Monitoring of Radioactively Contaminated Scrap Metal
Phase III

SURVEY OF EXISTING NATIONAL TRAINING COURSES AND MATERIALS TO HELP MANAGE RADIOACTIVE SCRAP METAL

- WORK IN PROGRESS -

United Nations Economic Commission for Europe (UNECE)
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I. INTRODUCTION

Under phase III of the project "Monitoring of Radioactively Contaminated Scrap Metal" UNECE will collect existing training documents and based on these, identify gaps and make suggestions for the development of training and capacity building programmes to facilitate the implementation of the recommendations on monitoring and response procedures for radioactive scrap metal developed under Phase II.

A first step was a scoping exercise to obtain from the International Expert Group an overview of existing training materials to monitor radioactive scrap metal addressing prevention, detection and response. The results of this survey are presented in this document. In addition, annex I includes a complementary UNECE survey of international training institutions providing opportunities and courses that are of relevance to preventing, detecting and responding to incidents involving radioactive scrap metal.

II. OVERVIEW

In order to obtain a better picture of training material available in different countries, a quick survey was done among the UNECE Expert Group on Monitoring of Radioactively Contaminated Scrap Metal representatives over the summer of 2006. Three broad questions were asked:

> *1. In your country/organization/company who is the target audience for available training in monitoring and responding to the presence of radioactive scrap metal? (Customs, scrap yard managers, metal companies, demolition sector, regulatory body, transport sector etc.)*
>
> *2. What type of training does this target audience receive? (in-country/abroad, workshops, CDs/written materials, practical/theoretical etc.)*
>
> *3. What are the main fields covered by this training (prevention, detection, response)?*

Respondents:

A total of 20 countries, the European Commission, the International Atomic Energy Agency (IAEA) an international recycling organization (BIR) representing the recycling industry, a private company in Estonia, and a consultant to the scrap metal industry in the Netherlands responded to the above 3 questions.

Responding countries were: Brazil, Belgium, Croatia, Czech Republic, Estonia, India, Ireland, Italy, Latvia, Lithuania, Luxembourg, Norway, Romania, Russian Federation, Slovenia, Spain, Sweden, Switzerland, Tajikistan, USA and the European Commission. Countries did not necessarily respond to all three questions.

In addition, the IAEA, as well as a number of countries, such as the USA and Brazil, provided a number of relevant documents and/or CDs. Titles of all relevant documents that have been provided can be found under annex II.

III. RESPONSES

Responses are summarised below under three broad categories: 1. audiences for the training, 2. type of training (workshop or other) and 3. training content.

At this stage, care needs to be taken in analysing these responses, as they do not necessarily provide a comprehensive overview of a country's available training in this area. Nonetheless, they provide a good initial picture of key training options pertaining to the management of radioactive scrap metal.

A. Audiences

The audiences for the training vary between countries, but can be sub-divided as:

- Customs authorities;
- Regulatory authority, including the police force and defence sector;
- Scrap yards and metal companies, (managers and/or employees)
- The transport sector, including forwarding agents, railways, airports and seaports.

Table 1: Target sectors for training

Country/organization	Sector			
	Customs	Regulatory authority (including police and defence)	Industry/ Scrap yard (managers or employees)	Transport (forwarding agents, railways,
Belgium			✓	
Brazil	✓	✓	✓	✓
Croatia	✓			
Czech Republic		✓		
Estonia	✓	✓	✓	
Estonia (private sector)			✓	
India	✓	✓	✓	
Ireland	✓	✓	✓	
Italy	✓	✓	✓	✓
Latvia	✓	✓	✓	
Lithuania	✓	✓	✓	
Luxembourg			✓	
Norway	✓	✓	✓	
Romania	✓	✓	✓	✓
Russian Federation	✓	✓	✓	
Slovenia	✓	✓	✓	✓
Spain			✓	
Sweden	✓		✓	
Switzerland			✓	
Tajikistan	✓			
USA		✓	✓	
BIR			✓	
IAEA	✓	✓		✓
Consultant (Netherlands)			✓	

Conclusions: Audiences

Conclusion 1: *The area that appears to receive the least training is the transport sector.*

B. Type of training

As shown below, countries provided very different degrees of responses to the question about the sort of training they offered.

Belgium
The training consists in theory and is given by experts of the Federal Agency. Slides tend to be used as training materials. A copy of the slides is given to each participant. Demonstration of some radioactivity measurement instruments is also shown.

Brazil
Usually melting companies have a radiological supervisor (because of nuclear gauges installed). The supervisors have to participate in 100 hours of training (covering radiological protection, detectors, waste management, transport and emergency) given by private companies and afterwards they are submitted to an exam at the Brazilian Nuclear Energy Commission (CNEN) - The Brazilian Regulatory Body in the Nuclear Field. Most of these courses include practical lectures. It is noted though that courses are no specifically tailored to the industrial sector.

Czech republic
A Radiation Protection Officer (RPO), is responsible for education and training of other workers in radiation protection. This obligatory training and exam (of workers) must be provided minimum once a year. Sometimes the training also contains some practical exercises, depending on the RPO.

Estonia
Most of the training is provided through 1 or 2-day workshops, which include several lectures and a practical exercise. The participants get written materials and the presentations are also available for download from the website.

Estonia (private sector)
In-company training is provided on an annual basis.

India
Training courses for monitoring of radiation in the public domain and responding to radiological emergencies is done periodically. Specific courses targeting Customs to help them detect radioactive sources in scrap metal are being conducted on a regular basis by the Atomic Energy Regulatory Board (AERB). Training courses and Interactive seminars are held for the members of the “All India Induction Furnaces Association”, a nodal association of the metal recycling industry. Training material is predominantly in printed form to ensure immediate access to the target audience at remote locations, where they might not have access to the electronic versions.

Ireland
The Regulatory Authority has in-house experts in radiation detection and radiological protection. There is no formal training in monitoring and responding to the presence of radioactive scrap metal, only on-the job training and experience. Customs Officers have attended an in-house radiation protection workshop organized by a local University. One of the largest scrap yards in Ireland has staff trained in the use of a portal radiation detector.

Italy
Written materials, theoretical and practical exercises are the basis for training courses.

Latvia
Training courses include theoretical lectures as well as practical exercises in the use of dosimetric devices and proper performing detection measurements. The Radiation Safety Centre has prepared printed methodical instructions and is distributing them for personnel engaged in collection of metal scrap.

Lithuania
Training consists in workshops. According to the order of the director of Radiation Protection Centre No. 45 of October 27, 2005, scrap metal yard workers and managers must undergo 8 hours of training in Radiation protection.

Luxembourg
Staff from metal companies are informed about the risks linked to radioactive material with a special focus on radioactive scrap material and a procedure, describing the practical handling of alarms, has been established.

Norway
Scrap yard managers and metal companies receive some kind of training given by the suppliers (ex. Laborel) of measuring equipments. However, there is no systematic training in this sector.

Once a year the Norwegian Radiation Protection Agency (NRPA) organises theoretical and practical seminar/workshops on different relevant topics in this relation for customs and Civil Defence in northern Norway (at the Russian border). Also practical exercises in the field are being carried out.

Romania
Training courses and workshops are offered, but essentially abroad (although some in-country courses are also provided).

Providers of portals and other monitoring devices offer written instructions and/or practical demonstrations on use.

Russian Federation
Training consists in workshops.

Sweden
The Radiation Protection Authority gives almost no training in monitoring and responding to the presence of radioactive scrap metal except that the preparedness organization at SSI recently has given about 20 Customs' officers a relatively in depth training in measuring suspicious goods. Normally personnel in different work places obtain information and training organized by the management via the seller of the measurement equipment they buy.

Switzerland
A 3-day radioprotection course with 16 theoretical lessons and 8 practical ones is attended by scrap exporters. The course is is organized by the Swiss National Accident Insurance Fund (SUVA) and is recognized by the Swiss Federal Office of Public Health as radioprotection course.

Tajikistan
Training consists in practical/theoretical workshops, including CDs and written materials. Some of the training is in-country and some is done abroad.

USA

Training in the USA is all in-country. CDs have been produced and distributed (both in-country and limited distribution abroad). A web-based training programme is under development.

The Nuclear Regulatory Commission is producing a poster for the scrap metal industry showing types of radioactive materials commonly found at scrap yards and outlining a response and notification procedure.

International Atomic Energy Agency (IAEA)

The IAEA can tailor its training programmes to the needs of the various organizations responsible for nuclear security. Most of the training activities consist in a series of lectures given by experts in the relevant field and their schedules are designed to allow adequate time for participants to discuss and interact with each other. Many of the workshops feature demonstrations involving the use of radiation sources and radiation detection equipment, practical exercises in the classroom/laboratory or simulation exercises in the field and site visits. Upon completion of the training activities each participant is provided with written training material including a CD.

Training courses are provided in a national, regional or international setting.

Bureau of International Recycling (BIR)

BIR is the international trade association of the recycling industries with around 60 countries represented through their national trade associations and individual companies.

At a national level, some of the national trade associations affiliated to BIR provide training courses for their member companies regarding the detection and response to radioactive contamination in scrap metal. Such training is provided at workshops by specialist instructors or at national training facilities. These trade associations include but are not limited to BDSV (DE), BMRA (UK), FER (ES), ISRI (USA) and MRF (NL). Individual company members of BIR and of national trade associations that make or sell detection equipment may also provide their customer companies with operator training. A number of national trade associations also provide awareness-raising material such as posters and leaflets.

At an international level, BIR holds workshops during its Conventions, in May and October, which are held at various locations around the world. The schedule for these is agreed with the BIR International Environment Council dependent on specific issues that need addressing or reinforcing. Providers of radiation monitoring equipment regularly attend BIR Conventions to demonstrate and sell their equipment, ranging from hand-held monitors, through grab equipments to gate/portal monitors.

BIR has produced a "Guide to Radioactivity" (an A4 publication of 30 pages) which it has distributed to each BIR member. Printed material from the IAEA is also distributed to BIR member companies and affiliated national associations. BIR has made available certain information, PowerPoint presentations etc, on the members only pages of the BIR website.

Consultant (Netherlands)

In the Netherlands, the private company in question followed training courses at the Nuclear Institute. In addition, the Internet is used as a source of additional materials and information.

Conclusions: Type of training

Conclusion 2: *Training tends to consist in workshops with, in a few cases, some practical exercises.*
Conclusion 3: *In many cases the suppliers of equipment such as portals also provide training on use of the equipment.*
Conclusion 4*: A number of respondents indicated that training may be annual or that at least some sort of "refresher" training is provided.*
Conclusion 5: *There is a big disparity between countries in the type of training, the intensity of training, the target audience etc. which appears to reflect very different understandings of the issue and the level of risk.*
Conclusion 6: *Limited material exists, but its transferability from one country to another is hampered by language.*

C. Fields covered

Belgium

- Basic notions of radioactivity (dose and dose rate, relation between dose and risk,…) and basic principles of radioprotection.
- Radioactive sources detected in waste and scrap.
- Radioactivity measurements instruments (dose rate and contamination monitor, scintillator,…) : how to use them ?
- Directives of the Federal Agency for Nuclear Control for the use of a portal monitor
- Radiological risk in case of detection: this gives a rough estimate of the dose that members of staff could be exposed to in case of detection of radioactivity; a comparison is given with the dose received in more common circumstances (X-rays, natural background, airplane,…)

Czech Republic

The aim of the course is to allow staff to distinguish between normal and emergency cases

Estonia

The training provided covers basic radiation and radiation protection, detection of radiation and practical work with available measuring devices, reporting and communication requirements (whom to inform and who can do what) and practical exercises.

Estonia (private sector)

Fields covered include: prevention, measurement, detection as well as response should a radioactive source be detected.

India

Course structure for training:

1. Structure of Atom
2. Laws of Radioactive decay, Half Life, Mean life, Decay Constant, Activity
3. Dosimetric Quantities
4. Principles of Radiation Detection
5. Radiation Detectors
6. Scintillation Radiation Detectors
7. Semiconductor Radiation Detectors
8. Neutron Detectors and applications
9. Calibration of Radiation Instruments
10. Personal Decontamination Procedures
11. Nuclear Fission, Chain Reaction and Criticality
12. Radioactivity and External Dose Calculations
13. Radiation Shielding
14. Internal Dosimetry: Basic Principles
15. Individual Monitoring for Internal Contamination
16. Concept of Personnel Monitoring. Use of DRD, TLD, Electronic Dosimeter etc
17. Bio-Kinetic Models and Internal Dose Evaluation
18. Nuclear Facilities: An Overview
19. Nuclear Reactors In India
20. Radiological and Health Impacts of Chernobyl Accident
21. Radiological Accidents and their Control
22. Occupational Radiation Protection
23. Personal Protective Equipment
24. Laboratory Methods for Monitoring of Foodstuff, Water, Milk etc for Radioactive Contamination levels
25. Regulatory Aspects in Occupational Exposures
26. Biological Effects of Radiation
27. Transport of Radioactive Material
28. Principles of Waste Management
29. Medical management and Planning for Radiation Emergencies
30. Monitoring Systems for Radiation Emergency Response
31. Preparedness and Response to Nuclear / Radiological Emergencies

Ireland

Courses cover basic radiation awareness and detection.

Italy

Prevention and detection are the main points covered in the courses.

Latvia

Personnel engaged in collection of metal scrap receive mandatory training course (including an examination at the end of the course) at the Latvian University, covering the following main issues:

a) basic items of radioactivity and radiation measurements;
b) main sources and peculiarities of radioactivity in scrap metal;
c) radiation safety legislation and management of practices with radioactive sources;

d) legal issues and practices with radiation measurements for scrap metal;
e) biological and medical effects of ionizing radiation;
f) theoretical and practical training in basic radiation dosimetry;
g) processing of measurement results, drawing up deeds and reports.

A radiation safety course at the Latvian University is currently training workers engaged in the dismantling of Salaspils Research Reactor. The Customs Institute of Riga Technical University has implemented a training system for all custom inspectors, including basic items of radioactivity as well as border control aspects.

Lithuania
Training includes:
- Overall understanding of ionizing radiation
- Protection measures from ionizing radiation
- Radiation monitors
- Use of radiation monitors
- Recognition of ionizing radiation sources
- Monitoring of metal scrap, waste and products
- Response to the presence of radioactive scrap metal

Luxembourg
Detection and response are the most important elements of the training.

Norway
In northern Norway training is hands-on and provides trainees with information on measurement techniques, and response procedures. It also provides regular updates on the general situation in this field.

Romania
Training includes use of the detection equipment (for customs' officers and the industry), radiological emergency response, (for the National Commission for Control of Nuclear Activity -CNCAN - intervention teams), response to illicit trafficking (for police teams), detection of radiation, in general, (for Health Ministry units) and transport regulations for radioactive materials (for transport companies).

Russian Federation
Training covers: monitoring of scrap, sources of radioactive pollution of scrap, methods and devices for detection of radioactivity in scrap metal, reaction to radioactivity, radiation protection, transportation of radioactive materials, and how to complete official papers with the monitoring results.

Slovenia
In 2002 Slovenian front-line officers (customs, police) were given a one-day course which covered mainly: prevention, detection and response This training was organised and performed by the SNSA and customs with the support of the Health Inspectorate.

Contents of the course:
- Customs overview, legislation
- Slovenian experience - illicit trafficking
- Radiation and radiation protection - basics
- Most frequent sources, packaging
- Licensing process and inspection control

- Use of detection equipment
- Procedures for detection and response.

In 2004, a seminar for the private sector (scrap recyclers, major scrap-yards), and also some participants from the state authorities was organized covering mainly: prevention, detection and response This training was organised by the SNSA and the Institute of Occupational Health with the support of the Ministry of Interior and customs.

Contents of the course:

- Radioactivity - basics, health hazard
- Measures and response in case of elevated radiation
- Role of Slovenian customs, police and SNSA, including inspection control
- Detection and use of detection equipment and safety precautions.

The industrial sector is trained also by the producers of detection equipment/systems and Slovenian radiation protection experts without the involvement of the Slovenian state institutions. Slovenian state institutions have received some detection equipment in 2002, 2003 and 2004. US donations were followed by some practical hands-on training (2004) with the emphasis on detection and response to malicious acts and (nuclear/radiological) weapons of mass destruction/disruption.

A few 1-week training courses for customs and police officers (and others) in the area of illicit trafficking of nuclear and other radioactive material e.g. in 2000 (Gotenica, Slovenia), were organised by the European Commission and Austrian Research Centres in Seibersdorf. There are also specific courses e.g. for police officers, carriers of dangerous goods etc, where some topics may include radiation safety, security of sources, response etc.

Spain:

Two types of courses are offered in Spain: a basic course and an advanced one.

1. Basic course on radioactivity and radiation measurement

The course consists in 13 lectures held over 2 days, with theory classes (8 h), 2 practical classes (4 h) and a workshop (1 h). The objective of the course is to impart basic knowledge on sources of ionising radiation, radiological risks, and surveillance and control measures relating to ionising radiation.

The course programme is as follows:

1. Introduction to issues (2 h)
Subject 1: Regulatory surveillance system. Legal aspects. Management of radioactive waste (1 h)
Subject 2: Specific issues related to the presence of radioactive material in scrap metal. Protocol and resolution on intervention and obligations (0.5 h).
Subject 3: Incidents in Spain (0.5 h)

2. Basic Concepts (4 h)
Subject 4: Ionising radiation: natural and artificial radiation. The atom: the periodic table. Radioactivity: radioactive isotopes (1/2 h)
Subject 5: Radiological magnitude and units. Examples. (1/2 h)

Subject 6: Surveillance and measurement of radiation. Detectors. Spectrometry.Monitoring equipment of radiation and contamination (1 h)
Subject 7: Applications of ionising radiation: equipment, materials and sources. Radioactive waste (1h)
Subject 8: Radiological risk: effect on health (1/2 h) Basic principles of radiological protection. Protection against specific risks: irradiation and contamination. Operative radiological protection (1/2 h)

3. Specific Concepts (2 h)
Subject 9: Surveillance and control: Radiation portal monitors .Alarm settings (1 h)
Subject 10: Intervention in the case of detection. Localization, segregation and conditioning. Final disposal of materials (1 h)

Practical sessions: Utilization of equipment for measuring radiation and contamination (4 h)
P1 Surveillance and measurement of radiation: Radiation and contamination monitors (2 h)
P2 Surveillance and measurement of radiation: radiation portal monitors (2 h)
Symposium: Practical experience (1 h).

2. Advanced Course on Identification and Quantification of Radioactive Material

The course lasts five days and a total of 26 hours, with 18 hours of theory and 8 hours of practical classes. The practical classes concentrate primarily on using portable detectors and equipment for radiological characterization based on gamma spectrometry.

The objective is to train people in surveillance and control measures for radioactive material, and to introduce the techniques of identification, segregation, qualitative and quantitative characterization, as well as conditioning of radioactive sources and materials which can occur in companies in the scrap recycling sector.

The programme consists of the following modules:

1.- Introduction to issues (2 h)
Subject 1. Radioactive materials. The regulatory control system. Legal aspects and management of radioactive waste. (1 h)
Subject 2. Specific issues of the presence of radioactive material in scrap. Protocol and legislation on intervention and obligations. (1 h)

2.- Detection and measuring of radiation (9 h)
Subject 3. Interaction of radiation with material. Radiation detection. (1 h)
Subject 4. Spectrometry techniques to identify radionuclide. (2 h)
Subject 5. Qualitative analysis. Identification. (1.5 h)
Subject 6. Quantitative analysis. Reference sources. (1.5 h)
Subject 7. Statistics. Uncertainty in measurement. (1 h)
Subject 8. Detection system for localization, identification and characterization of radioactive material and its application in the metal industry. (2 h)

3.-Practical aspects (3.5 h)
Subject 9. Radiological protection. (1 h.)
Subject 10. Conditioning of radioactive materials and radiation sources. (1 h)

Subject 11. Incidents of radiation source smelting. Lessons learned. (1.5 h)

Seminars (4 h)
Seminar I: Calculation of activity in radioactive materials. (2 h.)
Seminar II: Response. Practical cases. (1.5 h.)

Practical training (8 h.)
Practical course 1: Statistics. Factors which influence measurements: distance, time and shielding. (2h.)
Practical course 2: Gamma spectrometry. Calibration in energy and efficiencies. Calculation of activity with INa detector (2 h.).
Practical course 3: Utilising of own equipment. Localization of radioactive material. (2 h)
Practical course 4: Utilising own equipment. Identification of radioactive material. (2 h)

Between 1998 and 2005 16 courses were held with a total of 332 workers from smelting and recovery companies.

Sweden
The High Activity Sealed Sources (HASS) directive has led to an information brochure that will be distributed to Customs, police, scrap yards and smelting plants.

Switzerland
The main topics covered by courses are:
- constitution of matter
- radioactivity
- radiation
- dose, dose rate
- effects of ionising radiation
- limits given by the legislation
- measures of protection: time, distance, shielding
- fundamental principles of radioprotection
- licensing
- incidences
- storage, packaging, transport
- radioactive waste
- applications of radioactive sources in industry
- practical exercises concerning measures of protection (time, distance, shielding)
- practical exercise concerning incidence
- practical exercise concerning measurement of radioactivity in scrap metal

Tajikistan
The main topics covered in training are prevention and detection.

USA
The United States' Environmental Protection Agency has produced two CD ROM training programmes entitled "Responding to Alarms at Metal Processing Facilities" and "Identifying Radioactive Sources at the Demolition Site". The metal processing industry training programme is designed to build monitoring and

assessment skills. Four critical skills are taught: 1) correctly passing through the monitor, 2) locating a remote area to isolate the radioactive material, 3) using a hand-held survey metre to locate material and 4) reporting incidents to authorities. The student then gets to practice these skills and apply them to scenarios based on actual incidents.

The demolition industry training focuses on identification of gauges and devices, emphasizing the physical characteristics and the type of facilities in which they are most commonly found. Opportunities along the demolition timeline to identify and properly handle these gauges and devices are identified. Both the demolition managers and the health and safety officers have been briefed on the programme and it has been sent out to over 800 U.S. demolition companies.

International Atomic Energy Agency (IAEA)

The fields covered by training are prevention, detection and response. More specifically topics include:

- International Legal Instruments relevant to Nuclear Security
- Physical Protection and Control of Radioactive Sources
- Prevention of illicit trafficking in nuclear and other radioactive material
- Effective Detection systems and techniques at border crossings and other 'choke' points
- Technology and user-friendly instruments for detection and identification of radioactive material
- Response procedures for incidents involving nuclear or other radioactive material
- Response to radiological emergencies

The courses are run in conjunction with Member States on an 'as requested' basis.

Bureau of International Recycling (BIR)

Training covers primarily detection and response procedures.

Consultant (Netherlands)

The focus of ongoing training in the company relates to new findings and developments.

Table 2: Overview of fields covered by training

Country	Fields covered		
	Prevention	**Detection**	**Response**
Belgium	✓	✓	✓
Brazil		✓	✓
Croatia		✓	
Czech Republic		✓	✓
Estonia	✓	✓	✓
Estonia (private sector)	✓	✓	✓
India	✓	✓	✓
Ireland		✓	
Italy	✓	✓	
Latvia	✓	✓	✓
Lithuania	✓	✓	✓
Luxembourg		✓	✓
Norway		✓	✓
Romania		✓	✓
Russian Federation	✓	✓	✓
Slovenia	✓	✓	✓
Spain	✓	✓	✓
Sweden	✓		
Switzerland	✓	✓	✓
Tajikistan	✓	✓	
USA	✓	✓	✓
IAEA	✓	✓	✓
BIR		✓	✓
Consultant (Netherlands)		✓	

Conclusions: Fields covered

Conclusion 7: *Most of the training emphasis to date appears to be on detection*

IV. PRELIMINARY CONCLUSIONS AND NEXT STEPS

The survey was intended to obtain a snapshot of the training available to practitioners in different countries. With 20 national responses out of 56 countries contacted, response rate was of 36 per cent. Bearing this in mind, in addition to the above seven conclusions, a number of preliminary general conclusions can be drawn from this survey.

At a national level:

Firstly, it would appear that while most countries have some sort of national training, there is limited regional or sub-regional training and exchange. Training tends to be conducted nearly exclusively at a national level. A second conclusion is that the focus of training suggests that there is an emphasis on dealing with radiological emergency response that requires the immediate intervention of state authorities. Limited effort seems directed at dealing with what appear to be smaller incidents, despite the fact that these may hide potentially serious problems. Thirdly, in many cases, training courses tend to address multiple audiences and are therefore, relatively general in nature. Very few respondents noted that they had specific courses for the scrap metal sector for instance. As this is the main target for the Recommendations developed by the UNECE Group of Experts, this is an important point. In addition, in many countries this sector may be quite informal and it may require additional effort to effectively reach target audiences. A fourth conclusion is that there appears to be an over-dependence on training in the use of monitoring devices rather than in the entire prevention, detection and response process.

At an international level:

The IAEA offers the opportunity for tailor made training at regional and national levels. To date audiences targeted by the IAEA have tended to be professionals or experts essentially from the regulatory bodies or Customs.

Annex 1

UNECE Survey of international training institutions and opportunities

In addition to national training options, a number of training centres have been identified as offering relevant courses that could be of interest to actors in the scrap metal industry and other relevant sectors.

Belgium

1. The International School for Radiological Protection (isRP), a task force within SCK•CEN (a Belgian Centre for Nuclear Energy Studies), co-ordinates and organises training programmes on all aspects of radiological protection. isRP courses are for the private sector, the political and academic world and the general public. In the private sector, the courses are aimed at personnel of the Belgian nuclear power plants, fuel production and waste treatment companies and external companies providing nuclear services. Courses are also organised in cooperation with public and private health care services. The isRP addresses the safety and emergency services within the framework of the ministries of the Interior, Public Health, Social Affairs and the Environment, Labour and Employment.

The isRP teachers are SCK•CEN staff members who have a solid knowledge in their field, and who can thus directly transfer their practical experience into the various courses. The courses are supported by extensively documented textbooks and multimedia tools, and for certain relevant subjects, with interactive software designed at SCK•CEN.
http://www.sckcen.be/isrp/aspx/about.aspx

2. The SCK•CEN, under the EU's DG RTD, offers a training Course on Preparedness and Response for Nuclear or Radiological Emergencies.
http://www.sckcen.be/sckcen_fr/activities/train/tcm2006/index.shtml

France

The French Institute on Radioprotection and Nuclear Safety offers courses with the following themes:

- General procedures on radioprotection
- Prevention and protection;
- Rules to protect patients;
- Risks linked to exposure to ionising radiation, notably on the « potentially damaging effects» on the embryo and foetus;
- Specific radioprotection procedures established in different medical sectors (radiology, nuclear medicine …) ;
- Procedures in case of abnormal situations

http://www.irsn.org/formations/radiomed108.htm

Netherlands

Radiation Protection and Health Physics courses are offered on a regular basis at several levels, all officially recognized by the Dutch government. In addition, tailor-made special courses have been developed for among others the medical sectors, off-shore industry, fire fighting departments and nuclear power plants. It includes a course on dealing with radioactivity for metal and scrap metal industries
http://www.nrg-nl.com/product/edu/rad.html

Switzerland
Courses on radioprotection for the industry and for transporters are offered by SUVA.

http://www.suva.ch/fr/home/suvapro/asa_neu/10_elemente-ausbildung/arbeiten_besonde_gefahren/transport_radioaktiven_stoffen.htm?WT.svl=sub

USA
1. The Environmental Protection Agency (EPA) developed a training programme for industry including CDs with step by step guidance on monitoring and managing radioactive scrap metal.

2. The Louisiana State University (LSU) has a number of training modules available as powerpoint presentations online. The modules are for users of radiation and radioactive materials. They cover:

- Module 1: Radiation Safety At LSU
- Module 2: Fundamentals Of Ionizing Radiation
- Module 3: L.S.U. Radiation Safety Program
- Module 4: Biological Effects Of Ionizing Radiation
- Module 5: Regulations And Standards
- Module 6: Exposure Control And Personnel Monitoring
- Module 7: Radioactive Waste Handling, Storage And Disposal
- Module 8: General Rules For Radioactive Material
- Module 9: General Rules For Radiation Producing Machines
- Module 10: General Rules For Field Use Of Sealed Sources
- Module 11: General Rules - Animal Experimentation
- Module 12: General Rules For Irradiator Use

http://www.radsafety.lsu.edu/rst_mods/index.htm

3. The Radiation Safety Academy offers over 25 courses with scheduled training in Washington DC as well as web-based training. Courses include radiation safety, medical radiation safety, low level radioactive & mixed waste management, radiation instruments, etc.
http://www.radiationsafetyacademy.com/courses.html

4. The Institute of Scrap Recycling Industries (ISRI) has published two videos and several documents, the latest of which is "RADIOACTIVITY IN THE SCRAP RECYCLING PROCESS-Recommended Practice and Procedure". ISRI has an active Radioactive Materials Task Force and is currently revising completely the Recommended Practice and Procedure, including videos, using recommendations from the task force. When completed in 2007, ISRI will also offer onsite training for its members. Included in the new training programme will be a large volume of actual pictures of sources found by recyclers and by the general public. It includes modules on Radiation overview, Equipment, Programme Implementation, Training, Response, and Health and Safety.

European Union (EU)
1. The European Network on Education and Training in Radiological Protection (ENETRAP) project aims to bring together different ideas and approaches on education and training (E&T) in radiological protection (RP) in order to better integrate and harmonise national E&T activities on a European level.

The main objectives of the ENETRAP project are:

- to better integrate existing E&T activities in the RP infrastructure of the European countries in order to combat the decline in both student numbers and teaching institutions
- to develop more harmonised approaches for E&T in RP in Europe
- to better integrate the national resources and capacities for E&T
- to provide the necessary competence and expertise for the continued safe use of radiation in industry, medicine and research

The project will assess training needs and capabilities within the EU Member States and the Candidate Countries, and evaluate the current situation with regard to mutual recognition of competencies and diplomas. The required qualifications for key professional functions in industry, medicine, research and the public sector will be assessed, along with the training available to support those qualifications, including OJT programmes and e-learning opportunities
http://ec.europa.eu/research/energy/fi/fi_cpa/other/article_3861_en.htm
http://www.sckcen.be/enetrap/

2. European ALARA network

The objectives of the European ALARA Network are

- To maintain, enhance and develop competence in radiation protection, with special emphasis on the implementation of the ALARA principle for occupational, public and patients exposures both in routine operations and emergency situations
- To contribute to the harmonization of radiation protection policies and practices, particularly concerning ALARA, both at regulatory and operational levels within European countries
- To contribute to the integration and effective co-operation of expertise in radiation protection that is available in the European countries
- To cover all types of practices within the different sectors: nuclear, industrial, medical, research, and work with naturally occurring radioactive materials (NORM)
- To cover radiation protection themes relevant to all sectors, as well as themes specific to one or more sector(s).

The Network has organised and will continue to organise short workshops once a year which provide a forum for a few dozen experts to exchange feedback experience and to identify problems that need further research or development. Workshop themes covered so far have included:

- “Developments in Implementing ALARA in Occupational, Patient and Public Exposures", Prague, Czech Republic, 12th-15th September 2006
- ”Occupational Exposure to Natural Radiation", Augsburg, Germany, October 2005
- "Occupational Radiological Protection Control through Inspection and Self-assessment", Uppsala, Sweden, September 2004
- "Decommissiong of Installations and Site Remediation", Arnhem, The Netherlands, October 2003
- "Occupational Exposure Optimization in the Medical and the Radiopharmaceutical Sectors", Madrid, Spain, October 2002
- "Industrial Radiography: Improvements in Radiation Protection", Rome, Italy, October 2001
- "Management of Occupational Radiological and Non-radiological Risks: Lessons to be Learned", Antwerp, Belgium, November 2000
- "Managing Internal Exposure", Neuherberg, Germany, November 1999
- "Good Radiation Practices in Industry and Research", Chilton, UK, November 1998

- "ALARA and Decommissioning", Saclay, France, December 1997

http://www.eu-alara.net/index.php?option=com_content&task=blogsection&id=6&Itemid=38

IAEA

1. Postgraduate Educational Course in Radiation Protection and Safety of Radiation Sources (PGEC)

The PGEC is a comprehensive training programme aimed at training young professionals at graduate level, or the equivalent, for initial training to acquire a sound basis in radiation protection and safety of radiation sources. Some of the participants would be expected to become trainers in due time. PGEC is designed to provide both theoretical and practical training in the multidisciplinary scientific and / or technical bases of international recommendations and standards on radiation protection and their implementation. A standard training course syllabus for the postgraduate course is developed which contains 11 parts and covers various topics of radiation protection including waste safety.

The Agency has been assisting the organization of the regular PGECs in different Regional Centres and in the IAEA's official languages (in Argentina for Spanish, in Greece and Malaysia for English, in Syria for Arabic, in Morocco for French and in Belarus for Russian).

2. Practice specific specialized training courses and workshops

The specialized or task-specific/practice-specific training courses are usually shorter in duration. These courses last one or two weeks and are in principle given to those who have already attended PGEC. There are more than 30 such courses organized and supported by the IAEA annually. However in this context, the IAEA training courses on: (i) Assessment of occupational exposure due to external radiation sources; (ii) Occupational radiation protection; (iii) For Customs Authorities can be of specific interest. The training material for the courses is available on CD-ROM and is disseminated to Member States on request.

3. Radioactive Waste management training at the IAEA

During the course of 2001 work was carried out to develop a comprehensive syllabus for training in radioactive waste management with particular emphasis on waste safety. This was in response to both the situations where increasing numbers of requests were being received for training events on waste safety, and the recognition in the General Conference resolution of the importance of the Agency training efforts in, inter alia, radioactive waste safety. The scope of the reference training material currently under development is focused on general fundamental principles for radioactive waste (RAW) management, safety requirements on predisposal and disposal activities. It has been structured in six main areas (30 modules): General Aspects, Predisposal Management of RAW, Disposal of RAW, Management of Special Waste, Environmental Restoration and IAEA Activities on Safety of Radioactive Waste Management.
http://www-ns.iaea.org/training/rw/wss-training.htm

4. Regional Training Courses On The Physical Protection Of Radioactive Sources

The IAEA is undertaking regional training courses to create an awareness of the need to physically protect and control sources and apply adequate physical protection measures to sources throughout their life cycle. Courses cover international recommendations and physical protection principles, and provide methodologies and guidelines for designing physical protection systems for radioactive sources; and provide practical experience in applying guidance and methodologies. Participants should be a mix of regulators, users, producers and protectors of sources in medical and industrial applications.
http://www-pub.iaea.org/MTCD/Meetings/Announcements.asp?ConfID=29382

5. IAEA Nuclear Security Training Catalogue
This catalogue provides detailed information about the IAEA's nuclear security training activities. These courses are run in conjunction with Member States on an 'as requested' basis. Interested participants should approach the IAEA's Office of Nuclear Security through their respective UN Mission to the IAEA.
http://www.unece.org/trans/radiation/tools_training.html

Annex 2

Training documents provided

Belgium
- Summary of the Belgian directive on the use of a portal monitor of radioactivity in the non-nuclear sector.

Brazil
- Noções Básicas de Proteção Radiológica, Instituto de Pesquisas Energéticas e Nucleares (IPEN), 2002

- Programa de Gerência de Rejeitos Radioativos em Pesquisa - PROGER Comissão Nacional De Energia Nuclear, Superintendência De Licenciamento E Controle, Coordenação De Rejeitos Radioativos, 1998

- Transporte de Material radioativo no Brasil, COMISSÃO NACIONAL DE ENERGIA NUCLEAR Diretoria de Radioproteção e Segurança Nuclear

- Assessoria Estratégica de Segurança Nuclear, Coordenação de Rejeitos Radioativos, Principais Aspectos, 3a Edição, 2005, Autores :Frida Eidelman, Paulo Fernando Lavalle Heilbron Filho, Jesus Salvador Pérez Guerrero

- Calibração E Manutenção De Instrumentos Medidores De Radiação, Maria Da Penha Albuquerque Potiens, ATOMO; IPEN; TRION (No date)

- Dosimetria Individual, Engo Matias Puga Sanches, ATOMO; IPEN; TRION (No date)

- Teoria Sobre Detetores Para Radiação, Engo Matias Puga Sanches, ATOMO; IPEN; TRION (No date)

- Efeitos Biológicos Das Radiações Ionizantes
Profa MSc. Sandra A. Bellintani, ATOMO; IPEN; TRION (No date)

- Princípios Básicos do Sistema de Limitação de Dose, Prof. Gian-Maria Sordi, ATOMO; IPEN; TRION (No date)

India
- Vehicle Monitor Specifications

Spain
- Radioactividad en la Chatarra, Consejo de Seguridad Nacional (CSN), Información para los trabajadores de la industria metalúrgica y del sector de la recuperación de metales, (no date)

- Material radiactivo: Precaución con la chatarra, CSN en colaboración con ENRESA, FER, UNESID

USA
- Responding to Radiation Alarms at Metal Processing Facilities (CD)

- Identifying Radioactive Sources at the Demolition Site (CD)

EC

- ENETRAP, European Network on Education and Training in Radiological Protection, M. Coeck, C. Etard, S. Möbius, A. Schmitt-Hannig, A. Luciani, J. van der Steen, M. Marco, J. Stewart, P. Scalliet, J. Balosso, R. Thompson

- Creation of the European Platform on Training and Education in Radiation Protection (EUTERP Platform): EXPLANATORY NOTE FOR PARTICIPANTS, NRG, Radiation & Environment, The Netherlands

IAEA

- Safe Transport of Radioactive Material (4th ed.), Training Course series, Vienna 2006.

- Reference Training Material: The Safety of Radioactive Waste Management, Standard Syllabus, Training Course Series, Draft.

- Radiation People and the Environment, Vienna 2004.

- IAEA Nuclear Security Training Catalogue

- Customs Radiation Safety Course, (CD Rom) IAEA and WCO

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