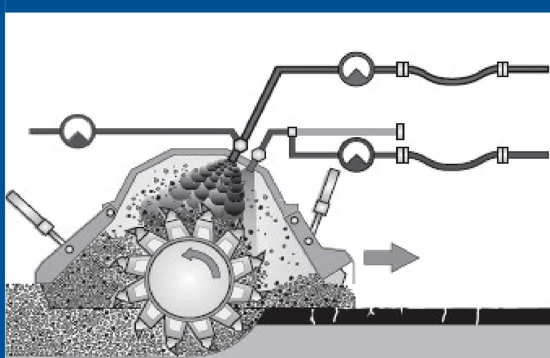
Minnesota's Experience

In Minnesota, Olmsted and Fillmore Counties successfully have used cold-in-place recycling with foamed asphalt. Fillmore County started using cold-in-place recycling with foamed asphalt more than five years ago, says John Grindeland, Fillmore County engineer. Roads with sections that were rehabilitated with cold-in-place recycling and foamed asphalt, which include more than eight miles of CSAH 8 and more than nine miles of CSAH 5, show less cracking than traditional mill and overlay projects, he says.

"I think we are getting more bang for our buck," says Grindeland. Compared with the traditional mill and overlay technique, the cold-in-place recycling sections in Fillmore are experiencing less cracking to date.

Foamed asphalt offers advantages in the application process as well.

"I don't think we used as much oil as we have to use with other techniques," says Grindeland. It also helps reduce the overall time it takes for the pavement rehabilitation process.



(Above): Diagram of the full depth recycling process

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New Resources

The Minnesota Local Road Research Board (LRRB) sponsored a recent research project to assess the recycled pavements that use foamed asphalt, evaluate such projects in Minnesota, and develop design guidelines.

The project confirmed that all cold-in-place recycling sections with foamed asphalt are performing very well to date and that transverse cracking and rutting appears to be reduced by using foamed asphalt cold-in-place recycling rehabilitation techniques. The foamed asphalt layer remains a cohesive unit and does not crumble, according to testing. Data analysis revealed that the recycled pavement layer develops a relatively uniform strength.

As part of the project, general design guidelines were developed for the use of foamed asphalt in cold-in-place recycling and full depth reclamation.

For More Information

For a copy of the LRRB report 2009-09: ***Recycled Pavements Using Foamed Asphalt in Minnesota***, visit:

http://www.lrrb.org/PDF/200909.pdf

For a current state-of-practice review about cold-in-place recycling, visit:

http://www.fhwa.dot.gov/pavement/recycling/cir/

MINNESOTA DEPARTMENT OF TRANSPORTATION

Making the Most of Your Pavement Dollars

A closer look at the use of foamed asphalt for cold-in-place recycling and full depth reclamation

LRRB
LOCAL ROAD RESEARCH BOARD

Key Benefits

Petroleum plays an important role in road construction and rehabilitation. As oil prices escalate, so, too, do the costs to repair and rehabilitate roads. Minnesota and other states are increasingly turning with success to recycling techniques that are resulting in cost savings, environmental benefits, and high-performance levels.

Throughout the years, the high price of asphalt, the need to conserve energy, the reduced availability of high-quality aggregates, and the dwindling supply of landfill space all helped spur advances in the technology and equipment for asphalt pavement recycling methods. Projects with recycled asphalt pavement (RAP) performed well, which led to the growth of RAP.

Local and state agencies now are able to select from several different rehabilitation methods, including cold-in-place recycling and full depth reclamation. Because they involve processing materials on site, cold-in-place recycling and full depth reclamation greatly reduce the need to haul materials away. The methods also offer other benefits that include:

* Cost savings

* Reduced emissions

* Strong performance results

* Reduced construction times

Options

Cold-in-place recycling and full depth reclamation involve different approaches:

• Cold-In-Place Recycling
Cold-in-place recycling uses the grade control of the milling machine to trim the old road, usually to four inches; recycled materials can be spread typically through a separate paver with its own grade controls but can be spread by a grader, placing the material in a uniform lift over the undisturbed base material.

• Full Depth Reclamation
Full depth reclamation is a reclamation technique in which the full flexible pavement section and a predetermined portion of the underlying materials are uniformly crushed, pulverized, or blended, resulting in a stabilized base source. Further stabilization may be obtained through the use of available additives.

According to a case study from the Ontario Ministry of Transportation, cold-in-place recycling with foamed asphalt reduced emissions by 50 percent, consumed 62 percent less aggregates, and cost 40-50 percent less when compared to conventional mill and overlay treatments.

Broad Use

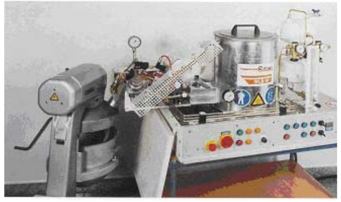
First developed in Iowa as a method to stabilize soil, foamed asphalt has served as a stabilizing procedure for recycled materials since the 1970s. Many parts of the world, including South Africa, Australia, Canada, Europe, and Asia have used foamed asphalt in their road rehabilitation projects. Some states also have developed foamed asphalt specifications, which are guiding construction of pavement stabilization projects.

The 2009 Annual Minnesota Pavement Conference featured a presentation on the application of in-place recycling in Ontario, Canada. Ontario began using cold-in-place recycling and full depth reclamation with foamed asphalt nearly 10 years ago. The pavements in Ontario are performing well, often carrying significantly more traffic during their service life than anticipated. The presentations concluded that cold-in-place recycling is an environmentally friendly flexible pavement rehabilitation technique that helps decrease life cycle costs, reuse existing non-renewable material, minimize new materials, and reduce on-site transportation.

The Role of Foamed Asphalt

Used with both methods, foamed asphalt helps reduce binder and transportation costs, increases efficiency, decreases environmental impact, and adds strength and moisture resistance to remaining pavement materials.

Foamed asphalt forms by injecting small quantities of cold, atomized water under pressure into hot asphalt binder. When it makes contact with the binder, water becomes steam and produces asphalt foam that is mixed with pulverized asphalt pavement materials at the job site. As the mix cools and the steam evaporates, the binder-coated aggregate provides a stabilized base source.



Introducing moisture into a stream of hot asphalt creates a foam that mixes well with aggregates.