LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

February 14, 1992

Mr. Fred Omundson
Chemical Specialties, Inc.
One Woodlawn Green, Suite 250
Charlotte, North Carolina 28217

Subject: Report on Concrete Sealer Testing
Law Project No. 224-03309.03

Mr. Omundson:

As authorized by your acceptance of our Proposal No. 101MR1 dated October 23, 1991, Law Engineering has completed testing of three concrete sealers. The purpose of our testing was to determine the permeability and absorption of concrete specimens treated with the specified sealers. This report presents a summary of the test procedures used, the materials used in the test and our test results.

SUMMARY OF TEST PROCEDURES

Permeability
The permeability of three test specimens (concrete cores treated with a sealer) was determined in general accordance with the test procedures outlined in the Corps of Engineers (COE) CRD-C 48-73 "Method of Test for Water Permeability of Concrete". The test procedures used varied from the COE test in that the concrete core specimen thicknesses were reduced from 6 inches to 4 inches and CCA was used in lieu of water to determine the permeability of the sample. In brief, CCA under constant pressure was forced through the concrete core sample and the amount of CCA passing into the sample was measured when a steady flow was achieved.

Absorption
The percent reduction in weight gain of concrete cores was determined by soaking four samples in a 2 percent solution of CCA. The weight gain of the samples treated with a sealer on the top was compared to the weight gain of the control (untreated) sample. The core samples were treated by applying a concrete sealer product to

the top surface (except for the control) and coating the bottom and sides with a chemical resistant epoxy before being soaked. The weight gain of the samples was measured at 3, 6, 9, 12, 15, 18 and 21 days.

Depth of Penetration

The depth of penetration of the sealers was determined by diametrically cutting the core samples treated. The depth of penetration was determined by noting the depth at which water will "bead" on the cut surface or by noting the depth of concrete discoloration caused by the sealer/coating.

MATERIAL INFORMATION

Concrete

The concrete tested was part of a portland cement concrete apron constructed by Concrete Supply at their South Plant. The concrete apron was poured July 15, 1991. On December 4, 1991 six 6 inch diameter and fourteen 4 inch diameter cores were removed from the apron for the product testing. From the mix design information submitted we estimate that the concrete sampled had a water to cement ratio of 0.54 and a water to cement and flyash ratio of 0.43. The concrete had a specified compressive strength of 3,600 psi at 28 days. Cores removed from the apron and tested in general accordance with ASTM C 42, "Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete", had an average compressive strength of 4,520 psi at approximately 5 months from date of placement.

Sealers

J & R Industries Pena-Seal: 2-Part Epoxy, application rate: 130 square feet per gallon (aka *KrystalSeal*)

3M Concrete and Masonry Sealer 2000: Siloxane Sealer, application rate: 110 square feet per gallon

Sika Sikagard 70: Siloxane Sealer, application rate: 100 square feet per gallon

Our test results are summarized in the following table.

TEST RESULTS

Permeability and Absorption Testing of Concrete Sealers
Chemical Specialties, Inc.
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Product	Permeability (10^{-9} cm/s)	Percent Wt. Gain[1]	Percent Reduct. in Wt. Gain[1&2]	Penetration Depth (in.)[3]
Sikagard 70	3.7	0.31	44	0.2
Pena-Seal (*aka KrystalSeal*)	0.9	0.17	100	0.3
3M 2000	0.8	0.32	40	0.2

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1 Results for weight gain through twenty-one days.
2 Percent reduction of weight gain based on comparison of test specimens to a control specimen. The control specimen was coated on all exposed surfaces (top, bottom and sides) with a chemical resistant epoxy. The top surfaces of the test specimens were treated with the test products (Sikagard 70, Pena-Seal or 3M 2000).
3 Depth of penetration of coating/sealer was determined by cutting core specimens diametrically and visually examining the sawed surfaces.

CLOSURE

Law Engineering appreciates this opportunity to provide our professional services on this project. Please contact us if we can be of further assistance or if you have any questions concerning this report.

Sincerely,

LAW ENGINEERING

Thomas R. Tate, P.E.
Materials Engineer

William J. Brickey, P.E.
Principal Engineer