Montana Department of Transportation
Research Program
November 2003

ANNUAL EXPERIMENTAL EVALUATION REPORT

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

Location:	Red Lodge, Montana – Carbon County, Highway 212 (P-28) Milepost 91-101.6
Project No.:	Red Lodge North STPP 28-2(22)70
FHWA No.	MT 00-03
Description:	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:	August 11, 2003
Date Constructed:	July 2001
Report Origin:	Craig Abernathy Experimental Project Coordinator

Highway 212, (P-28) suffered from rutting, plastic deformation and transverse cracking with the previous AC pavement. The Montana Department of Transportation decided to conduct an experimental cold in-place recycle project using Koch Pavement Solutions™ CIR-EE process.

Research will perform and publish annual evaluations until the year 2006. A final report will be issued at that time. Research may elect to continue the evaluations informally. The experimental documentation will encompass recording visual distress, wheel rut measurements and crack mapping with 300 ft. intervals at every milepost of the project. There are three data sites at each section. 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.

Treatment	**CPM**
Section 1	0
Section 2	0
Section 3	0
Section 4	11.7
***Section 5**	**46.9**
Section 6	0

*This data site was located at milepost 97.5 in the 75mm recycle site, section 5. The extrapolation puts the CPM at 46.9, with a standard deviation of 2.07. This report will note that there was an abnormally high transverse cracking within the 300′ data site. Eight, low severity across-lane cracks were documented. Of the

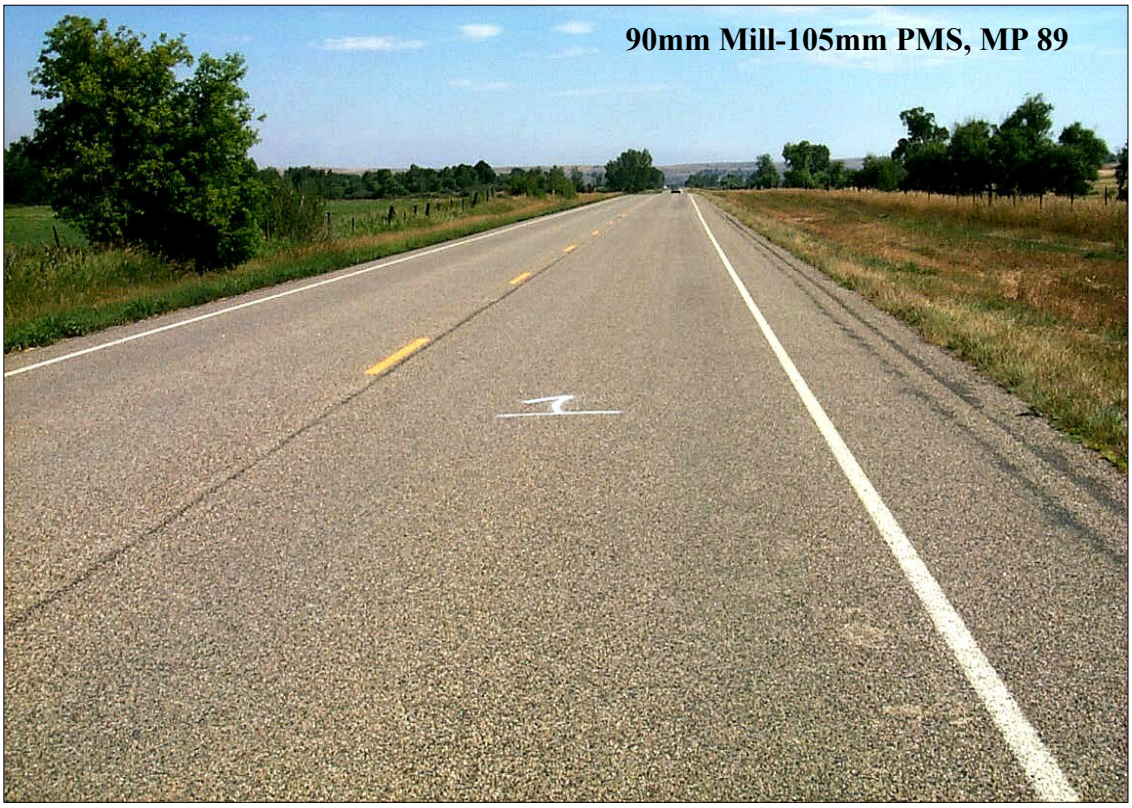
other two data sites within this section exhibited no cracking at all. This site is considered an anomaly and is not (at this time) an indication of performance.

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
90mm cold mill, 105mm PMS	3	3	3	3
75mm recycle, 45mm PMS	3	1	1	1
75mm Recycle	2	4	6	4
75mm mill and fill PMS	4	4	3	3
75mm recycle	2	3	7	4
75mm recycle, 90mm PMS	5	3	2	3

Most data sites exhibited good appearance and even seal with minimum rut. Several sections did have low to moderate flushing mainly in the wheelpaths. Both 75mm recycle sections (3 & 5) displayed the majority of flushing.

Based on this evaluation Research has rated this project as performing well. The following are representative images of the individual treatments. All views are looking north.

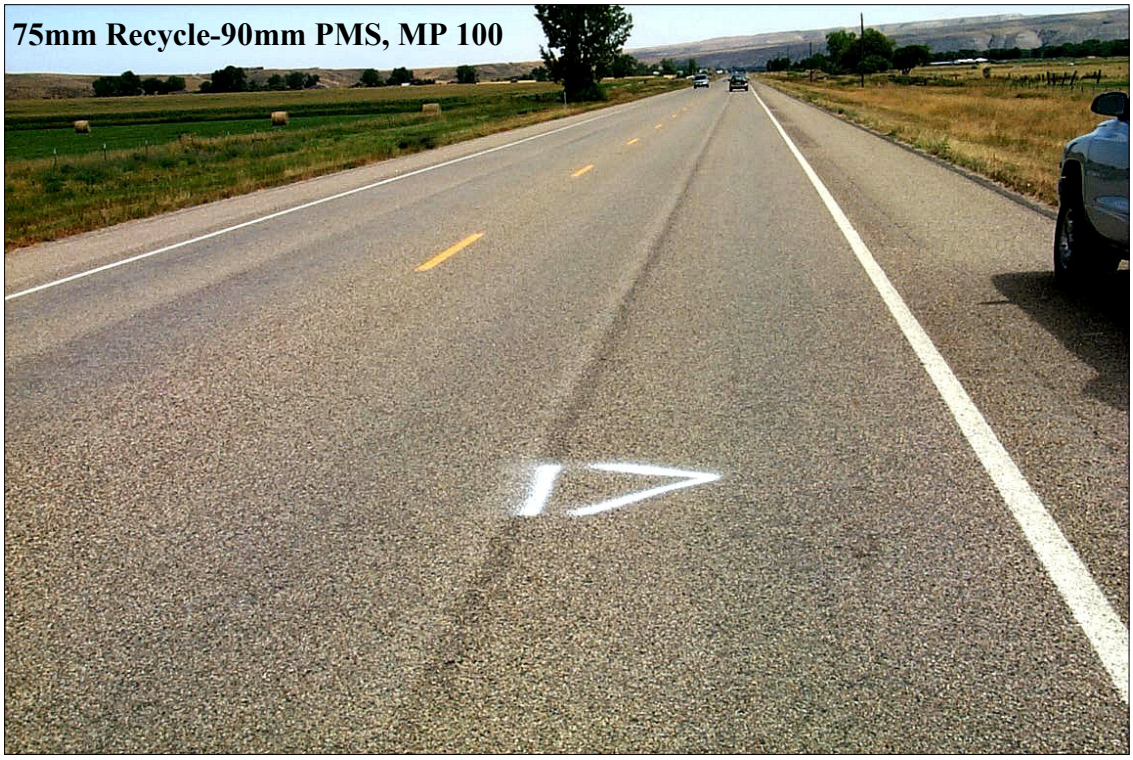



75mm Recycle-45mm PMS, MP 92


75mm Recycle, MP 94.5

75mm PMS, MP 95.85

75mm Recycle, MP 96.5


75mm Recycle-90mm PMS, MP 100