

allegation #5  
Gickls

NUCLEAR DATA SUMMARY PACKAGE

Carbo Zinc 11/Phenoline 305 Finish

Rec'd  
4/6/84 @BNL

Test Report No. SR-105

8511070038 851016  
PDR FOIA  
GARDE85-59 PDR

INDEX FOR TEST REPORT NO. SR-105

<u>SECTION</u>	<u>PAGE(S)</u>
STATEMENT FROM OAK RIDGE ON PROCEDURES USED IN THEIR EVALUATION . . .	3
DEA AND RADIATION TOLERANCE TEST Panel PREPARATION DATA . . . . .	5
DEA TEST RESULTS . . . . .	10
RADIATION TOLERANCE TEST RESULTS . . . . .	12
DECONTAMINATION TEST PANEL PREPARATION DATA . . . . .	14
DECONTAMINATION TEST RESULTS . . . . .	16
PHYSICAL PROPERTIES . . . . .	18
CHEMICAL EXPOSURE SAMPLE PREPARATION DATA AND INDIVIDUAL CHEMICAL EXPOSURE DATA . . . . .	24
SUMMARY OF CHEMICAL EXPOSURE RESULTS . . . . .	37
SURFACE BURNING CHARACTERISTICS . . . . .	39

Manufacturer: Carboline  
St. Louis, MO

Analytical Chemistry Division  
Oak Ridge National Laboratory  
Date: Aug. 16, 1978

## 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, spec. Nos. 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  $1 \times 10^8$  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

Approved

J. R. Gilling  
L. T. Griffin

Manufacturer: Carboline  
St. Louis, MO

Analytical Chemistry Division  
Oak Ridge National Laboratory  
Date: Aug. 16, 1978

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 D.F." 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

J. R. Relling

Approved

L. T. Corbin

Manufacturer: Carboline  
St. Louis, MO

Analytical Chemistry Division  
 Oak Ridge National Laboratory  
 Date: Aug. 16, 1978

Table 1. DBA solution composition, distilled water

0.28 M boric acid (3,000 ppm boron)  
 0.064 M sodium thiosulfate  
 Adjusted to pH 9.5 with sodium hydroxide

Table 2. DBA test conditions\*

Time	Temperature (°F)	Pressure (psig)	Comments
Start			
10 seconds	307	60	Steam injection.
2 hrs 47 min	307	60	
5 minutes	307-280	60-30	Injected cold spray.
20 minutes	280-250	30	Adjusted pressure.
4 days	250	30	
3 minutes	250-230	10	Drained; injected cold spray.
15 minutes	230-200	10	Adjusted pressure.
3 days	200	10	
End of test			

\*These data are taken from recorder charts on permanent file at ORNL.

ORNL Log Book No. A7562; A7-17-8

Evaluated

Approved

J. G. Gellberg  
L. T. Carlin

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

Test Report No. SR. 105

DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED Carbo Zinc 11/Phenoline 305 Finish
2. TYPE SUBSTRATE Certified ASTM A36 Steel SIZE 2" x 4" x 1/4"
3. SURFACE PREPARATION (describe) Sandblasted to SSPC-SP10-63 with a 1-3 mil blast profile.

4. PRODUCT DATA: SAMPLE NO.(s) S6-101, S6-102

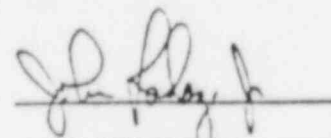
5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED ---

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	TIME & DATE APPLIED
1c	Carbo Zinc	11	7M5123M 7L0980Z	Spray	74°/42%	S6-101).0024/.0022 S6-102).0024/.0023	3-7-
1c	Phenoline	305 Finish	7L2908M 7L2894M	Spray	70°/40%	S6-101).0036/.0036 S6-102).0036/.0036	4-18-

5. CURING CONDITIONS: AMBIENT TEMP Primer 60-79 71-78 °F REL. HUMIDITY Primer 35-86% 33-56%  
MINIMUM CURE Primer 42 20 DAYS

6. TEST PROCEDURE ORNL Master Analytical Manual Method No. 2 0921

7. TESTING PERFORMED BY Analytical Chemistry Div. DATE SUBMITTED 5-8-78  
Oak Ridge National Laboratory

  
TEST REPORT NO. 01629

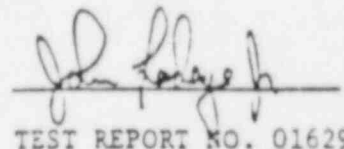
## DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED Carbo Zinc 11/Phenoline 305 Finish
2. TYPE SUBSTRATE Certified ASTM A36 Steel SIZE 2" x 4" x 1/4"
3. SURFACE PREPARATION (describe) Sandblasted to SSPC-SP10-63 with a 1-3 mils blast profile.
4. PRODUCT DATA: SAMPLE NO.(s) S6-105, S6-108, S6-110, S6-112
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
1c	Carbo Zinc	11	7M5123M 7L0980Z	Spray	74°/42%	S6-105).0019/.0018	3-7-78
						S6-108).0019/.0017	
						S6-110).0029/.0029	
						S6-112).0026/.0025	
1c	Phenoline	305 Finish	7L2908M 7L2894M	Spray	70°/40%	S6-105).0038/.0034	4-18-
						S6-108).0035/.0035	
						S6-110).0016/.0015	
						S6-112).0018/.0015	

5. CURING CONDITIONS: AMBIENT TEMP Primer 60-79 °F REL. HUMIDITY Primer 35-86%  
71-78  
 MINIMUM CURE Primer 42 DAYS  
20
6. TEST PROCEDURE ORNL Master Analytical Manual Method No. 2 0922
7. TESTING PERFORMED BY Analytical Chemistry Div. DATE SUBMITTED 5-8-78  
Oak Ridge National Laboratory


TEST REPORT NO. 01629

## carboline

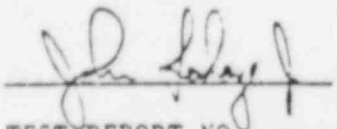
## DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED Carbo Zinc 11/Phenoline 305 Finish
2. TYPE SUBSTRATE Certified ASTM A36 Steel SIZE 2" x 4" x 1/4"
3. SURFACE PREPARATION (describe) Grit blasted to SSPC-SP10-63 with a 1-3 mil blast profile.
4. PRODUCT DATA: SAMPLE NO.(s) S6-115, S6-116
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
1c	Carbo Zinc	11	7M5123M 7L0980Z	Spray	74°/42%	S6-115).0020/.0018 S6-116).0022/.0021	3-7-
1c	Phenoline	305 Finish	7L2908M 7L2894M	Spray	70°/40%	S6-115).0025/.0023 S6-116).0026/.0023	4-18-

5. CURING CONDITIONS: AMBIENT TEMP Primer 60-79  
71-78 °F REL. HUMIDITY Primer 35-86%  
33-56%
- MINIMUM CURE Primer 42 DAYS  
20
6. TEST PROCEDURE ORNL Master Analytical Manual Method No. 2 0922
7. TESTING PERFORMED BY Analytical Chemistry Div. DATE SUBMITTED 5-8-78  
Oak Ridge National Laboratory

  
TEST REPORT NO. 01629

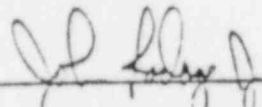
DBA AND RADIATION TOLERANCE

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED Carbo Zinc 11/Phenoline 305 Finish
2. TYPE SUBSTRATE Certified ASTM A36 Steel SIZE 2" x 4" x 1/4"
3. SURFACE PREPARATION (describe) Shot blasted to SSPC-SP10-63 with a 1-3 mil blast profile
4. PRODUCT DATA: SAMPLE NO.(s) S6-119, S6-120
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
1c	Carbo Zinc	11	7M5123M 7L0980Z	Spray	74°/42%	S6-119).0024/.0022 S6-120).0021/.0023	3-7-
1c	Phenoline	305 Finish	7L2908M 7L2894M	Spray	70°/40%	S6-119).0023/.0022 S6-120).0025/.0026	4-18-

5. CURING CONDITIONS: AMBIENT TEMP Primer 60-79  
71-78 °F REL. HUMIDITY Primer 35-86%  
33-56%
- MINIMUM CURE Primer 42  
20 DAYS
6. TEST PROCEDURE ORNL Master Analytical Manual Method No. 2 0922
7. TESTING PERFORMED BY Analytical Chemistry Div. DATE SUBMITTED 5-8-78  
Oak Ridge National Laboratory

  
TEST REPORT NO. 01629

DEA TEST RESULTS

Test Report No. SR. 105

Manufacturer: Carboline  
St. Louis, MO

Analytical Chemistry Division  
Oak Ridge National Laboratory  
Date: Aug. 16, 1978

System Identification: x Steel        Concrete Block

CZ11/305 Finish

DBA Test Results:

ORNL Master Analytical Manual Method No. 2 0922;

ORNL Log Book No. A 7562; A7-17-8

<u>Sample No.</u>	<u>DBA Phase</u>	<u>Comments**</u>
<u>S6-105</u>	<u>spray</u>	<u>(SA) Few blisters, #6, sides A, B.</u>
<u>S6-108</u>	<u>spray</u>	<u>(SA) Side A: few blisters, #6, Side B: coatings</u> <u>intact, no defects.</u>
<u>S6-110</u>	<u>spray</u>	<u>(SA) Coatings intact, no defects, sides A, B.</u>
<u>S6-112</u>	<u>spray</u>	<u>(SA) Coatings intact, no defects, sides A, B.</u>
<u>S6-115</u>	<u>spray</u>	<u>(GR) Coatings intact, no defects, sides A, B.</u>
<u>S6-116</u>	<u>spray</u>	<u>(GR) Coatings intact, no defects, sides A, B.</u>
<u>S6-119</u>	<u>spray</u>	<u>(SH) Coatings intact, no defects, sides A, B.</u>
<u>S6-120</u>	<u>spray</u>	<u>(SH) Coatings intact, no defects, sides A, B.</u>
<u>      </u>	<u>      </u>	<u>      </u>
<u>      </u>	<u>      </u>	<u>      </u>
<u>      </u>	<u>      </u>	<u>      </u>

\*Irradiated.

\*\* (SA) = sand blast; (SH) = shot blast; (GR) = grit blast.

Evaluated

J. J. Gellera

Approved

L. T. Phillips

RADIATION TOLERANCE TEST RESULTS

Test Report No. SR. 105



DECONTAMINATION TEST

TEST PANEL PREPARATION DATA

Test Report No. SR. 105

DECONTAMINATION TEST

BECHTEL CF-952 AND A.N.S.I. N-5.12

TEST PANEL PREPARATION DATA

1. PRODUCT TO BE TESTED Phenoline 305 Finish
2. TYPE SUBSTRATE Steel SIZE 2" x 4" x 1/4"
3. SURFACE PREPARATION (describe) Sandblasted to SSPC-SF10-63
4. PRODUCT DATA: SAMPLE NO. (s) 810

<u>COAT</u>	<u>PRODUCT</u>	<u>PRODUCT CODES</u>	<u>BATCH #</u>	<u>APPLICATION METHOD</u>	<u>CONDITIONS R/M(°F)%R.H.</u>	<u>THICKNESS (ins.)</u>	<u>DATE APPLIED</u>
1c	Carbo Zinc	11	5J5818M XAS094M	Spray	75°/35%	.002/.0025	3-30-76
2c	Phenoline	305	5H3189M 5H3271M	Spray	70°/35%	.004/.0045	4-2-76

5. \* CURING CONDITIONS: AMBIENT TEMP. 65 to 77 °F REL. HUMIDITY 30 to 70 %  
MINIMUM CURE 21 DAYS

6. TEST PROCEDURE ORNL Master Analytical Manual Method No. 2 0920
7. TESTING PERFORM BY Oak Ridge National Laboratory DATE SUBMITTED 4-23-76

\*Primer: 75°F 35% 72 Hours

TEST REPORT NO. SR-81

DECONTAMINATION TEST RESULTS

Test Report No. SR. 105

Manufacturer: Carboline

Analytical Chemistry Division <sup>Page 17</sup>  
Oak Ridge National Laboratory  
Date: June 15, 1976

Decontamination Test Results:

These tests performed according to ORNL Master Analytical Manual  
Method No. 2 0920 and Bechtel Corp. Spec. CP-952.

ORNL Log Book No. A 7562; 4-23-6

Sample Number	Contaminant	Decontamination Factor (DF)				Percent of Total Activity Removed <sup>1</sup>
		Water @25°C	Acid @25°C	Acid @80°C	Overall	
810	Ce-144	5.9	10	>24	>1500	
CZ-11/	Ru-105	16	1.7	1.7	44	
305	Cs-137	>420	6.2	2.2	>6500	
	Zr-95	3.6	13	2.0	94	
	TOTAL	9.6	5.1	2.2	110	99.1

<sup>1</sup>Percent of total activity removed =  $(1 - \frac{1}{DF}) \times 100$ .

Approved *L. T. [Signature]*

PHYSICAL PROPERTIES

Test Report No. SR. 105

**carboline**PHYSICAL PROPERTIESBECHTEL CP-954 AND A.N.S.I. N-5.12

1. PRODUCT TESTED Carbo Zinc 11/ Phenoline 305 Finish
2. TYPE SUBSTRATE Taber Abrasion Panels
3. SURFACE PREPARATION (describe) None
4. PRODUCT DATA: SAMPLE NOS. 700, 859, 860

<u>COAT</u>	<u>PRODUCT</u>	<u>PRODUCT CODES</u>	<u>BATCH #</u>	<u>APPLICATION METHOD</u>	<u>CONDITIONS R/M(°F)%R.H.</u>	<u>THICKNESS (ins.)</u>	<u>DATE APPLIED</u>
1c	Carbo Zinc	11	5J5818M XA5094M	Spray	75°/30%	.003	----
1c	Phenoline	305 Finish	5B4841 4M1578	Spray	75°/35%	.004	6/14/76

5. CURING DATA:
- AMBIENT TEMP. 75 °F REL. HUM. 35 % MIN. CURE TIME 7 Day

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

7. TEST RESULTS:

- \* 7.1 ABRASION: Federal Test Method Standard 141 Test Method 6192,  
1000 cycles with a CS-17 wheel and a 1000 gram load.

LOW - 64.9 mg. HIGH - 65.9 mg. AVERAGE - 65.4 mg.

- 7.2 ADHESION: Determined by use of the ELCOMETER ADHESION TESTER

AVERAGE OF 5 TESTS \_\_\_\_\_ psi

DESCRIBE FAILURE \_\_\_\_\_

- 7.3 DIRECT-IMPACT RESISTANCE:

Approved: \_\_\_\_\_

PHYSICAL PROPERTIESBECHTEL CP-954 AND A.N.S.I. N-5.12

1. PRODUCT TESTED Carbozinc 11/ Phenoline 305
2. TYPE SUBSTRATE Sand blasted steel
3. SURFACE PREPARATION (describe) SSPC - SP 5-63
4. PRODUCT DATA: SAMPLE NOS. 679, 684, 683, 680, 711

<u>COAT</u>	<u>PRODUCT</u>	<u>PRODUCT CODES</u>	<u>BATCH #</u>	<u>APPLICATION METHOD</u>	<u>CONDITIONS R/M(°F)R.H.</u>	<u>THICKNESS (ins.)</u>	<u>DATE APPLIED</u>
1c	Carbozinc	11	5J5818 XA5094	Spray	70°/40%	.0021	12/10/75
1c	Phenoline 305		--	Spray	--	.0059	--

5. CURING DATA:

AMBIENT TEMP. 75° °F REL. HUM. -- % MIN. CURE TIME 5 months

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

7. TEST RESULTS:

7.1 ABRASION: Federal Test Method Standard 141 Test Method 6192,  
1000 cycles with a CS-17 wheel and a 1000 gram load.

LOW - HIGH - AVERAGE -

\* 7.2 ADHESION: Determined by use of the ELCOMETER ADHESION TESTER

AVERAGE OF 5 TESTS 690 psi

DESCRIBE FAILURE Cohesive failure of primer

7.3 DIRECT-IMPACT RESISTANCE:

Approved: \_\_\_\_\_

# carboline

## PHYSICAL PROPERTIES

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

1. PRODUCT TESTED Carbozinc 11/ Phenoline 305
2. TYPE SUBSTRATE Grit blasted steel
3. SURFACE PREPARATION (describe) SSPC - SP 5-63
4. PRODUCT DATA: SAMPLE NOS. 710, 707, 708, 709, 706

<u>COAT</u>	<u>PRODUCT</u>	<u>PRODUCT CODES</u>	<u>BATCH #</u>	<u>APPLICATION METHOD</u>	<u>CONDITIONS R/M(°F)±R.H.</u>	<u>THICKNESS (ins.)</u>	<u>DATE APPLIED</u>
1c	Carbozinc	11	5J5818 XA5094	Spray	70°/40%	.0022	12/10/75
1c	Phenoline	305	--	Spray	--	.0071	--

5. CURING DATA:  
AMBIENT TEMP. 75 °F REL. HUM. -- % MIN. CURE TIME 5 months

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

7. TEST RESULTS:

- 7.1 ABRASION: Federal Test Method Standard 141 Test Method 6192,  
1000 cycles with a CS-17 wheel and a 1000 gram load.

LOW -

HIGH -

AVERAGE -

- \* 7.2 ADHESION: Determined by use of the ELCOMETER ADHESION TESTER

AVERAGE OF 5 TESTS 640 psi

DESCRIBE FAILURE Cohesion of primer failure with some glue  
and topcoat adhesion failure

- 7.3 DIRECT-IMPACT RESISTANCE:

# carboline

## PHYSICAL PROPERTIES

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

1. PRODUCT TESTED Carbozinc 11/Phenoline 305
2. TYPE SUBSTRATE Shot blasted steel
3. SURFACE PREPARATION (describe) SSPC - SP 5-63
4. PRODUCT DATA: SAMPLE NOS. 701, 702, 703, 704, 705

<u>COAT</u>	<u>PRODUCT</u>	<u>PRODUCT CODES</u>	<u>BATCH #</u>	<u>APPLICATION METHOD</u>	<u>CONDITIONS R/M(°F)%R.H.</u>	<u>THICKNESS (ins.)</u>	<u>DATE APPLIED</u>
1c	Carbozinc	11	5J5818 XA5094	Spray	70°/30%	.0022	12/9/75
1c	Phenoline	305	--	Spray	--	.0064	--

5. CURING DATA:  
AMBIENT TEMP. 75 °F REL. HUM. -- % MIN. CURE TIME 5 months

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

7. TEST RESULTS:

7.1 ABRASION: Federal Test Method Standard 141 Test Method 6192,  
1000 cycles with a CS-17 wheel and a 1000 gram load.

LOW - HIGH - AVERAGE -

- \* 7.2 ADHESION: Determined by use of the ELCOMETER ADHESION TESTER

AVERAGE OF 5 TESTS 620 psi

DESCRIBE FAILURE Cohesion of primer failure

- 7.3 DIRECT-IMPACT RESISTANCE:

# carboline

## PHYSICAL PROPERTIES

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

1. PRODUCT TESTED Carbo Zinc 11/Phenoline 305
2. TYPE SUBSTRATE Steel Pipe, 60.3mm OD by 406mm long
3. SURFACE PREPARATION (describe) SSPC-SP5-63
4. PRODUCT DATA: SAMPLE NOS. p. 43, p. 44, p. 45, p. 46, p. 47, p. 48, p. 49

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)R.H.	THICKNESS (ins.)	DATE APPLIED
1c	Carbo Zinc	11	5J5818M XA5094M	Spray	70°F/70%	.003-.006	5/26
1c	Phenoline	305	5B4841 4M1578	Spray	80°F/40%	.004	5/27

5. CURING DATA:  
AMBIENT TEMP. 75 °F REL. HUM. 70 % MIN. CURE TIME 3-4 days

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

7. TEST RESULTS:

7.1 ABRASION: Federal Test Method Standard 141 Test Method 6192,  
1000 cycles with a CS-17 wheel and a 1000 gram load.

LOW -

HIGH -

AVERAGE -

7.2 ADHESION: Determined by use of the ELCOMETER ADHESION TESTER

AVERAGE OF 5 TESTS \_\_\_\_\_ psi

DESCRIBE FAILURE \_\_\_\_\_

- \* 7.3 DIRECT-IMPACT RESISTANCE: (100 inch-pounds) Topcoat delamination and  
primer splitting at and adjacent to area of  
impact (7mm diameter circle).

Approved: \_\_\_\_\_

CHEMICAL EXPOSURE TEST

PANEL PREPARATION AND INDIVIDUAL

CHEMICAL RESISTANCE TEST RESULTS

Test Report No. SR. 105

# CHEMICAL RESISTANCE TEST RESULTS

BECHTEL CP-953 and A.N.S.I. N-5.12

1. TYPE SUBSTRATE: SIZE 2" X 4" CONCRETE        STEEL X OTHER
2. SURFACE PREPARATION (describe): Grit blasted to SSPC-SP5-63

3. PRODUCT TESTED: Carbo Zinc 11 SAMPLE NO.: 690  
Phenoline 305

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M (°F) & R.H.	THICKNESS (ins.)	DATE APPLIED
1c	CarboZinc	11	5J5818 XA5094	Spray	70°/40%RH	.0022	12/10/76
1c	Phenoline 305		5H3819M	Spray	75°F/45%RH	.0043	

4. CURING CONDITIONS:

AMBIENT TEMP. (°F)	% REL. HUMIDITY	LENGTH OF CURE
100°	100%	
100°	100%	
75°	40%	4 months

5. TYPE OF TEST:

CHEMICAL EXPOSURE TEST PER BECHTEL CP-953 and A.N.S.I. N-5-12

6. TEST TEMPERATURE: AMBIENT 75 °F SOLUTION 75 °F
7. CHEMICAL SOLUTION (pH and Concentration): 5% Nitric Acid (pH=0.8)
8. TEST OBSERVATIONS: DATE STARTED 4/26/76  
OOT 4/30/76

ACCEPTANCE CRITERIA	CHEMICAL EXPOSURE RESULTS				
	1 DAY	2 DAYS	3 DAYS	4 DAYS	5 DAYS
8.1 FLAKING/PEELING	NE	NE	NE		
8.2 DELAMINATION	NE	NE	NE		
8.3 BLISTERING	NE	#8D-B in VP @ E	#8D-B in VP @ E		
8.4 OTHER EFFECTS	NE	SL.CD. in LP	SL.CD. in LP		

RESULTS REVIEWED BY P. D. Fisher

CHEMICAL RESISTANCE TEST RESULTSBECHTEL CP-953 and A.N.S.I. N-5.12

1. TYPE SUBSTRATE: SIZE 2" X 4" CONCRETE \_\_\_\_\_ STEEL X OTHER \_\_\_\_\_
2. SURFACE PREPARATION (describe): Grit blasted to SSPC-SP5-63

3. PRODUCT TESTED: Carbo Zinc 11 SAMPLE NO.: 691  
Phenoline 305

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/T (°F) & R.H.	THICKNESS (ins.)	DATE APPLIED
1c	Carbo Zinc	11	5J5818 XA5094	Spray	70°F/40%RH	.0025	12/1/76
1c	Phenoline	305	5H3189M 3271M	Spray	75°F/45%RH	.0030	

4. CURING CONDITIONS:

AMBIENT TEMP. (°F)	% REL. HUMIDITY	LENGTH OF CURE
100°	100%	4 months
100°	100%	
75°	40%	

5. TYPE OF TEST:

CHEMICAL EXPOSURE TEST PER BECHTEL CP-953 and A.N.S.I. N-5-12

6. TEST TEMPERATURE: AMBIENT 75 °F SOLUTION 75 °F
7. CHEMICAL SOLUTION (pH and Concentration): 5% Sulfuric Acid (pH=1.3)
8. TEST OBSERVATIONS: DATE STARTED 4/26/76

ACCEPTANCE CRITERIA	CHEMICAL EXPOSURE RESULTS				
	1 DAY	2 DAYS	3 DAYS	4 DAYS	5 DAYS
8.1 FLAKING/PEELING	NE	NE	NE	NE	NE
8.2 DELAMINATION	NE	NE	NE	NE	NE
8.3 BLISTERING	NE	NE	NE	NE	NE
8.4 OTHER EFFECTS	NE	NE	NE	NE	NE

RESULTS REVIEWED BY P. D. Fisher

CHEMICAL RESISTANCE TEST RESULTSBECHTEL CP-953 and A.N.S.I. N-5.12

1. TYPE SUBSTRATE: SIZE 2" X 4" CONCRETE STEEL X OTHER
2. SURFACE PREPARATION (describe): Grit blasted to SSPC-SP5-63

3. PRODUCT TESTED: Carbo Zinc 11 SAMPLE NO.: 692  
Phenoline 305

<u>COAT</u>	<u>PRODUCT</u>	<u>PRODUCT CODES</u>	<u>BATCH #</u>	<u>APPLICATION METHOD</u>	<u>CONDITIONS R/M(°F)&amp;R.H.</u>	<u>THICKNESS (ins.)</u>	<u>DATE APPLIED</u>
1c	Carbo Zinc	11	5J5818 XA5094	Spray	70°/30%	.002	12/19/7
1c	Phenoline	305	5H3189M 3271M	Spray	75°/45%	.0035	

4. CURING CONDITIONS:

<u>AMBIENT TEMP. (°F)</u>	<u>% REL. HUMIDITY</u>	<u>LENGTH OF CURE</u>
100°	100%	8 days
70°	40%	

5. TYPE OF TEST:

CHEMICAL EXPOSURE TEST PER BECHTEL CP-953 and A.N.S.I. N-5-12

6. TEST TEMPERATURE: AMBIENT 75 °F SOLUTION 75 °F
7. CHEMICAL SOLUTION (pH and Concentration): 5% Hydrazine (pH=9.6)
8. TEST OBSERVATIONS: DATE STARTED 4/26/76

ACCEPTANCE CRITERIA	CHEMICAL EXPOSURE RESULTS				
	1 DAY	2 DAYS	3 DAYS	4 DAYS	5 DAYS
8.1 FLAKING/PEELING	NE	NE	NE	NE	NE
8.2 DELAMINATION	NE	NE	NE	NE	NE
8.3 BLISTERING	NE	NE	NE	NE	NE
8.4 OTHER EFFECTS	NE	NE	NE	NE	NE

RESULTS REVIEWED BY P.D. Fisher

# CHEMICAL RESISTANCE TEST RESULTS

Page 28

BECHTEL CP-953 and A.N.S.I. N-5.12

1. TYPE SUBSTRATE: SIZE 2" X 4" CONCRETE STEEL y OTHER \_\_\_\_\_

2. SURFACE PREPARATION (describe): Grit blasted to SSPC-SP5-63

3. PRODUCT TESTED: Carbo Zinc 11 SAMPLE NO.: 493  
Phenoline 305

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/°(°F) & R.H.	THICKNESS (ins.)	DATE APPLIED
1c	Carbo Zinc	11	5J5818 XA5094	Spray	70°/40%	.0022	12/10/7
1c	Phenoline	305	5H3189M 327LM	Spray	75°/45%	.0040	--

4. CURING CONDITIONS:

AMBIENT TEMP. (°F)	% REL. HUMIDITY	LENGTH OF CURE
100°	100%	
70°	40%	8 days
75°	40%	4 months

5. TYPE OF TEST:

CHEMICAL EXPOSURE TEST PER BECHTEL CP-953 and A.N.S.I. N-5-12

6. TEST TEMPERATURE: AMBIENT 75 °F SOLUTION 75 °F

7. CHEMICAL SOLUTION (pH and Concentration): 5% Sodium Hydroxide (pH=13.1)

8. TEST OBSERVATIONS: DATE STARTED 4/26/76

ACCEPTANCE CRITERIA	CHEMICAL EXPOSURE RESULTS				
	1 DAY	2 DAYS	3 DAYS	4 DAYS	5 DAYS
8.1 FLAKING/PEELING	NE	NE	NE	NE	NE
8.2 DELAMINATION	NE	NE	NE	NE	NE
8.3 BLISTERING	NE	NE	NE	NE	NE
8.4 OTHER EFFECTS	NE	NE	NE	NE	NE

RESULTS REVIEWED BY P. D. Fisher

## CHEMICAL RESISTANCE TEST RESULTS

Page 29

BECHTEL CP-953 and A.N.S.I. N-5.12

1. TYPE SUBSTRATE: SIZE 2" X 4" CONCRETE \_\_\_\_\_ STEEL X OTHER \_\_\_\_\_
2. SURFACE PREPARATION (describe): Grit blasted to SSPC-SP5-63
3. PRODUCT TESTED: Carbo Zinc 11 SAMPLE NO.687  
Phenoline 305

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)&R.H.	THICKNESS (ins.)	DATE APPLIED
1c	Carbo Zinc 11		5J5818 XA5094	Spray	70°/40%	.0630	12/10/75
1c	Phenoline 305		5H3189M 5H3271M	Spray	75°/45%	.0635	

4. CURING CONDITIONS:

AMBIENT TEMP. (°F)	% REL. HUMIDITY	LENGTH OF CURE
100°	100%	
70°	40%	8 days
75°	40%	4 months

5. TYPE OF TEST:

CHEMICAL EXPOSURE TEST PER BECHTEL CP-953 and A.N.S.I. N-5-12

6. TEST TEMPERATURE: AMBIENT \_\_\_\_\_ 75 °F SOLUTION \_\_\_\_\_ 75 °F
7. CHEMICAL SOLUTION (pH and Concentration): 5% Ammonium Hydroxide (pH=11.3)
8. TEST OBSERVATIONS: DATE STARTED 4/26/76

ACCEPTANCE CRITERIA	CHEMICAL EXPOSURE RESULTS				
	1 DAY	2 DAYS	3 DAYS	4 DAYS	5 DAYS
8.1 FLAKING/PEELING	NE	NE	NE	NE	NE
8.2 DELAMINATION	NE	NE	NE	NE	NE
8.3 BLISTERING	NE	NE	NE	NE	NE
8.4 OTHER EFFECTS	NE	NE	Edge chipped in handling	NE	NE

RESULTS REVIEWED BY P. D. Fisher

TEST.42276

TEST REPORT NO.

68261

# CHEMICAL RESISTANCE TEST RESULTS

Page 30

BECHTEL CP-953 and A.N.S.I. N-5.12

1. TYPE SUBSTRATE: SIZE 2" x 4" CONCRETE STEEL X OTHER
2. SURFACE PREPARATION (describe): Grit blasted to SSPC-PC 5-63

3. PRODUCT TESTED: Carbo Zinc 11 SAMPLE NO.: 696  
Phenoline 305

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/1" (°F) & R.H.	THICKNESS (ins.)	DATE APPLIED
1c	Carbo Zinc	11	5J5818 XA5098	Spray	70° 30%	.002	12/19/7
1c	Phenoline	305	5H3189M 3271M	Spray	75° 45%	.004	

4. CURING CONDITIONS:

AMBIENT TEMP. (°F)	% REL. HUMIDITY	LENGTH OF CURE
100°	100%	
70°	40%	8 Days
75°	40%	4 Months

5. TYPE OF TEST:

CHEMICAL EXPOSURE TEST PER BECHTEL CP-953 and A.N.S.I. N-5-12

6. TEST TEMPERATURE: AMBIENT 75 °F SOLUTION 75 °F
7. CHEMICAL SOLUTION (pH and Concentration): 5% Solution Borate (pH = 11.4)
8. TEST OBSERVATIONS: DATE STARTED 04/26/76

ACCEPTANCE CRITERIA	CHEMICAL EXPOSURE RESULTS				
	1 DAY	2 DAYS	3 DAYS	4 DAYS	5 DAYS
8.1 FLAKING/PEELING	NE	NE	NE	NE	NE
8.2 DELAMINATION	NE	NE	NE	NE	NE
8.3 BLISTERING	NE	NE	NE	NE	NE
8.4 OTHER EFFECTS	NE	NE	NE	NE	NE

RESULTS REVIEWED BY P. D. Fisher

CHEMICAL RESISTANCE TEST RESULTSBECHTEL CP-953 and A.N.S.I. N-5.12

1. TYPE SUBSTRATE: SIZE 2"x4" CONCRETE STEEL X OTHER
2. SURFACE PREPARATION (describe): Grit blasted to SSPC-SP5-63

3. PRODUCT TESTED: Carbo Zinc 11 SAMPLE NO.: 689  
Phenoline 305

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)%R.H.	THICKNESS (ins.)	DATE APPLIED
1c	Carbo Zinc 11		5J5818 XAS094	Spray	70°/40%	.0021	12/10/75
1c	Phenoline 305		5H3189M 3271M	Spray	75°/45%	.0036	--

4. CURING CONDITIONS:

<u>AMBIENT TEMP. (°F)</u>	<u>% REL. HUMIDITY</u>	<u>LENGTH OF CURE</u>
100°	100%	--
70°	40%	8 days
75°	40%	4 months

5. TYPE OF TEST:

CHEMICAL EXPOSURE TEST PER BECHTEL CP-953 and A.N.S.I. N-5-12

6. TEST TEMPERATURE: AMBIENT 75 °F SOLUTION 75 °F
7. CHEMICAL SOLUTION (pH and Concentration): 0.5M Sodium Fluoride (pH = 7.6)
8. TEST OBSERVATIONS: DATE STARTED 4/26/76

ACCEPTANCE CRITERIA	CHEMICAL EXPOSURE RESULTS				
	1 DAY	2 DAYS	3 DAYS	4 DAYS	5 DAYS
8.1 FLAKING/PEELING	NE	NE	NE	NE	NE
8.2 DELAMINATION	NE	NE	NE	NE	NE
8.3 BLISTERING	NE	NE	NE	NE	NE
8.4 OTHER EFFECTS	NE	NE	NE	NE	NE

RESULTS REVIEWED BY P. D. Fisher

## BECHTEL CP-953 and A.N.S.I. N-5.12

1. TYPE SUBSTRATE: SIZE 7"x4" CONCRETE        STEEL X OTHER
2. SURFACE PREPARATION (describe): Grit blasted to SSPC-SP 5-63

3. PRODUCT TESTED: Carbo Zinc 11 SAMPLE NO.: 695  
Phenoline 305

COAT	PRODUCT	PRODUCT		APPLICATION CONDITIONS		THICKNESS (ins.)	DATE APPLIED
		CODES	BATCH #	METHOD	R/P(°F)&R.H.		
1c	Carbo Zinc 11		5J5818 XA5094	Spray	70°/40%	.002	12/10/75
1c	Phenoline 305		5H3184M 3271M	Spray	75°/45%	.004	

4. CURING CONDITIONS:

AMBIENT TEMP. (°F)	% REL. HUMIDITY	LENGTH OF CURE
100°	100%	
70°	40%	8 days
75°	40%	4 months

5. TYPE OF TEST:

CHEMICAL EXPOSURE TEST PER BECHTEL CP-953 and A.N.S.I. N-5-12

6. TEST TEMPERATURE: AMBIENT 75 °F SOLUTION 75 °F
7. CHEMICAL SOLUTION (pH and Concentration): 5% Citric Acid (pH=2.6)
8. TEST OBSERVATIONS: DATE STARTED 4/26/76

ACCEPTANCE CRITERIA	CHEMICAL EXPOSURE RESULTS				
	1 DAY	2 DAYS	3 DAYS	4 DAYS	5 DAYS
8.1 FLAKING/PEELING	NE	NE	NE	NE	NE
8.2 DELAMINATION	NE	NE	NE	NE	NE
8.3 BLISTERING	NE	NE	NE	NE	NE
8.4 OTHER EFFECTS	NE	NE	NE	NE	NE

RESULTS REVIEWED BY

# CHEMICAL RESISTANCE TEST RESULTS

Page 33

BECHTEL CP-953 and A.N.S.I. N-5.12

1. TYPE SUBSTRATE: SIZE 2" X 4" CONCRETE STEEL X OTHER
2. SURFACE PREPARATION (describe): Grit blasted SSPC-SP5-63

3. PRODUCT TESTED: Carbo Zinc 11 SAMPLE NO.: 688  
Phenoline 305

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/°(°F) & R.H.	THICKNESS (ins.)	DATE APPLIED
1c	Carbo Zinc	11	5J5818 XA5094	Spray	70°/40%	.003	12/10/75
1c	Phenoline	305	5H3189M 5H3271M	Spray	75°/45%	.003	--

4. CURING CONDITIONS:

AMBIENT TEMP. (°F)	% REL. HUMIDITY	LENGTH OF CURE
100°	100%	--
70°	40%	8 days
75°	40%	4 months

5. TYPE OF TEST:

CHEMICAL EXPOSURE TEST PER BECHTEL CP-953 and A.N.S.I. N-5-12

6. TEST TEMPERATURE: AMBIENT 75 °F SOLUTION 75 °F
7. CHEMICAL SOLUTION (pH and Concentration): 5% Di-Sodium Phosphate
8. TEST OBSERVATIONS: DATE STARTED 4/26/76

ACCEPTANCE CRITERIA	CHEMICAL EXPOSURE RESULTS				
	1 DAY	2 DAYS	3 DAYS	4 DAYS	5 DAYS
8.1 FLAKING/PEELING	NE	NE	NE	NE	NE
8.2 DELAMINATION	NE	NE	NE	NE	NE
8.3 BLISTERING	NE	NE	NE	NE	NE
8.4 OTHER EFFECTS	NE	NE	NE	NE	NE

RESULTS REVIEWED BY P. D. Fisher

# CHEMICAL RESISTANCE TEST RESULTS

Page 34

BECHTEL CP-953 and A.N.S.I. N-5.12

1. TYPE SUBSTRATE: SIZE 2" X 4" CONCRETE STEEL X OTHER
2. SURFACE PREPARATION (describe): Grit blasted to SSPC-SP5-63

3. PRODUCT TESTED: Carbo Zinc 11 SAMPLE NO.: 694  
Phenoline 305

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/T(°F) & R.H.	THICKNESS (ins.)	DATE APPLIED
1c	Carbo Zinc	11	5J5818 XA5094	Spray	70°/40%	.002	12/10/76
1c	Phenoline	305	5H3189M 5H3271M	Spray	75°/45%	.004	—

4. CURING CONDITIONS:

AMBIENT TEMP. (°F)	% REL. HUMIDITY	LENGTH OF CURE
100°	100%	--
70°	40%	8 days
75°	40%	4 months

5. TYPE OF TEST:

CHEMICAL EXPOSURE TEST PER BECHTEL CP-953 and A.N.S.I. N-5-12

6. TEST TEMPERATURE: AMBIENT 75 °F SOLUTION 75 °F
7. CHEMICAL SOLUTION (pH and Concentration): 0.3M Hydrogen Peroxide
8. TEST OBSERVATIONS: DATE STARTED 4/26/76

ACCEPTANCE CRITERIA	CHEMICAL EXPOSURE RESULTS				
	1 DAY	2 DAYS	3 DAYS	4 DAYS	5 DAYS
8.1 FLAKING/PEELING	NE	NE	NE	NE	NE
8.2 DELAMINATION	NE	NE	NE	NE	NE
8.3 BLISTERING	NE	NE	NE	NE	NE
8.4 OTHER EFFECTS	NE	NE	NE	NE	NE

RESULTS REVIEWED BY P. D. Fisher

# CHEMICAL RESISTANCE TEST RESULTS

Page 35

BECHTEL CP-953 and A.N.S.I. N-5.12

1. TYPE SUBSTRATE: SIZE 2"x4" CONCRETE            STEEL X OTHER
2. SURFACE PREPARATION (describe): Grit blasted to SSPC-SP5-63

3. PRODUCT TESTED: Carbo Zinc 11 SAMPLE NO.: 697  
Phenoline 305

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)&R.H.	THICKNESS (ins.)	DATE APPLIED
1c	Carbo Zinc 11		5J5818	Spray	70°/40%	.0025	12/10/7
1c	Phenoline 305		5H3189M 3271M	Spray	75°/45%	.0035	--

4. CURING CONDITIONS:

<u>AMBIENT TEMP. (°F)</u>	<u>% REL. HUMIDITY</u>	<u>LENGTH OF CURE</u>
100°	100%	8 days
70°	40%	4 months
75°	40%	

5. TYPE OF TEST:

CHEMICAL EXPOSURE TEST PER BECHTEL CP-953 and A.N.S.I. N-5-12

6. TEST TEMPERATURE: AMBIENT 75 °F SOLUTION 75 °F

7. CHEMICAL SOLUTION (pH and Concentration): 0.3M Potassium Permanganate

8. TEST OBSERVATIONS: DATE STARTED 4/26/76

ACCEPTANCE CRITERIA	CHEMICAL EXPOSURE RESULTS				
	1 DAY	2 DAYS	3 DAYS	4 DAYS	5 DAYS
8.1 FLAKING/PEELING	NE	NE	SA in LP	SA (CK) in LP	SA in Liquid Phase
8.2 DELAMINATION	NE	NE	SA in LP	NE	NE
8.3 BLISTERING	NE	NE	SA in LP	NE	NE
8.4 OTHER EFFECTS	Sev. CD in LP	Sev. CD in LP	Sev. CD in LP	Sev. CD in LP	Sev. CD in LP

RESULTS REVIEWED BY                                 

TEST. 42276.

TEST REPORT NO.

# CHEMICAL RESISTANCE TEST RESULTS

Page 36

BECHTEL CP-953 and A.N.S.I. N-5.12

1. TYPE SUBSTRATE: SIZE 2"x4" CONCRETE STEEL X OTHER
2. SURFACE PREPARATION (describe): Grit blasted to SSPC-SP5-63

3. PRODUCT TESTED: Carbo Zinc 11  
Phenoline 305 SAMPLE NO.: 699

COAT	PRODUCT	PRODUCT CODES	BATCH #	APPLICATION METHOD	CONDITIONS R/M(°F)&R.H.	THICKNESS (ins.)	DATE APPLIED
1c	Carbo Zinc	11	5J5818 XA5094	Spray	70°/40%	.0022	12/10/76
1c	Phenoline	305	5H3189M 3271M	Spray	75°/45%	.0045	

4. CURING CONDITIONS:

<u>AMBIENT TEMP. (°F)</u>	<u>% REL. HUMIDITY</u>	<u>LENGTH OF CURE</u>
100°	100%	
70°	40%	8 days
75°	40%	4 months

5. TYPE OF TEST:

CHEMICAL EXPOSURE TEST PER BECHTEL CP-953 and A.N.S.I. N-5-12

6. TEST TEMPERATURE: AMBIENT 75 °F SOLUTION 75 °F
7. CHEMICAL SOLUTION (pH and Concentration) 1 lb/gal. Trisodium Phosphate  
(pH = 12.3)
8. TEST OBSERVATIONS: DATE STARTED 4/26/76

ACCEPTANCE CRITERIA	CHEMICAL EXPOSURE RESULTS				
	1 DAY	2 DAYS	3 DAYS	4 DAYS	5 DAYS
8.1 FLAKING/PEELING	NE	NE	NE	NE	NE
8.2 DELAMINATION	NE	NE	NE	NE	NE
8.3 BLISTERING	NE	NE	NE	NE	NE
8.4 OTHER EFFECTS	NE	NE	NE	NE	NE

RESULTS REVIEWED BY \_\_\_\_\_

SUMMARY OF CHEMICAL EXPOSURE RESULTS

Test Report No. SR. 105

**carboline**

BECHTEL CP-951 AND A.N.S.I. N-5-12

## CHEMICAL RESISTANCE TEST RESULTS

COATING SYSTEMS: Carbo Zinc 11/Phenoline 305 Finish

PRODUCT TESTED	5% CITRIC ACID	5% NITRIC ACID	5% HYDRAZINE	5% SULFURIC ACID	0.30 M HYDROGEN PEROXIDE	5% SODIUM HYDROXIDE
Carbo Zinc 11/ Phenoline 305 Finish	Pass	Fail	Pass	Pass	Pass	Pass

PRODUCT TESTED	0.5M SODIUM FLUORIDE	5% SODIUM BORATE	5% AMMONIUM HYDROXIDE	0.30M POTASium PERMANGANATE	1.0#/gal. TRISODIUM PHOSPHATE	5% DISODIUM PHOSPHATE
Carbo Zinc 11/ Phenoline 305 Finish	Pass	Pass	Pass	Fail	Pass	Pass

RESULTS APPROVED \_\_\_\_\_

TEST REPORT NO. SR.-63A

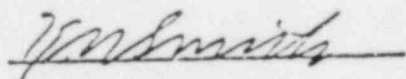
SURFACE BURNING CHARACTERISTICS OF  
NINE COATING SYSTEMS

SUBMITTED BY:

JOHNS-MANVILLE SALES CORPORATION  
RESEARCH & DEVELOPMENT CENTER  
KEN-CARYL RANCH, DENVER, COLORADO 80217

FOR  
CARBOLINE COMPANY


PREPARED BY:



K.H. SMITH

SENIOR RESEARCH ENGINEER

APPROVED BY:



G.R. KINZER

MANAGER, MATERIALS PERFORMANCE

Date August 12, 1977

Title: SURFACE BURNING CHARACTERISTICS OF NINE COATING SYSTEMS

Requested by: Carboline Company

#### SUMMARY

Surface burning characteristics tests, essentially as prescribed by ASTM E84-76a, were conducted on nine coating systems submitted by the Carboline Company, St. Louis, Missouri. Five samples had asbestos-cement board for the substrate and four were prepared over steel sheets.

#### OBJECTIVE

The objective of these tests was to evaluate the surface burning characteristics of nine coating systems. This evaluation was to consist of flame spread, fuel contributed, and smoke developed values.

#### MATERIAL

Nine sets of samples were submitted by the Carboline Company, 350 Hanley Industrial Court, St. Louis, Missouri. Each set consisted of three panels, each 21 x 96 in. Five sets had an asbestos-cement substrate and the other four had the coatings applied to 14 gage steel sheet.

The panels were stored at 70°F and 40 percent relative humidity for ten days prior to testing.

#### TEST METHOD

Each set of panels was tested in the Flame Spread Tunnel essentially as prescribed by ASTM E84. The igniting flame was fueled by methane and 6 cu ft per minute of oxygen were added to the air entering the tunnel.

The tunnel had not been rigorously calibrated, but tests on materials of known fire hazard classification produced good checks.

## RESULTS

The results, along with the descriptions of the coating systems, are presented in the appendix.