

TOXICS IN INDUSTRY

Manufacturers Turn to Recycling, Reuse

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INSTEAD of throwing it away or sending it to a special landfill, many manufacturers are looking for ways to recycle hazardous wastes into usable products. Not only does recycling recover salable materials—like silver from photographic wastes and industrial solvents from electroplating shops—but, with less going to the dump, it also saves on rising disposal costs.

"Waste minimization is a big priority at the EPA these days," says Robin Woods, a spokesman for the US Environmental Protection Agency. "We spent the last 15 to 18 years controlling pollution that is already generated. Now we are trying to prevent it in the first place."

The change of policy, explains David Bussard, acting director of EPA's waste-management division, is the result of a series of land disposal restrictions that will come into full effect in May 1990. The new regulations "require that waste which ends up in a landfill or surface impoundment be treated before it is sent there," which can add substantially to the cost of disposal, he says.

Because of the added cost, many large companies have started exploring ways of changing their manufacturing techniques to allow them to reuse or recycle their waste products. The GE Silicone plant in Waterford, N.Y., for example, is experimenting with using sludge from its manufacturing process as a substitute for cement, says Stephen E. Wiberley, a professor at Rensselaer Polytechnic Institute in Troy, N.Y., who is involved with the research project. Currently the sludge is incinerated and the ash goes to a landfill.

But many small companies lack the technical expertise or resources to investigate ways to reduce their waste or recycle it. "It may cost them a lot more to develop alternatives than to just have it landfilled at the present time, and that's a serious problem," says Dr. Wiberley.

Some hazardous wastes contain materials that are so valuable they pay to recycle themselves. Mar-Cor Industries, a Chicago recovery firm, has for the past 11 years been collecting spent photographic chemicals and used film from industrial darkrooms across the United States. Mar-Cor removes the silver and sells it, returning 75 percent of its worth to the firms that generated the waste.

"Silver is a hazardous waste,"

says Mar-Cor's president Sheldon B. Goldner. "It's a heavy metal. Once it's in the waste stream [or in the environment], it never leaves."

Other wastes are not as lucrative. For 17 years, Ezra Rosenbaum worked for the technical directorate of Anglo American in South Africa. "My job was to take

key to the whole thing: If they are not marketable, you don't have a recycling process."

Nevertheless, he says, the metals aren't valuable enough to pay for the cost of processing the waste: "When I conceived of the idea, . . . wastes were being taken out into the desert and dumped . . . in pits" at a cost of \$15 to \$20

which hopes to license two recycling plants in Mexico. "The Mexicans have decided that they ought to be as clean [as the US], and therefore they have welcomed us into the country to handle these hazardous wastes. The Mexicans now have an EPA that essentially translates into Spanish the US EPA standards."

Roughly a million tons of hazardous waste in the US goes to metal-recovery facilities every year, says the EPA's Mr. Bussard. In 1986, the last year for which good data exist, the US produced 525 million tons of hazardous waste, although most of that was waste water, which could be disposed of after treatment, he adds.

Some flammable wastes are burned for their energy. "We know that 1.5 million tons per year is burned as fuel at facilities that have hazardous waste permits," Bussard says. "For some of the solvent, it is a very safe and excellent thing to do. You avoid the air emissions you get from burning oil and other fuels." Another million tons of waste is sent to solvent-recovery firms, which extract any chemicals that can be reused and incinerate the remaining waste.

"We run them through a distillation process . . . which recovers the pure solvent inside the waste and strips it out," says Joe McNally, director of analytic operations for the solvent-recovery division of Clean Harbors in Quincy, Mass. The heat vaporizes the solvent into a gaseous phase and you run the gas through a cooling system that liquefies it. What you recover is the recycled solvent.

"If we get 10,000 gallons of a hazardous substance, typically we can generate 7,000 gallons of a reusable solvent," says Mr. McNally. What is left gets incinerated out of state. Every month, Clean Harbors turns 75,000 gallons of hazardous waste into 50,000 gallons of recycled solvents. Nationwide, more than 400 million gallons of solvent are recycled by companies like Clean Harbors every year, according to Brenda Pulley at the National Association of Solvent Recyclers.

Unfortunately, McNally says, recovered solvent is typically only 98 percent pure; before it can be sold, Clean Harbors must identify the contaminants. These are almost always alcohols, he says, "because they boil at the same temperature [as the solvents]."

Since many applications require solvents that are absolutely pure, he adds, there is a smaller market for recycled solvents than for new ones. But sometimes contracts require pure solvents in cases where recycled ones "would work just as well," McNally says.

"A lot of companies don't feel comfortable [using recycled chemicals]."

Soon, though, some firms may have no choice. Under the 1988 Treaty of Montreal, the US must halt production of ozone-damaging chlorofluorocarbon (CFC) chemicals by the year 2000. Recycling CFC solvents will still be allowed, however, since recycling does not involve the production of new chemicals. "I think that you'll see a lot of applications changing their specification package because there is not going to be a lot of availability for pure [CFC] solvents," he says.

Environmentalists have mixed reactions to waste-recycling firms.

Trash Cache

LAST October, Apple Computer Corporation buried 2,700 unsold Lisa computers in a Utah landfill, according to a report in InfoWorld, a computer-industry trade journal. Although the Lisa was once considered a technological breakthrough, Apple received a better tax break by destroying the computers than by giving them away to schools or third-world countries. —S. L. G.

"Clearly it's better than just landfilling," says Robert Sargent, an environmental advocate with the Massachusetts Public Interest Research Group. But, he adds, "to the maximum extent possible, we see in-house recycling and closed-loop systems as just being plainly preferable."

"Out-of-process recycling does not necessarily reduce the use of virgin materials, and it presents additional risks to workers and the environment, since it involves worker exposure, transportation, and, obviously, there are a lot of recycling facilities that are not necessarily handling and disposing of waste safely . . . It is only through looking at the process, rather than just looking at the end of the pipe, that companies get really innovative about ways to reduce [waste] to begin with."

"There have certainly in the past been some recycling firms where there have been environmental problems," agrees Bussard. "[EPA is] encouraging people to find source-reduction and in-house recycling options."

States such as Minnesota and North Carolina, he adds, have recently set up technical assistance programs to help businesses find ways to reduce their wastes and recycle the rest.



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technology from all over the world, pick it up and move it around. In . . . so doing I came up with some good technology for handling metallics," he says.

Dr. Rosenbaum realized that the principles used to recover metal from mining ores could be employed to take metal out of some kinds of industrial wastes—detoxifying the wastes in the process. "What I did was take good technology for each metal and I put the whole thing together like a string of beads. I did not invent a new technology for each metal," he says. The salvaged copper, nickel, chromium, zinc, and other metals are pure "to at least three nines," or 99.9 percent pure, says Rosenbaum. "They are very marketable. That's the

per ton. "I had a good idea how to reclaim and recycle this waste, but it was not economically viable. You cannot reclaim metals out of hazardous waste just for the value of the metal."

But times have changed. From 1985 to 1989, Rosenbaum ran a pilot plant based on his technology for Recontek, a California-based company. "The water that we sent down the drain had less heavy metal in it than the incoming San Diego water system," he says gleefully.

Recontek is now building a full-scale plant in Illinois at a cost of \$15 million that can handle 50,000 tons of metallic wastes a year. Meanwhile Rosenbaum has started his own company, Advanced Remediation Technology,