C.T.I. Consultants Pty. Ltd.

(Incorporated in N.S.W.) ACN 003824815

4 Rothwell Avenue,
Concord West NSW 2138
P.O. Box 153, Nth. Strathfield, 2137

Concrete and Coating Specialists

Phone: (02) 736 3911
Fax: (02) 736 3287

INVESTIGATION REPORT

SILANE APPLICATION TRIALS

PRECAST CONCRETE SEATING PLATS

CSR HUMES, ROOTY HILL

Client:	Drytreat (Australia) Pty Ltd		
Contact:	John Roche	**Tel:**	(02) 906 7257
Project:	Concrete Seating Plats for Aquatic centre c/- CSR Humes, Rooty Hill		

Prepared By:	Fred Salome		
Date:	08/03/93	Job	291
Report No.	C9130	Ref:	*DRYTREAT\291R9130*

Chris Edwards, B.E., M.I.E. Aust.
Director
Concrete Technology

Fred Salome, B.Sc. (Hon)
Director
Coatings Technology

Peter J. James, B.Sc. (Eng.), M.I.E. Aust.
Associate
Project Engineering

1 INTRODUCTION

Silane treatment has been proposed to compensate for a lack of cover on areas of the precast concrete seating plats manufactured by CSR Humes Pty Ltd at their Rooty Hill plant.

CTI were asked to carry out a trial application of DryTreat 100N isobutyltriethoxysilane, and determine

1) its effectiveness in reducing the water absorption of the concrete. This was to be determined by carrying out Initial Surface Absorption Testing (ISAT) testing on both treated and untreated areas

2) the equivalent cover, to be determined from the depth of penetration and from published results for the Diffusion Coefficient for Chloride Ions through concrete treated with isobutylsilane.

2 APPLICATION DETAILS

Saturday, 06/03/93

A trial application was carried out to a vertical face of the seating plat.

An area 1 metre long and 330 mm in height was taped off.

200 mL of silane were placed in a hand-held atomising bottle. This is sufficient silane for application of two separate coats at the recommended spreading rate of 300 mL/m^2 per coat.

Approximately half the material in the bottle was applied as the first coat, at 10.55 am. The conditions were hot and sunny, with a slight to moderate breeze. The treated face was in shade at the commencement of the first application. The concrete absorbed the initial spray quickly, but became surface saturated before the application was complete, so that the characteristic run-down was observed.

The surface gave a "dry" appearance some 30 minutes after application was complete.

The second application was carried out 1 hour after the first. By this time the sun had just started to fall onto this face. The material was absorbed less readily than the first coat, and the application rate was slowed down somewhat to prevent excessive run-off.

3 RESULTS AND DISCUSSION

The results for the ISAT tests are attached as Appendix 1. The results obtained from ISAT testing before and after the silane applications to the control areas show that silane effectively eliminated water absorption (i.e. reduced water uptake by 100%).

The result for the depth of penetration was 4 mm. In an article published in the Journal of the Oil And Colour Chemists Association (of the UK), H.L Robinson of Taywood Engineering Ltd presents results for the chloride diffusion of concrete treated with a number of water-repelling treatments, including isobutylsilane.

The Coefficient of Diffusion for Chloride Ions for the treated concrete is given as 4.37×10^{-10}, compared with 2.72×10^{-9} for untreated concrete (311 Kg cement).

The Equivalent Cover is linearly proportional to the depth of penetration. For penetration to a depth of 2 - 3 mm achieved in that investigation, the equivalent cover is calculated to be 8.81 cm.

Therefore the 4 mm penetration achieved here is equivalent to 14 cm (= 140 mm) additional cover.

TEST REPORT

INITIAL SURFACE ABSORPTION TEST

(I.S.A.T. - Bs 1881:Part 5;1970)

Client:	Dry-Treat Aust. Pty Ltd		
Contact:	John Roche	**Tel:**	(02) 906 7257
Project:	Seating Piats; Aquatic Centre c/- CSR HUMES		
Carried Out By:	F. Salome & R.A. Sutcliffe		
Date Tested:	06 & 08/03/1993	Job No.	291

TEST DETAILS

The untreated concrete of the seating plats was tested for absorption on Saturday, 06/03/93. The test was performed on a vertical face.

A sample area adjacent to the test location was treated on the same day by CTI with DryTreat 100N, two coats with a spreading rate of 300 mL/m^2 each, and with a 1 hour recoat interval. This area was tested on Monday, 08/03/93, for ISAT and for depth of penetration.

RESULTS

	I.S.A.T. (mL/sq. m/s)			
Time of Reading (minutes)	10	30	60	120
Untreated Area	0.170	0.064	0.034	0.015
Treated Area	0.000	0.000	N/A	N/A

Depth of Penetration

Splitting a 20 mm button core revealed that the depth of penetration was 4 mm.

CTI