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DOCKETED USNRC

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OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

Merri Horn
U.S. Nuclear Regulatory Commission
Attn: Rulemakings and Adjudications Staff
11555 Rockville Pike
Rockville, MD 20852

**Re: Proposed Rule for National Source Tracking of Sealed Sources (70 Fed. Reg. 43646 (July 28, 2005))**

Dear Ms. Horn:

On behalf of the Metals Industry Recycling Coalition ("MIRC"), we are pleased to provide you with these comments on the U.S. Nuclear Regulatory Commission's Proposed Rule for National Source Tracking of Sealed Sources. 70 Fed. Reg. 43646 (July 28, 2005).[1]

MIRC supports the Commission's proposed rule to implement a National Source Tracking System to monitor and provide increased oversight of certain sealed sources. However, consistent with the General Accounting Office's recommendations,[2] we are urging the NRC to extend the tracking program to include Category 3 sealed sources.

## I. Background

MIRC members comprise a major sector of the nation's economy. Companies that are members of the associations that comprise MIRC consume scrap metal to make new metal products. These companies are the largest recyclers by volume in the country.

Each year steel mills operating electric arc and basic oxygen furnaces recycle more than 75 million tons of scrap into new steel products. Steel products contain, on average, 66 percent recycled content. These products have wide ranging applications including many consumer products such as food and beverage containers, automobiles, homes and even surgical implants.

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[1] MIRC is an *ad hoc* coalition of metals industry trade associations and companies comprised of the American Iron and Steel Institute ("AISI"), the Copper and Brass Fabricators Council ("CBFC"), Inco, Inc. ("Inco"), the Nickel Institute ("NI"), the Steel Manufacturers Association ("SMA"), and the Specialty Steel Industry of North America ("SSINA").

[2] *Nuclear Security: DOE Needs Better Information to Guide its Expanded Recovery of Sealed Radiological Sources,* GAO-050967 (Sept. 2005)

Template = SECY-067

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Copper and brass scrap is also widely recycled into a variety of products that go into consumer use. In 1999, the copper industry recycled approximately 1,610,000 tons of scrap into new products. Copper and brass products contain, on average, 50 percent recycled content.

Additionally, nickel is a highly valued metal that is recycled at an exceptionally high rate. Increasingly, nickel is not only recycled as scrap, but is recovered from waste materials such as used batteries and electric arc furnace ("EAF") pollution control dust. In fact, upwards of 95 percent of the nickel content in stainless steelmaking EAF dust and other wastes can be recovered.

The recycling of scrap metal has become a sophisticated, technology-based industry, involving highly-controlled scrap selection and blending processes necessary to meet detailed customer specifications, including specifications and certification regarding radioactivity. Recycling generates significant environmental benefits. MIRC members recycle material that otherwise would be discarded in a landfill or improperly disposed. Such recycling conserves significant amounts of energy by using a feedstock of scrap instead of virgin ores. The energy savings from the steel minimill industry alone conserves enough energy each year to supply power to the city of Los Angeles for eight years.

Over the past decade, an industry-wide problem has emerged involving the amount of scrap metal contaminated with radioactive material. Some of this contamination in scrap is the result of background radiation absorbed by steel products, such as oil and gas transmission pipes. A more dangerous and potentially life-threatening form of contamination, however, is the presence of shielded radioactive sources – typically Cs-137 or Co-60 in the scrap supply.

## II. <u>Concerns Over Radioactive Sources in the Scrap Feedstock</u>

According to the General Accounting Office ("GAO"), there are approximately 40,000 general licensees authorized to possess approximately 600,000 shielded radioactive sources in the United States alone.[3] A large percentage of these sources are improperly managed, abandoned or at high risk of being abandoned. In fiscal year 2004, the Department of Energy ("DOE") recovered 443 mostly cesium-137 sources from a single bankrupt firm in Pennsylvania.[4] Unfortunately, other than this notable success, there has been very little effort to track these devices to ensure that they are properly managed and disposed.

DOE's recovery efforts, though intended originally to focus on DOE's own sources, have expanded in scope beyond solely recovering DOE sources to include sources in private

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[3] *Nuclear Nonproliferation: DOE Action Needed to Ensure the Continued Recovery of Unwanted Sealed Radioactive Sources.* GAO-03-483 (Apr. 2003).

[4] *Nuclear Security: DOE Needs Better Information to Guide its Expanded Recovery of Sealed Radiological Sources,* GAO-050967 p.6 (Sept. 2005).

ownership. However, DOE's efforts have been hindered by a woeful lack of information about sources that are not in its possession.[5] As a result of the lack of an effective sealed source tracking system, outdated sealed sources are too often discarded and channeled into the recycling stream for recovery of their metal components.

Radioactive sources in scrap feedstock pose a number of serious problems for the metal recycling industries. A radioactive source that is inadvertently melted in a furnace has the potential to lead to dangerous levels of radiation exposure for mill workers and even the surrounding community. When a radioactive source is melted, depending on the isotope involved, it may contaminate slag and slag handling equipment, the finished metal product, the furnace, baghouse, and duct systems and the surrounding facility. In one instance in Florida, a teletherapy unit was discovered prior to melting that was rated at 5,000 curies of cobalt-60. Had the unit contained its rated quantity of cobalt-60 and been melted, it would have subjected the melt shop workers and the surrounding community to a potentially lethal dose of radiation. Cobalt-60 was, in fact, melted at a Mexican facility in 1983.[6] The workers and community suffered serious radiation exposure and, unfortunately, the steel was allowed to enter the United States to be used in homes.[7]

In addition to exposure concerns, when a source is melted, each component of the system must be completely cleaned and many mill components must be discarded. Contaminated items must be disposed of in costly low-level radioactive waste disposal facilities. The mill must remain closed while the remediation and replacement takes place. Often this can take several weeks to several months. The combined cost of the remediation, disposal and closure following an inadvertent melt of a radioactive source typically requires a remediation program that can cost $12-$24 million.

Since 1980, there have been 84 known melts of significantly radioactive sources by the metals recycling industry internationally.[8] In each case, workers were placed at unnecessary risk and facilities were saddled with excessive remediation and disposal costs, with many being forced to close for extended periods of time. One of these 84 inadvertent melts occurred in Florida in 2001. This facility melted a significant source containing Cesium-137. Fortunately, no employees were subjected to any dangerous exposures. However, the mill was forced to close for 27 days and incurred several million dollars in remediation and disposal costs.

The downstream customers of MIRC member companies are also extremely concerned about radioactivity in recycled metal products. The metals industry has worked diligently for

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[5] *Id.* at 31.

[6] *Id.* at 1.

[7] *Id.* at 1.

[8] *Meltings of Radioactive Materials*, Yusko, J.G., Pennsylvania Department of Environmental Protection (2004) (attached)

many years to build consumer confidence in the safety and utility of products made from recycled metal. However, the public, often fueled by sensationalized news reports, remains concerned about the safety of recycled metals in products that they use. The mere perception that metal products are unsafe because they are made from potentially radioactive scrap metal may lead to massive customer de-selection. Notwithstanding government assurances that the scrap is safe or that low levels of radiation are safe, consumers simply do not want any added radiation in their homes, automobiles or workplaces. Rightly or wrongly, consumer confidence would be severely undermined if even small amounts of low-level radioactive sources were found in the scrap feedstock.

To preserve consumer confidence and the safe and continued operation of their mills, the metals recycling companies have implemented use of sophisticated radiological detection devices to screen scrap shipments before they enter a facility. Many facilities also retest their scrap feedstock before it enters the furnace. However, even the most advanced detection systems cannot be 100 percent effective in locating a single shielded source within a truckload or rail car of scrap. Moreover, if the shield on the source remains fully intact throughout the scrapping process, the source may not be detectable at all.

In order to screen most effectively the incoming scrap, metals recycling companies calibrate their detection equipment to be as sensitive as possible; oftentimes at, or slightly, above, background levels. Consequently, low-level sources, with activity levels that may not pose exposure concerns, will trip the sensors on a regular basis. A conservative estimate, based on conversations with MIRC member companies, indicates that a typical mill may sound between 20-50 false positives – *per month*. Each of these requires a response. MIRC's concern is that mills may be forced to decrease the sensitivity of their equipment so that the number of false positive alerts becomes more manageable and fewer process interruptions occur. However, in "turning up the dial" on their radiation detection equipment, mills are exposed to a greater risk of melting a high-level source. The more sources that are unaccounted for, the greater this risk.

## III. <u>MIRC's Efforts to Eliminate Radioactive Sources From the Scrap Feedstock</u>

MIRC has worked closely with the NRC, DOE, and EPA to develop mechanisms and regulatory policies to exclude radioactive materials from the scrap stream. We have worked with NRC to develop a registration program for certain generally licensed sources and for the imposition of registration fees. We strongly supported NRC's efforts to increase the base civil penalties for the loss, abandonment, or improper transfer or disposal of sealed sources and devices. We have also worked closely with NRC to seek a safe and cost-effective means of disposing of waste following the inadvertent melting of a sealed source.

Most recently, MIRC has worked with NRC to prevent the release of slightly radioactive scrap metal into the recycling stream and we believe that the proposal developed by the NRC staff went a long way toward achieving that objective.

The staff proposal would have established a 1 millirem ("mrem") annual dose limit for "releasing" solid material that originated in radioactively restricted and/or impacted areas of a facility into a limited number of pathways. Of specific importance to the metals industry, the staff proposal would not have allowed for the preapproved release of metals for recycling. Instead, on an individual case-specific basis, a licensee seeking to release scrap metal for recycling would have been required to apply to the NRC for approval and proposed procedures for such release. As a result, radioactive scrap metal would only be released for recycling on a case-by-case basis under the oversight of the NRC. Additionally, materials exceeding the 1 mrem annual dose limit would be entirely segregated from the scrap stream.

MIRC was disappointed by the June 2, 2005 announcement that the Commission had voted to disapprove publication of the staff's proposal regarding radiological criteria for controlling the disposition of solid materials, and we hope it can be resurrected in the future. Meanwhile, the integrity of the metals industry's scrap feedstock remains at risk. The risk is compounded by the increased dismantling of aging Cold War-era facilities containing materials and equipment with residual levels of radioactivity. Additionally, as the value of scrap metal continues to rise, scrap metal dealers become less discriminating about the sources of scrap and, instead, place a premium on gathering as much scrap as they can. Moreover, the stressed capacity of disposal facilities for sealed sources and the high cost of disposal has lead to increased improper storage and mismanagement of sealed sources that, in turn, increases the likelihood of improper disposal or recycling.[9] All of these considerations add to the risk faced by metals recycling companies.

## IV. Issues Concerning the Proposed Rule

NRC's current proposed rule would make great strides toward assisting the metals industry in eliminating radioactive sources from its scrap feedstock because it provides better oversight, management and stewardship of certain sealed sources. Sealed sources subject to the proposed rule that are nationally tracked (and subject to increased NRC oversight) are much less likely to be managed in such a way as to lead to their inadvertent or intentional disposal in the waste or recycling streams. However, NRC is only proposing to extend the tracking and management requirements to Category 1 and Category 2 sealed sources. Category 3 sources would not be regulated under the proposed rule.

We understand that NRC had proposed to limit the rule to Category 1 and Category 2 sources because those sources have the greatest potential to be used by terrorists in a radiological dispersal device or radiological exposure device. However, in failing to address Category 3 sources, NRC is neglecting to provide critical oversight of a significant category of sealed sources – some potentially quite dangerous – and most likely to end up in the scrap metal stream.

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9 *Id.* at 6.

Category 3 sources are significantly more likely to be improperly disposed of or mismanaged because they are much less expensive and much more numerous than Category 1 or Category 2 sources. As of June 7, 2005, DOE recovered 10,806 sources as part of its sealed source recovery program.[10] According to the GAO, 98.5 percent of these sources were below Category 2.[11]

In the preamble to the proposed rule, NRC identifies Category 3 sources as those sources that have 1/10 the radioactivity of Category 2 sources. (70 Fed. Reg. at 43649.) However, this statement is misleading. Category 3 sources are sources with radioactivity levels that *start* at 1/10 the radioactivity of Category 2 sources, but also include sources that have radioactivity levels right up to the lower threshold of Category 2 sources. Accordingly, the difference between a Category 2 source and a Category 3 source can be negligible. Under this proposed rule, Category 2 sources will be tracked and monitored, while Category 3 sources, which may have radioactivity levels nearly equal to Category 2 sources, will remain unchecked and unmonitored. Moreover, GAO, DOE and the IAEA have all recognized that the accumulation of Category 3 sources can pose a threat equal to or greater than the threat posed by a Category 2 source.[12] "For example, storing 15 well-logging devices in close proximity (each well-logging device typically contains a 2-curie cesium-137 source, which is a Category 3 source) would be equivalent to having a 30-curie, cesium-137 source in this location, which is an IAEA Category 2 source."[13]

Moreover, it is not uncommon for several Category 3 sources to be stored in close proximity as the example above suggests. Many larger businesses that use sealed source gauges and other equipment maintain a large number of these Category 3 devices to be able to work at multiple jobsites. The manager of DOE's U.S. Radiological Threat Reduction Program estimated that over 90 percent of the sites where DOE has recovered sealed radiological sources also contained quantities of lesser radioactive sources that, when aggregated, were equivalent to a single Category 2 source and thus, posed risks equal to that of a Category 2 source.[14]

Perhaps more disconcerting is the fact that NRC is proposing *automatically* to delist and cease tracking Category 2 sources at the point at which they decay below Category 2 levels. It is likely that many licensees may believe that their management responsibilities with respect to the decayed source have also ceased. Accordingly, this proposed rule may result in even more of the most highly-radioactive Category 3 sources ending up in the scrap or waste streams.

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[10] *Id.* at 14.

[11] *Id.* at 35.

[12] *Id.* at 34.

[13] *Id.* at 34.

[14] *Id.* at 34.

In the proposed rule, NRC notes that, unless accumulated in significant quantity, Category 3 sealed sources may not have enough radioactivity to be used in a dirty bomb. However, some of the more radioactive Category 3 sources may pose a threat nearly comparable to the threat posed by Category 2 sources. Additionally, *all* devices in the Category 3 range are capable of wreaking havoc at metals recycling facilities.

NRC has stated that it decided not to extend its proposed source tracking program to Category 3 sources in order to remain consistent with the recommendations of the International Atomic Energy Agency ("IAEA"). However, the IAEA specifically recommended that Category 3 sources be tracked.[15] The IAEA report states:

> Disused sources represent the largest pool of vulnerable and potential orphan sources. History has shown that many accidents involving orphan sources come about because sources that are no longer used are eventually forgotten, with subsequent loss of control years later. To this end, it is beneficial from both a safety and security viewpoint for *all disused sources to be identified* [emphasis added] and to undergo proper disposition . . . Licensees are discouraged from proper disposal of disused sources by the cost involved, by the bureaucracy of doing so, or by the lack of an available disposal option . . . It is clear that information needs to be gathered by those developing a national strategy regarding the status of *at least all Category 1, 2, and 3 sources* [emphasis added] on the licensee's registry or national registry so that all appropriate decisions can be made regarding them. Generally, this will involve asking the licensee or owner of the source about its frequency of use.[16]

## V. Recommendations

MIRC supports the premise of this important proposed rulemaking. NRC's proposal is, in many ways, entirely consistent with various steps that MIRC has been advocating for many years. Assignment of unique serial numbers is critical to ensure that sources are properly managed throughout their use and at the end of their useful lives. Requiring licensees to assess their inventory on an annual basis is also necessary to ensure that proper stewardship is taking place. Requiring prompt and accurate reporting of all sealed source transactions gives NRC the necessary oversight to ensure that sources are monitored and never improperly disposed.

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[15] *Strengthening Control Over Radioactive Sources in Authorized Use and Regaining Control Over Orphaned Sources: National Strategies*, IAEA-TECDOC-1388 (Vienna Austria: February 2004).

[16] *Id.* at 40.

These common sense steps are equally necessary to track Category 3 sources, especially those sources that contain radioactivity levels that are nearly comparable to Category 2 sources. Accordingly, as NRC's stated goal in the rulemaking is to reduce the availability of sources which can be used in a dirty bomb or other radiological dispersion devices, Category 3 sealed sources, especially accumulated Category 3 sealed sources, should be tracked aggressively as well.

Moreover, Category 3 sealed sources currently present a danger to the metals recycling industry, its employees and surrounding communities. While protecting against the development of a dirty bomb is an important goal, NRC must recognize that Category 3 sources in the scrap stream also pose a threat to public safety. The threat is very real. Without adequate tracking and monitoring, the number and gravity of these 84 reported incidents will continue to rise.

When implemented, the National Source Tracking System will develop the infrastructure to track Category 1 and Category 2 sealed sources. We believe that, with a modest additional investment, NRC has the ability to track Category 3 sources as well. If NRC declines to extend this proposed rulemaking to include Category 3 sources, it will foreclose an opportunity to advance a rule which is truly protective of public safety and the environment.

Thank you for the opportunity to comment on this important rulemaking. If you have any questions, please feel free to contact John Wittenborn at 202.342.8514.

Respectfully,

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Counsel to the Metals Industry Recycling Coalition

Enclosure

**Meltings of Radioactive Materials** **(Reported World-Wide)**



| # | Year | Metal | Plant | | Location | Isotope | Activity | Decon $M (US) |
|---|---|---|---|---|---|---|---|---|
| 1 # | | Gold | NY | NY | | Ra DEF | unknown | |
| 2 | 1982 | Steel | | | *Taiwan* *+ | Co-60 | 770 GBq | |
| 3 | 1983 | Steel | Auburn Steel | NY | | Co-60 | 930 GBq | 4.4 |
| 4 | 1983 | Iron / Steel | *Juarez* | | *Mexico* *~ | Co-60 | 15000 GBq | |
| 5 | 1983 | Gold | unknown | NY | | Am-241 | unknown | unknown |
| 6 | 1984 | Steel | U.S. Pipe & Foundry | AL | | Cs-137 | 0.37 - 1.9 GBq | 0.6 |
| 7 | 1985 | Steel | *Brazil* | | *Brazil* *~ | Co-60 | unknown | |
| 8 | 1985 | Steel | Tamco | CA | | Cs-137 | 56 GBq | 1.5 |
| 9 | 1987 | Steel | Florida Steel | FL | | Cs-137 | 0.93 GBq | 0.2 |
| 10 | 1987 | Aluminum | United Technology | IN | | Ra-226 | 0.74 GBq | 0.5 |
| 11 | 1988 | Lead | ALCO Pacific | CA | | Cs-137 | 0.74 - 0.93 GBq | 0.2 |
| 12 | 1988 | Copper | Warrington | MO | | ARM | unknown | unknown |
| 13 | 1988 | Steel | *Italy* | | *Italy* * | Co-60 | unknown | |
| 14 | 1989 | Steel | Bayou Steel | LA | | Cs-137 | 19 GBq | 0.05 |
| 15 | 1989 | Steel | Cytemp | PA | | Thorium | unknown | 0.1 |
| 16 | 1989 | Steel | *Italy* | | *Italy* | Cs-137 | 1000 GBq | |
| 17 | 1989 | Aluminum | *Podolsk* | | *Russia* | unknown | unknown | |
| 18 | 1990 | Steel | NUCOR Steel | UT | | Cs-137 | unknown | 2 |
| 19 | 1990 | Aluminum | *Metallicapra* | | *Italy* | Cs-137 | unknown | |
| 20 | 1990 | Steel | *Irish Steel* | | *Ireland* | Cs-137 | 3.7 GBq | |
| 21 | 1990 | Steel | | | *Czechoslovakia* | Co-60 | unknown | |
| 22 | 1991 | Steel | | | *India* *~ | Co-60 | 7.4-20 GBq | |
| 23 | 1991 | Aluminum | Alcan Recycling | TN | | Thorium | unknown | |
| 24 | 1991 | Aluminum | | | *Italy* | Cs-137 | unknown | unknown |
| 25 | 1991 | Copper | | | *Italy* | Am-241 | unknown | unknown |
| 26 | 1992 | Steel | Newport Steel | KY | | Cs-137 | 12 GBq | 1 |
| 27 | 1992 | Aluminum | Reynolds | VA | | Ra-226 | unknown | unknown |
| 28 | 1992 | Steel | Border Steel | TX | | Cs-137 | 4.6 - 7.4 GBq | unknown |
| 29 | 1992 | Steel | Keystone Wire | IL | | Cs-137 | unknown | 2.3 |
| 30 | 1992 | Steel | *Ostrowiec* | | *Poland* | Cs-137 | 37 GBq; 200 Bq/g | |
| 31 | 1992 | Copper | | | *Estonia / Russia* | Co-60 | unknown | |
| 32 | 1992 | Iron / Steel | *Rubtsovskiy* | | *Russia* | Cs-137 | unknown | |
| 33 | 1992 | Steel | *Irkutsk* | | *Russia* | Ra-226 | unknown | |
| 34 | 1993 | Steel | Auburn Steel | NY | | Cs-137 | 37 GBq | 0.6 |
| 35 | 1993 | Steel | Newport Steel | KY | | Cs-137 | 7.4 GBq | unknown |
| 36 | 1993 | Steel | Chaparral Steel | TX | | Cs-137 | unknown | unknown |
| 37 | 1993 | Zinc | Southern Zinc | GA | | U dep | unknown | unknown |
| 38 | 1993 | Steel | | | *Kazahkstan* * | Co-60 | 0.3 GBq | |
| 39 | 1993 | Steel | Florida Steel | FL | | Cs-137 | unknown | unknown |
| 40 | 1993 | Steel | *Highveld Steel & V* ^ | | *S. Africa* | Cs-137 | < 600 Bq/g. | unknown |
| 41 | 1993 | Steel | *Brescia* | | *Italy* | Cs-137 | unknown | unknown |
| 42 | 1993 | Copper | *IMI Wolverhampton* | | *United Kingdom* | Cs-137/Cs-134 | 1-10 GBq | unknown |
| 43 | 1994 | Steel | Austeel Lemont | IL | | Cs-137 | 0.074 GBq | unknown |
| 44 | 1994 | Steel | U.S. Pipe & Foundry | CA | | Cs-137 | unknown | unknown |
| 45 | 1994 | Steel | | | *Bulgaria* | Co-60 | 3.7 Gbq | unknown |
| 46 | 1995 | Steel | *Atlas / Tracy* ** | | *Quebec* | Cs-137 | 0.2 - 0.7 GBq | unknown |
| 47 | 1995 | Steel | *Hradek Steel* | | *Czech Republic* | Co-60 | unknown | unknown |
| 48 | 1995 | Steel? | | | *Italy* | Cs | unknown | unknown |
| 49 | 1995 | Steel | | | *Germany* | Am-241 | 1.67 GBq | unknown |
| 50 | 1996 | Steel | *Fundia AB* | | *Sweden* | Co-60 | 100 MBq | unknown |
| 51 | 1996 | Steel | *Voest-Alpine* | | *Austria* | Co-60 | unknown | unknown |
| 52 | 1996 | Lead | | | *Brazil* ~* | Ra DEF | unknown | unknown |
| 53 | 1996 | Aluminum | Bluegrass Recycling | KY | | Th-232 | unknown | unknown |
| 54 | 1997 | Aluminum | White Salvage Co. | TN | | Am-241 | unknown | unknown |
| 55 | 1997 | Steel | WCI ~ | OH | | Co-60 | 0.9 GBq (?) | unknown |
| 56 | 1997 | Steel | Kentucky Electric | KY | | Cs | 1.3 GBq | unknown |
| 57 | 1997 | Steel | *Alfa Acciai Steel* | | *Italy* | Cs-137 / Co-60 | 200 / 37 GBq | 4 M$ |
| 58 | 1997 | Steel | *Sidemor* | | *Greece* | Cs-137 | 11 Bq/g | unknown |
| 59 | 1997 | Steel | Birmingham Steel | AL | | Cs-137 / Am-241 | 7 Bq/g | unknown |
| 60 | 1997 | Steel | *CSN* ~* | | *Brazil* | Co-60 | < 0.2 GBq | unknown |
| 61 | 1997 | Steel | Bethlehem Steel ~ | IN | | Co-60 | 0.2 GBq | unknown |
| 62 | 1998 | Carbon | | | *unknown* | unknown | unknown | |
| 63 | 1998 | Steel | *Avesta Sheffield* | | *Sweden* | Co-60 | 20 MBq | unknown |
| 64 | 1998 | Steel | *Acerinox* | | *Spain* | Cs-137 | > 37 GBq | ~ 100 M$ |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 65 | 1998 | Steel? | | | *Slovenia* | unknown | unknown | |
| 66 | 1998 | Steel | *Avesta Sheffield* | | *Sweden* | Ir-192 | 8 GBq | |
| 67 | 1998 | Aluminum | S. AL Castings~ | AL | | Th | unknown | unknown |
| 68 | 1999 | Steel? | | | *Kenya* | Th | unknown | unknown |
| 69 | 2000 | Steel | *Avesta Sheffield* | | *United Kingdom* | Pu-238 | 141 GBq | "several M$" |
| 70 | 2000 | Aluminum | *Rouville Station* | | *Quebec* | U dep | 140 kg DU | unknown |
| 71 | 2000 | Steel | *Huta Katowice* | | *Poland* | Co-60 | ~ 35 Bq/g | unknown |
| 72 | 2000 | Steel | *? ~* | | *S. E. Asia* | Co-60 | 5 kBq/g | unknown |
| 73 | 2001 | Aluminum | IMCO Recycling | OH | | U dep | unknown | unknown |
| 74 | 2001 | Steel | Ameristeel | FL | | Cs-137 | unknown | ~ 12 M$ |
| 75 | 2001 | Steel | *(foundry) @* | | *Mumbai, India* | Co-60 | 30 Bq/g | unknown |
| 76 | 2001 | Steel | *Sideurgica Sevillana* | | *Spain* | Cs-137 | 40 GBq | ~ 30 M$ |
| 77 | 2002 | Steel | *Makstil A. D. (fdy) %* | | *Skopje, Macedonia* | Co-60 | ~ 1 Bq/g | unknown |
| 78 | 2002 | Steel | *Lien-Chen* | | *Taiwan* | Cs-137 | unknown | unknown |
| 79 | 2003 | Steel | *Aceria (ACB)* | | *Sestao (Biscay), Spain* | Cs-137 | unknown | unknown |
| 80 | 2004 | Steel | *Outokumpu (Stainless)* | | *Sheffield, UK* | Am-241 | ~ 2 GBq | unknown |
| 81 | 2004 | Steel | *Acciaierie Beltrame* | | *Italy* | Cs-137 | ~ 1.9 GBq; 25 Bq/g | unknown |
| 82 | 2004 | Steel | *Sidenor* | | *Cantabria, Spain* | Cs-137 | unknown | unknown |
| 83 | 2004 | Steel | | | *Shaanxi Pvc, China* | Cs-137 | unknown | unknown |
| 84 | 2004 | Steel | Timken | Canton, OH | | Cs-137 | 0.5 mr/h dust | unknown |

**Last update: 10/10/2005 16:19**

**NOTES:**

# multiple cases reported, earliest circa 1910
* contaminated product exported to United States
+ at least one incident occurred in this time frame, resulting in contaminated plumbing fittings exported to U. S.
^ contaminated V slag exported to Austria; detected in Italy
** contaminated by-product (EAF dust) exported to U.S.
~ contaminated product distributed in U.S. (consumer or otherwise)
% contaminated product (steel slabs) detected in Italy

| % | # | Affected Industry | U. S. | elsewhere | flags |
|---|---|---|---|---|---|
| 75.0% | 63 | Steel | 22 | 41 | |
| 13.1% | 11 | Aluminum | 7 | 4 | |
| 2.4% | 2 | Gold | 2 | 0 | |
| 2.4% | 2 | Lead | 1 | 1 | |
| 4.8% | 4 | Copper | 1 | 3 | |
| 1.2% | 1 | Zinc | 1 | 0 | |
| 1.2% | 1 | Carbon | 0 | 1 | |
| 100.0% | 84 | TOTAL | 34 | 50 | |

| % | # | Rad Mtl melted | U.S. | elsewhere | flags |
|---|---|---|---|---|---|
| 46.4% | 39.0 | Cs-137 | 18.5 | 20.5 | |
| 25.6% | 21.5 | Co-60 | 3 | 18.5 | |
| 6.0% | 5.0 | Th | 4 | 1 | |
| 1.2% | 1.0 | Ir-192 | 0 | 1 | |
| 6.5% | 5.5 | Am-241 | 2.5 | 3 | |
| 3.6% | 3.0 | U | 2 | 1 | |
| 1.2% | 1.0 | Pu | 0 | 1 | |
| 6.0% | 5.0 | Ra + | 3 | 2 | |
| 1.2% | 1.0 | ARM | 1 | 0 | |
| 2.4% | 2.0 | unknown | 0 | 2 | |
| 100.0% | 84.0 | TOTAL | 34 | 50 | |

NOTE: half-integer value due to discovery of multiple isotopes

**Unconfirmed meltings**

| | | |
|---|---|---|
| 1993? | Steel | Egypt? |
| 1995? | Steel | Slovakia? |
| 1998? | Steel | Italy - discovery of Cs-137 deposited in soil |

| Affected Indu: | # | % | Rad Mtl melted | # | % |
|---|---|---|---|---|---|
| Steel | 63 | 75.00% | Cs-137 | 39.0 | 46.43% |
| Aluminum | 11 | 13.10% | Co-60 | 21.5 | 25.60% |
| Gold | 2 | 2.38% | Th | 5.0 | 5.95% |

| | | |
|---|---|---|
| Lead | 2 | 2.38% |
| Copper | 4 | 4.76% |
| Zinc | 1 | 1.19% |
| Carbon | 1 | 1.19% |
| Total | 84 | 100.00% |

| | | |
|---|---|---|
| Ir-192 | 1.0 | 1.19% |
| Am-241 | 5.5 | 6.55% |
| U | 3.0 | 3.57% |
| Pu | 1.0 | 1.19% |
| Ra + | 5.0 | 5.95% |
| ARM | 1.0 | 1.19% |
| unknown | 2.0 | 2.38% |
| Total | 84.0 | 100.00% |

**Mail Envelope Properties** (434C0FCD.7A5 : 12 : 14245)

| | |
|---|---|
| **Subject:** | MIRC Comments on Proposed Rule for National Ssource Tracking of Sealed Sources |
| **Creation Date:** | Tue, Oct 11, 2005 3:18 PM |
| **From:** | "D'Angelo, Wayne" <WD'Angelo@colliershannon.com> |
| **Created By:** | WD'Angelo@colliershannon.com |

**Recipients**
nrc.gov
owf5_po.OWFN_DO
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| **Files** | **Size** | **Date & Time** |
|---|---|---|
| MESSAGE | 1037 | Tuesday, October 11, 2005 3:18 PM |
| D'Angelo, Wayne.vcf | 147 | |
| SFX90E.pdf | 671237 | |
| Mime.822 | 921909 | |

**Options**

| | |
|---|---|
| **Expiration Date:** | None |
| **Priority:** | Standard |
| **Reply Requested:** | No |
| **Return Notification:** | None |
| **Concealed Subject:** | No |
| **Security:** | Standard |