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## **THE UNITED STATES INITIATIVE FOR INTERNATIONAL RADIOACTIVE SOURCE MANAGEMENT (ISRM)**

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## 1. BACKGROUND

Loss of control of radioactive sealed sources can lead to radiation injuries and death (1)<sup>4</sup>. Radioactively contaminated materials may have become contaminated as a consequence of the deliberate or inadvertent mishandling of radioactive sources, or by having been part of a nuclear facility, such as a power plant or nuclear submarine (2,3). Regardless of the original source of the contamination, the resulting contamination can be passed along in materials, such as carbon steel, or in the finished products that are made from that material, such as automobiles or structural steel.

EPA has concluded that only a very small amount of material is potentially available for recycling from licensed nuclear facilities (0.1% of the annual US recycled metal use). This material is carefully monitored, and poses a very low, if any risk. However, uncontrolled (orphaned) radioactive sources can pose a much higher risk, since the radiation is concentrated, and if the shielding is removed, the radiation exposure can be harmful or fatal, as noted above. Thus, EPA made as its first priority a program to bring these orphaned radioactive sources under control, since they can be a source of risk to the health of humans, and can be melted into and contaminate metals.

If land is radioactively contaminated, responsible officials can protect the public from harm by restricting access to the land in a variety of ways. In addition, an existing and permanent system of land records can provide notice of past use of the site to potential buyers. Radioactively contaminated material, however, quickly can be lost in general commerce, with no indication of its radioactivity. For example, given the international nature of metals trading, contaminated metal from any part of the world can be shipped anywhere, and transformed into products which completely conceal its origin. Ironically, this happened in the US in 1997 when protective lead aprons for nuclear medicine workers were made from lead which had slight radioactive contamination (4). To help solve this problem, the US is offering to expand its national program for controlling radioactive sources into a broader and world-wide endeavor, to help reduce the number of sources that could end up contaminating metals.

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<sup>4</sup>Numbers in parentheses refer to references at the end of the paper.

In most of the cases, the levels of contamination in the material or finished products have been low enough to not cause acute radiation effects. However, increasing numbers of instances of lost or abandoned radioactive sealed sources are being reported, much to the concern of everyone involved. Unlike radioactively contaminated material, the radioactivity in the sealed source may be in a high enough concentration to cause immediate physical harm. A recent incident in Turkey with a cobalt source that resulted in serious injury highlights the need for increased vigilance on the part of those involved with recycling metals to recognize radioactive sources that have slipped from proper regulatory control (5).

## **2. ORPHANED SOURCES PROGRAMS IN THE US**

The US Environmental Protection Agency (EPA) has funded a cooperative orphaned source initiative with the CRCPD, to bring under control unwanted sources and thus reduce the potential for unnecessary exposure to the public, workers and the environment. That program includes the cooperation of the other government agencies and the steel and recycling industries. The initiation of that program was reported in September, 1998 in the paper *The New Orphaned Radioactive Sources Program in the United States*, and is available on the EPA Internet site (<http://www.epa.gov/radiation/cleanmetals>) (6).

Since the paper was presented, the CRCPD has made additional progress. The CRCPD web site ([www.crcpd.org](http://www.crcpd.org)) includes extensive information on the identification and disposal of unwanted radioactive material, and has a toll free number to call for help. By working with the holders of the material and waste brokers, CRCPD has been able to simplify and reduce the cost of disposition of the material. The CRCPD is continuing to work with the government agencies to further develop databases on sealed radioactive sources and to produce and distribute information on the identification and disposition of radioactive material. The databases will be used for tracking lost, stolen or abandoned sources as well as posting alerts on sources that have been found out of control.

## **3. NUCLEAR REGULATORY COMMISSION PROGRAM**

The Nuclear Regulatory Commission (NRC) is involved in several actions designed to

reduce health threats and the potential for radioactive contamination of metal in the US. One action is to make changes in the programs dealing with radioactive sources to seek improvement of control and accountability of radioactive sources by licensees. For instance, in the US certain categories of licensees (called general licensees) may use devices containing radioactive sources with minimal oversight or contact by regulators because of the robust safety design of these devices. However, NRC also recognizes that some contact with regulators is needed, and thus is developing a periodic registration program for general licensees. The NRC intends for these efforts to result in a rulemaking. Further information is included in the Staff Requirements Memorandum, SECY-98-199 (6).

A parallel effort by the NRC involves the development of a dose-based regulation for clearance (release from regulatory control) of materials and equipment from NRC -licensed facilities. The NRC plans an Enhanced Participatory Rulemaking for this effort, which will include extensive input by the public. The NRC Commissioners provide program direction to the staff through Staff Requirements Memos, called SECY papers. SECY-98-028 indicates that the clearance standard should not be a detectability standard, and should codify clearance levels above background for unrestricted use that are adequately protective of the public health (7). The rule is intended to apply to all metals, equipment, and materials, including soil. Public meetings for the clearance standard development are scheduled for fall of 1999. Actions which involve developing regulations normally take several years to complete.

#### **4. DEPARTMENT OF ENERGY PROGRAM**

The Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy, which is responsible for programs to reduce energy use in the US, promotes recycling of metals as one means of achieving this goal. DOE is educating the metals industries about radiation, so that the industry might be more willing to recycle some materials from the DOE complex, and in addition, be better able to deal with orphaned radiation sources that might accidentally turn up in scrap metal.

Unfortunately, there is often a large gap between the level of knowledge of radiation possessed by the physicist who deals with radiation regularly, and the steel and scrap industry who must deal with it as a random contaminant in their product. The DOE designed a training

course to help bridge that gap. The course, aimed at the steel industry, was presented first in March, 1999. Other organizations, such as the Institute of Scrap Recycling Industries (ISRI), have developed and present similar courses to their members.

One of the problems involved with proper disposition of sources is the difficulty with detection. Certain types of sources, or sources which are heavily shielded can be difficult to detect with current equipment, especially when surveying fully loaded moving trucks or rail cars. The DOE has launched several programs to improve the detection of radioisotopes in scrap metal through the development of advanced monitoring instruments. The goal of the programs is to substantially improve the ability of steel mills and their suppliers to detect hidden radioisotope sources in steel scrap with minimum false alarms. DOE has taken several approaches, including research programs at national laboratories and a call for proposals for exploratory research in the detection of hidden radioisotope sources that pose a threat to health and the environment. Further information is available on the Internet (<http://hgighub.lbl.gov/esd>).

Some sources require special handling. The Los Alamos National Laboratory has proposed a program in which they would accept neutron sources, dismantle them, and recover the radioactive material. More information is available on the DOE web site (<http://www.nepa.eh.doe.gov/ea/ea1059>).

## **5. Department of State (DOS) International Radioactive Source Management Initiative**

In order to better coordinate the efforts in the US, and work with the international community, the U. S. Department of State (DOS) is beginning a program called the International Radioactive Source Management Initiative. The goal of this initiative is to coordinate the various US programs to support work being done by the IAEA to deal with orphaned sources. The Department of State, through a number of Federal agencies such as EPA, NRC, DOE, and with the assistance of US industry, will endeavor to provide support to the international community, particularly through IAEA, to include expertise and program knowledge to assist in the tracking, management, identification, and disposition of Alost sources@ entering nation states and targeted industries.

The DOS has formed partnerships with the various US groups, both government and private industry, developed a steering committee, and is organizing subcommittees. Each of these subcommittees is collecting information on all relevant work being done in the US and elsewhere, and identifying the areas which could benefit from more research and development, such as detection.

## **6. International Atomic Energy Agency Efforts**

The projects described above concentrate primarily on issues related to discrete sources, and there are several IAEA efforts that deal with this problem. These efforts have been discussed in other venues and elsewhere in this workshop.

Despite the controls in place for materials used in licensed facilities, and licensing and handling requirements for sealed sources, the possibility still remains that some radioactivity could end up in metal. An international standard for materials would serve as a final screen for radioactivity in materials. The IAEA has produced IAEA-TECDOC- 855, Clearance levels for radionuclides in solid materials (8). Since its publication, new studies have been done in several countries, and as a result, IAEA plans to revise the document. The first meeting to review the new data was held in Luxembourg in September, 1998, and the second in Vienna, Austria in April, 1999. IAEA hopes to complete the revision within two years.

## **7. Conclusion**

Radioactive sources which escape from regulatory control (become orphaned) and are handled improperly can cause injury or death as well as causing contamination of metals used in commerce world-wide. Programs in place and in progress in the US will help to reduce the potential for problems that result when sources to be handled improperly. But metals and finished products made from metals are traded internationally, and radioactive contamination can be spread widely. It is important to develop and implement a world-wide program that will help stem the problem with orphaned sources and contaminated materials.

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