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**ECONOMIC COMMISSION FOR EUROPE****Group of Experts on Monitoring of Radioactively Contaminated Scrap Metal****REPORT OF THE FIRST SESSION<sup>1</sup>  
(5 to 7 April 2004)****EXECUTIVE SUMMARY**

In 2001, the UNECE published a report, "Management of Radiation Protection in the Recycling of Metal Scrap". As a follow-up, a Group of Experts on Monitoring of Radioactively Contaminated Scrap Metal was convened by the UNECE in Geneva (5-7 April 2004). The first session, which was attended by experts from more than 20 countries and international organizations, reviewed the results of a questionnaire that had been circulated to countries and discussed policies and experiences in monitoring and interception of radioactively contaminated scrap metal worldwide. The primary focus was on ways and means to facilitate and secure international trade and transport of scrap metal. In addition, safety and health issues that generally are already addressed and regulated in legal instruments, standards and guidelines prepared by UNECE and IAEA were reviewed.

The topic of the Expert Group session is of significant importance considering that, in 2001, the worldwide consumption of scrap metal was in the order of 370 million tonnes. During that period, nearly 4,000 incidents were reported in North America alone involving detection of various types of radioactive material in scrap metal. There appear to be an increasing number of uncontrolled orphan (radioactive) sources in a number of countries. Some of these sources have gone undetected and have been melted down accidentally or shredded with scrap metal, thereby entering the metal stream. While the potential health and safety risks of such incidents are usually not very high due to the relatively low radiation levels involved, they are still often above acceptable levels and the economic and financial consequences of such contaminated scrap metal and metal products for the recycling and steel industry are extremely high as it regularly results in closure and clean-up of steel facilities and in loss of trust in the use of recycled materials.

With a view to addressing these issues, the session considered the need for (a) examining the possible preparation of an international voluntary protocol facilitating a consistent, comprehensive and harmonized approach to monitoring, interception and response measures in case of radiation contamination incidents, (b) preparation of training and capacity-building materials on best practices to assist affected personnel dealing with control of scrap metal, and (c) establishment of an Internet-based information exchange system open to all concerned parties.

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<sup>1</sup> Documentation presented at the session is available at [www.unece/trans/radiation/radiation.html](http://www.unece/trans/radiation/radiation.html).

## OPENING OF THE SESSION

1. The Group of Experts held its first session from 5 to 7 April 2004 in Geneva.
2. In his opening statement, the Director of the UNECE Transport Division, Mr. J. Capel Ferrer noted that the appearance of radioactively contaminated scrap metals in scrap yards and in international trade was a growing problem. With a view to addressing this issue, the UNECE, the European Commission (EC) and the International Atomic Energy Agency (IAEA) prepared in 2001 a *“Report on the Improvement of the Management of Radiation Protection in the Recycling of Metal Scrap”* that recommended measures to avoid the introduction of radiation sources into the metal recycling stream<sup>2</sup>. In continuation of this work, the Government of the United States of America proposed to the UNECE secretariat that it should convene this international expert group to review and analyze existing national policies and experiences in the monitoring and interception of imported scrap metal for radioactive contamination at ports of entry and border crossing points.
3. In preparation of this meeting, the UNECE secretariat, assisted by the IAEA, has transmitted to Governments and international organizations a questionnaire with a view to documenting the current legislation, knowledge and experience in the monitoring, interception and managing of incidents with radioactively contaminated scrap metal<sup>3</sup>.
4. Mr. Capel Ferrer expressed the hope that, following a thorough exchange of experiences, the Group of Experts might be in a position to prepare concrete recommendations for improved international cooperation in this field as well as for institutional follow-up arrangements, if deemed necessary.

## ATTENDANCE

5. The session was attended by experts and representatives from the following 20 countries: Austria; Belarus; Belgium; Bulgaria; Croatia; Cyprus; Czech Republic; Estonia; Finland; France; Italy; Kyrgyzstan; Latvia; Lithuania; Luxembourg; Romania; Russian Federation; Slovakia; Switzerland; United States of America (USA).
6. The following inter-governmental organizations were represented: International Atomic Energy Agency (IAEA); World Customs Organization (WCO).
7. The following non-governmental organization was represented: Bureau of International Recycling (BIR).

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<sup>2</sup> For details see: [www.unece/trans/radiation/radiation.html](http://www.unece/trans/radiation/radiation.html).

<sup>3</sup> The questionnaires as well as all replies received are contained on [www.unece/trans/radiation/radiation.html](http://www.unece/trans/radiation/radiation.html). The access code for this restricted site may be obtained from the UNECE secretariat.

8. A consultant to a scrap processing company participated at the invitation of the secretariat.

## **ADOPTION OF THE AGENDA**

Documentation: TRANS/AC.10/2004/1; Informal Document No. 2 (2004).

9. The Group of Experts adopted the provisional agenda prepared by the secretariat without modification.

## **ELECTION OF OFFICERS**

10. The Group of Experts elected Mr. R. Turner (United States of America) as Chairman and Mr. M. Isakov (Russian Federation) as Vice-Chairman for this session.

## **ISSUES AT STAKE AND NEED FOR ACTION REGARDING RADIOACTIVELY CONTAMINATED SCRAP METAL**

11. Radioactively contaminated scrap metal has become an urgent issue due to an increasing number of incidents being detected in the international trade of scrap metal and changes in the economics of steel production, such as the use of electric arc furnaces. Through 2001, scrap yards and steel mills in North America recorded more than 4,000 detections of radioactive materials in incoming scrap metal as the result of accidents or inadvertent disposal and more such incidents are being reported with the increased use of sophisticated radiation detection equipment.

12. Although the potential health and safety risks of melting or shredding radioactively contaminated materials at steel mills are usually not very high due to the relatively low radiation levels involved<sup>4</sup>, they are still often above acceptable levels and the economic consequences (e.g. the costs for the clean-up of individual incidents can range from US\$ 12 million to more than US\$ 100 million), the actual or perceived environmental consequences of such incidents and the loss of trust of business and consumers in recycled material products can be significant.

13. With a view to identifying the issues at stake and to determining the need for action to address such issues, the Group of Experts considered background documents prepared by experts from the United States of America (USA) and the Russian Federation. These documents addressed the existing and planned regulatory and industry practices and procedures to monitor and control radioactively contaminated scrap metal, compliance with such procedures and possibilities for effective and focused response procedures in the event of radiological incidents.

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<sup>4</sup> In a few limited cases, the risks can be high, as is noted in TRANS/AC.10/2004/1, item 3, 2. para., where it is stated that "...the negative health and environmental consequences of such incidents could be enormous...".

## **UNITED STATES PILOT STUDY TO DETECT RADIOACTIVE MATERIALS IN IMPORTED SCRAP METAL AT SEAPORTS**

Documentation: TRANS/AC.10/2004/2.

14. The Group of Experts was informed about the first results of a pilot study undertaken by the U.S. Environmental Protection Agency (EPA) to investigate the need for and feasibility of safeguarding against illicit or inadvertent inclusion of radioactive contamination in imported scrap metal arriving at seaports.

15. In introducing the study, Mr. Turner (United States of America) noted that the recycling of scrap metal has grown rapidly as have the incidents of recyclable metals being contaminated with radioactive material. Many shipments of contaminated material go through undetected only to be discovered later after delivery to foundries, steelworks and smelters.

16. The pilot study initiative focused on protecting commerce. However, it also overlapped with existing initiatives, including illicit trafficking and exemption of materials. The United States has a growing radiation control capability at its border crossings. By September 2004, 90 per cent of all ports will have radiation monitoring for incoming container cargo. In addition, there are 248 portal monitors in use at land border crossings.

17. Mr. Turner suggested that the goals for the Group of Experts might include sharing of information, learning from each other's experiences and identifying areas of international consensus and areas where additional efforts were needed. In this context, the following questions might need to be answered:

- (a) Is it possible to develop an internationally acceptable scrap metal radiation monitoring and response protocol?
- (b) What additional regulations and guidance, if any, are needed?
- (c) What monitoring systems and protocols need to be established, communicated and implemented internationally?

18. A CD-ROM produced by EPA was made available to participating experts containing a training programme for staff at metal processing facilities addressing response procedures to radiation alarms.

## **REGULATIONS AND TECHNICAL FACILITIES FOR MONITORING RADIATION OF SCRAP METAL IN THE RUSSIAN FEDERATION**

Documentation: TRANS/AC.10/2004/3.

19. The Group of Experts was informed about regulatory and technical facilities that exist in the Russian Federation to monitor radioactively contaminated scrap metal. Mr. Isakov (Russian Federation) highlighted the problems that exist today in trying to resolve the issue of detection and action with regard to contaminated scrap metal. The existing international and national regulatory systems provide, to a great extent, for a good basis for addressing many of the issues.

20. There is a need to improve reliability and consistency of monitoring. Detection depends on many factors, not all of which are necessarily addressed in current monitoring schemes. Controls and monitoring need to be applied at all steps in the scrap metal chain starting at the producer, through the transport system including reloading, until receipt by the buyer.

21. Systems that detect different types of radiation are needed. It is equally important to understand the critical characteristics and parameters involved. It would be useful to establish a standard procedure for certification of monitoring systems allowing for the detection of radiation sources of different types and power. A database accessible to all participants in the scrap metal chain would be useful. This could assist in providing an acceptable level of radiation control for the total trade and transport chain.

## **CONTROL OF SCRAP METAL BY CUSTOMS AUTHORITIES IN THE RUSSIAN FEDERATION**

Documentation: Informal Document No. 1 (2004).

22. Aspects of monitoring imports and exports of radioactively contaminated scrap metal at borders was presented by Mr. Kravchenko (Russian Federation). He pointed out that one of the tasks for which Customs authorities throughout the world are responsible is the detection of radioactively contaminated goods.

23. From the perspective of the Russian Federation, there are two key tasks to be carried out by Customs: (a) Control of illicit trafficking of materials across the border, and (b) Control of foreign trade activities (export, import, transit, temporary importation, etc.) on the basis of identification of names, products and quantities declared in Customs and commercial documents.

24. Five conceptual principles were presented including (1) monitoring of radiation, (2) priority of radiation safety over legal activities, (3) efficient controls to avoid delays in border crossings (4) efficient use of control resources (personnel and equipment) and (5) use of mainly national technical facilities.

25. Four stages of control were outlined: (1) detection, (2) localization of danger, (3) identification of hazardous materials, and (4) dose monitoring. Technical facilities to accomplish these controls include detection equipment, analysis of measurements and personal dosimetry and means of providing for personal protection.

26. As the number of radiation monitoring stations at borders increased, the number of detections decreased (2000/2001). There was also a similar decline in the number of returns of scrap metal from the Russian Federation to other countries. Thus, as it became apparent that borders were monitored, traders and transport operators apparently tried to avoid the shipment of contaminated materials.

## **EXPERIENCES IN MONITORING RADIOACTIVELY CONTAMINATED SCRAP METAL**

Documentation: Informal Document No. 3 (2004).

27. The Group of Experts reviewed the report summarizing more than 40 country responses to the questionnaire that had been circulated by the UNECE. The secretariat introduced the comprehensive report it had prepared analyzing in detail the country and industry responses<sup>5/</sup>. Particular attention was given to the following issues relating to radioactively contaminated scrap metal:

- Existing and planned national regulatory mechanisms;
- Monitoring of the movement of radioactive materials, particularly scrap metal, including training of staff involved in inspection and response;
- Dispositioning (removal) of detected radioactive materials;
- Contractual provisions governing trade in scrap metal products;
- Governmental and private sector response procedures and requirements;
- Inter-agency cooperation in monitoring and response;
- Good (and bad) practices and lessons to be learned.

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5 The detailed analysis of country and industry responses to the UNECE questionnaire, updated by meeting participants and replies received following issuance of Informal Document No. 3 (2004), will be published as a separate document.

28. Experts from the metal recycling industry, from border control agencies (Customs and others) and from radiation control agencies reported on respective responsibilities, activities undertaken and on experiences with radiation contamination incidents and their resolution.

29. Their reports showed that the issues that arise in the monitoring and control of radioactively contaminated scrap metal seem to be very similar in most countries. Some of the general issues that were highlighted during the discussions related to the following aspects:

- There is a clear need for harmonization of the approaches for monitoring of scrap metal worldwide.
- There is a clear need for well-prepared and repeated training programmes for all personnel involved in dealing with and monitoring radioactively contaminated scrap metal, through all management levels, and in responding effectively to radiation alarms. This includes efficient cooperative procedures between national governmental control authorities and competent industry personnel. As many sources are coming from demolition sites, training programmes for demolition workers, as currently being developed in the United States of America, are also of importance.
- The exchange of information and experiences (good and bad practices) among all parties involved and among countries is crucial for the effectiveness of measures taken at national and international levels with a view to protecting health and safety and to facilitating international commerce and transport of scrap metal.
- Ease of determination and enforcement of the financial responsibilities for the management of discovered sources and contaminated materials is important. In most countries, the “polluter pays” principle is applied. In case of international transactions, the application of this principle is, however, often hampered by limited financial recourse, since much of the cargo is usually paid to the supplier before the problem is discovered. In that event, the shipper, not the importer is usually required to cover the costs of resolution of the problem. In some countries, Government funds are available to assist small operators in the disposal of detected orphan radioactively contaminated materials.

30. In this context, it was noted that the “Spanish Protocol for Collaboration on the Radiation Monitoring of Metal Materials” is a good example of how to institutionalize necessary cooperative action in this field at the national level. Since its coming into force in 1999, this voluntary protocol has proven its value in that country and could thus serve as a reference starting point for future international cooperative efforts in this regard.

31. The Group of Experts noted that radioactive contamination of metal scrap and its resolve can be viewed from different angles depending on the source and level of radioactivity. It can involve (a) nuclear materials related to national security issues, (b) significant radioactivity (e.g. from orphan sources) leading to possibly significant health effects to members of the public or

workers, (c) severe commercial damage (which may include orphan sources) and (d) low concentrations of radionuclides (below exemption or clearance levels) that may lead to commercial problems as metal facilities and consumers do not want to have any radiation emanating from their purchases.

32. Thus, resolution of these problems should focus not only on nuclear materials and highly radioactive sources that may pose radiological health effects, but also on other radioactive materials including those that are in the range of or below the level that require regulatory control. In this context, it was noted that the IAEA is developing a safety guide on application principles of exclusion, exemption and clearance. All member States have the opportunity to participate in the development and review of this guide and of relevant standards and supporting documents. Multiple international standards (e.g. the Basic Safety Standards, IAEA Safety Series No.115) exist already providing guidance for radiation protection, including justification of a practice.

33. The Group of Experts noted that options for dealing with radioactively contaminated scrap are decontamination, melting, storage and disposal, each of which requires specialized know-how, procedures and facilities. The industry alone may not always be able to deal with all of the ensuing problems. At the international level, competent organizations of the United Nations should take a lead role assisting in the development of practical solutions for the benefit of safety and of international trade. The development and application of technical solutions may require the support of specialized organizations, such as the IAEA and the BIR.

34. In this context, it was noted that Customs authorities generally look to the World Customs Organization (WCO) for guidance rather than to the IAEA. This underlines the need for close cooperation of the two international organizations in this field.

35. The Group of Experts considered the information provided by the participants on regulatory work of their organizations as well as experiences in addressing transport and trade of radioactively contaminated scrap metal and the resolving of radiation contamination incidents. Detailed information was also provided by experts from the IAEA, UNECE, WCO, BIR and a consultant of a scrap processing company. A summary of the information and data provided is contained in the annex to this report.



## **ACTIONS TO BE TAKEN AT NATIONAL AND INTERNATIONAL LEVELS**

Documentation: Informal Document No. 4 (2004).

36. The Group of Experts considered the issues arising from the results of the questionnaire and from the detailed presentations by national and international authorities and organizations at the session. Deliberations went beyond safety and security issues to elaborate what can be accomplished within the existing national and international regulatory systems to facilitate international commerce with scrap metal.

37. The Group of Experts identified the following ten issues that could be considered as a common basis for possible future work and could provide a framework for an internationally harmonized approach of monitoring scrap metal to assist in the international trade of metals. The ultimate goal of this approach would be to minimize all problems associated with radiological contamination of scrap metal during all stages of the recycling process (demolition, procurement, handling, transport and international trade, melting)<sup>6</sup>.

### **Regulatory Infrastructure – Existing and planned national regulatory infrastructure**

#### **Issue 1:      Application of the IAEA Code of Conduct for the Safety and Security of Radioactive Sources**

38. The Group of Experts noted that most countries have developed a comprehensive legal regulatory framework, appropriate to manage radioactive products and, in particular, radioactive sealed sources. It also took note of several additional appropriate tools and regulatory measures, such as the IAEA Safety Standards and the IAEA Code of Conduct for the Safety and the Security of Radioactive Sources and the Council Directive 2003/122/EURATOM of the European Union on the control of high-activity sealed radioactive sources and orphan sources.

39. The Group of Experts noted that countries may wish to apply the IAEA Code of Conduct for the Safety and Security of Radioactive Sources, which provides guidance towards a more standardized and controlled approach to the management of radioactively contaminated metals and could thus lead to a reduction in the number of contaminated metal incidents. Its use is recommended by the IAEA secretariat. Therefore, consideration might be given to undertaking a joint effort to further strengthen national control procedures on the basis of such international guidelines and regulatory measures with a view to globally strengthening the safety and security of radioactive sources and reducing costs associated with radiological incidents involving scrap metal.

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<sup>6</sup> For details of the metal recycling loop, on the actors involved and on the regulatory and contractual framework, refer to the UNECE publication: Improvement of the Management of Radiation Protection Aspects in the Recycling of Metal Scrap (2001) (<http://www.unece.org/trans/radiation/pub.html>).

**Monitoring – Movement of radioactive material, particularly scrap metal, including training of staff involved in inspection and enforcement**

**Issue 2:      Monitoring of imported and exported metal scrap**

40. Countries may wish to consider establishing regulatory requirements regarding the monitoring of imported and/or exported scrap metal for radioactivity at national borders. With the emerging EU open border policy, there is the potential for a decrease in radiation monitoring of shipments between these nations. Without border monitoring, the burden for most of the monitoring will fall upon the receiving facility (see Issue 3), where the primary responsibility for monitoring will fall upon the metal processing industry.

41. Specifically, the Group of Experts noted that further consideration might be given to establishing a broad-based, consistent approach providing for monitoring of scrap metal for radioactivity at borders and the exporting facility.

**Issue 3:      Location of monitoring of scrap metal in the distribution chain**

42. The results of the questionnaire and the discussions at the session showed that a wide disparity exists in countries with regard to the location, scope and magnitude of monitoring requirements and procedures.

43. The Group of Experts felt that further consideration should be given to globally harmonize or standardize requirements and procedures for monitoring of scrap metal for radiological contamination or embedded sources before being transported, i.e. at the point of origin of scrap metal shipments.

**Issue 4:      Need to globally harmonize the monitoring of scrap metal and metal products**

44. There also exists a wide disparity in many countries with regard to specifications and locations of detectors, the percentage of imported and exported materials monitored, quality assurance procedures used, extent of procedures to be followed in training, protocols to be followed when an alarm is triggered, detection alarm thresholds, testing and calibration of monitoring systems, etc. One major weakness appears to be in the area of training of personnel, of providing guidelines for identifying and characterizing sources and of providing reporting protocols at and for personnel at processing facilities.

45. The Group of Experts determined that it would be useful to prepare internationally recognized guidance material in all of these areas. The objective would be to provide for a harmonized approach to monitoring of scrap metal and metal products, to ensure specific

guidance on training of personnel at metal processing facilities and at border crossings, as appropriate, and to improve education of staff with a view to facilitating early and adequate identification of sources before they get into the metal processing chain. Use of available training materials (e.g. of IAEA, WCO and state-level organizations such as United States, EPA) could facilitate this effort.

**Dispositioning – Governmental and private sector response procedures and requirements for removal and management of detected radioactive material**

**Issue 5:      Arrangement for disposal facility or return to manufacturer programme**

46. When materials become contaminated with radioactive material, there are generally no well-established methods for remediation and proper arrangements for subsequent management of this material and for supporting the “polluter-pays” principle. Failure to support the “polluter-pays” principle may, by default, lead to punishing the finder or holder of the material in the scrap recovery/recycling sector, thereby providing a disincentive to good detection.

47. The Group of Experts was of the view that further consideration should be given to preparing an internationally recognized protocol or programme for handling materials found to be radioactively contaminated. It also supported the “polluter-pays” principle for cost recovery. In addition, in case of radiological contamination from orphan sources, protocols for the allocation of specific national funds are considered important for the safe handling of the resulting contaminated material and necessary associated cleanup activities.

**Issue 6:      Application of existing regulations for the shipment of detected radioactive material**

48. Many countries recognize and rely upon the IAEA Regulations for the Safe Transport of Radioactive Material (TS-R-1). In the event that sources, material or contaminated scrap metal have activity levels that exceed those for being exempt from the Transport Regulations (as specified in Table I of TS-R-1), the requirements of TS-R-1 should be applied and should serve as the protocol for its transportation.

49. The Group of Experts felt that, in order to facilitate and secure the transport of radioactively contaminated material, efforts should be made to ensure appropriate implementation of all existing transport regulations, both domestically and internationally, of contaminated material, including radioactive sources and contaminated scrap metal.

**Issue 7:        Mechanisms for effectively dealing with contaminated scrap metal**

50. When scrap metal or metal products are detected as containing radioactive material or being radioactively contaminated, effective methods for dealing with those materials are often lacking or may not be applied effectively. Methods, which could be established on a national or regional basis, might include (1) cleanup (decontamination), (2) melting, (3) storage, (4) disposal (for clearance material and possibly NORM), (5) collection, (6) transportation and (7) disposition (including reuse, recycle or disposal) for orphan radioactive sources. Each of these options requires specialized operations and facilities. At present, for any material found to be radioactive or for found discreet sources, the industry in general does not always seem to be able to deal adequately with the problem.

51. The Group of Experts recommended that the industry, in cooperation with competent international organizations, explore viable alternatives with a view to avoiding the release of radioactively contaminated scrap metal into commerce and to the safe management of this material.

**Contracts – Provisions to facilitate trade in scrap metal**

**Issue 8:        Strengthening of contractual requirements on the acquisition of scrap metal**

52. Strengthening contractual arrangements with processors, producers and purchasers of scrap metal products may be needed in order to improve both the domestic and international control of the production and movement of contaminated scrap material and to allocate clear responsibilities for the management of such material.

53. The Group of Experts recommended that consideration be given to strengthening contractual arrangements among all parties in the metal processing chain, without impeding commerce, with a view to ensuring that proper controls and procedures are in place for dealing with contaminated scrap metal and inadvertently produced contaminated metal products.

**Reporting - Inter-agency cooperation in monitoring, notification and response**

**Issue 9:        Standardizing and strengthening reporting and investigating procedures**

54. The results of the questionnaire and the discussions at the session showed that there are apparently deficiencies in the reporting and investigation of radioactive contamination incidents. Responsibilities are often not clear. In addition, there are ongoing efforts to adapt the IAEA International Nuclear Event Scale (INES) as a means of reporting incidents with radioactive

material such as sealed sources, and this system could possibly be extended further to cover incidents with radioactively contaminated scrap metals. However, the current limitations of INES in the context of radioactively contaminated scrap metal must be recognized.

55. The Group of Experts, therefore, recommended that efforts be undertaken to streamline the reporting protocols on and investigation procedures of incidents at metal processing facilities and to establish protocols for the collection and disposition of detected radioactive material in scrap metal

### **Experiences – Establishing an international information exchange system**

#### **Issue 10:      Establishment of a mechanism for the exchange of information on practices and lessons learned in monitoring radioactively contaminated scrap metal**

56. Inter-country sharing of information on experiences with radioactively contaminated metal and lessons-learned when dealing with such material, if accomplished frequently and openly by Governmental authorities and by industry, could prove beneficial to effectively monitor radioactively contaminated scrap metal at the national level. It could also assist in protecting against the production and dissemination of radioactively contaminated materials at the international level.

57. The Group of Experts was of the view that the establishment of an Internet-based information exchange system could address these issues and could be undertaken by an inter-governmental or non-governmental body. Such a system could also incorporate a regular newsletter.

### **EVALUATION AND RECOMMENDATIONS**

58. The Group of Experts felt that its first session had been an excellent opportunity to exchange views among Governmental and industry experts on the present state-of-art on monitoring and the management of radiation incidents related to scrap metal. The preparations for the session and the input from more than 40 countries worldwide had allowed the compilation of a large amount of up-to-date data and information that was not previously available. The Group of Experts noted that such an exercise, if undertaken periodically, could ensure a continued dialogue in this area among all parties concerned and could further international coordinated action in this field.

59. A permanent international dialogue, such as initiated through the present session of the Group of Experts, might result in the following concrete outputs that could be envisaged to considerably facilitate international control, transport and commerce of scrap metal:

- (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 on best practices.

## **REPORT**

60. The Group of Experts requested the UNECE secretariat to prepare a report of its present session.

61. With a view to ensuring that the views of all participating experts are adequately reflected, a draft report should be circulated to all participants. On the basis of their comments, the UNECE secretariat would then finalize the report of the session and ensure its translation and distribution.

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## Annex

### Summary of presentations and contributions made at the Group of Experts (Geneva, 5-7 April 2004)

#### **COUNTRY EXPERIENCES**

##### Austria

Licensing process: Each radioactive material exceeding the exemption level must have a license. License is unlimited. Multiple authorities provide the licenses within Austria. Austria does not have a centralized regulatory system. Modification of relevant regulations would require anyone acquiring radioactive material to provide input to a state-operated database and, in addition, the status of the companies will be monitored. The problems related to scrap metal are not so much related to radiation protection, but to the specification of commodities. Sellers and buyers must be responsible. Transport of radioactive material is a real radiation protection issue. This cannot be resolved easily, and it will be required that anyone introducing contaminated material into the market shall be responsible for paying for remediation and transportation of the material. It will be difficult if it involves non-Austrian entities, so the responsibility will devolve to the Austrian buyer. In case of small scrap metal dealers, the authorities will take care of the management of the sources; but this requires gate monitoring, etc.

##### Belarus

Belarus is a major producer of metal products. In addition, the country is a significant transit state for scrap and processed metal. Belarus has a database to monitor all sources. Activities are covered by national law. All exported and imported metals are monitored at some, but not all, of the border crossings (road and rail); efforts are being made to increase the border crossing monitoring coverage. Monitoring at international airports is also envisioned. Illicit trafficking is also a major issue. Incidents are reported to the IAEA. Additional efforts will be needed to monitor within the recycling loop, not just at borders. Efforts are also needed in the training area.

##### Belgium

The problem with radioactively contaminated metals is both a radiological problem and an economic problem. When a source is lost, one is confronted with a radiological emergency which is covered by the country's national legislation and procedures. The Belgium Agency for Radioactive Waste and Enriched Fissile Materials (ONDRAF/NIRAS) is responsible for all radioactive waste, and the Federal Agency for Nuclear Control (FANC) is the authorizing

authority for ionizing radiation activities. Causes of problems with radioactively contaminated metals include orphan sources, medical waste, industrial wastes, ores and lightning rods. Places where these problems can occur include scrap metal yards, recycling installations, waste storage facilities, incinerators, etc. Detection is provided by portal monitors. FANC works closely with its stakeholders to jointly develop criteria and procedures to address the problem.

Belgium follows the “polluter pays” principle, which means the scrap yard may not be liable, but rather the owner of the source that introduced it into the system. Focus is on identifying responsibilities, which can sometimes be difficult. Once detected, the radioactive material must be immobilized and properly managed. Financing of these activities is dealt with on a case-by-case basis. In the future, better traceability is needed, reinforced protection provisions for high activity sources are envisioned and financing mechanisms need to be defined. A protocol with similar aims to the Spanish protocol is being pursued.

Belgium welcomes the adoption of the EU Directive on the control of high-activity sealed radioactive sources and orphan sources. Once implemented, this instrument should provide for a significant decrease in the number of sealed sources and therefore the cases of contaminated metal scrap. Information feedback from other EU member States on the implementation results may be useful to other countries.

It is worth noting that the application of European Directives is flexible and can be implemented differently by individual States to adapt them to national specificities while ensuring the respect of its provisions. The State has an obligation to communicate to the European Community how it is enforcing the Directive. While the enlargement of the European Union will result in loss of some controls at borders, nothing would prevent a State from enforcing a radiological control, even though economic controls may be reduced. It was noted that the best detection point is at the scrap yard where personnel are best equipped to address the problem.

### **Bulgaria**

In the past five years, 109 radiation detection events have occurred in Bulgaria, 77 of which involved scrap metal. Efforts to reduce these events include strengthening the regulatory regime, adding technical equipment for monitoring radioactivity in shipments at key border, airport and industry facility locations; and the conducting of training and exercises.

### **Croatia**

Experience in Croatia is similar to that reported by other countries. Croatia has a specific problem with border controls (a small country, with a long border). Focus at this session has been on scrap metal, but Croatia’s major problem is with orphan sources. It was noted that many



“old” sources, such as old radium-dial watches, will be found in transit, and the goal should be to identify and properly control all such sources.

### **Czech Republic**

The Czech Republic has established an extensive regulatory regime, based on international standards (e.g. IAEA Safety Standards and UNECE regulatory instruments). The role of Customs services is changing as the country becomes part of the European Union. Although goods entering the Czech Republic will have been monitored by other EU countries, the Czech Republic will continue to use portal monitors at its border crossings and, in addition, within the country mobile monitoring detectors will be used in each of the eight local directorates (using hand-held instruments and spectrometers). In addition, portal monitors are used at ten processing facilities, and also three portal monitor stations at key waste incinerator and waste dumps. The State Office for Nuclear Safety (SUJB) coordinates these tasks with the Czech police, fire brigades and Custom services. Protocols exist for disposal or safe storage of seized material. In 2003, about 60 to 280 events were reported monthly, but this resulted in only three seizures. Other (83) seizures were of materials at steelworks, incinerators and waste dumps. Details on the types of alarms and seizures are available. A big incentive for steelworks to monitor radioactive sources is the potential of very significant economic loss should such material be processed resulting in the need to clean up the facility.

### **Estonia**

Monitors exist at two sites (total of five instruments), and hand-held devices are used at seven sites (total of 12 instruments). Various incidents were reviewed in detail illustrating the capabilities of the monitoring capabilities and actions taken as a result of alarms.

### **Finland**

Finland has established procedures for monitoring shipments of materials, including actions by the Finnish Customs organization. Fixed monitors have been used at all major border crossings, and sea and air ports have both hand-held and automatic systems. If an automatic monitor is triggered, then hand-held devices are used to further explore the cause of the alarm. All users of such equipment are trained. Results have been very good in monitoring transport. Most incidents have been caused by contaminated scrap metal. The number of incidents has decreased with time, as the monitoring at borders has led operators to undertake their own monitoring.

**Italy**

Italian legislation is in full agreement with the relevant European Community Directive. Procedures are in place (not prescribed by law) for both borders and facilities. There are no exemption limits; each event is investigated on a case-by-case basis. About 30 foundries exist in Italy. About 50 per cent of detected sources are coming from Italian or other EU countries. When contaminated metal is discovered, Italy used INES to notify the event; additional information on the proper application of INES to the scrap metal contamination problem would be useful. An event involving contamination of metal products with Co-60 was discussed extensively with regard as to how to handle the material and to deal with the problem of long-term exposures of people resulting from its application in facilities and equipment. When found, how to transport? Italian judges intervene and decide. Activities are determined on a case-by-case basis and do not always take account of international transport regulations.

**Kyrgyzstan**

Kyrgyzstan has had some problems with trade in scrap metal. The legal structure of the Republic covers many issues related to the issue. Parliament has passed legislation dealing with the trade in scrap metal since this has become significant. Smelting and mining facilities provide a significant economic base for the country. They have been trained by the IAEA on types of equipment for detection. The Ministry noted complaints of contamination at border crossings, but the monitoring bodies do not have adequate equipment. They are probably not identifying all of the contaminated materials that are crossing their borders. This may include shipments that are transiting the country. The radiation safety standards that were adopted during the era of the former Soviet Union are still used. Each consignment is covered by a certificate issued by the appropriate Ministry in consultation with other Ministries.

**Latvia**

Latvia has regulations that have been established in 2001 which, inter alia, require companies buying bulk materials to test the material for radioactivity. Both fixed and portable monitoring devices are used and their application depends on the volume of the materials. Training of personnel examining these cargoes is required. These responsibilities can be passed on to a contracting company. Actions in event of alarms include distinguishing between a nuisance and a real alarm; if the radiation level is greater than 30 per cent of background then the load is tested. Real alarm responses are handled by the emergency response team of the RadWaste Management Agency. If it involves sealed sources, IAEA is notified.

### **Lithuania**

Lithuania has all necessary legislative and regulatory controls in place, including control of practices, imports and exports of sources, notification of intentions, licensing of practices, maintaining a national register of sources, ensuring physical security of sources, using safe procedures for transport, detection of radioactive material on its borders, dealing with found radioactive sources, etc. Technical measures include monitoring of scrap metal yards, monitoring at borders, detailed analysis to identify sources and training of staff. One of Lithuania's biggest efforts is the monitoring at borders, airports and railway stations. International cooperation, dealing with common problems (e.g. development and implementation of training, monitoring equipment, quality assurance) and making best use of limited resources is needed at all levels.

### **Luxembourg**

A significant quantity of scrap metal is used in Luxembourg, about 2 million tons per year. Controls are implemented at the entrance to the companies, although this is done on a voluntary basis and only part of the companies are equipped with monitoring devices. Sources of materials can arrive by different modes of transport (e.g., road, barge). The training of plant staff usually occurs abroad. In the event of an alarm, the country has established protocols to follow. Each consignment for the steel industry is monitored for gammas. If detected, it is returned to the supplier if known, otherwise the recipient is responsible. Since 1994, there have been about 100 alarms per year, 80 per cent of which are due to NORM. Recently, the number has decreased to about 46 alarms; this decrease in rate of alarms is primarily attributed to attention being paid by the shipper to the need to monitor for radiological contamination before shipping. Customs focus is, to a great extent, at the airports where special sites are provided for storage of radioactive material.

### **Romania**

Romania has established a regulatory infrastructure for radiological safety, including exclusion levels that are close to the draft IAEA Safety Guide DS161. Transport regulations generally follow the guidelines in IAEA TS-R-1, except that authorization requirements are more stringent than specified by IAEA. Once Romania joins the European Union (EU), it will bring its regulations in line with EU requirements. Multiple events were outlined, including identification of an Americium smoke detector in the load of one truck, of contaminated aluminium waste – both events were resolved satisfactorily. A number of low-activity sources have been detected and all problems were resolved without any radiological hazard. There are an increasing number of orphan sources found in former industrial installations; many arising from demolition sites, and appropriate actions are being taken to ensure safety and security of these sources. With the enhanced regulatory regime that has been established, actions are being taken at scrap yards to

apply these new requirements; the situation is improving. Despite this progress, there is definitely a need to strengthen the border monitoring capabilities.

### **Slovakia**

The current regulatory infrastructure for Slovakia and their recent experience in the area of contaminated metal and found sources was reviewed. Discussion focused around the use of IAEA's International Nuclear Event Scale (INES) for monitoring events involving contaminated radioactive material and whether it was applicable or adequate. There are proposals for expanding the INES beyond its current scope. Many of the contamination incidents were not identified at the borders, but in the factories. Discussion with adjoining States on better control of borders is under way.

### **Switzerland**

Any transport of radioactive material is subject to authorization by regulatory bodies, and cross-border transport is monitored by Customs authorities. Radiological protection is based on national legislation, but is implemented at the level of the 26 cantons. Controls for scrap metal are carried out by the foundries. Switzerland is not a member of the EU, but surrounded by EU member States. About 10,000 trucks cross the country each day. Switzerland does not have detection stations at the borders, but has equipped control personnel with gamma detectors to assist in protecting personnel and control the import of radioactive material. Switzerland has export of scrap to some countries, and these have been monitored with more sensitive detectors. The solution to involve the entire recycle chain is very important; the foundries themselves should be engaged in detection. Switzerland would endorse establishing an international voluntary protocol in this respect.

## **REGIONAL AND INTERNATIONAL EXPERIENCES**

### **Bureau of International Recycling (BIR)**

Mr. A. Rodriguez-Martinez of the BIR discussed experiences with contaminated scrap and the Spanish protocol. A video on radioactive material contamination in the metal recycle industry was presented. Source material had entered the shredded metal stream at a facility, which resulted in its contamination and in contamination of the shredder and in extensive operational and financial consequences to remedy the situation. Such events should lead to continuous improvements of the system with a view to avoiding such events. The "Spanish Protocol" resulted from an event that occurred in Spain in 1998, which caused significant physical, administrative and perceptual consequences. The Spanish Government's goal was to establish a dialogue between all stakeholders involved. The protocol was agreed by various Government

authorities, the steel and recycling industry and labour union organizations. This was broadened to include non-ferrous metals. The protocol is a voluntary, cooperative and balanced effort in which everyone received and gave something, and every signatory commits to certain actions. Its goal is to promote common knowledge and agreed solutions, utilizing lessons-learned and sharing of costs. Experience shows that, in the application of the protocol since its inception:

- approximately 1000 radioactive materials have been withdrawn, including 83 sources (37 small and 46 relevant sources);
- 74 facilities are in the protocol representing 14 million tons per year; and
- the number of detected sources grows with time.

Mr. Bartley of the BIR noted that the structure of the scrap metal industry is well described in the so-called “Blue Book” of the UNECE, which has been endorsed by UNECE, IAEA and the European Commission. The scrap metal industry is pyramidal in structure. At the point of the pyramid are the scrap suppliers working down nationally and internationally to the metal melting facilities - steel works and non-ferrous metal smelters and refiners. The recycling industry's priority is to protect its workers, facilities, equipment, and its customers from radioactive contamination of the recyclable materials. Whilst metal melting facilities were the first in the industry to invest in radiation detection equipment, closely followed by their immediate scrap suppliers, the video shown to the Group of Experts highlighted that scrap processors are as at much risk as metal smelting and refining facilities. There are some 900 major scrap processing operators using shredders worldwide. The pyramidal structure of the scrap industry indicates that there are 'choke-points' in the material supply chain where detection may be carried out most efficiently, in particular before the mechanical processing or melting and refining steps.

A chart was presented that assumes scrap arisings are similar in origin and mix, and is based on 2001 data of the International Iron and Steel Institute. Certain deductions were made from these data taking into consideration the experience gained from surveying some 60 million tonnes of scrap metal arising from mostly industrialized countries. The extrapolation is from some 60 million tonnes to 373 million tonnes. The chart illustrated that for domestic scrap consumption in all countries, some 7000 "sources and scrap pieces with 'actionable' radioactive contamination" may be expected to be found. Furthermore, it showed that for scrap materials imported and exported, some 2000 "sources and scrap pieces with 'actionable' radioactive contamination" may be expected to be found.

Three conclusions were drawn from this paper exercise:

1. Domestic detection systems will lead to more "sources and scrap pieces with 'actionable' radioactive contamination" than border crossing detectors.
2. An increase in detection systems at the domestic/national level will lead to a reduction in detections with respect to exports at borders.
3. The extrapolation from the original data supports that more detection systems should lead to more detections in total.

This increase in detections in scrap metal can be expected to remain for many years, as this is a function of the age of the scrap metal being recovered and recycled, some up to 40 years' old or more. The increase in detections is, therefore, not expected to be yet affected by current activities to control high activity sealed sources. BIR supports all activities that will reduce the occurrence of radioactive contamination in the metal scrap cycle. BIR recognizes the different country-specific business practices, especially differences in modes of transport. These practical differences require national solutions. However, BIR strongly promotes international and regional regulatory and voluntary approaches that take account of the needs of the recycling industries, such as:

- the internationally supported recommendations and conclusions in the UNECE "Report on the Improvement of the Management of Radiation Protection Aspects in the Recycling of Metal Scrap";
- the European Council Directive 2003/122/Euratom of 22 December 2003 on the control of high-activity sealed radioactive sources and orphan sources;
- the European Council Resolution on the establishment of national systems for surveillance and control of the presence of radioactive materials in the recycling of metallic materials in the member States;
- the promotion of amnesties for those collecting orphan sources, supported by cost free disposal of the sources; and
- the follow-up activities by this Group of Experts.

BIR warned against the use by regulators of the "finder pays" principle. The adoption of such a principle is a clear economic incentive to not find anything! Rather, BIR supports the "polluter pays" principle, and also advocates that since the scrap metal industry does not want radioactively contaminated material, the scrap industry cannot be the polluter. The scrap industry is the most important part of the solution to protect society by detecting (prior to removal and proper disposal) radioactive material that could otherwise be harmful to human health and the environment.

**International Atomic Energy Agency (IAEA)**

The current status of the development of international standards on the release of contaminated material and sited from regulatory control was reviewed by Ms. B. Batandjieva (IAEA). The applicability of various IAEA Safety Standards to the issue of radioactively contaminated metals and detection of such events were reviewed. The basic principles of dealing with practices and interventions were addressed.

The status of the document on clearance of radioactive material (draft DS161) which deals with the application of the concepts of exclusion, exemption and clearance (as established in the Basic Safety Standards, Safety Series No. 115) has recently been approved by the IAEA's Waste Safety Standards Committee (WASSC) and will go before the IAEA's Commission on Safety Standards (CSS) later this year. Criteria for release of materials contaminated with natural radionuclides from regulatory control are based on the exclusion concept, using levels established by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), where the activity concentration levels for materials containing artificial radionuclides are specified in the guide for each radionuclide. National and international trade in commodities containing radionuclides with activity concentrations below the values of activity concentration suggested in the draft document should not be subject to regulatory control for the purposes of radiation protection.

Also, IAEA is working on a guide dealing with the release of sites from regulatory control (DS332).

Measures to prevent accidental situations can be focused in two areas: strengthening monitoring mechanisms and control of disused sealed radioactive sources. The IAEA is working to develop guidance for both of these topics. In addition, significant focus has been on the control of radioactive sources, which includes the Code of Conduct on the Safety and Security of Radioactive Sources. To date, 28 member States have signed the Code of Conduct. Guidance on its application is under preparation.

There is also a tripartite agreement between the United States of America, the Russian Federation and the IAEA to assist countries of the former Soviet Union in dealing with sources. This tripartite agreement is being expanded with a view to its becoming a global system.

### **United Nations Economic Commission for Europe (UNECE)**

The regulatory framework for the transport of radioactive material was reviewed by Ms. S. Mansion (UNECE) (Informal Document No. 7 (2004)). It was noted that the IAEA Regulations for the Safe Transport of Radioactive Material (TS-R-1) are recommendatory except for IAEA activities. These requirements have become legally binding through the work of other United Nations bodies, including the UNECE, by means of treaties covering transport by various modes (IMO's IMDG Code for maritime transport, ICAO' Technical Instructions for air transport, UNECE's ADR for road transport and ADN for inland water transport in Europe, RID for rail transport in Europe, etc.). Often countries outside of Europe abide by the ADR and RID requirements as a matter of convenience. As a result, any transport of contaminated scrap metal is to be undertaken on the basis of these regulatory requirements that should ensure safety of persons and the environment during such transport activities. It was noted that, when a contaminated consignment is identified, the relevant competent authority will need to be contacted for authorization to transport the contaminated consignment to its ultimate destination. Systematic monitoring, especially early in the process chain, will assist in alleviating problems associated with the transport of these materials.

### **World Customs Organization (WCO)**

The activities of the World Customs Organization regarding the transport of contaminated materials were discussed by Mr. Olivieri (WCO) (Informal Document No. 8 (2004)). Illicit trafficking of radioactive and other dangerous goods has been a concern of WCO for a number of years, and focus is on stopping such activities at borders. Thus, Customs must be included in national and international deliberations on controlling transport of contaminated scrap metal. In this area, focus has been on awareness raising, training, information exchange and database development as well as on international cooperation.

In 1998 IAEA and WCO have established cooperation with a Memorandum of Understanding. A training course for Customs officers is being developed in conjunction with IAEA. The WCO database includes a specific module for nuclear material. Five incidents are currently reported therein relating to the transit of radioactive material. Detected attempts to transit with radioactive material are unfortunately not always reported while this information may have been captured by the relevant IAEA database.

In June 2003 the Johannesburg Convention was approved, which enhances control of borders, including provisions for dangerous goods. Spontaneous assistance and notification for arrival of such materials are both provided for in the Convention. The WCO is conscious of the concerns over "dirty bombs" and continues to address means for reducing risks in this area.



## **COMPANY-SPECIFIC COMMENTS**

Mr. van der Reijden (consultant) noted that the scrap metal industry is confronted with a growing problem, the unwanted presence of radioactive material in scrap. A scrap load which is measured at one point for Gamma radiation and shows zero radiation may not necessarily be 100 per cent free of radioactive material. Therefore, many in the industry are measuring the same load several times in different configurations, increasing the chance of detecting radiating materials. Clients of the industry, the smelters, are demanding that there be no detectable radiation.

He noted that his company has succeeded in sending 250,000 metric tonnes of stainless steel scrap in 12 months without one single radiating object being detected by the client. However, they did receive objects with radioactivity levels below free release levels which triggered their detection systems. In these cases, it is hoped that the owners of this radioactive contaminated material can be encouraged not to release it because it is of no value to their portion of the industry; in fact it would result in a nearly unbearable extra burden. Mr. van der Reijden also pointed out that the “return to sender” approach is virtually impossible to apply in practice and can take years to accomplish.

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