Enclosure

TEXAS UTILITIES GENERATING COMPANY

SKYWAY TOWER • 400 NORTH OLIVE STREET, L.B. 81 • DALLAS, TEXAS 75201

L. F. FIKAR
EXECUTIVE VICE PRESIDENT

June 22, 1984

TXX-4201

Dockets: 50-445
50-446

Mr. Richard L. Bangart, Director
Region IV Comanche Peak Task Force
United States Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76011

COMANCHE PEAK STEAM ELECTRIC STATION
UNITS 1 and 2
PROTECTIVE COATING ALLEGATIONS TRANSMITTED
BY LETTER OF MAY 18, 1984
FILE NO. 906.1

Dear Mr. Bangart:

This letter responds to your letters of May 18 and May 23, 1984 relative to sixty allegations about protective coating practices at Comanche Peak. To aid in an understanding of our responses, we have repeated the allegation as stated to us in your letter of May 18, 1984 followed by our response in the format requested by your letter of May 23, 1984.

Our responses were developed based on technical knowledge, knowledge of actual jobsite conditions, review of existing documentation found to be analogous to certain of the allegations, and where appropriate, interviews with cognizant QC personnel. As you will note, supporting documentation is included with certain responses as a means of shortening the length of the response.

We trust you will find the enclosed information helpful in expediting closure of these issues. Please advise if you require further information.

Sincerely yours,

L. F. Fikar

8408220412 840807
PDR ADOCK 05000445
Q PDR

LFF:pew
Enclosures
cc: Mr. Thomas A. Ippolito
Mr. John Collins

TXX-4201
06/22/84

Allegation No. 1

Paragraph 4.3.1.2 of Procedure Number CCP-40 states "Imperial coatings may be applied in the following sequential order: #11S/1201/11S/1201 or 11S/1201/11/1201." Imperial letter dated May 8, 1978, VBR-7697 to Mr. Kelly Williams, second paragraph, states: "Although the resultant systems #11S/1201/11S/1201 or #11S/1201/11/1201 have not been qualification tested, there is no reason to believe that they are not viable systems." Thus these two systems have not been DBA qualified.

Evaluation of Validity

This allegation is correct, but is not significant because this combination of coatings occurs in limited areas. Nutec 11 or 11S and Nutec 1201 are applied to existing 11S/1201 only during a touch-up repair or during interface with previously applied adjacent coatings. This overlapping is necessary in order to achieve a smooth transition with the previously applied adjacent coatings. Due to the limited area of coatings involved in overlapping systems as a result of applications adjacent to previously coated surfaces and/or coating repairs, this issue has never been considered to be significant enough to warrant special consideration such as DBA qualification.

DBA data is unavailable for 11S/1201/11/1201 and 11S/1201/11S/1201 - the two combinations specified in the allegation. Imperial has, however, conducted Elcometer adhesion tests for the above systems at both high and low film thicknesses and all systems passed. (See Imperial's Report No. 759, attached). Additionally, Imperial has developed satisfactory irradiation and DBA data for systems similar to those specified in this allegation (see response to Allegation No. 12).

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

IMPERIAL

TECHNICAL REPORT

NUMBER

759

TITLE

Elcometer Adhesion Tests
Nutec Concrete Coating Repair Systems
11S/1201/11S/1201
11S/1201/11/1201

FOR

Preparation for: Comanche Peak Nuclear Plant
Glen Rose, Texas

CUSTOMER

Submitted by: Jerry Arnold
Accepted by:
Approved:
Date: 4/19/84

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

The information contained in this report, based upon our experience, is offered without charge as part of our service to customers. It is intended for use by persons having technical skill at their own discretion and risk. We assume no liability in connection with its use. This information is not intended as a license to operate under, nor a recommendation to infringe, any patent covering any material or use.

Introduction: Following the installation of the 11S/1201 concrete coating system, it sometimes becomes necessary to repair damaged areas or fill holidays in the original system. Also separate applications sometimes result in overlap of the newly applied coatings to adjacent, aged systems. The result is the application of Nutec 11S or 11 over previously applied and cured 1201 topcoat. The purpose of this adhesion test is to demonstrate the validity of this practice.

Procedures: Concrete blocks, measuring 2x4x2" were coated with the following systems:

A] Nutec 11S (10 mils)
Nutec 1201 (3 mils)
Nutec 11S (10 mils)
Nutec 1201 (3 mils)

B] Nutec 11S (35 mils)
Nutec 1201 (16 mils)
Nutec 11S (35 mils)
Nutec 1201 (16 mils)

C] Nutec 11S (10 mils)
Nutec 1201 (3 mils)
Nutec 11 (3 mils)
Nutec 1201 (3 mils)

D] Nutec 11S (35 mils)
Nutec 1201 (16 mils)
Nutec 11 (20 mils)
Nutec 1201 (16 mils)

The dry film thicknesses applied were selected to envelope the thickness range actually applied at nuclear jobsites. For application and curing details refer to the attached panel preparation sheets.

Six adhesion tests were conducted on each system (two tests per concrete block) using an Elcometer adhesion tester.

Results: The attached laboratory result sheet outlines the individual results. Below are the resultant averages:

System	Ave. PSI	Mode of Failure
11S (10mils)/1201 (3mils)/11S (10mils)/1201 (3mils)	313	100% Concrete
11S (35mils)/1201 (16mils)/11S (35mils)/1201 (16mils)	337	75% Concrete 25% 11S(1st Co
11S (10mils)/1201 (3mils)/11 (3mils)/1201 (3mils)	325	85% Concrete 7% 11S 8% Glue
11S (35mils)/1201 (16 mils)/11 (20mils)/1201 (16 mils)	313	85% Concrete 15% 11S

Conclusions: All pulls exhibited concrete failure and surpassed the minimum 200 PSI values required by ANSI N5.12.

ELCOMETER ADHESION

ON 2X2X4 CONCRETE

Work Order / 0125

Glue Type I 0 E5

DOLLY #1 : SIDE "B"
#2 : SIDE "A"

Date 4-17-84

PANEL NO. & SIZE	SYSTEM	DFT	DOLLY NO.	PSI	TYPE & POSITION OF FAILURE* 1st 11$ %CO	%AD	%CO	%AD	CONCRETE %CO	%AD	GLUE %CO	%A
6151	11$/12 · 11$/1201; 10 mils / ? mils · ? / 3 mils; ①		1	260					100			
			2	230					100			
6152			1	450					100			
			2	290					100			
6153			1	410					100			
			2	240					100			
6154	11$/1 · 11$/1201; 35 mils / 1 mils · 35 mils / 16 mils; ②		1	390					100			
			2	380	40				60			
6155			1	260	30				70			
			2	450	40				60			
6156			1	320	20				80			
			2	220	20				80			
6157	11$/ · 201/11/1201; 10 mils / · 5 / 10 mils / 3 mils; ③		1	410					100			
			2	290					50		50	
6158			1	230	20				80			
			2	450					100			
6159			1	210	20				80			
			2	360					100			
6160	11$/ · 201/11/1201; 35 mils / · 5 / 20 mils / 16 mils; ④		1	460	30				70			
			2	280	30				70			
6161			1	370					100			
			2	230					100			
6162			1	320					100			
			2	220	30				70			

*CO = Cohesion AD = Adhesion

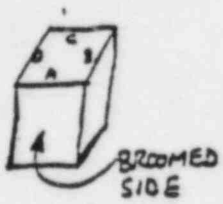
ELCOMETER ADHESION

Work Order AR0125

Glue Type DURO E5

Date 4-17-84

PART NO. & SIZE	SYSTEM	DFT	DOLLY NO.	PSI	TYPE & POSITION OF FAILURE*							
					1ST 11$				CONCRETE		GLUE	
					%CO	%AD	%CO	%AD	%CO	%AD	%CO	%AD
AVERAGES	①			313					100			
	②			337	25				75			
	③			325	7				85		8	
	④			313	15				85			



*CO = Cohesion AD = Adhesion

SPRAY OUT & TESTING INSTRUCTIONS

AR0125

PAGE 1 OF 3	ORIGINATOR Elcometer Adhesion	AT # R0090

PANEL			COATING DETAILS										REMARKS	TEST CODE
PAN # OR BLOCK	SIZE OR SIDE	SP	CODE	BATCH B	BATCH C	DFT	WFT	TEM	RH	DATE / TIME	DFT			
6151	2x4x2		11S			10	11.4	69	86	4/2/84 1:00				
			1201			3	5.6	68	62	4/5/84 4:00				
			11S			10	11.4	69	67	4/7/84 4:00				
			1201			3	5.6	74	74	4/9/84 4:15				
6152	✓					✓								
						✓								
						✓								
						✓								
6153	✓					✓								
						✓								
						✓								
						✓								
6154	2x4x2		11S			35	39.8							
			1201			16	30.6							
			11S			35	39.8							
			1201			16	39.6							
6155	✓					✓								
						✓								
						✓								
						✓								

SPRAY OUT & TESTING INSTRUCTIONS

AR0125

PAGE 2 OF 3	ORIGINATOR	AT #: R00[illegible]

PANEL			COATING DETAILS										
PAN # OR BLOCK	SIZE OR SIDE	SP	CODE	BATCH B	BATCH C	DFT	WFT	TEM	RH	DATE / TIME	DFT	REMARKS	TEST CODE
6156	✓					✓							
						✓							
						✓							
						✓							
6157	2x4x2		115			10	11.4						
			1201			3	5.6						
			11			3	3.8						
			1201			3	5.6						
6158	✓					✓							
						✓							
						✓							
						✓							
6159	✓					✓							
						✓							
						✓							
						✓							
6160	2x4x2		115			35	37.8						
			1201			16	29.8						
			11			20	15.4						
			1201			16	29.6						

SPRAY OUT & TESTING INSTRUCTIONS

AR0125

PAGE 3 OF 3	ORIGINATOR	AT #: R0090

PANEL			COATING DETAILS										
PAN # OR BLOCK	SIZE OR SIDE	SP	CODE	BATCH B	BATCH C	DFT	WFT	TEM	RH	DATE / TIME	DFT	REMARKS	TEST CODE
6161	✓					✓							
						✓							
						✓							
						✓							
6162	✓					✓							
						✓							
						✓							
						✓							

24.5 182.5
21.7 38.4
231.2 220.9

75

MIXING INSTRUCTIONS

AR0125

PAGE 1 OF 1	ORIGINATOR	AT# R0090

CODE	FORMULA	THIN.	SOL.	M.R. VOL		M.R. WEIGHT		PAGE	CODE	THIN.	REMARKS
115						13.2	1.94	122	13	164	
1201						52.32	7.72				
1121						20.0	12.0 ②	104	62.7		

① Filler - 60.0 ② Filler - 35.0

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: Nutec 11S/Nutec 1201/Nutec 11S/Nutec 1201
2. TYPE SUBSTRATE: Concrete
3. SURFACE PREPARATION (Describe): All surfaces lightly wirebrushed to remove efflorescence and/or laitance, followed by a 80 PSI compressed air blow down.
4. PRODUCT DATA: SAMPLE NO. (s) : 6151, 6152, 6153
5. DATE AND TIME CURING COMPOUNDED OR PRIMER APPLIED: N/A

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/H(°F) %R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
1	Nutec	11S	4286/4287/4288	Squeegee	69/86	12.3	4/2/84
2	Nutec	1201	4284/4285	Spray	68/62	3.7	4/5/84
3	Nutec	11S	4286/4287/4288	Squeegee	69/67	12.1	4/7/84
4	Nutec	1201	4284/4285	Spray	74/74	3.5	4/9/84

CURING CONDITIONS: AMBIENT TEMP. 60 - 100 °F REL. HUMIDITY 40 - 80 % MINIMUM CURE 8 DAYS

TEST PROCEDURE: Elcometer Adhesion

TEST PREFORMED BY: Imperial DATE SUBMITTED: 4-17-84

APPROVED BY: Gerald E. Arnold REPORT NUMBER 759

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: Nutec 11S/Nutec 1201/Nutec 11S/Nutec 1201

2. TYPE SUBSTRATE: Concrete

3. SURFACE PREPARATION (Describe): All surfaces lightly wirebrushed to remove efflorescence and/or laitance, followed by a 80 PSI compressed air blow down.

4. PRODUCT DATA: SAMPLE NO. (c) : 6154, 6155, 6156

5. DATE AND TIME CURING COMPOUNDED OR PRIMER APPLIED: N/A

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/H(°F) %R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
1	Nutec	11S	4286/4287/4288	Squeegee	69/86	37.5	4/2/84
2	Nutec	1201	4284/4285	Spray	68/62	4.3	4/5/84
3	Nutec	11S	4286/4287/4288	Squeegee	69/67	11.2	4/7/84
4	Nutec	1201	4284/4285	Spray	74/74	3.5	4/9/84

CURING CONDITIONS: AMBIENT TEMP. 60 - 100 °F REL. HUMIDITY 40 - 80 % MINIMUM CURE 8 DAYS

TEST PROCEDURE: Elcometer Adhesion

TEST PREFORMED BY: Imperial DATE SUBMITTED: 4/17/84

APPROVED BY: Gerald E. Arnold REPORT NUMBER 759

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: Nutec 11S/Nutec 1201/Nutec 11/Nutec 1201
2. TYPE SUBSTRATE: Concrete
3. SURFACE PREPARATION (Describe): All surfaces lightly wirebrushed to remove efflorescence and/or laitance, followed by a 80 PSI compressed air blow down.
4. PRODUCT DATA: SAMPLE NO. (s) : 6157, 6158, 6159
5. DATE AND TIME CURING COMPOUNDED OR PRIMER APPLIED: N/A

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/H(°F) %R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
1	Nutec	11S	4286/4287/4288	Squeegee	69/86	12.2	4/2/84
2	Nutec	1201	4284/4285	Spray	68/62	4.3	4/5/84
3	Nutec	11	4290/4292/4293	Squeegee	69/67	4.5	4/7/84
4	Nutec	1201	4284/4285	Spray	74/74	3.5	4/9/84

CURING CONDITIONS: AMBIENT TEMP. 60 - 100 °F REL. HUMIDITY 40 - 80 % MINIMUM CURE 8 DAYS

TEST PROCEDURE: Elcometer Adhesion

TEST PREFORMED BY: Imperial DATE SUBMITTED: 4/17/84

APPROVED BY: Gerald E. Arnold REPORT NUMBER 759

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: Nutec 11S/Nutec 1201/ Nutec 11/ Nutec 1201
2. TYPE SUBSTRATE: Concrete
3. SURFACE PREPARATION (Describe): All surfaces lightly wirebrushed to remove efflorescence and/or laitance, followed by a 80 PSI compressed air blow down.
4. PRODUCT DATA: SAMPLE NO. (s) : 6160, 6161, 6162
5. DATE AND TIME CURING COMPOUNDED OR PRIMER APPLIED: N/A

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F) %R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
1	Nutec	11S	4286/4287/4288	Squeegee	69/86	36.0	4/2/84
2	Nutec	1201	4284/4285	Spray	68/62	17.4	4/5/84
3	Nutec	11	4290/4292/4293	Squeegee	69/67	21.9	4/7/84
4	Nutec	1201	4284/4285	Spray	74/74	16.8	4/9/84

CURING CONDITIONS: AMBIENT TEMP. 60 - 100 °F REL. HUMIDITY 40 - 80 % MINIMUM CURE 8 DAYS

TEST PROCEDURE: Elcometer Adhesion

TEST PREFORMED BY: Imperial *DATE SUBMITTED: 4/17/84

APPROVED BY: [signature] REPORT NUMBER 759

TXX-4201
06/22/94

Allegation No. 2

Specific sequencing of coatings systems not required. For example, NRC (sic) No. C83-01752 dated 06/23/83, Disposition section, first paragraph, states: "Table A2 in Appendix A of AS 31 specifies acceptable coating systems, i.e., primer and final coat product identification and vendors." Then goes on to say that full sequencing is not identified. "This table does not identify full system sequencing or application parameters." Does a system's sequencing change for a repair? Why? Has the repair sequence been DBA qualified?

Evaluation of Validity

The allegation is not valid. Specification 2323-AS-31, Appendix A, Table A-2 (attached) does require specific primer/topcoat sequencing. Note 3 to the table states "It is essential that coating systems be used only as specified above, unless an alternate system is proposed by a coating manufacturer and subsequently approved by the Engineer."

The specification limits application parameters to "manufacturer's latest application instructions," which includes field touch-up and repair.

The manufacturer's data sheets, application instructions, and letters clarifying procedures were the basis for the application procedures issued for use at CPSES. These procedures described allowable overlap during touch-up or repair and sequence of coating application.

As indicated in our response to Allegation No. 1, the coating system sequence on an area which has been repaired may differ from the coating system sequence which was subjected to DBA qualification. However, due to the limited area of coatings involved in overlapping systems as a result of coating repairs, this issue has never been considered to be significant enough to warrant special consideration such as DBA qualification.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

APPENDIX "A"

TABLE A-2

APPROVED COATING SYSTEMS FOR USE IN CONTAINMENT[3] | Rev.2

Steel[1]

Manufacturer	Primer	Topcoats
Ameron	Dimetcote 6 or E-Z	Amercoat 66
Carboline	Carbozinc 11	Phenoline 305
Mobil	Mobil-Zinc 7(13-F-12)	Series 89
Tnemec	Tneme-Zinc 92E-12	Epoxoline 66
Southern Imperial	Durazinc 560	Reactic 1201
Ameron/Carboline	Dimetcote 6	Phenoline 305
Carboline	Carboline 191 Primer*	Phenoline 305

| DCA 19,576 R.0 Rev.2

Concrete[2]

Manufacturer	Surfacer	Topcoat
Ameron	Nu-Klad 110AA	Amercoat 66
Carboline	No. 195	Phenoline 305
Mobil	46-x-29 Epoxy	Series 89
Stonehard/Tnemec	Stonliner 5	Epoxoline 66
Southern Imperial	NUTEC 11S [4]	Reactic 1201
Keeler & Long	No. 6548S	No. 7475

* For Repair Use Only

| DCA 19,576 R.0 Rev.2

Gibbs & Hill, Inc.
Specification 2323-AS-31
Revision 2
March 15, 1984
Sheet 2 of 2

Notes

1. Minimum surface preparation shall be near white metal blast cleaning per SSPC SP-10.

2. Surface preparation shall be as recommended by the manufacturer.

3. It is essential that coating systems be used only as specified above, unless an alternate system is proposed by a coating manufacturer and subsequently approved by the Engineer.

4. NUTEC 11S or NUTEC 11 may be used for touchup.

TXX-4201
06/22/84

Allegation No. 3

DCA, No. 17,142, Rev. 2, allows Carboline 305 to be applied over another manufacturer's epoxy coating. Has this system been DBA qualified?

Evaluation of Validity

This allegation is correct. This system is not DBA qualified but has been added to the Protective Coatings Exempt Log. (See entry number 22 on Protective Coatings Exempt Log attached).

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

PROTECTIVE COATINGS EXEMPT LOG

ENTRY Nº	ITEM OR AREA	COATING SYSTEM	SQ.FT.
20	portion of missile shield floor Unit I Re NCR CB4-00091	Carboline CZ-11 primer w/ carboline 305 topcoat	0.25
21	26 Tool clips on base plate Unit I APPROX EL 1027' Re NCR #CB4 01016	carboline 191 primer w/ carboline 305 Topcoat	39.0
22	MANIPULATOR CRANE UNIT 1 TBX-F11SCMC-01 EL 860'-0" RE. DCA 17,142	AMERON DL/ AMERON 66/ PHENOLINE 305 TOPCOAT	~~500~~ 2300
23	FLOOR COATING APPLIED W/ MINIMUM 7 DAY CURE RATHER THAN 28 DAY - AZ 310° @ EL 905'-9" RAD 59'6" TO 61'2" AZ NOTED IS ℄ - PER ITRANSFER #U1-003922 1RMB	IMPERIAL NUTEC 11S/11/1201	6.0
24	CHECKER PL ON UNIT 1 POLAR CRANE ~~[illegible]~~	CZ11 PRIMER W/ PHENOLINE 305 TOPCOAT	2,400.0
	TRASH COMPACTOR RB.I #CPI-WBBABW-01	TOUCH UP VENDOR COAT (NON CERT) W/ 191/305 SYSTEM	98.0
26	COATINGS ON POLAR CRANE GIRDERS ~~(BEAMS)~~ BACK SIDE NEXT TO LINER, AREA OF BUS BAR ASSY & GIRDER SUPPORT BRACKETS (REF DCA 3270)	CZ11 PRIMER W/ PHENOLINE 305 TOPCOAT	2,700.0
27	COATINGS APPLIED TO THE 8 INSPECTION CHAMBERS UNIT 1 @ ELEVATION 829'-832' REFERENCE DCA 6114 R1	CARBOLINE CZ 11 PRIMER W/ PHENOLINE 305 TOPCOAT. TOUCH UP W/ CARBOLINE 191 PRIMER & 305 TOPCOAT.	3,000.0
28	SNUBBER COATINGS IN AREA OF LOCK WIRE TYPES: SMF 1/4 & 1/2, 01, 03, 10; SMA 1/4, 1/2, 01, 03, 10. REFERENCE DCA 20127	CARBOLINE CZ 11/ PhenoLINE 305 & POSSIBLE TOUCH UP W/ CARBOLINE 191 / PHENOLINE 305	110.0
29	U BAR SADDLES FOR PIPE WHIP RESTRAINTS REFERENCE DCA 20128	CARBOLINE CZ11 / PHENOLINE 305	385.0
30	RICHMOND INSERTS IN RB.I. REFERENCE AS-31 SECTION 2D subparagraph 2 & DCA 12,374 REV 1 Which WAS INCOR into R2 of AS-31	CARBOLINE CZ11/ POSSIBLE IMPERIAL 11S OR 11 THEN TOPCOAT OF NUTEC 1201	2,258.0

TXX-4201
06/22/84

Allegation No. 4

DCA, No. 12,374, Rev. 1, allows inorganic zinc primer (Carboline CZ-11 ?) to be top coated by Imperial 1201. Has this system been DBA qualified?

Evaluation of Validity

The CZ-11/Nutec 1201 system has been DBA qualified. (See attached test report indicating DBA qualification for this system). It should also be noted that DCA No. 12,374, Rev. 1 deals only with the presence of CZ-11/Nutec 1201 on Richmond Inserts that are embedded in concrete. Due to the size and configuration of these areas and difficulties with application details, these coatings have been classified as indeterminate and have been placed on the Protective Coatings Exempt Log (see entry number 30 on Protective Coatings Exempt Log, attached).

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

PROTECTIVE COATINGS EXEMPT LOG

ENTRY Nº	ITEM OR AREA	COATING SYSTEM	SQ. FT.
20	portions of missile shield floor Unit I Ref NCR CBA-00091	Carboline CZ-11 primer w/ Carboline 305 Topcoat	0.25
21	26 Tack welds clips on base plate Unit I approx EL 1027' Re NCR #CBA 01014	Carboline 191 primer w/ Carboline 305 Topcoat	39.0
22	MANIPULATOR CRANE - UNIT 1 TBX-FIISCMC-01 EL 860'-0" RE. DCA 17,142	AMERON DL/ AMERON 66 / PHENOLINE 305 TOPCOAT	500 BW 2300
23	FLOOR COATING APPLIED W/ MINIMUM 7 DAY CURE RATHER THAN 28 DAY - AZ 310° @ EL 905'-9" RAD 59½" TO 61½" AZ NOTED IS ℄ - PER TRANSFER #U1-003422 1EMB	IMPERIAL NUTEC 11S/11/1201	6.0
24	CHECKER PL ON UNIT 1 POLAR CRANE ~~ABAC ABE~~	CZ11 PRIMER W/ PHENOLINE 305 TOPCOAT	2,400.0
	TRASH COMPACTOR RB1 #CP1-WBBABW-01	TOUCH UP VENDOR COAT (UNICERT) W/ 191/305 SYSTEM	98.0
26	COATINGS ON POLAR CRANE GIRDERS ~~(BELOW)~~ BACK SIDE NEXT TO LINER, AREA OF BUS BAR ASSY & GIRDER SUPPORT BRACKETS (REF DCA 3270)	CZ11 PRIMER W/ PHENOLINE 305 TOPCOAT	2,700.0
27	COATINGS APPLIED TO THE 8 INSPECTION CHAMBERS UNIT 1 @ ELEVATION 824'-832' REFERENCE DCA 6114 R1	CARBOLINE CZ 11 PRIMER W/ PHENOLINE 305 TOPCOAT. TOUCH UP W/ CARBOLINE 191 PRIMER & 305 TOPCOAT.	3,000.0
28	SNUBBER COATINGS IN AREA OF LOCK WIRE TYPES: SMF ¼ & ½, 01, 03, 10; SMA ¼, ½, 01, 03, 10. REFERENCE DCA 20127	CARBOLINE CZ 11 / PhenoLINE 305 & POSSIBLE TOUCH UP W/ CARBOLINE 191 / PHENOLINE 305	110.0
29	U BAR SADDLES FOR PIPE WHIP RESTRAINTS REFERENCE DCA 20128	CARBOLINE CZ11 / PHENOLINE 305	385.0
30	RICHMOND INSERTS IN RB1. REFERENCE AS-31 SECTION 2.0 subparagraph 2 & DCA 12,374 REV 1 which was incor into R2 of AS-31	CARBOLINE CZ11 / POSSIBLE IMPERIAL 11S OR 11 THEN TOPCOAT OF NUTEC 1201	2,258.0

Imperial

TECHNICAL REPORT

NUMBER

553-81

TITLE

TEST PROGRAM TO EVALUATE DBA PERFORMANCE
OF OVERLAP COATING SYSTEMS (CARBOLINE/IMPERIAL)
FOR BEAVER VALLEY UNIT 2

FOR

GENERAL USE

CUSTOMER

STONE AND WEBSTER

Submitted by: GERALD E. ARNOLD GEA

Approved: ROBERT R. TAYLOR RRT 12/28/81

Date: DECEMBER 24, 1981

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

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TEST PROGRAM TO EVALUATE DBA PERFORMANCE
OF OVERLAP COATING SYSTEMS (CARBOLINE/IMPERIAL)
FOR BEAVER VALLEY UNIT 2

INDEX

SCOPE:

The purpose of this test was to evaluate the DBA performance of Carboline/Imperial mixed systems for use at Beaver Valley 2 Nuclear Plant. Systems to be tested are:

A] CZ-11/191
B] CZ-11/191/1201
C] CZ-11/1201
D] CZ-11/1201/191
E] CZ-11/11S/11/1201

BACKGROUND:

The above systems are possible overlap combinations at Beaver Valley especially on steel imbeds. Most steel imbeds at the project are already coated with Carboline's CZ-11 primer or CZ-11 topcoat with #191. When the adjacent concrete is coated with Imperial's 11S/11/1201 system, some of the coated imbeds are overlapped.

The test specimens were prepared under the direction of Stone and Webster by painters at the Beaver Valley Project. The coated specimens were then submitted to Imperial. Imperial coordinated the testing activities at ORNL. The work was authorized by Stone and Websters Purchase Order # E24476.

SUMMARY OF RESULTS:

All test specimens were irradiated to 2.66×10^7 rads and then DBA tested with maximum temperature and pressure parameters of 340°F and 70 PSIG respectively. All panels performed in accordance with the acceptance criteria of ANSI N101.2.

PROCEDURE:

The test specimens were fabricated and coated at the Beaver Valley Nuclear Plant in Shippingport, Pa. Section 2 of this report contains the Stone and Webster procedure for test specimen preparation. The specific panel preparation data can be found in Section 3. It describes the coating application performed by Stuart Painting under the surveillance of Stone and Webster Quality Control. The coated specimens were allowed to cure and then were shipped to Imperial coatings. Coordination of the testing activities was performed by Imperial through its contract with ORNL. Authorization of this testing program was made by Stone and Webster per Purchase Order #E24476.

The test specimens were submitted to Oak Ridge National Laboratories where they were exposed to a cumulative radiation dose of 2.66×10^7 rads and then DBA tested. The test was designed to be subjected to maximum temperature and pressure of 280°F and 45 PSIG respectively. However, during the test a sudden surge in these parameters resulted in a maximum temperature of 340°F and a maximum pressure of 70 PSIG. The temperature/pressure spike lasted for only 1.5 minutes. The initial 28 hours of the DBA tested were performed in the autoclave. The remaining 11 days were conducted in a constant temperature chamber at 130°F and 100% RH.

RESULTS:

The test results, Section 5, describe the condition of the panels following irradiation then again at the end of DBA testing.

CONCLUSIONS:

The tested systems met the acceptance criteria of ANSI N5.12 (radiation tolerance) and ANSI N101.2 (DBA testing). Two defects (unacceptable per ANSI) were noted on panels 4-1-4-2, and 4-3-4-4, along the coating overlap area where the repair coating was tied into the previously applied system. Some minor separation was occurring at this interface prior to submittal of the panels to ORNL. This separation can be attributed to the taping method used to apply the repair coating and the length of time the tape was allowed to remain on the panels. When the specimens were received by Imperial, the tape was still intact along the edges of the 3,4 and 4A series. The taping resulted in high millages along the tape line, solvent entrapment, and exposed repair primer. Some of the repair system began to peel back a short distance from the tape line when the tape was removed. As a consequence of these observations, the minor defects noted on panels 4-1-4-2 and 4-3-4-4, should be ignored, especially since the remaining four panels 4-5-4-6, 4-1A-4-2A, 4-3A-4-4A and 4-5A-4-6A, exhibited no defects.

Manufacturer: Imperial

New Orleans, Louisiana

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: October 29, 1981

SYSTEM IDENTIFICATION   x Steel panel   ___ Concrete block

CZ-11/1201/191
CZ-11/1201

DBA TEST

ORNL Master Analytical Manual Method No. 2 0922.
ORNL Log Book No. A9675, A10-8-1.

Sample No.	DBA phase	Test results
3-1-3-2	spray*	Front: Coatings intact, no defects after one day. Blisters, #6 few, at coating interphase and weld area at end of test. Rear: Coatings intact no defects after one day. Blisters, #6 few, at coating interphase and weld area at end of test.
3-3-3-4	spray*	Front: Coatings intact, no defects after one day. Blisters, #6 few, at weld area at end of test. Rear: Coatings intact, no defects after one day. Blisters, #6 few, insert area at end of test.
3-5-3-6	spray*	Front: Coatings intact, no defects after one day. Blisters, #4 few, weld area and coating interphase at end of test. Rear: Coatings intact, no defects all areas.

*Irradiated.

Evaluated Paul S. Hegle

Approved L. T. Corbin

SUMMARY OF RESULTS

Panel No.	System	DBA Results
1/1	CZ-11/1201	No Defects
1/2	CZ-11/1201	No Defects
1/3	CZ-11/1201	No Defects
2/1	CZ-11/11S/11/1201	#8M
2/2	CZ-11/11S/11/1201	#8M
2/3	CZ-11/11S/11/1201	#8M
3-1-3-2	CZ-11/1201, CZ-11/1201/191	#6 at coating interphase and weld area
3-3-3-4	CZ-11/1201, CZ-11/1201/191	#6F weld area
3-5-3-6	CZ-11/1201, CZ-11/1201/191	#4F weld area (front only)
4-1-4-2	CZ-11/191, CZ-11/191/1201	Minor separation at coating interphas
4-3-4-4	CZ-11/191, CZ-11/191/1201	One Large blister on 4-3
4-5-4-6	CZ-11/191, CZ-11/191/1201	No Defects
4-1A-4-2A	CZ-11/191, CZ-11/191/1201	No Defects
4-3A-4-4A	CZ-11/191, CZ-11/191/1201	No Defects
4-5A-4-6A	CZ-11/191, CZ-11/191/1201	No Defects

TXX-4201
06/22/84

Allegation No. 5

Procedure No. CCP-30A, Rev. 2, page 2 of 13, paragraph 1.3.1 allows the application of Carboline 305 over the primer Dimetcote 6 by Ameron. Has this system been DBA qualified?

Evaluation of Validity

We assume the term "Carboline 305" used in the allegation refers to Phenoline 305 manufactured by Carboline.

A coating system of Carboline's Phenoline 305 over Ameron's Dimetcote 6 primer has been specifically qualified for DBA. (See Carboline Testing Project 01684, Final Report, attached).

Safety Significance

None

Generic Implications on Other Syst-ms or Contractors

Not Applicable

LABORATORY TEST REPORT

August 11, 1978

Testing Project: 01684
FINAL REPORT

SUBJECT: LOCA; Amercoat D-6/Phenoline 305 Finish and the Comanche Peak FSAR LOCA Curve

REFERENCE: Comanche Peak Nuclear Station; Mr. Don Sutton; Mr. Keith Falk; Mr. Dan W. McBride; Testing Project 01651

PURPOSE: To determine the performance of 1c Amercoat D-6/1c Phenoline 305 Finish when exposed to the Comanche Peak Steam Electric Station, FSAR LOCA curve and evaluated according to ANSI N101.2-1972, Section 4.5 as interpreted by Carboline.

CONCLUSION: After the seven days of the Comanche Peak FSAR LOCA curve, the following exhibit an acceptable performance:

	System	Primer Cure
1,2	1c Amercoat D-6 1c Phenoline 305 Finish	17 days at 67-79°F (19-26°C) and 53-88% R.H.
3,4	1c Amercoat D-6 1c Phenoline 305 Finish	17 days at 95-100°F (35-38°C) and 100% R.H.

PROCEDURE: A) Test Coupons

Size: 2" x 4" x 1/4" Certified ASTM A36 Steel
Surface Prep: Gritblasted to SSPC-SP5-63
Abrasive Media: GFH #50 grit (Cleveland Metal Abrasives, Inc.)

B)

	Systems Tested	Batch Numbers	Dry Film Thickness
1,2	1c Amercoat D-6 (cured in Cure Cabinet*)	1503310 1503210	2.5 - 3.5 mils
	1c Phenoline 305 Finish	7B0427M 6M3959M	6.2 - 8.6 mils
			9.2 -11.1 mils
3,4	1c Amercoat D-6 (cured in High Humidity Drum**)	1503310 1503210	2.4 - 3.3 mils
	1c Phenoline 305 Finish	7B0427M 6M3959M	4.7 - 5.4 mils
			7.3 - 8.0 mils

*Cure Cabinet is at ambient temperature but, has humidity controlled from 50% to 90% R.H.
**High Humidity Drum is at 100°F (38°C) and 100% R.H.
From the Carboline Research & Development Laboratory

The technical data furnished is true and accurate to the best of our knowledge. However, no guarantee of accuracy is given or implied.

carboline

Testing Project: 01684
FINAL REPORT

PROCEDURE: (Continued)

C. Cure Schedule

1,2 Amercoat D-6: 17 days at 67-79°F (19-26°C) and 53-88% Relative Humidity.

Phenoline 305 Finish: 18 days at 71-80°F (22-27°C) and 55-70% Relative Humidity.

3,4 Amercoat D-6: 17 days at 95-100°F (35-38°C) and 100% Relative Humidity.

Phenoline 305 Finish: 18 days at 71-80°F (22-27°C) and 55-70% Relative Humidity.

D. Exposure

Texas Utilities Generating Company, Commanche Peak Steam Electric Station, FSAR Figures 6.2.1-1 and 6.2.1-2.

1. Time/Temperature/Pressure Profile

Time	Temperature	Pressure	Spray Condition
Initial to 10 seconds	240°F (115°C)	44 psia	Static
10 seconds to 15 mins.	270°F (132°C)	58 psia	Dynamic
15 mins. to 1 hour 15 mins.	215°F (102°C)	34 psia	Dynamic
1 hour 15 mins. to 7 days	215°F-130°F (102°C-51°C)	34-10 psia	Dynamic

(Note: This is the theoretical curve supplied by Comanche Peak. It was followed as closely as possible with the LOCA apparatus available at Carboline Company. Please refer to the recorder chart (L115-129) for exact conditions of LOCA profile.)

2. Spray Solution

H_2BO_3 (2000 ppm as Boron) in deionized water.
pH = 8.5 - 10.0 (NaOH added to adjust pH).

GRADING PROCEDURE:

The test coupons were evaluated for performance in the following areas:

1) Material flaking off
2) Delamination between coats and/or peeling

The technical data furnished is true and accurate to the best of our knowledge. However, no guarantee of accuracy is given or implied.

carboline

Testing Project: 01684
FINAL REPORT

GRADING PROCEDURE: (Continued)

3) Blistering of the topcoat
4) Chalking of the coating
5) Excessive cracking

Grading procedures specified in Report N101.2 - 1972 of the American National Standards Institute-Protective coatings for Light Water Nuclear Reactor Containment Facilities:

4.5 Methods of Examining and Evaluating the Exposed Test Specimens
The dynamic and/or static elevated temperature-pressure and irradiation test panels shall be evaluated within 2 hours and again after 2 weeks after removal from the test chamber for the following surface defects: flaking, delamination and/or peeling, blistering, and chalking. Defects listed in Subsections 4.5.1 through 4.5.4 shall be dealt with as follows:

4.5.1 Flaking. ASTM D772, Evaluating Degree of Resistance to Flaking (Scaling) of Exterior Paints, Part 21, American Society for Testing and Materials, Philadelphia, Pa. 19103. Flaking shall not be permitted.

4.5.2 Delamination and/or Peeling. Delamination and/or peeling shall not be permitted.

4.5.3 Blistering. Blistering shall be limited to a few, intact blisters, Size No. 4, ASTM D714, Standard Method of Evaluating Degree of Blistering of Paints, Part 21, American Society for Testing and Materials, Philadelphia, Pa. 19103. The number and the size of blisters shall be recorded.

4.5.4 Chalking. ASTM D659, Standard Method of Evaluating Degree of Resistance to Chalking of Exterior Paints, Part 21, American Society for Testing and Materials, Philadelphia, Pa. 19103. Heavy chalking shall not be permitted.

Any other changes in coating properties which are not also associated with the separation, or the release, of coating from the substrate shall not be a cause for rejection.

The technical data furnished is true and accurate to the best of our knowledge. However, no guarantee of accuracy is given or implied.

carboline

Testing Project: 01684
FINAL REPORT

ANSI N101.2-1972 Criteria
(As interpreted by Carboline)

Maximum Degree of Failure Allowable

Flaking ASTM D772		10 (None)
Delamination or Peeling		None
*Blistering ASTM D714-56	Blister Size	Blister Density
	#2	None
*NOTE: A blister is not intact when it has resulted in coating being separated from the test coupon.	#4	Few
	#6	Medium
	#8	Medium-Dense
Chalking ASTM D659		8 (Light)

NOTE: Flaking, blistering and chalking are all evaluated according to ASTM Standards, with a rating of 10 indicating that no failure was observed in the specific grading area.

The technical data furnished is true and accurate to the best of our knowledge. However, no guarantee of accuracy is given or implied.

carboline

Panel Identification and Coating System	Dry Film Thickness	Flaking	Delamination or Peeling	Blistering	Chalking	Other Performance Characteristics	Performance Evaluation
1A* 1c Amercoat D-6 (Primer Cure 53-88% R.H. 1c Phenoline 305 Finish	3.5 mils 6.5 mils 10.0 mils	10	None	None	10	----	Acceptable
1B 1c Amercoat D-6 (Primer cure 53-88% R.H.) 1c Phenoline 305 Finish	3.0 mils 6.2 mils 9.2 mils	10	None	#4 Few Intact	10	----	Acceptable
2A* 1c Amercoat D-6 (Primer cure 53-88% R.H.) 1c Phenoline 305 Finish	2.8 mils 7.7 mils 10.5 mils	10	None	None	10	----	Acceptable
2B 1c Amercoat D-6 (Primer cure 53-88% R.H.) 1c Phenoline 305 Finish	2.5 mils 8.6 mils 11.1 mils	10	None	#4 Few Intact	10	----	Acceptable
3A* 1c Amercoat D-6 (Primer cure 100% R.H.) 1c Phenoline 305 Finish	2.4 mils 5.4 mils 7.8 mils	10	None	None	10	----	Acceptable
3B 1c Amercoat D-6 (Primer cure 100% R.H.) 1c Phenoline 305 Finish	3.3 mils 4.7 mils 8.0 mils	10	None	None	10	----	Acceptable
4A* 1c Amercoat D-6 (Primer cure 100% R.H.) 1c Phenoline 305 Finish	2.6 mils 4.7 mils 7.3 mils	10	None	None	10	----	Acceptable
4B 1c Amercoat D-6 (Primer cure 100% R.H.) 1c Phenoline 305 Finish	2.5 mils 4.9 mils 7.4 mils	10	None	None	10	----	Acceptable

Testing Project: 01684
FINAL REPORT

RESULTS

Panel Identification and Coating System	Dry Film Thickness	Flaking	Delamination or Peeling	Blistering	Chalking	Other Performance Characteristics	Performance Evaluation
Acceptable Performance ANSI N101.2-1972, Section 4.5, As Interpreted by Carboline		10	None	#4F to #8MD	#8 (Light)	*Panel suspended in the vapor phase	

John J. Ladage, Jr.
Developmental Chemist
Testing Department

Michael D. Tellor
Supervisor
Research & Development

John F. Montle
Vice President
Research & Development

/bj
XC: JFM/CJW/DMI/PDL/MDT

TXX-4201
06/22/84

Allegation No. 6

Procedure No. CCP-40, Rev. 5, page 5 of 13, paragraph 4.1.1.3 states: "Repair of embedded foreign objects such as nails, rebar chairs, bolts, wood or plastic shall be repaired per the following guidelines before application of Nutech 11S surfacer." Have these systems been DBA qualified?

Evaluation of Validity

The application of Nutec 11S over repaired embedded objects has not been DBA qualified, but this fact is without safety significance. The surface area of foreign objects embedded in concrete is negligible in proportion to the total area of any given concrete surface receiving coatings.

In any event there is substantial evidence that objects such as nails, rebar chairs, bolts, wood or plastic embedded in concrete does not affect the adhesion characteristics of Nutec 11S.

1. Observations made in Imperial's labs over the years while preparing concrete coupons for DBA tests. The concrete blocks were formed in plywood, lattice like forms which occasionally transferred wood particles and splinters to the concrete surface. No failures were ever attributed to the wood in the concrete. Refer to attached Imperial letter dated March 8, 1984, Subject: Wood Splinters in Concrete.

2. Qualitative tests conducted by Imperial. These tests found that Nutec 11S adhered to both rebar chairs (rubber and polyethylene). Refer to attached Imperial's letter dated March 8, 1984, Subject: Rebar Chairs.

3. Elcometer Adhesion tests performed at Comanche Peak. Results averaged well above the required minimum of 200 psi. Refer to attached Interoffice Memo dated June 19, 1978, Subject: Adhesion Test of Embedded Wood in Concrete. It is noteworthy that the mode of failure in five of the six adhesion dollies tested was concrete failure.

4. DBA data from Imperial. (Report No. 462-1-81 attached).

The purpose of the test was to evaluate the feasibility of applying Nutec 11S surfacer to steel embedded in concrete (i.e., Richmond inserts, steel embeds). These tests demonstrate adequate coating performance under DBA conditions.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

#6

Box 20077 New Orleans, Louisiana 70189 U.S.A. 504-254-1433

IMPERIAL PROFESSIONAL COATINGS

March 08, 1984

Mr. Jerry Firtel
c/o Tom Kelly - Civil Engineering
Comanche Peak Nuclear Station
P.O. Box 1002
Glen Rose, Texas 76043

SUBJECT: Wood Splinters in Concrete

Dear Jerry:

Attached is a copy of my letter of April 19, 1978 dealing with wood "splinters" embedded in concrete. I still concur with the opinion expressed in the 1978 letter based on the following:

1. Good sound painting practices. The surface preparation that was recommended is sufficient to remove loose particles. All that remains is intact, embedded material.

2. Visual inspection of embedded wood in concrete surfaces at Comanche Peak before and after surface preparation.

3. The small amount of surface area involved. The embedded material in question is not large pieces of wood, rather small hair-like splinters. The amount of wood in contact with the Nutec 11S surfacer is minimal compared with the concrete surrounding it.

4. Observations made in the lab over the years while preparing concrete coupons for DBA tests. Imperial's concrete blocks were formed in plywood, lattice-like forms which occasionally transferred wood particles and splinters to the concrete surface. No failures were ever attributed to wood in the concrete.

Jerry, if you have any questions please don't hesitate to call me.

Sincerely,

Jerry Arnold

cc: Jerry Firtel (Ebasco-NY)
Project Files
Reading Files

#6

P.O. Box 29077 New Orleans, Louisiana 70189 U.S.A. 504-254-1433

IMPERIAL PROFESSIONAL COATINGS

March 08, 1984

Mr. Jerry Firtel
c/o Tom Kelly - Civil Engineering
Comanche Peak Nuclear Station
P.O. Box 1002
Glen Rose, Texas 76043

SUBJECT: Rebar Chairs

Dear Jerry:

My recommendation for handling rebar chairs in the past has been to use a mechanical tool such as a 3-M Roto Peen to cut the protruding tips flush with the concret surface while at the same time imparting a profile to insure adherance of the Nutec 11S.

Several years ago I conducted some qualitative tests on rebar chairs for another job site. I applied 11S to two types of rebar chairs; rubber and polyethylene. I found that the Nutec 11S adhered better to the rubber tips and Nutec 11S would adhere to polyethylene chairs with a rough profile. Because of the geometry of the rebar chairs Elcometer Adhesion tests are not feasible. I believe that jobsite adhesion tests would substantiate my findings.

Sincerely,

Jerry Arnold

cc: Jerry Firtel (Ebasco-NY)
Project Files
Reading Files

Brown&Root Inc.

35-1195
6/19/78
#6

INTEROFFICE MEMO

IM-14473

TO: Pat Clarke

DATE: June 19, 1978

FROM: H. D. Hash, Jr.

SUBJECT: CPSES, Job No. 35-1195
Adhesion Test of Embedded Wood in Concrete

As embedded wood particles in concrete has become an increasing problem in surface preparation of concrete substrate, the following adhesion tests were performed in Room #197 El. 810' Upper Auxiliary.

Testing Nutec #11, Reactic #1201 over existing wood particles:

Test #1

a. 900 PSI Concrete Failure
b. 750 PSI Concrete Failure
c. 800 PSI Concrete Failure Test #1 Avg PSI-816 PSI

Test #2

a. 650 PSI Coating Failure
b. 800 PSI Concrete Failure
c. 600 PSI Concrete Failure

Test #2 Avg. PSI- 683 PSI

The overall test average of this room is 749 PSI, which exceeds the values recommended by Imperial Coatings VBR-7494, April 19, 1978. This should substantiate Imperial's opinion that embedded splinters and wood fuzz which cannot be removed by water blasting, will not be detrimental to the performance of the concrete coating system.

H. D. Hash Jr.
H. D. Hash, Jr.
Level III Coating Inspector

cc: U. D. Douglas
~~D. Sutton~~
O. B. Jones

Imperial

TECHNICAL REPORT

NUMBER

462-1-81

TITLE

REVISION

DESIGN BASIS ACCIDENT TEST RESULTS -NUTEC 11S OVER CLEAN-N-STRIP AND ABRASIVE BLASTED STEEL

FOR

GENERAL USE

CUSTOMER

Submitted by: GERALD ARNOLD GEA

Approved: ROBERT R. TAYLOR RRT 2/19/86

Date: JANUARY 22, 1982

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

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SCOPE: The purpose of this test was to evaluate the feasibility of applying Nutec #11S surfacer to steel imbedded in concrete (i.e. Richmond inserts, Steel Imbeds) in Service Level I areas of nuclear power plants.

SUMMARY: Design Basis Accident test results from Oak Ridge National Laboratories indicate loss of adhesion on 11S coated specimens and #2 few blisters on 11S/1201 coated specimens which had previously been cleaned to bright metal with a 3M Clean-n-Strip cup wheel.

On the other hand no defects were observed on the 11S surfacer over abrasive blasted steel. Mixed results were obtained on 11S/1201 specimens which had been abrasive blasted. Two of four faces looked excellent; whereas the two remaining faces exhibited some blistering.

Of the eight 11S/abrasive blasted steel interfaces, five exhibited no defects and one contained very few #6 blisters (75% passing). Of the two faces which Oak Ridge National Laboratories reported as #2M, one appears marginal.

PROCEDURES: Eight 2" x 4" x ¼" carbon steel panels were prepared for coating:

a. Four were cleaned to bright metal with a 3M Clean-n-Strip cup wheel.

b. Four were abrasive blasted per SSPC-SP-10, near white blast, with a working mix of G-80, G-50, G-40 steel grit to achieve a surface profile of 2.0 mils.

Nutec #11S was applied to all eight panels over a two day period (one face of each panel a day). Nutec 1201 was then applied to two Clean-n-Strip panels and two blasted panels. Details of the application and curing are outlined on the attached panel preparation sheets.

The coated panels were then submitted to Oak Ridge National Laboratories for Design Basis Accident testing, with maximum 365°F. and 70 psig parameters.

The tested panels were evaluated by ORNL personnel immediately upon removal from the autoclave and reinspected by Imperial following shipment of the panels back to New Orleans.

CONCLUSIONS:

Based on the test results, application of Nutec 11S is not recommended (for surfaces greater than two square inches) over clean-n'-strip prepared steel in containment areas which would be exposed to the temperature and pressure conditions observed in this test.

Application of Nutec 11S is recommended for overlap on steel imbeds (maximum 2 inches overlap) and over imbedded steel objects (up to six square inches), which have been abrasive blasted or prepared with power tools which impart a surface profile (i.e., roto peen).

Of the eight abrasive blasted faces coated with Nutec 11S, five exhibited no defects and one contained only very few #6 size blisters. Oak Ridge also reported one face of panel 7829 (rear) as having #2 medium blisters. Imperial evaluated the panels thoroughly and believes that ORNL mistakenly evaluated the same face (front side) twice. Imperial has reevaluated the rear of panel 7829 to only few #4 blisters. The front side of panel 7829 was borderline.

Therefore, of the eight abrasive blasted faces tested, Imperial finds that seven comply with the ANSI N101.2 acceptance criteria (no larger than #4 few blisters) and the eight face is borderline. This amounts to an 87.5% success rate.

NOTE: Technical reports #353-80 and #413-80 relate Elcometer adhesion test data of Nutec 11S over abrasive blasted and power tool cleaned steel surfaces. These reports are recommended for review, especially for Service Level II and Balance of Plant service, when DBA testing is not required, that is, where the coating system will not be subjected to Loss of Coolant Accident conditions.

PANEL PREPARATION SHEETS

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: NUTEC #11S
2. TYPE SUBSTRATE: ASTM A-36 Carbon Steel SIZE: 2" x 4" x ¼"
3. SURFACE PREPARATION (Describe): Clean-n-Strip cleaned to bright metal
4. PRODUCT DATA: SAMPLE NO.(s): 7822
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: N/A

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
Front	NUTEC	#11S	2417 2102 2103	Squeegee	86/73	.022-.027	9/25/80
Back	NUTEC	#11S	2417 2102 2103	Squeegee	84/76	.021-.027	9/26/80

6. CURING CONDITIONS: AMBIENT TEMP. 80-90 °F REL. HUMIDITY 70-80 %
MINIMUM CURE 17 DAYS
7. TEST PROCEDURE: DBA
8. TESTING PERFORMED BY: Oak Ridge National Laboratories DATE SUBMITTED 10/13/80

APPROVED: Gerald C. Arnold Sr.

TEST REPORT NO. 462-81

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

PRODUCT TO BE TESTED: Nutec #11S

TYPE SUBSTRATE: ASTM A-36 Carbon Steel SIZE: 2 x 4 x½"

SURFACE PREPARATION (Describe): Clean-n-Strip cleaned to bright metal

PRODUCT DATA: SAMPLE NO.(s): 7823

DATE AND TIME CURING COMPOUND OR PRIMER APPLIED N/A

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
Front	NUTEC	#11S	2417 2102 2103	Squeegee	86/73	.022-.027	9/25/80
Back	NUTEC	#11S	2417 2102 2103	Squeegee	84/76	.021-.027	9/26/80
		--					

CURING CONDITIONS: AMBIENT TEMP. 80-90 °F REL. HUMIDITY 70-80 %

MINIMUM CURE 17 DAYS

TEST PROCEDURE: DBA

TESTING PERFORMED BY: Oak Ridge National Laboratories DATE SUBMITTED 10/13/80

APPROVED BY:

DATE: 1/22/82

PREPARED BY: Maurine Lee

DATE: 1/16/81

TEST REPORT NO.: 462-1-81

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: NUTEC #11S
2. TYPE SUBSTRATE: ASTM A-36 Carbon Steel SIZE: 2" x 4" x ¼"
3. SURFACE PREPARATION (Describe): Clean-n-Strip cleaned to bright metal.
4. PRODUCT DATA: SAMPLE NO.(s): 7824
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: N/A

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
Front	NUTEC	#11S	2417 2102 2103	Suqeegee	86/73	.018-.026	9/25/80
Back	NUTEC	#11S	2417 2102 2103	Squeegee	84/76	.018-.025	9/26/80
	NUTEC	#1201	1958/1959	Spray	74/78	F- .003-.004 B- .006-.007	10/1/80

Total Dry Film Thickness Range - Front .021 -.030
Back .024 -.032

6. CURING CONDITIONS: AMBIENT TEMP. 80-90 °F REL. HUMIDITY 70-80 %
MINIMUM CURE 17 DAYS
7. TEST PROCEDURE: DBA
8. TESTING PERFORMED BY: Oak Ridge National Laboratories DATE SUBMITTED 10/13/80

APPROVED: Gerald E. Cavoli

TEST REPORT NO. 462-81

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: NUTEC #11S
2. TYPE SUBSTRATE: ASTM A-36 Carbon Steel SIZE: 2" x 4" x¼"
3. SURFACE PREPARATION (Describe): Clean-n-Strip cleaned to bright metal
4. PRODUCT DATA: SAMPLE NO.(s): 7825
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: N/A

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
Front	NUTEC	#11S	2417 2102 2103	Squeegee	86/73	.021-.026	9/25/80
Back	NUTEC	#11S	2417 2102 2103	Squeegee	84/76	.018-.024	9/26/80
--	NUTEC	#1201	1958/1959	Spray	74/78	F- .003-.004 B- .004-.006	10/1/80

Total Dry Film Thickness Range - Front .024-.030
Back .022-.030

6. CURING CONDITIONS: AMBIENT TEMP. 80-90 °F REL. HUMIDITY 70-80 %
MINIMUM CURE 17 DAYS

7. TEST PROCEDURE: DBA

8. TESTING PERFORMED BY: Oak Ridge National Laboratories DATE SUBMITTED 10/13/80

APPROVED: Gerald E. Arnold

TEST REPORT NO. 462-81

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: NUTEC #11S
2. TYPE SUBSTRATE: ASTM A-36 Carbon Steel SIZE: 2" x 4" x¼"
3. SURFACE PREPARATION (Describe): Abrasive blasted per SSPC-SP-10, near white blast, with a surface profile of 2.0 mils as read on a Keane-Tator Profile Comparator Disc.
4. PRODUCT DATA: SAMPLE NO.(s): 7826
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: N/A

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
Front	NUTEC	#11S	2417 2102 2103	Squeegee	86/73	.020-.050	9/25/80
Back	NUTEC	#11S	2417 2102 2103	Squeegee	84/76	.024-.030	9/26/80

6. CURING CONDITIONS: AMBIENT TEMP. 80-90 °F REL. HUMIDITY 70-80 %
MINIMUM CURE 17 DAYS

7. TEST PROCEDURE: DBA

8. TESTING PERFORMED BY: Oak Ridge National Laboratories DATE SUBMITTED 10/13/80

APPROVED: [signature]

TEST REPORT NO. 462-81

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: NUTEC #11S
2. TYPE SUBSTRATE: ASTM A-36 Carbon Steel SIZE: 2" x 4" x¼"
3. SURFACE PREPARATION (Describe): Abrasive blasted per SSPC-SP-10, near white blast, with a surface profile of 2.0 mils as read on a Keane-Tator Profile Compartor Disc.
4. PRODUCT DATA: SAMPLE NO.(s): 7827
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: N/A

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
Front	NUTEC	#11S	2417 2102 2103	Squeegee	86/72	.018-.026	9/25/80
Back	NUTEC	#11S	2417 2102 2103	Squeegee	84/76	.021-.027	9/26/80

6. CURING CONDITIONS: AMBIENT TEMP. 80-90 °F REL. HUMIDITY 70-80 %
MINIMUM CURE 17 DAYS

- TEST PROCEDURE: DBA
- TESTING PERFORMED BY: Oak Ridge National Laboratories DATE SUBMITTED 10/13/80

APPROVED: Gerald E Arnold

TEST REPORT NO. 462-81

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: NUTEC #11S

2. TYPE SUBSTRATE: ASTM A-36 Carbon Steel SIZE: 2" x 4" x¼"

3. SURFACE PREPARATION (Describe): Abrasive blasted per SSPC-SP-10, near white blast, with surface profile of 2.0 mils as read on a Keane-Tator Profile Comparator Disc.

4. PRODUCT DATA: SAMPLE NO.(s): 7828

5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: N/A

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F) %R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
Front	NUTEC	#11S	2417 2102 2103	Squeegee	86/73	.022-.027	9/25/8[illegible]
Back	NUTEC	#11S	2417 2102 2103	Squeegee	84/76	.015-.020	9/26/8[illegible]
	NUTEC	#1201	1958 1959	Spray	74/78	F- .003- B- .006-.007	10/1/8[illegible]

Total Dry Film Thickness Range - Front .025-.031
Back .021-.027

6. CURING CONDITIONS: AMBIENT TEMP. 80-90 °F REL. HUMIDITY 70-80 %

MINIMUM CURE 17 DAYS

7. TEST PROCEDURE: DBA

8. TESTING PERFORMED BY: Oak Ridge National Laboratories DATE SUBMITTED 10/13/80

APPROVED: Gerald E Carroll

TEST REPORT NO. 462-81

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: NUTEC #11S
2. TYPE SUBSTRATE: ASTM A-36 Carbon Steel SIZE: 2" x 4" x½"
3. SURFACE PREPARATION (Describe): Abrasive blasted per SSPC-SP-10, near white blast, with a surface profile of 2.0 mils as read on a Keane-Tator Surface Profile Comparator Disc.
4. PRODUCT DATA: SAMPLE NO.(s): 7829
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: N/A

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(^{o}F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
Front	NUTEC	#11S	2417 2102 2103	Squeegee	86/73	.022-.027	9/25/80
Back	NUTEC	11S	2417 2102 2103	Squeegee	84/76	.020-.050	9/26/80
	NUTEC	#1201	1958 1959	Spray	74/78	F- .002-.003 B- .006-.007	10/1/80

Total Dry Film Thickness Range - Front .024-.030
Back .026-.057

6. CURING CONDITIONS: AMBIENT TEMP. 80-90 ^{o}F REL. HUMIDITY 70-80 %
MINIMUM CURE 17 DAYS
7. TEST PROCEDURE: DBA
8. TESTING PERFORMED BY: Oak Ridge National Laboratories DATE SUBMITTED 10/13/80

APPROVED: Gerald E. Arnold

TEST REPORT NO. 462-81

ORNL PROCEDURES

Manufacturer: Imperial
New Orleans, LA

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 11/13/80

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 1×10^8 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 [signature]

Approved [signature]

Manufacturer: Imperial
New Orleans, LA

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 11/13/80

ORNL Log Book No. A 7562; A10-29-80

Table 1. DBA solution composition, distilled water

Reagent	Concentration
Boric acid, H_3BO_3	6200 ppm
Hydrazine, NH_2NH_2	50 ppm
Trisodium phosphate, $Na_3PO_4 \cdot 12H_2O$	Required to adjust pH to 9.7

Table 2. DBA test conditions

Time	Temperature (°F)	Pressure (psig)	Comments
Start	214		Autoclave preheated.
58 s	385	68	Steam injected.
10 min	385	70	Pressure maintained by relief valve.
4 min	385–340	70	
6 h	340	70	
20 s	220	30	Spray solution added at 75°F.
20 min	220–250	30	Adjusted pressure with N_2.
4 days	250	30	
20 s	170	–15	Fresh spray solution added after draining autoclave.
25 min	170–200	10	
3 days	200	10	

Evaluated Ralph P. Hagle

Approved L.T. Corbin

TEST RESULTS

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

November 13, 1980

Mr. Gerald E. Arnold
Technical Representative
Imperial Professional Coatings
P. O. Box 29077
New Orleans, Louisiana 70189

Dear Jerry:

The enclosed report contains test results recently obtained on the Imperial protective coatings. This test was designed to encompass the 385 and the 340°F envelope curves.

If we can be of further assistance, please feel free to call on us.

Sincerely,

L. T. Corbin

L. T. Corbin, Section Head
Analytical Chemistry Division

LTC:dmw

Enclosures

Manufacturer: Imperial

New Orleans, LA

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 11/13/80

System Identification

x Steel panel ___ Concrete block

11S (clean n'strip)

DBA Test Results

ORNL Master Analytical Manual Method No. 2 0922.
ORNL Log Book No. A 7562; A10-29-80

Sample No.	DBA phase	Comments
7822	spray	Front: loss of adhesion. Rear: loss of adhesion.
7823	spray	Front: blisters, #2 few. * Rear: blisters, #2 few.

* Following shipment back to Imperial, inspection revealed areas of delamination on both sides. GEA

Evaluated [signature]

Approved [signature]

Manufacturer: Imperial

New Orleans, LA

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 11/13/80

System Identification

x Steel panel ____ Concrete block

115/1201 (clean n'strip)

DBA Test Results

ORNL Master Analytical Manual Method No. 2 0922.
ORNL Log Book No. A 7562; A10-29-80

Sample No.	DBA phase	Comments
7824	spray	Front: blisters, #2 few. Rear: blisters, #2 few.
7825	spray	Front: blisters, #2 few. Rear: blisters, #2 few.

Evaluated Ralph [signature]

Approved [signature]

Manufacturer: Imperial

New Orleans, LA

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 11/13/80

System Identification

x Steel panel ___ Concrete block

11S

DBA Test Results

ORNL Master Analytical Manual Method No. 2 0922.
ORNL Log Book No. A 7562; A10-29-80

Sample No.	DBA phase	Comments
7826	spray	Front: coatings intact, no defects. Rear: coatings intact, no defects.
7827	spray	Front: coatings intact, no defects. Rear: coatings intact, no defects.
	--	

Evaluated [signature]

Approved [signature]

Manufacturer: Imperial

New Orleans, LA

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 11/13/80

System Identification

x Steel panel ___ Concrete block

11S/1201

DBA Test Results

ORNL Master Analytical Manual Method No. 2 0922.
ORNL Log Book No. A 7562; A10-29-80

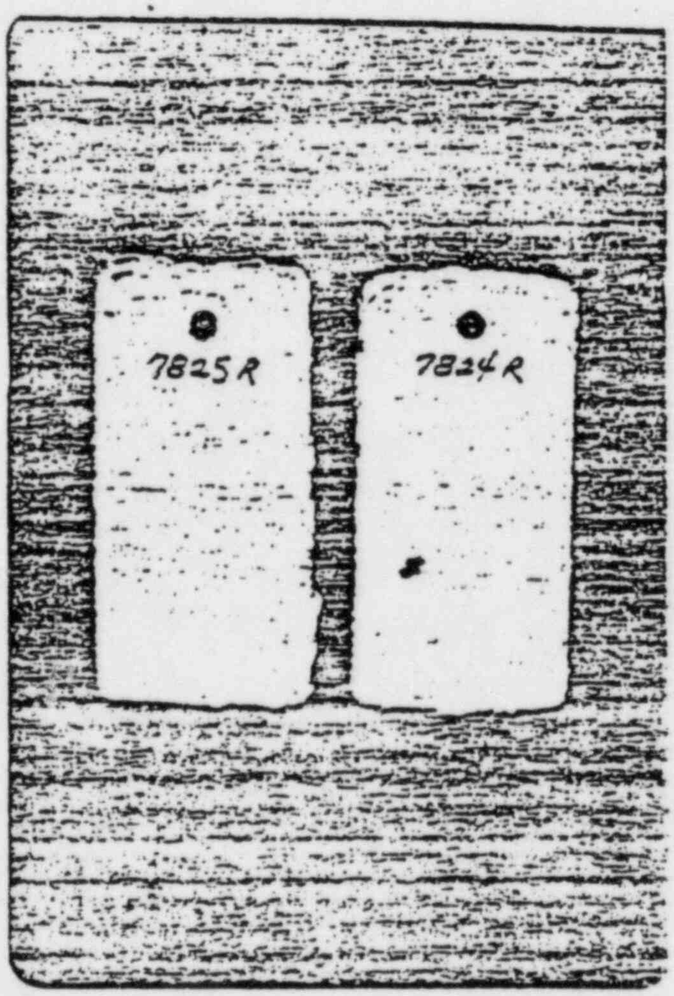
Sample No.	DBA phase	Comments
7828	spray	Front: coatings intact, no defects. Rear: blisters, #6 few.
7829	spray	Front: blisters, #2 medium. * Rear: blisters, #2 medium.

* Imperial inspection of panels
Front: #2-#4, few-medium (borderline)
Rear: #4 few

Evaluated Ralph F. Hyde [signature]

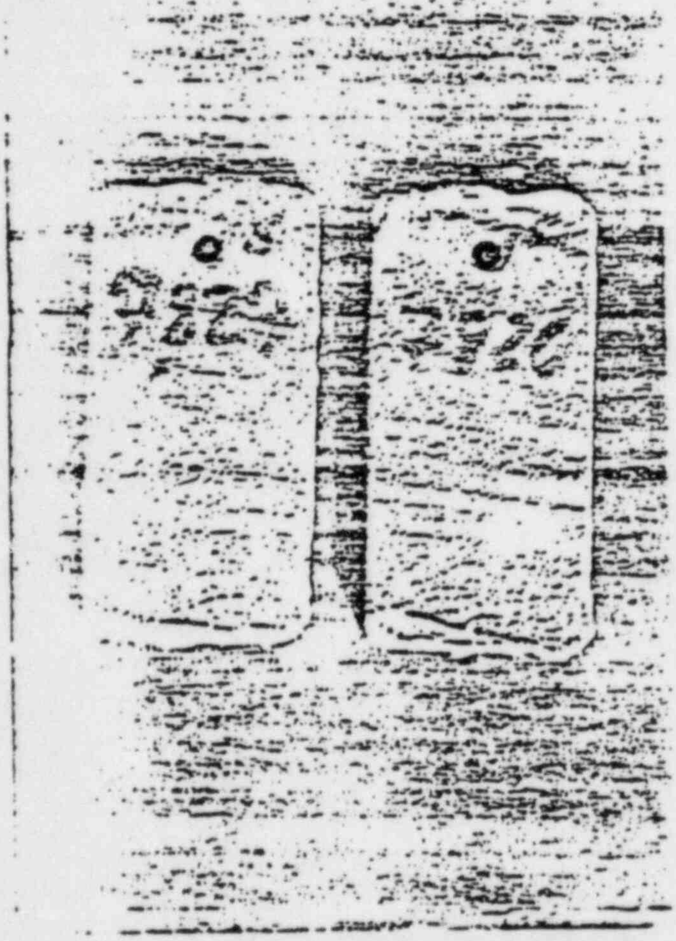
Approved L. T. Corbin [signature]

7822-7823

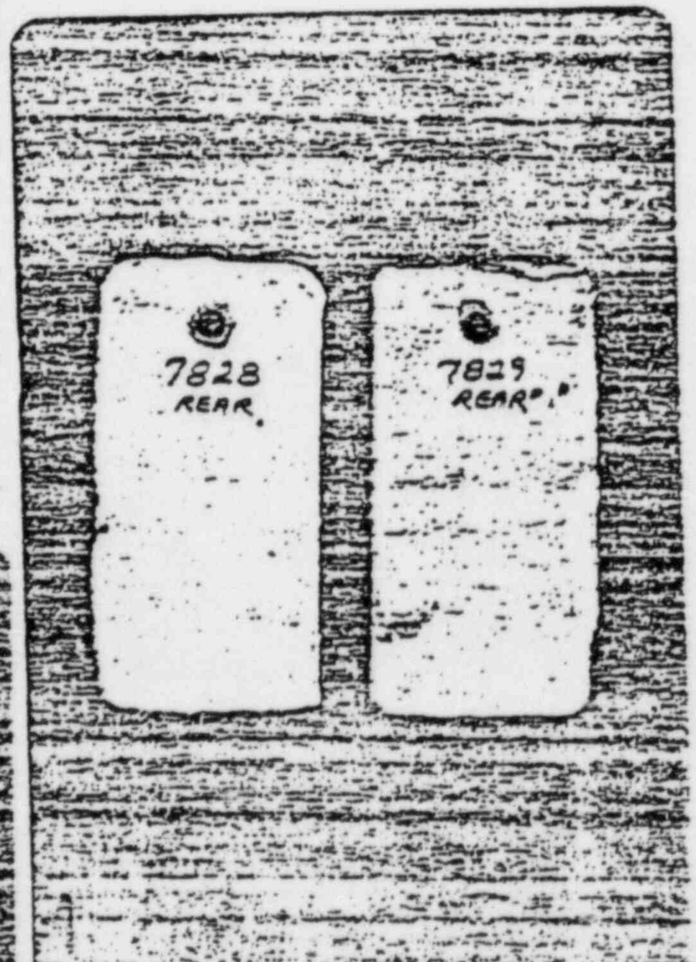


7824-7825 R

7824-7825

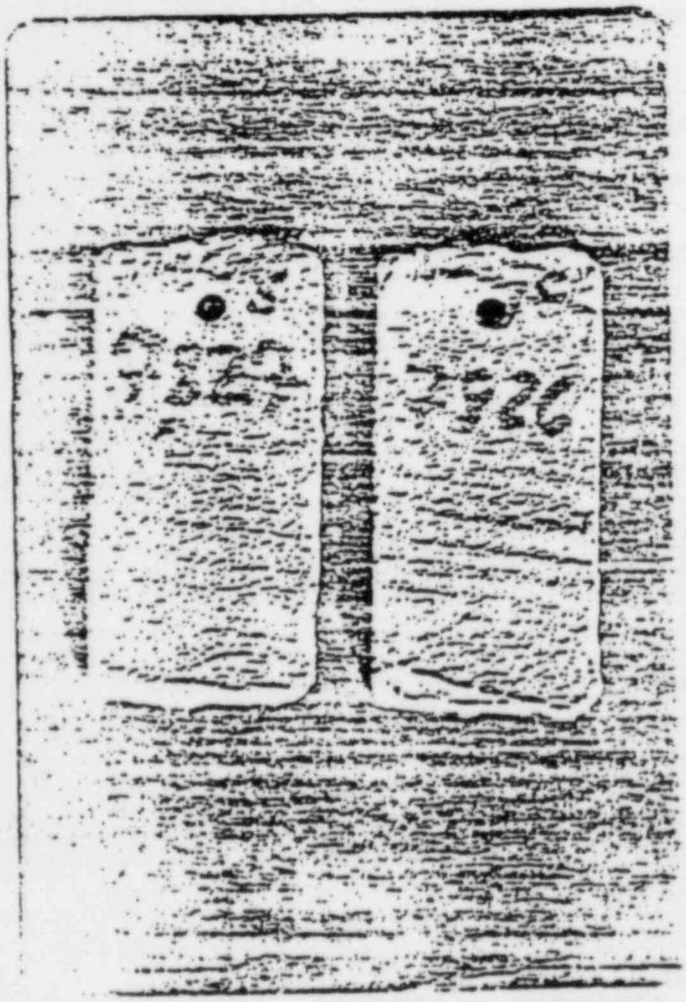


7826-7827

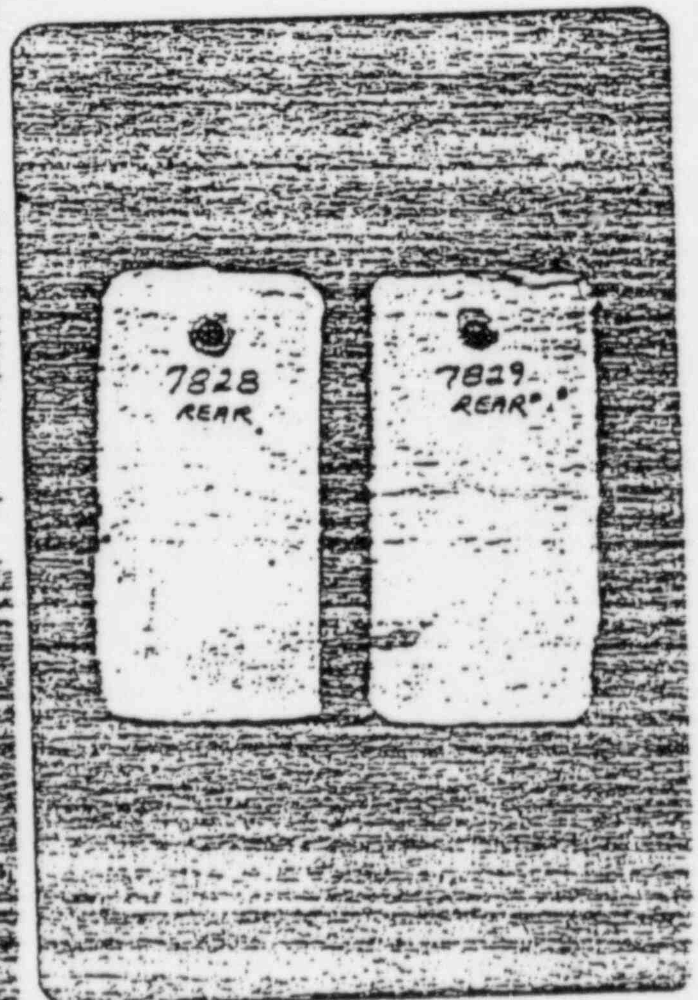


7828-7829 R

7826-7829



7826-7827



7828-7829 R

7828-7829

TXX-4201
06/22/84

Allegation No. 7

NCR No. C83-01986 discusses the cracking and flaking of concrete coatings systems (NUTEC 11, 11S, 1201). The disposition section of this NCR states "cracking of coatings is due to excessive stresses in the coating during drying and curing." The allegation is that repairing these cracks will not remedy the condition which caused the cracks.

Evaluation of Validity

The allegation as stated is true. The preventive measure to preclude recurrence of this condition is the proper application of the coating with emphasis on control of film thickness (see manufacturer's application bulletin attached). Requirements for control of the thickness of concrete coatings are included in procedures QI-QP-11.4-10, QI-QP-11.4-27 and CCP-40. If the coating is inadvertently applied too thick and cracks, the inspection process notes the problem and corrective action, i.e., rework of affected area, is taken.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

7

P.O. Box 29077 New Orleans, Louisiana 70189 U.S.A. 504-254-1433

IMPERIAL PROFESSIONAL COATINGS

January 19, 1983

NUTEC SYSTEM - FILM THICKNESS CONTROLS

Dear Customer:

This application bulletin has been prepared as a reminder that stress cracking is possible within the Nutec 11S system if application parameters, specifically; film thickness, topcoat times, and thinning are not controlled. Cracking, observed to date, has been restricted to floor areas where film thicknesses have dramatically exceeded the recommended tolerances. The problem is inherently difficult to detect because of the problems of accurately measuring the applied thickness of a coating on concrete. Routine wet film or dry film measuring techniques do not work on concrete. On walls, the problem is not acute because the coating will slump or sag, revealing the excess very readily.

A. Two sites had experienced minor stress cracks on floors, especially at the wall floor interface where the corners were covered with Nutec 11S. Both sites recognized the lack of control on film thickness and took steps to monitor film thickness, recoat times, and thinning. No further occurrences have been reported.

   Numerous sites have used the Nutec system and no cases of stress cracking have been reported to Imperial from Comanche Peak, South Texas Project, Riverbend, WPPSS 1, WPPSS 3, Hopecreek, Millstone, Beaver Valler, and Shearon Harris. In addition, no cracking has been reported from the many non nuclear applications in which Nutec 11S has been applied.

B. The following is a review of application conditions which appear in Imperial's application procedures distributed to each nuclear jobsite prior to start up apinting with Nutec system.

1. Film Thickness

   Recommended film thickness are as follows

Level 1	10-35 mils
Level 2 & BOP	10-60 mils

2. Patching Voids

Nutec 11S has been recommended for patching voids below the plane of the surface (i.e., bugholes) measuring ¼" in depth and diameter. Larger voids up to 1" inch depth and 2" in diameter may be filled, but usually require at least two passes to prevent sagging. In any case, prior to topcoating, these void areas should be cured to the extent that a fingernail impression can not be left in the surface.

Note: Nutec 11S is not recommended for leveling out undulating or very rough concrete. In cases where concrete has a very rough profile due to blasting or bush hammering, the film thickness restrictions outlined above must be observed.

3. Topcoat Times

Attached are a table and graphs which outline the cure times recommended for various film thicknesses. Thicknesses above 35 mils require additional cure time. Stress cracks may occur within the Nutec 11S if the topcoat is applied before the Nutec 11S has an opportunity to sufficiently cure through.

Application of the topcoat, before the recommended cure time has been achieved, may entrap solvent within the film, especially if the 11S has been applied at thicknesses above 35 mils. One can easily appreciate that a combination of a high film thickness and inadequate cure followed by the subsequent "swell" caused by introduction of the solvents in the topcoat must subsequently be replaced by shrinkage which may result in stress cracks.

4. Thinning

Maximum thinning with DL-54 solvent is 5% by volume.

In summary, the cracking problems can be avoided by following the Imperial application instructions, for the Nutec concrete coating system, which are present at all jobsites. Particular attention should be paid to the application parameters outlined above. On those projects where the parameters listed above are carefully controlled, there is no problem with cracking.

Should you have any questions concerning the topic or for names and addresses of references, please do not hesitate to contact me at (504) 254-1433.

Sincerely,

Gerald E. Arnold
Nutec Product Manager

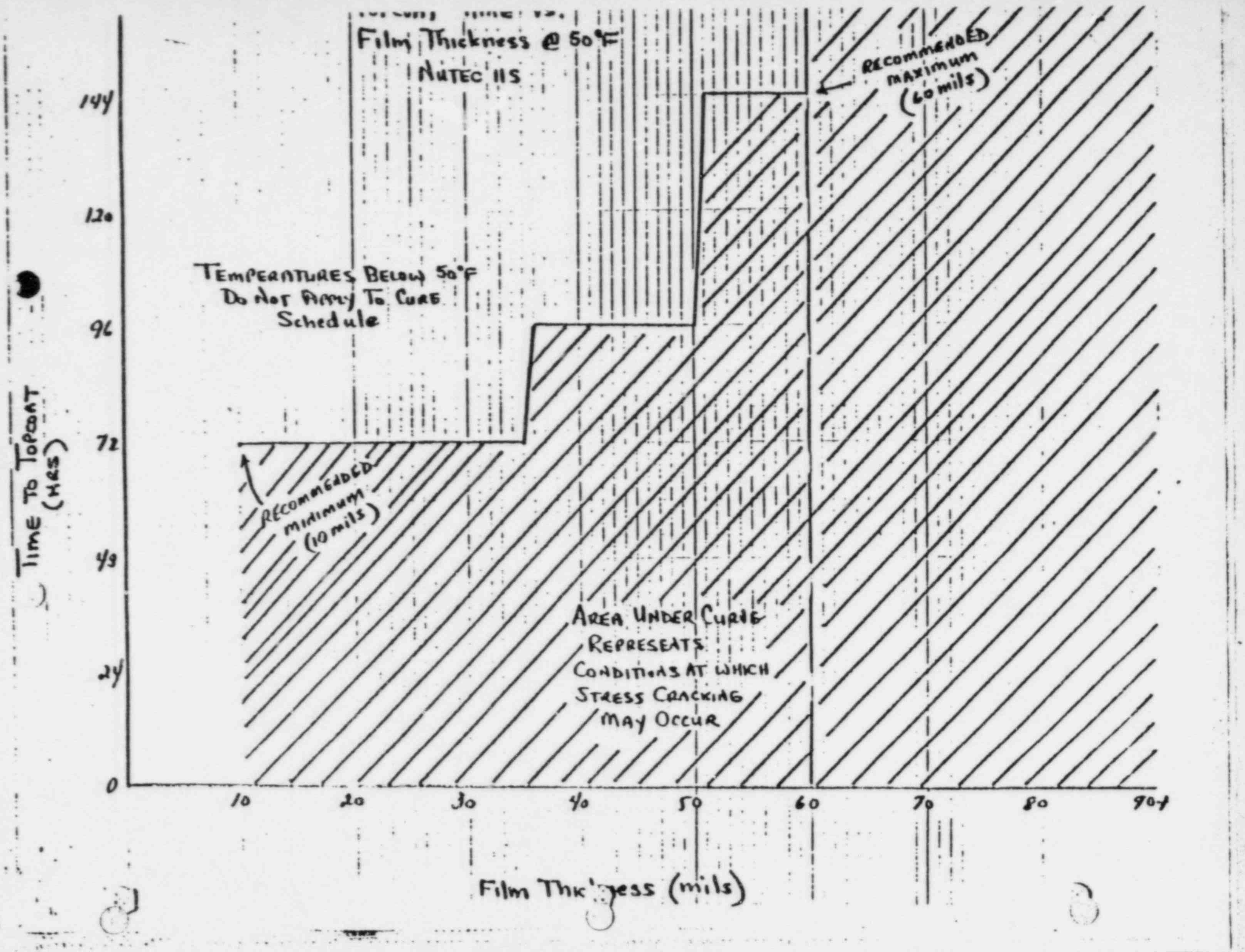
ATTACHMENT "A"

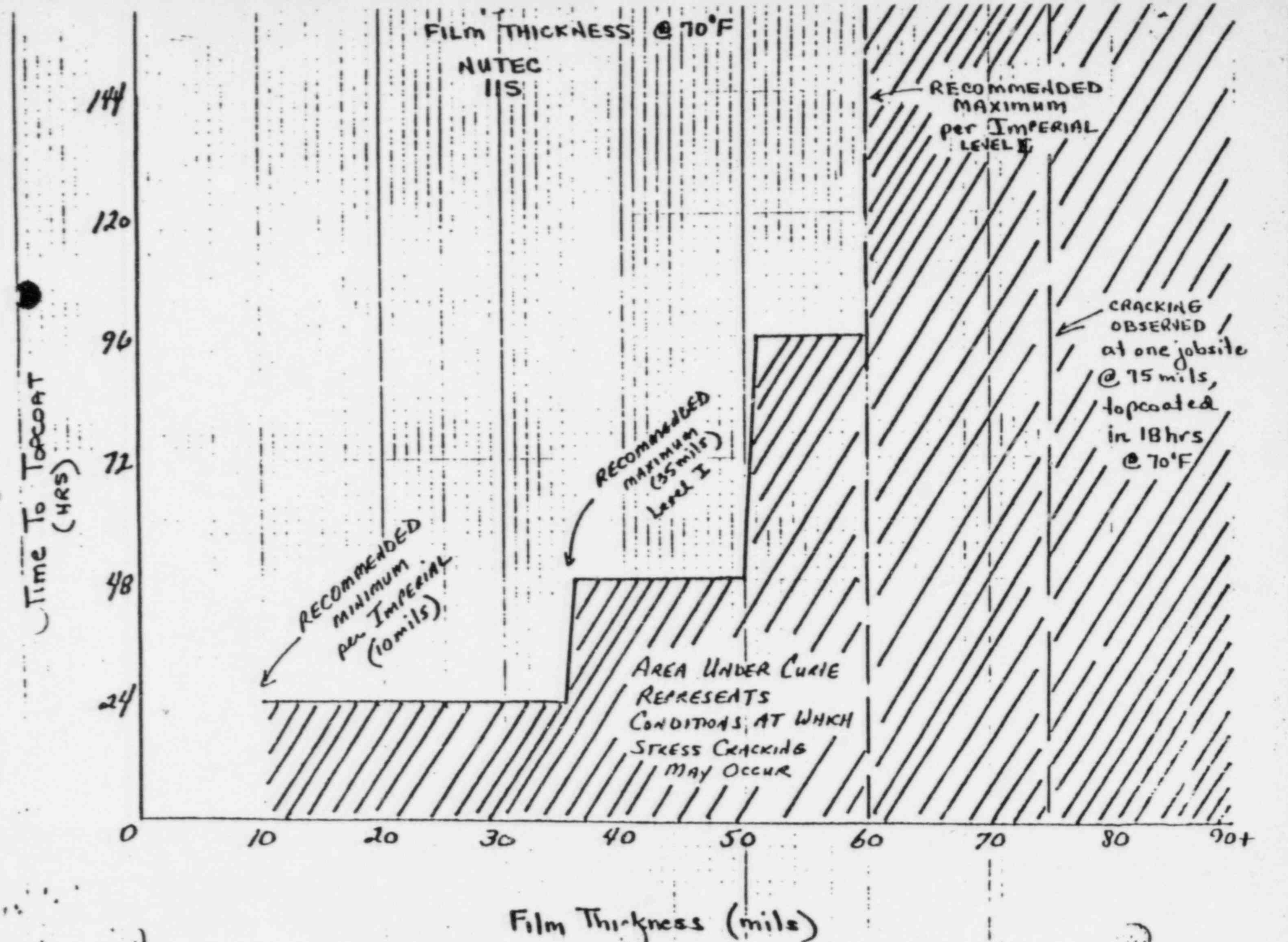
		NUTEC #6	NUTEC #10	NUTEC #11	NUTEC #11S	DURAZINC #555	AQUATEX #1180	REACTIC #1201
POT LIFE	$50^{o}F$	12 hrs	1½ hrs	1½ hrs	1½ hrs	12 hrs	N/A	16 hrs
	$70^{o}F$	8 hrs	1 hr	1 hr	1 hr	8 hrs	N/A	8 hrs
	$90^{o}F$	4 hrs	½ hr	½ hr	½ hr	6 hrs	N/A	5 hrs
INDUCTION TIME	$50^{o}F$	N/A	N/A	N/A	N/A	N/A	N/A	45 min.
	$70^{o}F$	N/A	N/A	N/A	N/A	N/A	N/A	20 min.
	$90^{o}F.$	N/A	N/A	N/A	N/A	N/A	N/A	10 min.
RECOAT OR TOPCOAT TIME	$50^{o}F.$	48 hrs	24 hrs	72 hrs	72 hrs	72 hrs	24-36 hrs	7-9 hrs
	$70^{o}F.$	12 hrs	4-6 hrs	24 hrs	24 hrs	24 hrs	6-8 hrs	4-6 hrs
	$90^{o}F.$	6 hrs	3 hrs	18 hrs	18 hrs	18 hrs	4-6 hrs	2-3 hrs
FULL CURE TIME	$50^{o}F$	14 dys	72 hrs*	10 dys	10 dys	72 hrs	72 hrs	10 dys
	$70^{o}F$	7 dys	24 hrs	7 dys	7 dys	24 hrs	24 hrs	7 dys
	$90^{o}F.$	4 dys	18 hrs	6 dys	6 dys	18 hrs	18 hrs	6 dys

* Full cure time should be used to determine time allowed between coating and use of forms coated with #10.

Additional curing time shall be allowed for film thicknesses;

	DFT	Additional Curing Time
11S	10 - 35	0
	35 - 50	24 hours
	50	72 hours
11	3 - 10	0
	10 - 20	24 hours


Film Thickness @ 50°F
NUTEC 11S
Temperatures Below 50°F
Do Not Apply To Cure
Schedule
Recommended
Maximum
(60 mils)
Recommended
Minimum
(10 mils)
Area Under Curve
Represents
Conditions At Which
Stress Cracking
May Occur
Time To Topcoat
(HRS)
144
120
96
72
48
24
0
10
20
30
40
50
60
70
80
90+
Film Thickness (mils)


FILM THICKNESS @ 70°F
NUTEC 11S
Time To Topcoat (HRS)
144
120
96
72
48
24
0
10
20
30
40
50
60
70
80
90+
Film Thickness (mils)
RECOMMENDED MINIMUM per IMPERIAL (10mils)
RECOMMENDED MAXIMUM (35mils) Level I
RECOMMENDED MAXIMUM per IMPERIAL LEVEL II
CRACKING OBSERVED at one jobsite @ 75 mils, topcoated in 18hrs @ 70°F
AREA UNDER CURVE REPRESENTS CONDITIONS AT WHICH STRESS CRACKING MAY OCCUR

TXX-4201
06/22/84

Allegation No. 8

Paragraph 4.1.3 of Procedure Number CCP-30, Rev. 11, states: "... shadows or tight residue of primer which may remain in the profile of the previously prepared substrate is acceptable." The allegation questions the integrity of an inorganic zinc primer which has been applied over a steel substrate with metallic zinc residue in the profile of the steel. The concern is that there will be coating adhesion problems, and that the zinc is isolated from the carbon steel substrate; thus the necessary galvanic action will fail to occur.

Evaluation of Validity

This allegation is without technical significance. Multi coats of inorganic zinc primers have been DBA qualified. (See Carboline Testing Project Report 01978.1 Final Report, attached, and response to Allegation No. 9). The DBA tests for CZ-11/CZ-11 systems indicated no failures in delamination, peeling, cracking or blistering. There is no question as to the ability of CZ-11 to adhere to a steel substrate, and the attached DBA test results indicate that CZ-11 will adhere acceptably to previously applied CZ-11. Therefore, the concern relative to CZ-11 adhering to a steel substrate with tight residue of primer is unwarranted.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not Applicable

LABORATORY TEST REPORT

Testing Project Number: 01973.1

Date: May 14, 1982

Report #: Final Time: 7 days

Date of Grading: December 22, 1981

Total Design Test Duration: 7 days

Requested by: Mr. D. W. McBride

TITLE: Performance of Carbo Zinc 11 Systems Exposed to 340°F Bechtel CP956-2/76 LOCA Curve.

PURPOSE: The purpose of this testing project is to determine how various Carbo Zinc 11 systems will perform in the upcoming 340°F Bechtel CP956-2/76 LOCA Curve tests at Oak Ridge National Laboratory scheduled for early 1982. The systems to be tested are:

1. 1c Carbo Zinc 11 @ 3 mils
2. 1c Carbo Zinc 11 @ 6 mils
3. 2c Carbo Zinc 11 @ 3/2 mils
4. 3c Carbo Zinc 11 @ 5/2/2 mils
5. 3c Carbo Zinc 11 @ 3/2/2 mils
6. 1c Carbo Weld 11/1c Carbo Zinc 11 @ 1.5/3.0 mils

CONCLUSIONS: Please refer to "Results".

DISCUSSION:

From the Carboline Research & Development Laboratory

The technical data furnished are true and accurate to the best of our knowledge. However, no guarantee of accuracy is given or implied.

carboline

TEST-01248O-1

A. Test Coupons

Description: 2x4x1/4 steel panels conforming to Carboline Specification ST1 (See Appendix 1)
Surface Preparation: Gritblasted to SSPC-SP 10-63 with a 1.0-3.0 mil profile.
Abrasive Medium 50/50 mix of GFH #40 grit and S230 shot.
Note: Before priming, the coupons were vapor degreased.

B. Systems Tested

System Number	Coating System	Color	Batch No.	Thinner	Thinning Ratio	Dry Film Thickness Range
1.	1c Carbo Zinc 11	green 0300	A: 1E5640M B: 1E2388Z	#33 1A2473M	10%	3.0-3.3 mils
2.	1c Carbo Zinc 11	green 0300	A: 1E5640M B: 1E2388Z	#33 1A2473M	10%	6.2-7.3 mils
3.	1c Carbo Zinc 11	green 0300	A: 0J5543M B: 9E1683Z	#33 0D3885M	12%	3.1-3.4 mils
	1c Carbo Zinc 11	green 0300	A: 1E5640M B: 1E2388Z	#33 1F0964M	50%	1.6-2.8 mils
4.	1c Carbo Zinc 11	green 0300	A: 1E5640M B: 1E2388Z	#33 1A2473M	10%	6.4-7.0 mils
	1c Carbo Zinc 11	green 0300	A: 1E5640M B: 1E2388Z	#33 1A2473M	50%	1.9-2.5 mils
	1c Carbo Zinc 11	green 0300	A: 1E5640M B: 1E2388Z	#33 1A2473M	50%	3.5 mils
5.	1c Carbo Zinc 11	green 0300	A: 0J5543M B: 9E1683Z	#33 0D3885M	12%	2.8-3.3 mils
	1c Carbo Zinc 11	green 0300	A: 1E5640M B: 1E2388Z	#33 1F0964M	50%	1.6-2.0 mils
	1c Carbo Zinc 11	green 0300	A: 1E5640M B: 1E2388Z	#33 1F0964M	50%	1.7-2.0 mils
6.	1c Carbo Weld 11	gray 0700	A: 0M2879M B: 1E2388Z	#33 1A2473M	5%	1.7 mils
	1c Carbo Zinc 11	green 0300	A: 1E5640M B: 1E2388Z	#33 1A2473M	50%	3.0-3.5 mils

C. Cure Schedule

System Number	Coating System	Time	Temperature Range	Humidity Range
1.	1c Carbo Zinc 11	2 months, 2 weeks	22-83°F	21-97%
2.	1c Carbo Zinc 11	2 months, 2 weeks	22-83°F	21-97%
3.	1c Carbo Zinc 11	7 months, 12 days	21-91°F	10-97%
	1c Carbo Zinc 11	2 months, 16 days	22-83°F	21-97%
4.	1c Carbo Zinc 11	1 month	26-86°F	21-97%
	1c Carbo Zinc 11	24 hours	70-76°F	39-41%
	1c Carbo Zinc 11	34 days	22-69°F	28-97%
5.	1c Carbo Zinc 11	7 months, 12 days	21-91°F	10-97%
	1c Carbo Zinc 11	24 hours	75-79°F	55-60%
	1c Carbo Zinc 11	2 months, 15 days	22-83°F	21-97%
6.	1c Carbo Weld 11	2 weeks	28-69°F	29-97%
	1c Carbo Zinc 11	20 days	22-68°F	28-97%

D. Exposure

Bechtel CP956 (2/76) LOCA Curve
1. Time-Temperature-Pressure Curve

Time	Temperature*	Pressure*
Initial	Ambient	Ambient
Initial to 6 hours	[illegible]°F (171°C)	70 psig
6 hours to 96 hours	250°F (121°C)	30 psig
96 hours to 7 days	200°F (93°C)	10 psig

*These are theoretical values. The next page are graphs of the theoretical and actual LOCA temperature and pressure curves. The data for the actual LOCA curves are from the chart recording for this test, found on page 97, Lab Book #230.

2. Water Chemistry

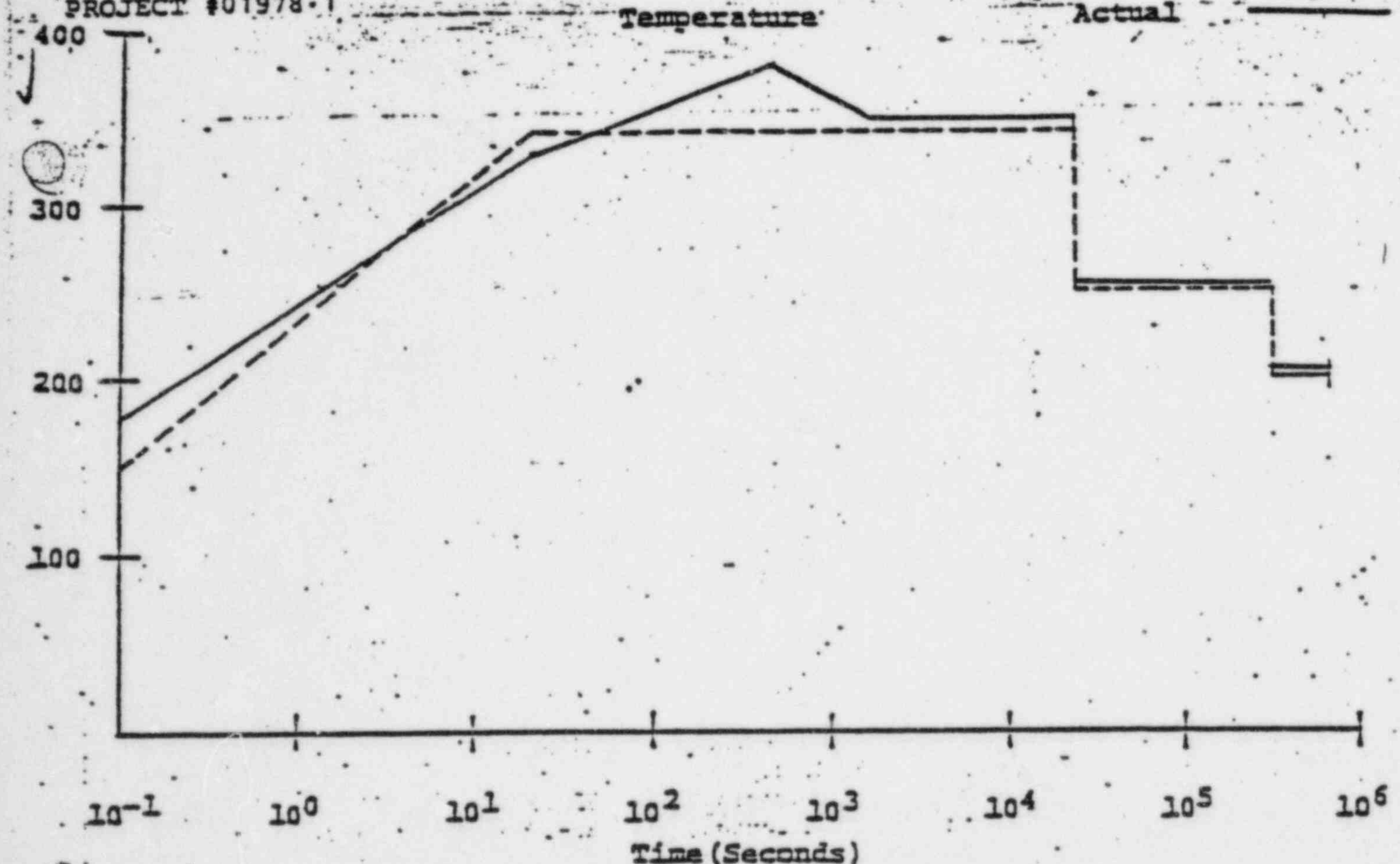
Deionized water pH = 7.[illegible]

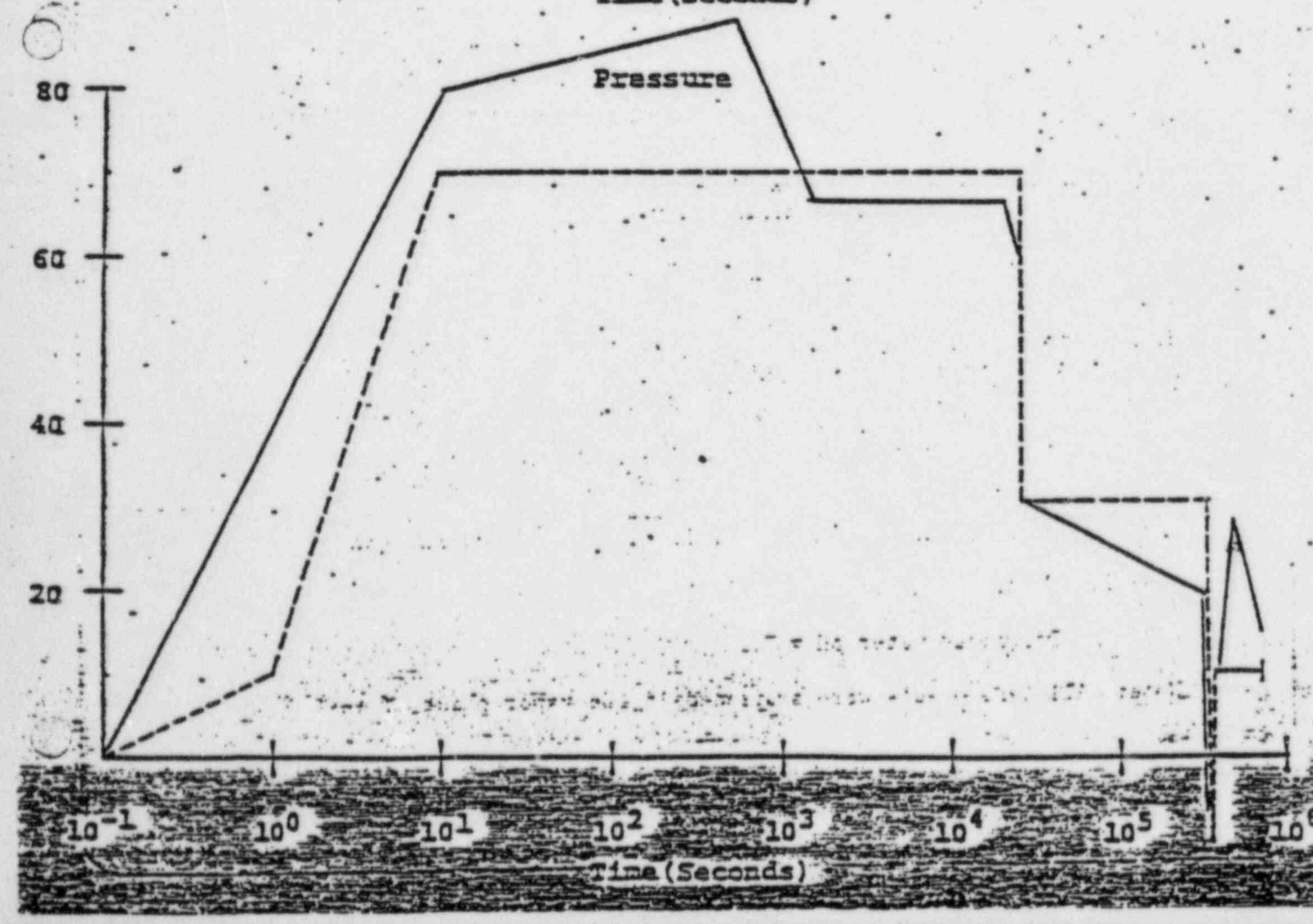
Note: All test panels were suspended in the vapor phase of test.

2/78 LOCA Curve

PROJECT #01978-1

Theoretical - - - -
Actual ———





LOCA Grading Procedure
(ASTM D3911-80

The test coupons are examined and evaluated within 4 hours after removal from the test chamber for the following coating defects:

Delamination - report extent
Cracking - report extent
Peeling - report extent
Blistering - report in accordance with ASTM Method D714

Key to Symbols in Results

B-blistering
CD-coating discoloration
F-few

RESULTS:

Panel Identification and Coating System	Dry Film Thickness (mils)	Delamination	Cracking	Peeling	Blistering	Other Performance Characteristics
1A; Side A 1c Carbo Zinc 11	3.0	none	none	none	none	CD
1A; Side B 1c Carbo Zinc 11	3.3	none	none	none	none	CD
2A; Side A 1c Carbo Zinc 11	7.3	none	none	none	none	CD
2A; Side B 1c Carbo Zinc 11	6.2	none	none	none	none	CD
3A; Side A 1c Carbo Zinc 11 1c Carbo Zinc 11	3.4 1.6 5.0	none	none	none	none	CD
3A; Side B 1c Carbo Zinc 11 1c Carbo Zinc 11	3.3 2.6 5.9	none	none	none	none	CD
3B; Side A 1c Carbo Zinc 11 1c Carbo Zinc 11	3.2 2.8 6.0	none	none	none	none	CD
3B; Side B 1c Carbo Zinc 11 1c Carbo Zinc 11	3.1 2.0 5.1	none	none	none	none	CD

...nel Identification ...d Coating System	Dry Film Thickness (mils)	Delamination	Cracking	Peeling	Blistering	Other Performance Characteristics
Side A						
1c Carbo Zinc 11	6.4	none	none	none	none	CD
1c Carbo Zinc 11	1.9					
1c Carbo Zinc 11	3.5					
	11.8					
Side B						
1c Carbo Zinc 11	7.0	From edge spreading 1/2" onto plane area.	none	none	none	CD
1c Carbo Zinc 11	2.5					
1c Carbo Zinc 11	3.5					
	13.0					
Side A						
1c Carbo Zinc 11	3.0	none	none	none	none	CD
1c Carbo Zinc 11	1.6					
1c Carbo Zinc 11	2.0					
	6.6					
Side B						
1c Carbo Zinc 11	3.3	none	none	none	none	CD
1c Carbo Zinc 11	1.7					
1c Carbo Zinc 11	2.0					
	7.0					
Side A						
1c Carbo Zinc 11	3.1	none	none	none	none	CD
1c Carbo Zinc 11	2.0					
1c Carbo Zinc 11	1.7					
	6.8					

SULTS:

nel Identification Coating System	Dry Film Thickness (mils)	Delamination	Cracking	Peeling	Blistering	Other Performance Characteristics
Side B						
1c Carbo Zinc 11	2.8	none	none	none	#2F-B	CD
1c Carbo Zinc 11	2.0					
1c Carbo Zinc 11	2.0					
	6.8					
Side A						
1c Carbo Weld 11	1.7	none	none	none	none	CD
1c Carbo Zinc 11	3.0					
	4.7					
Side B						
1c Carbo Weld 11	1.7	From edge spreading 1/2" onto plane	none	none	none	CD
1c Carbo Zinc 11	3.5					
	5.2					

Robert M. Reals
Lab Technician
Testing Department

Yuly Korobov
Supervisor
Testing Department

John Montle
Vice President
Technology

bic/T.P. 01978.1/
052682

cc: S. Lopata/D. Porthouse/J. Montle/E. Skiles/
S. Steinberg/C. Henson/D. McBride/
M. Dugan/Group Leaders

APPENDIX 1

Carboline Specification CB1

Preparation of Concrete Specimens:

Concrete Composition

Cement, ASTM C150, Type II. Low alkali
Gravel, ASTM C33, size 3/8 inch
Sand, ASTM C33
Water reducing admixture, ASTM C494
Air entraining admixture, ASTM C260
Pozzolans, ASTM C618
Water - Demineralized or distilled water

Concrete Proportions

Cement, 7 sacks per cubic yard
Sand-Gravel ratio, 55 sand, 45 gravel by volume
Pozzolans, to 15 percent replacement of cement
Air entraining admixture, 4-7 percent
Water reducing admixture, as per manufacturer's instructions
Water, to produce a 3 inch slump

Preparation of Test Specimen:

Make and cure the specimen according to ASTM C192, except that no form oils may be used. The face to be tested shall be composed to the form to simulate poured walls and the wood troweled surfaces: Broom finish top surface to simulate floors. No test face shall be saw cut. When applicable, concrete curing agents compatible with the coating system shall be used.

Panels:

The size for concrete panels shall be 2 by 4 inches by 2 inches thick ± 0.2 inches.

Curing Time:

Before concrete specimens are coated, they shall be cured a minimum of 28 days in accordance with ACI 301, "Specifications for Structural Concrete for Buildings." If a concrete curing primer is used, it shall be applied on the concrete within 24 hours after removal of the forms.

Carboline Specification ST1

Steel Test Specimens

Panels: The size for carbon steel panels shall be 2 by 4 inches by ½ inch thick ± 0.1 inches with rounded edges and corners. The steel for each specimen shall meet the requirements of ASTM A36, "Standard Specifications for Structural Steel".

TXX-4201
06/22/84

Allegation No. 9

It is alleged that three coats of inorganic zinc primer have been applied at Comanche Peak to obtain the required dry film thickness. Paragraph 3.2.4 of Instruction Number QI-QP-11.4.5, Rev. 27, states: "Only two (2) overcoats shall be applied." It is alleged that this system would lack chemical attraction or intercoat adhesion with itself. Is this three coat primer system qualified, for example for environmental (irradiation) conditions and DBA conditions, under ANSI N101.2-1972? This is another example of the coatings systems not being qualified.

Evaluation of Validity

It should be noted that the application of three coats of inorganic zinc primer is fully consistent with QI-QP-11.4-5. An "overcoat" of primer is a primer coat applied over an existing coat of primer; "two overcoats" would amount to a total of three coats of primer.

CCP-30 and CCP-30A are the two application procedures used at CPSES for Carboline and Ameron inorganic zinc primers, respectively. Both systems described in the two procedures are DBA qualified in accordance with ANSI N101.2 and are in accordance with the manufacturer's recommendations. Multi coats of inorganic zinc have been specifically qualified by both Carboline and Ameron. (See attached Carboline Testing Project 01978.1 and 02182, Ameron Report TRC-089-03, and response to Allegation No. 8).

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

✓ #9

LABORATORY TEST REPORT

Testing Project Number: 01978.1

Date: May 14, 1982

Report # Final Time 7 days

Date of Grading: December 22, 1981

Total Design Test Duration 7 days

Requested by: Mr. D. W. McBride

TITLE: Performance of Carbo Zinc 11 Systems Exposed to 340°F Bechtel CP956-2/76 LOCA Curve.

PURPOSE: The purpose of this testing project is to determine how various Carbo Zinc 11 systems will perform in the upcoming 340°F Bechtel CP956-2/76 LOCA Curve tests at Oak Ridge National Laboratory scheduled for early 1982. The systems to be tested are:

1. 1c Carbo Zinc 11 @ 3 mils
2. 1c Carbo Zinc 11 @ 6 mils
3. 2c Carbo Zinc 11 @ 3/2 mils
4. 3c Carbo Zinc 11 @ 5/2/2 mils
5. 3c Carbo Zinc 11 @ 3/2/2 mils
6. 1c Carbo Weld 11/1c Carbo Zinc 11 @ 1.5/3.0 mils

CONCLUSIONS: Please refer to "Results".

DISCUSSION:

From the Carboline Research & Development Laboratory

The technical data furnished are true and accurate to the best of our knowledge. However, no guarantee of accuracy is given or implied.

carboline

A. Test Coupons

Description: 2x4x1/4 steel panels conforming to Carboline Specification ST1 (See Appendix 1)
Surface Preparation: Gritblasted to SSPC-SP 10-63 with a 1.0-3.0 mil profile.
Abrasive Medium 50/50 mix of GFH #40 grit and S230 shot.
Note: Before priming, the coupons were vapor degreased.

B. Systems Tested

System Number	Coating System	Color	Batch No.	Thinner	Thinning Ratio	Dry Film Thickness Range
1.	1c Carbo Zinc 11	green 0300	A: 1E5640M B: 1E2388Z	#33 1A2473M	10%	3.0-3.3 mils
2.	1c Carbo Zinc 11	green 0300	A: 1E5640M B: 1E2388Z	#33 1A2473M	10%	6.2-7.3 mils
3.	1c Carbo Zinc 11	green 0300	A: 0J5543M B: 9E1683Z	#33 0D3885M	12%	3.1-3.4 mils
	1c Carbo Zinc 11	green 0300	A: 1E5640M B: 1E2388Z	#33 1F0964M	50%	1.6-2.8 mils
4.	1c Carbo Zinc 11	green 0300	A: 1E5640M B: 1E2388Z	#33 1A2473M	10%	6.4-7.0 mils
	1c Carbo Zinc 11	green 0300	A: 1E5640M B: 1E2388Z	#33 1A2473M	50%	1.9-2.5 mils
	1c Carbo Zinc 11	green 0300	A: 1E5640M B: 1E2388Z	#33 1A2473M	50%	3.5 mils
5.	1c Carbo Zinc 11	green 0300	A: 0J5543M B: 9E1683Z	#33 0D3885M	12%	2.8-3.3 mils
	1c Carbo Zinc 11	green 0300	A: 1E5640M B: 1E2388Z	#33 1F0964M	50%	1.6-2.0 mils
	1c Carbo Zinc 11	green 0300	A: 1E5640M B: 1E2388Z	#33 1F0964M	50%	1.7-2.0 mils
6.	1c Carbo Weld 11	gray 0700	A: 0M2879M B: 1E2388Z	#33 1A2473M	5%	1.7 mils
	1c Carbo Zinc 11	green 0300	A: 1E5640M B: 1E2388Z	#33 1A2473M	50%	3.0-3.5 mils

C. Cure Schedule

System Number	Coating System	Time	Temperature Range	Humidity Range
1.	1c Carbo Zinc 11	2 months, 2 weeks	22-83°F	21-97%
2.	1c Carbo Zinc 11	2 months, 2 weeks	22-83°F	21-97%
3.	1c Carbo Zinc 11	7 months, 12 days	21-91°F	10-97%
	1c Carbo Zinc 11	2 months, 16 days	22-83°F	21-97%
4.	1c Carbo Zinc 11	1 month	26-86°F	21-97%
	1c Carbo Zinc 11	24 hours	70-76°F	39-41%
	1c Carbo Zinc 11	34 days	22-69°F	28-97%
5.	1c Carbo Zinc 11	7 months, 12 days	21-91°F	10-97%
	1c Carbo Zinc 11	24 hours	75-79°F	55-60%
	1c Carbo Zinc 11	2 months, 15 days	22-83°F	21-97%
6.	1c Carbo Weld 11	2 weeks	28-69°F	29-97%
	1c Carbo Zinc 11	20 days	22-68°F	28-97%

D. Exposure

Bechtel CP956 (2/76) LOCA Curve
1. Time-Temperature-Pressure Curve

Time	Temperature*	Pressure*
Initial	Ambient	Ambient
Initial to 6 hours	340°F (171°C)	70 psig
6 hours to 96 hours	250°F (121°C)	30 psig
96 hours to 7 days	200°F (93°C)	10 psig

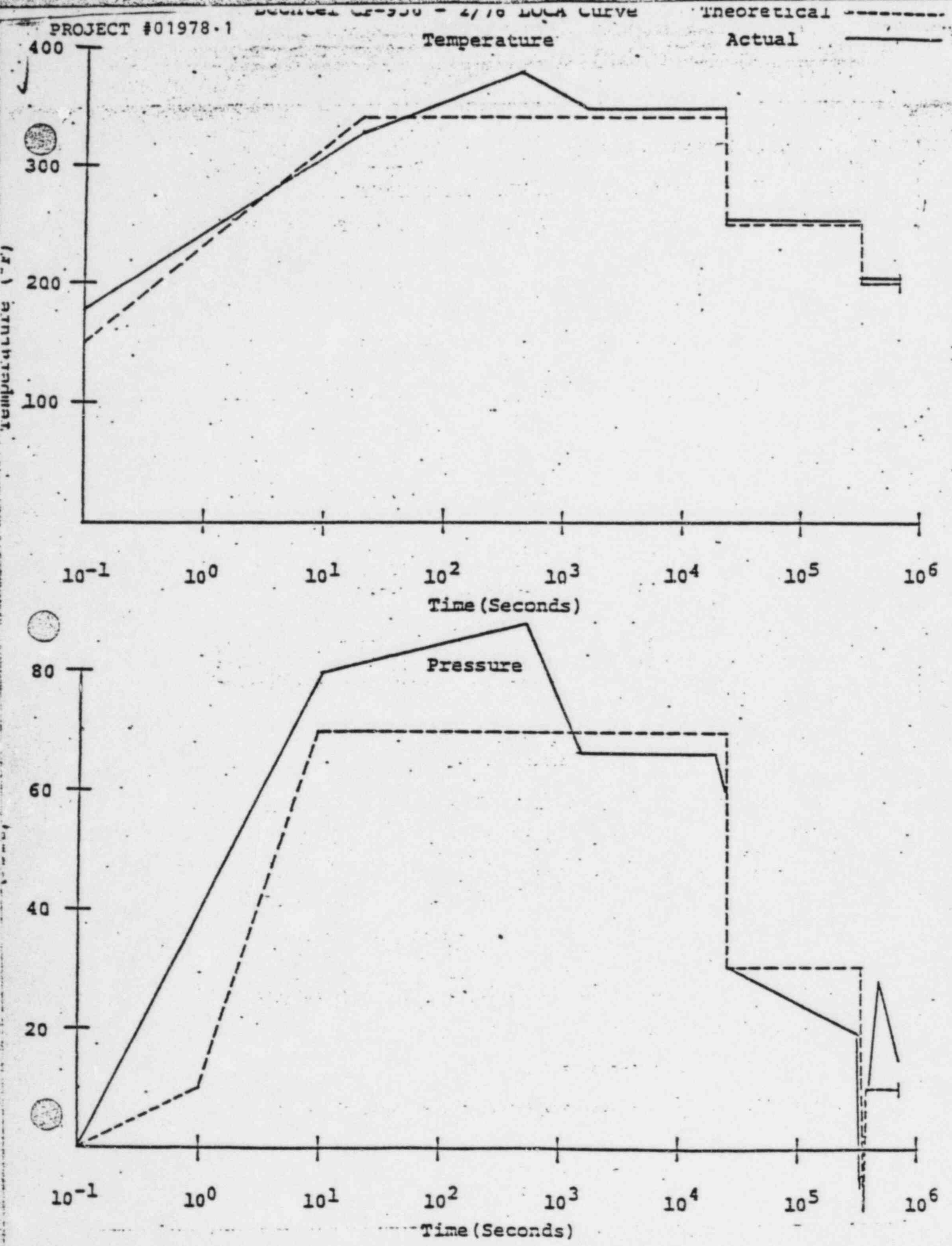
*These are theoretical values. The next page are graphs of the theoretical and actual LOCA temperature and pressure curves. The data for the actual LOCA curves are from the chart recording for this test, found on page 97, Lab Book #230.

2. Water Chemistry

Deionized water pH = 7.[illegible]

Note: All test panels were suspended in the vapor phase of test.

PROJECT #01978·1



LOCA Grading Procedure
(ASTM D3911-80

The test coupons are examined and evaluated within 4 hours after removal from the test chamber for the following coating defects:

Delamination - report extent
Cracking - report extent
Peeling - report extent
Blistering - report in accordance with ASTM Method D714

Key to Symbols in Results

B-blistering
CD-coating discoloration
F-few

RESULTS:

Panel Identification and Coating System	Dry Film Thickness (mils)	Delamination	Cracking	Peeling	Blistering	Other Performance Characteristics
1A; Side A 1c Carbo Zinc 11	3.0	none	none	none	none	CD
1A; Side B 1c Carbo Zinc 11	3.3	none	none	none	none	CD
2A; Side A 1c Carbo Zinc 11	7.3	none	none	none	none	CD
2A; Side B 1c Carbo Zinc 11	6.2	none	none	none	none	CD
3A; Side A 1c Carbo Zinc 11 1c Carbo Zinc 11	3.4 1.6 5.0	none	none	none	none	CD
3A; Side B 1c Carbo Zinc 11 1c Carbo Zinc 11	3.3 2.6 5.9	none	none	none	none	CD
3B; Side A 1c Carbo Zinc 11 1c Carbo Zinc 11	3.2 2.8 6.0	none	none	none	none	CD
3B; Side B 1c Carbo Zinc 11 1c Carbo Zinc 11	3.1 2.0 5.1	none	none	none	none	CD

ESULTS:

nel Identification nd Coating System	Dry Film Thickness (mils)	Delamination	Cracking	Peeling	Blistering	Other Performance Characteristics
A; Side A						
1c Carbo Zinc 11	6.4	none	none	none	none	CD
1c Carbo Zinc 11	1.9					
1c Carbo Zinc 11	3.5					
	11.8					
A; Side B						
1c Carbo Zinc 11	7.0	From edge spreading 1/2" onto plane area.	none	none	none	CD
1c Carbo Zinc 11	2.5					
1c Carbo Zinc 11	3.5					
	13.0					
A; Side A						
1c Carbo Zinc 11	3.0	none	none	none	none	CD
1c Carbo Zinc 11	1.6					
1c Carbo Zinc 11	2.0					
	6.6					
A; Side B						
1c Carbo Zinc 11	3.3	none	none	none	none	CD
1c Carbo Zinc 11	1.7					
1c Carbo Zinc 11	2.0					
	7.0					
B; Side A						
1c Carbo Zinc 11	3.1	none	none	none	none	CD
1c Carbo Zinc 11	2.0					
1c Carbo Zinc 11	1.7					
	6.8					

SULTS:

el Identification Coating System	Dry Film Thickness (mils)	Delamination	Cracking	Peeling	Blistering	Other Performance Characteristics
; Side B						
1c Carbo Zinc 11	2.8	none	none	none	#2F-B	CD
1c Carbo Zinc 11	2.0					
1c Carbo Zinc 11	2.0					
	6.8					
; Side A						
1c Carbo Weld 11	1.7	none	none	none	none	CD
1c Carbo Zinc 11	3.0					
	4.7					
; Side B						
1c Carbo Weld 11	1.7	From edge	none	none	none	CD
1c Carbo Zinc 11	3.5	spreading 1/2"				
	5.2	onto plane				

Robert M. Reals
Lab Technician
Testing Department

Yuly Korobov
Supervisor
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bic/T.P. 01978.1/
052682

cc: S. Lopata/D. Porthouse/J. Montle/E. Skiles/
S. Steinberg/C. Henson/D. McBride/
M. Dugan/Group Leaders

APPENDIX 1

Carboline Specification CB1

Preparation of Concrete Specimens:

Concrete Composition

Cement, ASTM C150, Type II. Low alkali
Gravel, ASTM C33, size 3/8 inch
Sand, ASTM C33
Water reducing admixture, ASTM C494
Air entraining admixture, ASTM C260
Pozzolans, ASTM C618
Water - Demineralized or distilled water

Concrete Proportions

Cement, 7 sacks per cubic yard
Sand-Gravel ratio, 55 sand, 45 gravel by volume
Pozzolans, to 15 percent replacement of cement
Air entraining admixture, 4-7 percent
Water reducing admixture, as per manufacturer's instructions
Water, to produce a 3 inch slump

Preparation of Test Specimen:

Make and cure the specimen according to ASTM C192, except that no form oils may be used. The face to be tested shall be composed to the form to simulate poured walls and the wood troweled surfaces: Broom finish top surface to simulate floors. No test face shall be saw cut. When applicable, concrete curing agents compatible with the coating system shall be used.

Panels:

The size for concrete panels shall be 2 by 4 inches by 2 inches thick ± 0.2 inches.

Curing Time:

Before concrete specimens are coated, they shall be cured a minimum of 28 days in accordance with ACI 301, "Specifications for Structural Concrete for Buildings." If a concrete curing primer is used, it shall be applied on the concrete within 24 hours after removal of the forms.

Carboline Specification ST1

Steel Test Specimens

Panels: The size for carbon steel panels shall be 2 by 4 inches by ¼ inch thick ± 0.1 inches with rounded edges and corners. The steel for each specimen shall meet the requirements of ASTM A36, "Standard Specifications for Structural Steel".

#03182

Manufacturer: Carboline

St. Louis, MO

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 10/27/83

REPORT OF IRRADIATION AND DBA TESTING

The irradiation test is conducted in accordance with American Society for Testing and Materials (ASTM) Standard Method D4082-83. The design basis accident (DBA) test is performed in accordance with ASTM Standard Method D3911-80. The tests are designed to meet specifications set in both ANSI report N101.2-1972, Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities, and N5.12-1974, Protective Coatings (Paints) for the Nuclear Industry. The DBA test spray solution was distilled water. The test conditions are listed in Table 1. After both the DBA and irradiation tests, 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 at ORNL, as the source of radiation. These fuel assemblies are stored under 20 ft 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 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 1×10^8 rad/h.

The fuel assembly is 20 in. high. A 20-ft-long, 3-1/2-in.-diameter pipe, with one end capped, is used for air irradiation tests. The capped end is lowered into a 4-in. opening at the center of the fuel assembly. The open end, above 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. 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 D Burtschell

Approved W R Laing

Manufacturer: Carboline

St. Louis, MO

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 10/23/83

ORNL Log Book No. A9675, A10/20/3

Table 1. DBA test conditions

Time	Temperature (°F)	Pressure (psig)	Comments
Start	170		Autoclave preheated.
20 s	340	70 (10 s)	Steam injected.
5 min 50 s	340	70	Steam turned off.
6 h	340	70	Pressure maintained by relief valve.
20 s	220	30	Spray solution added at 75°F.
15 min	220-250	30	Pressure adjusted with N_2.
4 d	250	30	
20 s	180	-15	Fresh spray solution added at 75°F after draining autoclave.
10 min	180-200	10	
3 d	200	10	
End of test			

Evaluated R O Scott [signature]

Approved W R Laing [signature]

Manufacturer: Carboline

St. Louis, MO

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 10/27/83

Carboline Testing Project #02182

SYSTEM IDENTIFICATION x Steel panel ____ Concrete block

1c Carbo Zinc 11

RADIATION TOLERANCE TEST

ORNL Master Analytical Manual Method No. 2 0921; ASTM Standard Method D4082-83; ORNL Log Book No. A9675, A10-13-3.

Initial dose rate: 1.35×10^7 rad/h

Test conducted in: x air ____ water

Sample No.	Dry Film thickness (mils)*	Cumulative dose	Test results
1	2.5	1.0×10^9 rads	Coating intact, no defects.
2	2.6	1.0×10^9 rads	Coating intact, no defects.
3	2.8	1.0×10^9 rads	Coating intact, no defects.
4	2.8	1.0×10^9 rads	Coating intact, no defects.
9	3.8	1.0×10^9 rads	Coating intact, no defects.
10	4.3	1.0×10^9 rads	Coating intact, no defects.
11	4.5	1.0×10^9 rads	Coating intact, no defects.
12	3.8	1.0×10^9 rads	Coating intact, no defects.

*Dry film thickness values provided by Carboline

Evaluated [signature]

Approved [signature]

Manufacturer: Carboline

St. Louis, MO

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 10/27/83

Carboline Testing Project #02182

SYSTEM IDENTIFICATION x Steel panel ___ Concrete block

1c Carbo Zinc 11

RADIATION TOLERANCE TEST

ORNL Master Analytical Manual Method No. 2 0921; ASTM Standard Method D4082-83; ORNL Log Book No. A9675, A10-13-3.

Initial dose rate: 1.35×10^7 rad/h

Test conducted in: x air ___ water

Sample No.	Dry Film thickness (mils)*	Cumulative dose	Test results
17	5.8	1.0×10^9 rads	Coating intact, no defects.
18	5.5	1.0×10^9 rads	Coating intact, no defects.
19	6.0	1.0×10^9 rads	Coating intact, no defects.
20	5.8	1.0×10^9 rads	Coating intact, no defects.

*Dry film thickness values provided by Carboline

Evaluated P. D. Brodhak

Approved WR Laing

Manufacturer: Carboline

St. Louis, MO

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 10/27/83

Carboline Testing Project #02182

SYSTEM IDENTIFICATION   x Steel panel   ___ Concrete block

2c Carbo Zinc 11

RADIATION TOLERANCE TEST

ORNL Master Analytical Manual Method No. 2 0921; ASTM Standard Method D4082-83; ORNL Log Book No. A9675, A10-13-3.

Initial dose rate: 1.35×10^7 rad/h

Test conducted in: x air ___ water

Sample No.	Dry Film thickness (mils)*	Cumulative dose	Test results
25	2.1/3.1	1.0×10^9 rads	Coating intact, no defects.
26	2.3/3.2	1.0×10^9 rads	Coating intact, no defects.
27	2.4/3.4	1.0×10^9 rads	Coating intact, no defects.
28	2.4/2.9	1.0×10^9 rads	Coating intact, no defects.
33	3.0/2.3	1.0×10^9 rads	Coating intact, no defects.
34	3.0/2.0	1.0×10^9 rads	Coating intact, no defects.
35	3.0/2.7	1.0×10^9 rads	Coating intact, no defects.
36	3.0/2.7	1.0×10^9 rads	Coating intact, no defects.

*Dry film thickness values provided by Carboline

Evaluated [signature]

Approved [signature]

Manufacturer: Carboline

St. Louis, MO

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 10/27/83

Carboline Testing Project #02182

SYSTEM IDENTIFICATION x Steel panel ____ Concrete block

1c Carbo Zinc 11

DBA TEST

ORNL Master Analytical Manual Method No. 2 0922.
ORNL Log Book No. A9675, A10-20-3.

Sample No.	Dry Film Thickness (mils)*	DBA phase	Test results
**1	2.5	Spray	Coating intact, no defects except discoloration
**2	2.6	Spray	Coating intact, no defects except discoloration
**3	2.8	Spray	Coating intact, no defects except discoloration
**4	2.8	Spray	Coating intact, no defects except discoloration
5	2.7	Spray	Coating intact, no defects except discoloration
6	2.3	Spray	Coating intact, no defects except discoloration
7	2.5	Spray	Coating intact, no defects except discoloration
8	2.6	Spray	Coating intact, no defects except discoloration

*Dry film thickness values provided by Carboline
**Irradiated

Evaluated R D Barksdale

Approved W R Laing

Manufacturer: Carboline

St. Louis, MO

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 10/27/83

Carboline Testing Project #02182

SYSTEM IDENTIFICATION   x Steel panel   ___ Concrete block

1c Carbo Zinc 11

DBA TEST

ORNL Master Analytical Manual Method No. 2 0922.
ORNL Log Book No. A9675, A10-20-3.

Sample No.	Dry Film Thickness (mils)*	DBA phase	Test results
**9	3.8	Spray	Coating intact, no defects except discoloration
**10	4.3	Spray	Coating intact, no defects except discoloration
**11	4.5	Spray	Coating intact, no defects except discoloration
**12	3.8	Spray	Coating intact, no defects except discoloration
13	4.3	Spray	Coating intact, no defects except discoloration
14	3.8	Spray	Coating intact, no defects except discoloration
15	3.8	Spray	Coating intact, no defects except discoloration
16	3.8	Spray	Coating intact, no defects except discoloration

*Dry film thickness values provided by Carboline
**Irradiated

Evaluated P D Brickstead

Approved W R Laing

Manufacturer: Carboline

St. Louis, MO

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 10/27/83

Carboline Testing Project #02182

SYSTEM IDENTIFICATION   x Steel panel   ____ Concrete block

1c Carbo Zinc 11

DBA TEST

ORNL Master Analytical Manual Method No. 2 0922.
ORNL Log Book No. A9675, A10-20-3.

Sample No.	Dry Film Thickness (mils)*	DBA phase	Test results
**17	5.8	Spray	Coating intact, no defects except discoloration
**18	5.5	Spray	Coating intact, no defects except discoloration
**19	6.0	Spray	Coating intact, no defects except discoloration
**20	5.8	Spray	Coating intact, no defects except discoloration
21	5.8	Spray	Coating intact, no defects except discoloration
22	6.0	Spray	Coating intact, no defects except discoloration
23	5.5	Spray	Coating intact, no defects except discoloration
24	5.8	Spray	Coating intact, no defects except discoloration

*Dry film thickness values provided by Carboline
**Irradiated

Evaluated R.O. Berlesbaile

Approved W.R. Laing

Manufacturer: Carboline

St. Louis, MO

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 10/27/83

Carboline Testing Project #02182

SYSTEM IDENTIFICATION   x Steel panel   ___ Concrete block

2c Carbo Zinc 11

DBA TEST

ORNL Master Analytical Manual Method No. 2 0922.
ORNL Log Book No. A9675, A10-20-3.

Sample No.	Dry Film Thickness (mils)*	DBA phase	Test results
**25	2.1/3.1	Spray	Coating intact, no defects except discoloration
**26	2.3/3.2	Spray	Coating intact, no defects except discoloration
**27	2.4/3.4	Spray	Chalking, discoloration
**28	2.4/2.9	Spray	Coating intact, no defects except discoloration
29	2.3/3.2	Spray	Chalking, discoloration
30	2.4/3.1	Spray	Coating intact, no defects except discoloration
31	2.3/3.5	Spray	Coating intact, no defects except discoloration
32	2.4/3.1	Spray	Coating intact, no defects except discoloration

*Dry film thickness values provided by Carboline
**Irradiated

Evaluated E.W. Brockstock

Approved W.R. Laing

Manufacturer: Carboline

St. Louis, MO

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: 10/27/83

Carboline Testing Project #02182

SYSTEM IDENTIFICATION x Steel panel ____ Concrete block

2c Carbo Zinc 11

DBA TEST

ORNL Master Analytical Manual Method No. 2 0922.
ORNL Log Book No. A9675, A10-20-3.

Sample No.	Dry Film Thickness (mils)*	DBA phase	Test results
**33	3.0/2.3	Spray	Chalking, discoloration
**34	3.0/2.0	Spray	Chalking, discoloration
**35	3.0/2.7	Spray	Coating intact, no defects except discoloration
**36	3.0/2.7	Spray	Coating intact, no defects except discoloration
37	3.0/2.3	Spray	Coating intact, no defects except discoloration
38	3.0/2.3	Spray	Coating intact, no defects except discoloration
39	3.0/3.0	Spray	Coating intact, no defects except discoloration
40	2.8/2.5	Spray	Coating intact, no defects except discoloration

*Dry film thickness values provided by Carboline
**Irradiated

Evaluated [signature]

Approved [signature]

carboline

350 HANLEY INDUSTRIAL CT., ST. LOUIS, MO 63144

TEST PANEL PREPARATION DATA

Testing Project #02182

Coating System: 1c Carbo Zinc 11

Substrate Type: Steel, Certified ST1 Surface Prep.: SSPC-SP10-63

For: DBA x Radiation x Decon ___ Physical ___ Chemical ___ Other: ________

I. Coating System

1c Carbo Zinc 11 at 2.0-3.0 Mils DFT
at ____ Mils DFT
at ____ Mils DFT
at ____ Mils DFT
at ____ Mils DFT
Total ____ Mils DFT

II. Batch Numbers

Product	Part A	Part B
CZ 11	3C0841M	3F5182Z

III. Application Criteria

Specimen Number	Product	Side	Date Applied	Method Applied	°F Temp.	% Rel.Hum.	Actual Dry Film Thickness DFT/Coat	Total DFT
1	CZ11	A	8/18/83	Spray	78°	75	2.5	2.5
2		B					2.6	2.6
3		A					2.8	2.8
4		B					2.8	2.8
5		A					2.7	2.7
6		B					2.3	2.3
7		A					2.5	2.5
8		B					2.6	2.6

Issued: November 1, 1983

Submitted by: [signature]
Title: Supervisor, Testing Dept.

jas/110183
test panel prep data 02182

carboline

TEST PANEL PREPARATION DATA

Testing Project #02182

Coating System: 1c Carbo Zinc 11

Substrate Type: Steel, Certified ST1 Surface Prep.: SSPC-SP10-63

For: DBA x Radiation x Decon ___ Physical ___ Chemical ___ Other: ________

I. Coating System

1c Carbo Zinc 11 at 3.0-5.0 Mils DFT
________ at ______ Mils DFT
________ at ______ Mils DFT
________ at ______ Mils DFT
________ at ______ Mils DFT
Total ______ Mils DFT

II. Batch Numbers

Product CZ 11 Part A 3C0841M Part B 3F5182Z
Product ______ Part A ______ Part B ______
Product ______ Part A ______ Part B ______
Product ______ Part A ______ Part B ______
Product ______ Part A ______ Part B ______

III. Application Criteria

Specimen Number	Product	Side	Date Applied	Method Applied	°F Temp.	% Rel.Hum.	Actual Dry Film Thickness DFT/Coat	Total DFT
9	CZ11	A	8/17/83	Spray	86°	50	3.8	3.8
10		B					4.3	4.3
11		A					4.5	4.5
12		B					3.8	3.8
13		A					4.3	4.3
14		B					3.8	3.8
15		A					3.8	3.8
16		B					3.8	3.8

Issued: November 1, 1983

Submitted by: Vicky Volokov
Title: Supervisor, Testing Dept.

Sheet 2 of 7

jas/110183
test panel prep data 02182

carboline
350 HANLEY INDUSTRIAL CT. ST LOUIS, MO 63144

TEST PANEL PREPARATION DATA

Testing Project #02182

Coating System: 1c Carbo Zinc 11

Substrate Type: Steel, Certified ST1 Surface Prep.: SSPC-SP10-63

For: DBA x Radiation x Decon ___ Physical ___ Chemical ___ Other: ______

I. Coating System

1c Carbo Zinc 11 at 5.0-7.0 Mils DFT
______ at ______ Mils DFT
______ at ______ Mils DFT
______ at ______ Mils DFT
______ at ______ Mils DFT
Total ______ Mils DFT

II. Batch Numbers

Product CZ 11 Part A 3C0841M Part B 3F5182Z
Product ______ Part A ______ Part B ______
Product ______ Part A ______ Part B ______
Product ______ Part A ______ Part B ______
Product ______ Part A ______ Part B ______

III. Application Criteria

Specimen Number	Product	Side	Date Applied	Method Applied	°F Temp.	% Rel.Hum.	Actual Dry Film Thickness DFT/Coat	Total DFT
17	CZ11	A	8/18/83	Spray	78°	75	5.8	5.8
18		B					5.5	5.5
19		A					6.0	6.0
20		B					5.8	5.8
21		A					5.8	5.8
22		B					6.0	6.0
23		A					5.5	5.5
24		B					5.8	5.8

Issued: November 1, 1983

Submitted by: Lily Voronov
Title: Supervisor, Testing Dept.

jas/110183
test panel prep data 02182

carboline
350 Hanley Industrial Ct. St Louis MO 63144

TEST PANEL PREPARATION DATA

Testing Project #02182

Coating System: 2c Carbo Zinc 11

Substrate Type: Steel, Certified ST1 Surface Prep.: SSPC-SP10-63

For: DBA x Radiation x Decon ___ Physical ___ Chemical ___ Other: ______

I. Coating System

1st coat Carbo Zinc 11 at 2.1-2.4 Mils DFT
2nd coat Carbo Zinc 11 at 2.9-3.5 Mils DFT
______ at ______ Mils DFT
______ at ______ Mils DFT
______ at ______ Mils DFT
Total ______ Mils DFT

II. Batch Numbers

Product CZ 11 Part A 3C0841M Part B 3F5182Z
Product CZ 11 Part A 3C0841M Part B 3F5182Z
Product ______ Part A ______ Part B ______
Product ______ Part A ______ Part B ______
Product ______ Part A ______ Part B ______

III. Application Criteria

Specimen Number	Product	Side	Date Applied	Method Applied	°F Temp.	% Rel.Hum.	Actual Dry Film Thickness DFT/Coat	Actual Dry Film Thickness Total DFT
25	CZ11	A	8/18/83	Spray	78°	75	2.1	2.1
26		B					2.3	2.3
27		A					2.4	2.4
28		B					2.4	2.4
25	CZ11	A	8/19/83	Spray	86	54	3.1	5.2
26		B					3.2	5.5
27		A					3.4	5.8
28		B					2.9	5.3

Issued: November 1, 1983

Submitted by: Yoly Koerlov
Title: Supervisor, Testing Dept.

jas/110183
test panel prep data 02182

carboline

TEST PANEL PREPARATION DATA

Testing Project #02182

Coating System: 2c Carbo Zinc 11

Substrate Type: Steel, Certified ST1 Surface Prep.: SSPC-SP10-63

For: DBA x Radiation x Decon ___ Physical ___ Chemical ___ Other: ______

I. Coating System

1st coat Carbo Zinc 11 at 2.1-2.4 Mils DFT
2nd coat Carbo Zinc 11 at 2.9-3.5 Mils DFT
______ at ______ Mils DFT
______ at ______ Mils DFT
______ at ______ Mils DFT
Total ______ Mils DFT

II. Batch Numbers

Product CZ 11 Part A 3C0841M Part B 3F5182Z
Product CZ 11 Part A 3C0841M Part B 3F5182Z
Product ______ Part A ______ Part B ______
Product ______ Part A ______ Part B ______
Product ______ Part A ______ Part B ______

III. Application Criteria

Specimen Number	Product	Side	Date Applied	Method Applied	°F Temp.	% Rel.Hum.	Actual Dry Film Thickness DFT/Coat	Actual Dry Film Thickness Total DFT
29	CZ11	A	8/18/83	Spray	78	75	2.3	2.3
30		B					2.4	2.4
31		A					2.3	2.3
32		B					2.4	2.4
29	CZ11	A	8/19/83	Spray	86	54	3.2	5.5
30		B					3.1	5.5
31		A					3.5	5.8
32		B					3.1	5.5

Issued: November 1, 1983

Submitted by: Yulg Kozobov
Title: Supervisor, Testing Dept.

Sheet 5 of 7

jas/110183
test panel prep data 02182

carboline

TEST PANEL PREPARATION DATA

Testing Project #02182

Coating System: 2c Carbo Zinc 11

Substrate Type: Steel, Certified ST1   Surface Prep.: SSPC-SP10-63

For: DBA x Radiation x Decon __ Physical __ Chemical __ Other: ____

I. Coating System

1st coat Carbo Zinc 11	at	2.8-3.0	Mils DFT
2nd coat Carbo Zinc 11	at	2.0-3.0	Mils DFT
	at		Mils DFT
	at		Mils DFT
	at		Mils DFT
Total			Mils DFT

II. Batch Numbers

Product CZ 11	Part A 3C0841M	Part B 3F5182Z
Product CZ 11	Part A 3C0841M	Part B 3F5182Z
Product	Part A	Part B
Product	Part A	Part B
Product	Part A	Part B

III. Application Criteria

Specimen Number	Product	Side	Date Applied	Method Applied	°F Temp.	% Rel.Hum.	Actual Dry Film Thickness DFT/Coat	Total DFT
33	CZ11	A	8/17/83	Spray	86	50	3.0	3.0
34		B					3.0	3.0
35		A					3.0	3.0
36		B					3.0	3.0
33	CZ11	A	8/19/83	Spray	86	54	2.3	5.3
34		B					2.0	5.0
35		A					2.7	5.7
36		B					2.7	5.7

Issued: November 1, 1983

Submitted by: Kuly Lewton

Title: Supervisor, Testing Dept.

Sheet 6 of 7

jas/110183
test panel prep data 02182

carboline
350 HANLEY INDUSTRIAL CT. ST LOUIS MO 63144

TEST PANEL PREPARATION DATA

Testing Project #02182

Coating System: 2c Carbo Zinc 11

Substrate Type: Steel, Certified ST1 Surface Prep.: SSPC-SP10-63

For: DBA x Radiation x Decon __ Physical __ Chemical __ Other: ____

I. Coating System

1st coat Carbo Zinc 11 at 2.8-3.0 Mils DFT
2nd coat Carbo Zinc 11 at 2.0-3.0 Mils DFT
at ___ Mils DFT
at ___ Mils DFT
at ___ Mils DFT
Total ___ Mils DFT

II. Batch Numbers

Product	Part A	Part B
CZ 11	3C0841M	3F5182Z
CZ 11	3C0841M	3F5182Z

III. Application Criteria

Specimen Number	Product	Side	Date Applied	Method Applied	°F Temp.	% Rel.Hum.	Actual Dry Film Thickness DFT/Coat	Total DFT
37	CZ11	A	8/17/83	Spray	86	50	3.0	3.0
38		B					3.0	3.0
39		A					3.0	3.0
40		B					2.8	2.8
37	CZ11	A	8/19/83	Spray	86	54	2.3	5.3
38		B					2.3	5.3
39		A					3.0	6.0
40		B					2.5	5.3

Issued: November 1, 1983

Submitted by: Wally Vordvorv
Title: Supervisor, Testing Dept.

Sheet 7 of 7

jas/110183
test panel prep data 02182

carboline

350 HANLEY INDUSTRIAL CT. ST LOUIS, MO 63144

SURFACE PREP AND CURE DATA FOR TESTING PROJECT 02182

2"x4"x¼" certified ASTM A36 Steel

Surface Preparation: gritblasted to SSPC-SP10-82 with a 2.0-3.0 mil profile

Abrasive Medium: 50/50 mix of GFH #40 grit and S230 shot.

CURE DATA

Coatings	Cure Time	Temperature Range	Humidity Range
1c CZ 11 @ 2.0-3.0 mils	30 days	80°F (27°C)	80%
1c CZ 11 @ 3.0-5.0 mils	30 days	80°F (27°C)	80%
1c CZ 11 @ 5.0-7.0 mils	30 days	80°F (27°C)	80%
2c CZ 11 @ 2.0/3.0 mils	First Coat:		
	24 hours	74-86°F (23-30°C)	53-78%
	2nd Coat:		
	30 days	80°F (27°C)	80%
2c CZ 11 @ 3.0/2.0 mils	First Coat:		
	48 hours	74-86°F (23-30°C)	50-78%
	2nd Coat:		
	30 days	80°F (27°C)	80%

All CZ11 panels were cured in Thermotron Environmental Chamber at 80°F, 80% R.H. In addition, panels remained in ambient room conditions a few days at Carboline plus additional time at ORNL prior to testing.

jas/042784
Surface Prep/Cure Data TP02182

carboline

PRODUCT IDENTIFICATION

Product Name Carbo Zinc Product Number 11

Generic Description Inorganic Zinc Primer

Weight Per Gallon	Part A Base	Range From 8.7 Green / 8.6 Grey	To 9.1 Green / 9.0 Grey		
	Part B Zinc	Range From N/A	To N/A		
	Part C N/A	Range From N/A	To N/A		
Viscosity Brookfield (list method) 75 ± 2°F	Part A - Range From 100	To 300 cps			
	Part B - Range From N/A	To N/A			
	Part C - Range From N/A	To N/A			
Total Solids	Part A - 35 ± 3 % Weight	N/A % Volume			
	Part B - 100 % Weight	100 % Volume			
	Part C - N/A % Weight	N/A % Volume			
Flash Point D-93-73 ASTM	Part A	- 56 °F			
	Part B	- Powder °F			
	Part C	- N/A °F			
	Mixed Components	- N/A °F			
Mixing Ratio	Part A 100 By Weight	N/A By Volume			
	Part B 220 By Weight	N/A By Volume			
	Part C N/A By Weight	N/A By Volume			

Recoat Time at 50% R.H.		Full Cure Time	
at 40°F	36 hrs.	36 hrs.	At 40 °F
at 50°F	24 hrs.	24 hrs.	At 50 °F
at 70°F	12 hrs.	12 hrs.	At 70 °F
at 90°F	8 hrs.	8 hrs.	At 90 °F

Service Temperature Limits Maximum 110** °F Wet 750 °F Dry

Minimum -60 °F Wet -60 °F Dry

Storage Life 12 Months Pot Life - @ 50°F 16 hrs @70°F 8 hrs @90°F 4 hrs

Compressive strength ASTM C-579-68	7 days @ 70°F	N/A
Tensile strength ASTM C-307-61	7 days @ 73°F	N/A
Modulus of Elasticity ASTM C-580-74	7 days @ 73°F	N/A
Flexural strength ASTM C-580-74	7 days @ 73°F	N/A
Initial set time ASTM C-308-71	@ 73°F	N/A

**Continuous Immersion Service

Date 5/4/84 Approved Michael J Hasse Test Report No. N/A

TS- 06376-2

carboline

PRODUCT IDENTITY AND QUALITY ASSURANCE CERTIFICATION RECORD

PURCHASER Carboline Company

CUSTOMER P.O. #

CARBOLINE INVOICE # 17544

"SHIP TO" ADDRESS 350 Hanley Ind Ct St Louis, Mo 63144

ATTENTION Robb Reals

NAME OF PROJECT

PRODUCT NAME & NUMBER: Carbo Zinc 11

GENERIC TYPE: Inorganic Zinc

COMPONENT: Base

FORMULATION AND TEST DATA

	STANDARD	BATCH
Batch Number	N/A	3C0841M
Date of Manufacture	N/A	March 1983
Shelf Life	12 Months	3-84 Exp. Date
Weight Per Gallon (FTMS 141a, 4184)	8.5-9.3 lbs.	8.95 lbs.
Viscosity - Method	Brookfield	Brookfield
Viscosity	150-250 cps	162 cps
Temperature	75 ± 2°F	75 °F
Color - Visual	Depends on Order	GREEN
Number	N/A	0300

This Batch Tested By--Initial/Date D.J. 4/27/83

MIXED MATERIAL FORMULATION DATA

Mixing Ratio by Weight 100 Parts Base to 220 Parts Zinc Filler

THEORETICAL COVERAGE 1000 mil sq.ft./gal.

Pot Life 8 (minimum) Hours at 75 °F 50 % R.H.

Flash Point—Pensky-Martens Closed Cup (ASTM D-93) (This Component Only) 56 °F

Tack Free Time 1/2 (minimum) Hours at 75 °F 50 % R.H.

Recoat Time 12 (minimum) Hours at 75 °F 50 % R.H.

Final Dry Time 12 (minimum) Hours at 75 °F 50 % R.H.

Specified Carboline Thinner #33 or #21

Recommended Dry Film Thickness Per Coat 2 - 3 Mils

This product is hereby certified as manufactured in accordance with the Carboline Quality Assurance Program. When mixed in accordance with Carboline printed instructions, it is within manufacturing tolerances of the batches originally tested in accordance with ANSI N101.2, ANSI N101.4 and ANSI 512.

Q.A./Q.C. Supervisor Signature: John Pitschel Date: 5-2-83

Production Services Department--Signature: Werner F. Brenner

Title: Inspector 5-4-83

Form Date 6/18/80

Approval John F Mutte

QB 61380 4

carboline

PRODUCT IDENTITY AND QUALITY ASSURANCE CERTIFICATION RECORD

PURCHASER Carboline Co

"SHIP TO" ADDRESS 350 Hanley Ind. CT.
St. Louis, Mo 63144

ATTENTION Susan Hayman

NAME OF PROJECT

CUSTOMER P.O. # —

CARBOLINE INVOICE # 31749

FILLER NAME & NUMBER / GENERIC TYPE: Carboline Zinc Filler / Zinc Dust

FORMULATION AND TEST DATA

		STANDARD	BATCH
Batch Number		N/A	3F5182Z
Date of Manufacture		N/A	June 1983
Shelf Life		24 Months	6/85 Exp. Da
Color - Visual		Metallic Gray	Metallic Gray
Sieve Analysis	325 mesh	5% Maximum Retained	1.5% Retained
(QCT# 127)	100 mesh	99.9% Minimum Through	100% Through
This Batch Tested By—Initial/Date			DL / 7-15-83

Mixing Ratio: See Liquid Component Product Identity Certifications or Application Instructions.

This product is hereby certified as manufactured in accordance with the Carboline Quality Assurance Program. When used in accordance with Carboline printed instructions, it is within manufacturing tolerances of the batches originally tested in accordance with ANSI N101.2, ANSI N101.4 and ANSI 512.

Q.A./Q.C. ~~Supervisor~~ Inspector
Signature: Denver F Brannan Date: 7-14-83

Production Services Department—Signature: [signature]

Title: Inspector 8/11/83

Form Date 4/28/81

Approval John F[illegible]

QB 42881-1

OAK RIDGE NATIONAL LABORATORY
OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 331

May 2, 1984

Mr. Tom Aldinger
M&QS
Bechtel Group, Inc.
50 Beale Street
P. O. Box 3965
San Francisco, CA 94119

Dear Tom:

This is in response to my phone conversations with Mr. Yuly Korobov and yourself concerning Carboline Testing Project #02182 and your request for clarification of our comments on samples 27, 29, 33 and 34. The comments read "chalking, discoloration". The discoloration occurred on all samples in this test; the color changed from green to dark gray. The chalking as reported for the above samples was not excessive and indicates that some material could be removed from the samples by wiping with a cloth.

If there are any questions or we can be of further service, please call on us.

Sincerely,

R D Brooksbank
R. D. Brooksbank
Chemist

RDB:lp

cc: Yuly Korobov

TESTING PROJECT: 02182

Sample No.	DFT Before	DFT After
1	2.5	2.5
2	2.6	2.6
3	2.8	2.8
4	2.8	2.8
5	2.7	2.3
6	2.3	3.0
7	2.5	2.9
8	2.6	2.3
9	3.8	3.4
10	4.3	3.3
11	4.5	3.3
12	3.8	3.3
13	4.3	2.9
14	3.8	3.3
15	3.8	3.1
16	3.8	3.5
17	5.8	7.0
18	5.5	8.0
19	6.0	7.2
20	5.8	8.0
21	5.8	6.7
22	6.0	7.1
23	5.5	8.0
24	5.8	7.8
25	5.2	5.6
26	5.5	7.4
27	5.8	6.0
28	5.3	6.0
29	5.5	5.8
30	5.5	6.3
31	5.8	6.6
32	5.5	6.2
33	5.3	6.3
34	5.0	6.3
35	5.7	6.3
36	5.7	7.2
37	5.3	6.3
38	5.3	6.6
39	6.0	6.2
40	5.3	6.5

201 North Berry Street
Post Office Box 1020
Brea, California 92621
(714) 529-1951 Telex: 655342

Attachment F0

Ameron

Protective Coatings
Division

Date: March 7, 1984

RADIATION AND DBA TESTING
OF DIMETCOTE 6 REPAIRED
AND TOUCHED UP WITH
DIMETCOTE 6

NAME: ____________________

STATEMENT FROM OAK RIDGE

ON PROCEDURES USED IN THEIR EVALUATION

Manufacturer: Bechtel/3M
Saint Paul, Minnesota

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: October 10, 1979

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 1×10^8 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 Ralph L. Apple

Approved L. T. [illegible]

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

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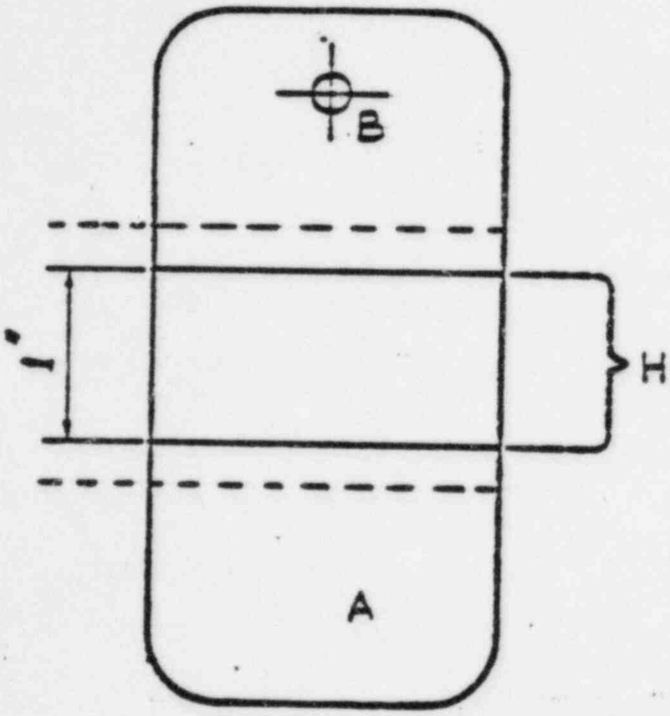
PANEL ID# 811

	COATING MATERIAL	DFT*
A.	Ameron D6N	4.0
B.	Ameron D6N	4.0
T. U.	Ameron D6N	3.1
F.	None	—



1. ABRASIVE BLAST TO SSPC-SP10 WITH A PROFILE FROM 1.5 TO 3.0 MILS.
2. APPLY THE INDICATED PRIMER TO DESIGNATED AREA OF PANEL. (NO PRIMER IS TO BE APPLIED TO CENTER SECTION H.)
3. ALLOW BARE AREA H TO RUST.
4. PHOTOGRAPH PANEL AT THIS POINT.
5. POWER TOOL CLEAN RUSTED AREA OF PANEL USING THE CLEAN AND STRIP WHEEL AND/OR DISC FOLLOWED BY THE ROTO PEEN WHEEL (MANUFACTURED BY 3M COMPANY.)
6. PHOTOGRAPH PANEL AT THIS POINT.
7. COAT THE PREPARED AREA WITH THE INDICATED TOUCH-UP COATING MATERIAL (TU).
8. PHOTOGRAPH PANEL AT THIS POINT.
9. APPLY INDICATED FINISH COAT ONTO AREAS A, B AND H.
10. PHOTOGRAPH PANEL AT THIS POINT.

* ACTUAL - AVERAGE OF TWO OR MORE READINGS

BECHTEL
LOS ANGELES

GEORGIA POWER COMPANY
ALVIN W. VOGTLE NUCLEAR PLANT

DBA REPAIRABILITY TEST PANELS

SCALE:	DRAWING NO.	REV.
JOB NO. 9510	811	

SIZE A 8½ X 11

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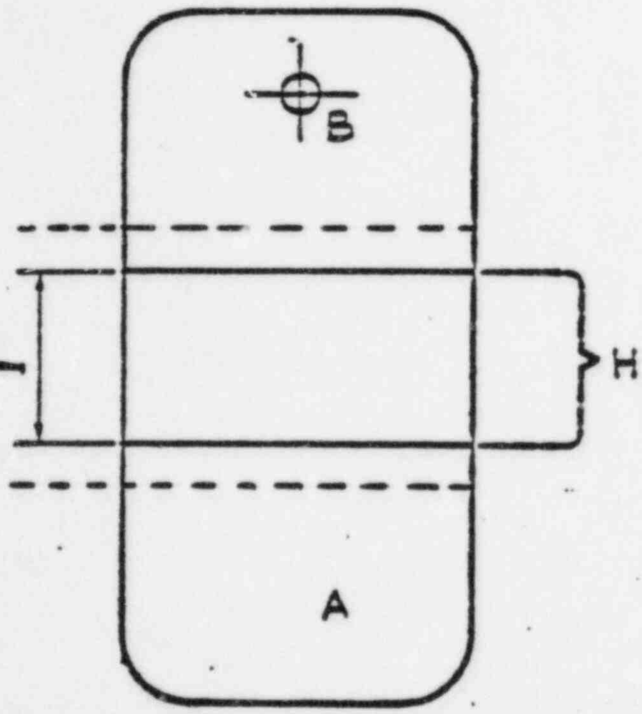
PANEL ID# 831



	COATING MATERIAL	DFT*
A.	Ameron D6N	3.8
B.	Ameron D6N	3.8
T. U.	Ameron D6N	3.2
F.	None	—

1. ABRASIVE BLAST TO SSPC-SP10 WITH A PROFILE FROM 1.5 TO 3.0 MILS.
2. APPLY THE INDICATED PRIMER TO DESIGNATED AREA OF PANEL. (NO PRIMER IS TO BE APPLIED TO CENTER SECTION H.)
3. ALLOW BARE AREA H TO RUST.
4. PHOTOGRAPH PANEL AT THIS POINT.
5. POWER TOOL CLEAN RUSTED AREA OF PANEL USING THE CLEAN AND STRIP WHEEL AND/OR DISC FOLLOWED BY THE ROTO PEEN WHEEL (MANUFACTURED BY 3M COMPANY.)
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9. APPLY INDICATED FINISH COAT ONTO AREAS A, B AND H.
10. PHOTOGRAPH PANEL AT THIS POINT.

* ACTUAL - AVERAGE OF TWO OR MORE READINGS

BECHTEL
LOS ANGELES

GEORGIA POWER COMPANY
ALVIN W. VOGTLE NUCLEAR PLANT

DBA REPAIRABILITY TEST PANELS

NO.	REVISIONS	DATE	BY	CHK.	SUPV	ENG. MGR.	SCALE	DRAWING NO.	REV.
							JOB NO.	831	

SIZE A 8½ x 11

SAMPLE IDENTIFICATION

AND

SPECIFIC TEST DESIGNATION

Sample No.	Primer/Touch-Up	Test Designation
811	Dimetcote 6/Dimetcote 6	Radiation & DBA
821	Dimetcote 6/Dimetcote 6	DBA
831	Dimetcote 6/Dimetcote 6	Radiation & DBA
841	Dimetcote 6/Dimetcote 6	DBA

RADIATION TOLERANCE TEST RESULTS

Manufacturer Bechtel/3M

Saint Paul, Minnesota

Report Number TRC-089-03

Analytical Chemistry Division
Oak Ridge National Laboratory
Date October 10, 1979

System Identification[a] x Steel panel ___ Concrete block

GR - Inorganic Zinc D-6
PT - Inorganic Zinc Touch-Up D-6
No finish

Radiation Tolerance Test Results

ORNL Master Analytical Manual Method No. 2 0921, Bechtel Corp. Spec. No. CP-951
ORNL Log Book No. A 7562; A8-23-9

Initial dose rate 1×10^7 rad/h
Test conducted in x air ___ water

Sample No.	Cumulative dose rate 2×10^8 rads: comments
811	Coatings intact, no defects all areas. 4.0/2.1
831	Coatings intact, no defects all areas. 3.1/3.2

[a]GR = grit blast cleaning; PT = power tool cleaning; SW = solvent wash cleaning.

Evaluated Ralph F. Hesle

Approved L. T. Corbin

DBA TEST RESULTS

Manufacturer Bechtel/3M
Saint Paul, Minnesota
ORNL Log Book No. A7562; A8-31-9

Analytical Chemistry Division
Oak Ridge National Laboratory
Date October 10, 1979

Table 1. DBA solution composition, distilled water

Solution A:	0.28 *M* boric acid (3000 ppm boron)
	Adjusted to pH 10.5 with sodium hydroxide
Solution B:	0.28 *M* boric acid (3000 ppm boron)
	Adjusted to pH 8.5 with sodium hydroxide

Table 2. DBA test conditions[a]

Time	Temperature (°F)	Pressure (psig)	Comments
Start			Autoclave preheated.
10 seconds	307	60	Steam injected.
2 minutes	307	60	
20 seconds	310	60	Spray solution A added at 310°F.
5-minute recovery	310–307	62–60	
64 minutes	307	60	
20 seconds	282	52	Spray solution B added at 250°F after draining autoclave.
5-minute recovery	282–307	60	
167 minutes	307	60	
15 minutes	307–250	30	Temperature and pressure reduced via cooling coil.
4 days	250	30	Pressure adjusted with N_2.
20 seconds	180	–7	Fresh spray solution B added at 75°F after draining autoclave.
15 minutes	180–200	10	Pressure adjusted with N_2.
3 days	200	10	
End of test			

[a]The above data are taken from recorder charts on permanent file at ORNL.

Evaluated Ruel L. Apple

Approved L. T. Corbin

Manufacturer Bechtel/3M

Saint Paul, Minnesota

Report Number TRC-089-03

Analytical Chemistry Division
Oak Ridge National Laboratory
Date October 10, 1979

System Identification[a] x Steel panel ___ Concrete block

GR - Inorganic Zinc
PT - Inorganic Zinc Touch-Up
No finish

DBA Test Results

ORNL Master Analytical Manual Method No. 2 0922
ORNL Log Book No. A 7562; A8-31-9

Sample No.	DBA phase	Comments
811[b]	spray	Coatings intact, no defects all areas.
821	spray	Coatings intact, no defects all areas.
831[b]	spray	Coatings intact, no defects all areas.
841	spray	Coatings intact, no defects all areas.

[a]GR = grit blast cleaning; PT = power tool cleaning; SW = solvent wash cleaning.

[b]Irradiated.

Evaluated Ralph L. Apple

Approved L. T. Corbin

Allegation No. 10

Paragraph 3.2.2.3 of Instruction Number QI-QP-11.4-5, Rev. 27, page 8 of 27, states: "Surfaces that have been power tooled with '3M Clean-N-Strip,' 80 grit or coarser 'flapper wheels,' sanding discs, 'roto peans,' or equivalent to provide acceptable surface profile. It has been alleged that:

a. The coating system applied to surfaces prepared using the above specified power tool methods are not qualified, for example for environmental (irradiation) conditions and DBA conditions under ANSI N101.2-1972.

b. The above mentioned methods provide a smoothing or polishing action, rather than a penetrating action as obtained with sandblasting or with a needle gun.

c. The profile that is obtained using the above-mentioned methods occurs in a sparse pattern and not a densely packed pattern.

Evaluation of Validity

Part a. alleges that specified power tool methods have not been qualified. Steel Structures Painting Council Surface Preparation Guides for Power Tool Cleaning, SSPC-SP3, does not specify which tools are to be used - only the required results. The same is true of manufacturer's recommended surface preparation and application instructions. In all cases, the manufacturers are required to test the repairability of their coating systems and do so with power tool surface preparation as part of their DBA qualification.

Part b. alleges that the methods of power tooling in the procedure creates a smooth polished surface. If a power tool is used incorrectly, a polished surface may result. However, during inspection, this type of surface would be rejected.

Part c. alleges the pattern of the profile is not densely packed. This is true if compared to a sand blasted profile; however, manufacturer's tested systems and procedures indicate acceptable performance of coatings applied to such surfaces.

The following correspondence and DBA test reports are attached to support our response:

1. Letter from Carboline dated April 5, 1978, Subject: ORNL Master Analytical Manual Method #20922, which relates DBA test performance of power tool cleaned surfaces.

2. Letter from Carboline dated November 12, 1979, Subject: Repair of Liner Plate Steel Coating System Carbo Zinc 11/Phenoline 305, which outlines preparation and application procedures.

3. Texas Utilities Generating Company office memo No. CPP-15956 dated May 8, 1984, Subject: CPSES Testex Test Results, which gave profiles of various power tool cleaned surfaces.

4. Carboline Laboratory Test Report No. 01931, LOCA Testing of CarboZinc 11/Phenoline 305 Finish Repairability.

5. Imperial Technical Report No. 612-82, DBA Nutec 6/1201, Nutec 1201/1201 Applied Over SSPC-SP3 (Clean n' Strip) Prepared Steel.

6. Ameron Test Report March 7, 1984, Radiation and DBA Testing of Dimetcote 6 Repaired and Touched Up With Dimetcote 6.

7. Carboline Testing Project 02040, dated 08/24/82, (attached to response to Allegation #30).

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not Applicable

carboline.

CABLE·CARBOCO·ST.LOUIS
TELEX 44 733?

PROTECTIVE COATINGS

FOR CORROSION RESISTANCE • WATERPROOFING • FIRE PROTECTION • ROOFING

#10

April 5, 1978

Mr. Monte Koch
Construction Specialist
Bechtel Power Corporation
12400 East Imperial Highway
Norwalk, California 90650

Reference: ORNL Master Analytical Manual Method #20922
Bechtel Corporation Specification No. CP-956
ORNL Log Book No. A7562A1-26-8

Dear Mr. Koch:

Our recommendation for surface preparation of inorganic zinc coated surface for touch-up and repair is to abrasive blast the area in need of repair to the original specification requirements. However, the recent Design Basis Accident tests run at ORNL support the use of power tool cleaning as an alternate to abrasive blasting.

The tests indicate that acceptable DBA performance is obtainable by using power tool cleaning as described in our surface preparation procedure described to you. We also feel that these procedures exceed the requirements of ANSI N101.2, paragraph 5.3.2 which has been adopted by the Nuclear Regulatory Commission as a minimum standard of overcoating and repair.

Since there are provisions under ANSI N101.2, paragraph 6.3.1.3 for alternate methods of surface preparation when special circumstances make it impractical to abrasive blast, we have investigated the use of the 3M "Strip-N-Clean" abrasive wheel for touch-up and repair of surfaces previously blasted and coated with our Carbo Zinc 11. Based upon the test results which are included with this letter, we the Carboline Company do hereby state and certify that the repairability DBA test procedures are valid and do hereby recommend that the following procedures be followed for the touch-up and repair of our Carbo Zinc 11 coating system.

1. Use the 3M "Strip-N-Clean" abrasive wheel, cleaning to a degree of acceptability as defined by supplied pictorial standards.

2. Blow or vacuum and solvent wipe.

carboline

3. Paint with Carboline 191 Primer within 12 hours and prior to rust formation lapping over two inches minimum onto the existing clean, intact primer.

4. Apply the touch-up primer at 2-5 mils dry film thickness.

Very truly yours,

CARBOLINE COMPANY

Dan W. McBride

Dan W. McBride
Nuclear Market Specialist

Sherwin L. Steinberg

Sherwin L. Steinberg
Vice President of Marketing

DWM:SLS/jg:301
cc: Mr. John F. Montle
Mr. Charles Wiegers
Mr. Marvin Garrett

Subscribed and sworn to before me a notary public in St. Louis County, Missouri, this 5th day of April, 1978.

Notary Public

My Commission Expires 3/25/79

VBR-12456

#10

AREA CODE 314
644-1000

carboline

CABLE-CARBOCO-ST.LOUIS
TELEX 44-7332

JOB NO. 35-1195

PROTECTIVE COATINGS
FOR CORROSION RESISTANCE • WATERPROOFING • FIRE PROTECTION • ROOFING

RECEIVED
JAN 14 1980
RECEIVED

November 12, 1979

Mr. Gordon MacPhail
Brown & Root, Inc.
Commanche Peak Station
P. O. Box 1001
Glen Rose, TX 76043

Subject: Repair of Liner Plate Steel Coating
System Carbo Zinc 11/Phenoline 305 Finish

Dear Gordon:

This will reconfirm our conversations concerning touch-up and repair of Carbo Zinc 11 on a containment liner and miscellaneous steel. Just reviewing, I will highlight our proposed procedures for repair.

First, we discussed vacuum sandblasting as surface preparation for touch-up. We both agreed that while this will provide good surface preparation, it was difficult to use in tight access areas or places where compressed air is just not available. Also sometimes vacuum blasting is not economically feasible for very small touch-up areas.

Secondly, we discussed repair procedures each with documentation supporting these repair procedures. The first was a series of panels DBA/LOCA tested at Oakridge National Laboratory. The coating system was Carbo Zinc 11/Repaired Carbo Zinc 11/Carboline 191HB. The original surface preparation for the rusty steel panels was a gritblast to a near white degree (SP-10) with a one to three mil blast profile, a small square in the middle of the panel was masked off from the gritblast while the first coat of Carbo Zinc 11 was applied. After full cure, the mask was removed. The surface preparation for the masked area was the following: Removal of rust and feather edging of the Carbo Zinc 11 by using a 3M Clean N Strip abrasive disk. The masked area was needle gunned to provide a profile. After the touch-up Carbo

B & R QCC DIST.

PROJECT MGR.	
PROJECT ENGR.	
QA MGR.	/
PROJECT CONST. ENGR.	/
TUGCO QA	
PROJECT GEN. MGR.	
ARMS	/
G. McPhail	1
VBR	1

cured, the entire panels were topcoated with Carboline 191HB. The panels were then submitted to Oakridge National Laboratory for DBA/LOCA testing. It should be noted that the topcoat was Carboline 191HB, not Phenoline 305 Finish. Nonetheless we expect that the performance would have been similar if not better with Phenoline 305 Finish. This series of surface preparation and recoating procedures more than meets the requirements for ANSI 101.2 Section 5 "Repairability and Maintenance Tests".

The second alternative is a test report for Carbo Zinc 11/ Phenoline 305 for weld repair on Carbo Zinc 11 prime steel plate. This report was repaired for the Duke Power Company. While the test is old, it still has value for repairability criteria for Carbo Zinc 11/Phenoline 305 Finish. Thirdly, a detailed report of the repairability of Carbo Zinc 11/Phenoline 305 Finish coating system in accordance with ANSI 101.2 criteria is enclosed. Also please find enclosed a Repair and Maintenance Procedures for Carbo Zinc 11/Phenoline 305 Finish we have been suggesting for several plants using the same coating system.

Several weeks ago I attended a 3M Power Industry Conference. The 3M people have run DBA/LOCA testing over Clean N Strip prepared steel with Carbo Zinc 11, both new and repaired areas. However, I have not yet received this report. When it arrives, I will forward you a copy. I have taken the liberty to have 3M send you some information about the 3M Clean N Strip. I hope that I have provided enough information concerning the repairability of Carbo Zinc 11/Phenoline 305 Finish coating system with the enclosures. If I can provide any clarifications or more information concerning this matter, please feel free to contact me directly.

Yours truly,

Timothy K. Dolan
Technical Service Engineer

TKD/lrb:114
Enclosures

REPAIR AND MAINTENANCE PROCEDURES
Coated Steel

Instructions for Repair and Maintenance of Carbo Zinc 11/Phenoline 305 Finish coating system.

I. Repair and Maintenance Procedure for Aged Carbo Zinc 11.

A. On damaged and rusty surfaces as well as surfaces with a severe amount of salt contamination sandblasting is generally the quickest and easiest method of salt and rust removal. The normal recommendation is to use sandblasting, either open nozzle or vacuum sandblasting to reprepare the surface to the original surface preparation--a near-white metal sandblast for nuclear operations.

During the time when this spot sandblasting is being done, it is generally easy and inexpensive for the coatings applicator to brush-off sandblast the rest of the area with a very quick light sandblast to remove surface contamination, loose salts, and crusty formations on the surface. This then would be the #1 recommendation if it is feasible from an economical and jobsite point of view.

Areas that have been prepared by blastcleaning should be blown off with clean, dry, oil free air or vacuumed to remove any residual dust prior to touch-up. The touch-up application of the Carbo Zinc 11 Primer should be accomplished as soon as possible after the blastcleaning is completed and the surface has been properly cleaned of dust, and before rust bloom or other contaminants are allowed to form on the surface.

B. On damaged and/or rusty surfaces <u>where sandblasting is not possible</u>, the recommended repair procedure would be to clean the surface by grinding with a carborundum stone or hardbacked open grit type power grinders or sanders. We have found that grinding wheels like 3M's "Clean and Strip" do a good job of cleaning with minimal steel polishing. The grinding or sanding operation should produce an anchor patter of approximately 1 mil. The good tight coating immediately surrounding the damaged area should be feather-edged by grinding or sanding operations two to three inches away from the damaged area to insure cleanliness and proper adhesion of the touch-up of Carboline Zinc 11. Rusted areas that cannot be reached by grinders or sanders should be needle gunned to obtain the proper profile and cleanliness prior to touch-up with Carbo Zinc 11. The required cleanliness of surface under these conditions should be comparable to the original specification--either a commercial or a near-white metal sandblast depending upon the actual operating parameters. In reality, however, we would anticipate that the maximum that could be obtained would be something equivalent to a commercial blast-cleaned surface even inside stringent areas such as primary containment in nuclear reactor facilities.

Damaged areas after they have been prepared by power grinding or needle gunning should be blown off with clean, dry, oil free air or preferably vacuumed to remove any residual dust prior to touch up. The touch-up application of Carbo Zinc 11 Primer should be applied as soon as possible after the power tool cleaning or needle gunning operation is completed and the surface has been properly cleaned of dust and before rust bloom or other contaminants are allowed to form on the surface.

C. Markings on the surface by crayon, chalk, or alkyd type paints may be removed by power wirebrushing using soft nonferrous metals to prevent excessive removal of the zinc. An alternate method that can be used for the removal of markings, if possible, is the use of Carboline Surface Preparation #1 or a nonflammable solvent type material such as trichlorethylene.

D. Dirty Zinc--Dirty zinc should be removed or cleaned using steam cleaning or thorough solvent wiping. If solvent wiping is used, one must be sure to change solvent frequently as well as changing rags frequently (recommendations have been made as often as every 100 to 1,000 square feet). The solvent used should be compatible and recommended by the manufacturer. Normally, Carboline Company recommends Thinner #2. In preference to this solvent cleaning, steam cleaning with scrubbing using stiff bristle brushed (Army GI brush) is recommended. Carboline does not prefer the use of detergents since a detergent may never be thoroughly removed and could leave a thin non-adhesive film over the inorganic zinc. After thorough cleaning to remove grease and oil deposits, the topcoat may then be applied.

E. Recoating Carbo Zinc 11

Considerable testing has been done to demonstrate the adhesion of new Carbo Zinc 11 to aged Carbo Zinc 11. Proper cleaning of the aged coat and proper thinning of the new coat are essential for proper intercoat adhesion.

If excessive removal of the Carbo Zinc 11 film occurs during the repair and cleaning procedures described above so that the remaining dry film thickness readings are below the minimum requirements of the specification, these areas should be touched up with a mixture of Carbo Zinc 11 and Thinner 33 or Thinner 21. The new Carbo Zinc 11 must be thinned from 30%-50% by volume to assure proper intercoat adhesion.

II. Topcoating with Phenoline 305 Finish

After the Carbo Zinc 11 has been cleaned, repaired and recoated as necessary in accordance with (I) above, topcoat as necessary with Phenoline 305 Finish at 4-6 mils per coat nominal dry film thickness range. Aged Phenoline 305 Finish should always be cleaned as necessary and wiped with Carboline Surface Preparation #1 immediately prior to recoating or mechanically abraded to roughen the surface. Overlap "spot" topcoat applications approximately 1" onto the surrounding prepared Phenoline 305 Finish. Recoat overall as desired after proper cure time (18 hours at 75°F).

III. Repair of Scratches, Small Cuts and Pinholes

Fill the defect with "bodied-up" Phenoline 305 Finish prepared as follows: mix approximately 2 parts mixed Phenoline 305 Finish with 1 part Carboline Filler-19. Use a putty knife, brush or gloved finger to fill the defect. Topcoat the area as desired per preceeding instruction II.

DWM:bj/406

Allegation 10

CPP-15,956

TEXAS UTILITIES GENERATING COMPANY

OFFICE MEMORANDUM

To Tom Brandt　　Glen Rose, Texas May 8, 1984

Subject COMANCHE PEAK STEAM ELECTRIC STATION
PROFILE TEST RESULTS

On March 9, 1984, a series of profile tests were performed. The tests were conducted to verify the consistency of the Test Tex Profile Gauge and to determine the profile of power and hand tools used on site.

The results were:

60 grit flapper wheel	1.5, 1.1, 1.0, 1.5, 1.4, 1.4, 1.5
3-M clean & strip	1.8, 1.4, 1.3, 1.2, 1.75, 1.4, 1.6
Hand sand (60 grit)	1.7, 1.7, 1.5, 1.75, 1.4, 1.6, 1.6, 1.3
Belt sand (36 grit)	1.1, 1.1, 1.0, 0.8, 2.0, 0.9, 0.8, 1.3
Needle gun	2.5, 2.7, 2.7, 2.25, 2.3, 2.5, 1.8

Tom Kelly

TK/bb

LABORATORY TEST REPORT

Testing Project Number: 01931

Date: February 10, 1981

Report # Final Time: 7 days

Date of Grading: 2-3-81

Total Design Test Duration: 7 days

Requested by: Mr. D. W. McBride

TITLE: LOCA Testing of Carbo Zinc 11/Phenoline 305 Finish repairability

PURPOSE: To determine the performance of 1c Carboline 191 Primer/1c Phenoline 305 Finish as a repair system for Carbo Zinc 11/Phenoline 305 Finish over a surface preparation of 3M "Clean 'n Strip" and 3M "Rotopeen" when exposed to the PWR 307°F. LOCA Curve and evaluated according to ANSI N101.2-1972, Section 4.5, as interpreted by Carboline. This is a proposed repair procedure for the Waterford Nuclear Station Unit #3 which is being engineered by Ebasco Services, Inc.

CONCLUSIONS: After 7 days of the LOCA Curve, the 1c Carboline 191 Primer/1c Phenoline 305 Finish system over a surface preparation of 3M "Clean 'n Strip" and 3M "Rotopeen" exhibits an acceptable performance when evaluated according to ANSI N101.2-1972, Section, 4.5, as interpreted by Carboline.

DISCUSSION:

From the Carboline Research & Development Laboratory

The technical data furnished are true and accurate to the best of our knowledge. However, no guarantee of accuracy is given or implied.

carboline

PROCEDURE:

A. Test Coupons

Description: 2"x4"x1/4" steel certified Carboline ST1 (See Appendix 1)

Surface Preparation: Gritblasted to SSPC-SP5-63 with a 2.0-3.0 mil blast profile.

Abrasive Medium: 50/50 mix of GEH #40 grit and S230 shot.

B. Systems Tested

System	Batch Number	Color	Thinner	Thinning Ratio	DFT Range
1c Carbo Zinc 11	A) OE5477M	Green	#33		
	B) OE1981Z	0300	9L1818M	12%	3.0-3.5 mils
1c Phenoline 305 Finish	A) OH1395M	Gray	Phenoline		
	B) OH1491M	C705	9M2285M	10%	4.0-4.5 mils

Carbo Zinc 11/Phenoline 305 Finish was removed by SSPC-SP3-63, power tool cleaning method. Detailed procedure is outlined in Section C; Repair Procedure.

System	Batch Number	Color	Thinner	Thinning Ratio	DFT Range
1c Carboline 191 Primer	A) OC3362M	Red	#15		
	B) OC3361M	0500	9L0859M	15%	4.0-4.5 mils
1c Phenoline 305 Finish	A) OH1395M	Gray	Phenoline		
	B) OH1491M	C705	9M2285M	10%	3.0-3.5 mils

C. Repair Procedure

1. Remove Carbo Zinc 11/Phenoline 305 Finish with 3M's "Clean 'n Strip" wheel

   a. A residual amount of Carbo Zinc 11 is left on substrate.

2. Restore surface profile with 3M's "Rotopeen"

   a. Operate power tool in two directions over substrate.

3. Solvent wipe substrate to remove grease and oil which may be present from power tool cleaning.

D. Cure Schedule

Carbo Zinc 11: Seven days at 100°F and 100% RH. Phenoline 305 Finish: 48 hours at 72-76°F and 27-32% RH. Carboline 191 Primer: 24 hours at 73-77°F and 29-32% RH. Phenoline 305 Finish: 72 hours at 72-78°F and 28-34% RH and a final cure at 150°F for 24 hours.

E. Exposure

PWR 307°F LOCA Curve

1. Time-Temperature-Pressure Curve

Time	Temperature**	Pressure**
Initial	Ambient	Ambient
Initial to 2 hours, 47 minutes	307°F (153°C)	60 psig
2 hours, 47 minutes to 96 hours*	250°F (121°C)	30 psig
96 hours to 7 days	200°F (93°C)	10 psig

2. Water Chemistry

0.28 Molar H_3BO_3 (3000 ppm Boron)

0.064 Molar $Na_2S_2O_3$

NaOH added to adjust to a pH of 9.5 at 77°F (25°C) in deionized water

*After 2 hours and 47 minutes of exposure, temperature of the test environment was reduced by spraying test solution at 200°F (93°C) into the test chamber which was at 307°F (153°C), giving a final temperature of 250°F (121°C).

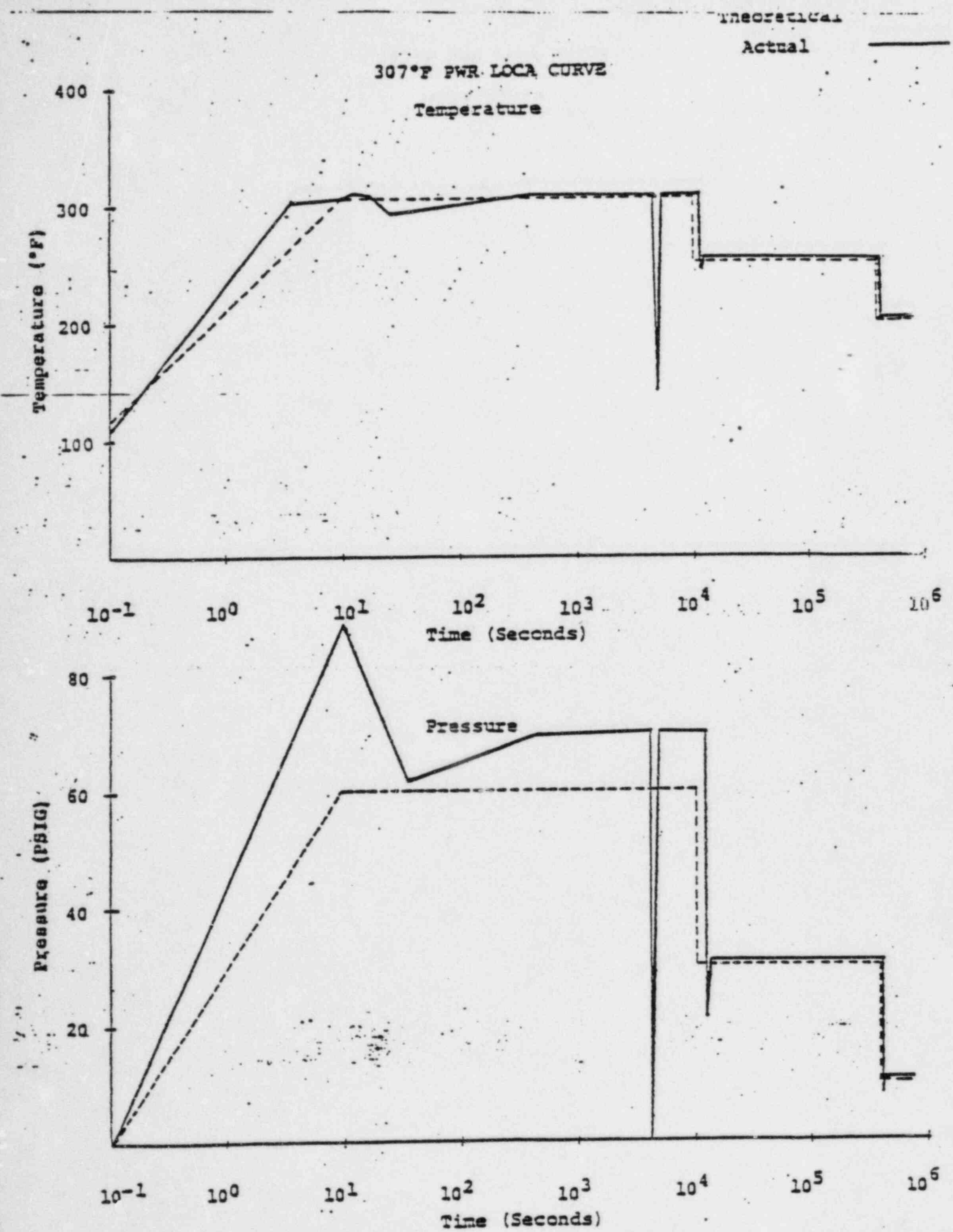
**These are theoretical values. The next page contains graphs of the theoretical and actual LOCA temperature and pressure curves. The data for the actual LOCA curves are taken from the chart recording for this test, which is stored in lab book #230, page 57

Note: Test was interrupted to place spray nozzle in LOCA chamber. Time was added to test to make up for interruption.

GRADING PROCEDURE: The test coupons were evaluated for performance in the following areas:

1) Material flaking off. 2) Delamination between coats and/or peeling. 3) Blistering of the topcoat. 4) Chalking of the topcoat. 5) Excessive cracking.

Grading procedures specified in Report N101.2-1972 of the American National Standards Institute - Protective Coatings for Light Water Nuclear Reactor Containment Facilities:


Theoretical
Actual
307°F PWR LOCA CURVE
Temperature
400
300
200
100
Temperature (°F)
10-1
10^0
10^1
10^2
10^3
10^4
10^5
10^6
Time (Seconds)
80
60
40
20
Pressure
Pressure (PSIG)
10-1
10^0
10^1
10^2
10^3
10^4
10^5
10^6
Time (Seconds)

GRADING
PROCEDURE: (continued)

4.5 Methods of Examining and Evaluating the Exposed Test Specimens

The dynamic and/or static elevated temperature-pressure and irradiation test panels shall be evaluated within 2 hours and again after two weeks after removal from the test chamber for the following surface defects: flaking, delamination and/or peeling, blistering and chalking. Defects listed in Subsection 4.5.1 through 4.5.4 shall be dealt with as follows:

4.5.1 Flaking. ASTM D772, Evaluating Degree of Resistance to Flaking (Sealing) of Exterior Paints, Part 21, American Society for Testing and Materials, Philadelphia, PA 19103. Flaking shall not be permitted.

4.5.2 Delamination and/or Peeling. Delamination and/or peeling shall not be permitted.

4.5.3 Blistering. Blistering shall be limited to a few, intact blisters, Size No. 4, ASTM D714, Standard Method of Evaluating Degree of Blistering of Paints, Part 21, American Society for Testing and Materials, Philadelphia, PA 19103. The number and the size of blisters shall be recorded.

4.5.4 Chalking. ASTM D659, Standard Method of Evaluating Degree of Resistance to Chalking of Exterior Paints, Part 21, American Society for Testing and Materials, Philadelphia, PA 19103. Heavy chalking shall not be permitted.

Any other changes in coating properties which are not also associated with the separation, or the release, of coating from the substrate shall not be a cause for rejection.

ANSI N101.2-1972 Criteria
(As interpreted by Carboline)

Maximum Degree of Failure Allowable

Flaking ASTM D772		10 (None)
Delamination or Peeling		None
*Blistering ASTM D714-56	Blister Size	Blister Density
	#2	None
*Note: A blister is not intact when it has resulted in coating being separated	#4	Few
	#6	Medium
	#8	Medium-Dense
Chalking ASTM D659		6 (Moderate)

Note: Flaking, blistering and chalking are all evaluated according to ASTM Standards, with a rating of 10 indicating that no failure was observed in the specific grading area.

RESULTS: PWR 307°F LOCA Curve

Panel Identification and Coating System	Dry Film Thickness	Flaking	Delamination or Peeling	Blistering	Chalking	Other Performance Characteristics	Performance Evaluation
1A)* Carboline 191 Primer Phenoline 305 Finish	4.5 mils 3.5 mils 8.0 mils	10	None	#4F-B	None	--	Acceptable
2A) Carboline 191 Primer Phenoline 305 Finish	4.5 mils 3.5 mils 8.0 mils	10	None	#6M-B	None	--	Acceptable
Acceptable Performance ANSI N101.2-1972, Section 4.5, As Interpreted By Carboline		10	None	#4F to #6M to #8MD	#6 (Moderate)		

*Panel suspended in the vapor phase.

LAB/T-21878-1

Robert M. Reals
Lab Technician
Testing Department

John J. Ladage, Jr.
Group Leader
Testing Department

John F. Montle
Vice President
Research and Development

jag/t.p. 01931

cc: S. Lopata/D. Porthouse/J. Montle/E. Skiles/S. Steinberg/P. Litzsinger/
M. Dugan/Group Leaders

carboline

Appendix I

Carboline Specification C31

Preparation of Concrete Specimens:

Concrete Composition

Cement, ASTM C150, Type II. Low alkali
Gravel, ASTM C33, size 3/8 inch
Sand, ASTM C33
Water reducing admixture, ASTM C494
Air entraining admixture, ASTM C260
Pozzolans, ASTM C618
Water - Demineralized or distilled water

NOT APPLICABLE

Concrete Proportions

Cement, 7 sacks per cubic yard
Sand-Gravel ratio, 55 sand, 45 gravel by volume
Pozzolans, to 15 percent replacement of cement
Air entraining admixture, 4-7 percent
Water reducing admixture, as per manufacturer's instructions
Water, to produce a 3 inch slump

Preparation of Test Specimen:

Make and cure the specimen according to ASTM C192, except that no form oils may be used. The face to be tested shall be composed to the form to simulate poured walls and the wood troweled surfaces: Broom finish top surface to simulate floors. No test face shall be saw cut. When applicable, concrete curing agents compatible with the coating system shall be used.

Panels:

The size for concrete panels shall be 2 by 4 inches by 2 inches thick ± 0.2 inches.

Curing Time:

Before concrete specimens are coated, they shall be cured a minimum of 28 days in accordance with ACI 301, "Specifications for Structural Concrete for Buildings." If a concrete curing primer is used, it shall be applied on the concrete within 24 hours after removal of the forms.

Carboline Specification ST1

Steel Test Specimens

Panels: The size for carbon steel panels shall be 2 by 4 inches by 1/4 inch thick ± 0.1 inches with rounded edges and corners. The steel for each specimen shall meet the requirements of ASTM A36, "Standard Specifications for Structural Steel".

Maile 11/14/83 Evans 2/6/89

IMPERIAL

TECHNICAL REPORT

NUMBER

612-82

TITLE

DBA NUTEC 6/1201, NUTEC 1201/1201 APPLIED OVER SSPC-SP-3 (CLEAN N' STRIP) PREPARED STEEL

FOR

GENERAL USE

CUSTOMER

Submitted by: JERRY ARNOLD HEA
Accepted by: ROBERT R. TAYLOR R.R. Taylor 6/02/82
Approved: ROBERT R. TAYLOR
Date: June 2, 1982

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

The information contained in this report, based upon our experience, is offered without charge as part of our service to customers. It is intended for use by persons having technical skill, at their own discretion and risk. We assume no liability in connection with its use. This information is not intended as a license to operate under, nor a recommendation to infringe, any patent covering any material or use.

PE:

The purpose of this test was to evaluate NUTEC 6 and NUTEC 1201, under DBA test conditions, over steel surfaces prepared in accordance with SSPC-SP-3 with a Clean n' Strip wheel.

CKGROUND:

For optimum performance of epoxy coating systems, the steel substrate is usually abrasive blasted. However, in some instances, especially during maintenance work, blasting is not feasible. In such cases where blasting can not be performed, power tool cleaning is recommended. This test evaluates one power tool - the Clean n' Strip manufactured by the 3M company.

SUMMARY:

All specimens tested met the acceptance criteria established by ANSI N101.2 for DBA testing.

PROCEDURE:

Steel panels measuring 2 x 4 x ¼ inch were exposed on a roof top for two weeks to induce rusting. The rusted and pitted panels were then power tool cleaned with a Clean n' Strip wheel to remove loose rust and milscale. The resultant surface appeared as bright metal with the exception of some remaining rust in pits. The panels were then coated as outlined below and as described in the attached panel preparation sheets:

Panel #	System
7927	6/1201
7928	6/1201
7931	6/1201
7932	6/1201
7935	1201/1201
7936	1201/1201

The coated panels were then submitted to ORNL for DBA testing with maximum temperature and pressure of 385°F and 70 PSIG respectively. Refer to the attached ORNL procedures for details.

RESULTS:

Refer to attached ORNL results sheets.

All panels surpassed the acceptance requirements of ANSI N101.2 for DBA testing.

CONCLUSIONS:

The DBA test results indicate that NUTEC 6 and NUTEC 1201 achieve adequate adhesion over a power tool cleaned surface to meet the rigors of design basis accident testing.

It should be noted that these test specimens were not irradiated prior to DBA testing. It was felt that this was an unnecessary step, since NUTEC 6 and NUTEC 1201 have demonstrated on numerous occasions the ability to withstand irradiation to 1 x 10^9 Rads.

ORNL TEST PROCEDURES

Manufacturer: Imperial
New Orleans, Louisiana

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: January 8, 1981

Report of Irradiation, Decontamination, and DBA Testing

The irradiation, decontamination, and design basis accident (DBA) tests are conducted, respectively, in accordance with Bechtel Corp. *Standard Specification Coatings for Nuclear Power Plants*, specs. CP-951, CP-952, and CP-956 (or with modifications as noted in Table 2, DBA test conditions). The tests are designed also 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 except the decontamination 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 1×10^8 rads/hour.

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

Evaluated D. L. Hoyle

Approved L. T. Corbin

Manufacturer: Imperial
New Orleans, Louisiana

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: January 8, 1981

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.

The decontamination procedure is as follows: a mixture of fission product nuclides (aged greater than 90 days and less than three years) is neutralized to pH 4 and immediately applied to the test specimens. The specimens are previously degreased in alcohol. After the contaminated spot is air dried, the activities of four of the nuclides are measured by counting with a Ge(Li) detector and a multichannel pulse height analyzer. The specimens are then suspended in a beaker of water at 25°C and washed by stirring for 10 minutes. The specimens are removed, the backs rinsed in water, air dried, and counted as above. The ratios of the activities before, to those after the decontamination are reported as decontamination factors for water. The decontamination and counting steps in 25°C and 80°C acids are repeated, and the respective decontamination factors calculated. The "total overall DF" is calculated as the ratio of the total activity at the beginning of the test to the total activity at the completion of the three washing steps. All activities are corrected for decay between counts. A computer has been programmed to do all the calculations.

Evaluated Ralph L. Apple

Approved L. T. Corbin

Manufacturer: Imperial

New Orleans, Louisiana

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: January 8, 1981

ORNL Log Book No. A 7562; A12-16-80

Table 1. DBA solution composition, distilled water

	Reagent	Concentration
Solution A:	Boric acid, H_3BO_3	5000 ppm
	Sodium hydroxide, NaOH	Required to adjust pH to 10.2
Solution B:	Boric acid, H_3BO_3	5000 ppm
	Sodium hydroxide, NaOH	Required to adjust pH to 9.0

Table 2. DBA test conditions

Time	Temperature (°F)	Pressure (psig)	Comments
Start	210		Autoclave preheated.
60 s	385	70	Steam injected.
80 s	370	66	
3 min	370–350		Spray solution A added at 300°F.
13 min	350	66	Pressure maintained by relief valve.
23 min	350–275		
33 min	275	35	
53 min	275–250		
63 min	250	30	Spray solution B added.
4 days	250	30	
20 min	250–200		
3 days	200	10	
End of test			

Evaluated Ralph L. Doyle

Approved L. T. Corbin

PANEL PREPARATION SHEETS

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

PRODUCT TO BE TESTED: Nutec 1201 airless/Nutec 1201

TY SUBSTRATE: ASTM A-36 Carbon Steel SIZE: 2 x 4 x 1/4

SURFACE PREPARATION (Describe): Cleaned to an SSPC-SP-3, power tooled, using a Clean-n-Strip.

PRODUCT DATA: SAMPLE NO.(s): 7936

DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: N/A

T	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F) %R.H.		THICKNESS (ins.)	TIME & DATE APPLIED
1	Nutec	1201 Airless	9772 9773	Spray	86°	77%	F .006 - .007 B .0045 - .005	10/17/80
2	Nutec	1201	1958	Spray	74°	78%	F .004 - .0045 B .0065 - .007	10/22/80

CURING CONDITIONS: AMBIENT TEMP. 70-90 °F REL. HUMIDITY 70-80 %

MINIMUM CURE 78 DAYS

TEST PROCEDURE: DBA

TESTING PERFORMED BY: ORNL DATE SUBMITTED 12/8/80

APPROVED: Gerald C. Ansell

TEST REPORT NO. 465-81

PREPARED BY: Sharon Farrow

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

.. PRODUCT TO BE TESTED: Nutec 1201 airless/Nutec 1201

!. TYPE SUBSTRATE: ASTM A-36 Carbon Steel SIZE: 2 x 4 x 1/4

!. .URFACE PREPARATION (Describe): Cleaned to an SSPC-SP-3, power tooled, using a clean-n-strip.

. PRODUCT DATA: SAMPLE NO.(s): 7935

. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: N/A

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M($^{\circ}$F)	%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
1	Nutec	1201 airless	9772 9773	Spray	86°	77%	F .005 - .006 B .007 - .008	10/17/80
2	Nutec ✓	1201	1958 1959	Spray	74°	78%	F .005 - B .007 - .0075	10/22/80

. CURING CONDITIONS: AMBIENT TEMP. 70-90 $^{\circ}$F REL. HUMIDITY 70-80 %

MINIMUM CURE 78 DAYS

. TEST PROCEDURE: DBA

. TESTING PERFORMED BY: ORNL DATE SUBMITTED 12/8/80

APPROVED: Sheill E. Arnold

TEST REPORT NO. 465-81

PREPARED BY: [signature]

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: Nutec 6/Nutec 1201
2. TYPE SUBSTRATE: ASTM A-36 Carbon Steel SIZE: 2 x 4 x 1/4
3. RFACE PREPARATION (Describe): Clean - n - strip to SSPC-SP-3 power tooled cleaned
4. PRODUCT DATA: SAMPLE NO.(s): 7927
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: 10/17/80

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)	%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
1	Nutec	6	1953 8461	Spray	86°	77%	F .0055 - .006 B .006 - .007	10/17/80
2	Nutec	1201	1958 1959	Spray	74°	78%	F .0065 - .007 B .007 - .0075	10/22/80

6. CURING CONDITIONS: AMBIENT TEMP. 70-90 °F REL. HUMIDITY 70-80 %
MINIMUM CURE 78 DAYS

7. TEST PROCEDURE: DBA

8. TESTING PERFORMED BY: ORNL DATE SUBMITTED 12/8/80

APPROVED: Gerald C. Arnold

TEST REPORT NO. 465-81

PREPARED BY: Sharon Smoyer

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

PRODUCT TO BE TESTED: Nutec 6/Nutec 1201

TYPE SUBSTRATE: ASTM A-36 Carbon Steel SIZE: 2 x 4 x 1/4

SURFACE PREPARATION (Describe): Clean-n-strip, to SSPC-SP-3 Power Tool Cleaned.

PRODUCT DATA: SAMPLE NO.(s): 7928

DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: 10/17/80

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)	%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
1	Nutec	6	1953 8461	Spray	86°	77%	F .007 - .008 B .006 - .0065	10/17/80
2	Nutec	1201	1958 1959	Spray	74°	78%	F .007 - .0075 F .006 - .0065	10/22/80

CURING CONDITIONS: AMBIENT TEMP. 70-90 °F REL. HUMIDITY 70-80 %

MINIMUM CURE 78 DAYS

TEST PROCEDURE: DBA

TESTING PERFORMED BY: ORNL DATE SUBMITTED 12/8/80

APPROVED: Gerald E. Arnold

TEST REPORT NO. 465-81

PREPARED BY: Sharon Gorgue

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: Nutec 6/Nutec 1201
2. TYPE SUBSTRATE: ASTM A-36 Carbon Steel SIZE: 2 x 4 x 1/4"
3. SURFACE PREPARATION (Describe): Cleaned to SSPC-SP3 power tooled using Clean-n-strip.
4. PRODUCT DATA: SAMPLE NO.(s): -7931
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: 10/17/80

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)	%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
1	Nutec	6	1958 8461	Spray	86°	77%	F .0055 - .006 B .005 - .0055	10/17/80
2	Nutec	1201	1958 1959	Spray	74°	78%	F .0065 - .007 B .005 - .0055	10/22/80

. CURING CONDITIONS: AMBIENT TEMP. 70-90 °F REL. HUMIDITY 70-80 %

MINIMUM CURE 78 DAYS

. TEST PROCEDURE: DBA

. TESTING PERFORMED BY: ORNL DATE SUBMITTED 12/8/80

APPROVED: [signature]

TEST REPORT NO. 465-80

PREPARED BY: [signature]

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

PRODUCT TO BE TESTED: Nutec 6/Nutec 1201

TYPE SUBSTRATE: ASTM A-36 Carbon Steel SIZE: 2 x 4 x 1/4

SURFACE PREPARATION (Describe): Cleaned to an SSPC-SP-3 power tooled using clean-n-strip.

PRODUCT DATA: SAMPLE NO.(s): 7932

DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: 10/17/80

LAP	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F) %R.H.		THICKNESS (ins.)	TIME & DATE APPLIED
1	Nutec	6	1953 8461	Spray	86°	-77%	F .007 - .0075 B .006 - .0065	10/17/80
2	Nutec	1201	1958 1959	Spray	74°	78%	F .007 - .0075 B .006 - .0065	10/22/80

CURING CONDITIONS: AMBIENT TEMP. 70-90 °F REL. HUMIDITY 70-30 %

MINIMUM CURE 78 DAYS

TEST PROCEDURE: DBA

TESTING PERFORMED BY: ORNL DATE SUBMITTED 12/8/80

APPROVED: Gerald C. Arelle

TEST REPORT NO. 465-81

PREPARED BY: Marion Smoyer

RESULTS

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

January 8, 1981

Mr. Henry L. Lomasney
President
Imperial Professional Coatings
P. O. Box 29077
New Orleans, Louisiana 70189

Dear Henry:

Enclosed are the test results on your recently submitted specimens.

If we can be of further assistance, please feel free to call on us.

Sincerely,

L. T. Corbin

L. T. Corbin, Section Head
Analytical Chemistry Division

LTC:dmw

Enclosures

Manufacturer: Imperial

New Orleans, Louisiana

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: January 8, 1981

SYSTEM IDENTIFICATION

x Steel panel ____ Concrete block

6/1201 (clean n'strip)

DBA TEST

ORNL Master Analytical Manual Method No. 2 0922.
ORNL Log Book No. A 7262; A12-16-80

Sample No.	DBA phase	Test results
7927	spray	Front: Coatings intact, no defects. Rear: Coatings intact, no defects.
7928	spray	Front: Coatings intact, no defects. Rear: Blisters, #6 few.
7931	spray	Front: Coatings intact, no defects. Rear: Coatings intact, no defects.
7932	spray	Front: Coatings intact, no defects. Rear: Coatings intact, no defects.

Evaluated [signature]

Approved [signature]

Manufacturer: Imperial

New Orleans, Louisiana

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: January 8, 1981

SYSTEM IDENTIFICATION

x Steel panel ____ Concrete block

1201/1201 (clean n'strip)

DBA TEST

ORNL Master Analytical Manual Method No. 2 0922.
ORNL Log Book No. A 7262; A12-16-80

Sample No.	DBA phase	Test results
7935	spray	Front: Single blister, #6. Rear: Coatings intact, no defects.
7936	spray	Front: Coatings intact, no defects. Rear: Coatings intact, no defects.

Evaluated Ralph L. Ray[?]

Approved L. T. Corbin

Attachment #10

201 North Berry Street
Post Office Box 1020
Brea, California 92621
(714) 529-1951 Telex: 655342

Ameron

Protective Coatings
Division

Date: March 7, 1984

RADIATION AND DBA TESTING
OF DIMETCOTE 6 REPAIRED
AND TOUCHED UP WITH
DIMETCOTE 6

NAME: ____________________

STATEMENT FROM OAK RIDGE

ON PROCEDURES USED IN THEIR EVALUATION

Manufacturer: Bechtel/3M

Saint Paul, Minnesota

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: October 10, 1979

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 1×10^8 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 Ralph L. Hoyle

Approved L. T. Corbin

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

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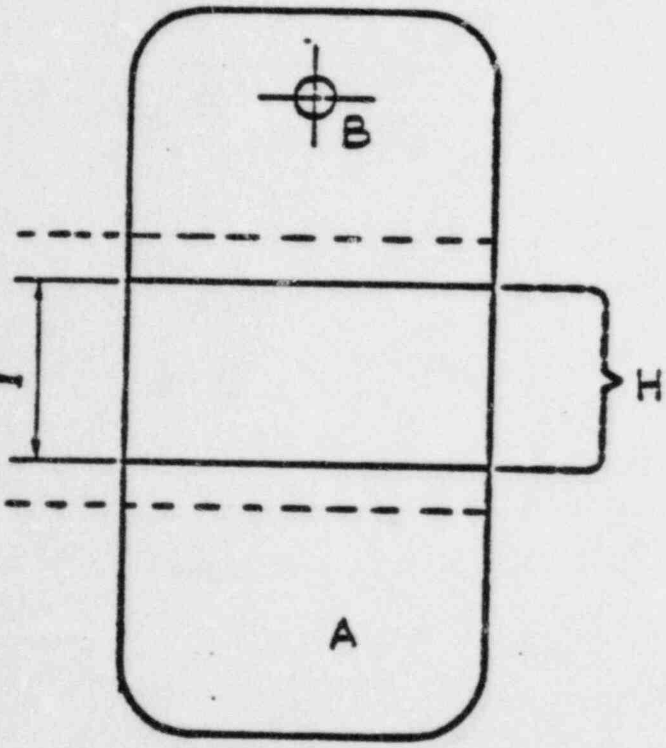
PANEL ID# 811

	COATING MATERIAL	DFT*
A.	Ameron D6N	4.0
B.	Ameron D6N	4.0
T. U.	Ameron D6N	3.1
F.	None	—



1. ABRASIVE BLAST TO SSPC-SP10 WITH A PROFILE FROM 1.5 TO 3.0 MILS.
2. APPLY THE INDICATED PRIMER TO DESIGNATED AREA OF PANEL. (NO PRIMER IS TO BE APPLIED TO CENTER SECTION H.)
3. ALLOW BARE AREA H TO RUST.
4. PHOTOGRAPH PANEL AT THIS POINT.
5. POWER TOOL CLEAN RUSTED AREA OF PANEL USING THE CLEAN AND STRIP WHEEL AND/OR DISC FOLLOWED BY THE ROTO PEEN WHEEL (MANUFACTURED BY 3M COMPANY.)
6. PHOTOGRAPH PANEL AT THIS POINT.
7. COAT THE PREPARED AREA WITH THE INDICATED TOUCH-UP COATING MATERIAL (TU).
8. PHOTOGRAPH PANEL AT THIS POINT.
9. APPLY INDICATED FINISH COAT ONTO AREAS A, B AND H.
10. PHOTOGRAPH PANEL AT THIS POINT.

* ACTUAL - AVERAGE OF TWO OR MORE READINGS

BECHTEL
LOS ANGELES

GEORGIA POWER COMPANY
ALVIN W. VOGTLE NUCLEAR PLANT

DBA REPAIRABILITY TEST PANELS

SCALE:	DRAWING NO.	REV.	
JOB NO.	811		

REVISIONS | DATE | BY | CHK. | SUPV | ENG. | P.E. | DATE

SIZE A

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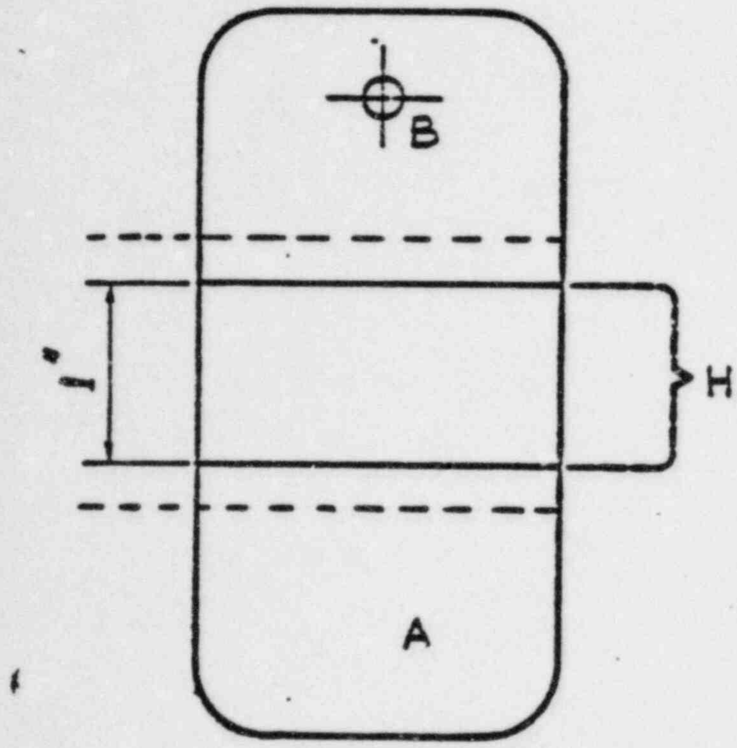
PANEL ID# 831

	COATING MATERIAL	DFT*
A.	Ameron D6N	3.8
B.	Ameron D6N	3.8
T. U.	Ameron D6N	3.2
F.	None	--



1. ABRASIVE BLAST TO SSPC-SP10 WITH A PROFILE FROM 1.5 TO 3.0 MILS.
2. APPLY THE INDICATED PRIMER TO DESIGNATED AREA OF PANEL. (NO PRIMER IS TO BE APPLIED TO CENTER SECTION H.)
3. ALLOW BARE AREA H TO RUST.
4. PHOTOGRAPH PANEL AT THIS POINT.
5. POWER TOOL CLEAN RUSTED AREA OF PANEL USING THE CLEAN AND STRIP WHEEL AND/OR DISC FOLLOWED BY THE ROTO PEEN WHEEL (MANUFACTURED BY 3M COMPANY.)
6. PHOTOGRAPH PANEL AT THIS POINT.
7. COAT THE PREPARED AREA WITH THE INDICATED TOUCH-UP COATING MATERIAL (TU).
8. PHOTOGRAPH PANEL AT THIS POINT.
9. APPLY INDICATED FINISH COAT ONTO AREAS A, B AND H.
10. PHOTOGRAPH PANEL AT THIS POINT.

* ACTUAL - AVERAGE OF TWO OR MORE READINGS

BECHTEL
LOS ANGELES

GEORGIA POWER COMPANY
ALVIN W. VOGTLE NUCLEAR PLANT

DBA REPAIRABILITY TEST PANELS

ENG. MGR.
DATE
SCALE:
DRAWING NO. 831
REV.
JOB NO.
NO. REVISIONS DATE BY CHK. SUPV.

SIZE A 8½ x 11

SAMPLE IDENTIFICATION

AND

SPECIFIC TEST DESIGNATION

Sample No.	Primer/Touch-Up	Test Designation
811	Dimetcote 6/Dimetcote 6	Radiation & DBA
821	Dimetcote 6/Dimetcote 6	DBA
831	Dimetcote 6/Dimetcote 6	Radiation & DBA
841	Dimetcote 6/Dimetcote 6	DBA

RADIATION TOLERANCE TEST RESULTS

Manufacturer Bechtel/3M

Saint Paul, Minnesota

Report Number TRC-089-03

Analytical Chemistry Division
Oak Ridge National Laboratory
Date October 10, 1979

System Identification[a] x Steel panel ___ Concrete block

GR - Inorganic Zinc D-6
PT - Inorganic Zinc Touch-Up D-6
No finish

Radiation Tolerance Test Results

ORNL Master Analytical Manual Method No. 2 0921, Bechtel Corp. Spec. No. CP-951
ORNL Log Book No. A 7562; A8-23-9

Initial dose rate 1×10^7 rad/h

Test conducted in x air ___ water

Sample No.	Cumulative dose rate 2×10^8 rads: comments
811	Coatings intact, no defects all areas. 4.0/2.1
831	Coatings intact, no defects all areas. 3.1/3.2

[a]GR = grit blast cleaning; PT = power tool cleaning; SW = solvent wash cleaning.

Evaluated Ralph L. Kesl

Approved L. T. Corbin

DBA TEST RESULTS

Manufacturer Bechtel/3M

Saint Paul, Minnesota

ORNL Log Book No. A7562; A8-31-9

Analytical Chemistry Division
Oak Ridge National Laboratory
Date October 10, 1979

Table 1. DBA solution composition, distilled water

Solution A:	0.28 *M* boric acid (3000 ppm boron)
	Adjusted to pH 10.5 with sodium hydroxide
Solution B:	0.28 *M* boric acid (3000 ppm boron)
	Adjusted to pH 8.5 with sodium hydroxide

Table 2. DBA test conditions[a]

Time	Temperature (°F)	Pressure (psig)	Comments
Start			Autoclave preheated.
10 seconds	307	60	Steam injected.
2 minutes	307	60	
20 seconds	310	60	Spray solution A added at 310°F.
5-minute recovery	310–307	62–60	
64 minutes	307	60	
20 seconds	282	52	Spray solution B added at 260°F after draining autoclave.
5-minute recovery	282–307	60	
167 minutes	307	60	
15 minutes	307–250	30	Temperature and pressure reduced via cooling coil.
4 days	250	30	Pressure adjusted with N_2.
20 seconds	180	–7	Fresh spray solution B added at 75°F after draining autoclave.
15 minutes	180–200	10	Pressure adjusted with N_2.
3 days	200	10	
End of test			

[a]The above data are taken from recorder charts on permanent file at ORNL.

Evaluated *Ruth L. Apple*

Approved *L. T. Corbin*

System Identification[a]

x Steel panel ___ Concrete block

GR - Inorganic Zinc
PT - Inorganic Zinc Touch-Up
No finish

DBA Test Results

ORNL Master Analytical Manual Method No. 2 0922
ORNL Log Book No. A 7562; A8-31-9

Sample No.	DBA phase	Comments
811[b]	spray	Coatings intact, no defects all areas.
821	spray	Coatings intact, no defects all areas.
831[b]	spray	Coatings intact, no defects all areas.
841	spray	Coatings intact, no defects all areas.

[a]GR = grit blast cleaning; PT = power tool cleaning; SW = solvent wash cleaning.

[b]Irradiated.

Evaluated Ralph L. Dapple

Approved L.T. Corbin

TXX-4201
06/22/84

Allegation No. 11

It is alleged that DCA No. 18,489, Rev. 1, allows a primer thickness of 0.5 mils. If this is so, is a coating system having a primer coat of 0.5 mil thickness qualified, for example for environmental (irradiation) conditions and DBA conditions, under ANSI 101.2-1972?

Evaluation of Validity

DCA 18,489, Rev. 1, to which this allegation refers, placed certain primer coatings with a thickness of 0.5 mils on the Protective Coatings Exempt Log (see entries 8-18 on the Exempt Log, attached). Because these coatings have been placed on the exempt log, the question whether they qualify under irradiation or DBA conditions is not meaningful.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

PROTECTIVE COATINGS EXEMPT LOG

ENTRY Nº	ITEM OR AREA	COATING SYSTEM	SQ. FT.
8	Liner Pl Coatings, .5 Mil Primer, AZ 96°-98° @ EL 1055'-1056'. Re. PCR# 00679	Carboline CZ11 w/ Carboline 305 TopCoat.	1.5
9	Liner Pl Coatings, 1.0 Mil Primer, AZ 220°-230° @ EL 1060'-1061'; RE. PCR 00577	Carboline CZ11 Primer w/ Carboline 305 Topcoat.	7.5
10	Liner Pl coatings, .5 Mil Primer, AZ 227°-230° @ EL 1044-1045'-6" Re. PCR 00630	Carboline CZ11 Primer w/ Carboline 305 Topcoat	4.5
11	Liner Pl coatings, .5 Mil Primer, AZ 225°-227° @ EL 1095'-6 - 1096'-6". Re PCR 00630	Carboline CZ11 Primer w/ Carboline 305 Topcoat	2.0
1[illegible]	Liner Pl coatings, .5 Mil Primer, AZ 304°-306° @ EL 1048'-6"-1051'; Re PCR 00637	Carboline CZ11 Primer w/ Carboline 305 TopcoaT	7.0
[illegible]	Liner Pl coatings, .5 Mil Primer, AZ 21°-24° @ EL 1044'-6 - 1047'-6"; RE PCR 00690	Carboline CZ11 Primer w/ Carboline 305 TopcoaT	9.0
14	Liner Pl coatings, 1.0 Mil Primer, AZ 290°-300° @ EL 1053'-1054'. Re PCR 00617	Carboline CZ11 Primer w/ Carboline 305 TopcoaT	7.5
15	Liner Pl coatings, .5 Mil Primer, AZ 267°-271° @ EL 1038 To 1042' Re PCR 00631	Carboline CZ11 Primer. w/ Carboline 305 Topcoat.	16.0
1[illegible]	Liner Pl Coatings .5 Mil Primer, AZ 281°-295° @ EL 1047-1049. RE PCR 00636	Carboline CZ11 Primer w/ Carboline 306 Topcoat	22.0
17	Liner Pl coatings, .5 Mil Primer, AZ 272°-274° @ EL. 1039'-1042': RE PCR 00636	Carboline CZ11 Primer w/ Carboline 305 TopcoaT	60.0
18	Liner Pl coatings, .5 Mil Primer. AZ 275°-276°30' @ EL 1030-1044. Re PCR 00636	Carboline CZ11 PRimer w/ Carboline 305 Topcoat	21.0
	14 Rebar sleeve Fails Rebar stubs and cadweld holes on MRB 0574' DIA at EL 407'	Carboline 191 Primer w Carboline 305 Top Coat	1.0

#12

Imperial

TECHNICAL REPORT

NUMBER

#495-81

TITLE

Nutec 11S/Nutec 1201
Nutec 11S/Nutec 11/Nutec 1201
Radiation Tolerance,
D[illegible]sign Basis Accident Testing (ORNL)

FOR

Company Knowledge

CUSTOMER

Submitted by: Gerald E. Arnold

~~Accepted~~ Approved. By: Gerald E. Arnold

Date: June 10, 1981

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

The information contained in this report, based upon our experience, is offered without charge as part of our service to customers. It is intended for use by persons having technical skill, at their own discretion and risk. We assume no liability in connection with its use. This information is not intended as a license to operate under, nor a recommendation to infringe, any patent covering any material or use.

Allegation No. 12

If maximum limits are used, paragraph 4.3.1.2 of Procedure Number CCP-40, Rev. 5., allows a 102 mil thick coating system for 11S/1201/11S/1201. Is this system thickness qualified, for example for environmental (irradition) conditions and DBA conditions, under ANSI 101.2-1972?

Evaluation of Validity

This allegation, which relates to a repair procedure involving limited total surface area, is addressed in our response to Allegation Number 1. Additionally, data developed by Imperial (See Test Report No. 495-81, attached) includes the results of irradiation and DBA tests of systems similar to those listed in Allegations No. 1 and No. 12. The coatings thicknesses tested range from 10 to 115 mils. All systems tested met DBA requirements. The systems subjected to irradiation were at film thicknesses of 10, 12, 30, 60 and 70 mils. These were unaffected by irradiation. In view of the limited areas involved and the available data, this allegation is without technical significance.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

SCOPE:

The purpose of this test is to evaluate the performance of Nutec 11S applied at film thicknesses of .020-.115" under design basis accident conditions specified for the South Texas Project. The effects of various mixing techniques and compressed air cleaning are also studied.

BACKGROUND:

The six test specimens were included in the South Texas Project test to generate data on Nutec 11S at film thicknesses higher than the currently qualified 35 mil. maximum DFT imposed in Service Level 1 areas, to comply with the newly revised STP test requirements and to provide data on surface preparation other than abrasive blasting.

SUMMARY:

All six specimens exhibited no defects when subjected to the STP design basis accident conditions (291°F., 70 PSIG). Two of the specimens were irradiated to $2x10^8$ rads; radiation tolerance was excellent.

PROCEDURES:

Concrete coupons, measuring 2x4x2", were coated as described in the attached panel preparation sheets. On coupons A32, A34, and A38, Nutec 11S was applied at various film thicknesses and in 1-3 coats. Some faces also received a tight coat of Nutec 11.

Coupons A78, A83, and A85 were coated with Nutec 11S and Nutec 11 which had either been hand mixed with a spatula or with a Cowles mixer. One face of each coupon received no Nutec 11. Therefore, the coupons in both sets represent both the Nutec 11S/11/1201 and the Nutec 11S/1201 system.

The test specimens were submitted to Oak Ridge National Laboratories. Coupons A32 and A83 were irradiated to $2x10^8$ rads; all coupons were DBA tested per the South Texas requirements, with maximum temperature and pressure, of 291°F. and 70 PSIG, respectively. (See attachment summary)

Refer to the attached ORNL statement for a description of the tests performed.

RESULTS:

Refer to individual ORNL results sheets.

Coupon No.	Irradiation	DBA Results
A32	Yes	No defects
A34	No	"
A38	No	"
A78	No	"
A83	Yes	"
A85	No	"

CONCLUSION:

At the LOCA conditions simulated in this test, the Nutec concrete system performed satisfactorily:

A) Without Nutec 11 (Nutec 11S/1201)

B) At Nutec 11S thicknesses of .020-.070" (one coat)

C) At Nutec 11S thicknesses of .040-.115" (two-three coats)

D) At Nutec 11 thicknesses of 1001-.010"

E) At Nutec 1201 thicknesses of .003-.012"

F) Regardless of dispersion speed (mixing)

G) Over various prepared surfaces

The data demonstrates that both the 11S/11/1201 and 11S/1201 systems met the acceptance criteria of ANSI N5.12 and ANSI N101.2, when subjected to a radiation exposure level of 2×10^8 rads and DBA conditions of 291°F and 70 PSIG.

This report should be reviewed in conjunction with Imperial's technical report #505-81, which describes the results of a second DBA test series on the Nutec concrete coating system.

SUMMARY OF TEST PROCEDURES

Coupon #	Surface Prep.	System	Max. DFT (Mils)	Rad. Levels	Comments
A 32	Broomed surface was abrasive blasted; all other surfaces were stoned followed by compressed air cleaning.	11S/1201 11S/11S/1201	70 (11S) 60 (11S)	$2x10^8$ rads	
A 34		11S/1201 11S/11/1201 11S/11S/1201 11S/11S/11S/11/1201	25 (11S) 40 (11S) 115 (11S) 75 (11S)	No radiation	
A 38		11S/11/1201 11S/11S/11/1201 11S/11S/1201	45 (11S) 70 (11S) 70 (11S)	No radiation	
A 78	Broomed surface was abrasive blasted; all other surfaces were wire brushed followed by compressed air cleaning.	11S/11/1201	30 (11S) 10 (11) 12 (1201)	No radiation	#11S & #11 were hand mixed.
A 83		11S/11/1201	30 (11S) 10 (11) 12 (1201)	$2x10^8$ rads	#11S & #11 were hand mixed.
A 85		11S/11/1201	30 (11S) 10 (11) 12 (1201)	No radiation	#11S and #11 were mixed on a Cowles dissolver.

TEST PROCEDURES

Manufacturer: Imperial

New Orleans, Louisiana

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: May 26, 1981

REPORT OF IRRADIATION AND DBA TESTING

The irradiation and design basis accident (DBA) tests are conducted, respectively, in accordance with Bechtel Corporation specifications CP-951 and CP-956 in Standard Specification Coatings for Nuclear Power Plants (or with modifications as noted in Table 2, DBA test conditions). The tests are designed to meet specifications set in both ANSI 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 irradiation tests, 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 at ORNL, as the source of radiation. These fuel assemblies are stored under 20 ft 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 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 1×10^8 rad/h.

The fuel assembly is 20 in. high. A 20-ft-long, 3-1/2-in.-diameter pipe, with one end capped, is used for air irradiation tests. The capped end is lowered into a 4-in. opening at the center of the fuel assembly. The open end, above 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. 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 [signature]

Approved [signature]

Manufacturer: Imperial

New Orleans, Louisiana

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: May 26, 1981

ORNL Log Book No. A9675, A5-5-1

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	150		Autoclave preheated.
10 min	150-291		Steam injected at 260°F.
20 min	291	70	Pressure maintained by relief valve.
45 min	291-260		
80 min	260	39	Pressure adjusted with N_2.
120 min	260-220		
180 min	220	20	
210 min	220-160		
21 h	160	5	
10 d	125	2	Placed in fresh spray solution in constant temperature bath.
End of test			

Evaluated Ralph L. [illegible]

Approved L. T. [illegible]

PANEL PREPARATION DATA

TEST PANEL PREPARATION DATA

PRODUCT TO BE TESTED: Nutec 11S/Nutec 1201

TYPE SUBSTRATE: Concrete Size: 2 x 4 x 2

SURFACE PREPARATION (Describe): Carborundum stone used to remove high lights and loose particles; broomed surface blast swept to remove efflorescence. Cleaned with 100 psi compressed air

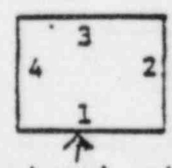
PRODUCT DATA: SAMPLE NO.(s): A-32

DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: N/A

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
	Nutec	11S	2519/2530/2517	Squeegee	66°F/53%	*	2/4/81 3:00 p.m.
	Nutec	11S	2519/2530/2517	Squeegee	60°F/85%	**	2/5/81 9:00 a.m.
	Nutec	11S	2519/2530/2517	Squeegee	64°F/55%	***	2/9/81 9:30 a.m.
	Nutec	1201	9772/1959	Spray	73°F/52%	*****	2/16/81,3:00

FILM THICKNESS (ins.)		11S *	11S **	11S ***	11 ****	1201 *****
Side 1	max.	.060-.070				.003-.005
Side 2	min.	.040-.050				.003-.005
Side 3			.010-.020	.030-.040		.003-.005
Side 4			.010-.020	.030-.040		.003-.005

TOP VIEW OF COUPON



Numbered and broomed surfac

TOTAL DRY FILM THICKNESS RANGE - Side 1 .063-.075 Side 3 .043-.065
Side 2 .043-.055 Side 4 .044-.074

CURING CONDITIONS: AMBIENT TEMP. 70-80 °F REL. HUMIDITY 45-65 %

MINIMUM CURE 7 DAYS

TEST PROCEDURE: DBA and Rad

COATING PERFORMED BY: ORNL DATE SUBMITTED 4-28-81

APPROVED Gerald E. Arnold

TEST REPORT NO. 495-81

TEST PANEL PREPARATION DATA

PRODUCT TO BE TESTED: Nutec 11S/Nutec 11/Nutec 1201 Nutec 11S/Nutec 1201

TYPE SUBSTRATE: Concrete Size: 2 x 4 x 2

SURFACE PREPARATION (Describe): Carborundum stone used to remove high lights and loose particles; broomed surface blast swept to remove efflorescence. Cleaned with 100 psi compressed air

PRODUCT DATA: SAMPLE NO.(s): A-34

DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: N/A

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
	Nutec	11S	2519/2530/2517	Squeegee	66°F/53%	*	2/4/81 3:00 p.m.
	Nutec	11S	2519/2530/2517	Squeegee	60°F/85%	**	2/5/81 9:00 a.m.
	Nutec	11S	2519/2530/2517	Squeegee	62°F/55%	***	2/9/81 9:30 a.m.
	Nutec	11	2476/2102/2444	Squeegee	62°F/43%	****	2/13/81,2:00
	Nutec	1201	9772/1959	Spray	73°F/52%	*****	2/16/81,3:00

FILM THICKNESS (ins.)		11S *	11S **	11S ***	11 ****	1201 *****
Side 1	Min.	.020-.025				.003-.005
Side 2		.025-.040			.001-.004	.003-.005
Side 3	Max.	.025-.035	.030-.040	.030-.040	.001-.004	.003-.005
Side 4			.020-.035	.030-.040		.003-.005

TOP VIEW OF COUPON

	3	
4		2
	1	

Numbered and broomed surfac

TOTAL DRY FILM THICKNESS RANGE - Side 1 .023-.030 Side 3 .086-.124
Side 2 .029-.049 Side 4 .053-.080

CURING CONDITIONS: AMBIENT TEMP. 70-80 °F REL. HUMIDITY 45-65 %

MINIMUM CURE 7 DAYS

TEST PROCEDURE: DBA

TESTING PERFORMED BY: ORNL DATE SUBMITTED 4-28-81

APPROVED Gerald C. Rosalt

TEST REPORT NO. 495-81

TEST PANEL PREPARATION DATA

PRODUCT TO BE TESTED: Nutec 11S/Nutec 11/Nutec 1201 , Nutec 11S/Nutec 1201

TYPE SUBSTRATE: Concrete Size: 2 x 4 x 2

SURFACE PREPARATION (Describe): Carborundum stone used to remove high lights and loose particles; broomed surface blast swept to remove efflorescence. Cleaned with 100 psi compressed air

PRODUCT DATA: SAMPLE NO.(s): A- 38

DATE AND TIME CURING COMPOUND OR PRIMER APPLIED: N/A

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
	Nutec	11S	2519/2530/2517	Squeegee	66°F/53%	*	2/4/81 3:00 p.m.
	Nutec	11S	2519/2530/2517	Squeegee	60°F/85%	**	2/5/81 9:00 a.m.
	Nutec	11S	2519/2530/2517	Squeegee	62°F/55%	***	2/9/81 9:30 a.m.
	Nutec	11	2476/2102/2444	Squeegee	62°F/43%	****	2/13/81,2:00
	Nutec	1201	9772/1959	Spray	73°F/52%	*****	2/16/81,3:00

FILM THICKNESS (ins.)		11S *	11S **	11S ***	11 ****	1201 *****
Side 1	min.		.030-.045		.001-.004	.003-.005
Side 2	max.	.025-.030	.030-.040		.001-.004	.003-.005
Side 3		.025-.030		.030-.040		.003-.005
Side 4		.025-.030	.030-.040			.003-.005

TOP VIEW OF COUPON

	3	
4		2
	1	

↑ Numbered and broomed surfac

TOTAL DRY FILM THICKNESS RANGE - Side 1 .034-.054 Side 3 .058-.075
Side 2 .059-.079 Side 4 .058-.075

CURING CONDITIONS: AMBIENT TEMP. 70-80 °F REL. HUMIDITY 45-65 %

MINIMUM CURE 7 DAYS

TEST PROCEDURE: DBA

TESTING PERFORMED BY: ORNL DATE SUBMITTED 4-28-81

APPROVED Gerald C. Arnold

TEST REPORT NO. 495-81

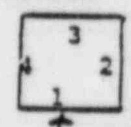
TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: Nutec 11S/Nutec 11/Nutec 1201, Nutec 11S/Nutec 1201
2. TYPE SUBSTRATE: Concrete SIZE: 2" x 4" x 2"
3. SURFACE PREPARATION (Describe): Blast swept on broomed surface to remove efflorescence; remaining faces wire brushed and blown down with 100 psi compressed air to remove dust and loose concrete.
4. PRODUCT DATA: SAMPLE NO.(s): A-78
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
	Nutec	11S*	2519/2086/2516	squeegee	71/73	See below	3-27-81
	Nutec	11*	2476/2683/2444	squeegee	73/64	"	4-2-81
	Nutec	1201	2606/2607	spray	69/51	"	4-6-81

FILM THICKNESS (ins.)		Nutec 11S	Nutec 11	Nutec 1201		TOTAL DFT RANGE
Side 1		.020-.030	.006-.010	.008-.012		.034-.052
Side 2	Min.	.020-.030		.008-.012		.028-.042
Side 3		.020-.030	.006-.010	.008-.012		.034-.052
Side 4		.020-.030	.006-.010	.008-.012		.034-.052

TOP VIEW OF COUPON



Numbered and broomed surface

. CURING CONDITIONS: AMBIENT TEMP. 65-80 °F REL. HUMIDITY 45-90 %

MINIMUM CURE 7 DAYS

. TEST PROCEDURE: DBA

. TESTING PERFORMED BY: ORNL DATE SUBMITTED 4-28-81

*Hand mixed

APPROVED: Gerald E. Arnold

TEST REPORT NO: 495-81

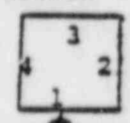
TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: Nutec 11S/Nutec 11/Nutec 1201 , Nutec 11S/Nutec 1201
2. TYPE SUBSTRATE: Concrete SIZE: 2" x 4" x 2"
3. SURFACE PREPARATION (Describe): Blast swept on broomed surface to remove efflorescence; remaining faces wire brushed and blown down with 100 psi compressed air to remove dust and loose concrete.
4. PRODUCT DATA: SAMPLE NO.(s): A-83
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED N/A

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
	Nutec	11S*	2519/2086/2516	squeegee	71/73	See below	3-27-81
	Nutec	11*	2476/2683/2444	squeegee	73/64	"	4-2-81
	Nutec	1201	2606/2607	spray	69/51	"	4-6-81

FILM THICKNESS (ins.)		Nutec 11S	Nutec 11	Nutec 1201		TOTAL DFT RANGE
Side 1		.020-.030	.006-.010	.008-.012		.034-.052
Side 2	min.	.020-.030		.008-.012		.028-.042
Side 3		.020-.030	.006-.010	.008-.012		.034-.052
Side 4		.020-.030	.006-.010	.008-.012		.034-.052

TOP VIEW OF COUPON



Numbered and broomed surface.

. CURING CONDITIONS: AMBIENT TEMP. 65-80 °F REL. HUMIDITY 45-90 %

MINIMUM CURE 7 DAYS

. TEST PROCEDURE: DBA / Radiation Tolerance

. TESTING PERFORMED BY: ORNL DATE SUBMITTED 4-28-81

*Hand mixed

APPROVED: Gerald E. Arnold

TEST REPORT NO: 495-81

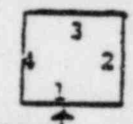
TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED: Nutec 11S/Nutec 11/Nutec 1201, Nutec 11S/Nutec 1201
2. TYPE SUBSTRATE: Concrete SIZE: 2"x4"x2"
3. SURFACE PREPARATION (Describe): Blast swept on broomed surface to remove efflorescence; remaining faces wire brushed and blown down with 100 psi compressed air to remove dust and loose concrete.
4. PRODUCT DATA: SAMPLE NO.(s): A-85
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(^{o}F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
	Nutec	11S*	2519/LN138-17-2	squeegee	71/73	See below	3-27-81
	Nutec	11*	2476/LN138-17-1	squeegee	73/64	"	4-2-81
	Nutec	1201	2606/2607	spray	69/51	"	4-6-81

FILM THICKNESS (ins.)		Nutec 11S	Nutec 11	Nutec 1201		TOTAL DFT RANGE
Side 1		.020-.030	.006-.010	.008-.012		.034-.052
Side 2	min.	.020-.030		.008-.012		.028-.042
Side 3		.020-.030	.006-.010	.008-.012		.034-.052
Side 4		.020-.030	.006-.010	.008-.012		.034-.052

TOP VIEW OF COUPON



Numbered and broomed surface.

6. CURING CONDITIONS: AMBIENT TEMP. 65-80 ^{o}F REL. HUMIDITY 45-90 %
MINIMUM CURE 7 DAYS

7. TEST PROCEDURE: DBA

8. TESTING PERFORMED BY: ORNL DATE SUBMITTED 4-28-81

*Cowles Mixed

APPROVED: Gerald E. Arnold

TEST REPORT NO: 495-81

RESULTS

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

May 26, 1981

Mr. Gerald E. Arnold
Technical Representative
Imperial Professional Coatings
P.O. Box 29077
New Orleans, Louisiana 70189

Dear Jerry:

Enclosed are the test results on your recently submitted specimens.

If we can be of further assistance, please feel free to call on us.

Sincerely yours,

L. T. Corbin

L. T. Corbin, Section Head
Analytical Chemistry Division

LTC:dmw

Enclosures

Manufacturer: Imperial

New Orleans, Louisiana

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: May 26, 1981

SYSTEM IDENTIFICATION

___ Steel panel x Concrete block

115/1201

RADIATION TOLERANCE TEST

ORNL Master Analytical Manual Method No. 2 0921; Bechtel Corporation Specification No. CP-951; ORNL Log Book No. A9675, A5-5-1.

Initial dose rate: 1.0×10^7 rad
Test conducted in: x air ___ water

Sample No.	Cumulative dose	Test results
A-32	2×10^8 rad	Coatings intact, no defects.

Evaluated Paul F. [illegible]

Approved L. T. [illegible]

Manufacturer: Imperial
New Orleans, Louisiana

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: May 26, 1981

SYSTEM IDENTIFICATION

___ Steel panel   x Concrete block

115/1201

DBA TEST

ORNL Master Analytical Manual Method No. 2 0922.
ORNL Log Book No. A9675, A5-5-1

Sample No.	DBA phase	Test results
A-32	spray*	Coatings intact, no defects, all areas.
A-34	spray	Coatings intact, no defects, all areas.
A-38	spray	Coatings intact, no defects, all areas.

*Irradiated.

Evaluated Ralph F. Apple

Approved L. T. Corbin

Manufacturer: Imperial

New Orleans, Louisiana

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: May 26, 1981

SYSTEM IDENTIFICATION

____ Steel panel x Concrete block

11S/11/1201

RADIATION TOLERANCE TEST

ORNL Master Analytical Manual Method No. 2 0921; Bechtel Corporation Specification No. CP-951; ORNL Log Book No. A9675, A5-5-1 .

Initial dose rate: 1.0×10^7 rad
Test conducted in: x air ____ water

Sample No.	Cumulative dose	Test results
A-83	2×10^8 rad	Coatings intact, no defects.

Evaluated Ralph L. Hugh

Approved L. T. [illegible]

Manufacturer: Imperial

New Orleans, Louisiana

Analytical Chemistry Division
Oak Ridge National Laboratory
Date: May 26, 1981

SYSTEM IDENTIFICATION ____Steel panel x Concrete block

11S/11/1201

DBA TEST

ORNL Master Analytical Manual Method No. 2 0922.
ORNL Log Book No. A9675, A5-5-1

Sample No.	DBA phase	Test results
A-78	spray	Coatings intact, no defects, all areas.
A-83	spray*	Coatings intact, no defects, all areas.
A-85	spray	Coatings intact, no defects, all areas.

*Irradiated.

Evaluated [signature]

Approved [signature]

Allegation No. 13

It is alleged that the coatings applied to areas such as the reactor core cavity will not maintain their integrity due to neutron and gamma exposure. It is further alleged that water and flaked-off paint will flow out of the reactor core cavity in the case of a LOCA. Are the coating systems applied to these area qualified under ANSI 101.2-1972, especially for environmental and DBA conditions? Which areas are qualified and which areas are not? If coatings in the cavity will come off with irradiation, will this cause a problem post-LOCA?

Evaluation of Validity

In the event of a LOCA, water will flow into, not out of, the reactor cavity. In order to be of safety significance, "flaked-off" paint would have to flow to the ECCS sump and thereby inhibit ECCS operations. There is no flow path from the reactor cavity to the ECCS. Consequently, "flaked-off" paint could not pose a safety problem.

This concern was originally voiced on NCR-C-83-00461 in February 1983 and addressed in the NCR disposition. Although the coatings systems within the reactor core cavity are DBA qualified, and their application in that area has been fully inspected and documented, it is assumed that these coatings will fail due to the severe radiation environment in which they are located. Accordingly, these coatings have been placed by Engineering on the Protective Coatings Exempt Log (attached, Item 41).

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

PROTECTIVE COATINGS EXEMPT LOG

ENTRY Nº	ITEM OR AREA	COATING SYSTEM	SQ.FT.
31	COATINGS APPLIED TO INTERIOR OF PIPE BUMPERS REF DCA 19,050 INCORPARATED INTO Rev 2 of AS-31	CARBOLINE CZ11/ Phenoline 305 TOPCOAT	200.0
32	COATINGS INADVERTENTLY APPLIED TO INTERIOR OF TUBE STEL SUPPORTS REF DCA 16106	CARBOLINE CZ11/ Phenoline 305 TOPCOAT	6,000.0
33	COATINGS ON TOP OF POLAR CRANE SUPPORT GIRDERS UNIT 1 BLDG. RE DCA 19707	CARBOLINE CZ11/ PHENOLINE 305 TOPCOAT	1,040.0
34	SUPPORT L'S FOR LIFE LINES @ EL 1000'4" & SUPPORT CLIPS FOR LIFE LINES @ EL 953'-8" RE DCA 20170	CARBOLINE 191/ PHENOLINE 305 TOPCOAT	58.0
35	RB1 AREA 40 & 39, EMBEDDED PIPE VENTS PRIMED UNDER AS 30 REQUIREMENTS - Re DCA 20252 (UNIT 1)	CARBOLINE 191 PRIMER	3.0
36	WESTINGHOUSE EQUIPMENT MEETING THE CATEGORY 3 REQUIREMENTS AS REFERENCED IN WESTINGHOUSE POSITION LETTER RG 1.54 RO	UNKNOWN	900.0
37	UNIT 1 REACTOR BLDG ROTATING ACCESS TROLLEY & ITS ASSOCIATED MECH EQUIPMENT.	KEELER & LONG 6548 PRIMER WJ #7475 TOPCOAT.	500.0*
38	UNIT 1 REACTOR BLDG POLAR CRANE CABLE DRUMS RE NCR C84 01494	CARBOLINE CZ11 PRIMER/ 305 TOPCOAT	288.0
39	CONTAINMENT ACCESS ROTATING PLATFORM HAND RAILS, STAIR TREAD GRATING	KEELER & LONG 6548 PRIMER WJ #7475 TOPCOAT	170.0
40	EDGE OF CONNECTING PL'S ON EAST SIDE OF SOUTH END GIRDER ON UNIT 1 POLAR CRANE - RE. NCR C84-01508	CARBOLINE 191 PRIMER / 305 TOPCOAT	5.0
41	RB1 ROOM 153 CONCRETE COATINGS	IMPERIAL NUTEC 11S / 11 / 1201 SYSTEM	3135
42	WESTINGHOUSE EQUIPMENT MEETING THE CATEGORY 2 REQUIREMENTS AS REFERENCED IN WESTINGHOUSE POSITION LETTER RG 1.54 RO (UNIT 1)	UNKNOWN	3,950

Allegation No. 14

a. It has been alleged that after a NCR is written, anyone can sign off on it.

b. It has been alleged that NCRs cannot be written, and that IRs must be written with "unsats." It is alleged that NCRs must be disposition by an engineer, while IRs can be dispositioned by anyone. What prevents items identified on an IR from becoming lost, the problem not being resolved, or generic items not being identified?

Evaluation of Validity

Allegation 14a is incorrect. The current site NCR procedure (CP-QP-16.0), and all prior revisions thereof, specify the individuals that are authorized to disposition an NCR, and to approve that disposition.

Allegation 14b seems to be a grouping of misconceptions.

CPSES coatings inspection procedures have always provided a means for identification, documentation, and disposition of nonconforming conditions. The vehicle for reporting such discrepant conditions at CPSES has included inspection reports, Field Deficiency Reports, and Nonconformance Reports. Each of these have been evaluated for trends adverse to quality in accordance with Criterion XVI of 10CFR50 Appendix B. The use of reporting documents other than NCR's at CPSES has also been evaluated by the Atomic Safety and Licensing Board and by NRC Region IV.

It is not true, as alleged, that "IRs can be dispositioned by anyone." Site procedures specify three methods for resolution of an Unsat IR. First, the discrepant area or condition may be reworked and reinspected. This disposition does not require Engineering input. Second, an Unsat IR may be dispositioned by a DCA, in which case Engineering input is provided in the DCA itself.

Third, the Unsat IR may be closed by the issuance of an NCR describing the same condition. Disposition of the NCR includes the required Engineering input.

Unique numbering in combination with manual logging of IRs provides tracking which precludes possibility of their unidentified loss or lack of resolution.

IR's are trended quarterly which provides trend analysis and corrective action for generic items as well as quality trends.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

Allegation No. 15

a. It is alleged that Paragraph 4.4.3.0 of Procedure Number CCP-30, Rev. 11, allows CZ-11 or Carboline 191 to be applied over existing Phenoline 305 topcoat and left intact, without sanding back to a "mottled" transition.

b. It is also alleged that this paragraph allows Phenoline 305 to be applied over Reactic 1201 and vice-versa.

Are these coating systems qualified, for example for environmental and DBA conditions, under ANSI 101.2-1972?

Evaluation of Validity

As with Allegations No. 1, 2 and 12, this allegation addresses a limited area in which two adjacent coatings applications or systems overlap. Allegation 15a is only partially correct. The referenced procedure governs certain repairs of coated steel surfaces. Contrary to the allegation, this procedure does require that existing coatings be feathered -- sanded -- back a sufficient distance to ensure a smooth final coating system. This paragraph also limits the area of "overlapping" systems to 1 1/2". No interface of two adjacent coatings applications or systems can be constructed without some degree of overlap. Although the referenced system in the allegation has not been DBA qualified, the practice of allowing overlapping systems in interface areas without formal DBA qualification of the resultant system has been and continues to be industry practice. Due to the limited amount of total surface area involved, this approach does not present any adverse technical or safety implications.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not Applicable

TXX-4201
06/22/84

Allegation No. 16

As a result of numerous allegations regarding improper pressure being applied to QC inspectors, NRC Office of Investigations has written violations in this area and proposed two civil penalties. Are there any coating material deficiencies in the plant resulting from the improper pressure applied to QC inspectors (e.g., pressure not to write unsat reports or NCRs, threats to lose job, use of verbal instructions to QC inspectors vs. written instructions, lack of support from QC management in technical disputes with construction, confusing instructions which do not support unsats, such as QI-QP-11, 4-5, Rev. 27, page 5 of 27, Note 4 and page 19 of 27 paragraph 3.7.5.b).

Evaluation of Validity

Applicants have formally responded to the proposed civil penalties. Our assessment of the situations which prompted the NRC to propose the civil actions resulted in a program to improve communication at all levels at CPSES. The Atomic Safety and Licensing Board considering the application for operating license for CPSES will consider allegations that improper pressure was applied to QC coatings inspectors. Applicants will present evidence to the Board that there has not been, and is not now, improper pressure applied to QC coatings inspectors. Such a practice has not and will not be tolerated. There is no reason to believe (nor is it reasonable to believe) that coating material deficiencies exist in the plant which have not been properly identified and resolved in accordance with the CPSES QA Program. This conclusion is supported by extensive OI investigations relative to this same subject, the results of which have recently been made public.

Note 4 on page 5 of 27 of QI-QP-11.4-5 Revision 27, is the procedure for isolating and determining the extent of coating areas that fail to meet dry film thickness requirements as detected by spot measurements. Using this procedure, a QC inspector can identify the coated areas that are unsatisfactory. In such case, the inspector prepares an "Unsat" IR, indicating any unacceptable localized areas within the overall area inspected. Any unacceptable areas must then be repaired and reinspected to assure acceptability. The allegation that this instruction does "not support unsats" is incorrect. Paragraph 3.7.5.b of this same inspection instruction simply permits the inspector to have the craft repair pinholes or small discontinuities while he is standing at the location. It is difficult to perceive how this instruction could contribute to "coating materials deficiencies" in tha words of the allegation. To the contrary, the procedure allows tha inspector to visually scrutinize the repairs of those defects while they are being performed.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 17

It is alleged that the "air acceptability test" results are invalid because cigarette butts are placed into the cheater valve of the spray gun prior to the test and removed after the test. Further, it is alleged that construction and QC management was aware of this practice.

Evaluation of Validity

Our investigation indicates that cigarette filters, not butts, were used in the cheater valve of the spray gun as a filter for oil and water contamination. Management was aware of the use of the filters. QC management was not aware, and cannot confirm, that filters were removed after the "air acceptability tests." In all cases, traps and filters were installed in the air line for the spray guns. In some cases, this degree of filtration proved insufficient, as small quantitites of oil and water still reached the gun and were visible on the "air acceptability test." The cigarette filters were used to remove the small quantity of contamination in the line that was not removed by traps and filters. If these filters were removed (as alleged) and if grease, oil and water went through the spray gun and were therefore applied with the coatings, the resultant coating system would have contained visible defects if the contaminants were in sufficient quantity to adversely affect the performance of the coating. Water applied with an inorganic zinc primer would have enhanced the cure and would have had no adverse effect. Water applied with epoxies would have resulted in a loss of gloss of the coating system and/or a "greasy" film over the coating surface. Grease and oil applied with inorganic zinc coatings would have been visually detectable due to discoloration and "creeping" or "crawling" of the cured film. Grease and oil applied with epoxies would be visually evident by appearance of fisheyes and crawling of the cured film. In all cases where these defects would have been present, QC would have rejected the defective areas at the time of visual inspection of the cured film. Deficient areas would then be reworked in accordance with applicable site procedures.

In actuality, no air supply can be made 100% free of oil and water. Minute quantities of each will be present in an air supply system which passes the "air acceptability test." In the event that part of the filtration system had been removed as alleged, any quantity of grease, oil or water, sufficient to cause adverse performance of the coating system, would have been detected by visual inspection and the deficiency corrected in accordance with applicable procedures.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 18

It is alleged that QC inspectors are not allowed to identify visual defects such as cracking or blistering during backfit inspections.

Evaluation of Validity

Backfit inspection procedures QI-QP-11.4-23 (Steel Substrates) and QI-QP-11.4-24 (Concrete Substrates) require dry film thickness measurements and adhesion tests of coated surfaces being reinspected. It was not intended that visual inspections of coated surfaces be performed as part of the backfit inspection program. Inspections of coated surfaces for visual defects are required by QI-QP-11.4-5 (Steel Substrates) and QI-QP-11.4-10 (Concrete Substrates). QI-QP-11.4-5 requires inspection of prime coated steel substrates for visual defects prior to any primer repairs and prior to seal or finish coat applications. QI-QP-11.4-10 requires inspections of concrete surfacer applications for visual defects prior to finish coat application. As part of finish coat final acceptance inspections, visual inspections are performed in accordance with QI-QP-11.4-5 (Steel Substrates) and QI-QP-11.4-10 (Concrete Substrates) on all coated surfaces (including all items inspected during the backfit program) in each area prior to turnover of the area. These final visual inspections include the identification (and repair) of surface defects such as cracking or blistering.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 19

It is alleged that Instruction Number QI-QP-11.4-23 and QI-QP-11.4-24 are very vague regarding the way the backfit inspections are to be conducted.

Evaluation of Validity

The allegation itself is so general, referring as it does to all of the backfit instructions, that it is difficult to evaluate. Nontheless, our review of the current revision of instructions QI-QP-11.4-23 and QI-QP-11.4-24 and of all previous revisions of each, indicates that there is no validity to this allegation. Each of these instructions provides clearly-stated step-by-step instructions which assure effective backfit inspections of coated surfaces. Each instruction includes the following provisions:

(1) Description of specific application of instruction, i.e., testing of coatings on steel substrates (QI-QP-11.4-23) and concrete substrates (QI-QP-11.4-24) for which corresponding documentation is missing or discrepant in order to determine acceptability of coating dry film thickness and tensile strength of adhesion to the substrate.

(2) Description of specific method for performance of scratch tests for determination of coating dry film thickness including Tooke gauge to be used, daily accuracy checks of the Tooke gauge, number of tests required based upon size of test area, and acceptance criteria.

(3) Description of specific method for performance of adhesion tests including calibrated adhesion tester to be used, number of tests required based upon size of test area, and acceptance criteria.

(4) Description of specific method for use of status indicators to physically identify all coated surfaces which backfit inspections determine to be unsatisfactory.

(5) Description of specific method for documenting results of backfit inspections.

(6) Description of requirements for mapping areas which have been backfit inspected in order to provide required traceability to the corresponding backfit inspection reports.

Six inspectors who have been utilizing these instructions during the past two and a half years to perform protective coatings reinspections, were individually questioned as to whether present or past revisions of these instructions were vague as written or as applied. All six inspectors responded that they have encountered no difficulties in understanding the requirements of either present or past revisions of QI-QP-11.4-23 and QI-QP-11.4-24.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 20

It is alleged that adhesion testing of the protective coatings are not performed properly. The QC inspectors are instructed not to cut around the adhesion test dollies when conducting adhesion tests. The instructions that come with the machine tell you to do so (and Specification AS-31 references these instructions).

Evaluation of Validity

We concur that the manufacturer's instructions for the Elcometer 106B Adhesion Tester recommend scribing around the dollies prior to pulling. We do not believe that the lack of scribing dollies invalidates adhesion testing. The Elcometer 106B adhesion tester is manufactured for all types of coatings, not just the phenolics and epoxies used at CPSES. The scribing of dollies could be an important factor in establishing adhesion values for some types of coatings, particularly those which exhibit peeling of coating upon receiving a tensile force or "band-aiding." The scribing of dollies is not an important consideration for adhesion testing of phenolics and epoxies and consequently this requirement was not incorporated into the original revisions of the backfit procedures QI-QP-11.4-23 and QI-QP-11.4-24. Testing was performed to substantiate the lack of importance of scribing around the dollies in testing the coatings used at CPSES. These tests showed that differences in values reached with scribed and unscribed dollies were statistically insignificant. A copy of the test report and the statistical analysis of the results is attached.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TUQ-1726

use in
NRC Report
83-07/83-04

TEXAS UTILITIES GENERATING COMPANY

OFFICE MEMORANDUM

To File Glen Rose, Texas July 6, 1983

Subject Test Report on Adhesion Tests

Background:

Manufacturers recommendations for use of the Elcometer Adhesion Tester Model 106 state that dollies should be scored prior to pulling to assure that the tensile force is acting only on a one square inch of coating.

A conscious decision was made in late 1981 (when the coatings "backfit" program began) to omit the requirement for scoring of the dollies based on:

1) Tensile strength of coating vs minimum requirement of spec.
2) Brittle nature of phenolic coating doesn't allow for paint to be removed in strips.
3) Conversations with coatings personnel involved with protective coatings for the nuclear industry.

The NRC identified the fact that this manufacturers recommendation had not been incorporated into the protective coatings instructions/procedures and had not been done in their (QC) field inspections. This was identified in I&E Report 83-07/83-04.

On 2/1/83, Mr. Mike Foote of TUGCO QA contacted Mr. Ken Trimber of KTA - Associates, Inc., who is the vendor who distributes the adhesion tester in question and has conducted in house testing which have shown no differences in results when dollies are not scored. Mr. Trimber stated that the ASTM D1.46.04 committee was presently in progress of establishing a standard for performing adhesion testing. However, this standard was not yet available, and suggested performing our own testing on site.

On Site Tests:

2 steel test panels (each approximately 2 ft. square) were prepared, blasted, primed with CZ-11, and finish coated with Phenoline 305. Three separate tests were run on these two steel panels (results attached).

Two concrete tests were conducted on a concrete wall which had been previously coated in Reactor Unit 2 (results attached). All testing was performed by the writer, with assistance from M. E. Foote, Coatings Quality Engineer; H. O. Williams, Coatings Supervisor; and Mr. Robert Wallace, Coatings Lead Inspector.

Analysis of Results:

A statistical analysis of the test results was performed by L. M. Bielfeldt, Special Project Engineer, TUGCO QA Dallas. She utilized the Wilcoxson two-sample test, which is a non-parametric test of hypothesis. In each case, the null hypothesis was that the mean of the uncut samples equaled the mean of the cut samples. Two tailed tests were conducted at a 5% level of significance and each test concluded that the null hypothesis should be accepted.

Conclusion:

The tests demonstrated that there is no significant difference between the scored and unscored dollies (at a 95% confidence level) and therefore, is no reason to either score around dollies before pulling or to question the validity of previous adhesion tests.

Prepared By: C. T. Brandt
Non-ASME QA/QC Supervisor
Protective Coatings Level III

Reviewed and Approved: R. G. Tolson
TUGCO Site QA Supervisor

RGT/CTB/lp
Attachments
cc: L. M. Bielfeldt
R. M. Kissinger

TEST RESULTS

	Uncut	Cut
Concrete Test 1	850	750
	450	500
	400	450
	500	400
	450	600
	600	800
Concrete Test 2	550	450
	400	625
	575	600
	400	475
	500	500
	625	625
	550	575
Steel Test 1	500	575
	550	550
	525	575
	675	600
	625	575
	650	650
	550	675
Steel Test 2	580	420
	500	460
	375	400
	600	425
	425	700
Steel Test 3	600	550
	650	600
	600	600
	600	650
	725	600
	600	525
	600	550
	575	575
	950	575
	575	
	600	
	450	

arms
file
NRM
M. Foote-326

2-3-83
9:01 AM
Ery

TUGCO CHSE

KTA-TATOR PGH
MR. MIKE FOOTE
TUGCO

FOLLOWING IS A CONFIRMATION OF OUR 2/1/83 TELECON REGARDING SCORING AROUND TEST DOLLIES WHEN USING THE ELCOMETER ADHESION TESTER. ALTHOUGH THEORETICALLY THE COATING SHOULD BE SCORED, KTA IN-HOUSE WORK HAS SHOWN NO DIFFERENCES IN RESULTS WHEN NOT SCORING.

NO STANDARDS CURRENTLY EXIST FOR USING THE INSTRUMENT. HOWEVER ASTM D1.46.04 IS PRESENTLY PREPARING A STANDARD AND INITIATING A SERIES OF ROUND ROBIN TEST PANEL STUDIES. THE GROUP MET LAST WEEK AND AGREED TO INCLUDE SCORING VS. NOT SCORING IN THE PROGRAM, ALTHOUGH MANY OF THE MEMBERS FELT THAT SCORING WAS UNNECESSARY BASED ON THEIR EXPERIENCE. ALSO, ON CONCRETE IT MAY BE POSSIBLE TO CREATE A SHEAR PLANE IN THE CONCRETE WHEN DRILLING, CAUSING A LOW PSI BREAK IN THE CONCRETE.

IN ORDER TO SOLVE YOUR IMMEDIATE QUESTION, IT IS SUGGESTED THAT YOU CONDUCT YOUR OWN TEST. PULL 10 DOLLIES SIDE BY SIDE: 5 SCORED AND 5 NOT SCORED AND COMPARE THE RESULTS.

VERY TRULY YOURS,

KENNETH A. TRIMBER
KTA-TATOR, INC.

P

TEXAS UTILITIES GENERATING COMPANY

OFFICE MEMORANDUM

To C. T. Brandt Glen Rose, Texas February 2, 1983

Subject Calibration of Adhesion Tester

I have personally discussed with Mr. Ken Trimber acceptable methods of calibration of adhesion testers this morning.

Mr. Trimber indicated that they (KTA - Associates) send their adhesion testers to Pittsburg Testing Laboratory in Pittsburg, PA where they are tested in a Tensile Tester. He indicated that a tension-testing calibration method would be an acceptable means of calibration.

M. E. Foote
Structural QC Supervisor

MEF/ls

cc: R. G. Tolson
M. Wells
J. D. Martin

QIQ-389

TEXAS UTILITIES GENERATING COMPANY

OFFICE MEMORANDUM

To: C. T. Brandt

Dallas, Texas: June 23, 1983

Subject: PATCH TESTS RESULTS

REFERENCE: NRC IR 83-07/02
NRC IR 83-19/13

I have reviewed the results of your adhesion tests comparing cut and uncut patches of protective coatings applied to concrete and steel substrates. In short, the tests demonstrate that there is no significant difference between the results of cut and uncut patch tests, at a 95% level of confidence.

The test data was analyzed by the Wilcoxon two-sample test, which is a non-parametric test of hypotheses. Attachments A, B and C contain summaries of the analyses. In each case the null hypothesis was that the mean of the uncut samples equaled the mean of the cut samples. Two-tailed tests were conducted at a 5% level of significance and each test concluded that the null hypothesis should be accepted.

If you have any further questions or comments, please do not hesitate to contact me.

Lisa Bielfeldt

L. M. Bielfeldt
Special Project Engineer

LMB:lm
Attachments
cc: R. G. Tolson

ATTACHMENT A

Concrete Substrate Tests 1 & 2

RANK	TEST RESULT	RANK	TEST RESULT
2.5	400	14.5	550
2.5	400	14.5	550
2.5	400	16.5	575
2.5	400	16.5	575
6.5	450	19	600
6.5	450	19	600
6.5	450	19	600
6.5	450	22	625
9	475	22	625
11.5	500	22	625
11.5	500	24	750
11.5	500	25	800
11.5	500	26	850

NOTE: Underlined test results are for uncut samples. Subscripts 1 and 2, below, represent uncut and cut samples respectively.

$n_1 = 13$ $\qquad \bar{x}_1 = 526.9$

$n_2 = 13$ $\qquad \bar{x}_2 = 565.4$

$H_0: \mu_1 = \mu_2$

$H_1: \mu_1 \neq \mu_2$

$\alpha = 0.05$

Critical region: $U \leq 45$

$w_1 = \sum \text{ranks}_1 = 156.0$

$$u = w_1 - \frac{(n_1)(n_1+1)}{2} = 65$$

$\therefore$ accept H_0

ATTACHMENT B

Steel Substrate Tests 1 & 2

RANK	TEST RESULT	RANK	TEST RESULT
1	375	14	575
2	400	14	575
3	420	14	575
4.5	425	16	580
4.5	425	17.5	600
6	460	17.5	600
7.5	500	19	625
7.5	500	20.5	650
9	525	20.5	650
11	550	22.5	675
11	550	22.5	675
11	550	24	700

NOTE: Underlined test results are for uncut samples. Subscripts 1 and 2, below, represent uncut and cut samples respectively.

$n_1 = 12$ $\bar{x}_1 = 546.3$

$n_2 = 12$ $\bar{x}_2 = 550.4$

$H_0: \mu_1 = \mu_2$

$H_1: \mu_1 \neq \mu_2$

$\alpha = 0.05$

Critical region: $U \leq 37$

$w_1 = \Sigma \text{ranks}_1 = 147.0$

$$u = w_1 - \frac{(n_1)(n_1 + 1)}{2} = 69$$

$\therefore$ accept H_0

ATTACHMENT C

Steel Substrate Test 3

RANK	TEST RESULTS	RANK	TEST RESULTS
1	<u>450</u>	13	<u>600</u>
2	525	13	<u>600</u>
3.5	550	13	<u>600</u>
3.5	550	13	600
6.5	575	13	600
6.5	<u>575</u>	13	600
6.5	<u>575</u>	18.5	<u>650</u>
6.5	575	18.5	650
13	<u>600</u>	20	<u>725</u>
13	<u>600</u>	21	<u>950</u>
13	<u>600</u>		

NOTE: Underline test results are for uncut samples. Subscripts 1 and 2, below, represent cut and uncut samples, respectively.

$n_1 = 9$ $\bar{x}_1 = 580.6$

$n_2 = 12$ $\bar{x}_2 = 627.1$

$H_0: \mu_1 = \mu_2$

$H_1: \mu_1 \neq \mu_2$

$\alpha = 0.05$

Critical region: $U \leq 26$

$w_1 = \sum \text{ranks}_1 = 79.5$

$$u = w_1 - \frac{(n_1)(n_1 + 1)}{2} = 34.5$$

$\therefore$ accept H_0

TXX-4201
06/22/84

Allegation No. 21

It is alleged that Brown & Root is doing the calibration on these adhesion testers, and they are not using a corrected value curve (which should have been supplied with each unit).

Evaluation of Validity

Brown & Root is performing calibration of the Elcometer 106B adhesion testers. This calibration does not involve the utilization of a "corrected value curve." Contrary to the allegation, corrected value curves are not supplied with the adhesion tester. Attached is a copy of all literature provided by the manufacturer of the adhesion testers; it does not include any reference to corrected value curves.

The use of corrected value curves is normally associated with precision instruments. The Elcometer 106B Adhesion Tester is by no means a precision instrument. The smallest gradations on the scale of the Elcometer 106B Adhesion Tester are in 200 psi intervals, and readings taken by the user are approximations within this 200 psi range. This provides for the possibility of significant observation error.

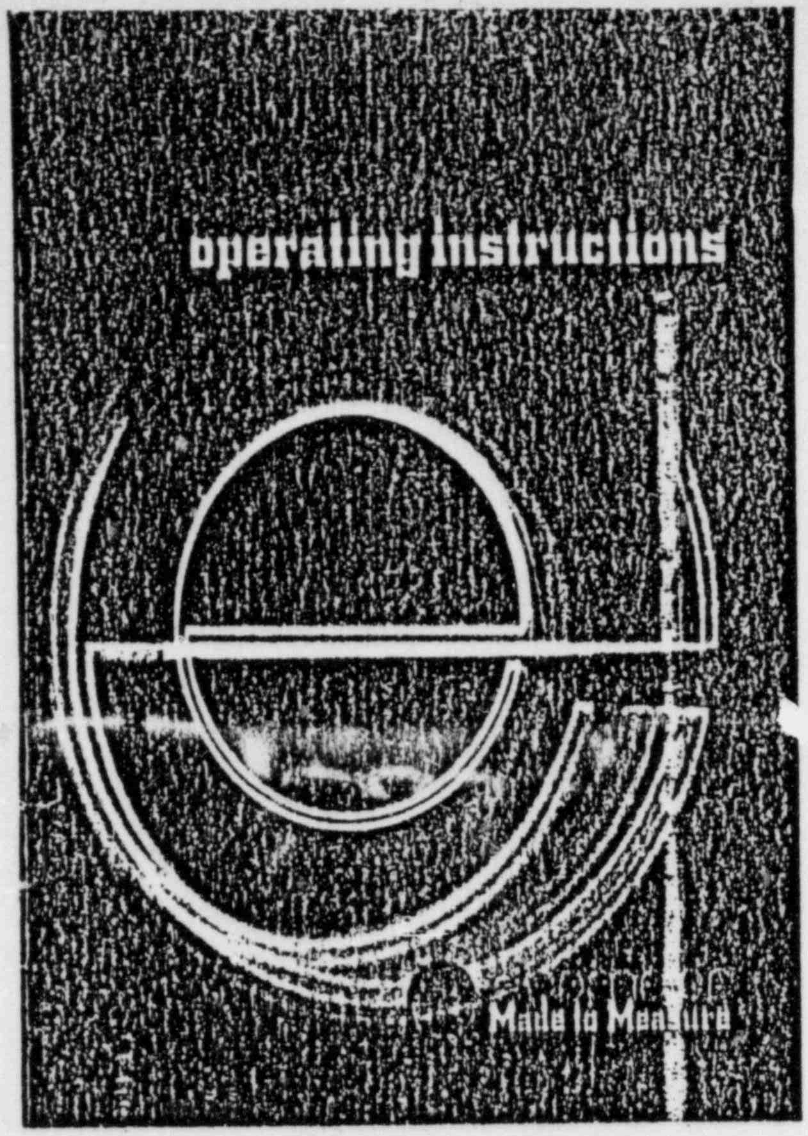
The purpose of performing adhesion testing is to substantiate proper adhesion and cohesion of the applied coatings, not to establish absolute values for tensile strength of adhesion. It is more prudent to adjust the frequency of calibration to maintain accuracy limits, which is the approach selected at CPSES, rather than to provide "adjusted values" to a nonprecision instrument and estimates of values.

Safety Significance

None known

Generic Implications on Other Systems or Contractors

Not applicable


operating instructions
Made to Measure

ELCOMETER MODEL 106

ADHESION TESTER

T10072502

SECTION 1

INTRODUCTION

THE ELCOMETER 106 ADHESION TESTER IS DESIGNED TO MEASURE THE BOND STRENGTH OF APPLIED COATINGS. A WIDE RANGE OF COATINGS CAN BE TESTED INCLUDING PAINT, PLASTIC, SPRAYED METAL, EPOXY, WOOD VENEERS AND LAMINATES ON WOOD, METAL OR PLASTIC.

THE INSTRUMENT EMPLOYS THE PULL-OFF METHOD [illegible] MEASURE THE LIFT OFF FORCE REQUIRED TO PULL A TEST [illegible] OFF A SMALL AREA OF COATING AWAY FROM THE BASE MAT[illegible]. TO ENSURE THAT SPECIFICATION REQUIREMENTS ARE MET. AFTER SURFACE PREPARATION, A DOLLY IS ATTACHED TO THE COATING UNDER EXAMINATION. AFTER CURING THE COATING IS CUT THROUGH. THE INSTRUMENT CLAW IS ENGAGED AND THE LIFT FORCE IS APPLIED. THE FORCE APPLIED IS RECORDED BY MEANS OF A DRAGGING INDICATOR ON AN ENGRAVED SCALE. THERE ARE FIVE DIFFERENT RANGES AVAILABLE AND EACH RANGE IS EXPRESSED IN IMPERIAL AND METRIC UNITS MAKING CORRECTION FOR THE AREA OF THE DOLLY. THE INDICATOR RETAINS THE VALUE WHEN THE DOLLY AND COATING SEPARATE FROM THE SURFACE AND IS RE-SET PRIOR TO EACH TEST.

THE 106 IS MECHANICALLY OPERATED AND DESIGNED TO BE COMPLETELY PORTABLE, TO OFFER THE PAINT INSPECTOR AND LABORATORY USER AN EASY, FLEXIBLE METHOD OF TESTING COATING AND SUBSTRATE BOND STRENGTHS.

SECTION 2
TECHNICAL SPECIFICATION

INSTRUMENT

RANGE	SCALE 1 0-35 KG/CM^2 AND 0-500 LB/IN^2 (0-3.43MPA)
	SCALE 2 0-70 KG/CM^2 AND 0-1000 LB/IN^2 (0-6.86MPA)
	SCALE 3 0-140 KG/CM^2 AND 0-2000 LB/IN^2 (0-13.72MPA)
	SCALE 4 0-280 KG/CM^2 AND 0-4000 LB/IN^2 (0-27.44MPA)
	SCALE 5 0-2 KG/CM^2 AND 0-30 LB/IN^2 (0-1.96MPA)
ACCURACY	±10% OF READING
HEIGHT	SCALES 1,2 & 5 - 155MM (6.1") SCALES 3 & 4 - 165MM (6.5")
DIAMETER	ALL SCALES 76MM (3")
NET WEIGHT	SCALES 1 & 5 - 0.96 KG (2.1 LB) SCALE 2 - 1.02 KG (2.24 LB) SCALE 3 - 1.62 KG (3.56 LB) SCALE 4 - 1.84 KG (4.05 LB)
GROSS WEIGHT (INCLUDING CASE AND ACCESSORIES)	SCALES 1 & 5 - 2.14 KG (4.7 LB) SCALE 2 - 2.18 KG (4.8 LB) SCALE 3 - 3.54 KG (7.79 LB) SCALE 4 - 3.74 KG (8.23 LB)
MATERIAL	ANODISED ALUMINIUM

TECHNICAL SPECIFICATION (CONTINUED)

TEST DOLLY	STANDARD WITH ALL 5 INSTRUMENTS
MATERIAL	HIGH TENSILE ALUMINIUM
DIAMETER	20MM ($3.14CM^2$)
BASE SUPPORT RING	(FOR USE WITH THIN SAMPLES)
MATERIAL	STEEL
CARRYING CASE	
MATERIAL	POLYPROPYLENE
DIMENSIONS	260MM X 345MM X 85MM (10.2"X13.6"X3.3")
ADHESIVE	ARALDITE (AV100) REGULAR
CURING TIME	24 HOURS AT 25^0C 3 HOURS AT 60^0C

SECTION 3.1
SURFACE PREPARATION

IN ALL CASES IT IS RECOMMENDED THAT THE SURFACE OF THE DOLLY AND THE TEST SURFACE BE DEGREASED WITH ACETONE, TRICHLOROETHYLENE OR SIMILAR, ABRADED WITH MEDIUM/FINE GRIT ABRASIVE PAPER AND DEGREASED AGAIN BEFORE ADHESIVE APPLICATION.

ADDITIONALLY, ENSURE THAT THE TEST AREA IS FREE FROM DUST AND IS DRY, AS THE PRESENCE OF SURFACE MOISTURE WILL GREATLY IMPAIR THE BOND OF AN ADHESIVE TO A COATING.

SECTION 3.2
ADHESIVE

THE ADHESIVE SUPPLIED WITH THE INSTRUMENT IS 'REGULAR' ARALDITE (AV100). THIS IS A TWO COMPONENT EPOXY RESIN PASTE, WHICH, WHEN MIXED, SHOULD BE USED WITHIN ONE HOUR. CURING TIMES ARE 24 HOURS AT 25^0C AND 3 HOURS AT 60^0C.

THIS ADHESIVE CAN GENERALLY BE USED IN WARM AND HOT ENVIRONMENTS. OTHER ADHESIVES ARE AVAILABLE FOR LOWER TEMPERATURES AND FASTER CURING, FROM YOUR DISTRIBUTOR OR FROM ELCOMETER INSTRUMENTS LTD.

SECTION 4
OPERATING INSTRUCTIONS

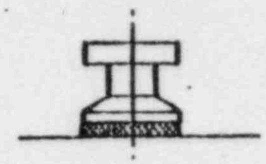
• IMPORTANT - PREPARATION OF DOLLY AND SURFACE

THE DOLLY IS MANUFACTURED FROM HIGH TENSILE ALUMINIUM AND CAN BE RE-USED. IT IS VERY IMPORTANT THAT THE SURFACE OF THE DOLLY AND COATING BE LIGHTLY ABRADED AND THOROUGHLY DEGREASED BEFORE APPLICATION OF THE ADHESIVE. FAILURE TO PREPARE DOLLY AND SURFACE MAY LEAD TO A POOR BOND AND AN INVALID TEST.

1. PREPARE THE SURFACE OF THE TEST DOLLY AND THE COATING BY ROUGHENING WITH ABRASIVE PAPER. THEN DEGREASE BY USING A SUITABLE SOLVENT TO CLEAN THE SURFACES, SUCH AS ACETONE, ALCOHOL, AND CARBON TETRACHLORIDE.

2. MIX A SMALL QUANTITY OF ADHESIVE (TWO PACK EPOXY RESIN) AND APPLY AN EVEN FILM TO THE TEST DOLLY.

3. PLACE THE DOLLY ONTO THE PREPARED TEST SURFACE AS SHOWN IN THE DIAGRAM AND APPLY PRESSURE TO SQUEEZE OUT EXCESS ADHESIVE WHICH SHOULD BE REMOVED. ALLOW TO CURE FOR THE RECOMMENDED TIME. N.B. THE USE OF THE DOLLY CLAMP WILL ASSIST WHEN STICKING TEST DOLLYS TO VERTICAL SURFACES WHICH HAVE A FERROMAGNETIC BASE. WHEN USING THE DOLLY CLAMP ENSURE THAT THE 'KEEPER DISC' IS REMOVED FROM THE BASE OF THE MAGNET PRIOR TO USE.



4. CUT THROUGH THE COATING AROUND THE BASE OF THE TEST DOLLY CAREFULLY, USING THE CUTTING TOOL PROVIDED. THE DOLLY CUTTER IS PROVIDED WITH A TOMMY BAR TO ASSIST THIS OPERATION.

5. PLACE THE SUPPORT RING OVER THE TEST DOLLY.

6. SLACKEN THE HANDWHEEL OR NUT OF THE ADHESION TESTER. SET THE DRAGGING INDICATOR TO '0' ON THE SCALE AND CAREFULLY ENGAGE THE TEST DOLLY WITH THE DOLLY CLAW.

7. ROTATE THE ADHESION TESTER HANDWHEEL/NUT CLOCKWISE SLOWLY AND UNIFORMLY, TO APPLY A PULL OFF FORCE TO THE TEST DOLLY. CONTINUE UNTIL THE COATING FAILS AND THE DOLLY IS REMOVED FROM THE SURFACE OR UNTIL THE SPECIFIED TEST FORCE IS INDICATED. THE MAXIMUM PULL-OFF FORCE ACHIEVED IS RETAINED AND CAN BE READ FROM THE INSTRUMENT BARREL BY OBSERVING THE POSITION OF THE DRAGGING INDICATOR.

8. REMOVE ANY PRESSURE FROM THE INSTRUMENT SPRING BY SLACKENING THE INSTRUMENT HANDWHEEL/NUT.

9. WHEN READING IS COMPLETE, RE-SET THE DRAGGING INDICATOR TO ZERO.

ASSESSMENT OF RESULTS

IN MOST CASES THE COATING WILL FULLY ADHERE TO THE DOLLY AND THE TEST CAN BE CLAIMED AS 100% VALID. THIS CAN BE DETERMINED BY EXAMINATION OF THE DOLLY AFTER COMPLETION OF THE TEST. IN CERTAIN INSTANCES, ONLY A PORTION OF THE COATING WILL BE REMOVED AND A PARTIAL ADHESION FAILURE BETWEEN THE ADHESIVE AND THE DOLLY MAY OCCUR. ALLOWANCES FOR THIS MUST BE MADE WHEN FINALLY EVALUATING THE RESULTS OF TESTS.

SECTION 5

MAINTENANCE

THE CALIBRATED PULL-OFF FORCE IS PROVIDED BY EITHER BELLEVILLE SPRING WASHERS OR A HELICAL SPRING WITHIN THE INSTRUMENT BODY.

AFTER SOME CONSIDERABLE USE, THE BELLEVILLE WASHERS OR HELICAL SPRING MAY AGE AND THE INSTRUMENT WILL NO LONGER INCORPORATE ITS ORIGINAL CHARACTERISTICS. THE BELLEVILLE SPRING WASHERS OR HELICAL SPRING MAY BECOME DISTORTED AND PERMANENTLY DAMAGED IF THE INSTRUMENT IS SCREWED UP FULLY, I.E BEYOND THE LENGTH OF THE ENGRAVED SCALE ON THE BARREL.

TO CHECK IF THE INSTRUMENT HAS DEVIATED FROM ITS INITIAL CALIBRATION, RELEASE THE HAND WHEEL OR NUT COMPLETELY, AND CHECK THAT THE ENGRAVED SCALE ON THE INSTRUMENT BARREL READS ZERO. IF IT DOES NOT, THEN THE BELLEVILLE SPRING WASHERS OR HELICAL SPRING HAVE BEEN PERMANENTLY DAMAGED AND REQUIRE REPLACING (SEE SECTION 6. SPARES)

REPLACE THE BELLEVILLE SPRING WASHERS OR HELICAL SPRING BY THE FOLLOWING PROCEDURE:-

1. OBTAIN APPROPRIATE SPARE COMPONENTS (SEE SECTION 6. SPARES).

2. UNSCREW THE HANDWHEEL OR NUT COMPLETELY.

3. REMOVE THE INSTRUMENT BARREL AND THEN REMOVE THE HELICL SPRING OR WASHERS, NOTING CAREFULLY IN THE LATTER CASE THE ORDER IN WHICH THE WASHERS ARE STACKED.

4. REPLACE THE HELICAL SPRING OR WASHERS, MAKING SURE THAT IN SCALES 2,3 AND 4 THE EXACT SAME NUMBER OF WASHERS ARE FITTED, IN EXACTLY THE SAME WAY AS THE ORIGINALS.

5. REPLACE THE SCALE BARREL AND CHECK THE ZERO. IT MAY BE NECESSARY TO ADD A NUMBER OF THE 125 MICRON (5 THOU) SHIM WASHERS TO BRING THE SCALE TO THE CORRECT READING.

6. ENSURE THAT THE LOCATING PIN FITTED TO THE CLAW (9) LOCATES IN THE HOLE IN THE BODY (7), OTHERWISE THE STUD MAY BE DISTORTED.

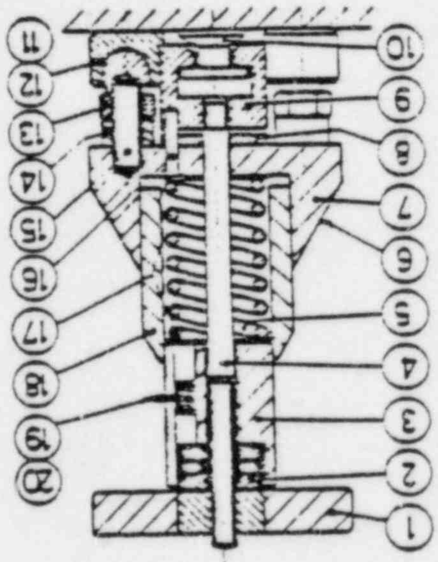
SCREW THREADS SHOULD BE KEPT LUBRICATED WITH LIGHT MACHINE OIL.

SCALES 1 & 2.

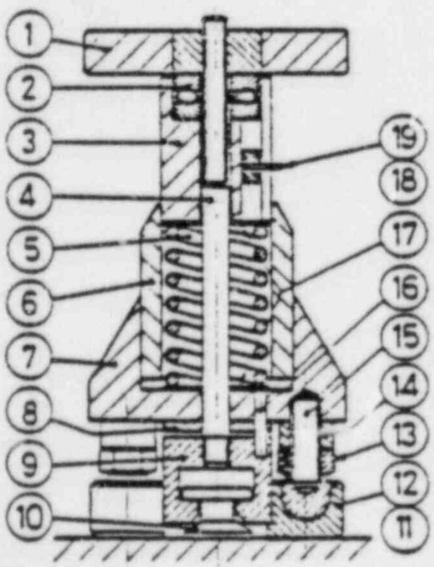
DESIGN CHANGES IN SCALE 1(JUNE 1983) AND SCALE 2 (JANUARY 1984) INCLUDE A COMPRESSION SPRING INSTEAD OF BELLEVILLE WASHERS AND A NEW INSTRUMENT BARREL, CALIBRATED TO THE NEW DESIGN. INSTRUMENTS ISSUED BEFORE THIS DATE WILL REQUIRE NEW REPLACEMENTS, ACCORDINGLY. (SEE SECTION 6. SPARES)

SCALE 2 ADHESION TESTER

PLEASE STATE RANGE WHEN ORDERING SPARES



REF	QTY.	PART Nº	DESCRIPTION
1	1	2892	Handwheel
2	1	1572	Ball-bearing
3	1	2903	Barrel
4	1	2901	Spindle
5	1	6543	Spring
6	3	1967-3	Grubscrew
7	1	3564	Housing
8	1	2893	Buffer
9	1	2894	Claw
10	1	2895	Dolly
11	3	2889	Socket
12	3	2402	Spring Wire
13	3	2890	Ball
14	3	2897	Spacer
15	3	2896	Stud
16	1	3155	Location Pin
17		2898	Correction Shim
18	1	3565	Zero Compensator
19	1	2899	Indicator Bobbin
20	2	1331	'O' Ring

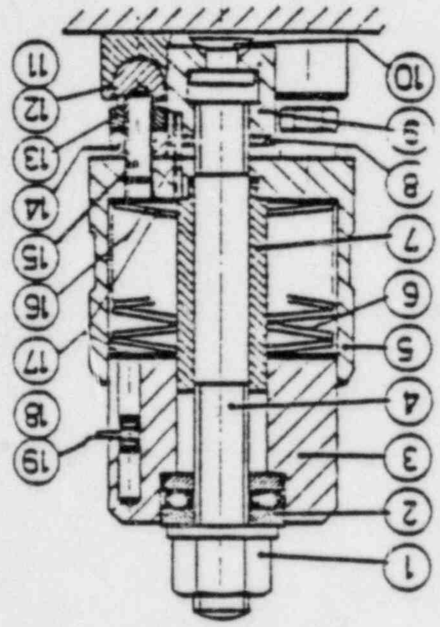


REF	QTY.	PART Nº	DESCRIPTION
1	1	2892	Handwheel
2	1	1572	Ball-bearing
3	1	2902	Barrel
4	1	2900	Spindle
5	1	5103	Spring
6	1	3565	Zero Compensator
7	1	3564	Housing
8	1	2893	Buffer
9	1	2894	Claw
10	1	2895	Dolly
11	3	2889	Socket
12	3	2402	Spring Wire
13	3	2890	Ball
14	3	2897	Spacer
15	3	2896	Stud
16	1	3155	Location Pin
17		5385	Correction Shim
18	1	2899	Indicator Bobbin
19	2	1331	'O' Ring

SECTION 6
SPARES

SCALE 1 ADHESION TESTER

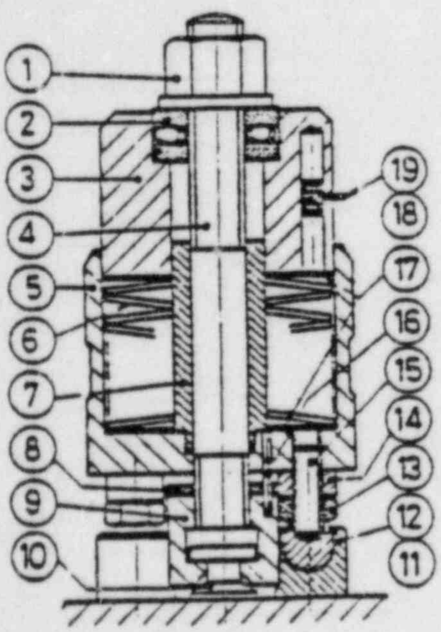
PLEASE STATE RANGE WHEN ORDERING SPARES



REF	QTY	PART Nº	DESCRIPTION
1	1	1581	Nut
2	1	1583	Thrust Bearing
3	1	2912	Barrel
4	1	3157	Stud
5	1	2907	Body
6	10	1579	Spring Washer
7	1	2909	Sleeve
8	1	2853	Buffer
9	1	3153	Claw
10	1	2895	Dolly
11	3	2889	Socket
12	3	2402	Spring Wire
13	3	2890	Ball
14	3	2897	Spacer
15	3	2896	Stud
16	1	3155	Location Pin
17		2910	Correction Shim
18	1	2899	Indicator Bobbin
19	2	1331	'O' Ring

SCALE 4 ADHESION TESTER

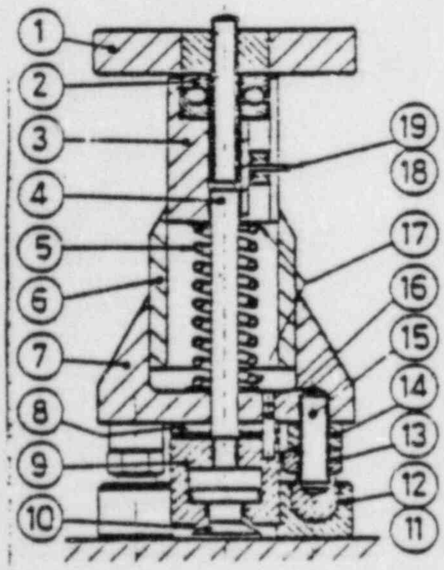
PLEASE STATE RANGE WHEN ORDERING SPARES



REF	QTY	PART Nº	DESCRIPTION
1	1	1580	Nut
2	1	1582	Thrust Bearing
3	1	2911	Barrel
4	1	3156	Stud
5	1	2907	Body
6	14	1578	Spring Washer
7	1	2908	Sleeve
8	1	2893	Buffer
9	1	3153	Claw
10	1	2895	Dolly
11	3	2889	Socket
12	3	2402	Spring Wire
13	3	2890	Ball
14	3	2897	Spacer
15	3	2896	Stud
16	1	3155	Location Pin
17		2910	Correction Shim
18	1	2899	Indicator Bobbin
19	2	1331	'O' Ring

SCALE 3 ADHESION TESTER

PLEASE STATE RANGE WHEN ORDERING SPARES



REF	QTY	PART Nº	DESCRIPTION
1	1	2892	Handwheel
2	1	1572	Ball-bearing
3	1	2903	Barrel
4	1	2900	Spindle
5	1	3335	Spring
6	1	3565	Zero Compensator
7	1	3564	Housing
8	1	2893	Buffer
9	1	2894	Claw
10	1	2895	Dolly
11	3	2889	Socket
12	3	2402	Spring Wire
13	3	2890	Ball
14	3	2897	Spacer
15	3	2896	Stud
16	1	3155	Location Pin
17		5385	Correction Shim
18	1	2899	Indicator Bobbin
19	2	1331	'O' Ring

SCALE 5 ADHESION TESTER

PLEASE STATE RANGE WHEN ORDERING SPARES

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06/22/84

Allegation No. 22

In the present backfit program, QC inspectors are required to take readings with adhesion testers without receiving formal training.

Evaluation of Validity

This allegation is unfounded and thus without merit.

Backfit protective coatings QC inspectors are trained in the use of the adhesion tester. Prior to certification for backfit inspection, each QC inspector receives on-the-job training and must pass a practical test on the use of the adhesion tester. Additionally, prior to certification, each inspector receives formal classroom training and must pass a corresponding written examination on the backfit inspection instructions which require the use of the adhesion tester. Training and testing are prerequisites for the backfit protective coatings QC inspector's certifications, are documented, and remain part of each individual's certification package.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

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06/22/84

Allegation No. 23

It is alleged that the Coatings QC Program at CPSES is inferior to the same programs at other nuclear power plant projects. One reason is that standard inspection practices, used at other sites, are not used at CPSES. For example, a sample adhesion test used by a QC inspector regularly at another site, was not allowed at CPSES by one of the QC lead men. This is the ASTM tape adhesion test.

Evaluation of Validity

We are unable to substantiate the subjective portion of this allegation. The methodology utilized for inspection of protective coatings at CPSES is equal, if not superior, to other nuclear plants under construction in both the United States and abroad. Documentation systems change from site to site, but the types of inspections performed and inspection methods and instruments utilized remain consistent.

10CFR50, Appendix B, Criterion I requires that "the authority and duties of persons and organizations performing quality assurance functions shall be clearly established and delineated in writing." This requirement is fulfilled by development of detailed QA/QC procedures and instructions defining, directing and controlling a quality control inspector's duties and responsibilities. 10CFR50, Appendix B, Criterion V requires that "Activities affecting quality shall be prescribed by documented instructions....and shall be accomplished in accordance with these instructions."

The protective coatings QC program at CPSES meets that requirement. The Comanche Peak FSAR currently requires compliance with Regulatory Guide 1.54, ANSI N101.4 and ANSI N 5.12. ANSI N 5.12, paragraph 6.4, states that adhesion of the prime coat to the substrate, intercoat adhesion, or cohesion of any coat of the coating system shall be determined by the use of the Elcometer adhesion tester (or equivalent instruments by other manufacturers). It should be noted, however, that this requirement for adhesion testing if for qualification of the coating, not for field testing of applied coatings. Our use of adhesion testers in the field therefore exceeds the requirements of ANSI N 5.12. The CPSES design specification, AS-31, specifies the use of an Elcometer Adhesion Tester, or equivalent, for determination of adhesion. The ASTM tape test is neither an equivalent to the Elcometer Adhesion Tester nor is it referenced in ANSI N101.4, ANSI N5.12, Regulatory Guide 1.54, Specification AS-31, CPSES Construction procedures, or Quality Control procedures/instructions.

In summary, the CPSES protective coatings QC program is equal or superior to inspection programs at other nuclear power plants. In fact, we find it quite similar to most plants under construction. The inspection instructions are above average in degree of detail in describing how inspections are to be performed. The cited example of a QC lead inspector directing an inspector not to use an ASTM tape adhesion test is an example of the CPSES QA program working. The ASTM tape adhesion test is not referenced or required by any code, standard, Regulatory Guide, specification or procedure applicable to CPSES, and the denial of its use, in fact, demonstrates QC supervision encouraging QC inspectors to follow procedures and not discouragement to a QC inspector's effort to assure a quality product.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 24

It is alleged that Q coatings have been placed over rusty, scaly unprepared metal surfaces inside pipe supports made of tube steel without end-caps. In these cases, the protective coating gets on the rusty inside of the tube. This coating material could later crack, scale, come off the pipe, and then travel to the sumps.

Evaluation of Validity

This allegation is correct. This condition was evaluated by Engineering on DCA 16,106 (attached) which placed the areas in question on the Protective Coatings Exempt Log. (See entry number 32, attached). In doing so, Engineering has determined that failure of the referenced coatings is without technical or safety significance.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

PROTECTIVE COATINGS EXEMPT LOG

III RY Nº	ITEM OR AREA	COATING SYSTEM	SQ.FT.
31	COATINGS APPLIED TO INTERIOR OF PIPE BUMPERS REF DCA 13060 INCORPARATED INTO Rev2 of AS-31	CARBOLINE CZ11/ Phenoline 305 TOPCOAT	200.0
32	COATINGS INADVERTENTLY APPLIED TO INTERIOR OF TUBE STEL SUPPORTS REF DCA 16106	CARBOLINE CZ11/ PheNOLINE 305 TOPCOAT	6000.0
33	COATINGS ON TOP OF POLAR CRANE SUPPORT GIRDERS UNIT 1 BLDG. RE DCA 19707	CARBOLINE CZ11/ PHENOLINE 305 TOPCOAT	1,040.0
34	SUPPORT L'S FOR LIFELINES @ EL 1000'4" & SUPPORT CLIPS FOR LIFELINES @ EL 953'-8" RE DCA 20170	CARBOLINE 191/ PHENOLINE 305 TOPCOAT	58.0
35	RBI AREA 40 & 39, EMBEDED PIPE UNITS PRIMED UNDER AS 30 REQUIREMENTS - RE DCA 20252	CARBOLINE 191 PRIMER	3.0
36	WESTINGHOUSE EQUIPMENT MEETING THE CATEGORY 3 REQUIREMENTS AS REFERENCED IN WESTINGHOUSE POSITION LETTER RG 1.54 R0	UNKNOWN	900.0

COMANCHE PEAK STEAM ELECTRIC STATION
DESIGN CHANGE AUTHORIZATION

(WILL) ~~(WILL NOT)~~ BE INCORPORATED IN DESIGN DOCUMENT DCA NO. 16,106 Rev. 1

1. SAFETY RELATED DOCUMENT: XX YES ____ NO

GIBBS & HILL INC. RECEIVED APR 04 1984

2. ORIGINATOR: CPPE XX ORIGINAL DESIGNER ____

3. DESCRIPTION:

A. APPLICABLE SPEC/~~DWG/DOCUMENT~~ 2323-AS-31 REV. 2

B. DETAILS THIS REVISION VOIDS AND SUPERSEDES DCA 16,106 Rev. 0.

In Containment structures various tube steel supports which do not have end caps, have coating on interior which has been applied without QC inspection and possibly over rusted steel. Request clarification on this item.

SOLUTION: If coating failed from these areas it would do so in a sporadic manner and involve only minute amounts of coatings. Gross coating failure causing clogging of the Containment spray pumps from these areas is not likely. Coatings extending into open tube steel members resulting from spray operations performed on the ends & exterior of the member is acceptable.

FOR OFFICE AND ENGINEERING USE ONLY

85-1195 RECEIVED [illegible] 05 1984 DOCUMENT CONTROL

GIBBS & HILL INC. RECEIVED APR 04 1984

4. SUPPORTING DOCUMENTATION:

Protective Coating Exempt Log Item #32 for Unit 1 1

5. APPROVAL SIGNATURES: MW/bb 4-2-84

A. ORIGINATOR: Mark Welch DATE 4-2-84

B. DESIGN REPRESENTATIVE: [illegible] DATE 4-3-84

C. DESIGN REVIEW PRIOR TO ISSUE: P. J. Shea DATE 4.4.84

6. VENDOR RELATED CHANGE: XX NO ____ YES: P. O. NUMBER: ____

7. STANDARD DISTRIBUTION:

ARMS (ORIGINAL)	(1)	Mark Welch-QA	(1)
QUALITY ENGINEERING	(1)	Civil Engineering	(1)
OCTG FOR ORIG. DESIGN	(1)	Design Review	(1)
WESTINGHOUSE	(1)		

Allegation No. 25

It is alleged that a seal coat was accepted prior to the finished coat being applied, when in fact the seal coat should have been rejected. The area in question is just outside the Skimmer Pump Room, in Reactor Containment Building-Unit 1, on the steel liner plate. The stains on the liner plate in the opinion of the inspector were not acceptable per procedure and should have caused the seal coat to be rejected for finish coat application. The QC inspector brought the condition to management's attention and requested their opinion. Management stated that the stains were in fact rust stains and acceptable, while the QC inspector felt it was obvious that the stains were not rust and unacceptable. The QC inspector stated: "The reason I accepted this was because I feared adverse action would be taken against me if I rejected it." The QC inspector goes on to say that this area has the finish coat on it now and none of the stains are visible.

Evaluation of Validity

The protective coatings QC Supervisor (a certified Level II Inspector) was the individual involved with this incident. He felt at the time that the inspector was satisfied with his technical assessment that the stains were indeed rust stains and were acceptable per procedure. The Quality Engineer, a certified Level III, concurred that the stains were rust stains and were acceptable. The Level III thought the inspector was satisfied. Had the inspector continued to express doubt, the Level III would have signed the inspection report indicating his evaluation, as he had done in similar situations in the past. (See Allegation Number 33). Further, the QC Supervisor stated that the referenced inspector was not threatened in any way to accept the area.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 26

It is alleged that Design Change Authorization (DCA) documents are not controlled.

Evaluation of Validity

This allegation is partially correct, but has no technical significance. Under site document control procedures, all DCA's used by personnel applying or inspecting coatings are controlled. These documents are issued and controlled by the Document Control Center (DCC) at CPSES.

When Engineering approves a DCA, Engineering forwards information copies to recipients designated on a standard distribution list. This distribution is intended to assure effective communication. These information copies are not controlled, but they are not used for construction or inspection.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 27

It is also alleged that DCAs at CPSES are originated and approved totally by engineering. QA/QC has no input in the review and disposition of DCAs.

Evaluation of Validity

The first part of this allegation is correct, and this practice meets regulatory requirements. The first step in establishing the CPSES QA Program involved a detailed review of the 18 Criteria of 10CFR50, Appendix B. These criteria do not require that design documents be reviewed and approved by the QA organization. What is required, however, by Criterion III of Appendix B is that design changes be reviewed by the original design organization (or other equally qualified design organization). Criterion VI, Document Control, requires that design documents (including changes) be distributed to and used at the location where the prescribed activity is performed.

The second statement in the allegation, that QA/QC has no input in the review or disposition of DCAs is incorrect. Engineering frequently discusses proposed DCAs with cognizant Quality Engineering personnel before DCA's are issued. DCA's are routinely checked by Quality Engineering personnel to evaluate their effect on QC procedures and instructions. Any Quality Engineering concerns resulting from these checks are resolved with Engineering.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 28

It is alleged that DCAs are used frequently and conveniently to cover up a condition for which a Nonconformance Report (NCR) should be written. The alleger estimated that 40% of the DCAs are for NCR conditions.

Evaluation of Validity

This allegation is evidently based on the misconception that a DCA is a method of hiding problems, and is therefore without merit.

DCA's are an engineering tool for resolving situations which arise during the normal course of construction. They are a highly visible design document for which QA is on standard distribution. This allows QA review for any conflicts and for incorporation into inspection procedures/instructions as required.

The use of DCA's at CPSES has been addressed by several entities, including the NRC via the CAT Report. DCA's are sometimes utilized as part of nonconformance report dispositions. Far from being used to "cover up" discrepant conditions, DCA's are part of the overall program to assure proper disposition and review of conditions requiring Engineering evaluation.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

Allegation No. 29

It is further alleged that DCAs are written to overcome a problem area which will take considerable time for repairs. In other words, the DCAs are used to facilitate the completion of a job even though this means that accepted procedures will not be followed.

Evaluation of Validity

While the first statement is correct, it is not significant. DCA's have been issued by Engineering for specific areas on which it would be difficult or impossible to apply or repair coatings in accordance with specification AS-31 requirements. (The subject matter of Allegation 24 is an example of this phenomenon, and its disposition by issuance of a DCA). In these specific cases, Engineering determined that coatings application to less stringent requirements will not have an adverse affect on the safe operation of the plant.

Construction procedures and QC instructions/procedures are revised to incorporate only those DCA's which effect generic changes to specification requirements.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 30

It is alleged that on numerous occasions DCAs have been issued to downgrade the surface preparation from an SP-10 to an SP-6 standard preparation. It is further alleged that DCAs are also written to downgrade Specification AS-31 requirements in containment to AS-30, which is the non-safety specification. The downgrading of an SP-10 to an SP-6 surface preparation is an example of DCAs being written to downgrade from an AS-31 to an AS-30 requirement.

Evaluation of Validity

This allegation is correct but without technical significance. Occasionally, Engineering has changed the degree of required surface preparation from SP-10 to SP-6. This decision was based on factors such as feasibility of surface preparation methods and performance requirements of the coating system. DBA data exists for CZ-11 over an SP-6 surface (see attached Carboline Testing Project 02040) which substantiates satisfactory performance of an inorganic zinc (CZ-11) over an SP-6 surface preparation under DBA conditions.

DCAs have also been issued changing the design requirement for some areas from a safety related (AS-31) to a non-safety related (AS-30) application requirement. These changes were based on Engineering evaluation of both technical and safety considerations. Areas which were changed to AS-30 application requirements have been added to the Protective Coatings Exempt Log.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

LABORATORY TEST REPORT

<u>TESTING PROJECT</u>: 02040

<u>DATE</u>: August 24, 1982

<u>REPORT #</u>: First <u>TIME</u>: Final

<u>DATE OF GRADING</u>: 7/19/82

<u>TOTAL DESIGN TEST DURATION</u>: Seven Days

<u>REQUESTED BY</u>: Dan McBride

<u>TITLE</u>: LOCA Testing of Carbo Zinc 11 over an SSPC-SP6 Blast

---

<u>PURPOSE</u>: To determine the performance of Carbo Zinc 11 over a SSPC-SP6 "Commercial Blast" when subjected to a 340°F BWR (ASTM D3911-80) LOCA condition.

<u>CONCLUSIONS</u>: Please refer to results.

From the Carboline Research & Development Laboratory

The technical data furnished are true and accurate to the best of our knowledge. However, no guarantee of accuracy is given or implied.

carboline

PROCEDURE:

A. Test Coupons:

2"x4"x ¼" steel, certified
Carboline ST-1 (See Appendix 1)
Surface Preparation: Gritblasted to SSPC-SP6-63, "Commercial Blast Cleaning".
Abrasive Medium: 50/50 mix of GFH #40 grit on S230 shot.
Panels were degreased before priming.

B. System Tested:

System Tested	Batch No.	Color	Thinner	Thinning Ratio	DFT Range (Mils)
1c Carbo Zinc 11	Part A: 2B5754M Part B: 2A2678M	Green #300	Thinner #33 1E0964M	12%	1.8-2.0

C. Cure Schedule:

System Tested	Time Cure	Temp °F	Temp °C	Relative Humidity Range
1c Carbo Zinc 11	2 days ambient	69°-76°	21°-24°	56% - 91%
	6 weeks, 3 days (roof)	50°-90°	10°-32°	33% - 97%
	3 days ambient	70°-76°	21°-24°	60% - 70%

D. Exposure:

1. Time-Temperature-Pressure Curve

Time	Temperature*	Pressure*
Initial	Ambient	Ambient
Initial to 6 hours	340°F (171°C)	70 psig
6 hours to 96 hours	250°F (121°C)	30 psig
96 hours to 7 days	200°F (93°C)	10 psig

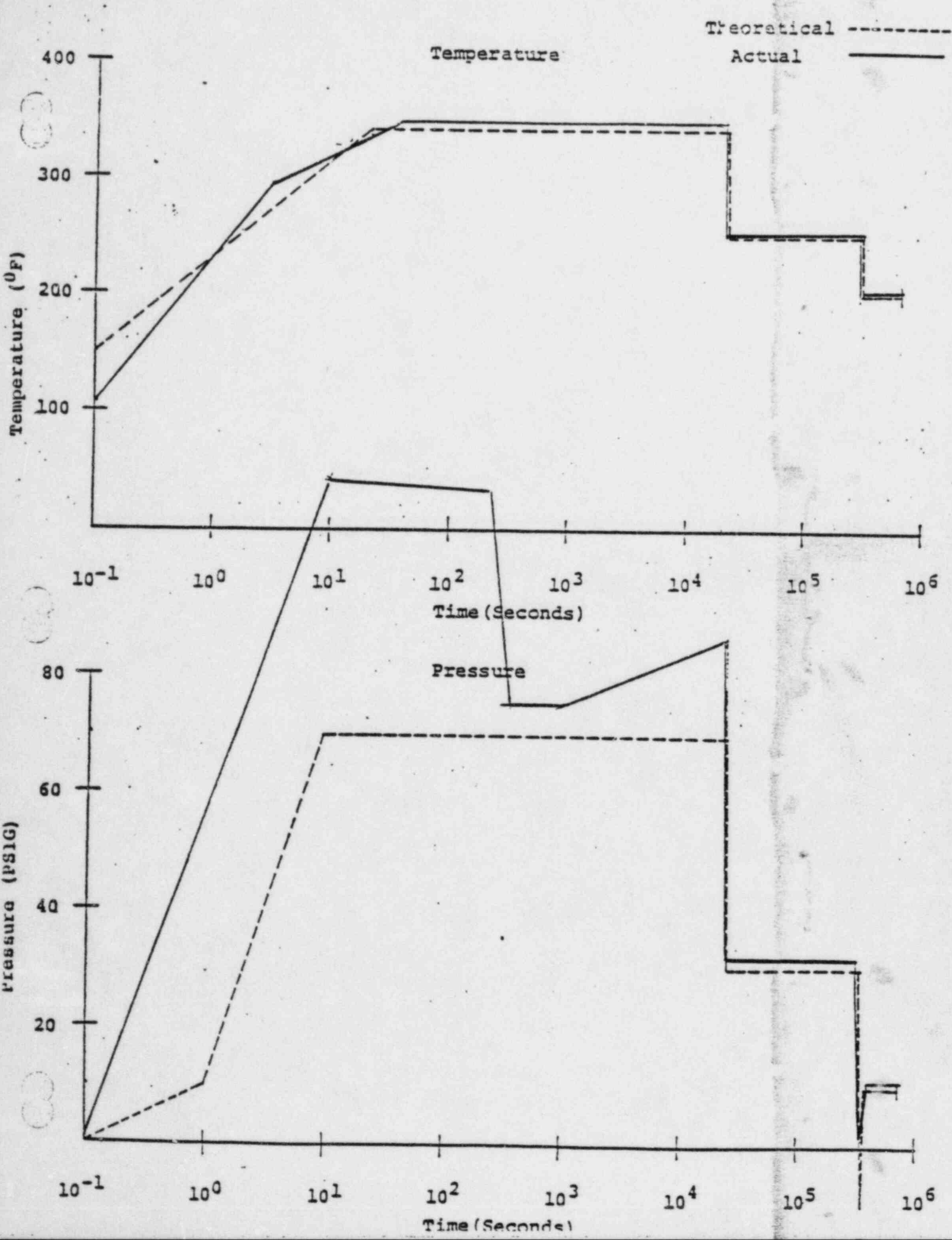
*These are theoretical values. The next page includes graphs of theoretical and actual LOCA temperature and pressure curves. The data for the actual LOCA curves are from the chart recording for this test are found on page 131, Lab Book #230.

2. Water Chemistry
Deionized Water pH=6.1

LOCA GRADING PROCEDURE (ASTM-D3911-80)

The test coupons are examined and evaluated within 4 hours after removal from test chamber for the following coating defects:

Delamination - report extent
Cracking - report extent
Peeling - report extent
Blistering - report in accordance with ASTM Method D714.



Theoretical
Actual
Temperature
400
300
200
100
Temperature (°F)
10^-1
10^0
10^1
10^2
10^3
10^4
10^5
10^6
Time (Seconds)
Pressure
80
60
40
20
Pressure (PSIG)
10^-1
10^0
10^1
10^2
10^3
10^4
10^5
10^6
Time (Seconds)

340°F LOCA VAPOR PHASE

COATING SYSTEM	DFT RANGE	FLAKING	DELAMINATION OR PEELING	BLISTERING	CRACKING	OTHER PERFORMANCE CHARACTERISTICS
1A Front						
1c Carbo Zinc 11	1.8	10	None	None	None	None
1A Back						
1c Carbo Zinc 11	1.8	10	None	None	None	None
2A Front						
1c Carbo Zinc 11	1.9	10	None	None	None	None
2A Back						
1c Carbo Zinc 11	1.9	10	None	None	None	None
3A Front						
1c Carbo Zinc 11	2.0	10	None	None	None	None
3A Back						
1c Carbo Zinc 11	1.8	10	None	None	None	None

340°F LOCA LIQUID PHASE

COATING SYSTEM	DFT RANGE	FLAKING	DELAMINATION OR PEELING	BLISTERING	CRACKING	OTHER PERFORMANCE CHARACTERISTICS
1B Front						
1c Carbo Zinc 11	1.9	10	None	None	None	None
1B Back						
1c Carbo Zinc 11	1.8	10	None	None	None	None
2B Front						
1c Carbo Zinc 11	2.1	10	None	None	None	None
2B Back						
1c Carbo Zinc 11	2.1	10	None	None	None	None
3B Front						
1c Carbo Zinc 11	1.8	10	None	None	None	None
3B Back						
1c Carbo Zinc 11	2.0	10	None	None	None	None

Maria R. Bumiller

Maria R. Bumiller
Laboratory Technician
Testing Department

Yuly Korobov

Yuly Korobov
Supervisor
Testing Department

John Montle

John F. Montle
Vice President
Technology

nt/082482/
T.P. 02040

APPENDIX 1

Carboline Specification CB1

Preparation of Concrete Specimens:

Concrete Composition

Cement, ASTM C150, Type II. Low alkali
Gravel, ASTM C33, size 3/8 inch
Sand, ASTM C33
Water reducing admixture, ASTM C494
Air entraining admixture, ASTM C260
Pozzolans, ASTM C618
Water - Demineralized or distilled water

Concrete Proportions

Cement, 7 sacks per cubic yard
Sand-Gravel ratio, 55 sand, 45 gravel by volume
Pozzolans, to 15 percent replacement of cement
Air entraining admixture, 4-7 percent
Water reducing admixture, as per manufacturer's instructions
Water, to produce a 3 inch slump

Preparation of Test Specimen:

Make and cure the specimen according to ASTM C192, except that no form oils may be used. The face to be tested shall be composed to the form to simulate poured walls and the wood troweled surfaces: Broom finish top surface to simulate floors. No test face shall be saw cut. When applicable, concrete curing agents compatible with the coating system shall be used.

Panels:

The size for concrete panels shall be 2 by 4 inches by 2 inches thick ± 0.2 inches.

Curing Time:

Before concrete specimens are coated, they shall be cured a minimum of 28 days in accordance with ACI 301, "Specifications for Structural Concrete for Buildings." If a concrete curing primer is used, it shall be applied on the concrete within 24 hours after removal of the forms.

Carboline Specification ST1

Steel Test Specimens

Panels: The size for carbon steel panels shall be 2 by 4 inches by ½ inch thick ± 0.1 inches with rounded edges and corners. The steel for each specimen shall meet the requirements of ASTM A36, "Standard Specifications for Structural Steel".

Allegation No. 31

It is further alleged that QC management interpreted an SP-6 on a DCA to mean "do the best you can". For example, when difficult access areas were involved, QC management allegedly stated to the QC inspectors, if you cannot get to an area, do not worry about it.

Evaluation of Validity

DCA-13,140 Revision 2 (attached), which was incorporated into Revision 2 of Specification AS-31, addresses coatings application and inspection requirements specific to surfaces which have limited access and to surfaces which are inaccessible.

This DCA provides examples of typical limited access areas. It states that an SSPC-SP-10 or equal surface preparation should be maintained, if possible, in limited access areas but that the minimum acceptable surface preparation for limited access areas shall be an SSPC-SP-6, or equal. QC inspection on limited access areas is required.

In addition, DCA 13,140 Revision 2 defines those areas which shall be considered as inaccessible per Paragraph 1.1b of Specification AS-31 and states the following: "Surface preparation and coating on inaccessible areas shall be on a best effort basis. QC inspection on inaccessible areas is not required."

Eleven QC inspectors were interviewed individually and questioned as to whether they had ever been directed by QC management to "do the best you can" and not to worry about "difficult access areas." All eleven inspectors responded that they had not received such direction from QC management. However, the interviews revealed that some question had previously existed as to what areas were considered to be inaccessible and therefore, not requiring QC inspection. This matter was clarified by the issuance of DCA 13,140, Rev. 2, which included definitive criteria for determination as to whether an area is to be considered inaccessible.

It should further be noted that formal training sessions attended by QC coatings inspection personnel included discussions of DCA 13,140, Rev. 2 criteria for determination as to whether an area to be coated is either inaccessible or limited access. The instructors emphasized that surface preparation for those areas which meet the DCA definition for limited access areas are required to meet as a minimum the requirements of SSPC-SP-6. It was further emphasized to the inspectors that all QC inspections required by the applicable coatings inspection instructions are required to be performed on those areas meeting the DCA criteria for limited access areas. In addition, the inspectors were instructed that QC inspections are not required in those areas which were defined by the DCA to be inaccessible.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

SPEC, HAH, TUGCO(2) AM(4)

CHANGE INDEX: OEI ____
: II ____
: III XX

COMANCHE PEAK STEAM ELECTRIC STATION
DESIGN CHANGE AUTHORIZATION

(WILL) ~~(WILL NOT)~~ BE INCORPORATED IN DESIGN DOCUMENT DCA NO. 13,140 Rev. 2

1. SAFETY RELATED DOCUMENT: XX YES ____ NO

2. ORIGINATOR: CPPE XX ORIGINAL DESIGNER ____

3. DESCRIPTION:

A. APPLICABLE SPEC/~~DWG/DOCUMENT~~ 2323-AS-31 REV. 1

B. DETAILS THIS REVISION VOIDS AND SUPERSEDES DCA-13,140 Rev. 1.

See attached.

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35-1195
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FEB 21 1983
DOCUMENT CONTROL

4. SUPPORTING DOCUMENTATION:

5. APPROVAL SIGNATURES: MW/sgf 2-21-83

A. ORIGINATOR: Mark Welk DATE 2-21-83

B. DESIGN REPRESENTATIVE: CR Hooton DATE 2-21-83

6. VENDOR TRANSMITTAL REQUIRED: YES ____ NO XX

7. STANDARD DISTRIBUTION:

ARMS (Original)	(1)	Ron Michels-QA Spec. Spvr. (1)
Quality Engineering	(1)	
TS for Orig. Design	(1)	
Westinghouse-Site	(1)	
Civil Engineering	(1)	

DCA FORM 11-80
Admin. Rev 7-82

C

In Reactor Building Unit 1 & 2, pipe supports & various electrical and equipment supports have areas which due to installation configuration of the supports or equipment an SSPC-SP10 or equal surface preparation cannot be achieved. This SSPC-SP10 or equal surface preparation cannot be achieved due to limited access to the specific area or inaccessibility per paragraph 1.1b. Request clarification of coating in these areas.

2

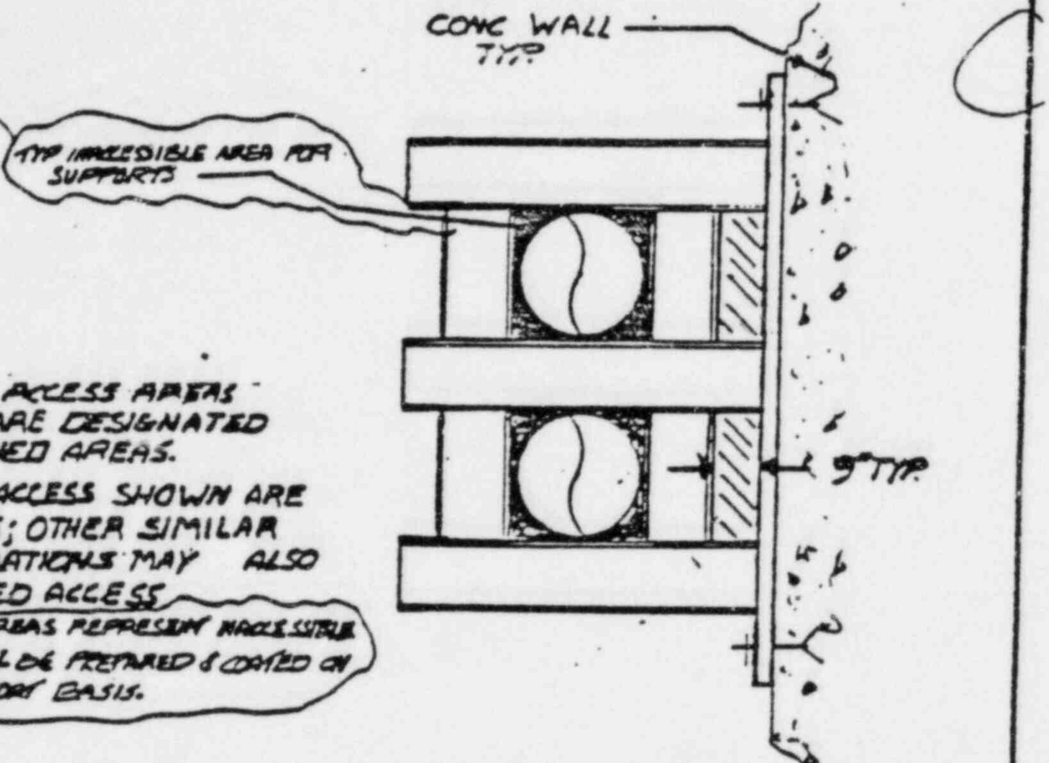
SOLUTION: Items and/or areas which are not inaccessible per paragraph 1.1b of AS-31, but due to the installation configuration of the support or item, the required SSPC-SP10 surface preparation cannot be met shall be considered as limited access areas. Typical limited access areas are as shown on the attached drawing.

All steel installed in the Reactor Buildings which is governed under AS-31 coating requirements is, as a minimum, shop primed prior to installation. The non previously AS-31 primed steel is therefore, limited primarily to weld and field cut locations.

In limited access areas, SSPC-SP10 or equal should be maintained if possible, however, SSPC-SP-6 or equal surface preparation shall be the minimum acceptable.

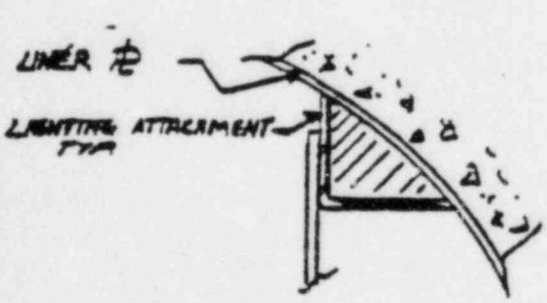
Except for the above, coating application and documentation in limited access areas shall be as presently required by AS-31. Areas on supports typified by shaded areas on the attached drawing shall be considered inaccessible per Paragraph 1.1b of AS-31. Areas which conduit, cable tray, instrumentation equipment, and various miscellaneous items and equipment, cover or come in contact with supports or backings are typical inaccessible areas per paragraph 1.1b of AS-31. Surface preparation and coating on inaccessible areas shall be on a best effort basis. QC inspection on inaccessible areas is not required.

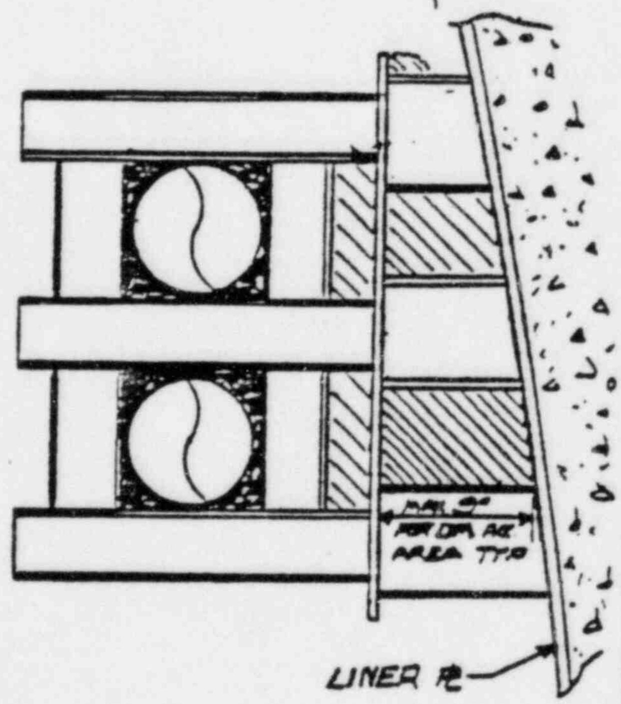
2



NOTES:

1. LIMITED ACCESS AREAS SHOWN ARE DESIGNATED BY HATCHED AREAS.
2. LIMITED ACCESS SHOWN ARE TYPICALS; OTHER SIMILAR CONFIGURATIONS MAY ALSO BE LIMITED ACCESS
3. SHADED AREAS REPRESENT INACCESSIBLE AREAS & SHALL BE PREPARED & COATED ON A BEST EFFORT BASIS.





Brown & Root, Inc. HOUSTON, TEXAS

CONT. NO 35-1195

TITLE

OWNER TEXAS UTILITIES SERVICES, INC.

LOCATION OF PROJECT C.P.S.E.S. GLEN ROSE, TEXAS

DWG. NO. DCA 13140 R2

PG. 3 OF 3

DRAWN BY CHECKED APPROVED DATE INT.

... SPEC, MAH, IDGCO, AM(4)

Void-sug by rev. 2

FIGURE 1.

COMANCHE PEAK STEAM ELECTRIC STATION
DESIGN CHANGE AUTHORIZATION

(WILL) ~~(XXXXXXXX)~~ BE INCORPORATED IN DESIGN DOCUMENTS   DCA NO. 13.140 Rev. 1

1. SAFETY RELATED DOCUMENT: XX YES ______ NO

2. ORIGINATOR: CPPE XX ORIGINAL DESIGNER ______

3. DESCRIPTION:

   A. APPLICABLE ~~SPEC~~/DWG/~~XXXXXXX~~ 2323-AS-31 REV. 1

   B. DETAILS THIS REVISION VOIDS AND SUPERSEDES DCA-13.140 Rev. 0.

   See Attached.

VOID

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4. SUPPORTING DOCUMENTATION:

5. APPROVAL SIGNATURES: MW/sgf   5-11-82

   A. ORIGINATOR: Mark Wells   DATE 5-11-82

   B. DESIGN REPRESENTATIVE: C McKissinger   DATE 5-11-82

6. VENDOR TRANSMITTAL REQUIRED: YES ______ NO XX

7. STANDARD DISTRIBUTION: DCA FORM 11-80

[redacted]

Quality Engineering (1)
TS for Orig. Design. (1)
Westinghouse-Site (1)

JOB NO. 35-1195
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MAY 12 1982
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In Reactor Building Unit 1 & 2, pipe supports and various electrical and equipment supports have areas which, due to the installation configuration of the support or equipment, an SSPC-SP-10 or equivalant surface preparation cannot be achieved.

The SSPC-SP10 or equal surface preparation cannot be met because of limited access to the specific area. Typical of these areas are shown on the attached drawing to this document as hatched areas, Request clarification on coating of these areas.

Solution: Items and/or areas which are not inaccessible per paragraph 1.1b of the above applicable specification, but due to the installation configuration of the support or item, the required SSPC-SP-10 or equal surface preparation cannot be met, shall be considered as limited access areas. Typeical limited access areas shall be areas as shown on the attached drawing.

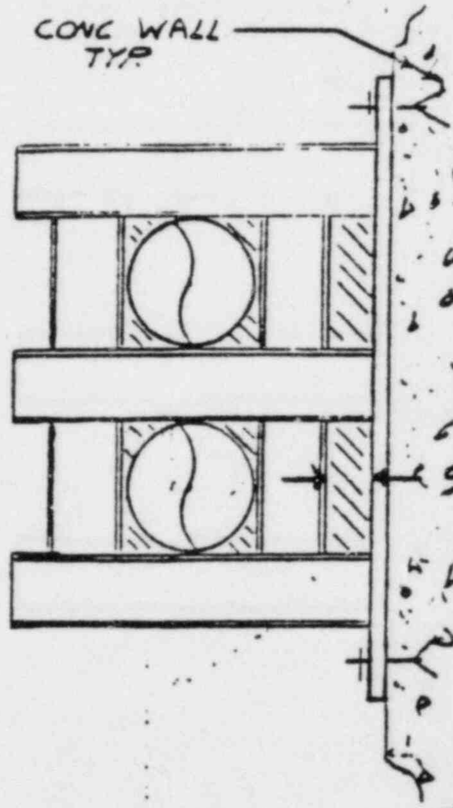
All steel installed in the Reactor Buildings which is to be coated under AS-31 requirements is, as a minimum, shop primed prior to installation. Therefore, the non previously AS-31 primed steel surface area is limited primarly to weld and field cut locations.

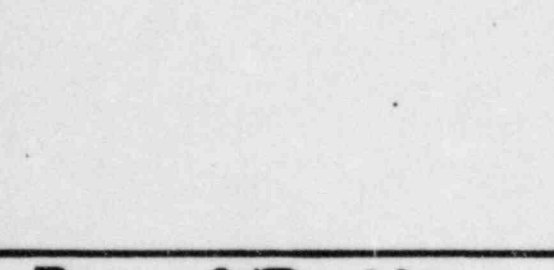
If possible, surface preparation of SSPC-SP-10 or equal should be maintained in limited access areas; however, as a minimum, SSPC-SP-6 or equal surface preparation shall be maintained.

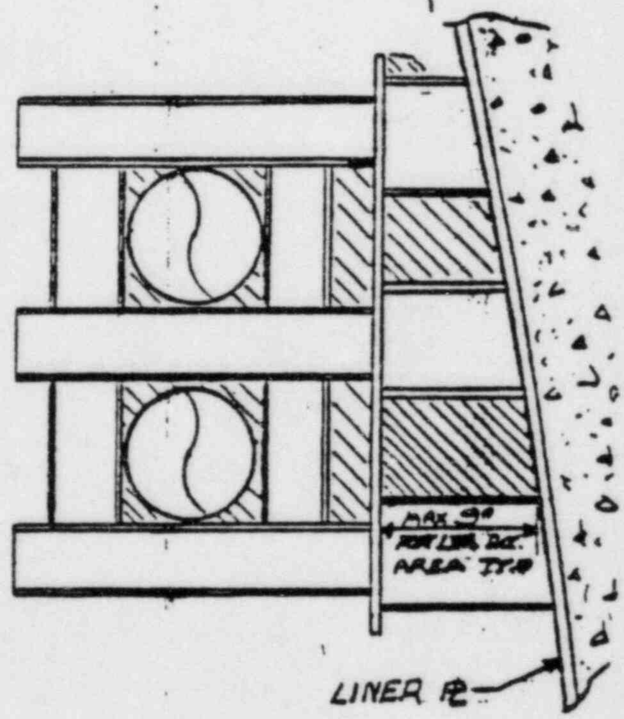
1

Accept for the above, coating application and documentation shall be as presently required by AS-31.

NOTES:
1. LIMITED ACCESS AREAS SHOWN ARE DESIGNATED BY HATCHED AREAS.
2. LIMITED ACCESS SHOWN ARE TYPICALS; OTHER SIMILAR CONFIGURATIONS MAY ALSO BE LIMITED-ACCESS







Brown & Root, Inc. HOUSTON, TEXAS		CONT. NO 35-1195
TITLE		DWG. NO.
OWNER TEXAS UTILITIES SERVICES, INC.		DCA 13140 R1
LOCATION OF PROJECT C.P.S.E.S. GLEN ROSE, TEXAS		PG. 3 OF 3
DRAWN BY CHECKED APPROVED	DATE	SHT.

SPEC,HAH,TUGCO,AM(4)

COMANCHE PEAK STEAM ELECTRIC STATION
DESIGN CHANGE AUTHORIZATION

(WILL) (XXXXXXXX) BE INCORPORATED IN DESIGN DOCUMENTS DCA NO. 13,140

1. SAFETY RELATED DOCUMENT: XX YES ____ NO
2. ORIGINATOR: CPPE XX ORIGINAL DESIGNER ____
3. DESCRIPTION:
   A. APPLICABLE XXXX/DWG/XXXXXXXX 2323-AS-31 REV. 1
   B. DETAILS See Attached.

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VOID

4. SUPPORTING DOCUMENTATION:

5. APPROVAL SIGNATURES: MW/sgf 4-29-82
   A. ORIGINATOR: Mark Wells DATE 4-29-82
   B. DESIGN REPRESENTATIVE: RMKissinger DATE 4-29-82
6. VENDOR TRANSMITTAL REQUIRED: YES ____ NO XX
7. STANDARD DISTRIBUTION:

[redacted]	(1)
Quality Engineering	(1)
TS for Orig. Design.	(1)
Westinghouse-Site	(1)

JOB NO. 35-1195
RECEIVED
APR 29 1982
RECEIVED

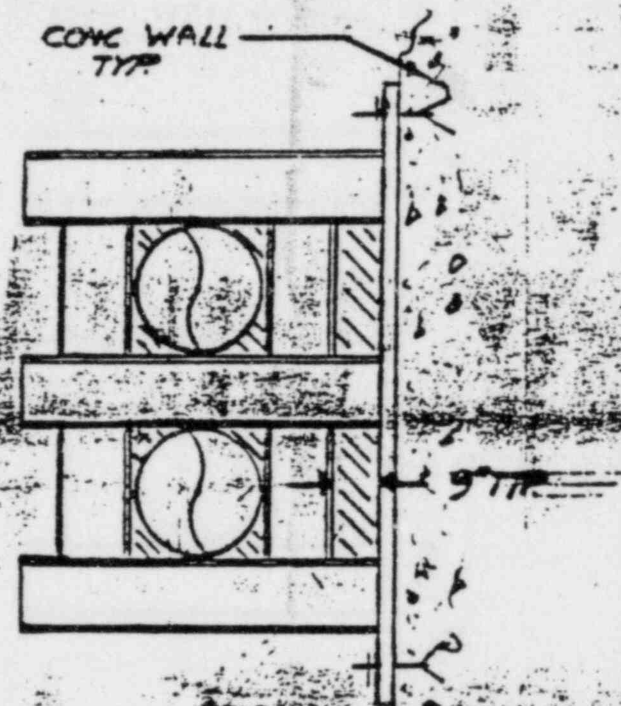
In Reactor Building Unit 1 & 2, pipe supports and various electrical and equipment supports have areas which, due to the installation configuration of the support or equipment, an SSPC-SP-10 or equivalant surface preparation cannot be achieved.
The SSPC-SP10 or equal surface preparation cannot be met because of limited access to the specific area. Typical of these areas are shown on the attached drawing to this document as hatched areas. Request clarification on coating of these areas.

Solution: Items and/or areas which are not inaccessible per paragraph 1.1b of the above applicable specification, but due to the installation configuration of the support or item, the required SSPC-SP-10 or equal surface preparation cannot be met, shall be considered as limited access areas. Typical limited access areas shall be areas as shown on the attached drawing.

All steel installed in the Reactor Buildings which is to be coated under AS-31 requirements is, as a minimum, shop primed prior to installation. Therefore, the non previously AS-31 primed steel surface area is limited primarily to weld and field cut locations.

If possible, surface preparation of SSPC-SP-10 or equal should be maintained in limited access areas; however, as a minimum, SSPC-SP-6 surface preparation shall be maintained.

Accept for the above, coating application and documentation shall be as presently required by AS-31.



NOTES:

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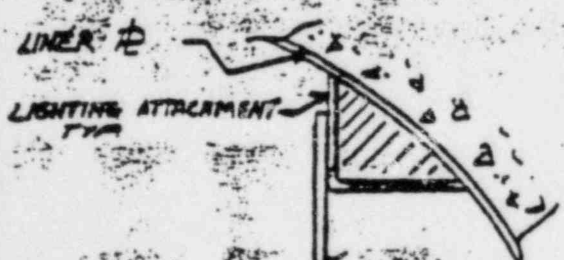

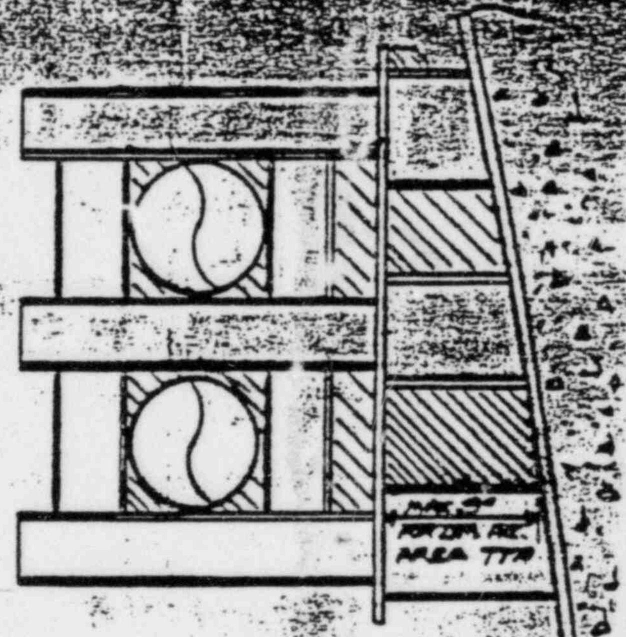

Brown & Root, Inc. HOUSTON, TEXAS		CONT. NO 35-1195
TITLE		DWG. NO.
OWNER TEXAS UTILITIES SERVICES, INC.		DCA 13 140
LOCATION OF PROJECT C.P.S.E.S. GLEN ROSE, TEXAS		PG. 3 OF 3
DRAWN BY CHECKED APPROVED	DATE	SHT.

TXX-4201
06/22/84

Allegation No. 32

It is alleged that after a reading list was signed by QC inspectors, the document that they read was removed and replaced by a different document, yet the reading list coversheet remained the same.

Evaluation of Validity

This allegation is difficult to address due to its vagueness. A review of the protective coatings reading lists and discipline procedures revealed no changes which altered the intent and basis of the inspectors' certifications. Further, each certified protective coatings QC inspector is issued controlled copies of the protective coatings inspection instructions and receives all revisions thereto. Periodic revisions have been made to the training procedures and corresponding revisions were made to the reading lists. This practice does not affect inspector certification, thus the allegation is without meaning.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

Allegation No. 33

It is alleged that many problems at CPSES with coatings are due to a QC Coatings Lead Inspector's (Individual K) lack of experience in QC. An example of this was when he identified the rust on an A-frame in the core area as being D-6 residue.

Evaluation of Validity

The cited example has been fully documented in accordance with the CPSES QA Program, therefore the identity of the "Lead Inspector" is known. This individual resigned his employment at CPSES in March, 1983.

When this individual initially became a lead inspector, he did not have extensive QC experience. His background, however, included over 20 years of coatings application experience, more than three of which were associated with nuclear facilities. Prior to assignment as a Lead Inspector at CPSES, the subject individual successfully completed the basic CPSES QA indoctrination and the appropriate QC training program for protective coating inspectors.

As stated previously, the cited example has been fully and appropriately documented. The difference of opinion between the inspector(s) and the Lead Inspector was independently reviewed by a Level III coatings inspector. He concurred with the Lead Inspector's opinion and so noted this determination on the inspection report. Additionally, two separate sets of adhesion tests, one in June of 1982 and another in April of 1983, by different inspectors, confirmed that the applied coatings are acceptable.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not Applicable

Allegation No. 34

It is alleged that the requirements of ANSI/ASME N45.2.2-1978 were not met for material storage.

Evaluation of Validity

This allegation is without merit. CPSES is not committed to ANSI N45.2.2 for the Construction Phase. Further, the standard does not even apply to the storage of protective coating materials. It should be noted, however, that protective coating materials storage facilities at CPSES exceed the minimum storage requirements specified by the manufacturers for coatings materials being stored. This meets the requirements of ANSI N5.12 which requires that protective coatings storage requirements be included in the project specification. Specification AS-31, the project specification for safety-related protective coatings, requires that protective coatings be stored in accordance with the corresponding manufacturer's recommendations.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

Allegation No. 35

It is alleged that Comanche Peak has problems in the area of workmanship, quality of work, painter qualification, and indoctrination. It is also alleged that documentation requirements were not being met, for example documentation of painter qualifications and in-process work.

Evaluation of Validity

We cannot and will not attempt to respond to a statement so vague and subjective as that Comanche Peak "has problems" in the general areas noted in the first sentence of the allegation.

The qualification of painters at CPSES has been and is fully in accordance with written procedures and ANSI N101.4. The second sentence of the allegation is thus incorrect as to documentation of painter qualification. Prior to late 1981, documentation requirements were not met for QC inspections. TUGCO received a Notice of Violation dated October 26, 1981 addressing this issue. From that date to the present, the protective coatings inspection program is in full compliance with applicable regulatory requirements.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 36

It is alleged that the traceability of coatings materials was not always maintained.

Evaluation of Validity

Traceability does not exist in all cases for coatings applied prior to November 1981. These coatings, however, are within the scope of the backfit inspection program which determines their adequacy.

Currently, and since late 1981, procedures have assured traceability for coatings materials. QC inspectors must enter the batch number of coatings on an Inspection Report prior to commencement of painting. Where no batch numbers are available, construction personnel may not use the non-traceable materials, but must obtain traceable coatings materials prior to application.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

Allegation No. 37

It is alleged that for the backfit program, areas that were stated to have satisfactory primer documentation ended up having 10 mils of primer on them, which exceeded the allowed maximum.

It is also alleged that none of the maps showing areas of adequate primer documentation were correct, for the backfit program. Additionally, it is alleged that the documentation for the backfit program was forged and falsified. Furthermore, it is alleged that a QC inspector for the night shift wrote up acceptable inspection reports for the dome area without ever performing the inspections.

Evaluation of Validity

The first sentence of this allegation is correct.

We assume the first sentence refers to backfit inspections for dry film thickness (DFT) on finish coated steel substrates for which acceptable documentation existed only for the primer coat. Until the issuance of Revision 5 of Instruction No. QI-QP-11.4-23 on 04/05/82, all backfit inspections for DFT on steel substrates were required to be performed by the Tooke test. DFT measurements of both the primer and the finish coats were taken and recorded. Revision 5 of QI-QP-11.4-23 (and all later revisions) deleted the requirement for performing a Tooke test on those finish coated steel substrates for which acceptable primer coat records existed and required that such surfaces to be tested by using an Elcometer Inspection DFT Gage to determine total coating system DFT only. The reason for this change was to eliminate duplicate inspections and corresponding documentation on primer coat surfaces which had been previously accepted (as evidenced by the existance of acceptable inspection documentation). Occasionally, during backfit inspections performed prior to 04/05/82, spot DFT readings for primer coated surfaces with acceptable documentation were found to be outside of the acceptable DFT range of the primer and documented as unsatisfactory. We do not consider this to be unusual in that locations of 5 spot DFT measurements are randomly selected and evenly spaced over each coated area of 100 square feet in accordance with SSPC-PA2-73T. It is highly improbable that any of the spot test locations of two separate inspections of the same surface area would coincide. As a result, it is highly probable that the individual spot readings and even the overall average of the spot readings for those two separate inspections will differ to some degree. It should be noted that unsatisfactory readings detected during the backfit inspections are tracked by the applicable inspection report until the condition is corrected or until Engineering disposition of the condition is received.

Our investigation was unable to substantiate the validity of the second sentence of this allegation. Individual interviews with nine coatings QC personnel familiar with the backfit program maps revealed that only two were aware of any discrepancies in the maps. The discrepancies noted were minor in nature and involved incorrect indication of gaps between adjacent inspection areas and outdated maps. It was further indicated by these two individuals that backfit inspection maps are presently up to date and any gaps detected have been correctly indicated on the applicable maps.

With regard to the third and fourth sentences, the USNRC OI is presently investigating the allegations concerning falsification of inspection records. Without more specific information, we are unable to investigate these allegations.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

Allegation No. 38

It is alleged that high dry film thicknesses (DFT's) of CZ-11 are power ground to an acceptable DFT. It is further alleged that this would burnish or polish the zinc, and possibly result in poor adhesion of the top coat.

Evaluation of Validity

The practice of power grinding excessive thicknesses of inorganic zinc primer (CZ-11) at CPSES is procedurally described and is performed in accordance with Carboline's recommendations. (See attached Carboline letter to Brown & Root, dated October 26, 1976, page 3, item 4, second paragraph). As noted in this letter, this practice is in accordance with ASTM standards. Further, investigation into typical failure modes for adhesion testing (conducted as a part of the backfit program) indicates that rarely, if ever, did adhesion failure occur between primer and topcoat. In summary, the CPSES approach is consistent with ASTM and manufacturer's recommendations. Testing performed to date does not support the conclusion that power grinding could lead to poor adhesion (less than 200 psi) between primer and topcoat.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

B & R DOC DIST.

DODD	
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TUCCO C.A.	

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OCT 29 1976

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PROTECTIVE COATINGS

FOR CORROSION RESISTANCE • WATERPROOFING • FIRE PROTECTION • ROOFING

350 HANLEY INDUSTRIAL COURT
ST. LOUIS, MO. 63144

October 26, 1976

Brown & Root, Inc.
P.O. Box 1001
Glen Rose, Texas 76043

Attention: Mr. H. C. Dodd, Jr., Project Manager

Subject: October 15, 1976 Meeting of Messrs. Julius Chupak, Keith Falk, Nick Gagliardo, Ralph McGrane, Henry Szatmary, Roger Tegtmeyer and Seymour Fiebach (Local Carboline Representative) at Gibbs & Hill Office, New York, N.Y.

Reference: Texas Utilities Service Company, Inc.
Commanche Peak Steam Electric Station
Containment Building #1 Painting
Gibbs & Hill, Inc. New York, N.Y.

Gentlemen:

It was agreed at above referenced Gibbs & Hill meeting that the application procedures and film thickness recommendations presented in the Carboline letter to Gibbs & Hill of October 21 (synopsis of discussion at Brown & Root meeting of October 15; reference Brown & Root letter to Texas Utilities Services of October 13) would be acceptable for implementation if proper documentation of conformance with applicable ANSI standards is provided to the job site. This is that letter of documentation.

The following recommendations for application of Carbo Zinc 11 and Phenoline 305 Finish will meet the applicable ANSI criteria noted. Specific points are in order of reply to the points of the October 13 letter from Brown & Root to Texas Utilities Services.

1. It is our recommendation that the nominal dry film thicknesses for the specified system is Carbo Zinc 11 at three mils/Phenoline 305 Finish at four mils. However, the dry film thicknesses recommended as the specified minimum is 2.5 mils for Carbo Zinc 11 and 3.0 mils for Phenoline 305 Finish. We recognize the following Allowable Deviations from Specified Dry Film Thicknesses (ASTM D 1.043 Special Technical Publication Chapter 10):

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Specified Film Thickness	Spot Test Minimum	Maximum Average Film Thickness	Spot Test Maximum
2.5 mils*	2.0 mils*	5.0 mils*	6.0 mils*
3.0 mils	2.4 mils	6.0 mils	7.0 mils

*Interpolated Values

As documentation of this recommendation, we have enclosed Carboline Laboratory Test Report 4-997 wherein Carbo Zinc 11 at three mils/ Phenoline 305 Finish at four mils passed the PWR/BWR LOCA of ANSI N101.5-1970 (currently ANSI N101.2-1972). The dry film thickness readings reported reflect an average value of both high and low spot readings similar to that above.

2. It was agreed upon in the Brown & Root meeting of October 15 that if the dry film thickness readings are uniformly adjusted by the magnetic thickness gauge reading on the bare, abrasive blasted substrate, that this will not be a problem. However, the values for dry film thickness reported in Carboline Laboratory test reports of LOCA performance do not reflect this method of film thickness measurement since it is not so specified in ANSI N101.2-1972 and ANSI N512-1974. Figures should then be adjusted by the average reading over the 1-2 mil blast profile of our panels which is approximately 0.5 mils.

3. Per ASTM D 1.043, Standard Technical Publication Chapter 10, 9.1.1 "where possible, runs and sags should be repaired by brushing out the excess wet material to give a smooth film of the specified thickness." However, in the cases that the runs and sags are identified in the cured film, ANSI 101.4-1972, sub-section 6.7.2 and 6.7.2.1 define "the following typical remedial actions be taken . . . major runs or sags should not be acceptable. If any do occur, they shall be removed, by suitable means, to the bare substrate or to the previously acceptable coat, and then the areas shall be recoated. Minor runs and sags that do not affect film quality and/or coating performance may be permissible." Runs and sags in Carbo Zinc 11 normally do not affect film integrity or performance and can be abraded off. If there is a loss of integrity such as areas of mudcracking, abrading will result in delamination of the film from bare steel. Therefore, it is our recommendation that all runs and sags (by definition flows of excessively applied coating) "that were not repaired while wet shall be removed by suitable means such as sanding or grinding" (ASTM D 1.043 Standard Technical Publication 10.9.1.2). A major run or sag, then, would be a run or sag that when abraded results in delamination to bare steel and thus must be removed to bare steel and repaired as specified. Runs and sags that can be removed without affecting the film can be considered minor runs or sags and are permissible.

4. Where the dry film thickness has been identified as being below the specified minimum, the recommended procedure for repair in accordance with ASTM D 1.043 Special Technical Publication, Chapter 10, Section 10.9.2.2 is to apply an additional coat of inorganic zinc primer. In this case, special requirements for this application consist of the existing prime coat being cleaned, i.e., free of oil, grease, dirt, rust staining, cement, visible moisture, and other contamination, and the subsequent prime coat be thinned 50%, i.e., two quarts of Carboline Thinner #33 per gallon of Carbo Zinc 11. Two coats of Carbo Zinc 11, plus Phenoline 305 Finish has no effect on the LOCA performance as you will note on the enclosed Carholine Laboratory Test Report SR57.

   Where the dry film thickness has been identified as being above the specified maximum film thickness, the following recommendations apply. Per ASTM D-1.043, Special Technical Publication, Chapter 10, Section 10.9.3.2 "localized areas of excessive film thickness that are not acceptable may be treated as runs or sags." Therefore, at the applicator's discretion, areas of excessive film thickness may be removed by sanding, grinding or abrading with screen wire. The other alternative is to sandblast back to bare metal and recoat as specified.

   It should also be noted that areas of dry spray should also be removed by abrading, normally with screen wire.

5. This problem is no longer pertinent as long as problems 1 and 2 have been resolved.

6. Steel Structures Painting Council SSPC-PA-2-73T, Appendix A.6, Proximity to Edges requires a minimum of 1" from any geometrical discontinuities unless the magnetic thickness gauge is calibrated under precisely similar conditions.

7. Two conditions apply to areas requiring touchup. Where bare steel is not exposed, the dry film thickness should be checked and if necessary an additional coat be applied as the same for areas with film thickness below the specified minimum. If bare steel is exposed, the area should be sandblasted and recoated per specification.

8. The inspection method of taking five spots of three readings each per 100 square feet is in accordance with Steel Structures Painting Council SSPC-PA2-73T was mutually accepted.

carboline

Mr. H. C. Dodd, Jr.
October 26, 1976
Page 4

9. The problem is handled by resolution of number 6 and number 8.

10. Since areas of less than the specified minimum film thickness need only be recoated per number 4, no limitation is necessary on the area relative to repair of low milage.

In addition to the above items, concern was also expressed as the definition of small areas relative to brush application. The agreed upon size limit for brush application is one square foot or 144 square inches.

We believe the above to be satisfactory documentation. If there are any questions, please direct them to our Field Representative, Charles Rushing, or to this office directly.

Very truly yours,

Charles J. Wiegers
Power Industry Manager

CJW/ra
201
Enclosures: CLTR SR57 & 4-997
occ: Messrs. Julius Chupak, Keith Falk, Nick Gagliardo, Ralph McGrane, Henry Szatmary Gibbs & Hill Inc., 393 Seventh, New York, NY 10001

TXX-4201
06/22/84

Allegation No. 39

It is alleged that old Phenoline 305 (between 1 and 2 years old) is being top coated with new Phenoline 305 with little or no surface preparation (solvent wipe).

Evaluation of Validity

This allegation is correct, but without technical significance. This method of recoating "aged" Phenoline 305 is procedurally addressed and is based on the coatings manufacturer's recommendation. (See attached letter from Carboline to Gibbs & Hill dated July 14, 1976).

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

AREA CODE 314
644-1000

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TELEX-044-7332

PROTECTIVE COATINGS
FOR CORROSION RESISTANCE • WATERPROOFING • FIRE PROTECTION • ROOFING

350 HANLEY INDUSTRIAL COURT
ST. LOUIS, MO. 63144

July 14, 1976

.. ..rry Szatmary
.. & Hill, Inc.
... 7th Avenue
..w York, New York 10001

Subject: Comanche Peaks

Dear Henry:

Confirming our phone conversation the other day, we discussed the procedures for applying a thin film tie coat of Phenoline 305 over the Carbo Zinc 11 on the Comanche Peak project. It is the intention to use this thin film as a tie coat to be topcoated later with a full coat of Phenoline 305.

Our recommendation would be to thin the Phenoline 305, approximately two quarts per gallon with Phenoline Thinner, and apply the Phenoline 305 at a dry film thickness of approximately one mil. To topcoat a year or so later it would be necessary to thoroughly solvent wipe the existing 305 surface with an appropriate thinner to insure that all contaminants are removed prior to topcoating.

If any additional information is required, Please do not hesitate to contact Seymour Fiebach or this office directly.

Very truly yours,

CARBOLINE COMPANY

Charles Wiegers
Power Industry Manager

CJW:kff/202
cc: Mr. Seymour Fiebach/Mr. Charles Rushing

Allegation No. 40

Instruction Number QI-QA-11.4-5, (sic), paragraph 3.2.2.d, Rev. 27, dated 11/08/83, page 7 of 27 states: "Verify that the blasted or power tooled surface has been brushed or vacuumed to the extent required for final surface inspection." It is alleged this has never been performed on power tool cleaned surfaces. It is further alleged that in lieu of following the procedure, the surfaces are being blown down with compressed air or wiped with a cloth rag. The concern with using compressed air is that the surface becomes contaminated with oil and/or water. The concern with a cloth rag is that the surface becomes contaminated with lint.

Evaluation of Validity

Taken out of context, this allegation appears to be correct. The next paragraph of the referenced procedure (QI-QP-11.4-5, Rev. 27, paragraph 3.2.2.e), however, goes on to state:

e) Verify acceptability of the blast cleaned or power tooled surfaces by performing the following inspections:

1. Absence of Foreign Matter -- A visual inspection shall be performed to determine that all oil and grease, dirt, millscale, rust, corrosion products, oxides, paint or other foreign matter have been completely removed from the surface except for light shadows, very slight streaks or slight discolorations caused by rust stains, millscale, oxides, or slight, tight residues of paint or coating that may remain. At least 95 percent of each square inch of surface area shall be free of all residues, and the remainder shall be limited to light discolorations as mentioned above.

The above required inspection would have detected the contaminating substances referenced in the allegation (water, oil, lint). The standard industry practice is to follow power tool cleaning with a solvent wipe. Our investigation indicates that this was the practice at that time and remains a practice. The fact that the procedure did not address solvent wipe as an acceptable cleaning method was corrected in the next revision to the procedure.

In summary, we find that procedural safeguards were in effect for the time period referenced in the allegation to preclude oil, water and lint contamination and find the allegation without technical significance.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201

06/22/84

Allegation No. 41

It is alleged that when wiping a surface immediately prior to repairing that surface, the paint is wiped with a foreign cleaning solution. This foreign cleaning solution is alleged to be a hospital disinfectant containing two (2) percent chlorides. The concern is that this hospital disinfectant is not allowed by procedure and could cause stress corrosion cracking of stainless steel.

Evaluation of Validity

It appears that this allegation stems from a misinterpretation of Regulatory Guide 1.54. Regulatory Guide 1.54 requires testing of all cleaning agents used for cleaning stainless steel. The use of a "foreign cleaning solution" (EconoLemon Disinfectant Cleaner-Hospital Type, manufactured by Garland Supply Company, Fort Worth, Texas) was originally identified on NCR C-83-01694. The concern at that time was that this cleaning solution was being used to clean finish coated liner plates (not stainless steel) and that it could have insulating properties and would preclude proper performance of a continuity test of the coated liner plate. Engineering evaluated the NCR and determined that there was no basis for the concern. Use of this type of detergent for this purpose requires no special qualification.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

Allegation No. 60

It is alleged that QC Inspectors were selectively sent to various inspections so that the coatings would pass inspection. For example, production calls for QC inspection. When the inspector arrives, he is told they are not ready. He returns to the QC office. On the way he meets a second inspector proceeding to the area he was just told was not ready for inspection. In this way, production selects the QC inspector they want. It is also alleged that QC management would reassign an inspector to a different task if he was going to reject a coating application. It is further alleged that QC management would send two inspectors to inspect an area, yet only one would sign the inspection report. It is alleged that the inspector not signing the report would not perform as thorough an inspection because he did not want to anger QC management, especially since the inspector did not have to sign the report.

Evaluation of Validity

We have investigated this allegation and have determined it to be partially correct but without technical significance. Our conclusion is based upon interviews conducted individually with eleven QC coatings inspection personnel. More than half of the individuals interviewed indicated that they were personally aware of cases in which construction had attempted unsuccessfully to request specific inspectors and of other cases in which construction had informed an inspector that an inspection which had been requested by construction was unnecessary because the area was not ready. They indicated, however, that the QC Supervisor and lead inspectors assign QC coatings inspectors to specific areas and/or applicator crews which precludes construction from being able to influence the assignment of inspectors. None of the individuals interviewed were aware of any cases in which a QC Supervisor or lead inspector had reassigned an inspector to another task in order to prevent the inspector from rejecting a coating application. With respect to the allegation regarding two inspectors performing an inspection with only one signing the corresponding inspection report, the interviews revealed that in one isolated case an inspector felt that a second inspector, who had assisted him in an inspection, had not performed as thorough an inspection as he could have, because only the first inspector would be signing the inspection report. In order to preclude the recurrence of situations similar to the isolated case discussed above, QC coatings inspection personnel will be reinstructed that each inspector participating in an inspection performed by more than one inspector shall co-sign the corresponding inspection report.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 42

It is alleged that duct tape has been placed over Richmond Inserts, leaving a hole behind the duct tape. Also, foam rubber was left inside the Richmond Insert. It is then alleged that 11S and 1201 are applied over the duct tape. The end result is what appears to be a solid wall, but in reality is a wall with holes in it covered with duct tape, 11S and 1201.

Evaluation of Validity

This allegation is correct but without technical significance. Engineering has issued DCA 12, 374 (attached) stating that coating of Richmond inserts shall be a Non-Q application. Because these coatings are not safety-related, they have been added to the Protective Coatings Exempt Log. (See item 30 on the Protective Coating Exempt Log, attached).

Instances where coatings have been applied over duct tape and foam rubber have been reported on Nonconformance Reports. The NCR's were dispositioned to rework the coatings in accordance with applicable procedures. Due to the nature of the 11S/1201 coating system, i.e., a rigid non-flexible film, coatings placed over the duct tape and foam rubber will generally crack, be reported during inspection of the area, and be reworked accordingly.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

RAH,TUGCO(2)AM(4) SPEC

CHANGE INDEX: OEI ____
: II ____
: III XX

COMANCHE PEAK STEAM ELECTRIC STATION
DESIGN CHANGE AUTHORIZATION

~~(WILL)~~ (WILL NOT) BE INCORPORATED IN DESIGN DOCUMENT   DCA NO. 12,374 Rev. 1

1. SAFETY RELATED DOCUMENT: XX YES ____ NO

2. ORIGINATOR: CPPE XX ORIGINAL DESIGNER ____

3. DESCRIPTION:

A. APPLICABLE SPEC/~~XXX/DOCUMENT~~ 2323-AS-31 REV. 1

B. DETAILS THIS REVISION VOIDS AND SUPERSEDES DCA-12,374 Rev. 0.

In Reactor Building Unit 1 and 2 numerous Richmond inserts exist embedded in the concrete. Request guidelines for coating the exposed face of these inserts. Solution: The exposed face of the inserts shall be primed with inorganic zinc primer and topcoated with Imperials Nutec 1201 topcoat. Although not required, a skim coat of Nutec 11S or 11 may be applied over the zinc primed insert to facilitate construction. Due to the size and configuration of these inserts, coating activities shall be performed in accordance with 2323-AS-30 coating specification. When performing this coating activity, tie in area around the insert face shall be a maximum of 1/2" into previously coated surface.

4. SUPPORTING DOCUMENTATION:

FOR OFFICE AND ENGINEERING USE ONLY

5. APPROVAL SIGNATURES: MW/sgf 11-2-82

A. ORIGINATOR: Mark Wells DATE 11/2/82

B. DESIGN REPRESENTATIVE: CRHooten DATE 11/3/82

6. VENDOR TRANSMITTAL REQUIRED: YES ____ NO XX

7. STANDARD DISTRIBUTION:

ARMS (Original)	(1)
Quality Engineering	(1)
TS for Orig. Design	(1)
Westinghouse-Site	(1)
Civil Engineering	(1)

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DCA FORM 11-80
Admin. Rev 7-82

PROTECTIVE COATINGS EXEMPT LOG

ENTRY №	ITEM OR AREA	COATING SYSTEM	SQ. FT.
20	portions of missile shield floor Unit I Per NCR C84-00091	Carboline CZ-11 primer w/ carboline 305 top	3.25
21	26 Tone deep clips on base plate Unit I Approx EL 1027' Re NCR # C84 01016	carboline 191 primer w/ carboline 305 Top	39.0
22	MANIPULATOR CRANE UNIT I # TBX-F115CMC-01 EL 860'-0" RE. DCA 17,142	AMERON D6/ AMERON 66/ PHENOLINE 305 TOPCOAT	583 / 2300
23	FLOOR COATING APPLIED W/ MINIMUM 7 DAY CURE RATHER THAN 28 DAY - AZ 310° @ EL 905'-9" RAD 59½" TO 61½" AZ NOTED IS ℄ - PER I TRANSFER # UI-003922 IRMB	IMPERIAL NUTEC 11S/11/1201	6.0
24	CHECKER PL ON UNIT I POLAR CRANE ~~TOTAL ARE~~	CZ11 PRIMER W/ PHENOLINE 305 TOPCOAT	2,400.0
	TRASH COMPACTOR RBI # CPI-WBBABW-01	TOUCH UP VENDOR COAT (NON CERT) W/ 191/305 SYSTEM	98.0
26	COATINGS ON POLAR CRANE GIRDERS ~~(BELOW)~~ BACK SIDE NEXT TO LINER, AREA OF BUS BAR ASSY & GIRDER SUPPORT BRACKETS (REC DCA 3270)	CZ11 PRIMER W/ PheNOLINE 305 TOPCOAT	2,700.0
27	COATINGS APPLIED TO THE 8 INSPECTION CHAMBERS UNIT I @ ELEVATION 824'-832' REFERENCE DCA 6114 R1	CARBOLINE CZ 11 PRIMER W/ PHENOLINE 305 TOPCOAT. TOUCH UP W/ CARBOLINE 191 PRIMER & 305 TOPCOAT.	3,000.0
28	SNUBBER COATINGS IN AREA OF LOCK WIRE TYPES: SMF ¼ & ½, 01, 03, 10; SMA ¼, ½, 01, 03, 10. REFERENCE DCA 20127	CARBOLINE CZ 11/ PhenoLINE 305 & POSSIBLE TOUCH UP W/ CARBOLINE 191/ PHENOLINE 305	110.0
29	U BAR SADDLES FOR PIPE WHIP RESTRAINTS REFERENCE DCA 20128	CARBOLINE CZ11/ PHENOLINE 305	385.0
30	RICHMOND INSERTS IN RBI. REFERENCE AS-31 SECTION 2D subparagraph 2 & DCA 12,374 REV 1 Which WAS INCOR INTO R2 of AS-31	CARBOLINE CZ11/ POSSIBLE IMPERIAL 11S OR 11 THEN TOPCOAT OF NUTEC 1201	2,258.0

TXX-4201
06/22/84

Allegation No. 43

It is alleged that zinc primer was not sufficiently cured before a top coat was applied. It is also alleged that the procedures were not followed to determine if the zinc primer was properly cured.

Evaluation of Validity

Unless an area where this is supposed to have occurred is specified, we have insufficient information with which to respond to this allegation. We have, however, interviewed coatings QC inspectors regarding this allegation. Nine of the eleven inspectors interviewed separately indicated that they were unaware of any cases in which a finish coat was applied on inorganic zinc primer before the primer coat was properly cured. The remaining two individuals interviewed acknowledged that methods utilized to verify proper cure of the inorganic zinc primer are in accordance with coatings application procedures (CCP-30 and CCP-30A) but questioned the validity of one of the verification methods as described in the procedures. The method in question is the "nickel test" which is discussed in Allegation No. 44.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

Allegation No. 44

It is alleged that the "nickel" test was not performed properly due to instructions received from QC supervisors. It is alleged that QC supervisors instructed QC inspectors to lay the nickel flat on the surface of the coating; then to lightly rub the nickel, as lightly as the inspector could, across the coating, to keep just enough pressure on the nickel so that it would not fall out from under the fingers.

Evaluation of Validity

We have investigated this allegation and determined that it is not correct. Of eleven coatings QC inspection personnel interviewed, all indicated that the "coin test" has been performed in the past and continues to be performed in accordance with the method described in coatings application procedures (CCP-30 and CCP-30A). CCP-30 Revision 12 Paragraph 3.3.1(f) contains the following sentence: "Carbo Zinc 11 is sufficiently cured for topcoat when the coating may be burnished rather than removed when rubbed with the flat portion of a smooth edged coin such as a nickel." CCP-30A Revision 4 Paragraph 3.3.1 (f) contains similar wording. It is our opinion that the "coin test" method described in CCP-30 and CCP-30A conforms with the preferred Carboline method for the coin test as described in the attached Carboline letter.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

Allegation 44

carboline

PROTECTIVE COATINGS
FOR CORROSION RESISTANCE • FIRE PROTECTION • WATERPROOFING

AREA CODE 314
644 – 1000

CABLE - CARBOCO - ST. LOUIS
TELEX– 44–7332

REPLY TO:
CARBOLINE COMPANY
1325 19th ST. - STE. 3-B
PLANO, TX. 75074
(214) 424-7512

Mr. Tom Kelley
EBASCO Services
Comanche Peak Nuclear Power Plant
P.O. Box 1002

Dear Tom:

Please be advised that the coin test procedure for checking the cure of Carbo Zinc 11 has been done in many different ways. I have been to Comanche Peak several times and demonstrated my favorite method, however. Instructions for the preferred method follow:

1. Use a quarter and lay it flat on the zinc primer.
2. Put heavy pressure on the coin with finger tips and rub the coin back and forth. (8-10times)

If the zinc primer is cured, the coin should leave a burnished, shiny appearance. If the Carbo Zinc 11 is not cured, it will <u>not</u> have a polished appearance.

I have demonstrated both situations (cured and not cured) to painters, foremen, engineers, and Q. C. personnel. If I can be of any further assistance, please let me know.

Sincerely,

Charles Rushing
North TX. Area Mgr.

cc. Steve Harrison

Mailed 4/12/84
Received 4/16/84

TXX-4201
06/22/84

Allegation No. 45

It is alleged that repairs of defects have been accomplished with no reinspection of these defects. For example, a repair is made, someone comes along and walks in the repair, you have accepted that area as satisfactory with footprints, contamination, sand, etc., and it is never reinspected. It is further alleged that this repair is not given a final inspection of the type that would have been performed had it been a regular production type job.

Evaluation of Validity

CPSES procedures define two categories of defects in coated surfaces: minor defects, whose minor dimension is less than 1/2"; and major defects, whose minor dimension is greater than 1/2". The procedure require that coatings applied in rework of major defects must be allowed to cure before reinspection occurs. Contamination of these areas would be identified when reinspected. If the allegation refers to these repairs, the allegation is simply incorrect.

Pinholes and minor defects are inspected at the time of repair. The only distinction between this and major defects is that larger repair areas are inspected after a defined curing period has lapsed. The rationale for timing the inspection of small repairs in a different manner than for larger repairs is threefold: 1) due to the small area of repair, the likelihood that these areas will receive damage prior to cure is remote; 2) the likelihood that defects will occur as a result of the curing process is even further remote; and 3) the difficulty in locating small repair areas for reinspection after curing. For such contamination of applied coating to occur it must occur prior to the coating curing to a tack free condition (normally a few hours after application). The conclusion that repairs of this size could contain footprints is incorrect. Even if repairs are extensive enough for contamination to be of concern, QC is alert to this possibility and documents such conditions as unsatisfactory. (See NCR C-84-0066, attached).

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TEXAS UTILITIES GENERATING CO.

COMANCHE PEAK STEAM ELECTRIC STATION
NONCONFORMANCE REPORT (NCR)

NCR No. C-84-00066R1

UNIT	STRUCTURE/SYSTEM	ITEM/COMPONENT	TAG/ID NUMBER	LOCATION OR ELEVATION	RIR NO.
1	~~Concrete~~ Coatings	~~Concrete~~ Floor	~~Traveler Numbers~~ 1-40-1 1-14-R	El 860 Area Codes 39+40	N/A

REPORTING PERSONNEL

NONCONFORMING CONDITION Contrary to the requirements of referenced procedures the following areas were subjected to personnel foot traffic and construction work prior to required cure time after application of 1201.

Floor at No. end of Rea. cavity open area El. 860' as shown on PFB-RIC-503-02 was final accepted with extensive pinhole repair at 4:15 a.m. on 1/6/84. adjacent floor area to east as shown PFB-RIC-503-02 Pg. 1 of 7 from approx. Az 105° to Az 135° was finaled with spot repairs at 8:45 a.m on 1/6/84. At 8:00 pm. it was noted that floor had been covered with gryfolyn and partially covered with plywood and heavy foot traffic and constr. activities were progressing in above areas.
See PCI-UI-001201 and PCI-UI-001618

REFERENCE DOCUMENT: ~~CCP-40/QI-QP-11.4-27~~ REV ~~6/0~~ PARA ~~4.2.2(c)/2.5(c)~~

REPORTED BY: Richard E. Gibson DATE: 5/29/84

QE

QE REVIEW/APPROVAL: [signature] For M. Krisher DATE: 5/29/84

ACTION ADDRESSEE: Trieste DEPARTMENT: Eng.

ACTION ADDRESSEE

DISPOSITION:

REWORK ______ REPAIR ______ USE AS IS XXX SCRAP ______

The gryfolyn and plywood put on the floor did not adhere to the coating. The time interval allowed was sufficient cure for the coverings to protect the coating.

Craft is reminded to adhere to curing times listed in CCP-40.

As the coating is intact and cured Use-as-is.

FOR INFORMATION ONLY

ARMS INDEXED

QA RECORD

RTN.	QA REVIEW
L	[initials] 6-1-84

FILE NO. 15.1

SUBFILE NO. C-84-00066

ENG. REVIEW/APPROVAL: [signature] DATE: 5/29/84

QE

QE REVIEW APPROVAL: [signature] DATE: 5/31/84

DISPOSITION VERIFICATION & CLOSURE: M Krisher DATE: 6/1/84

COMMENTS: Rev 1- Issued to re-open NCR and correct disposition.

TEXAS UTILITIES GENERATING CO.

COMANCHE PEAK STEAM ELECTRIC STATION
NONCONFORMANCE REPORT (NCR)

NCR No. C-8490066

UNIT	STRUCTURE/SYSTEM	ITEM/COMPONENT	TAG/ID NUMBER	LOCATION OR ELEVATION	RIR NO.
1	COATINGS	FLOOR	TRAVELER NUMBERS 1-19-0	EL 860 AREA COORS 39440	N/A

REPORTING PERSONNEL

NONCONFORMING CONDITION: CONTRARY TO THE REQUIREMENTS OF REFERENCED PROCEDURES THE FOLLOWING AREAS WERE SUBJECTED TO PERSONNEL FOOT TRAFFIC AND CONSTRUCTION WORK PRIOR TO REQUIRED CURE TIME AFTER APPLICATION OF 1201.

FLOOR AT NO. END OF REA. CAVITY OPEN AREA EL. 860' AS SHOWN ON PFG-RIC-503-03 WAS FINAL ACCEPTED WITH EXTENSIVE PINHOLE REPAIR AT 4:15 AM. ON 1/6/84. ADJACENT FLOOR AREA TO EAST AS SHOWN ON PFG-RIC-503-02 PG 1 OF 7 FROM APPROX. AZ 105° TO AZ 135° WAS FINALED WITH SPOT REPAIRS AT 8:45 A.M. ON 1/6/84. AT 8:00 P.M. IT WAS NOTED THAT FLOOR HAD BEEN COVERED WITH GRYFULYN AND PARTIALLY COVERED WITH PLYWOOD AND HEAVY FOOT TRAFFIC AND CONSTRUCTION ACTIVITIES WERE PROGRESSING IN ABOVE AREAS.

SEE PCI-U1-001201 AND PCI-U1-001618

ENGINEERING USE ONLY

REFERENCE DOCUMENT: QI-QP-11.4-27 REV 0 PARA 7.5(5)
CCP-40 REV 6 PARA 4.3.2.1(6)

REPORTED BY: [signature] RICHARD E. GIBSON DATE: 1/6/84

QE

QE REVIEW/APPROVAL: [signature] DATE:

FOR OFFICE AND ENGINEERING USE ONLY

ACTION ADDRESSEE: Trieste DEPARTMENT: Eng.

ACTION ADDRESSEE

DISPOSITION:

REWORK ______ REPAIR ______ USE AS IS XXX SCRAP ______

The grayfolyn and plywood put on the floor did not adhere to the coating. The time interval was allowed sufficient cure for the coverings to protect the coating.

Craft reminded to adhere to curing times listed in CCP-30.

FOR INFORMATION ONLY

As the coating is intact and cured - use as is

— [signature] 1/10/84

ENG. REVIEW/APPROVAL: James Matthews DATE: 01/10/84

QE

QE REVIEW APPROVAL: for H. W. Pendergrass [signature] DATE: 1/11/84

DISPOSITION VERIFICATION & CLOSURE: H. W. Pendergrass DATE: 1/13/84

COMMENTS:

Allegation No. 46

It is alleged that during tocke gauge tests, it was observed that rust was seen on steel substrate, and grease, grime, filth and other contaminants on concrete substrate.

Evaluation of Validity

Tooke tests are performed as part of the CPSES coatings reinspection program. Thousands of Tooke test have been performed in connection with the reinspection. Unless an area or areas where rust or other contaminants were supposedly observed are identified, we are unable to respond to this allegation.

As a technical matter, it is our opinion that the identification of "grease, grime, filth or other contaminants" on a coated concrete surface by means of a Tooke test would be impossible. It is our further opinion that identification of rust on coated steel substrate by means of a Tooke test would be extremely difficult, if not impossible. Identification of rust on coated steel substrate at CPSES would be further compounded by the common use of red iron oxide colored primers, which would make distinguishing between rust and red oxide colored primer difficult.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

Allegation No. 47

It is alleged that for an installation hanger for the steam generators, in violation of a written instruction, QC inspectors were instructed to perform approximately 25 elcometer adhesion tests.

Evaluation of Validity

Without having additional information, we assume that this allegation is referring to adhesion testing performed by QC on a primer coat on the Mirro insulation support ring of the Unit No. 1 Steam Generator No. 4. In actuality, there were a total of 32 adhesion tests performed on the primer coat on the support ring. The chronology of this matter is as follows:

08/31/82 a) Support ring with previously applied primer thereon is presented to QC for inspection prior to primer repair.

b) A QC inspector rejects surface preparation due to rust, old primer remaining and ink pen marks, and he documents this inspection on an inspection report.

09/01/82 a) A QC inspector performs an adhesion test on the support ring primer and two of the three adhesion dollies test below the minimum acceptable tensile strength of adhesion. In accordance with Instruction QI-QP-11.4-5 Revision 11 (effective revision on that date) paragraph 3.1.1(b), the primer coat is rejectable and requires removal to the steel substrate. (i.e., rejectable if any one of the three adhesion dollies tests below the minimum acceptable strength). Results of the failing test are documented on a second inspection report.

b) Construction then requests that three additional adhesion dollies be tested by QC to determine for information the extent of the unacceptable coating area.

c) A QC inspector tests three more adhesion dollies on the support ring primer and two out of three test below the minimum acceptable strength. Results of the additional testing are documented on the second inspection report.

09/08/82 a) Construction requests that QC perform additional adhesion testing of primer over the entire support ring in order to provide additional information.

b) A QC inspector tests a total of 26 more dollies on the primer at random locations over the entire support ring. Two out of the 26 tests are below the minimum acceptable strength. Results of the testing are documented on a third inspection report.

09/10/82 a) Construction removes primer to steel substrate from all surfaces of the support ring (except for inaccessible surfaces), and presents to QC for inspection.

b) A QC inspector performs inspection of surface preparation and corresponding complete primer repair which are documented as satisfactory on fourth inspection report.

As can be seen from the above chronology, the subject matter was controlled by QC from the first rejection to the complete removal of the primer and corresponding reapplication of primer. We disagree that this matter constitutes a violation of Instruction No. QI-QP-11.4-5 Revision 11. There are no requirements within that instruction which prevent construction from requesting additional tests for information purposes in order to determine the extent of unsatisfactory coating. If the area of unsatisfactory primer could have been be isolated, then construction could have presented the test data to Engineering for evaluation of the entire surface area of the support ring. Instead, the entire ring was stripped and recoated.

In summary, we have determined that this allegation is not correct.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 48

It is alleged that coatings have been applied over seismic joints. These joints are filled with foam and were not to be coated.

Evaluation of Validity

The terminology used in this allegation is incorrect. Seismic joints are air gaps of two to six inches (depending on location) and coating of such gaps is impossible. Apparently what is referred to is expansion joints. The application of protective coatings over these joints will not affect the intended function of the expansion joint. If expansion joints were coated and all these coatings failed, it would not present a safety problem due to the insignificant quantity of coatings involved.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 49

It is alleged that overspray into areas that had previously been inspected has been allowed and is commonplace.

Evaluation of Validity

We have investigated this allegation and have determined it to be incorrect. Ten of eleven coatings QC inspection personnel interviewed indicated that during spray applications of coatings or during final visual inspections they often encountered overspray on previously accepted coated substrates; the other inspector indicated that he had not encountered overspray. Those who had encountered overspray indicated that in each case, upon request by QC personnel, any overspray detected had been promptly removed by either wiping, if the coating overspray had not yet cured, or by screening (rubbing the surface with an aluminum screen) if the coating overspray had already cured. It was indicated by all QC personnel interviewed that in no case has QC, upon detection of overspray, permitted it to remain on previously accepted coated substrates.

It is not uncommon during spray applications for overspray to occur on adjacent substrates which have been previously coated. CPSES coatings inspection instructions adequately address the issue of overspray. These requirements are being effectively implemented.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 50

It is alleged that coatings have been applied without the benefit of quality control inspection.

Evaluation of Validity

NCR's and Unsat IR's have documented instances in which protective coatings have been applied to bare substrates or to previously coated substrates without appropriate QC inspection. The allegation is, therefore, factually correct.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 51

It is alleged that Phenoline 305 was thinned to a 50/50 mix with thinner. This 50/50 mix, when dried, became as brittle as glass. The Phenoline 305 became so brittle that it was not possible to obtain a tooke gauge reading. It lost its impact resistance and abrasion resistance.

Evaluation of Validity

The practice of thinning Phenoline 305 by adding two quarts of thinner per gallon (referred to as a "50/50 mix") is now and has always been procedurally described, and is based on the manufacturer's (Carboline) recommendation. (See attached Carboline letter to Gibbs & Hill, dated July 14, 1976). This thinning is done to control viscosity and has no effect on the impact resistance or abrasion resistance of the cured film.

Phenoline 305 forms a rigid film when fully cured. The fact that the coating appeared embrittled in this instance is more likely a function of the sharpness of the tooke gauge tip than any characteristic of the coating itself. A dull tip tends to "gouge" the coating surface rather than cleanly cut it.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

AREA CODE 314
644-1000

carboline

CABLE-CARBOCO-ST.LOUIS
TELEX-044-7332

PROTECTIVE COATINGS
FOR CORROSION RESISTANCE • WATERPROOFING • FIRE PROTECTION • ROOFING

350 HANLEY INDUSTRIAL COURT
ST. LOUIS, MO. 63144

July 14, 1976

M. Henry Szatmary
[illegible] & Hill, Inc.
[illegible] 7th Avenue
New York, New York 10001

Subject: Comanche Peaks

Dear Henry:

Confirming our phone conversation the other day, we discussed the procedures for applying a thin film tie coat of Phenoline 305 over the Carbo Zinc 11 on the Comanche Peak project. It is the intention to use this thin film as a tie coat to be topcoated later with a full coat of Phenoline 305.

Our recommendation would be to thin the Phenoline 305, approximately two quarts per gallon with Phenoline Thinner, and apply the Phenoline 305 at a dry film thickness of approximately one mil. To topcoat a year or so later it would be necessary to thoroughly solvent wipe the existing 305 surface with an appropriate thinner to insure that all contaminants are removed prior to topcoating.

If any additional information is required, Please do not hesitate to contact Seymour Fiebach or this office directly.

Very truly yours,

CARBOLINE COMPANY

Charles Wiegers
Power Industry Manager

CJW:kff/202
cc: Mr. Seymour Fiebach/Mr. Charles Rushing

Allegation No. 52

It is alleged that coatings have been placed over raw concrete that had no surface preparation.

Evaluation of Validity

We assume the term "r. w concrete" used in the allegation refers to bare concrete substrate. NCR's and Unsat IR's have documented instances in which coatings have been applied to concrete substrate without observance of QC inspection hold points.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 53

It is alleged that QC inspectors were not to write Requests for Information or Clarification.

Evaluation of Validity

Our evaluation of this allegation indicates that for a short period of time during mid-1982, a former protective coatings QC supervisor did verbally instruct his personnel not to write RFIC's. This resulted from a misunderstanding (on the QC Supervisor's part) of discussions he had had with his supervisor. When QA/QC Management learned of this directive, the QC Supervisor's verbal direction was rescinded. There have been numerous RFIC's written by QC personnel since that time.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 54

It is alleged that during the Backfit Program, only the first unsatisfactory reading was recorded, even if the following readings were either higher or lower, meaning further out of the acceptable range. It is further alleged that the trend analysis was adversely affected by not including the actual readings.

Evaluation of Validity

This allegation is not correct. Coatings backfit inspection instructions QI-QP-11.4-23 (steel substrates) and QI-QP-11.4-24 (concrete substrates) both include provisions for performing additional testing around unacceptable spot tests in order to determine the extent of each unsatisfactory area. Each instruction includes provisions for documenting results of additional testing. It was indicated by ten coatings QC personnel who were interviewed that unacceptable backfit test results, including results of additional testing to determine extent of unsatisfactory areas, have been performed in accordance with the requirements of backfit inspection instructions QI-QP-11.4-23 and QI-QP-11.4-24.

Because the allegation that only the first unsatisfactory reading was recorded is incorrect, the subsidiary allegation that trend analyses could be adversely affected on that basis is also incorrect. More to the point, quality trend analysis takes into consideration only whether items or activities are acceptable or unacceptable and does not take into consideration the degree of acceptability or unacceptability of individual items or activities.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 55

It is alleged that areas identified during the Backfit Program as being outside of the acceptable range for applied coatings were not removed as required.

Evaluation of Validity

This allegation is partially correct but without technical significance. Results of all backfit coatings inspections are documented on inspection reports. If Engineering accepts the unsatisfactory coatings conditions via a DCA, the applicable coatings are not removed or repaired. If Engineering does not accept the unsatisfactory conditions, the applicable coatings are repaired/reworked and subjected to reinspection by QC.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 56

It is alleged that original documentation related to the Backfit Program was destroyed by QC management.

Evaluation of Validity

This allegation is not correct. We are aware of no instances in which coatings backfit inspection documentation has been destroyed.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201
06/22/84

Allegation No. 57

It is alleged that in Unit 2, elevation 860, the room directly off the elevator had an area coated that was covered with filth, weld spatter, tobacco juice, and other unsuitable material.

Evaluation of Validity

We have investigated this allegation and assume that it is referring to a condition which occurred in Unit No. 1 rather than Unit No. 2 as indicated. Nonconformance Report No. C-84-00091 (attached) identified a similar condition on the Roll-Away Missile Shield Floor at Elevation 860' of Reactor Containment Building No. 1. This condition involved the application of finish coat on a floor plate surface that exhibited unfeathered areas of damaged finish coat, embedded contaminants, and other contamination including dirt and magic marker. After checking the nonconformance report log and interviewing ten QC coatings inspection personnel in regard to similar occurrences, we have concluded that the condition described above is an isolated case. In addition, our investigation revealed that no similar conditions have occurred in the general vicinity of the Unit No. 2 location which is vaguely described in this allegation. Furthermore, the coatings on the portions of the Roll-Away Missile shield floor described in Nonconformance Report No. C-84-00091 have been included by Engineering on the Protective Coatings Exempt Log (See Entry Number 20 on attached log sheet).

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TEXAS UTILITIES GENERATING CO.

COMANCHE PEAK STEAM ELECTRIC STATION
NONCONFORMANCE REPORT (NCR)

NCR No. C84-00091

UNIT	STRUCTURE/SYSTEM	ITEM/COMPONENT	TAG/ID NUMBER	LOCATION OR ELEVATION	RIR NO.
1	RCB	PROTECTIVE COATINGS	CP1-MEMEMS-01	EL 860'	N/A

REPORTING PERSONNEL

NONCONFORMING CONDITION

INSPECTION PER QI-QP 11.4-26 WAS REQUESTED ON THE #1 ROLL AWAY MISSLE SHEILD CP1-MEMEMS-01 (SEE TRAVELER 1-19-F- PCI-U1-0064) CONDITION OF THE SURFACE TO BE RECOATED WITH PHENOLINE 305 (0800). UPON VISUAL INSPECTION OF THE FLOOR PLATE THE FOLLOWING CONDITIONS WERE FOUND UNFEATHERED AREAS OF DAMAGED FINISH COAT EMBEDDED CONTAMINANTS, CONTAMINATION (IE DIRT, MAGIC MARKER ETC) THUS RENDERING THE ITEM UNACCEPTABLE. (SEE ATTACHED SKETCH)

QA RECORD

RTN	QA REVIEW
[illegible]	1-25-84

FILE NO. 15.1

SUBFILE NO. NCR#

ARMS INDEXED

REFERENCE DOCUMENT: QI-QP 11.4-26 REV 0 DATE: PARA 2.9.2 2.10.2 2.10.4

REPORTED BY: NEILL BRITTON Neill Britton DATE: 1,11,84

QE

QE REVIEW/APPROVAL: [signature] DATE: 1,11,84

ACTION ADDRESSEE: KISSINGER DEPARTMENT:

ACTION ADDRESSEE

DISPOSITION:

REWORK ______ REPAIR ______ USE AS IS XXX SCRAP ______

The large majority of the area meets the requirements of the specification and construction procedures. The minute areas of unfeathered chips and any possible embedded contaminates will ~~not [illegible]~~ [illegible] will be entered on the exempt log.

[signature] 1/11/84

ENG. REVIEW/APPROVAL: RMKissinger DATE: 1,11,84

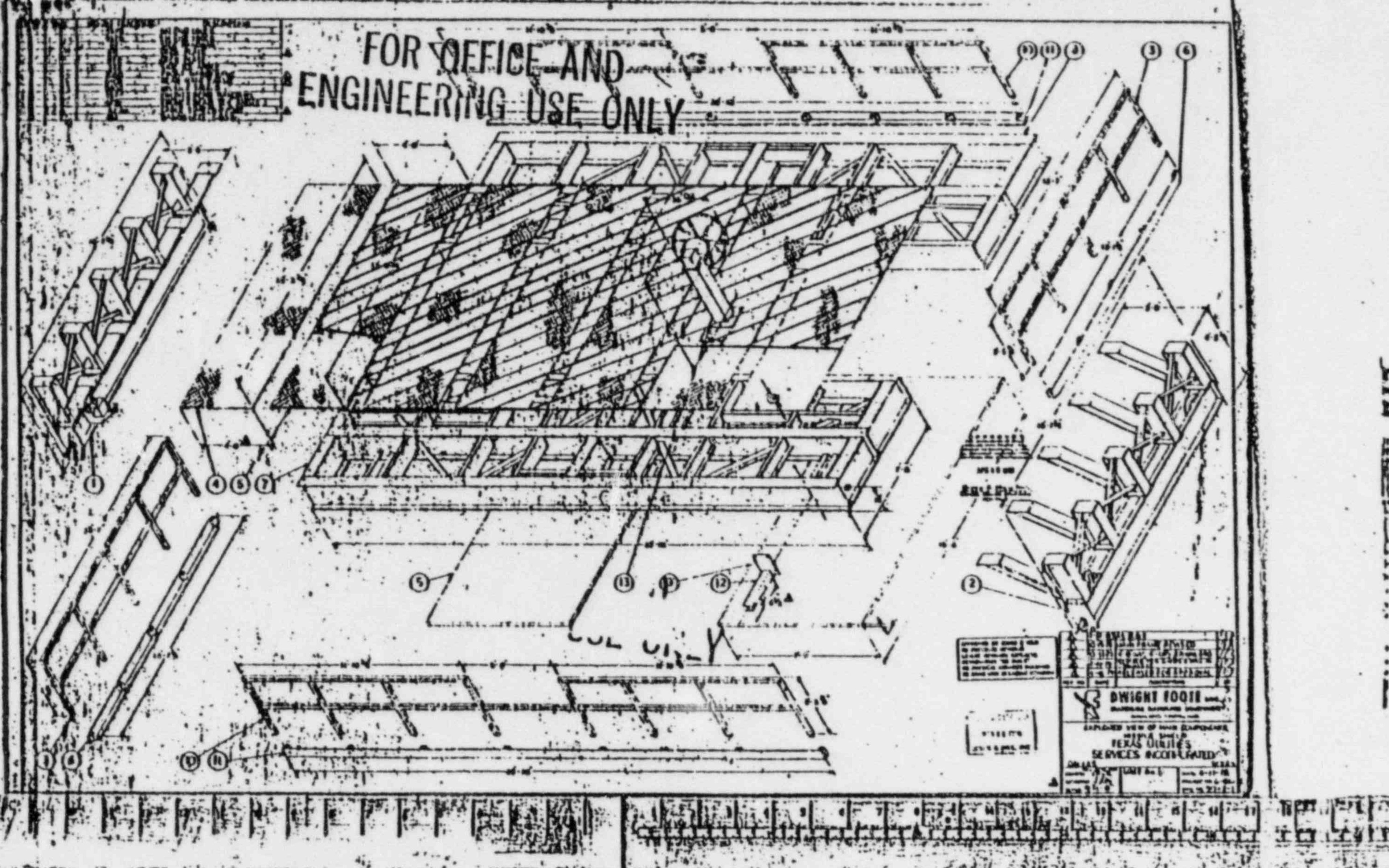
QE REVIEW APPROVAL: [signature] [initials] H. I. [illegible] 1/19/84 DATE: 1,11,84

DISPOSITION VERIFICATION & CLOSURE: 1/24/84 [initials] [signature] DATE: 1,24,84

COMMENTS:

FOR INFORMATION ONLY

AREA COATED PRIOR TO ISSUANCE OF NRC-87-L0091-



FOR INFORMATION ONLY

PROTECTIVE COATINGS EXEMPT LOG

ENTRY NR	ITEM OR AREA	COATING SYSTEM	SQ. FT.
20	portions of missile shield floor Unit I Rec NCR CBA-00091	Carboline CZ-11 primed w/ Carboline 305 topcoat	0.25
21	26 Tone [illegible] clips on base plate Unit I approx EL 1027' Re NCR #CB4 01046	Carboline 191 primed w/ Carboline 305 Topcoat	39.0
22	MANIPULATOR CRANE UNIT 1 #TBX-F11SCMC-01 EL 860'-0" RE. DCA 17,142	AMORON DL/ AMERON 66/ PHENOLINE 305 TOPCOAT	~~5.0~~ 2300
23	FLOOR COATING APPLIED W/ MINIMUM 7 DAY CURE RATHER THAN 28 DAY - AZ 310° @ EL 905'-9" RAD 59¼" TO 61½" AZ NOTED IS ℄ - REF: TRANSFER #U1-003922 IRMB	IMPERIAL NUTEC 11S/11/1201	6.0
24	CHECKER PL ON UNIT 1 POLAR CRANE ~~[illegible]~~	CZ11 PRIMER W/ PHENOLINE 305 TOPCOAT	2,400.0
25	TRASH COMPACTOR RBI #CP1-WEBABW-01	TOUCH UP VENDOR COAT (NON CERT) W/ 191/305 SYSTEM	93.0
26	COATINGS ON POLAR CRANE GIRDERS ~~(BEAMS)~~ BACK SIDE NEXT TO LINER, AREA OF BUS BAR ASSY & GIRDER SUPPORT BRACKETS (REF DCA 3270)	CZ11 PRIMER W/ PHENOLINE 305 TOPCOAT	2,700.0
27	COATINGS APPLIED TO THE 8 INSPECTION CHAMBERS UNIT 1 @ ELEVATION 824'-832' REFERENCE DCA 6114 R1	CARBOLINE CZ 11 PRIMER W/ PHENOLINE 305 TOPCOAT. TOUCH UP W/ CARBOLINE 191 PRIMER & 305 TOPCOAT.	3,000.0
28	SNUBBER COATINGS IN AREA OF LOCK WIRE TYPES= SMF ¼ & ½, 01, 03, 10; SMA ¼, ½, 01, 03, 10. REFERENCE DCA 20127	CARBOLINE CZ 11/ PhenoLINE 305 & POSSIBLE TOUCH UP W/ CARBOLINE 191/ PHENOLINE 305	110.0
29	U BAR SADDLES FOR PIPE WHIP RESTRAINTS REFERENCE DCA 20128	CARBOLINE CZ11/ PHENOLINE 305	385.0
30	RICHMOND INSERTS IN RBI. REFERENCE AS-31 SECTION 2.0 subparagraph 2 & DCA 12,374 REV 1 which was incor. into R2 of AS-31	CARBOLINE CZ11/ POSSIBLE IMPERIAL 11S OR 11 THEN TOPCOAT OF NUTEC 1201	2,258.0

Allegation No. 58

QC inspector (sic) procedures such as QI-QP-11.4-1 state: "Adequate lighting is defined as the minimum light produced by a (2) cell battery flashlight." It is alleged that the minimum is zero light. It is alleged that QC inspectors were to perform their inspections at arm's length, and if the light was bright, that wasn't the minimum. Rather, it was the maximum and they should obtain a weaker flashlight.

Evaluation of Validity

This allegation is not correct. Protective coatings inspection instructions require that visual inspections of surfaces be performed at approximately an arms length in distance from the surface being inspected. The intent of this CPSES requirement, which is quoted correctly in this allegacion, is that in the absence of permanent plant lighting, temporary lighting, natural lighting, etc., the minimum light required to perform a visual inspection of a surface is the light emitted from a properly functioning two cell battery flashlight which is in the "on" position and pointed in the direction of the surface being inspected. None of the eleven QC coatings inspection personnel, who were interviewed and questioned as to their understanding of the meaning of this requirement, indicated that they had any difficulty in understanding the subject requirement as it is stated in the inspection instructions.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable

TXX-4201

06/22/84

Allegation No. 59

It is alleged that a QC Inspector accepted substandard coatings on the liner plate, below and above the polar crane rail at azimuth 270° to 0°.

Evaluation of Validity

The lack of specificity of this allegation makes evaluation extremely difficult. We have reviewed inspection records (both production and backfit) for approximately 6,500 square feet of coatings in this area, and the records do not substantiate this allegation.

Safety Significance

None

Generic Implications on Other Systems or Contractors

Not applicable