

Thinking trash: A county engineer has devised a new way of closing and capping county landfills. His invention is gaining him recognition and could save the county some bucks. Read about it in Monday's *Californian*.



JANET B. CAMPBELL / THE CALIFORNIAN

Ramzi Mansour, closure division manager for the Waste Management Department, performed research for five years on geosynthetic clay liners and authored the long-term performance data for the usage of the substance for sanitary landfill covers under semi-arid climate conditions.

It's a dirty job, but he does it

Kern official on cutting edge of landfill research with liner material

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Two years ago, county engineer Ramzi Mansour had his work cut out for him.

As head of a division of the county's waste management department, Mansour had to find a way to close the county's aging dumps. Over the next several years, a half-dozen landfills in Kern County will be permanently closed and capped with a protective liner.

Mansour's job was to figure out the safest and cheapest way to do that.

The idea he came up with and the research it spawned are expected to save the county hundreds of thousands of dollars — if not millions — in coming years. It has also put him on the cutting edge of landfill liner research.

Traditionally, top liners are made of dense clay a foot deep to prevent water from seeping into the trash. But clay isn't a local resource.

So Mansour was facing the prospect of trucking in ton after ton of clay to build his liners — a costly process.

Please turn to **MANSOUR / B3**



This model of the Shafter-Wasco liner system utilized geosynthetic clay as a liner component. Geosynthetic clay contains sodium bentonite, which becomes a barrier and reduces any rainwater percolation, providing better environmental conditions and helping reduce groundwater contamination.

MANSOUR: Using geosynthetic clay in dumps is much cheaper than real clay

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And that's when he remembered. It was 1993 when Mansour was first tasked with designing a top liner for a county landfill near Delano.

Instead of using clay, Mansour suggested using a substance called a geosynthetic clay liner. Less than an inch thick when dry, the geosynthetic material — essentially a layer of clay sandwiched between synthetic fabrics — is much easier to handle.

And it's a lot cheaper, Mansour said.

The county waste management department was already going to use the material to line the bottom of a landfill in Wasco. So why not use it to cap the Delano site, Mansour said.

But the Central Valley Regional Water Quality Control Board, which must OK dump closures, rejected Mansour's idea, arguing the geosynthetic material was unproven as a top liner.

"They said no, take a hike," he said.

Mansour decided to test it.

He convinced the contractor installing the new Wasco landfill liner to install a small test plot. Near the landfill, he buried a 12-foot-by-24 foot piece of the geosynthetic liner and covered it with two feet of soil.

Then Mansour and his co-workers forgot about it — until late 1999.

That was when Mansour began thinking about how to close the county's 13.5-acre dump in Lebec. A clay liner would cost the county more than \$650,000. By using the geosynthetic material, Mansour estimated he could cut those costs to roughly \$275,000.

In late 1999, he and his co-workers went out to the Wasco landfill and exhumed their 5-year-old test plot. When they dug up the two feet of soil by hand, Mansour said he was surprised at the condition of the still-damp liner.

"We thought it might have dried out and cracked," he said. "But it looked perfect."

To be certain the material was working, Mansour sent samples to laboratories, which confirmed his hypothesis.

"The liner maintained its integrity," he said.

Mansour also gleaned other valuable information from the test plot, including the possibility that certain minerals could damage the material. That information will be useful when the county begins closing other landfills.

Already, Mansour said he has ruled out the geosynthetic liner for a landfill in Kern Valley because of soil condi-

tions there. But other sites in the Arvin, Buttonwillow, China Grade and Lost Hills areas are expected to be more conducive to the high-tech material.

"I'm probably going to be working with this stuff for some time," Mansour said.

Even if only a few of the local sites can use the geosynthetic liner, it would save the county money, said Waste Management Director Daphne Washington.

"It is very, very expensive to build these liners and anything we can do to bring that cost down helps," she said.

Mansour's test plot is expected to have ramifications beyond Kern County, as well. He has been invited to a waste management symposium in Italy later this year to discuss his findings.

"This is a significant contribution to the field," said Damon Brown, vice president of EBA Wastechologies, a consulting firm that helps design landfills. "People in areas with similar climates and soils should be looking at this closely."

Mansour's research is unique in the geosynthetic liner field, largely because of the test plot, said engineer Edward Kavazanjian, a consultant on the Lebec closure. Few scientists have taken the time to do such long-term field tests, he said.

"That's what makes Ramzi's research so important and valuable," he said. "There have been a lot of tests in laboratories or in tanks. But this was out there, in the ground for five years."

At the time the county's test plot was buried, geosynthetic liners weren't as common in the waste industry as they are today, Brown added.

"Ramzi had a lot of insight to bury this stuff back in those days," he said. "In those days this stuff was just being considered for use in landfills."