STEEL MANUFACTURERS ASSOCIATION
SPECIALTY STEEL INDUSTRY OF THE UNITED STATES
POSITION PAPER ON RADIOACTIVE SCRAP METAL
AND MIXED RADIOACTIVE WASTES
AUGUST 1994

I. THE SMA AND SSIUS COMPANIES

The Steel Manufacturers Association ("SMA") consists of 56 North American companies that operate 107 steel plants and employ approximately 63,000 people. SMA members are widely dispersed geographically, with 45 located in the United States, eight in Canada, and three in Mexico. SMA members account for approximately 40 percent of U.S. steel production.

The Specialty Steel Industry of the United States ("SSIUS") is a trade group representing 16 producers of specialty steel products, including stainless, electric, tool, magnetic, and other alloys. SSIUS companies represent 90 percent of the specialty steel produced in the United States. SMA member facilities' 1993 steel sales totaled approximately $14 billion, out of an estimated $33 billion in total steel sales. SSIUS companies accounted for $6 billion of 1993 sales.

Most of the SMA and SSIUS companies melt scrap metal in electric arc furnaces ("EAFs") to produce various steel products. Steel produced in EAFs account for more than 38 percent of the steel produced in the United States. Recycled scrap constitutes almost 100 percent of the feedstock of EAF steel producers. In 1993, EAFs consumed more than 40 million net tons of scrap metal (valued at $6 billion), including the scrap derived from approximately nine million junked automobiles, tin cans, old appliances, and other discarded steel products. EAF steel manufacturers recycle a greater volume, by weight, of secondary material than any other domestic industry.

II. INCREASED AMOUNTS OF RADIOACTIVE SOURCES IN THE STREAM OF RECYCLED SCRAP METAL

Over the past decade, an industry-wide problem has been developing which is rapidly increasing in magnitude. The amount of scrap metal contaminated with radioactive material in the scrap metal stream sold to SMA and SSIUS facilities has dramatically increased. *See* Attachment 1.

Some of the contamination in scrap is a result of background radiation absorbed by steel products, such as discarded oil and gas transmission pipes. A more dangerous and potentially life-threatening contamination, however, is found in scrap metal containing shielded radioactive sources, such as cesium-137 or cobalt-60. Typically, these are radioactive heads from gauges used in manufacturing operations that have shut down, or those contained in discarded hospital equipment, or in retired equipment resulting from recent U.S. military downsizing. Such radioactive sources are generally shielded in lead containers which can pass through even the most sensitive radiation detection devices. Other contaminated scrap or alloying materials can and have come from overseas, especially from countries where environmental and safety laws are less stringent than those in the United States.

Since 1980, there have been 34 reported incidents of accidental smeltings of radioactive material, including 23 in the United States. *See* Attachment 2. Many more radioactive sources have been discovered prior to melting. All 23 accidental radioactive material smeltings in the United States resulted from the melting of scrap metal that contained a hidden radioactive source. The vast majority of the accidental smeltings involved Atomic Energy Act ("AEA") material, the most common being cesium-137.

The increasing amounts of contaminated scrap metal existing in the scrap stream is directly proportional to: (1) the enormous number of radioactive devices currently licensed by the Nuclear Regulatory Commission ("NRC") over the last few decades; and (2) NRC's failure to adequately track and control the disposition of these sources. According to NRC data, as of 1993, there were more than 550,000 radioactive sources in the United States, including: (1) 22,000 specific licensees; (2) 2,300 gauge licensees; (3) 31,600 general licensees; (4) 456,000 10 C.F.R. § 31.5 devices; and (5) 42,000 gauges. [1]

The exact number of radioactive devices in the scrap metal stream is unknown. While NRC estimates that 15 sources are lost in the United States each year, the experiences of SMA and SSIUS member companies indicate that there are far more untraced or lost sources existing in the North American scrap supply. For example, one major scrap broker alone discovered more than 300 radioactive sources mixed with scrap metal between 1990 and 1993. Moreover, a report, *Radioactive Material in Metal Scrap*, prepared for the NRC concluded that: (1) total yearly reports of contaminated scrap metal has skyrocketed since 1988; and (2) the actual number of reported discoveries of radioactive sources in scrap metal represent only the "tip of the iceberg." *NRC Report* at 13.

The enormous number of licensed radioactive devices is only part of the current contaminated scrap problem. Equally, if not more important, is the absence of adequate regulations governing the issuance of licenses, sales, transfers, and disposal of licensed material. Coupled with this is the failure on the part of both federal and state agencies to adequately account for and inventory licensed sources. NRC has identified several regulatory shortcomings that have fostered the problem, including:

(1) past lack of or minimal NRC inspection oversight for some categories of users (*e.g.*, licensed gauge users);

(2) present infrequent NRC inspections of some categories of users (*e.g.*, five years for specifically licensed gauge users);

1/ *Radioactive Material in Metal Scrap (With Focus on Atomic Energy Act Materials)*, Joel O. Lubenau, at 17 (July 20, 1993) (prepared for NRC) (hereinafter "*NRC Report*").

(3) present lack of NRC inspection oversight for some categories of users (e.g., gauge users);

(4) a lack of regulation of naturally occurring radioactive sources ("NORM"):

(5) no limitation on cesium-137 in general license gauges;

(6) orphan wastes; and

(7) costs associated with disposal in accordance with federal and state regulations.

NRC Report at 16, 18.

Under the current regulatory framework, there is no economic incentive for an individual scrap dealer to identify a lost radioactive source before it is shipped in a load of scrap to a steel company. In fact, it can cost the finder of the source thousands of dollars to legally dispose of the source. Thus, the current regulatory system creates more of an incentive for scrap collectors to conceal rather than identify a radioactive source and to avoid the disposal costs by shipping the source either to scrap processors or EAF facilities.

III. PREVENTATIVE MEASURES

Almost all SMA and SSIUS companies have sensitive radiation detection equipment to monitor incoming scrap at their truck and rail entry stations. They cannot afford not to have detection equipment. EAF facilities have also implemented detailed handling systems and safety procedures to follow in the event a source is discovered. However, because most licensed sources are contained in lead containers that shield the radioactivity from radiation detection systems, not even the most advanced detection systems can detect 100 percent of the radioactive sources entering a plant. Therefore, technology alone is insufficient to solve the problem. Any solution must combine the efforts of the regulating agencies, the iron and steel industry, and the scrap industry.

SMA has created a Radiation Detection Equipment Task Force to research available radiation detection equipment and to develop recommended detection management standards for the scrap and steel industries. The Task Force is comprised of representatives from the steel, scrap, and radiation detection industries. The SMA Task force met with major equipment manufacturers and suppliers to discuss the fact that existing equipment do not adequately protect EAF steel producers from shielded radioactive sources buried within a load of scrap metal.

The Task Force's goal is to reduce the number of radioactive source meltings by: (1) developing attainable and verifiable detection equipment standards; and (2) establishing a comprehensive set of recommended practices and inspection procedures designed to minimize the possibility of melting radioactive sources. Given the enormous quantities of radioactive sources currently in the scrap stream, however, even with improved detection equipment, every EAF steel facility is vulnerable to the possibility that radioactive sources will escape detection and be melted in EAFs.

IV. COSTS ASSOCIATED WITH AN ACCIDENTAL MELTING OF SCRAP METAL CONTAMINATED WITH RADIOACTIVE MATERIAL

Despite their use of the best technical equipment to detect shielded sources. EAF companies have become the innocent victims of sources they never used or produced. but simply inherited. Most of the 23 accidental smeltings of radioactive material and most of the radioactive source "finds" prior to melting have involved scrap metal containing cesium-137 sources. an Atomic Energy Act material. When a radioactive source is melted, it contaminates the finished metal product, equipment (including the EAF, baghouse, and duct systems), EAF dust. and the surrounding facility. Radioactive melts also pose serious threats to workers. the surrounding community, and the environment.

In one instance in Florida, a teletherapy unit was discovered prior to melting that was rated for 5,000 curies of cobalt-60. Had the unit contained its rated quantity of cobalt-60 and been melted, it would have subjected melt shop workers to a lethal dose of radiation, and the radiation would have spread for more than a mile. Cobalt-60 was melted at a Mexican steel facility in 1983, resulting in serious radiation exposure and contaminated steel entering the United States.

SMA, SSIUS, NRC, the U.S. Environmental Protection Agency ("EPA"), and the Department of Energy ("DOE") should develop and implement effective measures now to prevent melts of this magnitude from occurring in the future.

A. Costs to Steel Companies

There are also devastating economic consequences if a radioactive source is melted in an EAF. The resulting downtime and cleanup costs have a profoundly negative economic impact on steel companies. If steel companies with radioactive contamination are forced into bankruptcy, the regulating agencies could inherit the enormous decontamination and disposal costs.

Available data from five SMA companies indicate that the costs associated with decontaminating a facility after a radioactive melt range between $2 million and $4 million. The costs of disposing and storing radioactive EAF dust range between $3 million and $15 million. In addition, depending upon the duration of time that a facility must cease steel production, the melting of a radioactive source can cost a facility between $360,000 and $13 million in lost revenues. *See* Attachment 3. Thus, the total costs associated with melting a radioactive source typically exceed $10 million per melt and can be as high as $24 million per melt. In contrast, a licensee that illegally disposes of a radioactive source faces only a relatively minor fine, assuming the source can be traced back to the licensee, which cannot be done if a source is melted.

Although every attempt is made to trace the party responsible for the unlawful disposition of a source, the party at fault is rarely found, despite the fact that these are government licensed sources. Accordingly, federal and state regulatory agencies should implement programs that do not place the full responsibility of detecting and properly disposing of radioactive sources and the enormous costs associated with the accidental melt of a source exclusively on individual steel companies that are innocent victims at the end of a chain of neglect.

B. Problems with Contaminated EAF Dust

The single largest expense associated with the accidental smelting of radioactive material is the treatment, storage, and disposal of the large amounts of contaminated EAF dust. When scrap metal is melted in EAFs, metal-rich EAF dust is generated and collected in state-of-the-art emission control baghouses. Because of its metal constituents, EAF dust is regulated by EPA under the Resource Conservation and Recovery Act ("RCRA") as the hazardous waste "K061." Most SMA and SSIUS companies send their EAF dust off-site for recycling by high temperature metals recovery ("HTMR"), which EPA has identified as the best demonstrated technology to manage this material.

A typical SMA and SSIUS EAF baghouse often contains hundreds of tons of EAF dust generated during each successive melting of scrap metal in an EAF. The melting of a radioactive source contaminates not only the dust generated during and shortly after the melting of one particular load of scrap metal containing the radioactive source, but also the dust being stored at the time of the melt in the EAF baghouse, duct systems, and in silos. Consequently, the melting of even a small radioactive source can contaminate thousands of tons of EAF dust, costing millions of dollars to treat and dispose.

EAF dust generated immediately after a radioactive scrap source is melted typically contains cesium-137 in the range of hundreds or even thousands of picocuries per gram of dust ("pCi/g").[2] Typically, K061 generated only a few days or a week after a radioactive scrap melt will contain concentrations of cesium-137 below 100 pCi/g. Approximately 75 percent of the existing quantity of approximately 25,000 tons of radioactive K061 contains less than 100 pCi/g of cesium-137. A few weeks after a radioactive scrap melt, the radioactivity level of newly generated K061 will typically drop to below 20 pCi/g (assuming there is some reasonable level of remediation activity). Although the average concentration of cesium-137 in radioactive K061 is approximately 60 pCi/g, most of the existing radioactive K061 contains less than 20 pCi/g of cesium-137. Even after extensive and extremely expensive decontamination and remediation operations (*i.e.*, replacing refractory bricks in the EAF and cleaning or replacing duct work), newly generated K061 may still contain between two and 10 pCi/g of cesium-137.

2/ *Risk Assessment of Options for Disposition of EAF Dust Following A Meltdown Incident Of A Radioactive Cesium Source In Scrap Steel*, Stanley E. Logan, Ph.D. (April 1993).

To our knowledge, no commercial facility in the U.S. is currently able and permitted to recycle, or treat and dispose of EAF dust that emits any level of radioactivity above *de minimis* "background" levels. Even if one of the nation's few "mixed" waste landfills becomes permitted to accept all K061 for treatment and disposal, the costs of first stabilizing that material and then landfilling it as a radioactive "mixed" waste would be prohibitive.

V. REGULATORY JURISDICTION

EAF dust contaminated by a source poses a problem that falls under both EPA and NRC jurisdiction. EAF dust is already an EPA listed hazardous waste that is regulated under RCRA. When EAF dust is contaminated, it is also considered a low-level mixed hazardous waste regulated by NRC.

A regulatory gap exists for the disposition of radioactive contaminated EAF dust. Under current EPA and NRC regulations, radioactive EAF dust: (1) cannot be processed at a typical HTMR facility, which is the preferred method most commonly used for recycling EAF dust; and (2) cannot be stabilized and disposed of in a lined RCRA hazardous waste landfill.

Consequently, six U.S. steel manufacturers that belong to SMA are temporarily storing on-site approximately 25,000 tons of low-level radioactive EAF dust for which there is no available recycling, treatment, or disposal option. These facilities are unfairly exposed to potential citizen suits or enforcement actions because they typically are forced into the untenable position of having to store a RCRA hazardous waste (K061) on-site without being able to obtain the necessary RCRA storage permits. Until an appropriate regulatory solution is developed so that facilities can economically recycle, treat, or dispose of EAF dust with low levels of radioactivity, a growing number of U.S. steel manufacturers will accumulate and have to store radioactive K061 on-site despite the fact they are operating state-of-the-art detectors. This makes no economic or environmental sense.

VI. RECOMMENDED SOLUTIONS

SMA and SSIUS companies cannot remain passive in the face of possible continued exposure of their workers and surrounding communities to the life-threatening environmental risks and economically devastating effects associated with radioactive scrap melts resulting from the lack of effective regulatory control by governmental agencies. Moreover, EAF steel producers that have been the unfortunate victims of a radioactive melt cannot continue to store radioactive material on-site indefinitely waiting for regulatory relief.

This problem must be addressed now. Regulatory solutions to the radioactive scrap metal problem must be divided into two separate areas: (1) "pre-melt" solutions designed to prevent radioactive sources from entering the scrap stream and to remove radioactive sources currently in the scrap stream; and (2) "post-melt" solutions designed to assist EAF facilities that accidentally melt a radioactive source decontaminate their facilities and dispose of contaminated EAF dust.

A. **Pre-melt**

1. **Concerted Efforts Needed by NRC, EPA, DOE, the States, the Steel Industry, and the Scrap Industry.**

SMA and SSIUS strongly suggest that NRC, EPA, DOE, the Institute of Scrap Recycling Industries, and the steel industry initiate joint efforts to assure more effective control of radioactive sources and to develop a program to alleviate the financial impact of mixed waste disposal now borne by EAF steel companies victimized by inadequate control of lost sources. EPA and NRC need to develop a coordinated and flexible approach to regulate low level mixed waste and establish a reasonably lower threshold for regulating a waste as "radioactive."

2. **Implementation of Licensing Fees to Penalize Licensees and Reduce Radioactive Material Entering the Scrap Stream and to Alleviate the Major Economic Impact Now Borne by EAF Steel Producers, and to a Lesser Extent by Scrap Processors.**

SMA and SSIUS member companies urge NRC to impose licensing fees which could be rebated when proof is obtained that licensees have properly disposed of licensed radioactive sources. Moreover, NRC should implement an incentive program under which scrap processors would have financial incentives to identify and report radioactive sources in the scrap stream, and also create penalties for any party that knowingly sells scrap metal containing radioactive sources.

The high cost of disposal creates an incentive for those who discover contaminated scrap metal to avoid notifying the appropriate authorities and to pass the contaminated scrap down the scrap stream. A scrap dealer who identifies radioactive material inherits the costs of appropriate disposal, unless the material can somehow be traced back to the licensee. Unless, NRC and EPA implement a program that encourages dealers and processors to remove radioactive sources from the scrap stream, radioactive material will continue to exist in the scrap stream and EAF steel producers will continue to be the victims of radioactive melts.

B. **Post-melt**

1. **NRC and EPA Should Implement an Exemption Allowing EAF Dust Containing Up to 20 pCi/g of Cesium-137 to be Recycled Through HTMR and Up to 100 pCi/g of Cesium-137 to be Disposed of in Hazardous Waste Landfills.**

The attached report, *Risk Assessment of Options for Disposition of EAF Dust Following a Meltdown Incident of a Radioactive Cesium Source in Scrap Steel*, prepared by S.E. Logan and Associates, Inc. (Attachment 4), provides a comprehensive health assessment that supports an exemption under which EAF dust containing up to 20 pCi/g of cesium-137 could be recycled through HTMR for zinc. A facility operating pursuant to a NRC license could discharge wastewaters that contained such a *de minimis* level of cesium-137 to an "unrestricted area." EAF

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dust with less than 20 pCi/g of cesium-137 that is safely recycled should not be subject to more stringent regulations than those applicable to wastewaters containing similar levels of cesium-137 which can be discharged from a NRC-licensed facility to a totally "unrestricted area."

The attached report also includes a comprehensive health assessment that supports an exemption under which EAF dust containing up to 100 pCi/g of cesium-137 could be stabilized to meet stringent leachate standards and landfilled in a hazardous waste landfill that meets all applicable requirements under RCRA (*i.e.*, double liners and leachate collection systems). Such a landfill would not have to be authorized to accept "mixed" radioactive wastes. SMA and SSIUS urge NRC to grant a national exemption or variance or at least provide authorized states with guidance that all EAF dust containing up to 20 pCi/g could be recycled by HTMR and all EAF dust containing up to 100 pCi/g could be stabilized and disposed in a hazardous waste landfill subject to RCRA's land disposal restrictions. Without such express NRC guidance, most authorized states are reluctant to provide the requested relief.

2. DOE Mixed Waste Facilities Should Accept Contaminated EAF Dust for Treatment and Disposal.

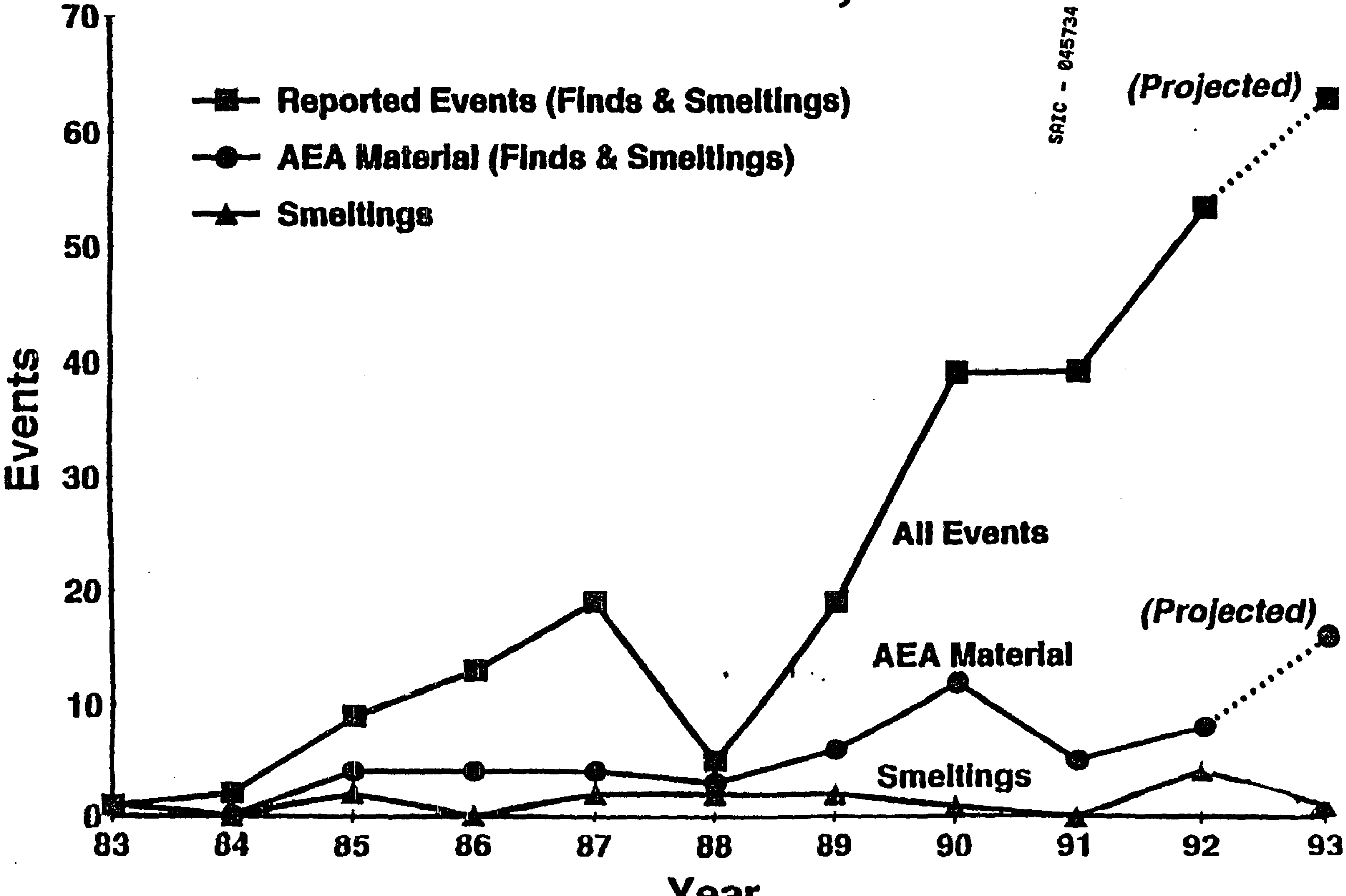
DOE already has a program to properly dispose of radioactive ferrous scrap derived from government owned or licensed facilities. Until an adequate solution is found to remove radioactive material from the scrap metal stream and until regulations are implemented allowing radioactive EAF dust to be treated and disposed of at hazardous waste facilities, NRC, EPA, and DOE should negotiate jointly a program under which DOE would accept radioactive EAF dust for treatment and disposal at DOE facilities. *See* Attachment 5.

Currently, there are several EAF facilities storing thousands of tons of radioactive EAF dust on-site because no adequate treatment and disposal options currently exist. As NRC has already recognized, DOE facilities have the capacity to accept contaminated EAF dust. *Id.* Allowing contaminated EAF dust to be treated and disposed of at a DOE facility would eliminate the need for EAF producers to store this material on-site and would lessen the financial burden that has been unjustifiably levied against EAF producers.

The Steel Manufacturers Association and the Specialty Steel Industry of the United States would be glad to request support from Congress for these programs, which are in the national interest.

Attachment

RADIOACTIVE MATERIAL IN METAL SCRAP
U.S. 1983 - JUNE, 1993



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Source: Radioactive Material in Scrap Metal (With Focus on Atomic Energy Act Material

Attachment
[redacted]

Table 1

Worldwide Smeltings of Radioactive Sources[a]

No.	Year	Metal	Location	Isotope	GBq	
1	[b]	Au	unknown, NY	^{210}Pb	unknown	Agreement State
2	83	Fe	Auburn Steel, NY	^{60}Co	930	Agreement State
3	83	Fe	Mexico[c]	^{60}Co	15,000	
4	83	Au	unknown, NY	^{241}Am	unknown	Agreement State
5	83	Fe	Taiwan[b,c,d]	^{60}Co	0.37-0.74	
6	84	Fe	US Pipe&Foundry,AL	^{137}Cs	0.37-1.9	Agreement State
7	85	Fe	Brazil[c]	^{60}Co	unknown	
8	85	Fe	TAMCO, CA	^{137}Cs	56	Agreement State
9	87	Fe	Florida Steel, TN	^{137}Cs	0.93	Agreement State
10	87	Al	United Tech,IN	^{226}Ra	0.74	
11	88	Pb	ALCO Pacific, CA	^{137}Cs	0.74-0.93	Agreement State
12	88	Cu	Warrington, MO	Accel	unknown	
13	88	Fe	Italy[c]	^{60}Co	unknown	
14	89	Fe	Bayou Steel, LA	^{137}Cs	19	Agreement State
15	89	Fe	Cytemp Spec, PA	Th	unknown	NRC.
16	89	Fe	Italy	^{137}Cs	1,000	
17	89	Al	Russia	unknown	unknown	
18	90	Fe	NUCOR, UT	^{137}Cs	unknown	Agreement State
19	90	Al	Italy	^{137}Cs	unknown	
20	90	Fe	Ireland	^{137}Cs	unknown	
21	91	Fe	India[c]	^{60}Co	7.4-20	
22	91	Al	Alcan Recycling,TN	Th	unknown	Agreement State

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Source: Nuclear Regulatory Commission, Joel O. Lubenau.

23	92	Fe	Newport Steel, KY	^{137}Cs	12	Agreement State
24	92	Al	Reynolds, VA	^{226}Ra	unknown	~~Agreement State~~
25	92	Fe	Border Steel, TX	^{137}Cs	4.6-7.4	Agreement State
26	92	Fe	Keystone Wire, IL	^{137}Cs	unknown	Agreement State
27	92	Cu	Estonia/Russia	^{60}Co	unknown	
28	93	Fe	Auburn Steel, NY	^{137}Cs	37	Agreement State
29	93	Fe	Newport Steel, KY	^{137}Cs	7.4	Agreement State
30	93	Fe	Chaparral Steel, TX	^{137}Cs	unknown	Agreement State
31	93	Zn	Southern Zinc, GA	DU	unknown	Agreement State
32	93	Fe	Kazahkstan[c]	^{60}Co	0.3	
33	93	Fe	Florida Steel, TN	^{137}Cs	unknown	Agreement State
34	94	Fe	Austeel Lemont, IL	^{137}Cs	0.074	Agreement State

Notes

[a] See text footnote (e) for references.

[b] Multiple cases have been reported. The earliest occurred about 1910.

[c] Contaminated product exported to US.

[d] At least one contamination incident occurred in this time frame resulting in contaminated plumbing fittings exported to the U.S. There have been reports of contaminated structural steel used in buildings in Taipai, Taiwan that were built in this time frame (Marley 1993).

Attachment

DECONTAMINATION, STORAGE, AND DISPOSAL COSTS RESULTING FROM THE SMELTING OF RADIOACTIVE SOURCES

	Average	High	Low	Facility 1	Facility 2	Facility 3	Facility 4	Facility 5
Cleaup Costs	$ 2,494,956	$ 3,866,778	$1,200,000	$3,866,778	$3,000,000	$ 2,000,000	$ 2,408,000	$ 1,200,000
Disposal & Storage Costs	$ 6,986,085	$12,500,000	$3,030,427	$3,030,427	$5,400,000	$ 6,500,000	$ 7,500,000	$12,500,000
Lost Profits	$ 3,822,130	$13,000,000	$ 360,651	$ 360,651	$1,400,000	$ 2,500,000	$13,000,000	$ 1,850,000
Total	$13,303,171			$7,257,856	$9,800,000	$11,000,000	$22,908,000	$15,550,000

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