

MMB Presents Second Region 5 Green Highways Webinar

On February 5, 2009, MMB hosted the second in a three-part Green Highways webinar series entitled: "Using Class C and Off-Spec Fly Ashes in Recycled Pavement Stabilization Projects." It featured technical presentations on two road reconstruction demonstration projects in which coal fly ash was used to strengthen a road base made from the pulverized original pavement. The webinar also included a WDNR regulator's experience with permitting these beneficial use projects. This activity supports MMB's priorities under the Resource Conservation Challenge to promote both industrial materials recycling and green building.

(from <http://www.epa.gov/reg5rcra/wptdiv/news/te021309.html>)

E-mail from Julie Gevrenov, U.S. EPA Region 5, Materials Management Branch, (312) 886-6832

Thank you for participating in last month's Region 5 Green Highway Webinar: Using Class C and Off-Spec Fly Ashes in Recycled Pavement Stabilization Projects. As promised, we attempted to answer all the questions submitted during the webinar and provide links to documents that were referenced during the discussion. That information is in the attached document. We are still working to get the webinar video file posted on the web, after which you will be able to review the presentations.

Please pass this along to anyone who viewed the webinar with you on February 5th. Stay tuned for an announcement about our April Green Highway Webinar, which will go out shortly!

USEPA Region 5 Green Highways Webinar #2 February 5, 2009 Q&A and Other Resources

Questions Pertaining to Jim Rosenmerkel's Presentation

1. How much fly ash was spread per unit of road?
 - a. Application rates are between 95 – 125 # / SY. Rates are determined by lab testing.
2. How is the exact #'s per sq yard of fly ash determined for a particular type of soil? Is it based on the desired psi of the mixture?
 - a. Optimum moisture/density for fly ash stabilized materials [clay soils or HMA] is determined by lab testing. Moisture / density contents are determined by Proctor tests for several ash contents and moisture contents.
3. What is the expected hydraulic conductivity of the stabilized HMA?
 - a. We don't have actual values, but do know that permeability is reduced in recycled, pulverized HMA material.
4. What is the target for strength? 300psi?
 - a. Unconfined compressive strength [Qu] should be 200 – 300 psi for typical applications. Higher Qu's might cause reflective cracking in pavement if it gets too high.

5. Are there or have there been long or longer-term studies regarding leaching of contaminants such as heavy metals out of the material used in soil stabilization projects? Also are there any long term leaching studies from full depth reclamation projects?
 - a. J.R. referenced a study at a beneficial use site on Wisconsin State Highway 60 near Lodi, WI, which was reconstructed in 2000. Four different test sections include subbase layers consisting of industrial byproducts, including one section with fly ash. The site is instrumented with lysimeters and groundwater monitoring wells, which have been monitored intermittently since construction. See Project #32 on the RMRC website: <http://www.recycledmaterials.org/Research/past/pastresearch.asp>. Additional information on the project was presented at the 2006 National Beneficial Use of Industrial Materials Summit by both Dr. Gardner (RMRC, UNH) and Dr. Benson (RMRC, formerly of UW Madison, currently at U of Washington). http://beneficialusesummit.com/2006/presentations/Kevin_Gardner/frame.htm http://beneficialusesummit.com/2006/presentations/Craig_Benson/frame.htm
 - b. Since permeability of fly ash stabilized recycled HMA is reduced, and most of the material is natural crushed aggregate, there have been no concerns expressed to us (i.e., Lafarge) by regulators. Furthermore, since fly ash changes chemically as hydration occurs, trace metals are effectively permanently bound or not detectable.
6. When recycling a full-depth reclamation project at the end of its life, have the release of contaminants, such as heavy metals that may be in the fly ash, been considered? If so, how do we avoid getting into a regulatory situation with either EPA or our state environmental regulatory agency?
 - a. A concerned user is advised to contact your state environmental agency regarding this question. Wisconsin DNR has developed excavation guidance for projects conducted under their beneficial use approvals (<http://www.dnr.state.wi.us/org/aw/wm/publications/beneficial/PUBLWA822/WA822.pdf>, page A3). Also, see links to presentations by Drs. Gardner and Benson under Question #5 regarding predicted leaching behavior as modeled over time.
7. Will the use of carbon injection in the flue gas cause a change in the uses of fly ash for soil stabilization?
 - a. Carbon injection may result in a high-carbon fly ash that does not meet ASTM specifications for use in cement and concrete. See John Siekmeier presentation for an example of use of a high-carbon ash for recycled pavement stabilization. There is a chance that some ACI ashes will not be useable in full depth reclamation.
 - b. EPA investigation of the leaching characteristics of fly ash from plants using sorbents for mercury control indicates that 1, mercury is strongly retained by the resulting CCR and unlikely to be leached at levels of environmental concern; 2, arsenic and selenium may be leached at levels of potential concern both with and without enhanced mercury control technology; 3, leachate concentrations and the potential release of mercury, arsenic, and selenium do not correlate with total content, so it is not recommended to base decisions on total content. ([EPA/600/R-06/008, January 2006 "Characterization of Mercury-Enriched Coal Combustion Residues from Electric Utilities Using Enhanced Sorbents for Mercury Control" by F. Sanchez, R. Keeney, D. Kosson, R. Delapp, and S. Thorneloe.](#))
8. Regarding leaching studies from FDR - how do you know it is not leaching out of metals from the soils being blended?
 - a. You'd need to include a control in the experiment. Industrial materials are not unique; naturally occurring materials at the site and/or traditional aggregates and

construction materials can also contain trace elements which can leach out over time.

Questions Pertaining to John Siekmeier's Presentation

1. What exactly is RPM? "Recycled Pavement Materials" can be lots of different stuff....
 - o It is full-depth reclamation of asphalt pavement, consisting of existing asphalt and existing granular base.
2. Is the LOI % on the fly ash high, or to be expected for other power plants. Seems high, as that is energy unused going up the stacks.. I thought power plants would want to burn more of the coal then 14% go up the stacks
 - o Loss on ignition (LOI), a measurement of the amount of unburned carbon remaining in the fly ash, is an indicator of suitability for use as a cement replacement in concrete: ASTM C618 specifications for use in Portland cement concrete allow a maximum LOI of 6%. The high-carbon fly ash used in this project exceeds that limit. Some possible causes for the high LOI: bituminous coals/fly ash have higher carbon contents than lignite and subbituminous coal/fly ashes; plants utilizing low-NOx burners to control NOx emissions run at a lower temperature, leaving more unburned carbon in the ash (incomplete combustion); presence of injected activated carbon used to capture mercury from the flue gas.
3. What are the units on the GHG charts? Were the GHG calculations adjusted to a "MT per mile" basis, or are they absolute numbers for the project?
 - o The unit on GHG emissions is Mg, absolute numbers for the project.
4. Have you gotten any results yet from the environmental monitoring set up on the MNROAD demo project? If not, what is the anticipated timeframe for monitoring the site, and when is the data expected to be available?
 - o Yes, we have been getting results from the environmental monitoring. A preliminary report, dated July 2008, is available on MnDOT's website at <http://www.mrr.dot.state.mn.us/research/pdf/2008mrrdoc026.pdf>. Case Study 21 has been published and is available on www.epa.gov/c2p2.

Additional Questions

1. In light of the recent fly ash impoundment (disposal site) spill in TN, has any Region 5 state re-visited their regulations on stock piling fly ash? Or any issues related to fly ash?
 - o By beneficially using coal combustion products, we can realize performance, economic and environmental benefits while reducing our need to dispose of this material. At this time, it is too early to determine if States are revisiting their disposal regulations for coal combustion wastes that are not beneficially reused.

Documents referenced during the webinar:

1. Coal Combustion Partnership Program (C2P2) Case Studies:
 - a. Case Study 15: [Waukesha County Airport/Crites Field Waukesha, WI: Full Depth Reclamation \[FDR\] – A Rehabilitation Option for Deteriorated Hot Mix Asphalt \[HMA\] Pavements \(PDF\)](#)
 - b. Case Study 18: [Rehabilitating Asphalt Highways: Coal Fly Ash Used on Ohio Full Depth Reclamation Projects \(PDF\)](#)
 - c. Case Study 21: [High-Volume Use of High-Carbon Fly Ash for Highway Construction \(PDF\)](#)

- d. Case Study 14: [Wisconsin Public Service Corporation Power Plant Foundation Evaluation \(PDF\)](#)
2. ACAA "Soil Stabilization and Pavement Recycling with Self-Cementing Coal Fly Ash" 2nd Ed, January 2008 <http://acaaffiniscape.com/storelistitem.cfm?itemnumber=5>

Additional Resources about Environmental Impacts of Using Coal Combustion Products

1. EPA's web page on Environmental and Health Information related to the use of CCPs <http://www.epa.gov/epawaste/partnerships/c2p2/use/effects.htm>
2. [Using Coal Ash in Highway Construction: A Guide to Benefits and Impacts \(PDF\)](#)
Provides basic information, cost and performance benefits, environmental benefits, health concerns, and case studies on the use of coal ash in constructing highways.
3. [Fly Ash Facts for Highway Engineers \(PDF\)](#)
Provides basic information about the uses of fly ash from the Federal Highway Administration.
4. [Waste and Materials-Flow Benchmark Sector Report: Beneficial Use of Secondary Materials - Coal Combustion Products \(PDF\)](#) (95 pp, 558K)
This report provides an initial assessment of the baseline practices, markets, and policies that affect the recovery and use of CCPs, **as well as an overview of life cycle information available to estimate incremental benefits associated with additional beneficial use.**