



MORE ON COLD WEATHER CONCRETING

At a recent Hume Highway Southern Alliance meeting with RTA, the issue of cold weather concreting was discussed at length. Mahaffey & Associates had done some homework and a Report by the US Corps of Engineers: "Extending the Season for Concrete Construction and Repair – Phase 1" was summarised and tabled. This research was sponsored by the US FHWA and also supported by 10 Northern States.

I have now followed it up with the US FHWA Concrete Quality Engineer and corresponded with him on the issue. I am advised that the study is in three Phases:

Phase 1 – Was to demonstrate the practicability of using commercial admixtures to lower the freezing temperature of the mixing water. This was achieved down to -5°C. It was completed in 2004.

Phase 2 – Was to demonstrate the effect of admixtures. It even showed some improvement in durability of the concrete. It was completed in 2006.

Phase 3 – Is still at the proposal stage and is intended to become the guide for appropriate admixture dosage rates. It has been approved, but not commenced.

I have also found that ASTM C1622 – Specification for Cols Weather Admixture Systems has been issued by the Testing Authority.

The FHWA have not approved the methodology and Mr Crawford suggested that it was up to the individual States to implement or otherwise. He pointed out also that the primary aim was to try to establish a method for maintenance and repair of concrete structures in cold weather. He was not aware of a specification for such work as the study is still incomplete.

I then wrote to the DoT Pavement Management Engineers in the 10 sponsor States and have now received 6 replies. In summary:

- 1 Nobody has used the technology for new pavement construction.
- 2 In some cases there are no proposals to use it in the future.
- 3 Some have a "wait and see" attitude.
- 4 Those who were better informed said that they would consider it for maintenance work.
- 5 Nobody has a Specification even for maintenance work.

All these States currently use very similar Specifications (Portland Cement Concrete – 10 pages and Portland Cement Concrete Pavement – 16 pages, total **26** pages. Compare this to RTA's R82 – 58 pages, R83 – 92 pages and R84 – 81 pages, making a total of **231** pages!).

In these Specifications the requirements for cold weather are:

- 1 No chemical additives to prevent freezing.
- 2 Protection by insulation.
- 3 No freezing allowed until strength of 24 MPa is reached.
- 4 No placement when temperature is below 4.5°C during the next 14 days after placement (I wonder how they figure this out?).
- 5 Can start placing when base surface is 2°C and rising.
- 6 Stop paving when ambient temperature drops below 7°C in shade.
- 7 Any concrete that has been frozen, has to be removed.

There is an article: "Breaking the Freeze Barrier" in the November 2005 issue of Concrete International which talks about the cold weather admixture systems (CWAS). This is quite interesting as background as it lists the admixtures that are added at the batch plant and those on job site. This would mean that the concrete has to be delivered by agitators. (If anybody is interested, I have a hard copy).

Arvo Tinni