

# WACA/WSDOT Meeting

## Minutes for Wednesday, December 8, 2010

**Attendees:**

Mike Polodna, WSDOT	Tom Weist, Oldcastle	Anthony Sarhan, FHWA
Steve Ford, Miles Sand & Gravel	Craig Matteson, Central Pre-Mix	Mohammad Sheikhezadeh, WSDOT
Jason Brewer, BASF	Dick Boss - Cadman	Megan Slater, Corliss
Eric Clark, Corliss	John Cherne, Lehigh Cement	Rob Shogren, Lafarge
Bruce Chattin, WACA		

**Location:** WACA Office, Des Moines, WA

**Next WACA Meeting Date:**

*Wednesday, March 9, 2011 at WSDOT HQ Mats Lab, Main Conf Room, 9:30 AM – 12:00 Noon*

**Future WACA Meetings Dates:**

*Wednesday, June 8, 2011, at WACA's Office in Des Moines, 9:30 AM – 12:00 Noon*

*Wednesday, September 8, 2011 at WSDOT HQ Mats Lab, Main Conf Room, 9:30 AM – 12:00 Noon*

**Meeting Minutes are available at:** <http://www.wsdot.wa.gov/biz/mats/>

**Issue: Performance Specifications for Concrete Mix Designs - Mo Sheikhezadeh**

Develop performance specification parameters for concrete.

*12/8/10 Mo stated that WSDOT is moving forward on 4 pilot projects using Performance Concrete in the bridge decks. The projects are: Chiwaukum in Wenatchee - Ad date March 2011; Salmon Creek in Vancouver - Ad date April 2011; Dry Creek on US 97 – Ad date September 2011; and McDonald Creek on US 101 - Ad date not reported.*

*There was much discussion regarding performance specifications. Mo reminded everyone that the specification WSDOT developed was reviewed by WACA and that revisions were made per their recommendations. Steve Ford spoke for moving forward and making improvements on each job. Dick Boss would like to have WACA speak with a united voice. Bruce Chattin agreed to provide a letter from WACA stating support for the WSDOT Prescriptive to Performance (P2P) effort. Anthony Sarhan voiced FHWA's support for the P2P effort.*

**Action Plan: Continue to give updates to WACA at quarterly meetings.**

**Issue: Degradation for concrete Aggregate/Base Course – Kurt Williams**

A research study is on-going to test the effect of using aggregate with low degradation values in concrete mixes.

*12/8/10 –Mike Polodna reported that the low deg (31) source was tested to 1500 freeze-thaw cycles and that the current source is at 240 cycles. The schedule is to complete the testing by July 1, 2011.*

**Action Plan: Continue to give updates to WACA at quarterly meetings.**

**Issue: Water for Concrete - Bob Raynes**

*WSDOT Standard Specification 9-25.1 Water for Concrete requires that in order to use recycled water the lab that tests their water must meet R-18. No one is currently using recycled water because of the R-18 requirement.*

*12/8/10 – Bob was not in attendance. Craig Matteson will discuss with Bob and either Bob or Dick Boss will write a proposal.*

**Action Plan: Review WACA proposal at next meeting.**

**Issue: Draft Specification-SCC- Kurt Williams:**

*SCC for Precast Units will be added to the Standard Specifications. Kurt passed out the proposed specification and asked for comments by October 1. Mike will email specifications to all today.*

*12/8/10 – Kurt reported that he received few comments and that the new specification will be available in the January amendment package on the WSDOT web site.*

**Action Plan: Issue complete.**

**Discussion Item: Prestressed Girders Constructed with SCC – Mo Sheikizadeh**

*WSDOT is designing a bridge in Spokane that will use prestressed girders constructed with SCC. WSDOT will continue to discuss the use of SCC for cast-in-place construction in the BCM team.*

*12/8/10 – Nothing new to report.*

**Action Plan: Issue complete.**

**Discussion Item: Novacem –Mo Sheikizadeh**

*Novacem is a new product by Lafarge that Mo is interested in receiving any available research reports.*

*12/8/10 – The Novacem paper discussed at the last meeting was handed out. See Attachment A. No further discussion.*

***Action Plan: Issue complete.***

***New Issue: Standard Specification 9-23.8 Waterproofing –Jason Brewer***

*Are changes needed to this specification? Should WSDOT be specifying ASTM C 1585 instead of ASTM C 642?*

*12/8/10 – There was a discussion of the specification and general agreement that it could use some changes. Jason will write a proposed specification and send it to Bruce for distribution to WACA members.*

***Action Plan: Review WACA proposal at next meeting.***

***New Issue: Mix Design Submittal Issues –Steve Ford***

*12/8/10 – Steve asked if others have been required to include gradations on the WSDOT mix design form when they are using AASHTO gradations. Others indicated that they have been required to do so. Mike Polodna stated that the % passing information is really only intended for a combined gradation submittal but that PE offices may have different interpretations.*

*Steve asked if a change in cement requires a new mix design submittal. Mike answered yes, that any changes to the mix design components require a new submittal.*

***Action Plan: Issue complete.***

***New Discussion Item: Aggregate Source Approvals for Sources to be Blended with Others – Dick Boss***

*An Aggregate Source Approval is required for each pit. Since WSDOT is now sampling and testing only processed material instead of pit run or blended material, source owners have issues supplying samples of processed, non-blended aggregates.*

*12/8/10 – Dick questioned how this issue should be addressed. Mike confirmed that each source needed to be sampled, tested, and approved individually. There was no one in attendance able to address this issue any further so it was tabled until the next meeting.*

***Action Plan: Put on the agenda and continue the discussion at the March meeting.***

rs have kludged together. nts to unite different on systems—especially roadband services—to ant user experience. aring ideas about that i with BT, which pro- and connections to 15 e in the United King- and, including nearly a gital-TV subscribers. 'won't comment on social-TV system might tit and her students at ia Lab demonstrated an prototype last year. A cen- aggregates video from s like YouTube, shares d data with social net- rs video to the user's TV, and the people in their d comments and rat- l forth via an iPhone app. g the TV screen for mes- ing that has proved irri- umers who don't want scuring the pictures on HDTVs. The app also r to tell the network i to show on his or her ice, if a friend suggests e owner agrees, that up at the appointed ary, Montpetit and her ented a refined version i to BT. Jeff Patmore, ith Montpetit as head iversity research at BT, stem could be rolled although he declines y plans. But Montpetit aits U.S. deployment of 'daughter, with whom ertain shows, heads next fall. Engineering issues aside, she wants elp friends and family d, even as they move m M. Bulkeley

## Storing carbon dioxide in cement

### Green Concrete

**M**aking cement for concrete involves heating pulverized limestone, clay, and sand to 1,450 °C with a fuel such as coal or natural gas. The process generates a lot of carbon dioxide: making one metric ton of commonly used Portland cement releases 650 to 920 kilograms of it. The 2.8 billion metric tons of cement produced worldwide in 2009 contributed about 5 percent of all carbon dioxide emissions. Nikolaos Vlasopoulos, chief scientist at London-based startup Novacem, is trying to eliminate those emissions with a cement that absorbs more carbon dioxide than is released during its manufacture. It locks away as much as 100 kilograms of the greenhouse gas per ton.

Vlasopoulos discovered the recipe for Novacem's cement as a grad student at Imperial College London. "I was investigating cements produced by mixing magnesium oxides with Portland cement," he says. But when he added water to the magnesium compounds without any Portland in the mix, he found he could still make a solid-setting cement that didn't rely on carbon-rich limestone. And as it hardened, atmospheric carbon dioxide reacted with the magnesium to make carbonates that strengthened the cement while trapping the gas. Novacem is now refining the formula so that the product's mechanical performance will equal that of Portland cement. That work, says Vlasopoulos, should be done "within a year."

Other startups are also trying to reduce cement's carbon footprint, including Calera in Los Gatos, CA, which has received about \$50 million in venture investment. However, Calera's cements are currently intended to be additives to Portland cement rather than a replacement like Novacem's, says Franz-Josef Ulm, director of the Concrete Sustainability Hub at MIT. Novacem could thus have the edge in reducing emissions, but all the

startups face the challenge of scaling their technology up to industrial levels. Still, Ulm says, this doesn't mean a company must displace billions of tons of Portland cement to be successful; it can begin by exploiting niche areas in specialized construction. If Novacem can produce 500,000 tons a year, Vlasopoulos believes, it can

match the price of Portland cement.

Even getting that far will be tough. "They are introducing a very new material to a very conservative industry," says Hamlin Jennings, a professor in the Department of Civil and Environmental Engineering at Northwestern University. "There will be questions." Novacem will start trying to persuade the industry by working with Laing O'Rourke, the largest privately owned construction company in the U.K. In 2011, with \$1.5 million in cash from the Royal Society and others, Novacem is scheduled to begin building a new pilot plant to make its newly formulated cement. —David Bradley

**NIKOLAOS VLASOPOULOS**  
(Novacem) Green concrete could reduce global carbon emissions that are due to cement production

**OTHERS WORKING ON GREEN CONCRETE**

**Kurt Zenz House, MIT**  
**Calera, Los Gatos, CA**  
**Joseph Davidovits, Geopolymer Institute, Saint-Quentin, France**

five blocks are different varieties of concrete made by Novacem's new type of cement. The magnesium oxides below form the concrete's basic ingredients, along with limestone, a carbon mineral used to make traditional Portland cement.

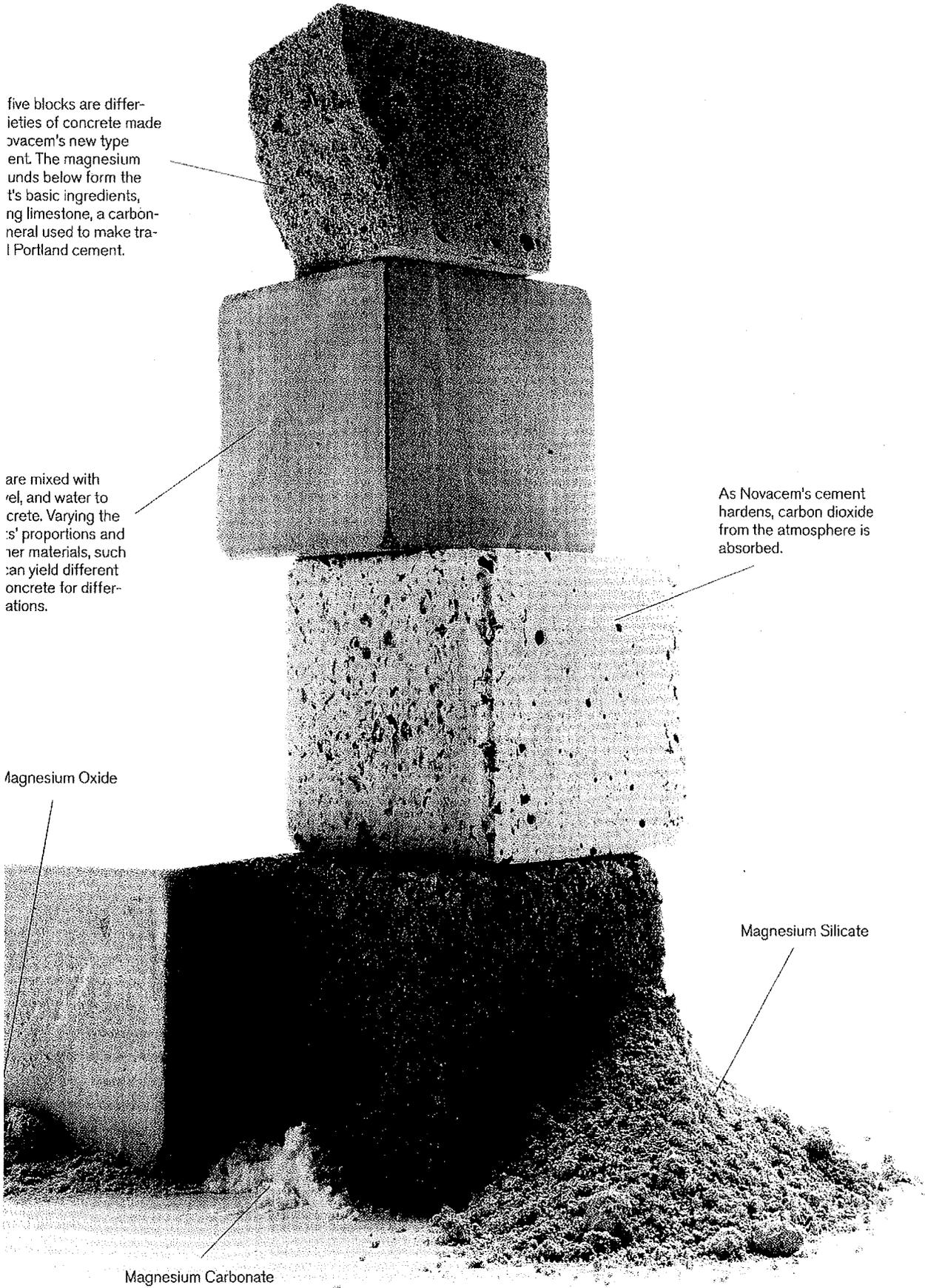
are mixed with sand, gravel, and water to create concrete. Varying the proportions and other materials, such as fly ash, can yield different types of concrete for different applications.

As Novacem's cement hardens, carbon dioxide from the atmosphere is absorbed.

Magnesium Oxide

Magnesium Silicate

Magnesium Carbonate



# Sustainable cement, concrete rise on Massachusetts Institute of Technology radar

Apr 26, 2010 1:28 PM

*Sources: Novacem Ltd., London; Massachusetts Institute of Technology, Cambridge, Mass.*

Following the late-2009 Concrete Sustainability [Hub](#) opening at the MIT Department of Civil & Environmental Engineering, the university's [Technology Review](#) has ranked a magnesium-based cement among 2010 Top 10 Emerging Technologies. Milled from minerals for which proven reserves exceed 10 trillion tons, **Novacem** has the potential to absorb more [carbon dioxide](#) than is released during production--as much as 100 kilograms of the greenhouse gas per ton. A working formulation of what developers dub "carbon-negative cement" was devised by Nikolaos Vlasopoulos, chief scientist at London-based Novacem Ltd., an Imperial College London start-up.

Novacem now is refining the product to achieve mechanical [performance](#) equal to that of portland cement--a goal that Vlasopoulos asserts is attainable within one year. A pilot batch plant has been built in Novacem's laboratories to be followed by a semi-commercial facility. Licensing of the first volume-output plants is anticipated in 2014-15, when production and use of the cement will be licensed on a nonexclusive basis worldwide.

Vlasopoulos formulated the recipe as an Imperial College grad student when he was investigating cements produced by mixing magnesium oxides with portland cement: adding water to the [magnesium compounds](#) absent portland in the mix, he discovered a solid-setting cement that did not rely on carbon-rich limestone. As it hardened, [atmospheric carbon dioxide reacted with the magnesium to make carbonates](#) that strengthened the cement while trapping the gas. Thus, Novacem's technology is based on magnesium silicates rather than limestone (calcium carbonate) as used in traditional portland cement. The company converts magnesium silicates into magnesium oxide using a low-carbon, low-temperature process and adds special mineral additives to produce Novacem cement.

## Related Articles

### [MIT, RMC Research, PCA launch Concrete Sustainability Hub](#)

To accelerate concrete science and engineering breakthroughs and their transfer to commercial practice, the Concrete Sustainability Hub (CSH) will fund \$10 million in [research](#) over the next five years, with MIT's School of Engineering, School of Architecture and Planning, and Sloan School of Management among candidate participants...

### [Industry supporters gather to hear early MIT sustainability hub research results](#)

With representatives on hand of both its industry collaborators--PCA and RMC Research & Education Foundation—at the first gathering of its kind since the research center was established in late-2009, the Massachusetts Institute of Technology Concrete Sustainability Hub (CSH) hosted a World of Concrete 2010 event...