

Montana Department of Transportation
Research Program

ANNUAL EXPERIMENTAL FINAL EVALUATION REPORT

Cold In-Place Recycle (CIR) Koch™ Process CIR-EE

Location: Red Lodge, Montana – Carbon County, Highway 212 (P-28) Milepost 90-101.6

Project No.: Red Lodge North STPP 28-2(22)70

FHWA No. MT 00-03

Description: Final report of experimental rehabilitation project consisting of cold milling approximately 75mm of asphalt cement, replace with cold in-place recycled using Koch's CIR-EE (Cold in-place Engineered Emulsion), plant mix surfacing and seal & cover

Evaluation Date: October 2007

Date Constructed: July 2001

Report Origin: Craig Abernathy
Experimental Project Manager

Highway 212, (P-28) suffered from rutting, plastic deformation and transverse cracking with the previous AC pavement. The Montana Department of Transportation, Billings Division decided to conduct an experimental cold in-place recycle project using Koch Pavement Solutions™ CIR-EE process. The length of the project allowed the installation of various treatments with adequate control sections. Research will perform and publish annual evaluations for the life of the project to compile a complete performance history. This report is the sixth year analysis.

Analysis

The experimental documentation will encompass recording visual distress, wheel rut measurements and crack mapping with 300 ft. intervals at every data location of the project. There are three data locations at each section for a total of eighteen sites. The breakouts of sections within this project are as follows (locations are approximate):

- ▶ **Section 1:** MP 89- MP 91, 90mm cold mill, 105mm PMS
- ▶ **Section 2:** MP 91-MP 94.3, 75mm recycle with 45mm PMS overlay
- ▶ **Section 3:** MP 94.3-MP 95.4, 75mm recycle with seal and cover
- ▶ **Section 4:** MP 95.4-MP 96.3, 75mm mill and fill PMS
- ▶ **Section 5:** MP 96.3-MP 98, 75mm recycle with seal and cover
- ▶ **Section 6:** MP 98-MP 101.6, 75mm recycle with two lifts of PMS (90mm)

The following is the individual breakout on cracks-per-mile (CPM) in order as listed above.

<u>Treatment</u>	<u>CPM</u>
Section 1	0
Section 2	51
Section 3	96
Section 4	84
*Section 5	151
Section 6	0

*This data site was located in section 5, milepost 97.5 at the 75mm recycle site. The extrapolation puts the CPM at 151, with a standard deviation of 2. This report will note that initially with the first annual inspection, there was an abnormally high transverse cracking within the 300' data site. To date, low severity transverse cracks have been documented throughout the entire section. In earlier analysis it was speculated data site 97.5 (field reference number 15) was anomalous with cracking compared to the entire section. However, with the increased cracking within the other two data sites may be an indicator of overall performance.

To date sections 1 and 6 have no noticeable cracking. Sections 2, 3, & 4 are beginning to show progressive transverse cracking, all low severity in nature. At this time the extent of transverse cracking in all sections is minimum and rated as good to fair.

The chart below is the averaged wheel-path rutting for all treatments. Rutting data was measured by the string-line method. All values are rounded to the nearest whole number.

TREATMENTS	AVERAGE RUT DATA (IN MILLIMETERS)			
	NORTHBOUND		SOUTHBOUND	
	OWP	IWP	IWP	OWP
(1) 90mm cold mill, 105mm PMS	6	5	5	5
(2) 75mm recycle, 45mm PMS	4	3	3	4
(3) 75mm Recycle	5	5	8	6
(4) 75mm mill and fill PMS	6	6	4	5
(5) 75mm recycle	5	5	9	7
(6) 75mm recycle, 90mm PMS	8	5	5	5

Most data sites exhibited good appearance and even seal with minimum rut. Several sections did have minimum flushing mainly in the wheelpaths. Section 2 (75mm recycle, 45mm PMS) displayed the best performance in rutting. Both 75mm recycle sections (3 & 5) display the most in averaged increased rut and exhibits more flushing. On average rutting is minor on the entire project. Average IRI for the project corridor is 70.

Based on this evaluation Research has rated this project as performing well. The following are images of all data sites of the individual treatments. All views are looking north. This report and additional project information can be found at the following address: <http://www.mdt.mt.gov/research/projects/redlodge.shtml>

Section 1: MP 89- MP 91, 90mm cold mill, 105mm PMS

Data sites 1, 2, & 3



Section 2: MP 91-MP 94.3, 75mm recycle with 45mm PMS overlay

Data sites 4, 5, & 6



Section 3: MP 94.3-MP 95.4, 75mm recycle with seal and cover

Data sites 7, 8, & 9



Section 4: MP 95.4-MP 96.3, 75mm mill and fill PMS

Data sites 10, 11, & 12



Section 5: MP 96.3-MP 98, 75mm recycle with seal and cover

Data sites 13, 14, & 15



Section 6: MP 98-MP 101.6, 75mm recycle with two lifts of PMS (90mm)

Data sites 16, 17 & 18.

