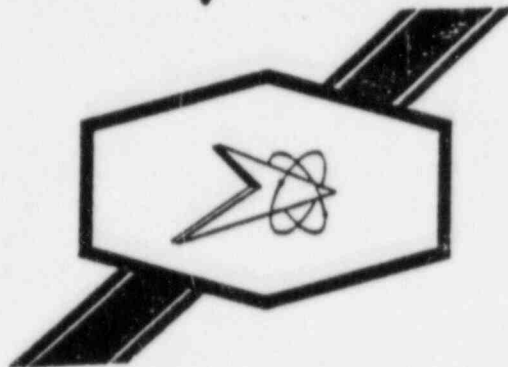


Imperial



TECHNICAL REPORT

NUMBER

249-78-G

TITLE

Effects of "Mudcracking" on DBA performance
of NUTEC #11S

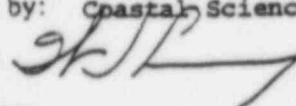
FOR

S.R.#1401

CUSTOMER

Brown & Root, Inc.
Comanche Peak

Submitted by: Coastal Science Associates

Approved: 

Date: 4/78

SOUTHERN IMPERIAL COATINGS CORPORATION, INC.
P. O. Box 29077, * New Orleans, Louisiana 70189
Phone: (504) 254-1433

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PDR

SUMMARY: The purpose of this test was to determine what effects cracking of the Nutec #11S film has on the performance of the concrete coating system. No defects were noted on the test specimen following DBA testing.

INTRODUCTION: "Mudcracking" of Nutec #11S has been noted on two occasions; in the laboratory and at the Comanche Peak jobsite. The "mudcracking" phenomenon was observed when rapid changes in surface or air temperature took place, immediately following application of the Nutec #11S. Elcometer adhesion and Design Basis Accident tests were conducted on the laboratory specimen to assure that this phenomenon was not deleterious to the performance of the coating system. No defects were noted on the test specimen following DBA testing at 307° F. and 58 psig. Elcometer adhesion was also demonstrated to be excellent at 650 psi and 100% failure in the concrete. The laboratory data was further supplemented by tests conducted by Brown & Root Quality Control at the Comanche Peak jobsite. Elcometer adhesion tests were performed with values greater than 500 psi.

METHODS: Lab. panel #3795, a concrete coupon measuring 2" x 4" x 2" was coated with Nutec #11S. The concrete had been previously coated with a concrete curing membrane, Res X. The specimen was placed under running water, in search of water beads which would indicate the presence of a Res X surface film. Satisfied that such a surface film was not present on the concrete, the specimen was placed in an oven at 120° F. for 15 minutes in order to expedite the application. The concrete was still warm when the Nutec #11S was applied. The room temperature was 58° F. and dropping due to a heater malfunction. Overnight the temperature in the laboratory plunged to 28° F.

The Nutec #11S film (which had mudcracked overnight) was cured for an additional 5 days @ 70-80° F. An Elcometer Adhesion test was conducted on the mudcracked #11S film.

Shortly after the mudcracking incident at Comanche Peak, the Elcometer Adhesion damage was repaired with Nutec #11S and the entire coupon topcoated with Reactic #1201. Design Basis Accident testing was performed at Coastal Science Associates with the maximum temperature and pressure reaching 307° F. and 58 psig. The DBA test was conducted over a 24 hour period and performed in accordance with Houston Lighting & Power, Revision 0, 10/22/75.

Refer to attached Test Panel Preparation Data sheet for details of surface preparation, coating application, and curing.

RESULTS:

- a. Elcometer Adhesion - 650 psi with 100% breakage in concrete
- b. DBA testing - No defects: all sides

(See attached Results sheet from Coastal Science Assoc.)

CONCLUSIONS: The "mudcracked" film exhibited excellent adhesion to the concrete substrate and demonstrated the ability to withstand the high temperature and pressures of a Designed Basis Accident test. The laboratory test results were further supported by on-site Elcometer Adhesion tests conducted by Brown & Root Quality Control. The lowest value obtained in these tests was 500 psi.

The "mudcracking" phenomenon is believed to occur because of large differences in surface and air temperatures resulting in varying degrees of expansion or contraction within the thick #11S film itself. Such changes can occur whenever space heaters are used and also as in the case of the laboratory application.

Because of its density, the concrete exhibits a greater resistance to temperature change than does the surrounding air. The temperature of the #11S film in proximity with the concrete, closely approximates that of the concrete, whereas the #11S exposed to the air, more closely approximates the air temperature.

REFERENCES: Lab. Notebook #56, pp. 35,58

/nd

PHYSICAL PROPERTIES

BECHTEL CP-954 and A.N.S.I. N-5.12

1. PRODUCT TESTED: Nutec #11S
2. TYPE SUBSTRATE: 2" x 4" x 2" concrete coupon
3. SURFACE PREPARATION: Sandswept with Cresblast #4 blasting sand.
4. PRODUCT DATA: SAMPLE NOS. 3795

<u>COAT</u>	<u>PRODUCT</u>	<u>PRODUCT CODES</u>	<u>BATCH #</u>	<u>APPLICATION METHOD</u>	<u>CONDITIONS R/M(°F) & R.H.</u>	<u>THICKNESS (ins.)</u>	<u>DATE APPLIED</u>
1	Res X		-----	Brush	70°F/48%	200 ft ² /gal.	12/8/77
2	NUTEC	#11S	3386/3388/LB!49	Squeegee	58°F/38%	.015 - .025	12/10/77

* First day curing temperature ranged from 28-58°F.

5. CURING DATA:

AMBIENT TEMP. * 70-80 °F REL. HUMIDITY: 45-60 % MIN. CURE TIME 5 DAYS

6. TEST PROCEDURE: Bechtel Standard CP-954 and A.N.S.I. N-5.12

7. TEST RESULTS:

- 7.1 ABRASION: Federal Test Method Standard 141 Test Method 6192, 1000 cycles with a CS-17 Wheel and a 1000 gram load.
- LOW - N/A HIGH - N/A AVERAGE - N/A
- 7.2 ADHESION: Determined by use of the ELCOMETER ADHESION TESTER
- _____ 650 psi
- 7.3 DIRECT IMPACT RESISTANCE: N/A

APPROVED MR

TEST REPORT NO. 249-78-G

PREPARED BY: Michael C. Arnold

DATE: 4/78

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: NUTEC #11S/REACTIC #1201
2. TYPE SUBSTRATE: Concrete SIZE: 2" x 4" x 2"
3. SURFACE PREPARATION (Describe): Sandswept with Cresblast #4 blasting sand.
4. PRODUCT DATA: SAMPLE NO.(s): 3795
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: 12/8/77

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
1	RES X	---	---	Brush	70°F/48%	200 ft ² /gal.	10/8/77
2	NUTEC	#11S	3386/3388/ LBI49	Squeegee	58°F/38%	.015 - .025	10/10/77
3	REACTIC	#1201	3952/3953	Spray	62°F/66%	.003 - .004	3/3/78

Total Dry Film Thickness: .018 - .029"

6. CURING CONDITIONS: AMBIENT TEMP. 70-80 °F REL. HUMIDITY 40-65
MINIMUM CURE 8 DAYS
7. TEST PROCEDURE: DBA per Houston Lighting & Power, Revision 0, 10/22/75
8. TESTING PERFORMED BY: Coastal Science Associates DATE SUBMITTED 3/10/78

APPROVED BY: [Signature]

DATE: 4/19/78

PREPARED BY: [Signature]

DATE: 4/19/78

TEST REPORT NO.: 249-78-G

COASTAL SCIENCE ASSOCIATES, INC.
6900 CANAL BLVD.
NEW ORLEANS, LOUISIANA 70124
TEL. 504-283-7251

SUBJECT: DESIGN BASIS ACCIDENT COATINGS TEST REPORT.

DATE: 3/13/78

DBA TEST CONDITIONS: ABBREVIATED HL&P (24 HOURS)

HIGHEST TEMPERATURE DURING RUN..... 307 DEG. F.

HIGHEST PRESSURE DURING RUN..... 58 LBS./ SQ. IN.

SAMPLE NUMBER: 3795

SAMPLE TYPE: CONCRETE COUPON

SAMPLE #	DESCRIPTION
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3795	SIDE 1: NO DEFECTS
	SIDE 2: NO DEFECTS.
	SIDE 3: NO DEFECTS
	SIDE 4: NO DEFECTS

REPORT WRITTEN FOR: SOUTHERN IMPERIAL COATINGS

REPORT # 068031178

APPROVED BY.

Chabot