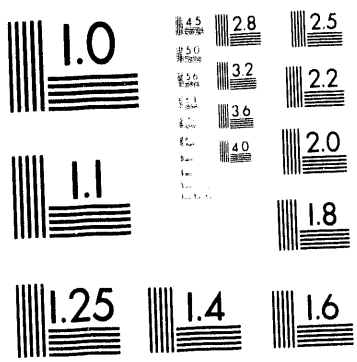
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FERNALD WASTE RECYCLING PROGRAM

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THE FERNALD WASTE RECYCLING PROGRAM

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ABSTRACT

Recycling is considered a critical component of the waste disposition strategy at the Fernald Plant. It is estimated that 33 million cubic feet of waste will be generated during the Fernald cleanup. Recycling some portion of this waste will not only conserve natural resources and disposal volume but will, even more significantly, support the preservation of existing disposition options such as off-site disposal or on-site storage. Recognizing the strategic implications of recycling, this paper outlines the criteria used at Fernald to make recycle decisions and highlights several of Fernald's current recycling initiatives.

INTRODUCTION

The Fernald Plant, known formerly as the Feed Materials Production Facility, is located on a 1,050 acre site 17 miles northwest of downtown Cincinnati, Ohio. Site construction was initiated in 1951 to fabricate uranium metal to meet defense production requirements of the Department of Energy. In October 1990, the DOE transferred management responsibility for the site from its Defense Programs organization to the Office of Environmental Restoration and Waste Management. In August 1991, the site was renamed the Fernald Environmental Management Project (FEMP) to reflect the site's new cleanup mission.

The Fernald facility has been designated as a Superfund site under CERCLA. The site is now being remediated under terms of a Consent Agreement with the USEPA and a Stipulated Amendment to the Consent Decree with the State of Ohio.

The cleanup of Fernald will generate enormous quantities of radioactive hazardous and mixed waste. This waste can generally be categorized as metal, concrete, transite, soil and the content of multiple waste pits. The total estimated waste volume resulting from the cleanup at Fernald is approximately 33 million cubic feet. Of this amount, the removal of 200 structures within the CRU3 production area will generate approximately 370,000 tons of metal, 197,000 tons of concrete, and 3,000 tons of transite. It is this CRU3 production area waste that has the most potential for recycling.

MATERIAL DISPOSITION OPTIONS

Before considering the factors that lead to a recycling decision, one must understand Fernald's current alternatives to recycling. These alternatives include: disposal of waste at DOE burial sites (such as the Nevada Test Site) or burial/storage of waste on site at Fernald (if approved under CERCLA).

Disposal at Nevada Test Site

Currently, the vast majority of Fernald waste is shipped to the Nevada Test Site for shallow land burial. As indicated in Table 1, an unusually large proportion of current waste volume buried at the Nevada Test Site comes from Fernald. Although a very high percentage of the total NTS waste, these figures include only Fernald backlog waste. Since remediation at Fernald has not yet been

initiated on a large scale, it is clear that Fernald will have an even larger impact on the total volume of waste buried at NTS in the future.

PLACE TABLE 1 HERE

This high concentration of Ohio waste going to the NTS is of concern to the Fernald facility. We have learned over the past twenty years in the commercial waste disposal world that when a large percentage of waste is generated in one region of the country and disposed of in another, political ramifications can be severe. Witness the high concentration of low-level nuclear waste shipped from nuclear utilities to Barnwell, SC in the late 1970's and the subsequent passage of the low-level radioactive waste policy act which encourages the formation of regional waste disposal compacts. Over the past several years, we have also witnessed litigation due to attempts of several States to limit the import of hazardous waste. This is not to say that similar situations will arise at the Nevada Test Site. In fact, NTS is an ideal site for disposal of DOE waste. It would, however, be naive to assume that all Fernald waste can continue to be buried in Nevada forever without limit.

On-Site Storage

A second option to recycling is the storage/burial of existing Fernald waste on site. Such an option can only be implemented as part of CERCLA records of decision for one or all of the five operable units at Fernald. Recognizing that the Fernald plant is located over a sole source aquifer that is already contaminated, it appears highly unlikely that all Fernald waste will be permitted to remain on site. It is likely that, if waste is allowed to remain on site at Fernald, it will include only the most innocuous waste such as fly ash or lime sludge.

Recycling

It is clear that all of Fernald waste <u>cannot</u> simply be "recycled" due to constraints in technology, cost and schedule. In the extreme, if we were to recycle all of Fernald's waste, it could take decades and cost billions of dollars. The real question then is, what portion of the existing Fernald waste can we properly and prudently recycle and, more specifically, what criteria should be used to determine whether certain classes of waste should be recycled? This is an important question because it is our belief that, without a prudent recycling effort, we jeopardize both the off-site and on-site disposal options.

RECYCLE DECISION CRITERIA

The Fernald plant has adopted a number of semi-subjective criteria to apply to the recycle decision. These criteria include the following:

Economics

How does the cost of recycling compare to the cost of disposal? What premium is DOE willing to pay to recycle DOE waste?

Comparing the cost of recycling to the cost of disposal is a relatively straight forward analysis. If Fernald were to simply ship waste to NTS, the major cost elements include labor, packaging, transportation and disposal charges. The most

significant factor is the cost of burial at the NTS. Fernald currently pays only $10/cubic foot while, in the commercial world, disposal cost including surcharges can be as high as $300/cubic foot. (This raises the question whether the $10/cubic foot charge for disposal at Nevada is a full life cycle cost.) The total cost of disposal can be compared to the cost of having a subcontractor recycle the material on a "turn-key" basis.

A recent scrap metal project at Fernald involved the recycling of 2200 tons of steel as an alternative to disposal. As illustrated in Table 2, the cost of recycling with a commercial company was approximately 18% higher than the cost of simply packaging and shipping this waste to the NTS. We believe that the recycle decision was the right decision for many non-economic reasons. But the decision raises some important questions. Just how much more would we have been willing to pay to recycle? Would this extra cost be considered an allowable cost for M&O or ERMC contractors?

PLACE TABLE 2 HERE

The economics of recycling can also be viewed from another angle. Using "paper" as an example, consider the cost of purchasing "recycled paper" rather than "paper." "Recycled paper" will by definition cost at least as much as "paper" simply because "recycled paper" is a specific subset of "paper." If it is economic to recycle paper, the "paper" that you purchase will almost certainly contain "recycled paper." What does this mean? If we shift our "paper" example to "waste shipping containers," it means that if DOE desires to procure waste containers fabricated from recycled DOE scrap metal, a premium will have to be paid. This again leads us to the question of the "premium" DOE is willing to pay for recycled products.

Impact on Cleanup Schedule

Will the choice to recycle impact the cleanup schedule? At Fernald, we recently initiated the D&D of Plant 7, one of the tallest and most visible buildings at Fernald. Initial plans included recycling relatively small gauge pipe covered with asbestos by removing the asbestos, splitting the pipe, decontaminating the pipe, and finally monitoring the pipe for free release. It was clear that, independent of economic impact of recycling this material, the decision to recycle in this manner would have a substantial negative impact on the Plant 7 cleanup schedule, delaying project completion by several months. As a result, the decision was made to recycle only 700 tons of plant structural steel and dispose of the smaller gauge steel directly at the NTS.

Availability of Disposal Options

Right now, the Fernald plant ships all of its low-level radioactive waste to the NTS. Can we assume that the disposal capacity at the NTS for Fernald waste is unlimited? Can we assume that DOE sites in other states will begin to accept Fernald waste? Can we assume that on site disposal options at Fernald will be approved under CERCLA?

It is clear that the availability of other disposal options will impact the recycling decision. At one extreme, if no disposal options existed, all Fernald waste would somehow have to be recycled. At the other extreme, with an unlimited disposal option, all Fernald waste might simply be shipped to NTS for burial.

The current availability of the Nevada Test Site does not, however, decrease the importance for recycling. Our ability to continue shipping waste to NTS may be dependent on our efforts to minimize the volumes we ship to Nevada by undertaking an aggressive recycle program. As a result, Fernald has taken a decidedly "pro-recycling" stance.

Impact on Worker Safety

Will a decision to recycle create safety hazards that would not be encountered if the waste material were simply buried? This is a pragmatic question that has to be answered by all DOE sites.

The work force employed at most DOE sites have been responsible for production activities. Historically, these workers have not been involved in handling heavy components that would be required to dismantle buildings and decontaminate large plant components for free release. On the other hand, commercial facilities are now in operation that have been set up to segregate, size reduce, decontaminate, monitor and release scrap material. Since these facilities were designed with this specific purpose in mind, one might presume that the specifically designed facilities, equipment and procedures in place would result in a safer operation. At Fernald, our preference is to handle only smaller components because of concern over worker safety.

Ability to Manage Liability

How do the environmental liabilities of recycling and disposal compare? Can these liabilities be managed? The decision to ship waste for off-site burial creates some concern about future liabilities. Under CERCLA, it has been proven that merely burying waste at a third party facility does not end the liability for the generator and the shipper. Time will only tell how great these liabilities are at a site such as the Nevada Test Site that is both ideally sited and controlled by DOE.

But recycling also has associated liabilities. The principle concern within DOE is that contaminated material is released into the environment may effect the health of the general public. In a sense, recycling creates a more immediate liability concern but avoids much of the longer term liability associated with disposal. Fernald is of the opinion that the liabilities associated with recycling can be managed through strict compliance with procedures, selection of well qualified subcontractors, and proper surveillance of the subcontractors and their processing, monitoring and release practices.

Existence of Commercial Recycle Market

Do the commercial markets exist to treat contaminated material and recycle or use the material that results? Fernald has plenty of material to recycle. The ability of Fernald to implement the recycle option is dependent upon the existence of commercial treatment options and the market for treated materials. Currently, Fernald has had dialogue with five companies who possess radioactive material licenses and have expressed a desire to take title to Fernald material for treatment (decontamination or beneficial reuse). These companies must, however, have an ultimate market for recycled products.

Currently, there are markets for some recycled metal products. SEG, for example,

has a contract with the DOE that enables them to melt contaminated metal to fabricate shield blocks for use in DOE high energy physics experiments. In this case, DOE provides both the material to recycle and the market for recycled products. Other initiatives are underway at Fernald to provide a market for waste containers fabricated from recycled metal provided by DOE sites. More difficult problems exist relative to concrete and transite. If, in fact, this material can be treated, what ultimate market exists for the modified products that result?

Existence of Free Release Procedures

Will free release limits be established for the release of all classes of material? Right now, regulations exist for the release of material contaminated with only surface contamination. At Fernald, we comply with DOE Order 5400.5 and Reg Guide 1.86, procedures that permit us to release material with surface contamination up to 1000 d/m per 100 cm^2 loose contamination and 5000 d/m per 100 cm^2 fixed contamination. Fernald is currently in the process of imposing additional administrative limits controlling the ultimate disposition of material with any measurable contamination above background. The option clearly exists to decontaminate and release surface contaminated material.

On the other hand, volumetric contamination creates a problem. DOE Order 5400.5 has limits related to "no added radioactivity." Any material with a potential for volumetric contamination has no release limits and can therefore be recycled only for "beneficial reuse" within a DOE controlled environment. Ultimately this regulatory difficulty will have to be addressed if we are going to be able to recycle large volumes of DOE scrap material.

Consistency with DOE Strategic Recycling Goals

Even if we could simply bury all Fernald waste, should we be concerned about the precedent that might be applied to valuable metals in inventory at Paduca, Oak Ridge and other DOE sites? Fernald, the site of the first ERMC, is a key site within the DOE recycling effort. Since large volumes of material will be generated at Fernald as cleanup accelerates over the next few years, Fernald believes it is important to demonstrate the ability to recycle these materials so that when the much larger volumes of material generated by other DOE sites becomes available, the precedent will be established for proper and prudent recycling. In other words, Fernald is in the vanguard of what we believe will be a thirty-year DOE recycling effort.

Consistency with Presidential Order on Recycling

What impact will Presidential Order #12780 have on Recycling decisions? This order requires that DOE "promote cost effective waste reduction in recycling or useable materials...from government activities" and that DOE integrate these programs "to assist in addressing the nation's solid waste disposal problems." Fernald desires to be very aggressive in implementing a recycling program to achieve the purposes of the presidential order.

Fernald Recycling Initiatives

With these fundamental recycling criteria in mind, the Fernald plant has embarked upon a number of initiatives for the recycling of Fernald waste. These

initiatives include the following:

Scrap Metal Piles

In 1992, the Fernald plant initiated a project to recycle/beneficially reuse 2,200 tons of scrap carbon and stainless steel comprising a large scrap metal pile. The carbon steel was melted by SEG for beneficial reuse as shield blocks within the DOE system. A smaller amount of stainless steel was decontaminated by Quadrex and free released to scrap metal dealers under their Quadrex Tennessee radioactive material license. A similar project is now underway for the recycle/beneficial reuse of 1350 tons of scrap copper.

Scrap Metal PRDA

Fernald, at DOE direction, is currently supporting SEG on a scrap metal demonstration sponsored by DOE-Morgantown under a Program Research & Development Announcement (PRDA). The purpose of the PRDA is to demonstrate the feasibility using DOE scrap metal for use in fabricating low-level waste shipping containers and other metal products. Under this PRDA, Fernald will supply 80 tons of stainless steel to SEG for decon and subsequent fabrication into these products. After shipping containers have been fabricated by SEG, they will be shipped back to Fernald for QA inspection and approval for use. These containers will then be used to ship actual Fernald waste to the Nevada Test Site. This demonstration supports Fernald's desire to create yet another market for treated (recycled) material.

Plant 7 D&D

Fernald is currently in the process of dismantling Plant 7 under a CERLA Removal Action. Fernald will contract for the recycling/beneficial reuse of approximately 700 tons of structural steel generated during plant dismantlement. As part of the same procurement, Fernald will place an order with the successful subcontractor to purchase waste containers with a metal content approximately equal to the 700 tons of metal. The goal is to create a market and thus promote commercial capacity for the fabrication of waste containers made from DOE recycled steel.

Material Release Facility

Fernald is in the early stages of establishing an infrastructure to survey, decon and release material in the process area that is currently clean or only slightly contaminated. The goal of this activity is to reduce the volumes of material that can potentially become contaminated or deteriorate due to continued delay in removal and treatment. This initiative involves regulatory clearance, material identification, public relations, preliminary surveys, monitoring, and establishment of a decontamination and free release facility at Fernald.

SUMMARY

Recycling at Fernald is perceived to be a requirement if we are to preserve our existing disposal options or to create new options for on-site disposal. In short, Fernald believes that a prudent recycling program is a prerequisite to maintaining options for waste disposition and thus a prerequisite for continuing site cleanup.

Disclaimer

TABLE I
Nevada Test Site Waste Disposal Volumes
(Cubic Foot)

	1991	1992	1993(9/5)
Fernald	341,000	775,000	488,000
Total NTS	341,000	866,000	599,000
Fernald %	100	89.5	81.5

TABLE II
SEG Scrap Metal Recycling Project (2210 Tons)

	DISPOSAL	RECYCLE
Labor		
Packaging (11328 hrs @ $30/hr)	$ 338,840	
Shipping (7080 hrs @ $40/hr)	283,200	
Containers		
Sealands (177 @ $2700)	477,900	
Transportation		
Shipments (177 @ $3000)	531,000	
Disposal		
Cubic Feet (238,950 @ $10)	2,389,500	
SEG		
Tons (2210 @ $2152)		$4,755,920
TOTAL COST	$4,021,440	$4,755,920

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