THE BENEFICIAL REUSE OF [SUSPECT] CONTAMINATED LEAD STOCKPILES IN THE U.S. NUCLEAR COMPLEXES

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ABSTRACT

In recent years a number of programs funded by the U.S. Department of Energy [DOE] have attempted to demonstrate various methods to convert radioactive scrap metal [RSM] into useable products. However, with the recent DOE moratorium on RSM recycling efforts there is a need to revisit the technical options available to the stakeholders. In a response to this need, Bull Run Metal Fabricators and Engineers [BRM] has designed the Integrated Lead Shield Container (ILSC). The enclosure can be a standard DOT 7A Type A container engineered to incorporate a contaminated lead shielding component sandwiched between steel "skins." The directed reuse of contaminated lead in a container for shielding purposes as distinct from macroencapsulation and burial of the lead holds great merit for projects in need of shielded products. This application of "sustainability thinking" for beneficial reuse is a powerful tool for making recycling an integral part of sustainable development. Eco-efficiency must be based on public policy that incorporates the regulatory role of government and the competitive strategy of industry to maximize the latent value in the RSM stockpiles. This paper outlines BRM strategies for a public/private working partnership in economic asset reuse, which could be applied to a range of commercially viable products.

INTRODUCTION

In recent years a number of programs funded by the U.S. Department of Energy (DOE) have attempted to demonstrate various methods to convert radioactive scrap metal (RSM) into useable products. However, with the recent DOE moratorium on RSM recycling efforts there is a need to revisit the technical options available to stakeholders. In response to this need, Bull Run Metal Fabricators and Engineers (BRM) has designed the Integrated Lead Shield Container (ILSC). This technology is a viable application of "sustainability thinking," which is based on the practices of sustainable development and eco-efficiency.

SUSTAINABLE DEVELOPMENT

The current definition of "sustainable development" grew out of the 1987 Brundtland Report (also known as "Our Common Future"). The author of that report, Dr. Harlem Brundtland, former United Nations Secretary General, alerted the world to the urgency of applying economic development practices that can be sustained without depleting natural resources or harming the environment.

The rhetoric of sustainability grabbed the international headlines at the 1992 United Nations Earth Summit held in Rio de Janeiro, and it is a bandwagon that trend-conscious companies want to join. The goals of the 1992 United Nations Conference on Environment and

Development (UNCED), also held in Rio de Janeiro, are summarized in a document known as Agenda 21. The Agenda analyzes the challenges of and defines objectives for achieving a more efficient and equitable world economy.

When looking for a working definition of "sustainability," one is confronted with many options. Perhaps the best known is from the World Commission on Environment and Development; it succinctly states that development is sustainable where it "meets the needs of the present without compromising the ability of future generations to meet their own needs."

This philosophy can be applied in business by requiring company strategies to integrate economic, environmental and social criteria into management decisions. The commitment to sustainable development requires a long-range view since the parameters for measuring its success or failure are inexact.

The principal pro-business lobbying group known as the World Business Council for Sustainable Development (WBCSD) is actively promoting these practices. The WBCSD, a coalition of some of the 120 leading international companies, is providing the leadership needed to apply sustainable development and promote eco-efficiency in business. The message from these corporate leaders is clear: Rethink the logistics of sustainable development so it will become a winning business strategy for the 21st century. It is the intent of the WBCSD to:

- demonstrate business progress towards sustainable development and develop principles for measuring and reporting performance;
- help companies by sharing leading edge practices;
- construct the right business framework.

BRM exemplifies the risk-reward framework for evaluating the benefits of sustainability-driven investments. The company has demonstrated that eco-efficiency and responsible entrepreneurship coupled with innovative public management models *do work*.
Recycling policies and sustainability may seem strange bedfellows, but for successful implementation of radioactive scrap metal polices the government must deploy, balance and adjust a mix of resources to maximize value. From a strategic business perspective, the ability to work with recovered materials in a "market model" rather than a "regulatory model" allows for a commercial viability that offers a new look at RSM opportunities.

One of the working analogies at BRM is the triangular relationship among time, price and quality. BRM and its customers can negotiate price and time, but in the nuclear industry, quality is not negotiable; quality standards are mandated by federal regulations. In addition to this triangle, however, BRM applies the underlying concepts of eco-efficiency, known as "the triple bottom line."

TRIPLE BOTTOM LINE

The concept of a triple bottom line was developed by John Elkington, the co-founder of SustainAbility, a London consulting firm that teaches major corporations how to be more environmentally sensitive, socially active, and economically profitable – hence, the "triple bottom line." If a company is serious about applying a sustainable model it must simultaneously pursue economic prosperity, environmental quality, and social equity. This prevents the traditional "bottom line," which is based on financial consequences only, from being the sole driver of market decisions.

A small company like BRM is able to implement this eco-efficiency model through public/private networking. In conjunction with the DOE Center of Excellence for Metals Recycle, and teamed with Duratek, BRM has learned that this is the preferred strategy for realizing lower costs, making the most of recycling opportunities and gaining a competitive edge. An example is the development of the Integrated Lead Shield Container. The ILSC uses a process whereby contaminated lead that had been labeled a liability is creatively and safely converted into a real asset, saving money and resources while not compromising standards or adding to long-term liabilities.

The Department of Energy and many commercial nuclear facilities hold vast quantities of suspect contaminated lead. Stockpiled through DOE, the lead is becoming an environmental liability. Current regulations forbid the general recycling of this waste material into the commercial marketplace. Virgin lead is an inexpensive commodity, which makes decontamination unprofitable. Macroencapsulation and burial of suspect contaminated lead have been the end result, but that is not a solution to the waste problem.

ILSC technology provides one way of repositioning the lead stockpile from that of a direct liability to that of a deferred asset. This concept is not new. It is the basis of business for all scrap dealers – "one man's trash is another man's treasure." It also makes economic and environmental sense. Using the suspect contaminated lead to line nuclear waste containers, which are then buried, reduces the cost of a lead-shielded B-25 Type box by about $16,000.

Virgin lead lined containers cost between $25,000-$30,000, so the cost savings is significant. It becomes even more so when looking at the big picture. The cost of current disposal practices adds up to about $2.5 million per 1 million pounds of contaminated lead buried, or $2.50 per pound. This does not include the costs, such as site management, associated with long-term stewardship of the waste at the burial facility. The ILSC process reduces the cost to about $1.00 per pound.

The winners in the current scenario of macroencapsulation and burial are contractors who manage to remove the lead liability from the manifest; the macroencapsulator's and landfills that reap income from this kind of disposal; and the virgin lead smelters and processors.

The losers in the current scenario are DOE and commercial nuclear entities that pay the cost of the disposal of suspect contaminated lead that has no monetary or strategic value; the general public (taxpayers), which becomes the ultimate recipient of the industry's liabilities; and the potential re-users of contaminated lead, who could recycle the lead in an eco-efficient and economically productive way.

Recycling of contaminated lead through the ILSC process demonstrates that sustainable development practices are good for business and a prerequisite for responsible waste management policies. By developing ILSC technology, BRM has provided evidence that the "latent value" of RSM can be harnessed through beneficial reuse, thus conserving our resource base.

CONCLUSION

The disposal cost of - suspect contaminated - lead is high. The stakeholder is not required to consider much of the long-term cost associated with disposition. The stakeholder's contribution [of lead and disposition money] to the program makes the ILSC an economically viable end product that fulfills an immediate market need at a much lower cost.

The technology to produce ILSC's is relatively 'low-tech' and is currently available and operational. Containers fabricated and shielded utilizing the ILSC process are currently being manufactured and delivered to several M&I and M&O contractors throughout the DOE complex. Engineers at theses facilities are re-designing waste packaging programs to take advantage of this [cost saving] alternative.

In addition to the economic benefit, the ILSC program is environmentally desirable in that it contains and controls a potential mixed waste while reducing the need to introduce additional hazardous materials into the DOE waste stream.