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Down in the Dump

By: Jay Finegan

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We're quickly running out of room for our solid waste, and innovative companies like Rusmar Inc. stand to get rich. But can this start-up first navigate through a maze of government regulations?

Let's talk trash. In fact, let's talk 160 million tons of trash -- the amount Americans throw out every year. And let's talk about an opportunity.

Anyone who remembers Long Island's vagabond garbage barge of a few years ago knows that the country is fast exhausting landfill space. In 1978 there were some 20,000 landfills. Since then nearly 14,000 have closed. Some got full; others were shut down by regulators. About 6,000 remain, and strict new laws will close 2,000 of those in the next decade. What's worse, so few new landfills are being built -- they're difficult and costly to site -- that national disposal demands may outstrip capacity by the late 1990s. Northeast and Great Lakes urban centers might run out of space by 1993. Speeding the crunch date is a regulatory requirement that landfills, each night, cover the day's trash with at least six inches of soil. The intent is sensible. The soil controls odors, litter, and vectors, landfill speak for insects and rodents. The trouble is, the soil consumes as much as 30% of landfill capacity. In some places soil itself is so scarce that landfill operators are buying farms just for their dirt. A landfill manager in Ventura, Calif., is actually trying to buy a mountain.

Enter Rusmar Inc., a West Chester, Pa., start-up aiming to replace all that soil with a patented, shaving-cream-like foam. If ever a product matched a need, you'd think, this is it. The foam is biodegradable, environmentally benign, and just as effective as soil in suppressing odor, litter, and vectors. In most cases it is cheaper than dirt and much easier to apply.

But most important, foam occupies virtually zero space. It breaks down to the landfill equivalent of bathtub ring. By reducing the need for soil, it can extend landfill longevity by years and thus increase profitability.

According to Rusmar's calculations, for instance, the average landfill requires at least 185 cubic yards of soil for daily cover, space that could generate about \$5,800 in revenues if used for trash instead -- or more than \$1.5 million a year. If soil must be purchased and transported, at costs of up to \$12 a cubic yard, landfill expenses run even higher. As the crunch worsens and garbage-truck dumping fees escalate, the value of landfill space will rise, and the economics of using foam will grow more compelling still.

Yet however urgent the landfill problem appears, founder Paul A. Kittle stumbled on it almost by accident. In 1985, after pitching a plan to use foam to control odors at hazardous-waste

sites, Kittle was approached by a listener. "If you do foams," he said, "why don't you invent one to cover landfills?"

Kittle was skeptical. He had come out of the University of California at Berkeley in 1963 with a Ph.D. in chemistry. Between stints with Rohm & Haas and ARCO Chemical, he'd worked at Apollo Technologies, a small specialty-chemical manufacturer in New Jersey, where he first became intrigued by foams. By the early 1980s he was a self-employed headhunter of technical talent. Foam technology, though, still fascinated him to the point that he'd obtained a patent for a foam to control coal dust and was working on one for odor suppression.

But landfills? Landfills would require a covering that holds up overnight, and foam doesn't last that long. At least not the foams in existence at the time.

But Kittle was convinced the landfill opportunity was real. He didn't mind the idea of holing up in a lab to tinker with the problems it presented. "I think if you are a well-trained Ph.D. chemist and you want to see if you can cut it, then you try to invent a technology and take it to the marketplace and make it a success," he says.

He rented a small space in West Chester and went to work. Methodically, Kittle mapped out the requirements. The material had to be a water-soluble, single-component product, so it could be sold as a concentrate and delivered by tank truck. It had to be so innocuous in its chemical composition that no one would question its safety. And it had to be so cheap that a landfill could cover a square foot of trash for 5¢ or 6¢. Ideally, there should be no question that if you used it, you'd save money.

Cut to September 27, 1988, Kittle's 50th birthday and the date his dream began to jell. On that day a group of five Philadelphia investors committed \$1 million -- half in debentures, half in equity -- taking a 55% stake in Rusmar, named after Kittle's parents, Russell and Mary.

Over the previous few years Kittle had struggled with "hundreds of gremlins," he says, to invent and perfect a foam he called AC-645. When tested, it formed a complete barrier to odor and vapor emissions for up to 36 hours. And he'd managed to make it from environmentally harmless ingredients, chemicals commonly found in cosmetics, detergents, and shampoos. "You could eat this stuff," he notes, "and the worse that would happen is you'd get a case of the runs."

The capital infusion allowed Kittle to get serious. He moved into a larger facility in West Chester and hired Paul Russo, an energetic chemist he'd worked with at Apollo Technologies. Russo, then 36, had experience in management and sales, and would handle everything from strategy to marketing. "Most people thought this would be an instant success," Kittle recalls. And why not? The market looked like a natural. His business plan, projecting first-year sales of \$3 million, practically oozed optimism. Rusmar, Kittle thought, was on its way.

Russo, as he came on board, was more guarded. He knew that foam faced a rocky reception. Rusmar had to persuade two kinds of customers: the landfill operators who would decide whether to buy the product and the government regulators who had to approve the product. Though introducing any new technology is tough, it can be hellish in the landfill area.

It wasn't as if Russo could win blanket permission from the Environmental Protection Agency to begin selling foam. The EPA sets the macro standards for landfills but leaves micro

regulation to the states. And some state regulatory agencies, mostly byzantine bureaucracies, issue permits for use of such products as foam on a case-by-case, site-specific basis. They'd have nothing to gain by issuing permits to landfills and everything to lose if, once approved, the foam had an unforeseen downside.

Landfill operators could easily grasp the value of the product. But would they go to the mat with the state agencies? Not likely. The agencies had enough to tangle with already. On a community-popularity scale, landfills rank near the bottom. Sure, your trash has to go somewhere -- preferably somewhere far away. To complicate matters, landfill operators were now facing new national regulations requiring the installation of pumping systems and liners to protect the groundwater, a tremendous burden. They didn't need a fight for foam permits.

The landfill scene itself was diverse and problematic. Russo's best targets were the large landfills in urban areas of the East Coast, Midwest, and West Coast, those taking in 500 to 10,000 tons a day with fees upward of \$65 a ton. He estimated their number at 300 to 500, constituting a potential market of \$45 million to \$75 million a year -- if the landfills could get permits.

Even beyond securing permits and convincing customers of foam's benefits, though, was the challenge of getting landfills to buy or lease the necessary application equipment. Foam for industrial use can't be sold in cans. It requires a large, specialized piece of machinery, outfitted with an air compressor, a pump, hoses, a solution-storage tank, and a manifold. Machines like that cost \$100,000 to \$150,000 depending on size, and you don't buy them off the shelf -- they have to be built. Early on Kittle had designed and fabricated a couple of units that are still operating at hazardous-waste sites in the South. And the cost wasn't outrageous by landfill standards. "They pay \$250,000 for a big dozer," says Russo, now the company's vice-president and general manager, "and earth movers go for around \$350,000." Still, that was big money for a start-up. And Russo couldn't sell any foam until he could build the machines for sale or lease.

To top it all off, foam -- specifically its application -- had a poor reputation. The marketing and technology rights of the first company in the field, a California outfit called Sanifoam, were acquired by 3M in February 1989, shortly after Russo joined Rusmar. At a test application in Chester, Va., the 3M/ Sanifoam gear proved so troublesome that landfill operations manager James McCook decided not to use it.

"It would take four or five hours of maintenance after using the system for a 30-minute application," McCook says. "The chemicals would solidify in the machinery, and they'd have to disassemble all that stuff to clean it out. This just wasn't practical."

It was here that Russo perceived an edge. Though 3M's entry into the field was threatening, it also served to legitimize the market. Rusmar's single-component foam was about half as expensive as 3M's double-component product, and it didn't jam up the equipment. "This is a process-driven industry in which machinery and its ease of use is key," Russo says. "Landfill guys don't care about the foam. They see the device -- that's what they use. So the real object of the sale becomes the equipment. You are selling them a machine that will help them solve a problem. It just so happens that along with the foam machine comes the foam chemical."

The chemical itself, with R&D costs largely past, could be a money machine all its own. It could generate gross margins of 70% or more, enough that Russo would need only six sales to

reach break-even. An average landfill covers 10,000 square feet. At 6¢ a square foot at a depth of three inches, foam sales to the landfill would reach about \$150,000 a year. Six customers like that would yield revenues of \$900,000 a year, enough to sustain Rusmar. But in Pennsylvania, which requires six inches of foam depth, six customers would provide \$1.8 million a year, growing the company even faster.

Pennsylvania was the obvious place to start. Rusmar was already there, and as it is a tough regulatory state, any successful field trials might help crack other markets. Soon after taking the job, Russo traveled to Harrisburg to meet with officials at the state Department of Environmental Resources (DER).

"The regulators need to be sold on this like anybody else, and the way to sell them is to get them involved," he says. "I asked what it would take to get the foam approved, and they described this incredibly long and complicated process. I asked if we couldn't just do a demonstration. It would give the department an opportunity to see the technology and also give some landfill operators a chance to see it in action."

William Pounds, a senior DER official, agreed. He cleared Rusmar for a June 1989 test at a landfill near Philadelphia. Russo made sure regulators from other regions attended. Among them was Rick Watson, engineering manager of the Delaware Solid Waste Authority, who liked what he saw. He gave Rusmar permission to conduct a small-scale test at Delaware's Central Solid Waste Facility. That went well enough that the facility conducted a successful full-blown, six-month trial, and by the end of June it had agreed to buy the Rusmar system.

When the results of the Philadelphia test proved satisfactory, the DER allowed Rusmar to conduct a second test last December. This one took place at the huge Empire Sanitary Landfill Inc., a privately owned facility near Scranton. Empire is a 600-acre, double-lined, state-of-the-art operation that can handle up to 5,000 tons of trash a day -- some 250 trucks' worth.

"We did test strips, and we did our best to make the foam fail," says Ronald Sturgeon, Empire's engineering director. "It was bitter cold, but it didn't freeze. We put it on a sunny slope, and it didn't slide away. Strong winds barely budged it. It did everything that soil did -- it just worked beautifully." Empire liked the product so much that it has applied for DER permission to use it on a regular basis.

"It's definitely going to be a benefit," Sturgeon says. "This landfill has a life expectancy of 25 to 38 years, and we think the Rusmar product will extend that by about 2 years. We charge from \$48 to \$62.50 a ton, so we'd be saving a lot of expensive airspace. It will also free up our trucks for other work."

Rusmar is speculating boldly on the Empire project. It has built a \$200,000 foam-application unit to do the job -- a self-propelled, tracked number that looks like a cross between an army tank and a fire truck. It's a gamble: Empire will purchase the machine, but only if it gets the state permit. Russo is doing everything in his power to make sure it does, including much of Empire's permit-application work.

Should the Empire contract proceed, Russo plans to parlay it into a major sales edge. Meanwhile, he is pressing on with a vigorous one-man sales crusade in the New England and Mid-Atlantic states. And he's not neglecting the huge hazardous-waste market -- the thousands of chemical lagoons and industrial-waste piles that might need foam sporadically to

control toxic vapors and odors. Rusmar has already been awarded the odor-suppression portion of the Boston Harbor cleanup project.

But as Russo sees it, the steady, long-term payoff is in sanitary landfills. He has enlisted the help of a sales rep in Irvine, Calif., to work the West Coast's large but highly regulated landfill market. And he's buttressed that with videos, a direct-mail campaign, and ads in trade publications.

Those efforts have generated some action. Not least is a technology sale and license agreement with Japan's Hodogaya Chemical Co., which will bring Rusmar some \$300,000 a year while Hodogaya test-markets the foam in Japan and much more if it blossoms into a fully realized program. That was a significant coup for Rusmar, and Russo made sure it made the local newspapers. "Foam Firm Does Bit for Trade Deficit," read one headline -- heady stuff for the tiny outfit.

Rusmar operates out of a 16,000-square-foot garage that had been vacated by a trucking company. The whole company is 10 people. In addition to Russo and Kittle, there are an office manager and a young, Berkeley-educated chemical engineer named David Manlowe. Three jacks-of-all-trades craftsmen assemble the pneumatic foam units (PFUs) -- the application machines -- and provide technical field support. Kittle, whose work attire runs to jeans and flannel shirts, spends his days producing chemicals. The garage is stacked high with drums of supplies from the likes of Dow Chemical Co. and W. R. Grace & Co.

All in all, it's a modest crew to be pitted against mighty 3M, an \$18-billion giant that has the deep pockets to play the regulatory waiting game. For now at least Rusmar has the funding to hang in there, but it hasn't always been easy. It cut quickly through the first \$1 million -- Kittle had dug himself \$500,000 in debt developing the product and building the first couple of machines. "We were not cavalier, but perhaps not as cautious as we should have been," Russo confides. "Things got real hairy with the investors -- they thought we'd be at break-even in three months."

In October 1989 Kittle was issued a method patent on his foam and the method of dispensing it. That was critical. "There are only a certain number of things that make foam," Kittle says. "The patent makes a broad claim to incorporate as many of these raw-material sources as possible. It's always possible that someone else could invent a brand-new molecule that foams. But how much is it going to cost to produce that, compared with the raw materials that we've got claimed in our patent, for megaton quantities? So it gives us a lock, if you will, a corner on the market for the lowest-cost raw materials. The patent protection is very important, because the chemical world runs on patents."

But start-ups run on money, and Rusmar was in desperate straits last winter. In a bit of serendipity, however, it received \$500,000 from A. Duie Pyle Inc., the West Chester trucking company whose garage Rusmar is leasing for \$7,300 a month. That infusion gave heart to the original investors, who ponied up an additional \$200,000. When the dust settled from the stock reshuffling, Kittle, Pyle, and the Philadelphia group each emerged with about a third of the company.

Last summer Rusmar was courting financial institutions, trying to secure an equipment-construction line of credit to build the PFUs. At the same time, a West Chester bank came through with \$120,000 to fund construction of two small foam machines for hazardous-waste

applications.

But Rusmar is hardly out of the woods. It badly needs a sales force but can't yet afford one. And it has yet to form an alliance with one of the so-called waste majors -- unlike 3M, which has made a cooperative agreement with Waste Management of North America, an operator of 128 large landfills. It's not for lack of trying. Russo has pitched Browning-Ferris Industries Inc. (BFI), Laidlaw Waste Systems Inc., and other landfill biggies to no avail. "I'd love to have one of those," Russo says. "But I can get by selling to the Empires and Delawares. What we need now is credibility and respect."

Still, that's the sort of thing that troubles venture capitalists who have traipsed through Rusmar's garage. "You take a company like BFI -- these are rational people," says Rick Defieux, an environmental specialist with Edison Venture Fund, in Lawrenceville, N.J., who looked at the deal. "When they show no interest, you have to wonder why. It makes you think there's something missing."

That something may be rain resistance, no minor detail to landfill operators. While 3M's foam can't be easily applied in a heavy rain, it does form a leathery surface that allows for runoff if rain falls on it after application. That's part of the trade-off for its cumbersome two-component mix. Rusmar's AC-645 can't survive a driving downpour. But then, the Rusmar product appears to be easier and faster to apply, and that's no minor detail to landfill guys, either.

But no matter how the votes come in, Rusmar believes, there'll be enough landfill business to keep both companies happy.

Research assistance was provided by Leslie Brokaw.

EXECUTIVE SUMMARY

The company:

Rusmar Inc., WestChester, Pa.

Concept: Exploit the landfill crisis by making and selling a patented foam to replace the dirt spread daily over dumped garbage, saving landfill operators space and money

Projections: Small profit on 1990 sales of \$2 million; pretax profit of \$1.5 million on 1994 sales of \$7.8 million

Hurdles: Persuading regulators to approve foam's use; convincing operators of its cost-effectiveness; battling giant 3M, which has introduced a competitive product

THE FOUNDER

Paul A. Kittle, President

Age: 52

Family: Married, no children

Source of idea: Suggestion from a prospect for another of Kittle's foam products

Personal funds invested: \$500,000

Equity held: 30%

Salary: \$120,000

Workweek: 70 to 80 hours

Education: B.S., chemistry, University of Illinois; Ph.D., chemistry, University of California at Berkeley

Other companies started: None

Last job held: Headhunter for scientists

His role: "I have no intention of being COO. I find that boring. But I do know what I do well -- and that's develop products."

FINANCIALS

Rusmar Inc. Projected Operating Statement

Revenue (in \$ thousands) **1990** **1994**

Chemical foam compound \$725 \$6,472

Application equipment, sale/lease 1,269 1,285

Total Revenue 1,994 7,757

Cost of Revenue

Chemical foam compound 248 2,542

Application equipment 385 795

Commissions 128 729

Total Cost of Revenue 761 4,066

Gross Profit 1,233 3,691

General and Administrative 1,225 2,148

Earnings Before Interest and Tax 8 1,543

WHAT THE EXPERTS SAY

CUSTOMER

JOHN CONAWAY

Solid-waste manager, Ventura Regional Sanitation District, which runs two landfills in Ventura County, Calif.

Rusmar looks to have a good product, but here in California the permit process will be a big pitfall. I'd be using Rusmar's foam right now if it weren't for the regulatory nightmare. We have a severe capacity crunch. But any time you file for a major operational change here -- and foam would fit into that category -- you need new permits from three separate agencies.

It would cost us more than \$1 million just to apply for them, given all the monitoring and documentation they require. I can easily see being required to do a very complicated and expensive series of groundwater tests and surface/air emission tests. Some of these are fly-emergence tests, where you have to get people to come out and actually count the number of flies that emerge prior to using the foam and then after using it. And even then there's no guarantee we'd get approval.

FINANCIER

RICK DEFIEUX

General partner, Edison Venture Fund, Lawrenceville, N.J., a \$40-million venture capital firm with a half-dozen investments in environmental companies

If you'll excuse the pun, this company looks pretty good on the surface, but you might find some problems as you dig deeper. It has developed a good product with tangible advantages in application. The problem is that any success it does have will require a substantial marketing effort, and right now its marketing is grossly insufficient. Paul Russo cannot do this alone.

For one thing, trimming the cost of daily cover is not the landfill operator's primary concern today. In many sections of the country, a valid permit in the waste-disposal business is tantamount to a license to steal; this is a very, very profitable industry.

What these landfill guys want to do foremost is keep their permits intact. Cost cutting is less important than staying in compliance with changing regulations. If Rusmar expects to sell its foam on the economics, then the numbers have to be very strong and show an overwhelming benefit. For some landfills, too, switching from soil to foam cover may precipitate a regulatory review of the entire landfill, which no operator would be eager for.

The second reason I think this company needs a substantial marketing effort is that landfill cover is not the regulators' number-one concern, either. Because foam is not environmentally beneficial -- it's basically just environmentally equivalent to soil -- regulators aren't particularly motivated to spend a lot of time on something that's just going to improve a landfill operator's pretax margin. They have a lot of other issues to think about.

Finally, Rusmar is facing formidable competition; 3M is very capable of outselling it, with Rusmar's rain-resistance disadvantage as a lever.

If Rusmar increases its direct-sales force, it needs very knowledgeable people and needs to focus on two or three or four states and do a full-court press on those agencies. If it simply can't afford to do that, then it's got to get an alliance with companies that know both the operators and regulators -- engineering consulting firms, maybe, that know how to deal with regulators.

I thought the revenue line was not outrageously unrealistic. The bottom line, I think, is that it has a shot at building a successful company, but it's got its hands full.

CUSTOMER

RICK WATSON

Engineering manager, Delaware Solid Waste Authority, which operates three state-owned landfills

We recently completed a six-month test of Rusmar's foam at one of our main landfills, and we've decided to stick with it on a full-time basis. The combined cost of the foam and the application machinery is actually slightly higher than soil. Each month we spend \$6,200 to lease the machine and about \$7,500 on foam. If you looked at it strictly on a daily cost basis, you could not justify using the foam.

What makes it worthwhile is the space savings. Landfill space is tough to get, and we need to maximize what we have. At the landfill where we tested it, soil takes up 30% of the volume. We think the foam will extend the life of that site by at least 10%. The reason it's not longer is that you can't use foam every day. If rain is forecast, you have to revert to soil. You have to use soil on weekends, too. We found that we used the foam an average of 16 days a month.

An extra benefit is labor savings. It takes the crew close to three hours to cover a day's garbage with soil, but only 30 to 45 minutes to do the job with foam. We had experience with Sanifoam before, on a test basis, and it was a pain to apply. The foam was OK, but the machinery jammed up and created a lot of extra work to clean it out. Rusmar's machinery is very easy to use, and it doesn't jam. That's really one of its strongest selling points. The people who have to use it really like it.

Our main concern is dealing with a start-up. We're concerned that if we buy the application machinery at a cost of \$120,000 or so, then we're taking a chance -- but Rusmar has offered to minimize that risk by leasing the machinery instead.

CUSTOMER

GARY STEEDE

Manager, Outagamie County Landfill, Appleton, Wis.

I don't agree with the evaluation of Sanifoam, the 3M product. We've used it for five years and never had the kind of problems described here. We're happy with it, and our maintenance has

never taken more than an hour.

Still, I would have inquired about Rusmar's foam if I'd known about it. They're talking 5¢ or 6¢ a square foot, whereas we're paying 12¢ to 13¢ -- so right there I'm interested. But I wasn't even aware that the product existed, and we've been using foam coverings for years. Rusmar needs advertising. It needs to get into more trade shows and publications like *Waste Age* and *Public Works* to make the operators aware this product is available. Otherwise it's going to have a hard time selling.

It also hasn't addressed the critical question: how long its foam lasts. It mentions 36 hours. The foam we're using now lasts a minimum of three days, and I wouldn't want to go any less than that. We have to alternate our active area every day, so duration is a big, big factor.

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