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Statutory and Regulatory Strategies for Source Separation of Batteries

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STATUTORY AND REGULATORY STRATEGIES FOR SOURCE SEPARATION OF BATTERIES

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ABSTRACT

One of the barriers to Municipal Solid Waste [MSW] incineration is concern for the heavy metals found in the solid waste stream. It is much simpler to remove items containing toxic heavy metals at their source and to recover the metals for reuse than it is to dispose of them by incineration and deal with the problems of toxic emissions and ash contamination. This paper will explore the nature and extent of heavy metal contamination of municipal solid waste from batteries, examine existing state and proposed federal legislation and regulations requiring source separation of batteries and propose possible improvements.

I. INTRODUCTION

When discarded items containing mercury, lead and cadmium are incinerated, these heavy metals are released. Without adequate air pollution control technology, these heavy metals enter the atmosphere.[1] Mercury is vaporized at MSW incinerator temperatures and is not captured as efficiently as other heavy metals by particulate control technology. If the MSW incinerator air pollution control technology captures the heavy metal particles before they are emitted, then the fly ash is contaminated with lead and cadmium, necessitating landfilling the ash as a hazardous waste. Incinerator ash that fails to pass the EPA leach test must be disposed of in hazardous waste landfills at a greatly increased cost per ton. Some incinerator authorities have found it more cost effective to return to landfilling all the MSW to avoid excessive ash disposal costs. Some states have responded by legislatively "detoxifying" ash.[2]

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1. The EPA has determined that emissions from Municipal Solid Waste (MSW) incinerators include lead, cadmium and mercury and has proposed their control in emission standards for both new and existing municipal waste combustors under the category of MWC metals.

2. *See e.g.* Michigan's Public Acts 52 and 53 of 1989 that transfers the management and disposal of municipal solid waste incinerator ash from the Hazardous Waste Act to the Solid Waste Management Act MCLA 299.401 to 299.437 to be buried separately from municipal solid waste.

II. WHY SEPARATE BATTERIES?

A. *Batteries in General*

Batteries, both lead-acid storage batteries and all "household" batteries - alkaline batteries, mercury button batteries, and nickel-cadmium rechargeables - are convenient sources of portable electricity. Without them we would crank cars by hand, be deprived of the convenience of flashlights and the pleasures of our "walkmans," and reduced to whisk brooms (instead of the ever popular "Dustbuster"®) and non-power screw drivers.

Batteries generate current by means of chemical reactions between heavy metal electrodes and an electrolyte. The types of metals chosen as electrodes are the essence of that battery, often designed for specific applications. In some instances, such as medical applications, the battery will be designed at the same time as the device to meet its specific power requirements.

Batteries include wet cells, such as the lead-acid storage battery in motor vehicles and even some lap top computers.[3] A lead-acid storage battery, which is rechargeable, consists of lead dioxide as the positive electrode and metallic lead as the negative electrode, which together account for half of the weight of a lead-acid battery.[4]

The other types of batteries are known as dry cells and include both single-use or primary dry cells, and secondary or rechargeable dry cells. Single-use batteries include the household battery, ranging in sizes from triple A to D, 9 volt, and large lantern cells with electrodes of either zinc and carbon or zinc and manganese (alkaline cells). These will be referred to generically as ordinary household dry cells. Single-use mercury batteries contain mercuric oxide electrodes[5], which account for 35-50% of the batteries' weight. Consumers most often see this type in the form of small buttons for watches, calculators, hearing aids and cameras. Mercuric oxide batteries are also used in specialized military, industrial and health care applications in triple A - D and 9 volt sizes as well as larger units.

Alkaline and zinc carbon dry cells also contain small amounts of mercury, which is used in every household battery as a coating on the

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3. B.F. Webster, *The Macintosh Portable*, MACWORLD, Nov. 1989, at 150.

4. FRANKLIN ASSOCS., LTD., CHARACTERIZATION OF PRODUCTS CONTAINING LEAD AND CADMIUM IN MUNICIPAL SOLID WASTE IN THE U.S. 1970 TO 2000 71-72 [hereinafter FRANKLIN STUDY].

5. Metallic mercury and mercury oxides are inorganic forms of mercury.

zinc, to prevent hydrogen gas production within the unvented dry cell, and also to prolong its shelf life. According to industry representative Raymond Balfour, vice president of Rayovac, the mercury is not in a concentrated form such as an electrode and therefore is not easily or economically recoverable for reuse.[6] The household battery industry was the largest consumer of mercury in the early eighties, and batteries contained almost 1% mercury by weight. Alkaline and zinc-carbon batteries also contain 0.02% by weight of cadmium due to an impurity in their casings.[7]

The dry cell industry has voluntarily reformulated its product to reduce significantly the amount of mercury used as an anti-gassing agent to 0.025% mercury by weight in alkaline cells and 0.01 % mercury by weight in zinc carbon cells.[8] Nevertheless, the EPA in its rulemaking for emission standards for municipal waste combustors stated that "[c]ommon alkaline manganese batteries contain 7% per cent mercury by weight."[9] Mr. Balfour explained that this discrepancy arose from a comparison of mercury to zinc by weight, rather than to total weight of the battery, and that the 7% figures represents early 1980's consumption levels before alkaline battery reformulation when mercury was running at 1% total battery weight.[10] Minnesota has accepted this explanation and exempted alkaline batteries from its household collection efforts.[11]

Rechargeable dry cells, as opposed to single use disposable batteries, have nickel and cadmium electrodes, with the cadmium accounting for 10-15% of the total battery's weight.[12] Eighty per cent of the nickel-cadmium batteries in use in the United States are found in cordless rechargeable appliances. These appliances are estimated to, on average, have a four year useful life. In these applications the batteries

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6. Meeting with Raymond Balfour, Vice President of Rayovac Corporation and household battery industry representative, in Wayne County, Michigan (May 3, 1990) [hereinafter *Meeting*].

7. FRANKLIN STUDY, *supra* note 4, at 196.

8. *Meeting, supra* note 6.

9. 54 Fed. Reg. 52209 (1990).

10. *Meeting, supra* note 6.

11. Discussed below at **III, D,** *(3).*

12. Table provided by Ray Balfour during *Meeting, supra* note 6.

are not accessible to the consumer for retrieval and source separation when the appliance no longer functions.[13] Nickel-cadmium batteries can also be purchased separately in sizes AAA to D and 9 volt, and can replace ordinary alkaline cells, but may not function as well.[14]

The down side of battery usage is determining environmentally sound disposal methods. That is required because of the high percentage by weight of toxic heavy metals such as lead, cadmium and mercury. These metals cause various adverse health effects that warrant finding some mechanism to minimize their presence in municipal solid waste destined for incineration.

B. *Heavy Metals in Batteries, and Their Health Effects*

Lead is extremely harmful to human beings and the ecosystem as a whole. It is known to cause cancer, birth defects and miscarriages as well as to damage human ability to reproduce. It attacks the blood, the kidneys and the central nervous system. At concentrations of 10 ppm it is harmful to wildlife. Lead bioaccumulates, which means that it is not easily excreted, and it tends to be retained in the tissue of organisms that ingest it. As these are consumed by other organisms higher up the food chain, the lead remains and is concentrated. Lead is persistent, which means that it does not break down or biodegrade into safer compounds. Small children are particularly susceptible to lead exposure.[15] An adult may retain only 6 - 10% of the 500 micrograms of lead a day he or she ingests. A child will retain 30 - 50%. Even low level exposure can lead to anemia, nervous disorders, fatigue, headache, poor appetite, clumsiness and diminished capacity. These adverse effects are reflected in poor school performance and all the related social ills. Scientists have recently determined that there is no threshold for lead poisoning, so that all children, not just those in the inner city, are at risk from lead in our environment. A recent study reported in the New England Journal of Medicine demonstrates that lead exposure

13. FRANKLIN STUDY, *supra* note 4, at 157-58.

14. For example, a typical Alkaline D cell will power a cassette player, which draws a fair amount of current, for 72 minutes. A similarly sized nickel-cadmium rechargeable will work for only twelve minutes. Nickel-cadmium batteries are reliable power sources for flashlights and portable radios, however. Telephone Interview with Terry Telzrow, President of Eveready Batteries, (September 28, 1989).

15. ANDERSON ET AL., ENVIRONMENTAL PROTECTION: LAW AND POLICY 144-146 (1984).

causes permanent adverse effects that carry over into adulthood.[16]

Mercury can irreversibly damage the brain, kidneys and developing fetuses, resulting in kidney failure, tremors and memory loss. The crazy "Mad Hatter" of Alice in Wonderland was a victim of mercury poisoning. Cadmium exposure can cause kidney damage, skeletal deterioration, lung diseases, such as emphysema and lung cancer, as well as damage to the liver, immune system, the testes, the nervous system and the blood. The hazard from these heavy metals and their presence in the MSW stream have been well documented, as incinerators around the country are forced to close because their emissions and ash contain unacceptable levels of mercury, lead and cadmium.

C. *Are Batteries Major Sources of Lead, Mercury and Cadmium?*

Nationwide in 1986, 138,000 tons of lead in the form of lead-acid batteries were disposed of as MSW. This amounts to 65% of all lead that ends up as MSW. That figure is expected to rise to over 183,000 short tons in the year 2000.[17]

Another way to assess the quantity of lead consumed by lead-acid batteries is to estimate the number of replacement batteries required by industry or consumers, such as Michigan's automotive fleet. According to 1988 figures from the Motor Vehicles Manufacturing Association and the Federal Highway Administration, Michigan alone has approximately 7,080,000 registered automobiles, buses and trucks, each of which uses at least one lead-acid battery for storage, lighting and ignition.[18] These batteries require replacement every three to four years so that somewhere between 1.7 and 2.3 million lead-acid batteries are required in Michigan annually. This figure does not include usage for motorcycles, golf carts, or marine and non-motor vehicle industrial and military applications.

Although the actual amounts by weight of mercury and cadmium in the waste stream are much lower than lead, it takes only very small amounts of these toxins to endanger human health. The most concentrated sources of mercury and cadmium in the waste stream are mercury oxide button batteries (used in older hearing aids, watches, cameras, etc.) and the cadmium electrodes of rechargeable

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16. Herbert L. Needleman et al. *The Long-Term Effects of Exposure to Low Doses of Lead in Childhood: An 11-year Followup Report*, 322 NEW ENG. J. MED. 83 (1990).

17. FRANKLIN STUDY, *supra* note 4, at 15.

18. MOTOR VEHICLE MFRS. ASS'N, MOTOR VEHICLE FACTS AND FIGURES '89 22 (1989).

nickel-cadmium batteries used in most cordless appliances, laptop computers, etc.

In 1990 an estimated 1300 tons of cadmium in the form of nickel cadmium electrodes will be discarded in the MSW nationwide. That figure is expected to exceed 2000 tons by the year 2000. This amount represents about 65% of total cadmium in MSW from all sources.[19]

Battery production in the United States has historically been the single greatest consumer of mercury, due in large part to the use of 1% mercury by weight of mercury as an anti-gassing agent in ordinary household dry cells. As mercury is eliminated from ordinary household batteries due to product redesign, mercury button batteries will account for a larger percentage of the total mercury in the solid waste stream. Preliminary figures for 1989 show that all battery production in the United States accounted for 250 metric tons or 20.7% of all mercury consumed.[20]

D. *Other Sources of Lead, Cadmium and Mercury in the Environment Besides Batteries.*

Lead, cadmium and mercury are all naturally occurring elements in the earth's crust. Even before mining, refining and manufacture of these metals there were certain naturally occurring background levels. Cadmium and mercury are often found in fossil fuels and other metal ores, and so are released in significant levels during combustion at electrical generating plants and the smelting of other metals. Lead and cadmium are used as pigments and stabilizers in paint and plastics, and lead is a fuel additive.[21] Mercury is used in the manufacture of chlorine and caustic soda, a coating material in fluorescent light bulbs, in electrical switches and dental fillings, and as a fungicide in latex paints.[22] Batteries, however, provide highly concentrated amounts of all three metals, all likely to end up in the municipal solid waste stream as discards from households. Other uses of heavy metals are not as

19. FRANKLIN STUDY, *supra* note 4, Table 1-6, at 20.

20. Thirty-two percent of the total mercury consumed in the United States went to chlorine and caustic soda production in 1989. This is the first year that battery production was not the largest consumer of mercury. PRELIMINARY DATA ON MERCURY CONSUMPTION IN THE U.S., U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF MINES (1989) [hereinafter MERCURY DATA].

21. *See generally* FRANKLIN STUDY, *supra* note 4.

22. MERCURY DATA, *supra* note 20.

readily identifiable or concentrated as the heavy metals in batteries. Batteries are easy to remove from the waste stream and to collect for reprocessing or safer disposal than unprotected landfilling or incineration. Lead and mercury in batteries have potential economic value for scrap recovery, given the right market conditions. As our use of incineration as a solid waste disposal technique expands,[23] source separation of materials that are harmful when incinerated is imperative.

III. SOURCE SEPARATION: PRE- OR POST-COLLECTION

The approaches to post-collection separation involve manual sorting operations at a resource recovery center prior to incineration or landfilling, with lead-acid batteries sent to secondary smelters. Electromagnetic separation is another option, especially at RDF incinerators. Recent experience with an RDF facility in Detroit tends to show that enhanced electromagnetic systems may be required to adequately recover mercury button batteries.[24] Of course, lead-acid batteries, lacking a ferrous casing, would not be recovered by this system, and manual removal would be required.

Pre-collection source separation requires the consumer to segregate spent batteries from ordinary household waste. The most successful materials separation program will be simple, mandatory, familiar, convenient, and with a long lead time. Individuals will be more likely to participate if trained or allowed to gain experience in a mature program, where recycling is a high profile community issue, and where there is much contact between the participants and those in charge. With these thoughts in mind, the materials separation and battery removal program with the greatest likelihood of success would be a mandatory program that included curbside collection. Next best would be mandatory drop-off.

The simplest option for the consumer would be segregation of spent batteries in a separate, labeled bag, and placing it along with the balance of the garbage for curbside collection. Success of this strategy is enhanced if it is used where curbside recycling is ongoing and the households are accustomed to sorting their trash.

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23. The National Solid Waste Management Association noted in 1990 that there were 122 waste to energy plants and 50 incinerators operating. At that time an additional 31 plants were under construction, and 74 were in the planning stages. N.Y. TIMES, May 27, 1990, at E5.

24. *See,* Consent Order between Greater Detroit Resource Recovery Auth. and Michigan Air Pollution Control Comm'n., (May 2, 1990).

An alternate strategy is to require separation for drop-off at collection sites. Local communities may do any or all of the following:

1. They may designate existing recycling collection centers to also accept batteries;
2. Obtain cooperation from local merchants who sell batteries to accept spent ones for collection by the local waste authority;
3. Designate local governmental offices to act as collection sites.

It may, however, be difficult to enforce a "mandatory" battery program. A more successful alternative, as demonstrated by the bottle bill in Michigan, is voluntary drop-off with a financial incentive, such as the return of a deposit paid at the time of purchase. A less successful method would be voluntary drop-off at retail stores or government offices with no incentive.

Industry has raised the concern that saving up mercury button batteries at home can lead to accidental ingestion by children, and pose a greater risk than incineration. The solution is to educate about safe storage at home, and provide for frequent convenient collection, rather than to expose the entire population to additional mercury emissions.[25]

With these thoughts in mind, most states that have attempted to regulate battery disposal have relied on consumer and retailer implementation of pre-collection strategies.

A. *Lead-acid Batteries and Model Battery Recycling Legislation*

The Battery Council International (BCI) is the trade group that represents 95% of the United States' battery manufacturers and recyclers. In an effort to avoid the enactment of stricter state laws concerning lead-acid battery disposal, BCI has proposed model legislation which has been enacted in 16 states.[26] Significantly, the model legislation does not provide for any consumer deposit to encourage return of the spent batteries. The industry position is that lead batteries should be returned for recycling by re-smelting, as most are, and payment of a deposit is not required to make the existing market system work.

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25. NATIONAL ELECTRICAL MFR. ASS'N., HOUSEHOLD BATTERY DISPOSAL BRIEFING BOOK (1990) [hereinafter NEMA BRIEFING BOOK].

26. Battery Council International's (BCI) model bill is already in effect in California, Georgia, Hawaii, Illinois, Indiana, Iowa, Kentucky, Louisiana, North Carolina, Oregon, Pennsylvania, Virginia, Wisconsin and Wyoming. Tennessee has adopted only a ban on landfilling and incineration.

The industry's position minimizes the fact that return rates can drop below 55% when the lead market is depressed.[27] Even if 80% of the spent batteries were currently being recycled (the estimate BCI uses), the remaining 20% is not a negligible amount. A lead-acid battery contains roughly 20 pounds of lead.[28] Solving the equation demonstrates that somewhere between 3,400 and 4,700 tons of lead finds its way into Michigan's municipal solid waste stream alone even when lead smelters recover 80%.

Similarly, in California there are approximately 24 million registered motor vehicles, each of which contains a lead-acid battery for lighting, ignition and electrical storage applications. An estimated 8 million used lead-acid batteries are generated and replaced in California each year. An estimated 30% of all used lead-acid batteries nationwide are not finding their way into the recycling process. In California, this gap translates into 2.4 million used lead-acid batteries escaping the recycling process each year.[29]

Furthermore, it is important to note that an 80% recycling rate is high in a market where there is great fluctuation due to variations in the market price. It is true that smelters recycled 80% of the lead-acid batteries in 1986. The year before, however, they recycled only 69.7% and in 1982 and 1983, only 52%.[30] These fluctuations are due to the market value of scrap lead and other variables. Ironically, lead recovery dropped when secondary or recycling smelters closed in response to strengthened air pollution control standards.[31] The Federal Clean Air Act (CAA) has been reauthorized and amended to strengthen controls on toxics. This in turn may lead to a drop in market prices and smelter capacity, and more lead-acid batteries entering the municipal solid waste stream. Reliance on an industry, that can experience such variations over short intervals, as the guarantee that lead will not end up as municipal solid waste is misplaced.

BCI's model legislation consists of six sections. Section 1 bans disposal of lead-acid batteries except by delivery to a battery retailer, wholesaler, smelter approved by the state or EPA, or recycling center.

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27. *See*, M. RUGG, SOURCES OF LEAD AND CADMIUM IN MUNICIPAL SOLID WASTE, A SURVEY OF THE LITERATURE 21 (1988).

28. FRANKLIN STUDY, *supra* note 4, Table 2-16, at 73.

29. CAL. HEALTH & SAFETY CODE § 25215 (West 1989).

30. FRANKLIN STUDY, *supra* note 4, Table 2-21, at 81.

31. *Id.* at 77.

It treats each improperly disposed of battery as a separate violation, and allows each state to fine individuals who dispose of a battery in municipal solid waste. Section 2 requires retailers to accept used batteries for return and post a notice explaining the recycling requirement. Section 3 requires state agencies to prepare the notices and permits their employees to inspect for, and cite and fine violations of, the posting and battery acceptance requirement. Section 4 requires battery wholesalers to accept at least as many batteries as sold, and requires the wholesaler to collect them from the retailer within 90 days. Section 5 anticipates enforcement of Sections 2 and 4 of the act against retailers and wholesalers, but not against individual citizens, as a misdemeanor with both fines and imprisonment. Section 6 provides that each section of the statute stands on its own, in case another section is found by a court to be invalid. The states have established an extremely variable range of fines, with most of the offenses being labeled a misdemeanor or other petty offense less than a felony. Hawaii, for example, will fine retailers who fail to exhibit the recycling notice $2000 a day,[32] while the penalty in Michigan is not more than $1000 or 60 days in jail.[33] By contrast Pennsylvania retailers who fail to post the notice are subject only to a $25 fine.[34]

The model bill does not, however, provide for the imposition of deposits on batteries to encourage the return of used batteries to the dealer if no trade-in is offered at the time of purchase. Five states have enacted legislation that requires either trade-in of the used battery or payment of a deposit at time of purchase.[35] Michigan has adopted BCI's language with an additional provision which requires a $6.00 deposit if no battery is traded in. Under Michigan law, deposits unclaimed after 30 days will be given to the state environmental response fund, less a small handling fee to the retailer.[36] In most other

32. HAW. REV'D STAT. § 342I-3 (1989).

33. 1990 MICH. PUB. ACTS 20 § 8(3).

34. 53 PA. CONS. STAT. § 4000.1510(E) (1988).

35. Maine, has established a $10 deposit. New York, Minnesota, Rhode Island and Washington have set $5. In all but Rhode Island, the retailer will keep 100% of the deposit. In Rhode Island, 20% of the deposits will go to the state.

36. 1990 MICH. PUB. ACTS 20 § 5(2).

states unclaimed deposits are retained by the retailer[37].

B. *Why is Deposit Legislation Necessary?*

One reason that Michigan's bill includes an eventual deposit on lead-acid batteries is Michigan's extensive and positive experience with consumer deposits of five and ten cents on returnable cans and bottles. My personal experience when I lived along a busy inner city artery confirms the success of the bottle legislation. At the end of the winter, when the snow banks had melted, none of the containers on my lawn were subject to Michigan's "bottle bill." Only bottles for Mohawk Vodka and Wild Irish Rose remained, because there was no financial incentive to dispose of them properly. Statistics bear out the teaching of this anecdote. Roadside litter dropped 84% following enactment of the bottle bill. Indeed, according to recent estimates, 97% of all cans and 93% of all bottles subject to a deposit are returned in Michigan.[38]

C. *Upfront Environmental Protection Fees*

Maine imposes a fee of $1.00 at the time of purchase of lead-acid batteries. The fee also applies to each tire purchased in Maine, and "white goods" or appliances are assessed $15.00 each. The fee known as a solid waste advance disposal fee, is a portion of Maine's integrated solid waste management legislation and apparently is designed to help defray the special disposal costs associated with used lead-acid batteries, tires and major home appliances.[39]

Florida's legislation concerning lead-acid batteries takes a different approach. In various parts of Florida's laws, lead-acid batteries are defined as "pollutants"[40] and "special waste" requiring special handling and management.[41] Florida law also bans the disposal of lead-acid

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37. *See e.g.*, 1989 Maine Advanced Legislative Services Ch.583; House proposal 801, enacting 38 MRSA §1604 (2) B.2. stating that both interest on unclaimed deposits, and the deposits themselves "inure to the benefit of the retailer."

38. PUBLIC SECTOR CONSULTANTS, MICHIGAN COMMENTARY, UNCLAIMED BEVERAGE CONTAINER DEPOSITS: AN UPDATE (1988).

39. 1989 Maine Advance Legislative Service 585, House Proposal 1025, Leg. Doc. 1431, § 4831 and § 4832.

40. FLA. STAT. ANN. § 206.9925(5) (West 1988).

41. FLA. STAT. ANN. § 403.703(34) (West 1988).

batteries at waste to energy facilities or at landfills and requires battery retailers to accept used batteries as trade-ins.[42] Florida has not adopted the BCI model.

The most interesting aspect of Florida's scheme is its $1.50 tax on all lead-acid batteries sold to consumers in the state, including those sold as part of a motor vehicle or vessel. The revenue raised by the tax becomes part of Florida's Water Quality Assurance Trust Fund. This legislation appears to be the response to a tragic experience with a battery salvage operation near a cypress swamp where battery acid containing dissolved heavy metals was found to have contaminated soils, surface water, sediment and ground water, and 23,000 cubic yards of battery casings were improperly buried. The SAPP site, among others, was placed on the National Priorities List for federal Superfund cleanup. Note that the contamination was caused not by incineration or landfilling of intact batteries, but by an improperly managed recycling operation. The main thrust of this statute is to provide cleanup funds for contamination caused by battery salvage and improper disposal rather than to create a mechanism to ensure that consumers return used batteries for lead recovery.

The Florida experience underscores the need to ensure that battery return programs, whether driven by a ban on disposal as MSW or a consumer deposit system, do not result in other forms of environmental damage. Extra vigilance is required to ensure that we are not victims of the environmental shell game as may happen when lead-acid battery recycling statutes present more batteries for reprocessing by salvage operations than they are equipped to handle or the market can bear. The federal government regulates lead-acid battery reclamation operations under the Resource Conservation and Recovery Act of 1976.[43] Several states have addressed this issue by specifically regulating lead-acid battery salvage operations.[44]

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42. FLA. STAT. ANN. § 403.708(15) (West 1988).

43. Pub. L. No. 94-580, 90 Stat. 2795 (codified as amended at 42 U.S.C.A. §§ 6901-6992 [West 1983 & Supp. 1992]); *See* 40 C.F.R. § 266.80 (1992).

44. *See e.g.*, Alabama Hazardous Waste Material Act Rules § 14-7-.07; California Hazardous Waste Regulations § 66822; Colorado Specific Hazardous Waste Standards Subpart G § 267.80; Minnesota Hazardous Waste Rules § 7045.0685; Montana Hazardous Waste Rules § 16.44.306; New York Standards for Managing Specific Hazardous Wastes and Hazardous Waste Management Facilities, NY Codes R. & Regs. Tit. 6 § 374.7; North Dakota Hazardous Waste Rules § 33-24-05-235; Ohio Hazardous Waste Management Regulations § 3745-58-70.

D. *Legislation for "Household Batteries"*

The problems of regulating source separation for "household" batteries are more complex because the types included in the definition of "household" varies from state to state. In any statute or regulation, the definition section determines what objects and activities are included within the scope of regulation and what exclusions or exemptions apply. California defines "batteries," for the purposes of regulating their transportation and storage as a possible hazardous waste, to mean "primary or secondary batteries, including nickel-cadmium, alkaline, carbon-zinc, and other batteries generated as non-RCRA waste similar in size to those typically generated as household waste. Batteries does not include lead-acid."[45] This is the broadest definition given household batteries in the handful of jurisdictions that have addressed the issue at all.

1. *California: Household Batteries as Hazardous Waste.* California's handling standards for household batteries implicitly require the collection or "recycling" of household batteries since any uncollected battery "disposed of on or into land, sea or air" will be deemed hazardous waste.[46] The California statute states that household batteries at a collection center will not be regulated as hazardous waste under certain circumstances:

1. An amount of batteries exceeding 200 pounds cannot be stored for more than 180 days;
2. They must be handled in a manner that minimizes the risk of explosion or fire;
3. The collection center must abide by certain record keeping requirements;
4. Batteries must be "treated or reclaimed" only at locations subject to California's hazardous waste regulations.

The net effect of this legislation is that any household battery not in a collection center is hazardous waste. The statute contains no specifics about source separation or mechanisms for collection or reprocessing once collected and ultimate disposal, although it seems possible that these issues may be addressed as part of a new requirement that California's County Solid Waste Management Plans (COSWMP) address

45. CAL. HEALTH & SAFETY CODE § 25216 (West 1989).

46. CAL. HEALTH & SAFETY CODE § 25216.2.

household hazardous waste collections.[47]

2. *Connecticut: Redesigning Rechargeables for Cadmium Battery Access.* Connecticut was the first jurisdiction to address the special concern of how to recycle nickel-cadmium batteries. Although the adverse health effects and contamination of incinerator ash are well documented, there is currently no existing market mechanism to recover the cadmium from nickel-cadmium batteries. Eighty percent of all nickel-cadmium batteries are sealed in appliances, so that the consumer cannot access them for recycling. The lack of access to batteries is a matter for study and correction. It should not become an excuse, as industry suggests, for ignoring the problem.

In earlier versions of its briefing book, the National Electrical Manufacturer's Association-Dry Cell Section [NEMA] took the position that lack of access to rechargeable nickel-cadmium batteries justified their disposal as part of municipal solid waste. Subsequently the Connecticut Legislature enacted a law that would have absolutely banned the sale after July 1, 1991, of any nickel-cadmium battery or product which contained one unless labeled with a statement announcing the need for proper disposal. The statute also contained a provision requiring further study of the issue, a common section in this brave new world of better battery disposal.[48] This earlier version of the statute was successfully attacked by the industry lobby and repealed after only two weeks. The revised version, tacked on to a bill designed to reduce excess packaging and the use of disposable products, requires Connecticut newspapers to use a greater percentage of recycled newsprint, limits restrictions on nickel-cadmium batteries to "consumer products" intended for "personal, family or household purposes."[49] This means that no systematic effort will be made to retrieve nickel-cadmium batteries in industrial, military or medical applications. Yet most industrial applications of rechargeables rely on nickel-cadmium batteries.

The Connecticut act adds a requirement that consumers be given access to nickel-cadmium batteries and that they be informed proper disposal is required, but delayed any notification or access requirement until July 1993, two years after the effective date in the repealed bill.

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47. 1989 Cal. Session Laws, Assembly Bill 888 amending Government Code Title 7.3, Chapter 3, Article 9.

48. 1989 Conn. Sub. HB 7439 enacted May 18, 1989; repealed by SHB 6641 § 13, Conn. Public Act 89-385.

49. 1989 Conn. SHB 6641, Public Act 89-385 § 12.

Unfortunately, what the statute gives with section 13(a), it takes away with Section 13(b), which allows the commissioner of environmental protection to exempt a product from the ban if it found either that redesign was not feasible by mid-1993, or that it would endanger health, safety and jobs in Connecticut. The final coup for the battery industry is to place the burden of safe disposal on the local municipalities. The battery industry is supportive of Connecticut's type of nickel-cadmium battery legislation.[50]

Battery recycling legislation that places the burden on the consumer rather than the manufacturer is not feasible unless either consumers can remove batteries for themselves to comply with recycling statutes, or retailers are compelled to accept the return of the entire appliance.

3. *Minnesota: Targets Industrial Mercury, Lead, and Cadmium Batteries and Drops Alkaline Batteries from Scheme.* Minnesota concluded from its statutorily-mandated study on household batteries[51] that alkaline batteries no longer constitute a significant enough source of mercury in mixed MSW to warrant inclusion in a source separation program.[52] Instead, Minnesota's statute bans disposal of mercuric oxide, nickel-cadmium and lead-acid batteries used by government, or industrial, communications or medical facilities, in mixed MSW. A manufacturer of such batteries is charged with the responsibility for ensuring proper collection, transportation and processing or accepting the spent batteries at its own manufacturing facility.[53] The major United States manufacturer of non-household mercuric oxide batteries already accepts return of its own spent batteries from its customers.[54]

The Minnesota legislation also requires the ordinary household button batteries to be clearly identified as to electrode type,[55] presumably to facilitate collection and reprocessing. The act also bans

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50. NEMA BRIEFING BOOK, *supra* note 25, at 5.

51. MINN. STAT. § 115A.961 (1989).

52. Randy Johnson and Carl Hirth, *Collecting Household Batteries: Myths and Realities*, WASTE AGE, June 1990, at 48.

53. MINN. STAT. § 115A.9155(1) (1990).

54. Telephone Interview with Lee J. Athearn, Plant Manager, Alexander Batteries, Mason City, Iowa (May 23, 1990).

55. MINN. STAT. § 325E.125(1) (Sup. 1993).

the sale of those alkaline batteries that contain more than 0.025% mercury by weight (unless in existing stock) after February 1, 1992, a standard the United States battery industry says is attainable and which some manufacturers have already achieved.[56]

Finally, Minnesota's law addresses the problem of access to nickel-cadmium batteries by banning their sale in Minnesota unless the battery is removable and the product is labeled concerning the need for proper disposal. Like Connecticut's bill, this provision is limited to "consumer products," although the Minnesota scheme also deals with commercial uses, as discussed above. Exemptions are available if the product cannot reasonably be redesigned by the deadline, the redesign would endanger public health or safety, or if the electrodes pose no hazard if disposed of in MSW. Unlike Connecticut's law, there is no exemption based on job loss, and any exemption must be renewed at the end of two years.[57] The provisions are enforceable by minimum fines of $100 per violation, though what constitutes a violation is not defined.[58]

IV. CURRENT FEDERAL INITIATIVES

A. *Proposed Municipal Waste Combustor Standards*

The United States Environmental Protection Agency [EPA] has proposed rules for Municipal Waste Combustors to upgrade emissions control technology on existing incinerators as well as to specify the "best demonstrated technology" for control of air emissions on facilities not yet built. In addition to prescribing technology, these proposed rules, which were to become final by the end of 1990, set by a court-ordered deadline, contain a requirement for a 25% reduction of solid waste by weight,[59] a ban on incineration of lead-acid batteries[60] and a household battery

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56. *See generally, supra* notes 6-11 and accompanying text.

57. MINN. STAT. § 325E.125(3) (1990).

58. MINN. STAT. § 325E.1251 (1990).

59. 54 Fed. Reg. 52209 (1989) (to be codified at 40 C.F.R. § 60.56a(h) NSPS for MWC operating practices; 40 CFR § 60.36a for existing MWC).

60. 54 Fed. Reg. 52209 (1989) (to be codified at 40 C.F.R. 60.56a(e) NSPS for MWC operating practices; 40 C.F.R. § 60.36a for existing MWC).

collection program[61]. If these rules were to become final, which they still have not, it appears that every state would be required to amend their state implementation plans [SIP], adopt enabling legislation and rules to implement the federal standards or risk the imposition of sanctions.

The proposed new source performance standards [NSPS] for municipal waste combustors [MWC][62] regulate three categories of emissions rather than specific compounds, MWC metal, MWC organics, and MWC acid gases under the authority of Section 111(b) of the Clean Air Act [CAA][63] as well as retrofitting requirements for existing MWCs under Section 111(d). Among other things, the EPA has determined that particulate matter is a reasonable surrogate to regulate in order to limit heavy metal emissions and dioxins which condense on and adhere to the particles. In addition to the usual assortment of combustion controls and emission control technology to meet the NSPS and revised performance standards for existing sources, the EPA took the somewhat controversial step of proposing source reduction requirements that call for 25% weight reduction of MSW by recycling. The proposed regulations also call for a ban on incineration of lead-acid batteries and a study as to the desirability of source separation of household batteries, including some consumer incentives such as deposit legislation.

The EPA's approach of reliance on source separation and waste minimization as well as post-combustion technological controls is commendable. We must stop fiddling with these notions in isolation. If virgin sources seem cheaper than recovered materials, it is only because we are asking our children and grandchildren to foot the bill for our waste.

Nevertheless, some commenters have suggested that such requirements imposed on emissions sources as part of air pollution control strategies are in excess of the authority Congress delegated to the EPA for air pollution matters. It appears that § 111 of the CAA provides adequate authority for promulgating performance standards and SIP guidelines that require materials separation as an element of emissions reduction. We need more, not fewer, efforts that bridge different aspects of environmental concerns and, as discussed below, the

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61. 54 Fed. Reg. 52209 (1989((to be codified at 40 C.F.R. § 60.56a(f) NSPS for MWC operating practices; 40 C.F.R. § 60.36a for existing MWC).

62. Notice of Proposed Rulemaking for Existing MWC, 54 Fed. Reg. 52209 (Dec 20, 1989).

63. Pub. L. No. 95-95, 91 Stat. 685 (codified at 42 U.S.C. §§ 7401-7642 (1988)); Notice of Proposed Rulemaking for New MWC, 54 Fed. Reg. 52251 (Dec 20, 1989).

CAA amendments ducked the issue again.

Specifically, the proposed regulations deal with emissions from the combustion of a fuel, i.e. MSW. Section 111 of the CAA requires the specification of a "technological system for continuous reduction of the pollution...including precombustion cleaning or treatment of fuels."[64] In the most practical sense, this includes materials separation prior to combustion. If you want it cleaner coming out, it had better be cleaner going in!

Nevertheless, without more explicit authorization from Congress, the EPA may find itself in protracted litigation, which will delay implementation of any battery separation provisions as the affected industries are sure to challenge an NSPS that mandates recycling and source separation. Meanwhile, both new and existing MSW combustors will continue to incinerate batteries - lead-acid storage batteries, nickel-cadmium rechargeable batteries, and mercuric oxide, zinc carbon and alkaline primary household batteries. Omission of such a key provision for the reduction of air toxic emissions would be a grave oversight. The solution to that is found in the Senate's version of the CAA Amendments.

B. *The Clean Air Act Amendments*[65] *- Senate Bill 1630 § 306 (l) & (m).*

Senate Bill 1630 § 306[66] would have created a new Section 130 in the Clean Air Act to regulate Municipal Solid Waste Incinerators. Much of this section would have been duplicative of the EPA proposed rules in that it would set emissions standards and limitations, albeit legislatively. These hypertechnical details are inappropriate matter for determination by legislation. Emission standards and operating practices are the province of expert regulatory agency rule making. Unfortunately, as enacted, 3306 exempts ash from MSW incinerators from regulation by the EPA for 2 years after the date of enactment of the Amendments.[67] Once again, Congress has "solved" a problem by not addressing it.

Nevertheless, two sections of SB 1630, § 306 (l) and (m), must not get "lost in the shuffle" and must be re-introduced after the 2 year

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64. Clean Air Act § 111(a)(7)(B).

65. Pub. L. No. 101-549, 104 Stat. 2399 (codified in various sections of 42 U.S.C. §§ 7401-7642).

66. Senate Bill 1630, 101st Cong, 1st Sess.

67. *Supra* note 65, at § 306.

exemption. Paragraph (l) would give the EPA authority to establish guidelines for materials that should not be incinerated but should be subject to either source separation or limitations on composition. Paragraph (m) authorizes the EPA to determine that a "product in commerce" is or may be harmful to human health and the environment when incinerated, and to regulate the production of such health threatening products.

The range of actions the EPA could take under this provision include:

1. The prohibition or regulation of the manufacture, processing or distribution in commerce of such product or article;
2. The dictation of the permissible concentration of any substances in the composition of the product or article, including a prohibition on the presence of such substances in the product, article or its residue;
3. A requirement that marking or labeling appear on such product or article, including instructions for the proper disposal of such product or article or its residue;
4. A requirement that the recovery or recycling such product or article, including imposing reimbursable fees on the sale of such product or article [this language will allow EPA to impose a deposit on batteries];
5. A requirement that solid waste management plans include municipal waste incineration units as required by subsection (b) of this section [requiring the facility to have been certified by the state that it has in place an enforceable plan to achieve a solid waste recycling rate of at least 25%] to provide for the separation, recovery, or recycling of such products or articles or residues to prevent, to the maximum extent practicable, any threat to human health or the environment which may result from the incineration of such products, articles or their residues, or the handling or disposal of ash from units which have incinerated such products, articles or their residues;
6. The dictation of disposal methods for such product, or article or its residues.

The EPA has twenty-four months after the date of enactment of this section, to identify not less than five pollutants which present the greatest threat to public health or the environment as the result of municipal waste combustion or the disposal of ash from such combustion and for which health and environmental threats can be substantially diminished through rules issued pursuant to this subsection, and thirty-six months to actually regulate the harmful products in commerce. This

language would permit the imposition of deposits on any and all types of batteries to encourage consumers to separate them from MSW prior to incineration.

This language is the clear-cut, absolute authority under Section 111 of the CAA for the materials separation and battery deposit requirements that the EPA has proposed. CAA Amendments are the most appropriate vehicle for prompt passage of statutory language that will ensure the EPA's authority to ban the incineration of toxic products such as batteries. This single provision will contribute greatly to the control of air toxics at little cost, and address the problem of heavy metal contamination that plagues all MSW incinerators in the United States.

C. *RCRA Reauthorization - House Bill 3735, §§ 106, 107*

Currently another potential vehicle for battery disposal regulation is making its way through the House Energy and Commerce Committee, in the subcommittee charged with responsibility for the RCRA. House Bill 3735 would reauthorize appropriations and amend certain provisions of the Solid Waste Disposal Act. Section 10 of the House draft is similar to the proposed CAA § 130 (m), though it is significantly more limited in the range of options the EPA has to prevent certain toxic constituents from reaching incinerators.

Significantly, it does not provide the authority for "imposition of reimbursable fees" or consumer deposits. The EPA's authority under this proposed amendment to RCRA is limited to bans on the constituents use in production of, or disposal in, incinerators or landfills, or requiring special management after discard or use of a substitute.[68] It provides no mechanism, however, to encourage source separation *before* discard. Unfortunately in the territorial arena of legislative deal making, it may be difficult for the RCRA subcommittee to prevail upon the CAA conference committee members to include the language form SB 1630 § 306 §§ 130(l), and (m).

The RCRA Reauthorization bill also calls for a nationwide lead-acid battery bill based on the BCI model.[69] Failure to post the required notice would be subject to an EPA administrative fine of not more than $1000 per day. While the House bill does not explicitly call for deposit legislation nationwide, its structure would allow individual states to

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68. House Bill 3735 § 106(b), 101st Cong, 1st Sess.

69. House Bill 3735 § 107(a), 101st Cong, 1st Sess. amending RCRA subtitle B by adding a new section, § 2010 Recycling Requirements for Used Lead-Acid Batteries (a) Battery Recycling Requirements.

enact deposit laws.[70] The house bill would also require a study and report on household batteries, including their effect on human health and the environment when incinerated or landfilled, their potential recyclability, source separation strategies, and the potential adverse effects of those activities.[71] Unfortunately the RCRA bill was not scheduled to be reported out of committee until July, and the session ended before work on the bill could be completed. Therefore the CAA conference committee is the best opportunity for removing batteries from incinerators nationwide.

The need for such measures is pressing as incinerators around the country exceed permit limits because of heavy metal emissions, and are forced to close because their ash is contaminated. Clear statutory authority is imperative, and the CAA Amendments are the appropriate vehicle.

V. CONCLUSION

It is urgent that we seize the successful market experience of battery deposit legislation and mandatory return to manufacturers to remove batteries with mercury, cadmium and lead electrodes from MSW. The American consumer will act to protect the environment when that protection is clearly in his or her best financial interest. Batteries collected because of the deposit system will be available to the manufacturers in sufficient quantities for economical recovery and reuse of heavy metals to minimize the total quantity of heavy metals in the environment. Battery deposit legislation will internalize the cost of safe disposal so that consumers pay for the required protection as they purchase the polluting products. Battery deposit legislation provides the mechanism for the industry to manage the environmental hazard it is producing.

The adverse effects of heavy metal pollution of the MSW are costly, and all of us pay for these costs indirectly by increased risk of loss of health and ultimately lost productivity. We need a regulatory structure to internalize these costs. Legislation to remove all batteries from MSW is likely to provide the greatest control of toxic heavy metal emissions

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70. Telephone Interview Tom Downs, legislative aid to NY Congressman George Hochbrueckner (May 30, 1990).

71. House Bill 3735 § 107(a), 101st Cong, 1st Sess. amending RCRA subtitle B by adding a new section, § 2010 Recycling Requirements for Used Lead-Acid Batteries, (b) Study and Report on Household Batteries.

per implementation dollar expended.

Charging consumers a deposit will not only help to ensure return of spent batteries for proper disposal, but will also get the consumer's attention. There appears to be no threat to the smelter industry since the deposits must be funded by the consumer's payment at the time of purchase. Existing facilities, even when upgraded, have no technological means for removing mercury from the exhaust. The mercury will contaminate the air unless a major source in the waste stream, mercuric oxide batteries, is removed before burning.

The battery industry complains that consumers will have to pay more if environmental restrictions are imposed. It is time for state and federal governments to take a firm stand against this position. It is the essence of the free market system that consumers pay the actual total costs for the convenience of portable cordless electricity. Only then will consumers have the freedom to make a fully informed choice. The individual citizens, for the most part unaware of batteries' impact on their health and quality of life, will be best served by the impetus a federal mandate will provide. A battery deposit requirement is critical as a means to encourage consumers to turn in their spent batteries instead of disposing of them in the MSW stream.