DOE’s NEW MARKET THRUST: RESTRICTED REUSE PRODUCTS

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ABSTRACT

On January 12th, 2000, the Secretary of Energy issued a moratorium on the Department’s release of volumetrically-contaminated metals, pending a decision by the Nuclear Regulatory Commission. On July 13th, 2000 the Secretary of Energy suspended the unrestricted release for recycling of metal from radiation areas within DOE facilities. As part of this suspension, the Secretary promoted the reuse and recycling of these metals within the complex. The restricted reuse of such metals to meet various internal product needs, such as containers, casks, drums, and shielding materials, has been an important EM initiative since the July suspension. The status of DOE efforts to promote the beneficial restricted reuse of its inventory of metals from radiation areas is the focus of this paper.

BACKGROUND

During 2000, due largely to concerns from the steel industry, the U.S. Department of Energy (DOE) implemented two policy-based decisions that have placed a great deal more importance on the internal recycle and reuse of excess metal inventories. These two policies have together significantly restricted the potential availability of “free release” paths for metals resident within DOE radiological areas into the commercial scrap metal market. Presently, the DOE is responding to this challenge by redefining its metal recycle and reuse business. This paper first provides a brief history of the metal recycle and release policy changes which occurred within DOE during 2000, and then offers some insights and examples as to how DOE is responding to both the challenges and opportunities associated with this new restricted reuse market thrust; a market which is focused more aggressively on encouraging restricted reuse strategies for the growing excess metal inventories residing in the Department.

In late 1999, concerns over the Department of Energy’s free release policy were expressed to the Secretary by the Metals Industry Recycling Coalition (MIRC) and others. The MIRC is an ad hoc coalition of U.S. metals industry trade associations, comprising the American Iron and Steel Industry, the American Zinc Association, the Copper and Brass Fabricators Council, the Nickel Development Institute, the Specialty Steel Industry of North America and the Steel Manufacturers Association. All of the members of MIRC consume metal scrap to make new metal products. These metals industries use sensitive and highly sophisticated radiation detection systems to prevent the accidental melting of sealed sources that have escaped appropriate regulatory oversight, and which have been inappropriately discarded within the domestic scrap supply. The inadvertent melting of sealed sources by MIRC members has resulted in potential health risks to workers and has cost these industries, on a number of occasions, millions of dollars per incident for the remediation and the disposal of contaminated
products, waste streams, mill equipment and surrounding property. Accordingly, MIRC members have both strong worker safety and financial interests in keeping unwanted radioactive material out of their steel mills and furnaces.

All MIRC members have set their radiation detectors at their portal gates and along their process lines at slightly above background levels, to protect against the possibility of sealed sources ending up in the melt. Of the more than 3,800 documented detector alarms at the portal gates of metals processing facilities across the USA, over 95% have been attributed to naturally occurring radioactive materials (NORM). To date, no documented alarm has been attributed to DOE scrap.

On January 12th, 2000, the Secretary of Energy issued a moratorium on the Department’s release of volumetrically-contaminated metals, pending a future set of decisions to be made by the Nuclear Regulatory Commission (NRC). This would, in part, allow the NRC sufficient time to proceed with a proposed rule-making, which would ostensibly set national standards for the release of solid materials (see 64 FR 35090). If the NRC determines to proceed with its proposed rule-making process, the moratorium will continue throughout the process, and the DOE is expected to support the NRC’s efforts. In May 2000, the NRC decided to ask the National Academy of Science to evaluate its work-to-date on the proposed rule making, and thus an additional delay in the NRC process is anticipated. It is anticipated that NRC will begin its proposed rule-making determination process during 2002, as the NAS has proposed a completion date of its study in the December 2001 time frame.

Then on July 13th, 2000, the Secretary took steps to ensure no metals with “detectable contamination” were released from Departmental facilities by suspending the unrestricted (free) release of metals from radiological areas into commercial scrap markets. The suspension was to be in effect until such time as sites could demonstrate the newer, more rigorous standard was met. This decision essentially broadened the previous ban to include surface-contaminated metals. As part of this suspension, the Secretary directed programs to actively seek the cost-effective and safe reuse and recycling of these metals inventories into needed restricted (internal) reuse products, such as containers, casks, drums, and shielding products. As a result of this directive, the Department is more engaged in a number of complex-wide initiatives to promote more effective internal recycle and reuse alternatives for excess metals and equipment affected by the moratorium and/or suspension actions.

The July 13 directive challenged the Department’s managers “to think creatively and come up with incentives to promote internal reuse and recycling.” While this “suspension memo” primarily focused on ensuring that metals from DOE’s radiological areas are not recycled into consumer products, the Secretary’s emphasis on internal reuse is a potential boon for both DOE owned and operated metal smelting and fabrication facilities and licensed radioactive waste management firms, such as GTS Duratek, Manufacturing Sciences Corporation, Starmet-CMI Corporation, and many others companies that are affiliated with the Trade Association of Radioactive Metal Recyclers (ARMR).
To many, the July directive seems to threaten the long term growth and viability of traditional “clean-for-release procedures,” such as the use of time-tested chemical and physical decontamination methods which have been used in conjunction with DOE approved survey-for-release clearance tables. For decades DOE Order 5400.5 and NUREG 1.86 have been successfully applied by DOE and NRC regulated firms (respectively) to the safe and cost-effective release of metals from radiological areas into the domestic commercial scrap metals recycling market.

However, the recent moratorium and suspension actions by the Department have also generated many restricted recycle and reuse opportunities, particularly for those DOE sites, national laboratories, and licensed commercial waste management companies that have positioned themselves to offer a wide range of innovative internal recycle and reuse alternatives to both free release and burial options. Since the suspension, a number of complex-wide initiatives have been identified (some of which have already been implemented) that may prove to be of long-term interest to some portion of the existing DOE, national laboratory and commercial waste management communities.

DOE REUSE AND RECYCLING TASK FORCE

As a direct outgrowth of the concerns expressed by MIRC and the steel industry as a whole, the Secretary of Energy established a “Reuse and Recycling Task Force” in February, 2000. The task force, which was to review Departmental policies regarding free release of all materials for reuse and recycling, completed its work in July, 2000. Various options were evaluated that considered the industry’s concerns while also fostering safe, fiscally responsible, and environmentally sensitive strategies for the recycle and reuse of metals within the DOE complex. As part of this task force’s mission, an evaluation was conducted of the various disposition paths presently open to surface (not volume) contaminated metals, including disposal, restricted (internal) reuse, and unrestricted (free) release. While internal recycling of some materials was more developed, other materials such as scrap carbon steel from decommissioning of nuclear facilities had little or no established reuse pathway.

The adequacy of the existing surface release guidelines used by DOE for the free release of materials, such as radioactive scrap metals (RSM), were also looked at by the task force. These criteria, found in DOE Order 5400.5, have in the past been fully certified as protective of both worker and public health. No evidence appears to have emerged as a result of the task force review that would dispute this. However, it was clear that the potential impact on the scrap metals industry by even one instance of detecting contamination in DOE scrap metal in the future, or even the perceived lack of market confidence by MIRC members for DOE metals, may impact DOE’s RSM recycle and reuse objectives. The task force did, however, find improvements were needed in record keeping and documentation related to releases. While the actual recommendations of the task force have not been made available, the result was that the Secretary decided to put the Department down the path of modifying DOE Order 5400.5. The revision would “improve the Department’s management of information about release inventories...
and establish requirements to limit release of metal for recycling to only metal that is shown to have no detectable residual radioactive material.” The revised order is expected to be in place in 2001 and will essentially limit future release of metals to residual radioactivity levels at or below background.

DOE’s CFO BUILDS INCENTIVES FOR THE RESTRICTED REUSE MARKET

As an outgrowth of the Department’s moratorium and suspension actions, the DOE is presently defining and implementing a series of safe and cost-effective restricted reuse responses that will encourage this new emphasis on internal recycle and reuse markets. Secretary Richardson challenged the Department to institutionalize and codify internal restricted reuse waste management policies and procedures. To that end, he called upon DOE’s Chief Financial Officer (CFO) to identify ways to institutionalize (through financial incentives) large-scale internal recycle and reuse of excess metals and equipment from radiological areas. These incentives, to include the following, are being designed to promote this emerging internal reuse market within the context of “return on investment,” as well as supporting the dual benefits of waste minimization and pollution prevention (P2). Some of the proposals that have been submitted to the CFO for consideration are as follows:

- **Establish a centralized source of DOE-wide project funding** that can be used for approved P2/restricted reuse project requests. Funds distributions to the 11 field offices would be recommended by the Waste Reduction Steering Committee, with the approval of DOE’s Environmental Executive.
- **Expand the use of the CFO-approved Generator Set-Aside Fee (GSAF) funding approach.** This approach taxes generators a small percentage of their total waste costs. Such funds are set-aside for P2/restricted reuse projects targeted at eliminating waste streams with the highest costs.
- **Require sites to “set-aside” a percentage of their budget** (within their existing site cap) to exclusively fund P2/restricted reuse projects.
- **Raise the DOE budget priority for P2/restricted reuse projects** that result in waste reduction and cost savings for DOE sites. This would allow P2/restricted reuse projects to compete with compliance-driven projects within the individual site budget caps.
- **Establish a “revolving fund” source of capital** for approved P2/restricted reuse projects. Make sites that “borrow” funds payback their loan through site waste reduction and cost savings. Sites are responsible for cost savings from P2/restricted reuse projects to payback the original investment.
- **Change site accounting systems** to require that cost savings from P2/restricted reuse projects be deposited in an investment account to fund future P2/restricted reuse projects.
- **Establish a standardized “Bartered Sales” procurement process** to maximize the reuse of excess equipment across the complex, and within licensed commercial firms. This process would allow for DOE sites to receive bartered remediation service.
compensation from commercial licensed companies who take legal possession of surplus equipment from radiological areas.

EVALUATION OF A METAL MELT PARTNER FOR LARGE SCALE REUSE

In the July directive, the Secretary also directed that a feasibility study be conducted on the potential use of a dedicated mill to recycle metals within the Department of Energy (DOE). The primary study objective was to determine the economic viability of recycling surplus carbon steel, stainless steel, and nickel from DOE’s decommissioning and cleanup activities into restricted use metal products (e.g., radioactive waste containers). The Office of Energy Efficiency and Renewable Energy (EE) was given the lead within the Department for the study.

On August 22nd, the DOE issued a “Notice of Program Interest” (NOPI) to determine the economic viability of recycling the Department’s surplus carbon steel, iron, stainless steel and nickel into “restricted reuse” products, such as low level waste containers and shielding walls. In this NOPI, the DOE noted that between 20,000-60,000 tons of metal per year will potentially be made available over a 30-50 year time frame, in support of this massive commercial metal melt and container fabrication effort.

In support of this expression of interest, and to help the Department determine both the quantity of metal inventory available over the next few decades, and the market-based need across the DOE complex for restricted reuse products, two DOE data calls were conducted. The first data call, which was focused on collecting information across the DOE EM sites on the potential feedstock of carbon steel, iron, stainless steel and nickel for the proposed dedicated steel mill (Surplus Metals, or the “Feeds” Data Call), was disseminated to the DOE sites during late August, 2000. The second data call, which was focused on restricted reuse product demand across the entire Department (the Demand, or “Needs” Data Call) was disseminated during mid September, 2000. Together, these data calls were defined in order to support a future decision by DOE as to whether it should invest in the long-term use of a dedicated electric metal melt facility to meet internal demand for metal products using its own surplus feedstock.

The Feeds Data Call revealed that the DOE has approximately 1.1 million tons of metal (see Table I.) available for potential reuse efforts over the next 35 years, almost all of which is being generated from decommissioning of surplus facilities. Nearly 80% (873K tons) of this inventory

<table>
<thead>
<tr>
<th>Metal</th>
<th>Inventory</th>
<th>Generation from D&amp;D</th>
<th>Total by Metal</th>
</tr>
</thead>
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<tr>
<td>Carbon Steel</td>
<td>85,198</td>
<td>787,859</td>
<td>873,057</td>
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<tr>
<td>Stainless Steel</td>
<td>6,609</td>
<td>167,394</td>
<td>174,003</td>
</tr>
<tr>
<td>Nickel</td>
<td>9,700</td>
<td>27,906</td>
<td>37,606</td>
</tr>
<tr>
<td>TOTAL</td>
<td>101,507</td>
<td>983,159</td>
<td>1,084,666</td>
</tr>
</tbody>
</table>

All metal quantities are in tons.
consists of carbon steel and iron. The remaining inventory, as measured by responses to this data call, consists of approximately 175K tons of stainless steel and 37K tons of nickel. Together, the Oak Ridge and Idaho Operations Offices account for approximately 93% of this projected inventory of 1.1 million tons. Nearly 58% of the entire inventory, and 100% of the nickel, will come from the Oak Ridge site (which includes the three gaseous diffusion plants). Approximately 35% of the entire inventory, and 78% of the stainless steel resides at the Idaho facility. Some summary charts are presented below.

* Note: For the 5 year periods beginning in FY-2011, the listed metal quantities equal the generation/year

Fig. 1. Quantity of Metal Feeds
The Needs Data Call revealed that DOE will need approximately 263K tons of metal to meet its demand for steel containers and other metal products over the next 35 years. Approximately 61% (160K tons) of this need was for carbon steel. The need for “B-25” type boxes, larger containers and 55 gallon drums dominated the product needs in this data call. Together they represented nearly 80% of the demand for metal products that could potentially be fabricated from the Department’s inventory of excess metals over the next three decades. It is acknowledged that the Needs Data Call has larger data limitations (and wider confidence ranges) associated with it than did the Feeds Data Call. Summary charts from the Needs Data Call are presented below.

Fig. 2. Operations Office Contribution to Specific Metal Quantities
As of the writing of this paper, no final report is available on the feasibility study. However, a review of the data and preliminary drafts yield some observations. At life-cycle quantity levels, it appears that the potential quantity of excess metals available for use outweighs the potential demand for internal use metal products. That is certainly encouraging in terms of finding opportunities for internal reuse. This data can be misleading, however, if interpreted incorrectly. If taken out of context and without the benefit of rigorous analysis, it could seem to support the notion that a large-scale facility (such as an existing commercial steel mill) could feasibly process...
the Department’s excess metals into reusable products. A closer look at the data and preliminary analysis indicates such an approach would require substantial subsidy and in fact, would bear large programmatic risks. On the other hand, the data does demonstrate considerable opportunity for targeted approaches using capabilities currently available in industry. An example would be addressing the need for high alloy steel (such as Alloy 22) in a future repository by using excess contaminated nickel from the Gaseous Diffusion Plants. The NOPI sent out in August will hopefully be followed by other opportunities for servicing future needs using excess metals.

RECYCLE AND REUSE OF SURPLUS LEAD: A COMMERCIAL MARKET SUCCESS

As a direct outgrowth of the Secretarial direction to develop cost-effective and safe restricted reuse markets for surplus metals from radiological areas, the DOE National Center of Excellence for Metals Recycle, together with GTS Duratek Inc., and team member Bull Run Metal Fabricators and Engineers LLC., defined a new market for surplus DOE lead that would traditionally be disposed of as mixed waste. The first success of this new commercial market occurred on October 23, 2000, when nearly 20,000 lbs. of surplus lead from the Department’s Hanford Reservation that was slated for disposal was instead melted at GTS Duratek and reused as shielding within seven canisters that were needed by DOE’s Pacific Northwest National Laboratory (PNNL) for on-site use. Fifty more of these PNNL canisters are expected to be fabricated and filled with Hanford’s excess lead by the GTS Duratek team in the next few months. Other orders for shielded containers of various dimensions and shielding capability from the Savannah River Site, and other DOE sites, have been confirmed. Those licensed waste management firms, and DOE sites (i.e. OR, SR, RL) with the capability to melt contaminated lead and/or to fabricate restricted reuse metal products, such as shielded containers and shielding walls, may indeed find large new business opportunities in this emerging beneficial reuse arena. In addition, DOE is presently developing a lead reuse policy that will both stimulate the reuse of excess lead and minimize the purchase of new lead.

SUMMARY

In summary, the Department is changing its focus to more beneficial reuse and less free release of excess materials. This shift should be looked upon as new opportunity to leverage industry’s creativity in helping the Department achieve its goals. Given the longstanding pressures being placed on the Department, this is a trend that will likely continue as long as the Department continues to perform significant cleanup and facility decommissioning activities.