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DRAFT
VOLUNTARY PROTOCOL

INTERNATIONAL RECOMMENDATIONS FOR MONITORING AND RESPONSE
PROCEDURES FOR RADIOACTIVE MATERIAL IN SCRAP METAL

Note by the secretariat

Note: In accordance with the recommendations adopted at the first meeting of the Group of Expert in 2004 (TRANS/AC.10/2004/4) and taking account of questionnaire replies from more than 50 countries, the UNECE secretariat, assisted by country experts, has prepared the present draft of a voluntary international Protocol on radioactively contaminated scrap metal for consideration and agreement by the Group of Experts.

An outline of the technical annexes to the Protocol, which are planned to be finalized following agreement on the basic provisions of the Protocol, is contained in document ECE/TRANS/AC.10/2006/5/Add.1 (English only).

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EXECUTIVE SUMMARY

Radioactive material can become associated with scrap metal in various ways and if not discovered it can be incorporated into steel and non-ferrous metals through the melting process. This can cause health hazards to workers and to the public as well as environmental concerns and it can also have serious commercial implications. Numerous incidents have occurred in recent years involving the discovery of radioactive material in scrap metal and, in some cases, in metal from the melting process. These incidents have proved to be very costly in relation to the recovery and clean-up operations required but also in terms of the potential loss of confidence of the steel industry in scrap metal as a resource. This has led the scrap metal industry to seek ways of avoiding the problem. With an increase in recycling of metal predicted, these problems can be expected to grow.

Shipments of scrap metal are monitored in most countries but to different extents and efficiencies. As yet, no serious approach towards unifying and harmonizing monitoring strategies and methods has been attempted at the international level. For these reasons, the United Nations Economic Commission for Europe (UNECE) has been requested to provide a consistent and harmonized approach for the detection of radioactive material in scrap metal, and for appropriate response procedures.

The present international voluntary Protocol, that has been prepared by a group of governmental and industry experts, provides recommendations, guidance and best practices for prevention, detection and response in relation to radioactive material in scrap metal. It defines the issues at stake and specifies the roles and responsibilities of all concerned parties in government and industry that are indispensable for an effective collaborative and unified approach at the national level. The Protocol also describes recommended practices and mechanisms to effectively prevent, detect and respond to radioactive material in scrap metal. It provides a unique opportunity for governments and the industry to harmonise their practices making use of best available expertise.

Governments and industry alike are encouraged to use the recommendations and guidance contained in the Protocol to develop strategies to effectively monitor and manage radioactively contaminated scrap metal. This should lead to better international harmonization of approaches and methods and will in turn allow for more effective prevention, detection and response measures at national levels.

INTRODUCTION

1. Recycled scrap metal is increasingly used in metal production. In 2003, the worldwide consumption of scrap metal was of the order of 405.5 million tonnes. In the case of steel, the proportion of steel products now made from scrap is more than one half. The rise in the importance of scrap metal as a resource has been paralleled by an increase in the frequency that radioactive material is detected in scrap metal shipments. Scrap yards and steel works and non-ferrous metal smelters and refiners are increasingly detecting radioactive material in incoming scrap metal as the result of accidents or inadvertent disposal. In North America alone, over 5,000 incidents were recorded in 2004 that involved various types of radioactive material in scrap metal. Some of this radioactive material has gone undetected, has been accidentally melted down or shredded and thus entered the metal stream.

2. While the potential environmental and health risks of most of these incidents is usually not very high due to the relatively low radiation levels involved, they are still often above acceptable levels, but more significantly the economic and financial consequences of such incidents for the steel processing industry are always very serious. The detection of radioactive material in processed metal, even with radiation levels below those requiring control, almost always results in the closure and clean-up of the involved facilities. In addition, such incidents lead to loss of trust in the recycled metal industry and the associated products since consumers do not wish to have radiation emanating from their purchases.

3. The frequency at which radioactive material in scrap metal is detected may be expected to continue to rise with the ever-increasing effectiveness of detection equipment, the wider application of radiation monitoring and an increase in overall quantities recycled. Current efforts to control high-activity sealed radioactive sources are unlikely to change this trend in the near future since recovered and recycled scrap is often 40 years or more old.

4. Considerable work has been undertaken in many countries and international bodies, such as the International Atomic Energy Agency (IAEA) and the European Union (EU), on the control of radioactive sources and their safe transport through the issue of standards and guidance. In addition to efforts on regulatory control, the metal recycling and producing industries have organised themselves to reduce the probability of radioactive material that escapes regulatory control being introduced into the recycling process. These measures are aimed at detecting radioactive material as early as possible, but its detection is not an easy task. Even with the most sensitive and sophisticated equipment, undetected radioactive material may be introduced into the recycling process.

5. Little concerted action has been taken by countries and the international community to develop specific standards and procedures to help reduce the problem of radioactive material appearing in scrap metal. An important exception is the 'Protocol for Collaboration on the Radiation Monitoring of Metal Materials' adopted in 1999 in Spain by concerned industrial organizations and by the relevant parts of government (ECE/TRANS/AC.10/2006/2). The Protocol provides for a unified national scheme of collaboration between concerned industry and government aimed at reducing the occurrence of events involving radioactive material in scrap metal and managing the consequences of such events if they do occur.

6. In 2001, the United Nations Economic Commission for Europe (UNECE), the European Commission and the International Atomic Energy Agency (IAEA) prepared a “Report on the Improvement of the Management of Radiation Protection in the Recycling of Metal Scrap” that recommends measures to avoid the introduction of radiation sources into the metal recycling stream.¹

7. In continuation of this work, the UNECE, with the support of the Government of the United States of America, has prepared and circulated a questionnaire to ascertain the current state of scrap metal radiation monitoring worldwide. Following evaluation of the information received, an international group of experts met in April 2004 to discuss policies and experiences in monitoring and interception of radioactively contaminated scrap metal world-wide and to explore ways and means to facilitate and secure international trade and transport of scrap metal.

8. The proceedings of the Group of Experts together with extensive documentation on national experiences are contained in a report published by the UNECE on “Monitoring, Interception and Managing Radioactively Contaminated Scrap Metal”. The Group of Experts identified ten issues as a common basis for possible future work and recommended to keep in motion a permanent international dialogue on these issues among Governments and private industries.² In particular, the following concrete outputs were envisaged:

- (a) Establishment of a voluntary international Protocol providing for a consistent and internationally harmonized approach to monitoring and response procedures;
- (b) Establishment and maintenance of an Internet-based information exchange system open to all concerned parties;
- (c) Compilation of training and capacity-building programmes.

9. The present voluntary international Protocol has been developed in fulfilment of the first of these proposed initiatives. It will be agreed upon at the second meeting of the Group of Experts on the Monitoring of Radioactively Contaminated Scrap Metal that will meet from 12 to 14 June 2006 under the auspices of the UNECE in Geneva.

10. The Protocol is of a voluntary nature and provides a framework of recommendations, guidelines and best practices based, to the extent possible, on existing national, regional and international instruments and standards and on national experience. The document is intended to support States in developing their own national systems of monitoring and response while encouraging further cooperation, coordination and harmonization at the international level.

11. At a later stage, when experience has been obtained in countries on the application of the document, consideration may be given to establishing a legally binding protocol that countries could commit themselves to with the objective of creating an international legal regime for countering the problem of radioactive material in scrap metal.

¹ For details see: www.unece.org/trans/radiation/radiation.html.

² For details refer to the web site of the project:

<http://www.unece.org/trans/radiation/replies/proceed.html>. Credentials and password for access to the protected parts of the site may be obtained from radiation@unece.org.

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**INTERNATIONAL RECOMMENDATIONS FOR MONITORING AND RESPONSE
PROCEDURES FOR RADIOACTIVE MATERIAL IN SCRAP METAL**

PREAMBLE

The INTERNATIONAL GROUP OF EXPERTS convened under the auspices of the United Nations Economic Commission for Europe (UNECE),

NOTING the increasing use of recycled scrap metal by the steel and foundry industries worldwide and the large volumes of scrap metal traded and transported internationally,

CONCERNED about the growing frequency of incidents involving the detection of radioactive material in scrap metal shipments with their potential environmental and health hazards to workers and the public,

ALSO CONCERNED about the high costs of the recovery and clean-up of incidents involving radioactive material in scrap metal, and about the resulting loss of confidence in scrap metal as a valuable resource,

DESIRING to facilitate the use and international trade of scrap metal without compromising safety,

AWARE that the scrap metal and steel industries do not want any radioactive material in their metals,

WELCOMING the efforts made in many countries by Governmental authorities and by industries to monitor shipments of scrap metals and to manage incidents,

NOTING that national strategies, coverage and procedures in the monitoring of scrap metal differ to a large degree and thus, require harmonization,

RECOGNIZING that the application of specific measures would depend on national administrative and commercial circumstances as well as prevailing national and international legislation,

CONVINCED that an internationally harmonized approach in addressing these issues would allow for more effective prevention, detection and response measures at all levels,

HAS AGREED on the following voluntary international Protocol containing recommendations, guidance, best practices and cooperative mechanisms to allow Governments and industries to develop their own strategies to monitor and manage radioactive material in scrap metal:

A. GENERAL PROVISIONS

1. Definitions *(from IAEA Safety Glossary [1] unless otherwise stated)*

- (a) **Clearance level:** A value, established by a regulatory body, at or below which a source of radiation may be released from regulatory control.
- (b) **Naturally Occurring Radioactive material (NORM):** Material containing no significant amounts of radionuclides other than naturally occurring radionuclides.
- (c) **Facilities:** Include nuclear facilities, irradiation installations, mining and milling facilities, waste management facilities and any other place where radioactive materials are produced, processed, used, handled, stored or disposed of — or where radiation generators are installed — on such a scale that consideration of protection and safety is required.
- (d) **Orphan source:** A source which poses sufficient radiological hazard to warrant regulatory control, but which is not under regulatory control because it has never been so, or because it has been abandoned, lost, misplaced, stolen or otherwise transferred without proper authorization.
- (e) **Polluter Pays Principle:** The principle that the polluter should bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment. *(from United Nations Rio Declaration [2])*
- (f) **Sealed radioactive source:** Radioactive material that is (i) permanently sealed in a capsule, or (ii) closely bonded and in a solid form. Or, a source whose structure is such as to prevent, under normal conditions of use, any dispersion of the radioactive substances into the environment. *(from the European Directive [3])*
- (g) **Radiation dose:** A measure of the energy deposited by radiation in a target.
- (h) **Radiation monitoring:** The measurement of dose or contamination for reasons related to the assessment or control of exposure to radiation or radioactive substances, and the interpretation of the results. Or, the measurement of radiation or radioactive contamination to indicate the possible presence of radioactive material within a scrap metal shipment. *(defined for the purposes of this Protocol)*
- (i) **Radiation protection:** The protection of people from the effects of exposure to ionizing radiation, and the means for achieving this.
- (j) **Radiation protection experts:** Persons who have been approved by national authorities as certified experts having had appropriate training and experience in operational radiation protection. *(defined for the purpose of this Protocol)*

- (k) **Radioactive contamination:** Radioactive substances on surfaces, or within solids, liquids or gases (including the human body), where their presence is unintended or undesirable.
- (l) **Radioactive material:** Material designated in national law or by a regulatory body as being subject to regulatory control because of its radioactivity.
- (m) **Radioactive material in scrap metal:** This may comprise radioactively contaminated scrap metal, activated scrap metal and scrap metal with a radioactive source or material contained within it. (*defined for the purposes of this Protocol*)
- (n) **Radioactive waste management:** All administrative and operational activities involved in the handling, pre-treatment, treatment, conditioning, transport, storage and disposal of radioactive waste.
- (o) **Regulatory body:** An authority or a system of authorities designated by the government of a State as having legal authority for conducting the regulatory process, including issuing authorizations, and thereby regulating nuclear, radiation, radioactive waste and transport safety.

2. Objectives

The recommendations in this Protocol are intended to assist governments, industry and all concerned parties to counter the problem of radioactive material appearing in scrap metal by seeking to prevent its occurrence, by effectively monitoring scrap metal shipments and facilities, and by intercepting and managing any radioactive material found in scrap metal.

This document establishes a framework of recommendations, guidelines and best practices for this purpose based, to the extent possible, on existing national, regional and international documents and on national experience. It sets out the responsibilities of all concerned parties and the actions required of them to fulfil the objectives.

The recommendations are intended to support States in developing their own national systems of monitoring and response and to encourage further cooperation, coordination and harmonization at the international level thereby creating global confidence in the reliability of the effectiveness and quality of monitoring and response.

3. Scope

These recommendations cover all metals used and traded nationally and internationally as part of the metal scrap recycling industry.

The recommendations are addressed to all parties concerned with the scrap metal recycling industry, including owners of scrap metal recycling and metal processing facilities, the sellers of scrap metal, the buyers and traders in scrap metal, the transporters of scrap metal, the departments of Government responsible for the control of incoming and outgoing shipments of scrap metal, e.g. Customs authorities, and the Governmental bodies responsible for safety, health and the environment in the context of radioactive material usage and transport.

The events most likely to give rise to radioactive material in scrap metal are inadvertent industrial mishaps, carelessness in the management of radiation sources and other radioactive material, errors in source accounting etc.; they are less likely to be concerned with the illicit trafficking of high activity radioactive sources.

The recommendations are aimed mainly at facilitating national and international commerce in scrap metal; they are not concerned with national/State security aspects of radioactive sources.

The recommendations are aimed at achieving at least a minimum standard of performance in prevention, detection and response in countries; they are not intended to supersede existing monitoring arrangements which may go beyond this minimum standard.

The recommendations are not intended to place legal commitments on countries but, instead, to provide recommendations, guidance and best practices which have been agreed upon by Governmental and industry experts in the field for voluntary application.

The application of the recommendations in a country will depend on national administrative and commercial circumstances as well as on prevailing national legislation.

The recommendations are intended to help prevent the introduction of discrete radiation sources and of improperly released radioactively contaminated material into the recycling stream. This will help to achieve the protection of workers and the public and to minimise the detriment to commerce. The three main steps for achieving these aims are: **prevention, detection and response**. These Recommendations address each of these steps.

4. Guidance and international legal instruments

As yet, there are no international instruments that directly address the problem of radioactive material appearing in scrap metal, however, the UNECE has considered the problem in two reports [4, 5]. The reports explore the nature and scale of the problem and the ways and means for avoiding the problem through national and international action.

4.1 National actions

Some national initiatives exist but they are at various stages of development and present different degrees of detail. Two such initiatives are highlighted here.

In Spain, the 'Protocol for Collaboration on the Radiation Monitoring of Metal Materials' adopted in 1999 has been adopted by the concerned industrial organizations and by the relevant parts of Government [6]. The Protocol provides for a unified national scheme of collaboration between concerned industry and government aimed at reducing the occurrence of events involving radioactive material in scrap metal and managing the consequences of such events if they do occur. The Protocol establishes a register held at the Ministry of Industry and Energy in which companies can register - thereby accepting the rights and obligations arising from registration.

In the United States of America, the National Council on Radiation Protection and Measurements (NCRP) has reviewed the problem of potentially radioactive scrap metal in a national context and discussed the commercial and health implications as well as the practical solutions [7].

4.2 Actions by industry

In Europe, some industry specifications exist for the quality of scrap metal. The EFR-EUROFER scrap specifications stipulate that “all (scrap) grades shall exclude hazardous radioactive material; material presenting radioactivity in excess of the ambient level of radioactivity and radioactivity in sealed containers even if no significant exterior radioactivity is detectable due to shielding or due to the position of the sealed sources in the scrap delivery”[8].

4.3 International legal instruments and standards

The Basel Convention is the principal international legal instrument governing the control of the transboundary movement of hazardous waste and it places requirements and obligations on Contracting Parties wishing to move hazardous waste between countries [9]. Radioactive waste is excluded from the scope of the Basel Convention because it is a part of another international convention, the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (the Joint Convention) [10], but the general principles of the Basel Convention are supported in the Joint Convention. These conventions are concerned, inter alia, with regularizing planned trade in hazardous material across borders. They declare the illicit movement of such material to be a criminal act but they do not address the inadvertent transfer of material - which is the main mechanism causing the appearance of radioactive material in scrap metal.

The problem of orphan sources is addressed in several international and regional documents. A voluntary Code of Conduct on the Safety and Security of Radioactive Sources [11] and guidance on its application for the import and export of radioactive sources [12] exist to encourage States to exercise control over radioactive sources. To date, eighty IAEA member States have advised that they are supporting the Code. A Directive of the Council of the European Union (EU) on the control of high activity sealed radioactive sources and orphan sources addresses essentially the same problem [3]. The control of disused radioactive sealed sources is the subject of Article 28 of the Joint Convention [10]. These efforts are mainly concerned with attempting to prevent the uncontrolled release of radioactive material from the system of control established for radioactive material. However, for the present, the problem of uncontrolled release of radioactive material persists. It continues to be necessary, therefore, to monitor shipments crossing borders and also within countries. This need is recognized in the context of orphan sources both in the Code of Conduct [11] and in the EU Directive [3].

In relation to the controlled release of material containing very low levels of radioactive material (clearance), an international Safety Standard has recently been published by the International Atomic Energy Agency (IAEA) which establishes a set of agreed levels of radionuclides, including radionuclides from NORM, in materials below which the associated radiation hazards to humans are judged to be negligible [13] (see annex 1). Clearance levels have also been defined in the European Commission’s document Radiation Protection 122 [14]. Schemes for the clearance of such materials are applied in many countries using similar

approaches to that described in the international documents. Details of a scheme used in the United Kingdom, which has been agreed by all parts of the nuclear industry have recently been published [15]. However, in the context of clearance levels it should be noted that even the detection of very low levels of radiation (above normal background) from a shipment may indicate a significant, but shielded, source of radiation. Therefore all detected radiation above background levels in shipments must be subject to further investigation.

5. Origins of radioactive material in scrap metal

The inclusion of radioactive material within scrap metal shipments can occur in a number of different ways. Some of the main sources of the radioactive material in scrap metal are listed below:

- (a) **Demolition of facilities in which radioactive sources have been used.** Radioactive sources are used for many purposes in medicine (e.g., radiotherapy, diagnostic applications), research (e.g., for experimental irradiation of materials or biological specimens) and industry (e.g. level gauging, product irradiators). If such sources are not removed from facilities prior to demolition then there is a risk that they may become part of the scrap metal taken from the premises.
- (b) **Loss of industrial radiography sources.** These sources are used for testing welds on pipe work in the field and sealed radioactive sources are sometimes lost or mislaid. They may be collected as scrap metal, often with the sealed sources still housed within their protective containers.
- (c) **Decommissioning of nuclear installations (such as nuclear power plants and other nuclear fuel cycle facilities).** This can produce significant amounts of metals including carbon and stainless steel, aluminium, copper and lead. A fraction of this material is activated or contaminated with radioactive material. This is normally decontaminated where possible or disposed of as radioactive waste but on occasions it may be mistakenly released for recycle.
- (d) **Demolition or decommissioning of industrial facilities processing raw materials containing naturally occurring radionuclides.** These industries include phosphate ore processing and oil and gas recovery and processing. The pipes and metal vessels from such facilities are sometimes lined with significant deposits of naturally occurring radionuclides and they may on occasions be mistakenly collected as scrap metal.

In addition, material from demolition or decommissioning containing artificial or naturally occurring radionuclides at levels below the regulatory clearance level may be released from regulatory control for possible recycle.

Certain radionuclides are more likely to be present in metal scrap than others. Annex 2 provides a summary of the radionuclides most likely to be of concern.

6. Recommendations on responsibilities and coordination

6.1 Responsibilities

6.1.1 National responsibilities

There are a number of stages in the scrap metal processing chain and at each stage it is possible to identify persons with specific responsibilities in relation to preventing or monitoring for the presence of radioactive material in scrap metal. They include the owner of radioactive sources, the seller of scrap metal, and the buyer of scrap metal. The owner of radioactive sources or material could be the owner of a nuclear power plant or of industrial premises, a laboratory or a hospital in which radioactive sources or material is used (all defined as 'nuclear facilities'). The owner of the radioactive sources or material is the person formally authorised in national legislation to use and take care of the radioactive sources or material. The seller of the scrap metal could be the owner of the premises being demolished, the company carrying out the demolition, a trading company in scrap metal, etc. The buyer of the scrap metal could be the owner of a scrap yard, a shredding facility or a melting works or another scrap metal trading company. In addition, there are persons between the seller and the buyer with responsibilities in relation to shipments of scrap metal, such as Customs officials and shipment carriers.

Specific Recommendations:

1. **The owner of radioactive sources or material** has obligations under national legislation to keep radioactive sources safe and secure while they are in use and for arranging their safe storage or disposal after their period of use. In the event of a source being lost or removed from control, the source owner remains responsible.
2. **The seller of the scrap metal** (who is usually the consignor for the shipment) is usually responsible to the buyer of the scrap metal, by contractual obligation or by national regulations, to provide a clean product. If the seller is so contractually or legally bound, the seller should arrange for radiation monitoring to be performed on the scrap metal at the point of origin and to provide a certificate indicating the results of that monitoring. An example of a certificate of shipment monitoring is attached as annex 3. The seller should arrange appropriate training of involved staff.
3. **The carrier (or carriers) of the scrap metal** can be held responsible for the material being carried and may wish to either monitor the shipment for radiation, or request a certificate from the seller (i.e. the consignor) of the scrap metal that the load has been appropriately monitored.
4. **National Customs authorities** should be concerned to prevent the import or export of unauthorized and potentially hazardous material and should therefore provide for the radiation monitoring of incoming and outgoing shipments of metal scrap at key border points. This should include appropriate training of involved staff.
5. **The buyer of the scrap metal** (e.g. the owner of the scrap yard, the shredding facility or the melting works) should be concerned that the material received is free from radioactive material and so it is in the buyer's interests to arrange for monitoring of the

scrap metal as it enters and leaves the premises of the scrap yard, the shredding facility or the melting plant. This should include appropriate training of involved staff.

6. **The national regulatory body** is responsible under national legislation and regulations for the licensing and regulation of radioactive sources and radioactive material. The regulatory body also has responsibilities related to ensuring the safety of workers, the public and the environment in the event of radioactive sources or other radioactive material becoming lost or misplaced (for example, in scrap metal). In some countries, these responsibilities may be shared between different national authorities, for example, government departments dealing with safety, health, and the environment. The relevant national regulatory body or bodies should promulgate appropriate regulations and provide guidance and advice on:
 - procedures to ensure safety in the event of radioactive material being discovered in scrap metal or metal product, and
 - the safe storage and disposal of radioactive material or scrap or product contaminated with radioactive material.
7. The seller, the buyer and the national Customs authorities should institute agreements with **national organizations with expertise in radiation monitoring and radiation protection**:
 - on the provision of advice and training, in advance of any potential radiation incident, related to the detection of radioactive material in metal scrap or metal product and response procedures; and
 - on the provision of assistance in the event of a radiation incident.

The seller, the buyer and the national Customs authorities should also be aware of the identity of the relevant national regulatory body or bodies so that the regulatory body can be quickly informed in the event of such an incident.

8. **The national competent authority responsible for the safety of the transport of radioactive material** should:
 - provide advice on the requirements for the safe transportation of recovered radioactive material or radioactively contaminated scrap metal or product;
 - issue Special Arrangement authorizations as needed for the safe transport of the recovered material or radioactively contaminated scrap metal or product; and
 - facilitate the return of contaminated scrap and waste across national boundaries, where this is appropriate.
9. **The national organization responsible for radioactive waste management** should provide arrangements for the safe processing and storage or disposal of the radioactive material resulting from any incident involving radioactive material in scrap metal, metal product or production waste.

It is noted that while responsibilities can be attributed at different levels, as indicated above, there will be circumstances in which the allocation of responsibilities is not so clear cut. This is most evident when the owner of the radioactive source or material or the seller cannot be discovered or located. In the event of the detection of radioactive material in scrap metal,

metal product or production waste, this can cause severe difficulties in financing the necessary radioactive waste management or clean-up operations. This is discussed further in Section 6.3.

6.1.2 International responsibilities

As discussed in Section 4, international and regional instruments such as the Joint Convention, the Code of Conduct and the EU Directive [3, 10, 11] place obligations on States to control and safely manage radioactive sources and disused radioactive sources but to date there are no international instruments related directly to the management of the inadvertent transfer of radioactive material in scrap metal.

6.2. Coordination

A distinction may be made between the situation when radioactive material appears in scrap metal due to events within the country rather than as a result of trade with other countries. In general, the responsibilities and financial liabilities are easier to allocate when the source owner, the seller and the buyer of the scrap metal are all within the same country. When imported scrap metal is discovered to contain radioactive material, determining the source owner and scrap metal seller can be a problem. In addition, the involvement of more than one national legal and regulatory system can complicate the issue. Finally, the allocation of responsibilities and the recovery of the costs of radioactive waste management and clean-up is likely to be more difficult.

6.2.1 National coordination

National laws and regulations apply with respect to the loss of control of the radioactive source and the national regulatory body is empowered to take action in relation to the owner of the radioactive source.

Specific Recommendation:

Government ministries, Governmental authorities (safety and Customs authorities), and agencies competent in radiation protection, transport and waste management and the industry (the metal scrap recycling industry and the metal works) should cooperate in resolving the problem of radioactive material in metal scrap and products. They should aim to establish a unified national approach with incentives for all concerned. The example of Spain in this context provides a good model [6]. Annex 4 shows an example of the possible contents of a unified national collaborative scheme.

6.2.2 International coordination

By coordinated action, the Governments and industries of countries can together contribute to reducing the likelihood of radioactive material appearing in scrap metal.

Specific Recommendations:

1. **States** should:
 - promote cooperation between Customs authorities in relation to monitoring at borders, thereby reducing monitoring needs;
 - promote cooperation between regulatory bodies in providing assistance and ‘know-how’ in the management of incidents involving radioactive material in scrap metal.
2. **The scrap metal recycling industry** should promote cooperation between the industries in different countries in providing advance warning of potential problems with scrap metal shipments.
3. **States and the scrap metal recycling industry** should encourage industries and Customs authorities in neighbouring countries to harmonize methods and procedures used for detection, thereby increasing confidence that shipments are free from radioactive material.

6.3 Costs and financing

The costs due to clean-up operations, loss of revenues due to delays, unavailability of facilities, etc. and radioactive waste management should be allocated on the basis of the ‘polluter pays’ principle. Application of this principle implies that the owner of the radioactive material found in the scrap metal is responsible for the recovery and waste management costs and for the costs associated with any clean-up operations required.

The ‘polluter pays’ principle should be incorporated into the contract between the seller and the buyer of scrap metal such that the costs associated with the management and disposal of any radioactive material found in a scrap metal shipment are covered by the seller (if the owner of the radioactive material cannot be found).

The ownership of any detected radioactive material should be clearly established in the contract between the seller and the buyer of the scrap metal, and the time and location of any transfers of ownership should be clearly specified.

In cases where it is not possible to determine the original owner of the radioactive material or the seller of the scrap metal, the financial responsibility would normally fall on the owner of the premises where the radioactive material is discovered. Since this could place undue burdens on individual owners, it is desirable for an emergency fund to be established to assist in providing for the costs of the radioactive waste management and disposal and for any clean-up operations needed in relation to radioactive material originating from unidentifiable suppliers. In this context, it is noted that Article 10 of the EU Directive [3] requires that Member States

establish “a system of financial security ... or any other equivalent means to cover intervention costs relating to the recovery of orphan sources”.

The emergency fund should be established and contributed to by the industry and government. The emergency fund should be managed by an independent body. Important roles of the body would be to establish that everything possible had been done to discover and extract payment from the supplier of the scrap metal containing radioactive material and to determine the level of financial support to be given to the owner. An example structure for a national emergency fund is shown in annex 7.

Specific Recommendations:

1. **The buyer** should ensure that a ‘polluter pays’ clause is contained in all contracts for the purchase of scrap metal.
2. **Government and industry** should establish an emergency fund to provide assistance to owners in relation to radioactive waste management, disposal and clean-up costs associated with radioactive material in scrap metal, metal product and production waste originating from unidentifiable suppliers.

B. FIELDS OF ACTION

7. Recommendations on prevention

7.1. Prevention of occurrence

In order to prevent the occurrence of events leading to radiation hazards to workers, the public and the environment, States should make arrangements for the safety of nuclear facilities and sources of ionizing radiation. Effective safety arrangements would prevent the loss of control over sealed radioactive sources and radioactive material and avoid the appearance of radioactive material in scrap metal shipments.

An important first step in achieving this objective is to establish an appropriate legal and governmental infrastructure for the safety of nuclear facilities and sources of ionizing radiation, radiation protection, the safe management of radioactive waste and the safe transport of radioactive material. To assist States in creating such an infrastructure, the IAEA has published safety standards which cover the development of the legal framework for establishing a regulatory body and other actions to achieve effective control of facilities and activities [16, 17].

In recognition of the particular problems associated with sealed radioactive sources and to ensure that sources within States’ territories are safely managed and securely protected during their useful lives and at the end of their useful lives, an international Code of Conduct has been agreed upon by a large number of States [11]. It encourages States to institute means for ensuring that sealed radioactive sources are managed safely and securely. The EU Directive of 2003 places similar obligations on EU States [3].

Specific Recommendations:

States should:

- have in place an effective national legislative and regulatory system of control over the management and protection of sealed radioactive sources and radioactive material; this should include an established regulatory body;
- have appropriate facilities and services for radiation protection available to persons who are authorized to manage radioactive sources;
- ensure that adequate arrangements are in place for the appropriate training of the staff of the regulatory body, law enforcement agencies and emergency services' organizations;
- establish a national register of radioactive sources (for details see reference [11]);
- ensure that source owners carry out regular checks to confirm that their inventory of radioactive sources is intact;
- promote awareness of the safety and security hazards associated with orphan sources;
- emphasize to sealed radioactive source designers, manufacturers, suppliers and users and those managing disused sources their responsibilities for the safety and security of the sources; and
- ensure that the possession, remanufacturing or disposal of disused sealed radioactive sources takes place in a safe manner.

7.2. Preparedness

Recognizing that the above arrangements are not always completely effective because of human error, neglect, and lack of proper training, etc. and that there is always a finite risk that radioactive material will appear in scrap metal, States should assess their own national situations. They should assess the likelihood that such problems could occur within their territories and their state of preparedness for such events. In this context, it is noted that the likelihood will vary considerably depending, inter alia, on the location of the country under consideration and the nature and extent of its metal industries. The likelihood assessment should include consideration of the following:

- (a) the magnitude of the scrap metal recycling industry in the country, i.e. the number of scrap metal suppliers, collection facilities and metal processing facilities;
- (b) the frequency of incoming scrap metal shipments from foreign countries and the sources of the scrap metal; and
- (c) the history of the occurrence of national events involving radioactive material detected in scrap metal.

Plans to counteract the possible presence of radioactive material in scrap metal should be in place. They should include the provision of radiation detection capabilities at key locations in the country (section 8), expertise to evaluate and respond to radiation alarms (section 9), and the training of relevant personnel (section 10).

The nature and extent of the plans and arrangements in a country should be proportional to the risk of the occurrence of radiation events involving scrap metal. They may, therefore, range from small scale monitoring in countries with little or no scrap metal processing industries, e.g.

monitoring checks at scrap metal suppliers premises and at borders, to wide ranging monitoring in countries with large scale scrap metal recycle industries, e.g. at scrap metal suppliers' premises, scrap metal collection yards, metal processing facilities and at borders. The level and extent of monitoring arrangements, of national expertise in radiation detection and event evaluation and of training programmes should be determined on the basis of the findings of the likelihood assessment.

Specific Recommendations:

States should:

- assess the likelihood of the occurrence of events involving the presence of radioactive material in scrap metal within the country;
- review and, if necessary, improve national arrangements to counteract the possible presence of radioactive material in scrap metal. The arrangements should be proportional to the likelihood of event occurrence; and
- as appropriate, and based on the likelihood assessment, require customs' organizations to install radiation monitors for the surveillance of scrap metal shipments at key border points and encourage owners of major scrap metal yards, shredding facilities and melting plants to install equipment to monitor incoming shipments and outgoing metal products.

8. Recommendations on detection

8.1 General aspects

The radiation monitoring of scrap metal should be performed at key points during its movement from its origin to the melting facility, that is:

- (a) at the point of origin of the scrap;
- (b) at borders of the country or State; and
- (c) at the entrances and exits to scrap yards, shredding facilities and melting plants (including the monitoring of metal products and production waste).

It will be necessary to make judgements on the extent and location of the monitoring required in a country. A first priority should be given to providing monitoring at the origins of the scrap metal, i.e., at the scrap yards of the sellers and the locations of other sources of scrap metal. Next, monitoring should be provided at the border crossings through which scrap metal shipments pass with some regularity and at the larger of the scrap metal facilities. The judgements should be informed by knowledge of the previous history relating to the occurrence of radioactive material in scrap metal shipments in the country.

It is noted that, in some regions, the barriers at border crossings between countries no longer exist, for example, in some parts of the European Union, and this means that there is monitoring only at the outer borders of the region. This may imply that greater reliance has to be placed on monitoring at the scrap metal recycle facilities within each country of the region.

Arrangements are already in place in many countries to provide for monitoring [4, 5], however, the monitoring and response schemes in use vary in their extent and nature from country to country and from facility to facility. As stated earlier, an important objective of these Recommendations is to provide for the harmonization of monitoring and response arrangements in countries and between countries.

Specific Recommendation:

States should ensure that radiation monitoring is performed at each of the points established within the country and that it is supplemented by an administrative process for determining the likelihood that specific shipments contain radioactive material and by visual monitoring of the shipments.

8.2 Administrative monitoring

Knowledge of the origin of the scrap metal, of the scrap metal supplier and the history of previous transactions can provide a first indication of whether there is a significant potential for radioactive material to be present in scrap metal consignments. Incoming shipments to scrap yards, shredding facilities and melting plants should, therefore, be reviewed in relation to these factors.

Specific Recommendations:

Persons responsible for the reception and monitoring of the shipments should be alerted if the shipment:

- arrives without evidence of radiation monitoring having been performed before shipment or during shipment;
- is from a supplier with a previous history involving the supply of radioactively contaminated scrap metal; and
- is from a supplier not previously known to the recipient company or the regulatory authorities.

8.3 Visual monitoring

Scrap metal should be visually monitored during its handling at scrap yards, shredding facilities and melting plants. Persons handling scrap should be trained to recognize the different types of radiation sources, source housings and radioactivity warning signs. Guidance on the different types of radiation sources and source housings is contained in an international catalogue produced by the IAEA [18].

Specific Recommendation:

Scrap yard, shredding facility and melting plant owners/managers should ensure that persons handling scrap are properly trained to recognize radioactivity warning signs and the different types of radiation sources and source housings.

8.4 Radiation monitoring

Scrap metal shipments by road, rail, inland waterway, sea and air should be checked for radiation using fixed (for example, portal, conveyor, or grapple monitors) or portable monitors. Annex 5 provides more detail on the monitoring of scrap metal shipments.

8.4.1. Monitoring at the point of origin

Scrap metal shipments should be monitored for radioactivity at the point of origin prior to their transportation.

Specific Recommendations:

Owners of the originating scrap metal companies should:

- ensure shipments are checked by administrative and visual means (sections 8.2 and 8.3) for the possible presence of radioactive material;
- provide portal radiation monitors at the exit to the premises where scrap is collected to check for the presence of radioactive material in each outgoing shipment (as a minimum requirement, all scrap metal shipments should be monitored using a hand-held radiation monitoring device prior to shipment);
- ensure the effectiveness of the monitors by checking daily with a small radiation source to verify the ability to detect changes in radiation intensity;
- arrange for periodic calibration and testing of the detectors to ensure optimum performance;
- provide appropriate training in radiation monitoring and initial response procedures for the involved personnel;
- provide a certificate to accompany the scrap metal shipment as evidence that the shipment has been checked for the presence of radioactive material and that no evidence of radioactive material has been found;
- establish a response plan for action in the event of radioactive material being discovered (Section 9);
- make formal arrangements with a national organization with expertise in radiation monitoring and radiation protection:
 - to provide training of personnel in radiation detection and response procedures, and
 - to provide assistance in the event of a radiation incident; and
- establish a plan and procedure for dealing with a departing shipment that has been shown to contain radioactive material.

8.4.2. Monitoring at borders

Scrap metal shipments should be monitored at key border points; this includes seaports, land crossings and airports. In this context, States should consider introducing legislation requiring that incoming or outgoing scrap metal is monitored for radioactivity at borders or, in the case of the EU, at the borders of the region.

Specific Recommendations:

Customs authorities should:

- ensure that shipments of metal scrap are checked by administrative and visual means (sections 8.2 and 8.3);
- provide portal radiation monitors at each major road and rail border crossing - for use on shipments of scrap metal (as a minimum requirement, scrap metal shipments at border points (including airports and sea-ports) should be monitored using hand-held instruments);
- ensure the effectiveness of the monitors by checking daily with a small radiation source to verify the ability to detect changes in radiation intensity;
- arrange for periodic calibration and testing of the detectors (at least annually) to ensure optimum performance;
- provide appropriate training in radiation monitoring and initial response procedures for customs officers likely to be involved in the monitoring of scrap metal shipments;
- establish a response plan for action in the event of radioactive material being discovered (section 9); and
- make a formal arrangement with a national organization with expertise in radiation monitoring and radiation protection:
 - to provide training of personnel on radiation detection and response procedures, and
 - to provide assistance in the event of a radiation incident.

8.4.3. Monitoring at scrap yards, shredding facilities and melting plants

Scrap metal should be monitored for radioactivity at the entrances and exits of all major scrap yards, shredding facilities and melting plants or at facilities where there is a significant potential for radioactive material to be present in incoming scrap. Depending on the size of the facility this may be achieved by means of fixed portal monitors and/or hand-held monitors. In addition, in-plant monitoring of conveyors or within scrap grapples or dust collection systems may be used to supplement the other forms of monitoring.

Specific Recommendations:

1. Owners of scrap yards, shredding facilities and melting plants should:

- ensure incoming shipments are checked by administrative and visual means (sections 8.2 and 8.3);
- provide a portal radiation monitor at the entrance/exit to the premises and, as appropriate, conveyor and grapple monitors (as a minimum requirement, ensure that all incoming and outgoing shipments are checked by hand-held radiation detection instruments. All entrances and exits should be monitored);
- ensure that the scrap metal is monitored for radiation when spread out after removal from the shipment;
- ensure the effectiveness of the monitors by checking daily with a small radiation source to verify the ability to detect changes in radiation intensity;

- arrange for periodic calibration and testing of the detectors (at least annually) to ensure optimum performance;
 - provide appropriate training in radiation monitoring and initial response procedures for personnel likely to be involved in the monitoring of scrap metal shipments;
 - establish a response plan for action in the event of radioactive material being discovered (section 9);
 - make a formal arrangement with a national organization with expertise in radiation monitoring and radiation protection to provide:
 - training of personnel on radiation detection and response procedures, and
 - assistance in the event of a radiation incident: and
 - require that contracts for the supply of scrap metal include the condition that any radioactive material discovered in shipments will be returned and accepted by the seller and that any associated costs will be covered by the seller.
2. **Owners of melting plants** should provide arrangements for the radiation monitoring of production waste systems including dust collection systems.

9. **Recommendations on response**

A response plan should exist at all locations where scrap metal or metal product or production waste is being monitored so that, in the event of sources or source housings being observed or elevated levels of radiation being detected in the scrap metal or in the shredded or processed metal, actions are clear and known in advance by operators and responsible organizations. Those involved should be appropriately trained on the implementation of the response plan.

9.1 **Response to an alarm**

If radiation is detected such that a radiation alarm in a fixed monitor is triggered:

- (a) The result should be checked (see annex 5) and, if, after checking, the result is verified, the shipment should be immobilized or in the case of metal processing, the process should be stopped. Access of personnel to the material should be limited to suitably trained and equipped personnel;
- (b) If the observed radiation levels exceed 0.1mSv/h at 1 metre from the surface of the load being transported or if radioactive contamination is detected in the vicinity the assistance of **radiation protection experts** should be sought ([19] and annex 5):

These experts should:

- (i) inspect the shipment or the affected processed metal or production waste in detail until the part or parts containing the radioactive material have been identified, taking due care to ensure that all persons involved are adequately protected from radiation during the inspection operation (that is, their exposures are kept as low as reasonably achievable with the restriction that doses to individuals are less than the dose constraints set by the national regulatory body [16]);

- (ii) evaluate the nature and amount of the radioactive material contained in the unprocessed metal scrap in the shipment, the shredded material, the melt or the production waste;
 - (iii) isolate the radioactive material and place it in a safe location;
 - (iv) check to determine if any radioactive material has been dispersed in the local area (by measurements to detect any surface contamination) and assess the likelihood of any other area being affected prior to the arrival of the shipment at the facility;
 - (v) draw up a report describing the actions taken, the results of the investigation and the steps taken to recover from the incident. (An example reporting form is contained in annex 6).
- (c) The regulatory body should be promptly notified of the event - if it is judged to be radiologically significant by the radiation protection experts according to State requirements or guidelines – either by the radiation experts themselves or by the facility owner or manager or by the senior customs official - and provided with a copy of their report;
- (d) If the radiation level is less than 0.1mSv/h at 1 metre from the surface of the load being transported, the members of staff of the facility trained in radiation monitoring and radiation protection should manage the situation. They should locate and isolate the radioactive material so that it will not interfere with the operation of the radiation detection system. If investigation and rearrangement of the scrap metal produces radiation levels in excess of 0.1mSv/h at 1 metre from the material surface, the radiation protection experts should be promptly contacted; and
- (e) The recovered radioactive material should be stored in a safe and secure location until arrangements have been made to safely dispose of it.

Specific Recommendations:

1. **Owners or managers of the originating scrap metal companies, Customs officials, owners or managers of scrap metal yards, shredding facilities or melting plants** should, on being alerted by responsible staff of a verified radiation alarm with radiation levels in excess of those indicated in item (b) above or of radioactive contamination being detected:
 - contact the radiation protection experts to provide assistance in safely locating and removing the radioactive material from the scrap metal or the melt and/or determining the presence and extent of any radioactive contamination;
 - notify the regulatory body promptly (by telephone) if the event is judged by the radiation protection experts to be radiologically significant, and, subsequently, provide the regulatory body with the report of the radiation protection experts; and,
 - ensure that the recovered radioactive material is placed in a safe and secure location pending its disposal.
2. **The relevant national regulatory body** should provide guidance and advice on:
 - procedures to ensure safety in the event of radioactive material being discovered in metal scrap; and,
 - the safe storage and disposal of radioactive material or scrap metal contaminated with radioactive material.

3. **The national competent authority for the safe transport of radioactive material** should provide advice on:
 - the requirements for the safe transportation of radioactive material or scrap metal contaminated with radioactive material; and
 - issue Special Arrangement authorizations as needed for the safe transport of the recovered material or radioactively contaminated scrap metal or product.

9.2. Management of detected radioactive material

Several options exist for the management of the radioactive material found in the metal scrap. It may be:

- (a) returned to the supplier of the metal scrap (however, as stated in the Joint Convention and the Code of Conduct [10, 11] radioactive sources should not be exported to States not having the administrative capability, resources and regulatory structure needed to ensure that the source will be managed safely);
- (b) melted under controlled conditions at an approved melting facility and recycled for specific applications; and
- (c) treated as radioactive waste and transferred to a suitable waste repository or waste storage facility.

It will generally not be acceptable to leave the radioactive material at the facility or border crossing where it was detected unless the facility has been licensed by the appropriate regulatory body for storage of such material, as it may ultimately cause a hazard to persons in the locality and, in addition, may interfere with the operation of the radiation detection system at the facility. Temporary storage may be allowed by the regulatory body if the proposed storage arrangements provide adequate radiation protection and security of the stored radioactive material.

In the event of radioactive material having become dispersed at the facility where the radioactive material was detected, it will be necessary to decontaminate and clean the affected areas and to dispose of the resulting material as radioactive waste. Such actions may require that metal processing operations be terminated until the decontamination, cleanup and disposal activities are adequately completed, and radiation protection of personnel is ensured. Assistance in decontamination, cleanup and disposal should be available from the national organizations responsible for radiation protection and radioactive waste management.

In the event that radioactivity has been transferred into metal products and these products have been distributed from the manufacturing facility prior to detection of the contamination, it will be necessary to take actions to safely recover these manufactured products, transport them and appropriately store and/or dispose of them.

In all cases, when the recovered material is moved for storage or disposal at locations away from the site of its discovery, it must be transported as radioactive material in compliance with transport regulations for radioactive material. These exist both at the national level and at the international level. However, national transport regulations are generally consistent with the internationally agreed transport regulations as established in reference [20].

Specific Recommendations:

1. **The Customs authority or the owner of the scrap metal yard, shredding facility or melting plant** should:
 - request the supplier of the scrap metal containing the radioactive material to take the shipment back and to manage the disposal of the radioactive material;
 - if for any reason this is not possible, contact the national organization responsible for radioactive waste management and request assistance in disposing of the radioactive material; and,
 - if there is radioactive contamination present on surfaces, request the assistance of the radiation protection experts and/or the national organization responsible for radioactive waste management in decontaminating the affected areas and in disposing of any radioactive waste produced in the decontamination operation.
2. **States** should have arrangements in place for the safe storage or disposal of radioactive waste and an authorized national body should exist to manage such waste.

9.3. Reporting

9.3.1 National reporting

As indicated in Section 9.2, in the first instance, a report should be made by the *owner of the facility* at which the detection of radioactive material occurred (seller, customs' organization, buyer) to the national regulator - (i) promptly, by telephone or email, and (ii) later, in writing using a reporting format similar to that shown in annex 6.

Specific Recommendations:

Responsible Customs officials and managers of scrap metal yards, shredding facilities and melting plants should be aware of the identity of the responsible national authorities that are to be notified and expert organizations that are to be utilized **in advance** of any incident so that these authorities and organizations can be promptly contacted and notified in the event of a radiation incident. In particular, they should be aware of the contact details of:

- the national regulator (or the relevant regulator, i.e. local, regional, State),
- a national organization approved to carry out radiation monitoring and radiation protection activities,
- the national competent authority for the safe transport of radioactive material; and
- the national organization approved to carry out radioactive waste management.

9.3.2 International reporting

If the incident could have transboundary implications, as for example, in the case of the dispersal of radioactive material to atmosphere from a melting facility or the discovery of a widely exported batch of scrap or processed metal, the incident should be reported to the IAEA as soon as possible so that potentially affected countries can be warned and so that they can take protective action. Such an event, which may have potential radiological significance to another

State, should be reported by the designated national authority (usually the national regulatory body) to the IAEA Emergency Response Centre. This is a legal requirement for States that are Contracting Parties to the Convention on Early Notification of a Nuclear Accident [21] but is recommended as an appropriate course of action for all States in these circumstances.

Specific Recommendation:

States should immediately report to the IAEA as well as the potentially affected country(ies) any incident involving the dispersal of scrap metal containing radioactive material that may have transboundary implications.

C. ADDITIONAL PROVISIONS

10. Training

Specific Recommendations:

Owners of originating scrap metal companies, customs authorities and owners of scrap metal yards, shredding facilities and melting plants should provide appropriate training for the management and workers at customs' points or facilities where scrap metal, metal product or production waste containing radioactive material may be found or processed. The staff should be:

- informed of the possibility that they may be confronted with scrap metal containing radioactive material;
- informed of the basic facts about ionizing radiation and its effects;
- advised and trained in the visual detection of sealed radiation sources and their containers;
- as appropriate, trained in the use of fixed and portable radiation detection equipment; and
- trained in the action to be taken in the event of the detection or suspected detection of a radiation source or radioactive material.

The training in radiation protection, monitoring and response should be provided by recognized radiation protection experts.

11. Information exchange

Reports and analyses of incidents involving radioactive material in scrap metal are valuable to the national and international scrap metal community as a means of learning from the experiences of others.

11.1 National level

The national authorities (regulatory body, Customs authority) should inform the scrap metal industry, through the national registry (if it exists), professional bodies, associations, unions, etc. of incidents that have occurred involving radioactive material in scrap metal.

11.2 International level

An international internet-based information exchange system of radiation incidents affecting the scrap metal industry should be established for the benefit of the world-wide metal recycling community.

12. Implementation and follow-up

12.1 Use and Implementation of the Protocol at National Level

The Protocol does not establish legal commitments nor does it oblige countries and industry groups to transpose its recommendations into national law or administrative instructions and/or to introduce them as national practice or codes of conduct. Application of the recommendations, guidance, best practices and cooperative mechanisms contained in the Protocol will depend on administrative and commercial circumstances as well as prevailing legislation in the various countries.

Nonetheless, the Protocol stems from a clear demand by Governments and the industry for a coordinated approach and recommended best practice to address prevention, detection and response to radioactive material in scrap metal. It represents a unique opportunity for advances to be made internationally in monitoring the problem of radioactive material in scrap metal, which is likely to increase in the future.

By agreeing to this Protocol, Governments and industries agree to use the provisions of the Protocol and its technical annexes as a consistent and comprehensive framework for their actions at the national level.

12.1 Monitoring and review procedures

In a follow-up phase, feedback on use of the Protocol will be requested so that it can be improved and its value assessed by the international community. Monitoring of national and international use of the protocol includes two aspects:

- (a) Implementation of the Protocol;
- (b) Review of the Protocol and its Annexes.

In view of its experience in this field, the UNECE may wish to consider coordinating relevant activities in cooperation with other international organizations.

12.1.1 Implementation of the protocol

At the next Expert Group meeting, to be held possibly in 2008, feedback should be requested from relevant parties on their experiences with the Protocol. Parties should be in a position to describe their experiences related to the following issues:

- (a) The ways in which the Protocol has been useful at the national and international levels;
- (b) The policy or procedural aspects that have changed as a result of the Protocol;

- (c) Measurable changes due to application of the Protocol recommendations;
- (d) Less useful aspects of the Protocol;
- (e) Proposed amendments based on use of the Protocol.

12.1.2 Review of the protocol and its annexes

The Protocol and its Annexes should be reviewed by Governmental and industry experts competent in prevention, detection and response procedures at national and international levels, in order to reflect state-of-the-art expertise in dealing with radioactive material in scrap metal. Starting, possibly, in 2008 the Expert Group could be convened, at regular intervals, possibly every 5 years, to establish progress made by Governments and industries in dealing efficiently with radioactive material in scrap metal. In the case of a serious incident(s), special meetings of the Expert Group should be convened.

In order to facilitate the follow-up to the Protocol, a permanent international dialogue should be maintained, such as initiated through the Group of Experts. National focal points (industry and Government) should be identified to communicate and share relevant expertise and experiences making use of a dedicated web portal or clearing house to facilitate this information exchange.

12.3 Dissemination of the protocol

The UNECE should endeavour to provide the Protocol and its Annexes in English, French and Russian and, depending on available resources, also into Arabic, Chinese and Spanish. The Protocol and its Annexes should be distributed worldwide to Governmental authorities and industries responsible for and dealing with scrap metal. The Protocol and its Annexes should also be available on the UNECE website. Government and industry representatives are encouraged to share it widely.

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ANNEXES (to be developed)³

Annex 1 INTERNATIONAL CLEARANCE LEVELS

Annex 2 RADIONUCLIDES LIKELY TO BE OF MOST CONCERN IN SCRAP METAL

Most of the radionuclides likely to be encountered can be identified by instruments capable of identifying spectra consisting of gamma ray energy peaks between 60 keV and at least 1.33 MeV.

Annex 3 EXAMPLE CERTIFICATE OF SHIPMENT MONITORING

Annex 4 EXAMPLE OF THE CONTENT OF A UNIFIED NATIONAL COLLABORATIVE SCHEME

Such a scheme would be based on the Spanish protocol, and include a registry, agreed and harmonized measures and procedures for detecting radioactive materials, assistance by governmental organizations, assistance by national expert organizations, arrangements by customs authorities to check imported and exported materials, and a national emergency fund.

Annex 5 GUIDANCE ON MONITORING SCRAP METAL SHIPMENTS

This guidance would be adapted from 'Detection of Radioactive Material at Borders (IAEA-TECDOC-1312, (2002)).

Annex 6 GUIDANCE ON REPORTING DETECTED RADIOACTIVE MATERIAL IN SCRAP METAL

This could be developed using existing forms from different countries.

Annex 7 EXAMPLE STRUCTURE FOR A NATIONAL EMERGENCY FUND

³ An outline of these annexes to be finalized following agreement on the Protocol is contained in document ECE/TRANS/AC.10/2006/5/Add.1 (English only).