Hardy BBT Limited
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

VA-01618

May 15, 1990

XYPEX CHEMICAL CORPORATION,
13731 Mayfield Place,
RICHMOND, B.C.
V6V 2G9

ATTENTION: Mr. D'Arcy Mainwaring, President

Dear Sirs:

Re: Phase II Tests on XYPEX CONCENTRATE - DS2

1.0 TEST PROCEDURE AND RESULTS

Tests have been conducted to evaluate the direct tensile bond strength and abrasion resistance of a plain concrete and concrete treated with XYPEX CONCENTRATE - DS2. A nominal 28 MPa base concrete mix was batched to the mix proportions given in the appended Technical Report No. 1. Properties of the plastic concrete are also provided. Compressive strength tests were performed on two 75 mm diameter x 114 mm long cores extracted from the plain concrete test panels. Compressive strengths were 33.1 MPa and 32.6 MPa at 28 days. The shake was supplied by XYPEX and applied at a rate of 37 kg/10 m^2 (75 lb./100 sq.ft.), in two applications of approximately equal mass to the plastic concrete. No difficulty was experienced in applying the shake at this rate. The final hardened surface appeared of good quality, except that a slight efflorescent bloom developed on the surface. This can be attributed to crystalline activity at the surface and the bloom tended to disappear with time in the dry air cure exposure of the laboratory. The panels were air cured in the laboratory at a temperature of approximately 23°C for 28 days prior to testing.

Direct tensile bond strength tests were conducted on the panels, using the procedure detailed in CAN/CSA A23.2-6B i.e. coring a 100 mm diameter hole into the concrete;

epoxy bonding a steel plate and conducting a tensile bond strength test using a calibrated jacking device. Test results are given in the appended Technical Report No. 2. The tensile bond strength on 3 cores averaged 2.0 MPa for the plain concrete (Panel A) and 1.5 MPa for 4 cores for the panel treated with XYPEX CONCENTRATE - DS2 (Panel B). Details of the mode of fracture and individual test results are given in Technical Report No. 2.

Taber Abrasion tests were conducted on pairs of 100 mm diameter cores extracted from each of the test panels, using Calibrade-H22 abrasive wheels and a 1000 g wheel load. Tests were continued for 1000 cycles, with the mass loss every 100 cycles being recorded. Test results are graphically depicted in the appended graphs. The plain concrete (Panel A) displayed an average mass loss of 6.1 g at 1000 cycles; the corresponding mass loss in the XYPEX CONCENTRATE - DS2 concrete (Panel B) was 5.3 g.

2.0 DISCUSSION

The direct tensile strength of the base concrete at 28 days was about 2.0 MPa. The average tensile bond strength of the XYPEX CONCENTRATE - DS2 treated concrete at 28 days was 1.5 MPa. This is well in excess of the minimum tensile bond strength of 1.0 Mpa required for bonded topping concretes in CAN/CSA-A23.1-M90, Cl. 23.4.2.3.

The Taber Abrasion test result of 6.1 g average mass loss at 28 days for the nominal 28 MPa concrete mix is consistent with data reported in product literature for such concrete. The average mass loss of 5.3 g for the XYPEX CONCENTRATE - DS2 treated concrete indicates that the abrasion resistance of this shake is better than the abrasion resistance of the plain concrete.

3.0 CONCLUSIONS

The XYPEX CONCENTRATE - DS2 shake appears to provide a well-bonded abrasion resistant surface treatment for concrete surfaces.

Respectfully Submitted,

Hardy BBT Limited,

Per: P. McGrath

P. McGrath, M.A.Sc., P. Eng.,
Materials Engineer.

Per: D. R. Morgan

D.R. Morgan, Ph.D., P. Eng.,
Chief Materials Engineer.

PM:wjc:nmd/ND#2
Enclosure

Hardy BBT Limited
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

TECHNICAL REPORT No. 2

TO: Xypex Chemical Corportation
13731 Mayfield Place
Richmond, B.C.
V6V 2G9

Attention: Mr. D. Mainwaring

FILE: VA – 01618
DATE: May 15, 1990
CLIENT P.O.
C.C.

PROJECT: Phase II Xypex Concentrate – DS2

SUBJECT: Direct Tension Bond Pulloff – 28 days air dry

		LOAD (KN)	STRESS (PSI)	STRESS (MPa)	COMMENT
PANEL A PLAIN CONCRETE	1	15.4	290	2.0	FAILED IN CONCRETE
	2	14.3	280	1.9	FAILED AT SURFACE
	3	15.4	290	2.0	FAILED AT SURFACE
	AVE			2.0	
PANEL B XYPEX CONCENTRATE - DS2	1	10.2	200	1.4	FAILED 3–5 mm BELOW SURFACE
	2	8.4	160	1.1	FAILED 3–5 mm BELOW SURFACE
	3	15.4	290	2.0	50% AREA FAILED 3–5 mm BELOW SURFACE 50% FAILED AT SURFACE
	4	11.4	220	1.5	60% AREA FAILED 3–5 mm BELOW SURFACE 40% FAILED IN EPOXY BOND
	AVE			1.5	

CERTIFIED BY: P. McGrath
P. McGRATH, M.A.Sc., P.ENG.