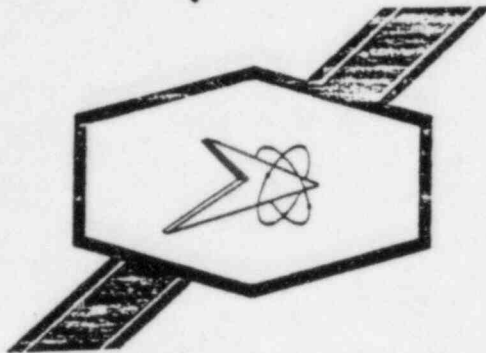


# Imperial



## TECHNICAL REPORT

NUMBER

412-80

TITLE

Design Basis Accident Testing  
Nutec 1201 and Nutec 1202 over Bare Concrete  
FOR

CUSTOMER

Submitted by: Gerald E. Arnold.

Accepted by: *Gerald E. Arnold*

Approved: *James J. Bauer*

Date: July 2, 1980

SOUTHERN IMPERIAL COATINGS CORPORATION, INC.  
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8511050342 851016

PDR FOIA  
GARDE85-59

PDR

SCOPE - The purpose of this test was to evaluate the DBA performance of Nutech 1201 and Nutech 1202 over bare concrete.

BACKGROUND - During the application of the Nutech 11S/11/1201 system, bare concrete is sometimes exposed due to overworking of the Nutech 11S or Nutech 11, or stoning or abrading of the surfacer to the substrate. In Service Level I and Service Level II areas it is essential that the concrete be shielded from radioactive nuclides and that the surface be easily decontaminable. It is already known, from past testing that Nutech 1201 meets these requirements - that decontamination factor is well within the ANSI N5.12 criteria. However, in addition to the above requirements, the Nutech 1201 (and 1202) must be demonstrated to withstand the rigors of a Loss of Coolant Accident - that is, it must remain intact on the surface, to prevent clogging of the strainers and to facilitate decontamination work.

PROCEDURE - Two concrete coupons, measuring 2 x 4 x 2" and prepared in accordance with the proposed ASTM D01.43 concrete procedure, were topcoated with Nutech 1201 and Nutech 1202 epoxy polyamide topcoats. Each topcoat was applied to two faces on each concrete specimen. Details of the application and curing of the coatings are outlined in the attached panel preparation sheets.

The panels were then submitted to Oak Ridge National Laboratories for Design Basis Accident Testing at the ASTM D01.43 proposed PWR curve (307°F., 60 psig). Refer to the attached ORNL procedures.

RESULTS - No defects were noted on either coupon. Refer to the attached ORNL results sheet.

CONCLUSION - In those instances where the concrete remains exposed, application of Nutech 1201 or 1202 is satisfactory provided the application is pinhole free.

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: Nutec 1201 and Nutec 1202
2. TYPE SUBSTRATE: Concrete SIZE: 2 x 4 x 2"
3. SURFACE PREPARATION (Describe): Wire brush cleaned to remove efflorescence from  
coupon.
4. PRODUCT DATA: SAMPLE NO.(s): 6165
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: N/A

<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>TIME &amp; DATE APPLIED</u>
1	Epoxy	*1202	8353/7939	Spray	44° 71%	.005 - .006	02/07/80 02/08/80
2	Nutec	**1201	6637/6333	Spray	44° 71%	.005 - .006	02/07/80 02/08/80

\*Sides 1 & 2 coated with 1202

\*\*Sides 3 & 4 coated with 1201

6. CURING CONDITIONS: AMBIENT TEMP. 40 - 45 °F REL. HUMIDITY 70 - 75 %  
MINIMUM CURE 35 DAYS
7. TEST PROCEDURE: DBA
8. TESTING PERFORMED BY: Oak Ridge DATE SUBMITTED 03/15/80

APPROVED: *Walter E. Arnold*  
TEST REPORT NO. \_\_\_\_\_

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: Nutec 1201 and Nutec 1202
2. TYPE SUBSTRATE: Concrete SIZE: 2 x 4 x 2"
3. SURFACE PREPARATION (Describe): Wire brush cleaned to remove efflorescence from coupon.
4. PRODUCT DATA: SAMPLE NO.(s): 6163
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: N/A

<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>TIME &amp; DATE APPLIED</u>
1	Epoxy	*1202	8353/7939	Spray	44° 71%	.005 - .006	02/07/80 02/80/80
2	Nutec	**1201	6637/6333	Spray	44° 71%	.005 - .006	02/07/80 02/80/80

\*Sides 1 & 2 coated with 1202

\*\*Sides 3 & 4 coated with 1201

6. CURING CONDITIONS: AMBIENT TEMP. 40 - 45 °F REL. HUMIDITY 70 - 75 %  
MINIMUM CURE 35 DAYS
7. TEST PROCEDURE: DBA
8. TESTING PERFORMED BY: Oak Ridge DATE SUBMITTED 03/15/80

APPROVED: Jack E. Arnold  
TEST REPORT NO. \_\_\_\_\_

Manufacturer: perial  
New Orleans, Louisiana

Analytical Chemistry Division  
Oak Ridge National Laboratory  
Date: May 14, 1980

### Report of Irradiation and DBA Testing

The irradiation and design basis accident (DBA) tests are conducted, respectively, in accordance with Bechtel Corp. *Standard Specification Coatings for Nuclear Power Plants*, specs. CP-951 and CP-956 (or with modifications as noted in Table 2, DBA test conditions). The tests are designed to meet the specifications set in both A.N.S.I. report N 101.2-1972, *Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities*, and N 5.12-1974, *Protective Coatings (Paints) for the Nuclear Industry*. The DBA test spray solution and the test conditions are listed in Tables 1 and 2. After both the DBA and the irradiation tests, the coatings are examined for signs of chalking, blistering, cracking, peeling, delamination, and flaking, according to ASTM standards where applicable. All test panels are returned to the coating manufacturer.

The irradiation tests are run using a spent fuel assembly, removed from the High-Flux Isotope Reactor (HFIR) at ORNL, as the source of radiation. These fuel assemblies are stored under 20 feet of demineralized water. The fuel is 93% enriched  $U^{235}$  as  $U_3O_8$  combined with aluminum. The spent fuel assemblies are removed after each 23-megawatt day period. Irradiation is done using the gamma energy from the accumulated mixed fission products. This more readily simulates conditions around a reactor than does a cobalt source. Also, the higher gamma activity affords shorter irradiation time to achieve accumulated doses. The dose rate four days after removal of a fuel assembly from the reactor is  $1 \times 10^8$  rads/hr.

The fuel assembly is 20 inches high. A 20-foot long, 3-1/2-inch diameter pipe, with one end capped, is used for the air irradiation tests. The capped end is lowered into the four-inch opening of the center of the fuel assembly. The open end, above the water level, is covered with an "O" ring sealed flange to which is attached a steel cable and an air outlet hose. The air inlet is located at the bottom of the pipe. The test specimens are connected to the bottom of the cable and lowered into the radiation field. Also at the center of the fuel assembly is a stainless steel clad cadmium tube used as a neutron absorber. This prevents contamination of the test specimens by induced radiation.

Evaluated R. P. Apple

Approved L. T. Carter

Manufacturer: Imperial  
New Orleans, Louisiana

Analytical Chemistry Division  
Oak Ridge National Laboratory  
Date: May 14, 1980

ORNL Log Book No. A 7562; A5-5-80

Table 1. DBA solution composition, distilled water

Reagent	Concentration
Boric acid, $H_3BO_3$	0.28 M
Sodium hydroxide, NaOH	Required to adjust pH to 9.5

Table 2. DBA test conditions

Time	Temperature (°F)	Pressure (psig)	Comments
Start			Autoclave preheated.
10 s	307	60 (10 s)	Steam injected.
2 h 47 min	307	60	Pressure maintained by relief valve.
4.5 min	307-270	30	Spray solution added at 75°F.
25 min	270-250	30	
4 days	250	30	
3 min	250-230	0	Fresh spray solution added at 75°F after draining autoclave.
10 min	230-200	10	
3 days	200	10	
End of test			

Evaluated

R. F. Hyslop

Approved

L. T. Collins

Manufacturer: Imperial  
New Orleans, Louisiana

Analytical Chemistry Division  
Oak Ridge National Laboratory  
Date: May 14, 1980

System Identification

Steel panel x Concrete block

1201/1202

DBA Test Results

ORNL Master Analytical Manual Method No. 2 0922.  
ORNL Log Book No. A 7562; A5-5-80

<u>Sample No.</u>	<u>DBA phase</u>	<u>Comments</u>
6163	spray	Coatings intact, no defects, sides 1, 2, 3, and 4.
6165	spray	Coatings intact, no defects, sides 1, 2, 3, and 4.

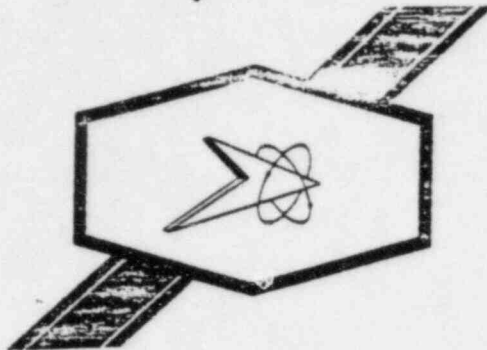
Evaluated

R. L. Apple

Approved

L. T. Cochran

# Imperial



## TECHNICAL REPORT

NUMBER

413-80

TITLE

Elcometer Adhesion of Nutec 11S  
Applied Power Tool Cleaned Steel

FOR

S.R. 41730

CUSTOMER

Submitted by: Harriet Springgate

Accepted by: *[Signature]*

Approved: *M. Lee*

Date: July 7, 1980

SOUTHERN IMPERIAL COATINGS CORPORATION, INC.  
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PURPOSE - The purpose of this project is to determine which surface preparation, when sandblasting is not feasible, lends the optimum adhesive qualities to Nutec #11S on a steel substrate.

SUMMARY - Adhesion tests conducted on Nutec 11S applied over power brush and 3M's Clean n' Strip cleaned steel, both resulted in values above the 200 psi minimum required by ANSI N5.12. None of the adhesion breaks occurred at the substrate.

METHODS - Three (3) 8" x 8" x 1/4" steel panels were prepared according to the following schedule of surface preparation and material used.

Table I

Panel #	Surface Prep.	System	D.F.T.	Batch #'s
6959	Clean n' Strip	11S	40 mils	6962/6808/2103
6958	Clean n' Strip	10/11S	2-2.5/20- 40 mils	6962/6975 - 10 6962/6808/2103-11S
6960	Power Brush	11S	40 - 40 mils	6962/6808/2103

Nutec 10 was applied 06/12/80 and Nutec 11S was applied 06/13/80.

After material application, the samples were allowed to cure about 2 weeks. Three Elcometer Adhesion dollies were applied to each panel using Duro 2-component epoxy glue. Following a 48 hour cure of the glue, the dollies were pulled using an Elcometer Adhesion Tester (0 - 500 lb capacity).

RESULTS - Results are tabularized in Table II.

Table II

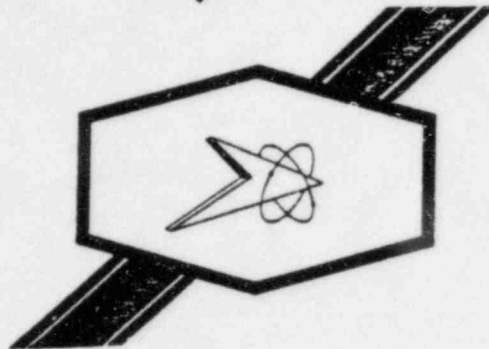
Panel #	Surface Prep. and System	Average PSI	Failure
6959	Clean n' Strip (11S)	266	100% 11S Intracoat Break
6958	Clean n' Strip (10/11S)	62.5	100% Intercoat Failure Between 10 & 11S
6960	Power Brush (11S)	310	100% 11S Intracoat Break

CONCLUSIONS - The Elcometer Adhesion results for Nutec 11S over both power tool cleaned surfaces were greater than the 200 ps- required by ANSI N5.12. None of the breaks in the 11S panels occurred at the substrate, even at values as high as 400 psi. Higher values can be expected with additional curing of Nutec 11S or at lower film thicknesses. The Nutec 11S on these panels was applied at or above 40 mils instead of the recommended 20 mils.

Nutec 10 is not recommended as a primer for Nutec 11S on steel substrates as a result of the poor Elcometer values.

REFERENCES - LN 108 pg. 48  
LN 110 pg. 13

# *Imperial*



## TECHNICAL REPORT

NUMBER

178-77-G

TITLE

"COMPATIBILITY OF BURKES FORM RELEASE TO  
IMPERIAL'S CONCRETE COATING SYSTEMS"

FOR

COMANCHE PEAK

CUSTOMER

TEXAS UTILITIES

Submitted by: Jerry Arnold

Approved:

Date: 8/5/77

SOUTHERN IMPERIAL COATINGS CORPORATION, INC.  
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DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: NUTEC 11S/NUTEC 11/ REACTIC 1201
2. TYPE SUBSTRATE: Concrete - Bechtel CP 956 SIZE: 2" x 4" x 2"
3. SURFACE PREPARATION (Describe): Burke's Form Release was generously applied to all surfaces with a clean cloth.
4. PRODUCT DATA: SAMPLE NO.(s): 3054
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: Burkes applied 7/5/77 10:00 a.m.

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
1	NUTEC	11S	2172/2275/2173	Squeegee	78°F/53% R.H.	.010-.020"	7/5/77 4:00 p.m.
2	NUTEC	11	2172/2275	Squeegee	82°F/61% R.H.	.003-.005"	7/6/77 4:00 p.m.
3	REACTIC	1201	6171/7434	Spray	86°F/70% R.H.	.005-.007	7/8/77 11:00 a.m.

6. CURING CONDITIONS: AMBIENT TEMP. 70-80 °F REL. HUMIDITY 40-60  
MINIMUM CURE 5 DAYS
7. TEST PROCEDURE: DBA per HL & P (Revision 0, 10/22/75)
8. TESTING PERFORMED BY: Coastal Sciences DATE SUBMITTED 7/13/77

APPROVED: \_\_\_\_\_

TEST REPORT NO. 178-77-G

DATE: 8/5/77

PREPARED BY: Gerald E. Arnold

August 5, 1977

COMPATIBILITY OF BURKE'S FORM RELEASE

IMPERIAL'S CONCRETE COATING SYSTEMS

Purpose: The purpose of this test was to determine if Burke's form release would effect the performance of Imperial's concrete coating systems, if the release agent were transferred to the concrete.

Procedure: In order to expedite the generation of data, and to test under extreme conditions; the Burke's form release was applied directly to the concrete prior to application of the NUTEC #11S. The form release was applied generously to all surfaces with a clean cloth at a spread rate of approximately 400 ft<sup>2</sup>/gal. The concrete coating system was applied as outlined in the attached panel preparation data. All specimens were cured at room temperature and relative humidity, then, submitted to Coastal Sciences for DBA testing per Houston Lighting and Power Revision 0, 10/22/75. All specimens were inspected for defects immediately upon removal from the autoclave, especially delamination of the NUTEC #11S from the concrete which would indicate an incompatibility.

Results: All surfaces were free of any defects.

Conclusions: Burke's form release does not pose any threat to the performance of Imperial's concrete coating systems.

# COASTAL SCIENCE ASSOCIATES

74) 283-7251

6900 CANAL BOULEVARD • NEW ORLEANS, LOUISIANA 70124

Date: July 18, 1977

Product Identification: Steel Panels 1 Concrete Blocks

DBA Test Conditions: Houston Lighting and Power Curve, Rev.0,  
Oct. 22, 1975, abbreviated to 28 hrs.

<u>Sample #</u>	<u>Comments</u>
-----------------	-----------------

3054	sides 1,2,3,4, free from blisters, cracks, flakes, and no loss of adhesion detected.
------	---

Approved

*Chas. A. Evans*

Report #043071677

# ENVIRONMENTAL QUALIFICATION TEST PROFILE

Pressure Versus Time

REVISION O, 10/22/75

ADDITIONAL  
 DEGR. TRANSIENT

DBA TRANSIENT

54.5 psig

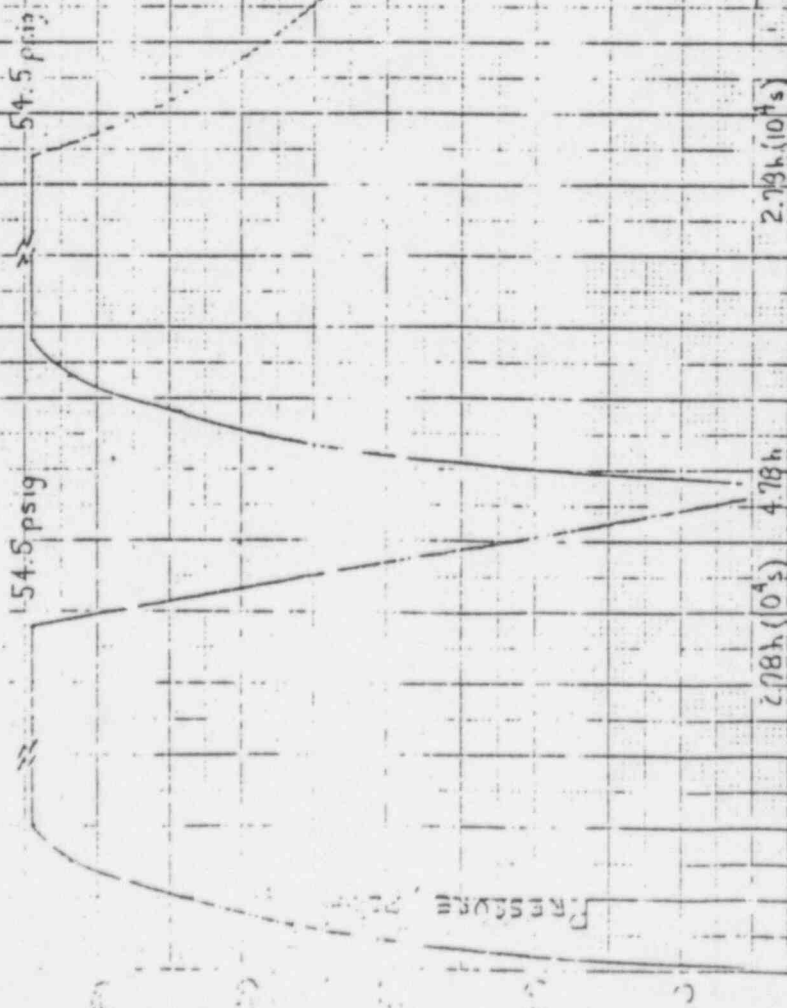
154.5 psig

2.78h (10<sup>4</sup>s)

4.78h

2.78h (10<sup>4</sup>s)

TIME



*Houston Power & Light (South Texas)*

# ENVIRONMENTAL QUALIFICATION TEST PROFILE

Temperature Versus Time

REVISION 0, 10/22/75

ADDITIONAL  
PEAK TRANSIENT

DBA TRANSIENT

291°F

291°F

4.78h

2.78h (10<sup>4</sup>s)

TIME

