

**Progress Report
March 2003**

FHWA POOLED-FUND PROJECT NUMBER: SPR 2(219)

TITLE: Extending the Season for Concrete Construction and Repair

PRINCIPAL INVESTIGATOR:

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OBJECTIVE: To develop an antifreeze admixture conforming to existing industry standards. This work will adapt recently developed knowledge about off-the-shelf admixtures to the specific conditions of highway construction. The admixture will protect concrete to 23°F (-5°C) or lower and allow concrete to gain appreciable strength while at the temperature.

PROGRESS: 01 February 2003 through 01 April 2003:

ITEMS IN THIS ISSUE:

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Funding: As of this writing, the funding for the final year of this project has begun to filter into FHWA. Reportedly, three states have obligated their FY03 funds, which arrived at FHWA a short time ago.

ASTM: A standard for antifreeze admixtures has been drafted and will be presented to the American Society for Testing and Materials (ASTM) Committee on Concrete and Concrete Aggregates (C09), Subcommittee on Chemical Admixtures (C09.23.03) on 15-18 June 2003. Developing a standard is not part of this pooled-fund study but we report on it to inform you of other related initiatives. Our pooled-fund study provides a cold-weather capability that requires no new ASTM standards because the admixtures we use are already approved for use in concrete. The ASTM standard is expected to take several years before it becomes official.

Final field demonstration: To date, we have developed in the laboratory admixture formulations from two manufacturers' product lines and have successfully tested them at four field locations. Our findings from these four studies are posted on our website. The final goal, before developing guidance for this new technology, was to determine how we could successfully hand this technology off to you, our partners. NHDOT helped evaluate this scenario by volunteering to provide the project oversight—assuring that the correct concrete mixture was ordered and delivered, that all admixtures were dosed into the concrete in the proper amounts and sequence, and that the concrete was properly placed, consolidated, finished and cured. We provided the written instructions from which NHDOT worked flawlessly. We are convinced that this technology is ready for wider application.

The job was conducted in Concord, NH during the coldest 3-day period over the past 25 years. It was cold enough that most ready-mix plants in the state were not in operation. However, as it turned out, compared to the four previous field trials, this job came closest to utilizing the full antifreeze potential of the admixture. (*For more details on the work done at Concord, NH, visit our website at http://www.crrel.usace.army.mil/concrete/concord_demonstration.htm*). This means that the -5°C admixture formulation developed in this study is potentially an over-match for many state applications. That is good news, but we can do better by developing a way to tailor our recommendations to custom-fit milder job conditions. On 03 March 2003 each state received our new Phase II proposal that explains how we can improve on what we've accomplished thus far.

Looking ahead: Now that the antifreeze technology has been successfully demonstrated, the final project goals are to:

1. complete the lab-testing program,
2. write a final technical report complete with a users' guide,
3. and conduct a workshop.
- 4.

In our last progress report we asked for your ideas on the best approach to holding the workshop. Feedback to date is minimal and somewhat mixed. Given that state budgets are tight, some states have indicated that finding funds to travel is difficult while other states feel that travel is possible. We see four options: the first is to have all of the ten states together at one site, the second is to hold regional workshops where several states can attend and the third is for CRREL to travel from state to state. Another possibility brought to our attention, option four, is to post a series of presentations, the same ones that we would give to you in person, on our website. We would lose the benefits of direct interaction but, as one commenter suggested, the website could be set up to receive your questions for us to answer over a period of a month for example. In our tight budgetary times, option four might work best. However, let us know what you think.

Phase II (revised): Based on comments received on our January 2003 draft Phase II proposal, we revised it to more closely meet your needs. Consequently, we reissued the Phase II proposal in early March 2003 and invited states to join us in expanding on what has already been accomplished. Since then five states have indicated strong interest. Our new proposal seeks to increase the freeze-thaw durability of concrete and to develop a method to “dial in” an exact dosage of admixture for a specific protection level. Feedback on the revised plan is positive, with

the possible modification of developing a handbook that sets dosage rates for various environmental conditions and types of concrete elements being constructed. The need to run calculations or operate computer programs was seen as being problematic, especially under hectic field conditions. We will modify our proposal accordingly. Based on our experience from Phase I, we estimate that we need the support of five more states.

Reauthorization legislation: According to FHWA, the current TEA-21 agreement, which includes TPF-5(003), goes until February 23, 2004. The reauthorization legislation shouldn't affect future pooled fund studies, as Congress is likely to reauthorize the continued existence of the Federal-aid highway program. We are still waiting to see if we can continue with Phase II under the existing study or if a new TPF number is needed to proceed. We'll get back to you as soon as we find out.

What we need from you:

1. How would you like to have a project workshop conducted, or is one needed?
2. Who else is interested in joining Phase II?

