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TOPICAL SESSIONS
Reports of Co-Chairmen for Highlight Sessions

T-8: Managing Radiation Protection Problems with "Orphan" Sources and Radioactivity in Scrap Metals

Monday, 15 May 2000

Chair and Keynote: G. Dicus Co-Chair: K. Duftschmid

Introduction

The problem of radioactive sources out of administrative control - nowadays often called "orphan sources" - showing up in the public domain in an uncontrolled manner, has become an international challenge and an increasingly important part of radiation safety. Serious accidents with such sources, such as in Goiania, Istanbul or Thailand - just to name a few dramatic examples - caused severe, partly lethal exposures to individuals.

Since the early 1980s numerous incidents have been reported where radioactive sources have been found in scrap metal. US databases contain some 2,500 reports of such incidents, which led to some 60 cases of accidental meltings of radioactive sources in steel, with increasing frequency in the last years. In Europe, in the *Acerinox* incident in Spain in 1998, melting of a caesium-137 source in an electric furnace of a stainless steel factory caused atmospheric contamination in France and in Italy of up to 2 mBq m^{-3}, about 1,000 times that of natural background - and triggered an international alert of the ECURIE system. Although the consequences for human health fortunately remained trivial in this case, the economic implications of this single melt-down were dramatic: over US$ 25 million were spent for clean-up, factory standstill and waste storage. This even caused a significant long-term impact on the *Acerinox* shares at the stock market.

Other problems with orphan sources often come from old radium sources used for medical purpose and trashed later, or military sources, earlier used for different applications and left in the field, such as in Georgia.

This topical session dealt with the entire problem of orphan sources and with detection of such sources at scrap yards, steel plants, and at borders.

The keynote, presented by Ms. Greta Dicus, Commissioner of the US Nuclear Regulatory Commission, entitled "An Overview of Managing the US Radiation Protection Program Concerning Generally-Licensed Sources and Devices". In the US today about 600,000 devices containing varying amounts of radioactive material are in use. Because of the relatively small radiation risk involved most of these devices have been generally licensed, which according to US legislation, does not require routine inspections and contacts between the licensees and the competent regulatory authorities. This caused a severe problem with many sources lost, stolen or unaccounted for due to lack of supervision. As a consequence,

approximately 200 sources or devices are reported missing each year. Some of these have been accidentally melted in steel mills, causing considerable contamination and excessive costs for clean-up procedures and loss of product. This problem is increasing with time. Consequently, the NRC is presently discussing proposed regulations for general licensees which include obligatory registration and improved accountability of these devices.

Ms. Dicus also presented a historical overview prepared by ***Mr. J. Lubenau (USA)*** on orphan sources in scrap metals. Part of the problem results form the extensive use of radium in the 1940s for medical applications. Most users of radium in the US were not subjected to any regulatory supervision until the 1960s, when the use of such sources was discontinued. Many such sources ended up in scrap metal, some radium seeds were sold as scrap gold and for jewelry made out of such material. Lost, stolen and abandoned sources have been found in the public domain, some radium sources even in the pavement of a sidewalk. Thus, US experience with radium provided some early insights into the problem of loss and recovery of abandoned sources.

Ms. S. Riscia (Italy) presented "The Italian Experience and Policy on Radioactive Contamination of Metal Scrap" and referred in particular to a contamination of the river Po south of Milano with caesium-137 that occurred in 1990. Investigations carried out pointed to some foundries located in the area that had accidentally melted caesium sources. A few years after this happening the Italian Ministry of Health was informed that contaminated scrap materials were circulating in Europe. Following these two occurrences an extensive plan was developed in Italy to monitor imported scrap metal for radioactive contamination. The presentation discussed the Italian experience made in elaborating regulations, set up experimental measurement procedures and protocols. It was observed that these measures taken did change the attitude of the industry perceptibly over the past years.

Mr. Lui (China) reported on a study undertaken to establish a national information database for radiation sources in China. Preliminary surveys indicate that 30,000-50,000 radioactive sources are presently in use in his country. Several severe incidents, some of which even fatal, happened as a result of loss of control of radioactive sources. Therefore, the Government of China has paid great attention to the further development of radiation safety and safety in the nuclear technology utilization. For this purpose, a database of radiation safety management and radiation sources is in preparation.

Mr. Beck (Austria) introduced the joint programme of the Austrian Government and the IAEA for the detection of scrap contamination and illicit trafficking at borders. In an extensive laboratory and field study conducted by the Austrian Research Center Seibersdorf radiation monitoring systems for borders were tested and further developed in co-operation with 21 manufacturers from 15 countries. The results of this study led to the definition of accepted minimum requirements which will be used as a basis for International Standards issued by ISO/IEC.