

Executive Summary

The State of Minnesota, together with Minnesota Counties, have continued to improve and expand comprehensive solid waste management programs. The Solid Waste Management Coordinating Board (SWMCB), the Minnesota Pollution Control Agency (MPCA), and the Minnesota Department of Transportation (Mn/DOT) are continuing their initiatives to enhance waste reduction, recycling and recovery of construction, demolition and industrial (CD&I) materials. This *Shingles Recycling White Paper* is the first in a series of four commodity-specific reports as part of the overall SWMCB / MPCA project on *CD&I Recycling Project ("Phase Two")* to be completed in 2008.

There is a rich and deep history of research and development on the emerging technology of using recycled asphalt shingles (RAS) as a road construction material supplement in hot mix asphalt (HMA). The body of published literature extends from the mid 1970's. The literature includes both government research publications and private reports or patent applications.

Mn/DOT has been one of the leaders in the research and development of RAS as a supplement in HMA. With the help of a variety of research organizations, Mn/DOT has a long list of shingles recycling research studies. Yet only manufacturers' shingle scrap is allowed as per the current Mn/DOT scrap shingle specification. This type of enabling specification that allows the use of the materials at the discretion of the contractor is referred to in the highway construction industry as a "permissive" specification. The broad consensus is that a similar permissive specification is also needed for tear-off shingles when used in HMA.

The 2007 *CD&I Study (Phase One)* identified asphalt shingles as a high priority commodity that could potentially be recovered from the CD&I waste stream that is currently being disposed in Minnesota's landfills. Asphalt roofing shingles are a significant portion of a C&D waste stream. The composition analysis for the indicated that roofing made up 15.2% of the total C&D waste as disposed in landfills. Most of this material could be readily sorted for recycling and recovery.

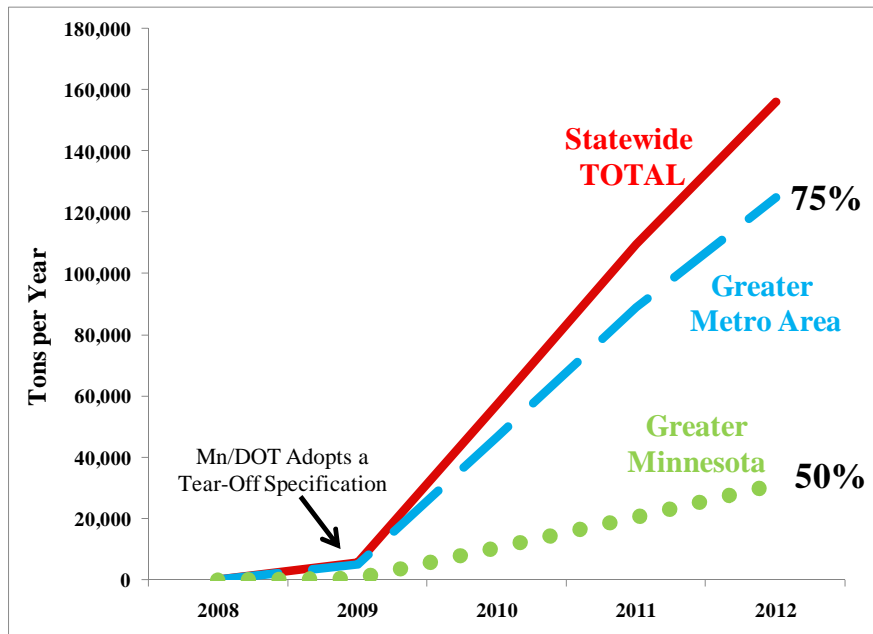
Recycling and other recovery of tear-off asphalt shingles in Minnesota has great potential in the near future to divert significant tonnage from landfills. Using a moderately aggressive estimate, this *White Paper* recommends the following goals:

Greater Metropolitan Area*: adopt a 75% recovery goal for available tear-off shingle scrap =	125,000 tons per year
Greater Minnesota: adopt a recovery goal of 50% for available tear-off shingle scrap =	<u>31,000 tons per year</u>
STATEWIDE TOTAL RECOVERY GOAL=	156,000 tons per year

(* Greater Metropolitan Area as defined by the U.S. Census Bureau as the larger metropolitan statistical area and includes 11 Minnesota counties around Minneapolis / St. Paul.)

This Statewide recovery total of 156,000 tons per year should be the "target" goal for market and policy development planning purposes. This target can serve as a benchmark for MPCA and the Counties to assess if adequate additional recovery progress is being made. Figure ES-1 displays a hypothetical forecast of annual recovery rates to attain this "target" goal.

Figure ES - 1
Tear-Off Asphalt Shingles Recovery Targets
 (Tons per Year)



The analysis and recommended strategies within this *White Paper* are, in general, intended to be applicable Statewide and address the needs of all Minnesota Counties and other local governments to find markets for tear-off shingles. However, all of manufacturers’ shingle scrap is generated in the Twin Cities Metropolitan Area. Plus the vast majority of tear-off shingle scrap is also generated in the Greater Metro Area and other larger urbanized regions of Minnesota (e.g., Duluth, Rochester, St. Cloud) where there is a higher rate of re-roofing jobs. Finally, there are more and larger HMA producers in these same urbanized regions of the state correlated with the amount of pavement construction. Therefore, this *White Paper* provides an initial consideration of both the economies of scale of shingle scrap availability and the transportation logistics and costs to get finished RAS product to potential markets.

One of the key barriers to the development of this new market is the exclusion of tear-off shingle scrap from HMA in the current Mn/DOT specification. Minnesota Counties and MPCA should work closely with Mn/DOT towards adoption of a new state materials specification providing for the appropriate use of tear-off recycled asphalt shingles in hot mix asphalt (HMA).

Counties and other local governments also have an important role to play in the development of the market for recycled tear-off shingles.

Minnesota Counties should issue request for bids to purchase hot-mix asphalt and bituminous paving services that include “alternate bid” options and “bid advisories” that state a non-binding policy preference for shingle-modified hot-mix asphalt.

One objective of this *White Paper* is to provide a bridge between the technical research and development efforts and the larger policy options to help continue to expand the market for recycled asphalt shingles. Therefore, as part of this *White Paper*, an exhaustive series of market

development “options” were analyzed. Criteria such as cost – effectiveness and overall feasibility, including likely political acceptance, were considered. Following this analysis, this *White Paper* forwarded a number of key policy and technical recommendations for accelerating the development of a strong market for tear-off shingles.

The *White Paper* recommendations and action steps state:

1. The MPCA and SWMCB should encourage Mn/DOT to continue to provide special, provisional project specifications for use of tear-off shingles in HMA that can be used by local governments and contractors on a job-by-job basis.
2. The MPCA and SWMCB should encourage Mn/DOT to continue with its plans to adopt a “permissive” specification for use of tear-offs based on results of a new 2008 – 2009 lab study such that contractors can use tear-off RAS unless explicitly prohibited by the local project engineer. It is further recommended that adoption of this permissive specification is adopted by the end of 2009.
3. The Minnesota Shingles Recycling *Technical Working Group (TWG)* should continue to convene to help coordinate related market development initiatives by State and local government agencies.
4. As a temporary means to help demonstrate the feasibility of use of tear-off RAS into HMA, willing SWMCB County departments of transportation should consider a designing **selected** 2008 and 2009 construction demonstration projects that specify the use tear-off derived HMA. Beginning in about 2010, (assuming that Mn/DOT has adopted a permissive tear-off specification in 2009) Counties should use regular purchasing procedures (e.g., “...may use tear-off shingles...”).
5. All SWMCB member Counties should announce their individual plans for using tear-off shingles in HMA construction projects in 2008 and 2009. Each SWMCB County should consider which affirmative procurement policy method they will use for their respective project specifications.
6. MPCA should develop a dedicated tear-off shingles recycling market development grant program for 2009 through 2012. This “dedicated, targeted” tear-off shingles grant approach should be sunset in 2012 or when the tear-off market is self-sustaining (whichever comes first).
7. MPCA should develop a sustainable building technical memo (e.g., for use by LEEDTM – type of programs) specific to recycling of tear-off shingles that includes requirements for:
 - a. Standard definitions and terminology
 - b. Standard measurement methods
 - c. Recommended means to develop independent certification of recycling
 - d. Recommendations for funding such certification
8. SWMCB and MPCA should develop tear-off shingles recycling technical assistance tools such as brochures and web page information. Such tools should be used, as appropriate, when State and local regulators conduct on-site, pre-demolition inspections.

9. If there is not reasonable and steady progress towards the proposed targets for recovery of tear-off shingles by the end of 2009, MPCA should evaluate legislative options which may include authority and funding to further promote the market development for tear-off shingles.
10. SWMCB and MPCA should develop a model C&D recycling program, including specific provisions for tear-off shingles recycling requirements. Such a model program should include options for:
 - a. Required bid advisories (i.e., voluntary preferences for purchase of tear-off derived HMA).
 - b. Required bid alternatives (i.e., explicit itemization of the price difference for tear-off derived HMA pavement)
 - c. Other voluntary affirmative procurement methods (“...may use tear-off shingles in HMA...”) such as would be provided by Mn/DOT’s proposed new permissive specification for tear-off shingles.