

THE BARRIERS ARMR FACES IN ACHIEVING METAL RECYCLE FROM RADIOLOGICALLY CONTAMINATED SCRAP METAL

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ABSTRACT

From 1995 to present, the turbulence surrounding the companies providing recycle services and the holders of such metals including the DOE have come to an impasse on the process seemingly on the basis of economic reasoning. Currently, the DOE has reduced or eliminated metals contracts outside of the "Privatization" effort and the commercial sector is paralyzed by the disposal option. It is an industry that reached 15,000 tpy in 1995 and has since fallen to less than 10,000tpy as a result. This paper examines the current condition and the on-going efforts the association and regulatory bodies such as EPA and NRC have toward making a sensible future for this fledgling industry. The regulatory environment is seen as key to the future of this important work.

INTRODUCTION

ARMR has been the Industry advocate for metal recycle for more than 4 years now. Formed in late 1995, this industry association comprises the majority of companies who have a stake in processing contaminated materials, be they categorized low-level wastes, debris or metals for recycle.

They are not the only activities with a stake in the process we have learned. The owners of such contaminated materials have a vested interest in the process: Engineers, Demolition Contractors and Laboratories and Universities have a similar stake. Princeton University is interested in metal recycle because it faces the disposition of the Tokamak reactor there from Fusion Experiments conducted from the late 70's through to the early 90's. Argonne National Lab is interested in metal recycle because of its D&D activities and retirement of surplus facilities dating from CP-1.

Argonne currently teaches a comprehensive decommissioning course there (5 days) building upon its experience with the recent decommissioning of CP-5 and the industry alliance with commercial utilities such as Commonwealth Edison of Chicago. ComEd eventually faces the task of decommissioning more than a dozen reactors from its inventory of active and retired plants and facilities.

If we focus on the contaminated metals alone, how do we expect the process to go? We know the approximate tonnages of metals to be dispositioned from both commercial and DOE (gov't.) sources. We know where the regulations stand today, and importantly, we know that the nearest competition to recycle/reuse continues to be direct disposal in some fashion (sometimes with

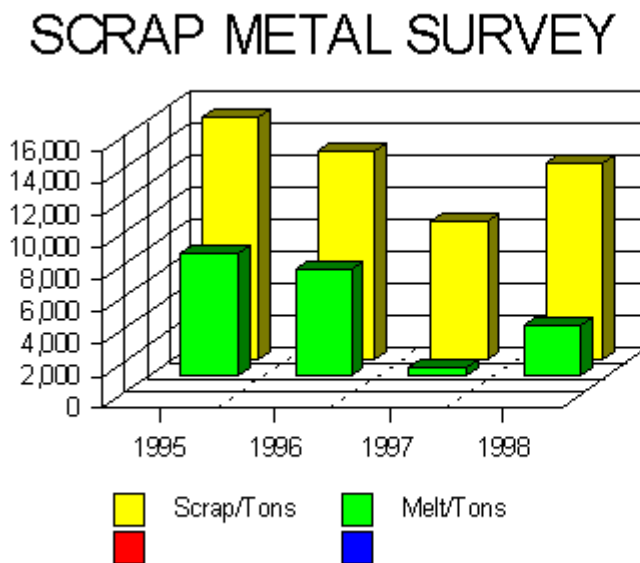
treatment and sometimes without treatment). We have continuously explored this topic within our annual Beneficial Reuse conference series given in Knoxville during the summer months each year (I believe the date for this year's conference will be the week of July 26th) and the conference usually lasts 3 to 3 and 1/2 days.

This paper addresses the barriers to metal recycle that are recognized today in two principal categories: Economics and Regulation.

TRACK RECORD

ARMR has been conducting surveys of the metals processing and recycle since 1995. This means we have an identifiable industry with at least a 4 year track record wherein the players are known. It is interesting to note that the number of players in this industry has doubled from those early years.

Figure 1 shows the Scrap Metal Data we have compiled in recent years beginning with 1995. The importance of this data is to establish the existence of a quantifiable business activity, but at the same time to establish trends as our expectation of developments from both the commercial nuclear markets and the DOE complex. This then taken together with the changes in our regulatory climate might prove the effect or benefit of any changes. Naturally, our processor companies (those that are immediately in the business of processing the metals) view this very simply. Does the DOE with its vast stockpiles of metals represent an addition to my business opportunity?



In the short term, the answer to this question was, “no substantial effect” as DOE ran out its earliest contracts and moved onto “Privatization” as it is called.

Curiously, at the same time this was happening, the commercial sector got caught up in deregulation (of electric utilities) which gave pause to those companies shipping metals and attention was shifting to the Decontamination and Decommissioning of uneconomical assets (powerplants).

From a metals recycle standpoint, DOE dismantlement and Utility Decommissionings should provide substantial sums of metals for recycle. The DOE portion is often viewed as more than 1.0MM tons in inventory while the commercial nuclear plants would provide 641,000* tons when all passed their timelines.

Figure 1 points to 1997 as the year of decision. During 1997 virtually no melt projects were undertaken and total metals recycle dipped to 8630 tons.

With the results of the 1998 survey, we are happy to say that this industry is now on upswing. While 1995 was peak for this work, 1998 places us well on the track to exceed those numbers possibly this year. DOE's contribution (1266tons from the data) is now 10% and climbing. We also expect the first metals from decommissioning of commercial nuclear plants to have an impact.

THE SCRAP METAL MARKET

Scrap value enters into the market equation for processing and recycling of the metals. The higher the scrap value, the lower the cost of processing and disposition. As a generality, Carbon Steel (4cents/lb.) Is approximately 3% of processing costs while Nickel pays for itself. Since we are more often not dealing with Nickel, the table below gives the reality for offset of process costs.

- Table 1 shows over the last three years declining prices for virtually all types of metals. Since 1995, Nickel has dropped from \$4.00+ to \$1.43 per pound, less than 1/3 its earlier value. Copper: 85¢ has dropped to 60¢; Aluminum has dropped from 55¢ to 31¢; Stainless had a jump in 1996
- IES Date, study dated 6/13/97 making assumptions by LWR Type: PWR or BWR, page 2-11.

TABLE 1. SCRAP METAL MARKET (Annual Averages/Source: American Metals Market)				
Year/Type	1996	1997	1998	
Nickel/Metric Ton	\$7304	\$6688	\$3256	
\$/lb.	\$3.32	\$3.04	\$1.48	
Copper/Metric Ton	\$1848	\$1804	\$1914	
\$/lb.	\$0.84	\$0.82	\$0.87	
Alum./Metric Ton	\$1078	\$1122	\$1034	
\$/lb.	\$0.49	\$0.51	\$0.47	
Stainless/Metric Ton	\$338	\$330	\$253	
\$/lb.	\$0.154	\$0.15	\$0.11	
Carbon Steel/ Metric Ton	\$145.97	\$145.79	\$120.91	
\$/lb.	\$0.07	\$0.07	\$0.05	

Since the majority of metals processed include Carbon Steel and Stainless Steel, things have not changed much for these in the last 3 years. The value of these metals in recycle vary only 3% to 12% of processing costs. Thus while important, we do not look to the scrap metal market to make the case or value for processing and recycle. The incentive has to come from somewhere else.

The DOE is known to have a large inventory of Nickel and possibly Aluminum and Copper. The question of processing and recycle of these metals will need to be addressed on a case basis. But, as you can see the DOE should have acted 3 years ago to maximize its return on the Nickel.

DISPOSAL COSTS

Disposal costs vary with each disposal site in the commercial sector and within the DOE. It has been our goal to keep metals from being buried along with other Low-Level Wastes on the basis they could be cleaned and recycled. Our ability to do that will pit the cost of processing to the cost of disposal everytime.

It isn't possible within this paper to detail each condition and each site that accepts LLW including metals but we have done a cursory survey with the following results:

Among the commercial sites, disposal costs range according to the table:

TABLE 2. COMMERCIAL LLW DISPOSAL COSTS			
	Barnwell, SC	Richland, WA	Envirocare, Utah
Type Wastes	Class A,B,C, SNM*	Class A,B,C,SNM	Class A, SNM, Mixed Wastes
Costs (Range) \$/cf	330-550**	65-235	50-120
Equiv. Metals Disp. Costs @ 70 #/cf	\$4.70+ per lb.	\$0.93-\$3.35 per lb.	\$0.71-\$1.71 per lb.

* 10CFR61 Definitions

** Cask Shipments are generally the higher cost shipments for disposal.

If we were to assume processing costs in the range \$1.25 to \$1.50 we observe that Barnwell disposal costs clearly favor metals processing, but the other two sites do not unless scrap value can make up the difference.

We have a similar table for DOE sites (estimates) surveyed a couple of years ago.

TABLE 3. DOE SITES' LLW DISPOSAL COSTS			
	Sav. River	Hanford	Nev. Test Site
Type Wastes*	All but MW & TRU	All but MW & TRU	All but MW & TRU
Costs \$/cf	\$100	\$80	\$17
Equiv. Metals Disp. Costs @ 70#/cf	\$1.43	\$1.14	\$0.24

- Wastes are subject to qualification criteria (WACS) at each of the sites.

Clearly, within DOE sites, the situation for recycle is worse. DOE could choose to bury everything but fortunately it hasn't done so. There are other societal and economic concerns to address. We believe environmentalists favor cleaning and recycle. Fundamentally, our society embraces recycle as an achievement over largess in consumerism and planned obsolescence and throwaway that have caused our landfills to fill up!!

In any case, we haven't made the economic case for recycle and that is a barrier.

REGULATORY CLIMATE

The EPA and the NRC have had turns at the issue of release of formerly contaminated materials from the nuclear industry and the DOE as a whole. The industry has had problems with fugitive sources arriving at the steel mills and intruding the melt before they are discovered. We have upcoming problems for NORM materials that are more prevalent than we previously thought. And, finally the steel mills with monitors are able to capture Reg. Guide 1.86 materials because there is no standard to set them. Thus the steel mills use a default setting that is background only.

When we speak of stakeholders: we have the International Community, we have the Steel Industry (including the Scrap Recycle Industry), we have Manufacturers and we have Environmentalists of various persuasions and we have the public at large.

Nowhere in our efforts to date, have we been able to bring them together to an understanding that we have a need for standards that will benefit the public health and safety as well as our industry. So we stand transfixed in our current position, working with Reg. Guide 1.86 and making the best of it. Reg. Guide 1.86 as you know, provides NRC surface criteria for release of materials (including metals) which were formerly contaminated or were cleaned to remove contamination. These criteria are surface criteria only but they have been utilized successfully since 1974. And, recently, the EPA found in its study toward "Dose/Risk Based Clearance Standards" that the Reg. Guide was adequately protective of the human health and the environment.

The EPA dropped its effort a year ago when rulemaking for a scrap metal rule did not meet with industry approval and the environmental community got up in arms because we would attempt to do anything with this problem.

Since then the NRC has resumed study of its regulatory options in dealing with release of materials and equipment (including metals) with small residual radioactivity. The commissioners also agreed last year that the NRC would proceed independently on this. As of this writing, the NRC is in the research phase and is soon to release its risk analysis data under NuReg. 1640 which is the data put forth by SAIC. The NRC and the EPA both felt a risk based regulation was the proper path forward as the NRC promotes a "Risk Informed and Performance Based" approach to new regulation from the NRC.

The EPA is presently limiting its activities to the issues of:

- Orphaned Sources (Fugitive Sources) and their recovery and regulation.
- Foreign Trade and Imports (consistent international standards).
- Domestic Standards Initiative (idled last year).

Will the current NRC initiative produce a rulemaking? We don't know! We feel Dose/Risk based standards are a good idea for their value in determining what is radioactive and what is

not? The industry has a lot of comfort with things as they are. When the EPA challenged the Reg. Guide 1.86 format, and attempted to replace it, the nuclear industry balked at the conditions! Reg. Guide 1.86 works and there are case by case releases of materials beyond that which are petitioned by licensees which the DOE and NRC will consider. The NRC and the DOE (which is autonomous in these matters) have determined that petitions can be readily processed for cases where Dose/Risk are trivial as defined by the IAEA studies. We trust as the NRC Research moves forward, there will be a rule one day. Perhaps 3-5 years hence if we can make our case.

OBSERVATIONS:

This paper gives the results of four important areas for metals recycle: Metals Survey, the Scrap Metal Market, Disposal Costs and the Regulatory Climate. Are these barriers to metal recycle and have we covered everything? Most Likely they are and most likely, we have not.

That is to say, the scrap metal survey indicates the level of our business activity and it appears in an upswing today. So that is good, but is it sustainable?

We discussed the Scrap Metal Market (prices) and find the impact of most scrap value to be small in comparison to process costs unless we are dealing with the higher value metals such as Copper, Nickel or Monel.

We discussed Disposal Costs which have both a punishing and nullifying effect on metal recycle. If disposal can be had very cheaply, then it makes no sense to pay the additional costs of processing to recycle the metals. As far as land disposal is concerned, we need to ask if the long term effects are adequately protective of the human health and the environment (similarly as we are asked about release criteria) and if we are paying the true societal cost of land disposal. We believe only the Barnwell facility has a publicly avowed sense of societal cost and it is the only one that justifies recycle.

The Regulatory Climate is presented here but is not ranked as first, second or last. It is very important and we in industry feel this is unfinished business. Today's rules have not benefited metal recycle more than what we have been doing for the last 20 years. Is the current posture at EPA and NRC to embrace Dose/Risk based regulation enough to change the rules? Can we move ahead on the definitive need to state, "What is Radioactive and What is not"?

We don't think there is an opportunity for near term change (i.e. within the next 3-5 years) The reason for this is our stakeholder involvement is coming from such diverse directions that we cannot get together in the near term.

What we believe we can do is:

- Satisfy the Steel Industry on the fugitive sources issue through tougher regulation of these items.
- Begin regulating NORM materials (which is essential but not dealt with in this paper again primarily to satisfy the steel industry and begin

accounting for this; neither EPA nor the NRC have been willing to accept responsibility for these).

- Examine and respond to the international need for uniform regulation.
- Define the health risk so that all can understand.

By not moving on regulation or rules for general residual activity limits for materials and equipment (including metals) we see various industry such as automotive who specify limits of radioactivity from their suppliers. Will this then become a defacto regulation through practice. We in the industry would prefer a more forthright address and regulation of the question, "What is Radioactive and What is Not? Then and only then can we visualize the minimization of barriers to metal recycle as we know them.