Recycling nickel-cadmium batteries

By Susan Cohen

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State-mandated, industry-sponsored battery recycling programs are nearly here.

By this July, the batteries that power rechargeable products will be removable, and right now, two statewide programs to recycle those and all other rechargeable batteries are being implemented. Despite delays, in the leading-edge states of Minnesota and New Jersey, industry is setting up systems that may establish important and useful precedents for nickel-cadmium battery recycling. These states bear watching for what might be applicable elsewhere.

Freeing the batteries

To many people, rechargeable batteries mean the cylindrical alternatives to "regular" alkaline or carbon-zinc batteries that power toys, portable radios and cassette players. But these are only the tip of the iceberg — 10 percent to 20 percent of the total sold annually in the U.S. Most rechargeable household batteries are the "hidden" ones — in cordless telephones, power tools, camcorders, portable computers, two-way radios and other electronics. Probably slightly less than half are sold to commercial and industrial (C/I) customers, and the rest to householders.

The vast majority of rechargeable batteries are made of nickel and cadmium (nicads); most of the rest are small, sealed lead-acid (SLA) batteries. The growing product category of nicads alone accounted for almost 10 percent of U.S. battery sales in 1992 (1), up from 6 percent to 8 percent in 1985.

By industry estimates, 300 million to 400 million nicad cells were sold in 1992 (there is no independent census of data). These include both the single-cell "batteries," as we generally know them, and also groups of cells packed together. Whether on a cell or pack basis, only 15 percent to 20 percent are purchased alone; the rest come inside consumer products.

Cadmium and nickel are heavy metals with well-known potential toxic and carcinogenic effects. Efforts to regulate rechargeable batteries are part of a broader campaign to keep products containing these metals out of normal waste disposal channels.

Until recently, the batteries inside rechargeable products could not be removed. For safety reasons, manufacturers embedded them in the product; most products were not even labeled as containing a battery. But recognizing that they had to do something about the growing use of cadmium, and being pushed by a 1989 Connecticut law, manufacturers began redesigning products to meet a July 1, 1993 deadline that requires removability. Connecticut also required that the product be labeled with disposal requirements for the battery it used, and that the battery chemistry be identified. A number of other states, including Minnesota and New Jersey, enacted similar legislation, and most products have been successfully redesigned, somewhat ahead of schedule.

State mandates and manufacturer responsibility

Broader-based battery legislation in Minnesota and New Jersey shares a common feature with respect to rechargeable batteries, beyond requirements on removability and labeling. Both states make industry responsible, to a greater or lesser extent, for the ultimate disposition of its product.

Minnesota was the first state to impose some "take back" requirements on rechargeable battery manufacturers. Beginning in 1990, legislation mandated a three-stage process. The first law put the burden on battery (nicad cell) manufacturers to collect, transport and properly dispose of their rechargeable batteries — but from the non-household sector only.

A subsequent law applies to the household sector, and is broader; it makes manufacturers of batteries and battery-containing products responsible for collecting both rechargeable batteries and the products in
which they were contained. This is to be done in two stages, first with 18-month pilot programs that began April 1992, and then a statewide program beginning two years later. The design of the statewide program will be based on the pilot program experience and will likely achieve a 90 percent recovery rate. Bi-annual reporting during the pilot phase is required.

In contrast to Minnesota, the New Jersey law puts the burden explicitly on battery manufacturers only, and does not differentiate between sectors in terms of overall manufacturer responsibility. In particular, New Jersey's 1991 battery management act requires battery manufacturers to collect and recycle or properly dispose of all rechargeable household and C/I batteries, but not products – beginning January 20, 1993.

As of that date, battery manufacturers must file a battery management plan, which includes an educational component, with the New Jersey Department of Environmental Protection and Energy. Reports on return/recovery rates follow every six months. The state would like to aim for an 85 percent capture rate, but this is not part of the legislation.

The industry and its response

To deal with emerging environmental requirements, the Portable Rechargeable Battery Association was formed in mid-1991 by the five leading ni-cad battery manufacturers, to deal with emerging environmental requirements. The founding members are Gates Energy Products, Panasonic Industrial Company, Saft America Inc., Sanyo Energy (USA) Corp. and Varta Batteries. Additional members are smaller battery makers, product manufacturers and compilers of battery packs that share responsibility for redesigning products, collecting batteries and funding programs.

By the end of 1992, PRBA had 116 members: 17 cell/battery manufacturers, 85 product manufacturers and 14 "associates" in related businesses (mainly in the metal industry and trade associations). PRBA believes it represents more than 90 percent of ni-cad manufacturing capacity worldwide, 60 percent of SLA and a "large" portion of rechargeable consumer products.

In both Minnesota and New Jersey, PRBA has responded to the legislative requirements on behalf of its members. (In Minnesota, where products have to be taken back, a handful of companies have also filed independent plans.) Despite the differences in the requirements in the two states, the emerging programs will overlap considerably given the realities of environmental constraints, corporate responsibility, industry structure and recycling costs.

The broad outline of each plan is to capture batteries from a number of collection systems at a statewide consolidation facility and to ship batteries from there to a recycling point. But despite the April 1992 date, PRBA itself reported that only 2,500 pounds of batteries were recovered from Minnesota households as of October 15, 1992 (2); some of the pilot programs do not begin until 1993. In New Jersey, the plan due by January 20, 1993 had conditional but not final DEPE approval as of mid-March.
Stuck in the mud
Why the delays? In part, this is because PRBA had to establish a legal and physical infrastructure from scratch. For example, it had to help establish a consolidation facility in both states and develop a contract for the facility — complicated procedures because the facility must meet certain environmental criteria. In addition, there have been disagreements requiring negotiation in both states, such as the extent to which nickel-cadmium manufacturers would have to sort out non-nickel-cadmium batteries from Minnesota collection programs, and in New Jersey, the point at which the battery industry begins to be responsible for C/I battery waste.

Perhaps the largest stumbling block is the characterization of used commercial nickel-cad cells as hazardous waste. This distinction comes from a March 1990 U.S. Environmental Protection Agency rule that defines as hazardous segregated waste that fails its Toxicity Characteristics Leaching Procedure test. It applies to nickel-cadmium and SLA — but only those in the non-household sectors, since household wastes by definition are not hazardous.

As a result of the TCLP rule, used C/I nickel-cads fall under RCRA Subtitle C requirements, making them more expensive than household nickel-cadmiums to collect, store and ship, and making it more difficult to establish an efficient recycling program. In fact, some take-back programs already in place for C/I customers were terminated when the rule took effect.

Believing that properly packed used nickel-cad cells will not present a danger during handling, storage and transport to recycling centers, PRBA has, from its inception, lobbied the federal government to create a special waste category for all batteries bound for recycling. A proposed rule (40 C.F.R., Part 273) appeared in the Federal Register on February 11, beginning the 60-day notification period.

Meanwhile, PRBA did obtain an interpretative memo from EPA, which suggests that batteries bound for recycling from smaller C/I establishments (known as conditionally exempt small quantity generators — that is, from establishments with less than 220 pounds per month of this waste) could be mixed with those from households. Minnesota has indicated that its enforcement policy is in line with the EPA memo; New Jersey is less willing to commit itself. In any event, industry has been reluctant to mix batteries without a formal rule.

The cost savings from a recycling program that allows commingling of nickel-cads from all sources should be significant. Transportation would be cheaper, from...
collection, consolidation and metals recovery, because non-hazardous waste has less expensive carrier and manifesting requirements. In addition, batteries could be held longer at interim consolidation points, further reducing per-unit transportation costs by using larger, less frequent shipments. Preliminary EPA estimates show annual national savings in these categories could be almost $600 million compared to costs under full Subtitle C compliance.

Finally, larger quantities shipped reduce the charge for recycling. Inmetco (Ellwood City, Pennsylvania), the only U.S. facility PRBA has found to accept used ni-cads for recycling, prices large, repeat shipments on a negotiated contract basis, for which it does not quote a set rate. However, its "small pack" average price of 25 cents per pound for 70-pound battery shipments compares to price breaks that begin with 20,000-pound shipments.

Program structure
If and when the "pieces" are in place, the consolidation facility will accept batteries from both commercial and household programs. A facility has been identified in each of the two states. The necessary reviews and audits are further along in Minnesota; an optimistic assessment is that both facilities will be accepting batteries by the spring. Batteries are to be sent from the consolidation facility to be recycled. Currently,
Inmetco in Ellwood City, Pennsylvania is the only U.S. facility known to accept used ni-cad batteries for recycling.

Inmetco will probably use Inmetco in the short term, it has not made a long-term commitment as to destination. There are options in France and Japan.

Although non-household batteries will probably come to the consolidation facility through direct contractual arrangements between manufacturers and the C/I customers, there will be two categories of possible routes for household batteries:

- Existing and/or new county collection programs, either curbside or drop-off. At a minimum, PRBA will pay for shipment and disposition from one site per county, once batteries are collected and sorted.
- Private-sector channels, including reverse distribution through retail outlets and manufacturer designated service centers, and mail-back programs.

In addition, PRBA has designed a public education campaign through print and electronic media, public displays and mailings. This is expected to run a few calendar quarters, and perhaps beyond.

These components differ in some of their specifics in the two states. In New...
Mail them in

Among the companies providing free, pre-paid mailers are Black and Decker, Makita and Skil. These companies are PRBA members and tend to see the PRBA activities and emerging program as supplementary to their own.

Customers throughout the continental U.S. can use the mailers for batteries. The envelopes contain the batteries or battery pack from one product and are sent to Inmetco in Ellwood City, Pennsylvania.

The pre-paid mailers are not an efficient long-term solution to battery recycling, since individual shipment and handling is a costly practice. But because customers are not charged directly—the mailer is free—it does facilitate battery recovery.

In a multi-county consolidated sanitary district (Western Lake Superior) in northern Minnesota where batteries are received through special household hazardous waste (HHW) events and drop-off at HHW facilities, industry has agreed to do two things beyond paying for the handling and final disposition. The cell manufacturers will accept the legal designation of "responsible parties," and PRBA will pay the salary of an intern to create a battery collection program.

In Hennepin County, which includes Minneapolis, batteries have been collected for more than two years through a combination of curbside and drop-off collection programs. There, PRBA will pay the county a $300 per month management service fee and will reimburse for transportation to a recycling point ($300 per 55-gallon drum, which covers costs). In addition, PRBA has agreed to a 25-cent-per-pound battery sorting fee for ni-cads and SLAs because Hennepin collects all batteries commingled.

PRBA has developed a few plans to support distribution through private channels. In Minnesota, it is using a toll-free number through which callers can learn the product-specific or battery take-back route. Some manufacturers refer cus-
tomers to their service centers and/or provide pre-paid mailers (see sidebar). Some callers, depending on their location and the product, are told to keep their batteries until the program is fully implemented. But few people even know about the toll-free number — PRBA wants to hold off on the educational program until the consolidation facility is up and running, which is being delayed partly in the hope of a change in the hazardous waste rule. From April to October of 1992, only 135 calls were received.

PRBA has planned a program for reverse distribution through retail establishments, but will also not put it into effect until a consolidation facility is operational. Standardized boxes placed in stores will serve for both collection and mailing. When a box is full of sorted batteries, the retailer will call a mailing service to deliver the box to the facility and then bill PRBA. In Minnesota, this pilot program is not statewide; in New Jersey, more than 1,000 retailers plan to participate.

Moving on?
The coming months should see the loop closing up on rechargeable, recyclable batteries. In both Minnesota and New Jersey, consolidation facilities to collect the batteries should be up and running, media campaigns should be going, and reverse distribution systems and some county programs should be in place. Wrinkles and unknowns remain, of course, and further delays could bring talk of state penalties in New Jersey, where the legislative mandate to begin the program has already passed. But most parties remain optimistic.

The fate of the EPA special waste rule is an important one. Although implementation of the New Jersey and Minnesota programs does not depend on its approval, the costs do. Large periodic shipments of used batteries, if they are not classified as hazardous, will reduce the cost of recycling — a cost paid for initially by industry, but eventually passed on to consumers in the form of higher prices or perhaps a battery management fee.

More importantly, given the complications of hazardous waste facility permits and interstate waste shipments, the extent to which the two facilities could be available to accept batteries from other states does depend on a uniform rule. So watch for its outcome, and start planning to collect those ni-cads.

For more information on the Portable Rechargeable Battery Association, contact PRBA at 1000 Parkwood Circle, Suite 430, Atlanta, GA 30339; (404) 612-6620 or (404) 612-6641 (fax).

End notes
(2) Portable Rechargeable Battery Association, Program for the Collection and Recycling of Rechargeable Batteries and Battery Powered Products in the State of Minnesota, Six Month Report, October 1992. PRBA noted that there may be batteries returned to and held at service centers that were not included in the 2,500 pounds. In addition, the on-going Hennepin County program, which PRBA is now supporting, also reported on in this six-month report, collected much more: 9,757 pounds in 1991 and 4,479 pounds in 1992.