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## New Product Improves Road Safety

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SafeLane is made up of a patented combination of epoxy and aggregate rock. Transportation workers apply standard anti-icing chemicals on the road surface before frost or ice storms are expected. SafeLane overlay acts like a rigid sponge, storing the chemicals in the materials and then automatically releasing them as conditions develop to form ice or snow. The result is safer roads with better mobility and less maintenance. The overlay helps prevent frost or ice from ever forming on road or bridge surfaces and releases the anti-icing chemicals multiple times.

### Applied in 25 states

Invented at Michigan Tech University, SafeLane overlay was licensed to Minnesota-based Cargill in 2004 and has met with an enthusiastic response. By the end of the 2007 construction season, SafeLane overlay was installed at 50 sites in 25 states, including both road and bridge applications and commercial venues such as sidewalks, parking lots and airport baggage handling areas.

In Minnesota, for example, 30 accidents occurred on the Mitchell Bridge in Hibbing from 2002–2004. This past winter only one motorist crashed on the bridge and that was caused by driver error. Part of the credit for safer travels goes to Mother Nature for a mild winter with few frost events, and even fewer snow and ice events, across northern Minnesota. SafeLane

was installed on the southbound lanes of the bridge last July and is also helping to improve traction year-round at the site.

“Although the use of an epoxy sealant is not novel, the retention of deicing chemicals by the special aggregate employed may lead to a remarkable improvement in performance from a safety perspective,” says Dr. John Evans, Department of Chemistry and Biochemistry, University of Minnesota-Duluth (UMD). Evans and the Minnesota Department of Transportation formed a partnership on a three-year study of SafeLane overlay’s performance at the Hibbing site as part of the research effort at the Northland Advanced Transportation Systems Research Laboratory (NATSRL).

### SafeLane’s benefits

Evans notes that the SafeLane overlay aggregate has special properties with its sharp edges that lead to improved traction and possess the ability to absorb and retain anti-icing chemicals. The result, Evans explains, is a unique list of potential benefits:



- Accident reduction (traction and deicing),
- Reduced chemical materials and applications costs,
- Prolonged bridge deck life,
- Reduced surface maintenance,
- Reduced environmental impact from deicing chemicals, and
- Reduced frequency of treatment of remote structures.

Although commonly called the Mitchell Bridge, the Hibbing test site is actually two bridges connected by a roadway over railroad tracks. SafeLane overlay was applied to 16,600 total square feet of bridge deck and roadway.

“Time spent pre-planning is time well spent,” is one of the lessons MnDOT learned from the installation process, according to Patrick Huston, bridge engineer, MnDOT District 1.

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# New Product Improves Road Safety (continued)

Planning steps range from evaluating suitability of prospective test locations to just-in-time training for crew members on the morning of startup.

## Follow standards

One month before installation, MnDOT made standard deck repairs, including fixing spalls and joints and patching asphalt. A detailed traffic control plan was also prepared.

Workers installing SafeLane follow protocols set by the American Association of State Highway and Transportation Officials. Step one involves deck preparation to remove oil and contaminants, including shot blasting, sand blasting and stripe removal. "Because you don't want expansion devices and glands to fill up with epoxy," Huston explains, "bridge joints and obstacles must be masked." MnDOT used duct tape but wasn't completely satisfied with the results. Huston suggests other organizations may want to try backer rod.

Meanwhile, crews mixed and prepared the epoxy. While SafeLane overlay is a new technology to improve road and bridge safety, it is applied in a surprisingly low-tech manner. Crews manually spread the epoxy using squeegees, and then shovel the aggregate across the surface. In this case, a limited work area of 15 feet by 38 feet made it impractical to use automated equipment.

SafeLane overlay is applied in two applications for road and bridge projects. The epoxy is left to cure for seven to eight hours depending on outdoor temperatures. After it cures, loose rock is scraped off and vacuumed by a sweeper truck followed by leaf blowers. The surface is then reopened to traffic.

## MnDOT's process

MnDOT designated 23 bridge and highway maintenance workers as the crew for the project. While that may have been more workers than necessary, Huston says, the department believes it was "better to have too many than not enough." MnDOT also chose to subcontract shot-blasting of the deck, initial traffic control set-up and interim striping.

Accident reduction was the primary purpose for applying SafeLane overlay to the Mitchell Bridge, and preventative maintenance represents a secondary purpose. Huston adds potential benefits in the infrastructure protection area include a seal on the deck, a better option than a chloride spray system because the bridge is exposed to less chlorides, a new wear surface, and a great team building project.

One of the few potential drawbacks from a bridge engineer's perspective, Huston notes, is that observers can no longer see the deck surface and must rely on the deck underside to judge the bridge's condition.

Improved traction is one of the immediate benefits motorists crossing the Mitchell Bridge are experiencing following the SafeLane overlay installation, and MnDOT performed skid tests before and after installation. Traction was "too good to be quantified," said Huston immediately following installation. Since then, traction in the test area has been "greatly improved during rain and light frost," adds Tim Sheehy, operations superintendent, MnDOT District 1.

## Analyzing results

While MnDOT has closely monitored performance results at Hibbing for the past two years, Cargill has commissioned leading ice and snow control expert Dr. Wilfred Nixon to analyze SafeLane overlay's winter performance at all test sites. In his 2006–2007 report, Nixon, president of Asset Insight Technologies and professor of engineering at the University of Iowa, concludes, "a consistent result appears to be forming that the SafeLane overlay leads to a safer road in winter conditions."

Nixon cautions that for statistically significant results, safety studies need to be conducted over several years but adds, "There is now two years of consistent evidence that improved performance by SafeLane overlay under winter conditions ... does indeed translate into safety improvements for the traveling public."

MnDOT continues to collect data and analyze results at the Mitchell Bridge during the winter of 2007–2008 while expanding the number of test sites in Minnesota to five additional bridge structures located near Bemidji, Alexandria and Barnesville.

Moreover, Minnesota will become the first state to test SafeLane overlay in a new application. MnDOT plans to install the overlay in 2-foot to 4-foot inlays along wheel tracks on the approaches to one of the bridges to help improve traction and reduce accidents. It's a new use for SafeLane overlay and a sign of users' growing confidence in this versatile technology.