

Disposable diaper recycling: the straight poop

by Marty Westerman

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Should disposable diapers be recycled or composted?

"Those diapers are tough," said Don Dentz about Rabanco's pilot project to recycle disposables with Procter & Gamble and the City of Seattle. "And hey, not everything on this planet is going to be recyclable. Not today. Though everybody's working toward that in the future."

Every year, 16-20 billion disposable diapers are produced in the U.S., and 51 percent of them are P&G's Pampers and Luvs brands, which earn the company about \$1.5 billion. The Number Two company, at 37 percent market share, is Kimberly-Clark, with its Huggies brand. Disposable diapers account for 2 percent of the U.S. waste stream because a phenomenal 99.55 percent of parents use them, according to a January 1991 lifecycle diaper study (*Diapers: Environmental Impacts and Lifecycle Analysis*, by Carl Lehrburger, Jocelyn Mullen and C.V. Jones).

In that context, the current baby boom makes an ugly prospect for municipalities bent on source reduction, reuse and recycling. Many talk about banning disposables outright. Many parents are caught in the middle, trapped between their desire for convenience and their commitment to the environment.

Pilot project uneconomical

For now, P&G's disposable diaper recycling party is over. Rabanco has already sold the hybrid, \$750,000 wet-pulper machine P&G assembled last year to mulch paper fibers from 7,200 diapers a day in Seattle.

In their forthcoming project reports, P&G and the City of Seattle will conclude, albeit reluctantly, that although it is possible to recycle disposable diapers technically (the pulping machine worked), it would take the disposable diapers from an urban region of 10 million people to make it profitable. That limits North American candidates to Los Angeles, New York and Mexico City.

Originally, the recycling test was to be

three months long, but P&G and Rabanco extended it to eight in order to explore other areas. "It doesn't make sense to develop a process just to do one product," Dentz explained. Between diaper runs, Dentz also tested the processing of poly-coated packages and found the machine handled them fine.

Companies such as Atlanta-based Ponderosa Fibres of America have been processing post-industrial scrap paper for 25 years, including paper and plastic laminations. The company does handle some post-consumer waste, including rinsed milk and juice cartons and is working with many national companies to establish post-consumer recycling programs.

However, says Ponderosa's corporate development special projects manager, Jeff Moon, "We haven't adapted our system to accept dirty disposable diapers yet because we don't fully understand the ramifications of the technology necessary, the acceptance of recycled pulp/plastic and the long-term economics." While making no commitments, Moon says that "We are certainly willing to consider recycling dirty [disposable] diapers." Ponderosa has been in contact with P&G.

So, Procter & Gamble will make its report, and meanwhile will jump wholeheartedly into its \$20 million commitment to disposable diaper composting programs.

In a different stream

Anderson's Diaper Service of Seattle is offering customers disposable and cloth diaper services, and according to its owners, Ken and Gene Anderson, they'll pick up used disposable diapers twice a month for \$17.31 and process them. The company sorts the cloth diapers from the disposables, then runs the disposables through the same wash process used for cloth diapers. This flushes wastes down the sewer, separates plastic from pulp, and yields two clean, recyclable products — paper and plastics.

Charging user fees, as Anderson has begun doing in Seattle, is the first key to this mini-success story. The other key is matching the technology to the job. Knowaste Technologies, Inc., has taken a great leap forward, says its marketing manager, Mark Groves. It is successfully recycling nearly a ton (dry weight) of disposable diapers in one shift a week at Mississauga, Ontario, near Toronto. Unlike its U.S. counterpart, Procter & Gamble Canada has not yet closed the door on disposable diaper recycling. P&G Canada has invested \$750,000 (Canadian) in cash and contributions to support Knowaste's diaper recycling efforts.

"Procter & Gamble is basically in the pulp business," explains Groves. "It owns its own forests, and makes its own products from them, so when they approached recycling diapers [in Seattle], they used retrofitted pulping machinery.

"Knowaste started with machinery from the linen and cloth industries. This enabled us to do continuous batch processes, and control temperature and chemistry in a series of baths. The key is treating the super-absorbent polymers (also known as absorbent gelling material), in the first bath. This removes its

liquid and changes it back into a grit we can remove with conventional equipment."

That yields a high quality stream of long fiber fluff, worth anywhere from \$600 to \$900 a ton to manufacturers, and clean polyethylene, polypropylene and mylar for the plastics feedstock market. Knowaste

Disposable diapers account for about 2 percent of the U.S. waste stream.

is now patenting its system design, and has signed 20 Toronto area hospitals to provide disposable diapers for its prototype operation. Groves reckons the hospitals account for about 10 percent of disposable diaper waste in the area, and they already pay a service to remove them. The next market Knowaste will approach is day-care centers and nurseries.

"We'll have the system fine-tuned, and

the bugs worked out by fall, and have large-scale machines ready for market by the end of the year," declares Groves.

Once these machines are ready Groves expects their availability and skyrocketing local tipping fees to prompt municipalities to start subsidizing residential diaper recycling collection programs, a prospect he foresees happening in about four years.

The January 1991 Lehrburger report rests its conclusion that reusable diapers are environmentally superior to disposables on the assumption that disposables will be thrown away. If these diapers are recycled or composted, that will certainly tip the lifecycle calculations favorably toward disposable diapers and bring sighs of relief from parents and manufacturers alike.

That brings up composting. "The valuable materials in disposable diapers are lost in composting," complains Groves. "It has value in reducing need for landfill, but the materials have more value recycled."

A new look at the earth

Even as Knowaste succeeds at recycling, P&G is apparently convinced it won't work, and is touting the company's success in compostable disposables. Company ads are already running in magazines, with photos of soil and saplings, and headlines such as "This baby is growing up in disposable diapers," and "Ninety days ago, this was a diaper."

The composting test featured in these ads took place in St. Cloud, Minnesota, where Recomp, Inc. manages a municipal solid waste composting operation. According to the Solid Waste Composting Council, 10 municipal solid waste composting facilities are currently operating in the U.S. The project in St. Cloud tested whether a higher-than-average quantity of disposable diapers, i.e., greater than 2 percent of the total organic waste, would affect the composting process.

The composting vessel used here is a pipe 12 feet in diameter by 120 feet long. Noncompostable materials, recyclables, nonrecyclables (such as some plastics) and hazardous wastes are removed at the front end to keep them from being processed. After tumbling the materials, the vessels are emptied through large mesh screens that remove the plastic diaper backsheets and other debris; the material is then composted in windrows or trenches to cure it. A final fine screening removes the diapers' Mylar closure tabs.

The absorbent gelling material apparently goes with the compost and cel-

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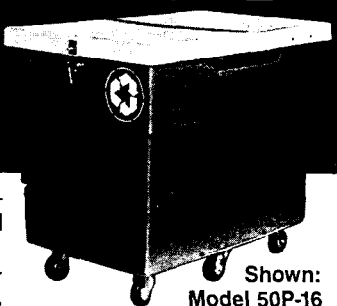
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lulose. The gel was originally developed for agricultural applications, to help soils hold water better.

Recomp and P&G brought in extra used diapers from as far away as 60 miles, to boost the quantity of diapers as high as 8 percent of the total waste. According to a P&G scientist who declined to be identified, even this level of disposables did not hamper composting.

"It's the very material that goes well with composting facilities," the scientist said. "Cellulose and feces are both high in carbon, and the plastic, about 20 percent of the diaper by weight, is separated out."

Another P&G scientist, Dr. Larry King, the environmental engineer who managed the project for P&G, declared composting a success. "The compost cured fine," he asserted. "There was no difference in compost quality as diaper quantity increased. The only way we knew there were more was that we got more back-sheets in the initial screening. Chemically, there was no difference between compost without diapers and compost with them."

King further noted that no viruses or pathogens were found in the cured compost, which sets aside concerns ex-

pressed early on by critics of disposables composting. King found that sustained curing temperatures of 60 degrees Centigrade were sufficient to eliminate viruses and pathogens.

The workable solution

The Lehrburger report says that 87 percent of cloth diapers are laundered at home and 13 percent are handled commercially, indicating that the majority of parents will not voluntarily pay a user fee to handle their diaper loads. The garbage fee that residents already pay may be the point at which a municipality can insert the cost of getting disposables separated and hauled to a recycling or composting operation.

Lehrburger also reports that the 99.55 percent of parents who use disposable diapers account for 82 percent of diaper changes. The other 0.45 percent of parents, who use cloth diapers, account for the remaining 18 percent of diaper changes, which apparently means that disposable diapers are more absorbent and must therefore be changed less often than cloth diapers.

Cloth diaper advocates, however, raise

questions about "sealing babies in non-breathable plastic pouches with super-absorbent gel," according to Ken Baker, executive secretary for Baby Diaper Service of Seattle. Pediatricians are concerned about rashes. Baker is "not sure enough research has been done on super-absorbent materials around babies. Toxic shock syndrome occurred in this kind of sealed, absorbent environment."

Aside from this, Baker stresses environmental and economic problems with disposables. "If a city's hierarchy of solid waste management is source reduction, then reuse, then recycling, disposable diapers don't fit. Also, all the cost analyses show that laundering cloth at home, or using a cloth diaper service, is at least 20 percent less expensive than using disposables."

Most North American parents would agree, but they buy disposables anyway. And paradoxically, that forces P&G, Kimberly-Clark and the other paper diaper makers to advocate composting and root for companies such as Anderson's and Knowaste, Inc. to succeed at recycling.