Background
Top-down cracking is becoming more prevalent at MnROAD. Longitudinal cracks have developed in the wheelpaths of several cells. In the year 2000 a total of 20 cores were taken from four mainline cells. It was determined at that time that the cracking initiated at the pavement surface and that the cracks stopped at the first layer interface.

In August 2005 13 more cores were taken from four mainline cells. The main goal was to further investigate the top-down cracking and its progression over time. A few cores were taken along transverse cracks to observe the deterioration present. This paper summarizes the results of this cracking investigation.

Top-Down Cracking
Cores were taken along top-down cracks in the driving lane of Cells 3, 14, 17, and 19. It was observed that the cracks have progressed significantly since 2000. In several cores, the cracks progressed down into the second or third lift instead of stopping at the first lift as in 2000. In other cores, the cracks propagated through the entire thickness. The cores in the right wheelpath (near the edge stripe) had top-down cracks through the entire thickness, while the cores in the left wheelpath (near the centerline) had top-down cracks that stopped part way down.

Cell 3 Partial Top-Down Crack

Cell 3 Complete Top-Down Crack
Transverse Cracking

An investigation of transverse cracking on Cells 14 and 17 was also performed. A core from Cell 17 (left) showed that the crack deteriorated from the bottom up to about 1/3 of the pavement thickness. This is consistent with previous investigations at MnROAD. Coring Cell 14 led to some interesting observations (right). Besides the deterioration from the bottom up, pumping was also present, in which fines from the base are pumped up through the crack to the surface. In addition, the microsurfacing on the cell created a seal in which water was trapped underneath the surface. Excess water from the core truck, since it was not able to pass up to the surface, traveled along the transverse crack. It created bulges in the microsurfacing and eventually broke through, creating a mini geyser in the pavement.

This cracking investigation could have implications when it comes time to rehabilitate the pavement sections. Both the top-down and transverse cracks are deteriorated more than was previously thought. A simple overlay or mill-and-overlay might not be enough to restore the ride quality of the cells, and more drastic measures might be necessary.

Cell 14 Coring Along a Thermal Crack with Microsurfacing