Workers lay down asphalt on Union Street in Hingham, one of many road projects using used asphalt containing recycled engine oil.
State transportation officials take an unusual U-turn on use of a controversial asphalt additive

BY JACK SULLIVAN | PHOTOGRAPHS BY WEBB CHAPPELL

TRANSPORTATION AND ENGINEERING officials from across New England gathered at the University of Massachusetts Dartmouth in June for what was being called an emergency “pavement summit.” The officials had learned a major asphalt provider had been adding recycled engine oil to its product as a binder for several years without telling anyone.

The asphalt company insisted the recycled oil worked just as well as other binders, saved money, and was good for the environment. But many state officials at the summit said they were hearing reports that recently paved roads were cracking prematurely. There was little definitive information tying the road breakdowns to the recycled oil in the asphalt, but some studies out of Canada said the product couldn’t stand up to cold weather.

Officials from Bitumar, the Montreal-based asphalt provider, and Norwell-based Clean
Harbors, the parent company of the Texas firm providing the recycled engine oil, told the group their product was perfectly safe. Their own studies showed no ill effects from using recycled engine oil. They also pointed out that a ban could be devastating for their businesses because the asphalt was already mixed for the paving season. One official from New Hampshire didn’t want to hear it, telling the Bitumar official that he should have been upfront about using the new asphalt additive from the beginning. “Had you asked us first, we would have told you not to do it,” the woman said, according to one of the attendees.

After hearing all the presentations, highway officials from Massachusetts, New Hampshire, Vermont, and Maine caucused among themselves and decided to ban the asphalt containing recycled engine oil. The officials felt a ban was the prudent thing to do. They were spending millions of dollars repaving roads, and they didn’t want to lay any more of the new asphalt until they knew it was effective. They asked the Pavement Research Institute of Southeastern Massachusetts, based at UMass Dartmouth, to run extensive tests on the product. Until they received assurances of the product’s durability, the decided to require asphalt suppliers to use more traditional binders.

Bitumar responded by suing all four states, seeking to block the product bans that were scheduled to take effect August 1. The company argued nothing in state regulations prevented the firm from adding recycled engine oil to their asphalt mix, which is made of refined crude oil to begin with. The firm also claimed a four-state ban would be financially disastrous, costing the company an estimated $30 million for this year alone.

The company won an injunction in Vermont, but the bans in Maine and New Hampshire were put into place. Massachusetts was the lone state to go in a different direction. One day before the ban was scheduled to take effect, state Highway Administrator Frank DePaola decided to call it off. His action was so unexpected that the lawyer representing the state in the lawsuit brought by Bitumar wasn’t even told of the change in course.

Industry officials and state engineers suspect politics played a role in the decision, but DePaola denies that. William Geary, the politically connected legal counsel for Clean Harbors and the former head of the Metropolitan District Commission, says he made some calls to state transportation officials and engineers to arrange meetings

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Massachusetts communities have little choice but to use asphalt that contains recycled engine oil after the state dropped a plan to ban the additive.
season,” DePaola says. “We don’t have any evidence on our roadways that it has caused premature failure.”

But his engineers say it’s too soon for any defects to appear; the new asphalt has been used on state roads for only a year. One longtime state engineer says DePaola’s decision turns the state’s test-first policy on its head. “This is the first time I’ve ever seen us throw anything down and say, ‘Let’s see how it works,’” says the engineer, who asked that his name not be used because he is not authorized to speak to the media. “The performance drives the decision, not the fact you’re saving the environment.”

THE RISE OF REOB

Asphalt is produced by refining crude oil. For the most part, it is a byproduct of oil refining rather than the intent. With the cost of oil skyrocketing in recent decades, asphalt producers are constantly looking for ways to reduce costs. One area where they’ve had some success is with the binders used to stabilize the product. Worn-out rubber tires, reclaimed asphalt, and old roofing shingles are just some of the materials that have been used as binders to keep costs down.

About 30 years ago, refiners began experimenting with adding recycled engine oil to asphalt, but its use was limited and confined to warmer climates. The binder, labeled Recycled Engine Oil Bottoms, or REOB, by industrial officials, is what sinks to the bottom when waste engine oil is re-refined. The lighter oil at the top can be used for other products, including engine oil. But there wasn’t much use for REOB until it was added to asphalt as a cheaper alternative to existing binders.

Safety-Kleen of Texas appears to be the first company to market recycled engine oil as an asphalt binder. The company collects waste oil from around the country and Canada and sends it off to its refining plants, including one in Ontario. Asphalt containing recycled engine oil was used primarily in the south initially, and then slowly made its way north over the last decade.

Details on the spreading use of the product are sketchy because Bitumar, the company that first incorporated recycled engine oil into its asphalt, didn’t tell anyone what it was doing. Bitumar asphalt containing the recycled engine oil began showing up in Massachusetts in 2013, shortly after Clean Harbors bought Safety-Kleen.

“This product is new to New England, and I understand that, but it’s not new to the industry,” says Francis O’Brien, who ran the Hudson Asphalt plant in Providence for more than 30 years before the company was purchased by Bitumar. O’Brien now works as a consultant to Bitumar and filed affidavits on the company’s behalf in the lawsuits against Maine, Vermont, New Hampshire, and Massachusetts.

O’Brien says there is no evidence indicating recycled engine oil weakens asphalt. He says the recycled oil actually makes for a cheaper and better product. “It helps lower the cost of asphalt, which allows us to sell it cheaper to contractors who pass the savings on to their customers, and, in fact, all the evidence is positive,” he says.

The evidence cited by O’Brien of the recycled engine oil’s performance comes from tests paid for by Safety-Kleen with little independent verification of the results.

There are no prohibitions on what binders an asphalt producer can use unless a state specifically bans an additive. The asphalt’s overall performance, however, must meet a state’s specifications. In Massachusetts as well as in the other New England states, asphalt has to meet a performance grade called 64-28, which means the product must
be able to withstand temperatures ranging from 64 degrees Celsius (147 degrees Fahrenheit) to minus-28 degrees Celsius (minus-18 degrees Fahrenheit).

Massachusetts did some routine performance grade tests on the Bitumar product when it was first delivered for use on projects, but those tests indicated the chemical composition of the asphalt hadn’t changed. Officials say the tests couldn’t distinguish between the petroleum products used in the asphalt from the petroleum-based recycled engine oil. Since Bitumar never disclosed that it was using a different binding agent, further tests were not conducted.

Paul Montenegro, an asphalt consultant from Providence who attended the pavement summit at UMass Dartmouth, says the industry’s concern about recycled engine oil stems partly from the way Bitumar started using the additive without telling anyone. “When people have good products, they’re out there telling you what the benefits are,” says Montenegro, who has worked in the asphalt business for 45 years. “These guys kept it a secret... What are the benefits?”

The state engineer who asked not to be identified says Bitumar’s secrecy amounts to a bait and switch. “It’s like someone’s selling you a hot dog and telling you it’s a steak,” he says.

Montenegro says industry officials aren’t opposed to a new product that saves money, but they want proof that the new product works before laying it down. If there is a problem with the recycled engine oil, he says, it can be fixed in a cost-effective manner with different additives if it doesn’t get out of hand. “I would rather err on the side of caution,” he says. “Let’s not go out and cause a lot of damage that we’ll have to pay for later.”

**EVIDENCE OF PROBLEMS**

About a decade ago, fairly new roads in Ontario began failing. Simon A.M. Hesp, a professor of chemical engineering at Queen’s University in Kingston, Ontario, was hired by the province to find out what was causing all the cracks, ruts, and other defects. It was a phenomenon that he was familiar with, having seen it on a number of roads in Kingston.

Hesp and his colleagues at the Hesp Research Group at Queen’s University began testing samples from the failed roadways and discovered metals such as zinc present in the asphalt mix. The zinc and other materials were consistent with old engine oil, which had previously not been used in asphalt. In research papers published in 2009, Hesp concluded that the engine oil was the cause
of the road problems because it was failing to hold the asphalt together.

“In Ontario we have found extensive early failure,” says Hesp. “There was engine lubricant and zinc, things that should never be in asphalt. We have found it in very high concentrations in roads that have failed.”

Transportation officials in Vermont and Maine were experiencing similar problems with their roads. They read the Hesp study and became concerned that REOB-infused asphalt might be the cause. Richard Bradbury, the director of materials testing for the Maine Department of Transportation, submitted an affidavit in the Bitumar lawsuit that laid out the state’s response to the “premature failure” of roads using asphalt containing the recycled engine oil.

“[Maine DOT] has never approved the use of REOB in...paving projects and, until recently, had no knowledge it was used as a modifier by Bitumar,” Bradbury said in his affidavit. The department “determined it would not place highway projects and the environment at risk without a better understanding of the long-term effects of the REOB additive.”

Nancy Singer, a spokeswoman for the Federal Highway Administration, says the agency is currently undertaking tests on recycled engine oil in asphalt. She says federal officials became aware of the use of recycled engine oil and potential problems with it “approximately four years ago.” She says the view that there is scant knowledge about the product’s properties and sustainability, despite Bitumar and Safety-Kleen’s claims, is “an accurate assessment of the current state of knowledge.”

O’Brien, Geary, and DePaola all dismiss the Hesp studies and instead point to Safety-Kleen’s experts, who say they have found no evidence of negative effects from using recycled oil. O’Brien insists the amount of recycled engine oil Hesp used in his study — between 15 and 30 percent of the asphalt — far exceeds what Bitumar puts in its asphalt, which he says is less than 8 percent.

“It’s like when you take aspirin for blood pressure problems,” says O’Brien. “Aspirin is probably good for you if you take two of them. If you take 30 of them, it’s not so good.”

But Hesp said he didn’t create the formula — it was what he found in the samples he took off the roads. He says no matter how he has run his tests, every indication in his lab shows asphalt with recycled engine oil cannot hold up to the freeze-and-thaw cycles that can wreak havoc with oil-based products in the north. There are concerns it
“You can recycle, but if your roads last half the normal cycle, that’s not a good outcome, is it?” asks Hesp. “It’s hundreds of millions of dollars of taxpayers’ money that goes down the drain. No one benefits.”

RISKS FOR MASSACHUSETTS

UMass Dartmouth expects to finish running tests on the asphalt with recycled engine oil early next year, but until then the industry isn’t holding still. Bitumar is selling the product across the state and some of its competitors are also jumping on the bandwagon, virtually guaranteeing that the product will show up on hundreds of miles of roads across Massachusetts.

All States Asphalt in western Massachusetts, one of the largest asphalt producers in New England, is now putting recycled engine oil into its mixes. There are at least six other independent producers in Massachusetts, but none has yet informed the state if they will add recycled oil to their mix.

Richard Miller, the All States president, says he resisted using recycled oil because he was unsure if it was an effective additive. He wanted to wait until more testing was done. But with Bitumar continuing to use it, Miller says, his hand was forced.

“As long as the state accepts it, we have to get in the game,” says Miller, pointing to lowered costs with the use of recycled engine oil. “There’s additives to asphalt that have always been used, but they’ve always been approved before. This has never been approved, but what’s my choice?”

The state’s decision also means cities and towns, which account for nearly two-thirds of the paved roads in Massachusetts, are laying down asphalt with recycled engine oil in it. Harry Sylvester, assistant projects manager for the Hingham Department of Public Works, says local DPWs have to accept whatever asphalt is supplied as long as it meets state specifications. He says Hingham should be unaffected whatever the state’s test uncovers because the municipality always applies a micro-surface topcoat — a thin sealant coat — to its roads designed to seal and protect the asphalt from the elements. It’s an expensive process and not one every town — or state — can afford to do.

“We’re at the mercy of that spec,” says Sylvester, whose town has had a bevy of projects this season, using about 2,600 tons of asphalt purchased from a supplier who buys from Bitumar. “I’ve heard rumors, [the asphalt industry has] been playing games with the oil for 20 years... But if they’re producing a product that meets state specifications, that’s our standard.”

The testing will determine whether the product can stand up over time. State engineers and transportation officials elsewhere in New England say roads should last

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at least 20 years. Hesp thinks they should last 30 years. DePaola says he is counting on the roads lasting only 12 to 15 years, a vast difference from most other experts.

The situation is eerily similar to a problem the MBTA had with concrete railroad ties that began showing up five years ago. The state bought concrete railroad ties that were supposed to last 50 years but crumbled and broke after less than 10 years because of a substandard mix. Taxpayers ended up footing the nearly $100 million bill to replace all the ties.

One major concern is what happens if the UMass lab or the Federal Highway Administration determine that asphalt with the recycled engine oil will not withstand New England’s harsh winters. DePaola says if the tests indicate the recycled engine oil doesn’t measure up, the state will reinstitute the ban. But, he admits, “we don’t have much recourse” for the asphalt that has already been laid down.

If the lab testing in Dartmouth “corroborates the Canadian results, then we’ll probably impose the ban at least for a year,” DePaola says. “The impact would be, the hope is, we get 12 years out of it before it fails.”

O’Brien says while he is confident the test results will uphold his company’s findings, Bitumar is prepared to resume using older, more expensive binders if a problem is uncovered. But as for the asphalt that has already been laid down, O’Brien says there is little the company can or will do. He says there are too many other factors involved – such as the quality of the contractor’s work or additional additives in the asphalt after it’s delivered to another supplier — to attribute any failure specifically to the use of recycled engine oil. “Safety-Kleen will pay for the cost of all the testing and we’ll live and die with the results,” he says. But when asked if Bitumar would offer a warranty for the asphalt that was laid down last year and this year, he says no. “That’s impossible,” he says. “It would be crazy for us to warranty stuff we have no control over.”

The state decision means communities are also laying down asphalt with REOB in it.

If Massachusetts were a country, its eighth graders would rank second in the world in science.*

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