d) In **Latvia** such a relationship had already been established before the Recommendations, however, the Recommendations helped to develop and strengthen it;
- (e) In the **USA** the Recommendations helped to engage the Institute of Scrap Recycling Industries (ISRI).

**C. On incidents**

32. Respondents were asked to assess whether the Recommendations have had an impact on minimising incidents. Table 5 below shows a relatively even spread of answers ranging from no impact to a big impact.

**Table 5 Impact of responses in minimising incidents**

No impact on minimizing incidents	Czech Republic, Iceland, Slovakia, Tajikistan
A small impact on minimizing incidents	Belarus, Finland, Latvia, Luxembourg, ELG Haniel
A medium impact on minimizing incidents	Brazil, Russian Federation, Vietnam
A big impact on minimizing incidents	Bulgaria, India, Lithuania, Serbia
Other	Belgium, Canada, Ireland, UK, USA

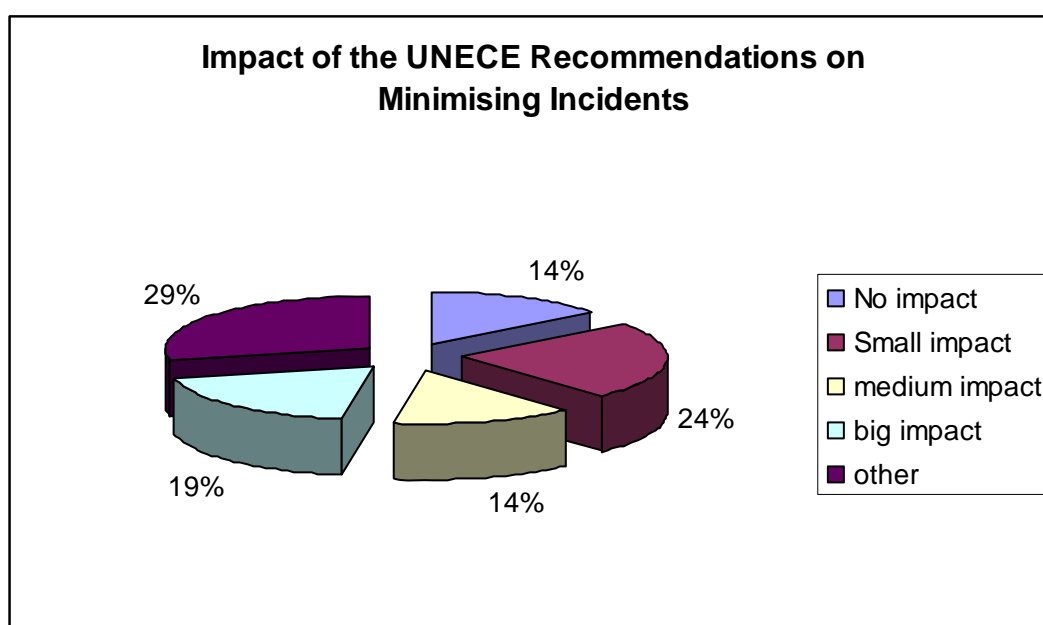


Figure 6

33. Respondents also highlighted the fact that general awareness has been raised about the issue, in part but not only, because of the UNECE Recommendations. They also reported that with improvements in detection systems this has also led to a greater number of incidents being reported. For these reasons the Recommendations are very timely and useful in helping countries respond to these alarms in a structured and informed manner and to build up the necessary expertise.

**IX. LESSONS LEARNT THANKS TO THE RECOMMENDATIONS**

34. Respondents were asked to identify lessons that they have learnt thanks to the Recommendations:

- (a) Importance of international coordination (Belarus);
- (b) The issue is of global importance (Belgium);
- (c) Much more work lies ahead and in reality only a few countries are managing the issue fully (Brazil and ELG Haniel);
- (d) Importance of allocating and defining clear responsibilities (Bulgaria);
- (e) Importance of cooperation to tackle problem of orphan sources (Finland);
- (f) The polluter pays principle is interesting but should be legally binding (Czech Republic);
- (g) Importance of radiation monitoring in the scrap metal industry (India);
- (h) Provides a framework within which regulatory authorities and scrap metal companies can work together (Ireland);
- (i) Value of the UNECE Recommendations in structuring radiation control activities (Russian Federation);
- (j) Helpful in decision-making (Tajikistan);
- (k) Increased awareness about radioactive scrap metal in the industry (ELG Haniel).

## X. REACH OF THE RECOMMENDATIONS

35. The reach of the Recommendations was estimated by determining with how many people the initial group of recipients shared the Recommendations. The results suggest that in addition to those receiving the Recommendations directly from the UNECE, between 1190 and upwards of 1465 people received the Recommendations. While this is an encouraging number, for the Recommendations to become truly effective a much greater effort would be needed to circulate them even more widely.

Table 6 **Reach of the UNECE Recommendations**

<b>With approximately how many people do you estimate that you have you shared the Recommendations?</b>		
<b>Number</b>	<b>Respondents</b>	<b>Total numbers</b>
0	-	0
1-10	Belarus, Canada, Iceland, India, Ireland, Luxembourg, Romania, Slovakia, UK	9-90
11-25	Belgium, Brazil, Czech Republic, Latvia, Morocco, Tajikistan, ELG Haniel	77-175
26-50	Bulgaria, Russian Federation, Serbia, Vietnam	104-200
51-100	-	0
Over 100	Finland, Lithuania, USA (1000s)	1000+

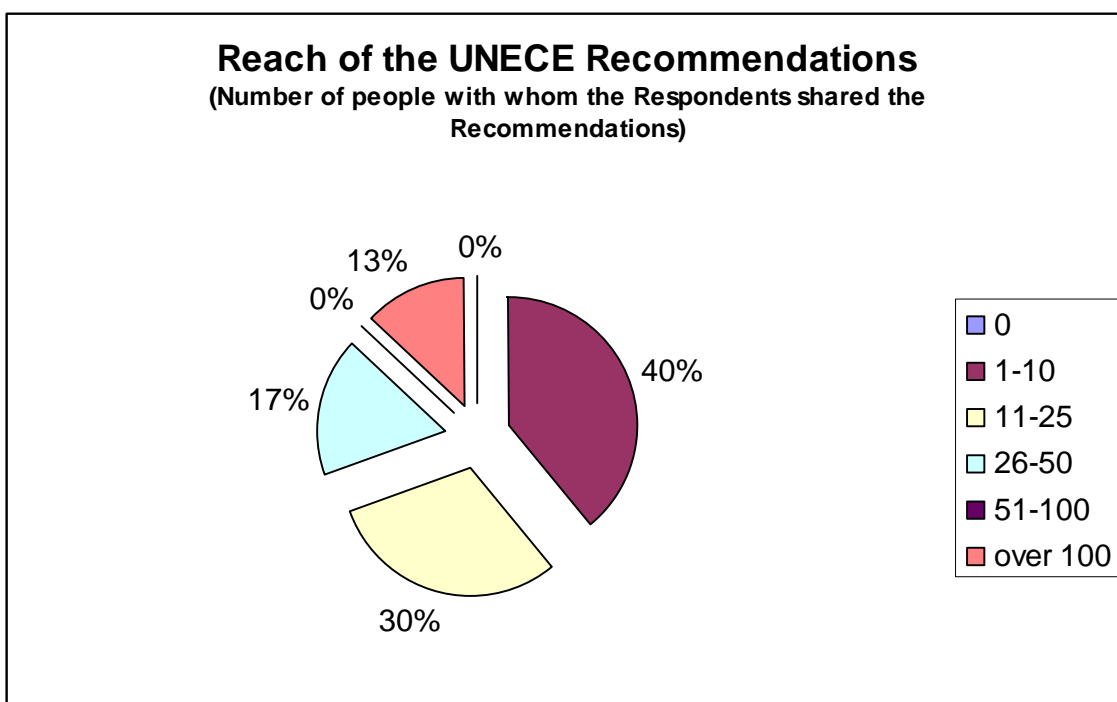


Figure 7

## XI. RECENT INCIDENTS INVOLVING RADIOACTIVE SCRAP METAL

36. A number of countries were willing to provide data on recent incidents involving radioactive scrap metal. The results are very uneven which suggests two things: a) some countries have more thorough checks than others, b) some countries simply have a much smaller metal recycling industry. While the data do not allow for any representative conclusions on the likelihood and scope of incidents with radioactive scrap metal, they nevertheless show that such incidents occur and are likely to increase due to more sophisticated detection mechanisms as well as the imminent decommissioning of possibly contaminated structures built in the 1960s.

Table 7 Incidents in recent years

Country	Latest Year	Total no. of domestic orphan sources lost	Total number of orphan sources found in imported waste and scrap	Total number of orphan sources found in exported waste and scrap
Belgium	2007	71	26	0
Bulgaria	1998-Sept 08	25	2	3
Czech Republic	2007	1	12 (incl. NORM)	-
Finland	2008	1	10-20 (incl. NORM)	0
Iceland	2008	0	0	0
Ireland	2007	-	-	1
Latvia	2007	0	2	1
Lithuania	2007	0	0	0
Luxembourg	2008	0	0	2
Serbia	2008	-	-	-
Slovakia	2007	-	12	3
UK	2008	-	1	1
Vietnam	2006	2	-	-

## **XII. ADDITIONAL COMMENTS**

37. Should the UNECE Recommendations be updated, most respondents have indicated their willingness to contribute to this process.

38. Some final comments noted by respondents include:

- (a) **Brazil** is currently developing a new paper on the difficulties in detecting radioactive material with a portal detector depending on the truck velocity, bulk density of the scraps in the truck, size of the truck, existing shielding of the source and position inside the truck, to be shared via the internet.
- (b) In **Bulgaria**, the BNRA is planning to translate into English the “Guideline for prevention, detection and response to radiation emergency in case of discovery of radioactive material in scrap metal”, (NRA No.QMS-EP-RG-01, 2008). They also noted that the publication of the Recommendations was very timely.
- (c) The **Czech Republic** noted that there was insufficient time to collect and contact all relevant information and institutions to complete the questionnaire thoroughly. They did note however, the critical importance of disposing of radioactive scrap metal. Finally, they highlighted the limitations of having the Recommendations only in English.
- (d) **Finland** noted that in the last two years three melting incidents of Am-241 sources have occurred at Outokumpu Plc. Tornio Works. Due to the low energies involved with Am, these accidents could not be averted through the use of even the most sophisticated radiation monitoring, hence the responsibilities of the scrap metal supply chain should be emphasised and the role of commercial agreements strengthened to drive home the message that dealing with the orphan source problem is the responsibility of the whole scrap metal supply chain.
- (e) **Iceland** noted that while there is no nuclear industry in the country, around 200 sealed sources in gauge levels are registered, although the use of these is rapidly diminishing. Sources must be disposed of by sending them abroad to manufacturers since there is no Icelandic depository. It would appear that some users have put sources into storage and need to be encouraged to legally dispose of them. These stored sources could become orphan sources and the Icelandic regulatory authority (IRPI) has identified this potential issue as a priority.
- (f) **Serbia** noted that the countries of the region (Slovenia, Croatia, Bosnia and Herzegovina, Montenegro, the former Yugoslav Republic of Macedonia and Serbia) held two meetings to look at applying the Recommendations and to establish adequate procedures and information exchange for detecting radioactive scrap metal: one in March 2007 in Zagreb and one in November 2007 in Belgrade. All members of national regulatory bodies and customs participated and the meeting led to a coordinated system of information exchange, as well as discussions on the formation of a regional centre for training. Furthermore Serbia noted that they have established obligatory controls for radioactivity on every load of imported, exported or transiting scrap metal. Radioactive controls are carried out by an authorized legal body. Serbia also noted that by building up prevention and permanent detection training in contaminated scrap metal, the Recommendations

helped to reduce the potential economic, public health and environmental impacts of this issue.

- (g) The **UK** noted that several consignments of consumer goods received into the UK in 2007 and 2008 from one country in the Far East were found to be contaminated with Cobalt-60 in the steel from which they were made. These goods had been manufactured from several different grades of steel, so the contamination did not originate from a single source in one melt.
- (h) The **USA** noted the important steps taken between government and the industry in taking this issue forward. The programme has taken on new life as both CRCPD and the industry have committed to funding it. The US Department of Energy (DOE) has now become involved in the disposition of found sources and is aiming to have more involvement in all states for disposition/disposal. ISRI is meeting with the Bureau of International Recycling (BIR) to discuss additional options, both radiation and other safety issues. The USA finally noted that the programme should be continued and expanded with periodic updates being shared with members.

### **XIII. FUTURE WORK**

39. In terms of future work related to the Recommendations, five (5) countries (Belarus, Brazil, Morocco, Romania and Russian Federation) felt that they should be more detailed, eleven (11) respondents felt that they should be more widely distributed (Belarus, Canada, India, Ireland, Latvia, Luxembourg, Morocco, Romania, Serbia, UK and the USA), and seven (7) countries (Bulgaria, Czech Republic, Ireland, Romania, Russian Federation, Tajikistan and Vietnam) felt that they should become legally-binding.

40. Additional comments for the future of the Recommendations included:

#### **A. Reporting**

Some respondents noted the importance of international reporting and the need for further work in this area, notably in collaboration with the IAEA (**Belgium**).

#### **B. Distribution**

**Ireland and the US** noted as a priority the need to distribute the Recommendations as widely as possible through whatever channels are available.

#### **C. Best practices and examples**

A number of respondents emphasised the value and importance of including more best practice examples. Also, inclusion of success stories from members who are using part or all of the Recommendations and how it has altered their radiation programme would be helpful. It was suggested (**Finland**) that in addition to the Recommendations, the UNECE website could become a best practice forum for the metal industry regarding the orphan source problem, including for example, draft commercial agreements, database of pictures or orphan sources etc. Furthermore, the idea of a multi-national scrap metal “Centre of Excellence”, or a similar mechanism, to collectively fund and track training and capacity building activities as part of a next phase of work was proposed (**USA**).

#### D. Liability and insurance companies

More work is needed on better defining liability. In many countries the “finder” is still the one responsible for clean up which is not a sustainable solution since it creates a disincentive for reporting detections (**Belgium and USA**). Furthermore, when there are serious incidents (economical, environmental and health), it is still unclear who foots the bill. More work is necessary to engage insurance companies.

#### E. Transport regulations

One respondent (**Belgium**) remarked on the important issue of ensuring that the Recommendations can be aligned with both national and international transport regulations.

41. Respondents were asked to identify the key target audience for future work on the Recommendations. The majority responded that governments, the private sector and international agencies should all be the main focus and that private-public partnerships were an important tool to achieve future collaboration. Table 8 below highlights these responses.

Table 8 **Main targets of future work on implementation of the Recommendations**

	Governments	Private sector	Public private partnerships	International agencies	All of the above
Belarus					X
Belgium					X
Brazil					X
Bulgaria					X
Canada					X
Czech Republic					X
Finland	X	X			
Iceland					X
India					X
Ireland					X
Latvia		X			
Lithuania			X		
Luxembourg	X	X			
Morocco	X	X	X		
Romania	X				
Russian Federation	X		X	X	
Serbia					X
Slovakia	X	X			
Tajikistan	X		X		
UK					X
USA					X
Vietnam					X
ELG Haniel	X				

42. In terms of possible future work on the Recommendations, respondents were asked whether the effort should be on:

- (a) Upgrading them;
- (b) Marketing them;



- (c) Distributing them more widely;
- (d) Raising awareness about them;
- (e) Training in their implementation, or
- (f) Translating them into other languages.

43. Eight (8) respondents (Brazil, Finland, Iceland, Lithuania, Romania, Russian Federation, Serbia, ELG Haniel) felt that they should be upgraded, eight (8) respondents (Belarus, Canada, Finland, Iceland, Morocco, Serbia, USA, ELG Haniel) felt that the emphasis should be on marketing them, thirteen (13) respondents (Belarus, Bulgaria, Canada, India, Latvia, Lithuania, Luxembourg, Romania, Russian Federation, Serbia, UK, USA, ELG Haniel) felt that they should be distributed more widely, seventeen (17) respondents (Belarus, Belgium, Bulgaria, Canada, Finland, India, Ireland, Latvia, Lithuania, Luxembourg, Morocco, Romania, Russian Federation, Serbia, Tajikistan, UK, USA) felt that awareness needed to be raised about them, fifteen (15) respondents (Belarus, Belgium, Brazil, Bulgaria, India, Ireland, Latvia, Morocco, Romania, Russian Federation, Serbia, Slovakia, Tajikistan, UK, USA) felt that the emphasis in the future should be on training, and eleven (11) respondents (Belgium, Brazil, Bulgaria, Canada, Czech Republic, India, Latvia, Luxembourg, Serbia, UK, USA) felt that they should be translated into other languages.

#### **XIV. CONCLUSIONS AND RECOMMENDATIONS**

44. Two broad conclusions can be extracted from this analysis:

- (a) the UNECE Recommendations have played an important role to date and will continue to be a useful tool, and
- (b) there is a role for an international programme or *centre of expertise* on radioactive scrap metal.

##### **A. Updating the UNECE Recommendations**

45. The analysis above demonstrates that the UNECE Recommendations have clearly been used by a large number of practitioners. In turn, these same practitioners have provided significant feedback on ways in which the UNECE Recommendations can be improved to make them more useful.

##### **Proposed way forward**

Taking each section of the Recommendations in turn, the following information would need to be added:

##### **1. Part I: General Provisions**

The paragraphs on national actions and actions by industry need updating. Information on best practices and photos could be inserted. More on typical concentrations of NORM and on the most dangerous spent sources could be included. The issue of transboundary shipment of such materials could be elaborated. More information could be included on the movement and storage of radioactive material. Options for making decommissioning less costly and more effective may need to be considered. Collaboration between government and the private sector is still an issue and more guidance and options could be provided on how to improve this collaboration. More could be said also on

responsibilities including liability and inclusion of insurance schemes that could be helpful on this issue.

## **2. Part II: Fields of Action**

### **(a) Prevention**

It would be useful to further elaborate the options for creating incentive programmes to encourage the identification and reporting of radioactive scrap metal.

### **(b) Detection**

More information on detectors and their sensitivities, calibration, positioning etc. could be included. Further details may be added on border controls. The inclusion of more examples as well as photos could be considered.

### **(c) Response**

It would be helpful to insert more examples of successful response procedures. Emphasis was also placed on the need for more direction on international reporting and harmonization of response procedures. Further details may be needed on disposal of detected material, including support to determine the best response given the circumstances.

## **3. Part III: Additional Provisions**

More could be included on training of personnel and on information exchange (across countries and within countries between government and private sector for instance).

### **Annexes**

Further concrete examples from different countries and companies would be helpful.

46. In addition suggestions were made to improve the format of the Recommendations, for instance presenting them more explicitly by target audience and also including a searchable web version with hyperlinks. Other actors may need to be included within the Recommendations, including the police, the waste sector more broadly and manufacturers/importers of consumer goods.

### **B. International Public-Private Partnership (Centre of Expertise)**

47. Expertise exists within the IAEA on addressing regulatory issues with respect to radioactive waste and international transport of such waste. Similarly, the European Commission has expertise particularly in legislative and training aspects. The scrap metal and metal processing industry has significant expertise when it comes to monitoring scrap metal for radioactivity. Different industry associations, such as the Bureau of International Recycling (BIR), play an important role in disseminating relevant information, raising awareness and providing support to address the issue. However, there are very limited options for a comprehensive approach, embracing all parties in the metal recycling chain. Additionally, it is not always easy to bridge the private and public sectors, both of which have an important role to play to manage this issue.

## **Proposed way forward**

An international public-private partnership or centre of expertise could be an avenue for integrating the key industry and governmental actors across sectors, allowing for an exchange of information and best practice and for tackling the problem of radioactive scrap metal jointly and in a coordinated manner. Such a partnership could complement existing activities, such as those of the IAEA and the private sector.

The overall objective of such a public-private partnership could be:

*Promotion of energy efficient recycling of metal resources by effectively managing, in a harmonized manner, the risk of radioactive scrap metal and minimizing its impact on business, health and the environment.*

Partners would need to adhere to this overarching objective. Each partner entity would however contribute in its own way to this objective and would inform others on a regular basis.

Such a public-private partnership could have three main modules:

### **Module 1      Implementation**

Further development, fine-tuning and use of the UNECE Recommendations, gathering lessons learnt and experiences from applying the Recommendations, with a view to reaching comprehensive voluntary international standards in prevention, detection and response procedures, including insurance schemes.

### **Module 2      Capacity building**

Organization of training workshops, exchange of experiences, expertise and know how, exchange programmes and workshops on relevant emerging topics.

### **Module 3      Trade and Transport Facilitation**

Preparation of guidelines on procedures and mechanisms to facilitate international trade and transport in scrap metal (that is potentially radioactive) and exchange of experiences and promotion of best practices, including for Customs authorities and the transport industry.

-----