



November 30, 1999

To: Concrete Waterproofing Manufacturing Pty. Ltd.

Attn: Mr. Gary Jackson

Subject: Xypex Projects - Alkali Aggregate Reaction

We can confirm that Xypex products have been used on a number of projects to protect the concrete structure from deterioration caused by Alkali Aggregate Reaction (AAR).

Briefly, for the alkali-aggregate reaction to occur, there must be sufficient moisture available within the concrete. The Xypex treatment is specifically designed to prevent the ingress of water into concrete structures, thus greatly reducing the possibility of the alkali-aggregate reaction from proceeding.

Much of the specific Xypex testing in relation to AAR has been performed in Japan. In fact, test results specifically related to the use of the Xypex "catalyst" to treat concrete affected by AAR have been published and reported at several international AAR conferences (London 1992 & Melbourne 1996). An updated report is scheduled to be presented at the Quebec AAR Conference in June 2000. Copies of the first two report are available for your review.

Xypex products have been used on over 30 projects in Japan specifically dealing with rehabilitating and protecting concrete structures subjected to AAR. See below, two representative examples of such projects:

Susobana Railway Bridge (Japan)

The railway bridge is located on the Shinetsu line between Nagano and Amori in Japan. It was constructed in 1971. "Hairline" cracks first appeared in the concrete around 1982 although an inspection determined that they were not severe. A subsequent inspection in 1987, recorded many "net-shaped" cracks and significant "hairline" cracks in the piers and abutments. The defective concrete was first removed by chipping and the Xypex was then applied directly to the affected concrete surfaces. A mortar was then installed over the treatment to fill the cavity.

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A subsequent inspection of the treated area showed that the Xypex treatment had been very effective in suppressing the deterioration caused by AAR. A further survey of the Susobana Railway Bridge and specifically the Xypex treated areas showed no further anomalies in the concrete surface.

Ryusaki Railway Bridge (Japan)

This elevated railway bridge was constructed between 1978 and 1979 on the Joetsu Shinkansen Line located between Niigata and Tsubame-sanjo in Japan. This is a girder-type elevated bridge with a total length of 800 m and consists of 19 pre-stressed concrete box girders connected together. On the top face there are two lines of track, a duct for electrical cables, a sound barrier, and a water channel for use in spraying water to melt snow in the winter. In 1984, it was observed that the girders were warping upwards. In 1989 the defective concrete was removed from the water channel and a Xypex treatment was applied to the surface prior to filling the repaired areas with a mortar. The inner surfaces of the girders were subsequently coated with the Xypex treatment. Following the Xypex applications, test cores were extracted from the concrete with the Xypex treatment. An electron microscopic inspection of the cores was performed and it was confirmed that there was almost no evidence of the "needle-like" growth associated with the alkali component of an alkali-aggregate reaction. Therefore, it was concluded that the Xypex treatment had successfully suppressed AAR. This bridge has subsequently been regularly inspected and no such anomalies have occurred.

Xypex Admix products have also been used in the mix design of pre-cast concrete in one project in Australia specifically to evaluate the ability of the Xypex treatment to protect concrete structures from deterioration caused by AAR. See below, the details of this project:

Concrete Railway Ties (Australia)

It was observed by Westrail that many of their concrete railway ties were showing deterioration most likely attributable to the effect of AAR. A testing program was undertaken in 1993 by Westrail to determine whether incorporating Xypex Admix into their concrete ties would prevent such deterioration. Based on observations

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several years later, the concrete ties that incorporated the Admix showed no signs of any deterioration caused by AAR. It should be noted that further tests need to be conducted to determine the long-term effect of the Xypex treatment on protecting the concrete ties against AAR.

Best Regards,

XYPEX CHEMICAL CORPORATION

A handwritten signature in black ink, appearing to read 'Vic Barber', is positioned above the printed name.

Vic Barber
Director of Operations